LEPROSY IN THE STATE OF MARANHÃO, BRAZIL*

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GEOGRAPHY AND DEMOGRAPHY

Between the Brazilian plateau in the south and the plateau of Guiana in the north there is an immense geosynclinal extending in an east-west direction, of which the Amazon river serves as the axis, limited by the Atlantic and the Andes. It is covered by deep paleozoic sediments, with tertiary formations along the river. On this geosynclinal is the dense and exuberant South American equatorial forest.

The state of Maranhão is situated in a prolongation of the meridional Atlantic border of the geosynclinal, its hinterland extending to the Brazilian plateau. It occupies a part of the northeastern region of Brazil, which is characterized by crystalline rocks of archean type, partly bared and partly covered by table-shaped sediments of variable extent and more or less influenced by meteorological agents. In the southern part of Maranhão such sediments are represented by permean and triassic red gres formations, the erosive materials of which constitute the great sandy alluviums of the valleys of the rivers Pindaré, Grajahú, Mearim and Itapicurú.

The crystalline peneplain is covered by a peculiar flora which becomes most typical in the northeast, where it is called "caatinga." The transitional part of the state between the geosynclinal and the northeastern part is characterized by a vegetable association less xerophile than the caatinga, consisting of grassy prairies with scattered small trees, which is called "cerrado."

Maranhão is situated between about 1° and 10° south of the equator. It is very low in the littoral and slightly elevated in the interior. The altitudes of 65 principal foci of population range between 3 and 295 meters above sea level, 25 percent of them being below 18 meters, 50 percent of the total below 50 meters, and 75 percent below 110 meters; the rest are between that and 295 meters.

*Translated from the Portuguese by Dr. H. C. de Souza-Araujo.

The climate is hot throughout the year, humid in the first six months and dry in the second semester. The annual mean temperature varies between 23.2°C. at Imperatriz city, in the interior, and 27°C. at St. Louis, the capital, in the littoral. The extreme temperatures at St. Louis are 20.6° and 35.1°C. The annual rainfall, based on six years' observations, ranges from 1,571 mm. at St. Louis (133 days) to 2,364 mm. at Caxias (172 days).

Maranhão is cut by many rivers, the majority of which go directly to the Atlantic. These rivers are of great interest in the human geography of the state, having served as natural routes of penetration, and the principal foci of population are situated along them.

The population of the state originated from three sources: the white race, represented by the Portuguese, the red, comprising the native peoples, especially the Guarany tribe, and the black, imported from various parts of Africa. Colonization began about the year 1620, for sugar cultivation. The Indians were employed in this work, but they proved to be unfit for such activity and they declined in numbers at the end of the 17th century, resulting in failure of the industry of the colonial center, St. Louis. That place was founded on an island off the coast of Maranhão. Near it, on the continent, there is an estuary where the agricultural project was established, the pecuary being established in the eastern part of the estuary. Due to the decline of the sugar industry, immigration decreased, and there began a mixture of the whites with the Indians, especially the Guaranys.

In the beginning of the 18th century a new period of economic progress began with the cultivation of cotton and rice, for which Negroes were imported from different regions of Africa. Later on such slaves arrived in Maranhão through the interior of the country, after being disembarked at Bahia. The importation of Negroes lasted until 1860. After 1888 the planting of cotton and rice declined greatly, due to abolition of slavery. The ethnological consequence of the lowered economic situation of the region was the mixture of a great part of the previously mixed people with the Negroes. Since that time the population of the state has been closed to any other new blood mixture.

According to censuses the population of the state has grown as follows:

Years	*Population*
1872.....	360,640
1890.....	480,854
1900.....	499,308
1920.....	874,337

The estimate for December 31, 1936, was 1,190,123 inhabitants. The density of population is 3.4 per square kilometer, the total area being 346,217 sq. km.

A majority of the population lives in the rural zone, under very bad housing conditions, in huts covered with palm leaves. The people are undernourished due to faulty choice of food, not to lack of it. The basis of the diet is inadequate, represented by manihot flour (*Manihot utilissima*, Pohl), which is very insufficient in proteins and vitamins.

The principal endemic diseases of the state are malaria and hookworm disease. Others are ectoparasitoses, beriberi and other tropical diseases like tropical ulcer, leishmaniasis, framboesia, etc.

ORIGIN AND DISSEMINATION OF LEPROSY

As has been said by many other writers, leprosy was unknown among the Amerinds of Brazil. The scourge was introduced into the country by the European colonists and African slaves. At the time of the discovery of America the Iberian peninsula, from whence came most of the colonists, was an active focus of leprosy. It is not known when this disease was introduced into Maranhão, but probably it dates from the beginning of the colonization. Souza Araujo has said (6):

> The appearance of leprosy in the littoral of northern Brazil is contemporary for various states, and dates from the 17th century. The scourge was incremented with the increased importation of African slaves after the beginning of the 18th century.

Historical and epidemiological data show that the first focus of the disease in the state was St. Louis, its first colonial center. From there it spread to the low region (*baixada*) around the capital, and in 1888 that zone was called by Nina Rodrigues (5) "zona leprosa." Afterwards leprosy was carried to the interior. The colonization of the center of the state, by whites and Indians occupied with pecuary, had no importance in the dissemination of the disease.

The first reliable record of the existence of leprosy here is dated 1826. The Provincial Council then informed the Imperial Government of the existence of a large number of persons attacked by leprosy (see Cesar Marques 2).

In 1833 there was inaugurated in St. Louis an asylum where 28 lepers were interned. That number represents an incidence of 0.14 per 1000 of the population (200,000), but of course they constituted only a small part of the total cases in existence. In a monograph published in 1882 by Lourenço de Magalhães (1), we find references to the existence of various endemic foci of leprosy in the valleys of the principal rivers of the state. In 1890 Nina Rodrigues estimated the total number of lepers to be 300, which estimate I consider to be below the actual number for that time.

Between 1922 and 1932, 1,023 cases were recorded from 24 out of the 65 counties of the state. Of this total, 529 were registered in 1922 and 1923 during the first census (Salvio Mendonça, 3). From the records the following biostatistical data can be summarized:

TABLE 1.—*Statistics of cases recorded between 1922 and 1932.*

Sex:	
Male	662
Female	333
	995
Civil state:	
Single	749
Married	195
Widowed	51
	995
Age groups:	
0— 4 years	3
5— 9 years	27
10—14 years	94
15—19 years	100
20—29 years	249
30—39 years	205
40—49 years	162
50—59 years	86
60 and over	69
	995
Type of the disease:	
Nodular	281
Anesthetic	501
Mixed	205
Undetermined	8
	995

LEPROSY CENSUS, 1939-1940

In March, 1939, I was appointed head of the leprosy control service of the State, and immediately started a census of lepers according to the scheme of the Cairo Congress. By June, 1940, I had secured records of 1,000 cases, as analyzed below. These records were obtained through the activities of various entities, especially the leprosy clinic at St. Louis and two travelling doctors. The Public Health posts cooperated with records of 19 cases.

The criteria adopted for the census were: (*a*) verification of the notifications of cases; (*b*) systematic examination of contacts; (*c*) examination of groups of persons, as school children, agriculture workers, laborers, commerce employees, officers, military personnel and prisoners. For each leper discovered a special record card was prepared, with all of the clinical and epidemiological data obtainable.

The sources from which these cases were reported are shown in Table 2, and the data are analyzed briefly in Table 3.

TABLE 2.—*Cases recorded, 1939-1940.*

Previously recorded:		
Bomfim Colony (Jan. 1, 1939)	131	
St. Louis leprosy clinic	45	176
New cases:		
Recorded by travelling doctors	728	
Recorded by St. Louis leprosy clinic	77	
Recorded by Public Health posts	19	824
TOTAL		1,000

Of the 824 new cases, 478 were recorded in 1939 and 346 in 1940, up to June 30th. An analysis of those recorded in 1939 appeared in a previous report (4).

Thirty-two counties were visited by the travelling doctors, 24 in the littoral and the low valleys of the rivers, and 8 in the hinterland. The first group of counties gave 580 lepers, or 24.1 per county, the second group 148, or 18.5 per county. In the first group the incidence was 1.4 per 1,000 population (total 388,142) and in the other it was 0.60 per 1,000 (total 238,968). The total population of the 32 counties visited is 627,110, of which 48,703 were examined, with the discovery of 728 lepers. Including the rest of the state where the census was not made we have just 1,000 lepers for the total of 755,000 population,

or 1.3 per 1,000. In some counties the incidence attained 5.1 per 1,000.

An important feature of the findings is that 61.1 percent of the cases recorded are closed ones. Only 6.1 percent of them are children. All races are equally affected, but cases are more frequent among males than among females, and more among the paupers than among others, findings which confirm observations in other countries. The bad conditions of life of the people, regarding their domiciles, food resources and rural endemic diseases, are the principal factors in the leprosy situation. Another and important one is the lack of efficient control measures.

TABLE 3.—*Analysis of the records of cases recorded, 1939-1940.*

Cases		Old	New	Total
Number		176	824	1000
Age and sex:				
Adults	Male	116	529	645
	Female	49	245	294
Children	Male	9	27	36
	Female	2	23	25
Sources:				
Maranhão	St. Louis	50	27	77
	Interior	100	738	838
Other states		26	59	85
Clinical types:				
Lepromatous		65	153	218
Neural		75	448	523
Mixed		31	140	171
Undetermined		5	83	88

HISTORY OF CONTROL

The history of the control of leprosy in Maranhão may be divided into two periods: (*a*) from 1826 to 1919, when the first attempts were made, without results because they were based on empiric measures; and (*b*) since 1920, when modern measures of control were adopted.

In the first period two leper asylums were organized in St. Louis, one succeeding the other, in 1833 and 1870. Also, three leper villages were established in the interior, at Vianna, São Bento and Anajatuba. In them there were isolated only the crippled lepers, representing of course a small minority of the actual cases.

In the second period there was organized a leprosy prophylaxis service, which functioned until 1932 without great efficiency. An attempt was made to build a large leprosarium at St. Louis; this was to be a monoblock-type hospital, and a very large amount of money was spent on it, but it was abandoned before inauguration. A new leprosarium-type colony was started in 1932 and finished in 1937, when it was opened with 124 patients. Since then it has been enlarged. In 1939 there was created a new prophylaxis service, based upon modern conceptions.

PRESENT ANTILEPROSY ORGANIZATION

The new Service of Prophylaxis of Leprosy comprises: (1) the chief medical officer in charge; (2) two travelling doctors, who work in the interior; (3) the Bomfim leprosarium; and (4) the leprosy clinic of St. Louis. The bacteriological institute (Instituto Oswaldo Cruz) cooperates with the service in routine work. Private cooperation is contributing to the work by the building of a preventorium for children of leprous parents, which will be put under the control of the service.

St. Louis Leprosy Clinic.—This clinic is located in the center of the capital, with one leprologist in charge and two nurses. Its activities in 1939 were: Patients attended, 45 old and 59 new; notifications received, 55, of which 26 were confirmed; contacts examined, 97; laboratory examinations made, 89; treatments given, 1,690 injections of derivatives of chaulmoogra (7,649 cc.); visits to domiciles, for follow-up, 381, and for treatment, 448.

Bomfim Leper Colony.—This leprosarium was installed and inaugurated by myself on October 17, 1937, with 124 patients; at present 160 patients are interned there. It is now being enlarged to a capacity of about 500.

The colony comprises: (*a*) A clean zone, with five residences for employees. (*b*) An intermediate zone, in which are the administration pavilion, Sisters' Home, Nurses' Home, an observation pavilion and the light and power plant. (*c*) The patients' zone, with a medical pavilion, hospital, asylum for cripples, 6 dormitory pavilions (Carville type), 90 homes for patients, dining room and kitchen, Catholic church, school, work shop, laundry (mechanical), prison, playground and plantation farm, water plant, sewage disposal system and cemetery.

In 1938, with a mean population of 127.7 monthly, the mortality was 11.8 percent and there were 2 percent of evasions. In 1939 the total number of interned patients was 163, with a

monthly average of 137.5; the mortality was 5.5 percent and evasions 3.6 percent. During the year these patients were attended by the physician about 5,000 times; 4,868 prescriptions were given, not including chaulmoogra; 6,738 injections were made, of which 3,784 were of chaulmoogra derivatives, totalling 15,349 cc.

NEW PLAN OF CONTROL

The incomplete census shows 1,000 lepers for two-thirds of the population of the state in its principal foci of the disease. Upon completion of this preliminary census the total number of recorded cases will, I believe, attain 1,300. Adding to this number a further 50 percent of unknown cases brings the estimate to 1,950, or 1.6 per 1,000 of the population.

Based upon this estimate, and the aspects of the endemic, I have proposed the following plan to control the disease in the state:

1. Enlarge the Bomfim colony to provide for 900 cases, of which 780 will be open ones (40 percent of the total estimated number), and 120 closed ones (10 percent of the total of closed cases) which will need this care because they are crippled or paupers.

2. Prepare the leprosy clinic of St. Louis to treat the closed cases and to follow up the patients under domiciliary treatment or observation.

3. Appoint three specialized physicians for the itinerant service in the interior, who can make at least one visit per year to each focus in the hinterland. During these visits they will be required to reexamine the domiciled patients under treatment and their contacts, and verify new cases reported by private clinicians.

4. Establish treatment posts with male nurses in the principal foci of the disease, these posts to be supervised by the visiting doctors.

With this very economical plan I believe it possible to control the disease in this region in a relatively short period of time.

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DESCRIPTION OF PLATE

PLATE 10

FIG. 1. Plan of the Bomfim colony. In Zone A, the clean zone, are located the residences of employees, well and reservoir. In Zone B, the intermediate zone, are the administrative pavilion, Sisters' Home, Nurses' Home, clinical observation pavilion, and power plant. At the edge of Zone C, the patients' zone, are a visiting room, a dressing room, the clinic pavilion and the work shop; inside are the residence pavilions and houses of the inmates and a separate asylum for cripples, the social hall, Catholic church, school, dining room and kitchen, infirmary, prison, laundry, incinerator and a second reservoir.

FIG. 2. View of the clean zone, with residences for employees.

FIG. 3. Administration building.

FIG. 4. Partial view of the patients' zone.

FIG. 5. Principal street of the colony.

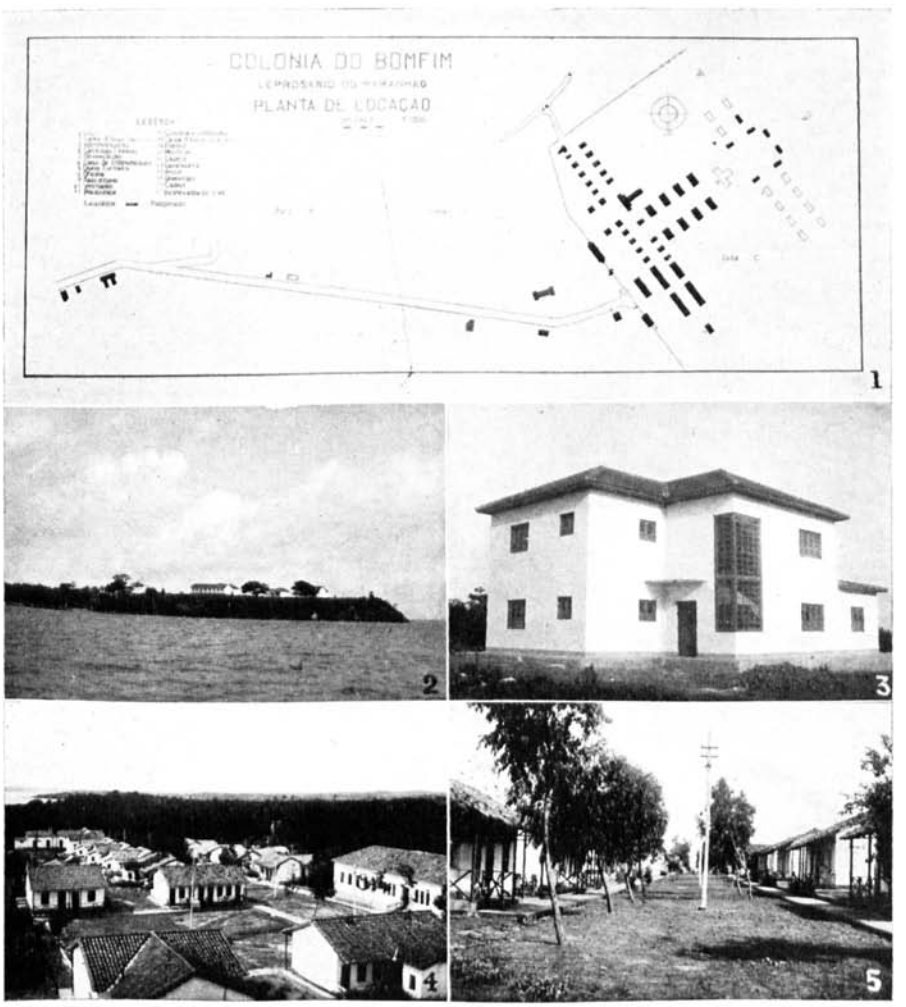

PLATE 10