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STUDIES OF THE MALARIA PROBLEM IN PORTO RICO

PAPER I

The following article is one of a series which will be published each month in the PORTO RICO HEALTH REVIEW.

These articles are abstracts taken from a book entitled "Malaria Surveys of Porto Rico" written by Dr. Walter C. Earle and H. A. Johnson, S. E. of the International Health Board of the Rockefeller Foundation and Dr. Eduardo Garrido Morales of the Department of Health of Porto Rico. It is being published by the Department of Health, and is written from studies of the malaria problem made in four different sections of the Island. They are as follows:

(1) A typical area on the north coast where irrigation is not practiced and swamp lands are abundant and population scattered.

(2) One on the east coast where lands were higher and water present was mainly that of irrigation and rains, and where population was concentrated.

(3) One on the dry south coast where in this instance malaria was a problem in a large town and also in a rural population where irrigation is practiced and swampy lands are abundant near the ocean.

(4) And one in the mountains where water is abundant but malaria not so reported.

The surveys were made in Barceloneta (1), Fajardo (2), Ponce (3) and Aibonito (4). The series of articles will be presented in this order beginning with the survey of Barceloneta.

SURVEY OF BARCELONETA

Barceloneta is the name of both a small village and the municipality in which this village is located, and is found in the western portion of the north coast of the Island. (See map of Island.) Arecibo adjoins Barceloneta to the west and Manatí to the east. Beyond Arecibo to the west the coast land is in the main quite high and there are no swamps. To the east of Arecibo there is a strip of coast land from two to four kilometers wide extending to Barceloneta about nineteen kilometers (twelve miles) away. This partic-

ular portion of the narrow coast land extends four to five kilometers beyond Barceloneta but with some interruptions,—a hill here and a lake there,—the lowlands extend more or less all the way to Bayamón which is the town next to San Juan.

Local Topography.

All along the shore line a barrier has been thrown up by wave and wind action, in some places consisting only of sand but in others, consolidation has taken place and rock reefs are present. This reef is only broken through in places to permit rivers or small streams to pass to the ocean. There is one such outlet for the Manatí river opposite the town of Barceloneta—another to the east four or five kilometers away where a small stream arising from seepage passes through and another at Arecibo where the Río Grande of Arecibo passes out.

This coast barrier is in its greater extent very narrow. Behind it is the strip of flat fertile alluvial plains which in the region varies between two to four kilometers in width. Farther inward the hills rise quite abruptly but to small heights and form rather broken narrow ridges more or less parallel with the ocean. Each successive ridge is a little higher than the preceding as is also the intervening level ground until finally the central mountain region is reached.

Large Water Courses.

The Manatí river winds through this region from the south and empties into the ocean opposite the town of Barceloneta. In storm years it may flood the surrounding country. It receives two large drainage channels near its mouth, one from the west (Caño Tiburones) and another from the east.

The Soil and its Drainage.

The underlying soil is a limestone formation which in the course of time has become more or less tunneled by numerous small streams. Sink holes and depressions are common in hilly portions and the outlets to these are common in the coast lands near the base of hills where in certain regions as opposite the town of Barceloneta numerous springs are found and much seepage is present.

The area to the west of the Manatí river is drained by a large channel which empties into the Manatí river near the ocean. Several kilometers to the west, two channels, one coming from along the beach to the north, unite with this main channel called Caño Tiburones. The bed of the channel is below high tide, so that when tides come in water flows up the channel almost to the foot of the hills. During

this time seepage and rain water must spread out into numerous ditches in the low area. The changes of the tide do not extend to the small ditches in these low areas, so the water stands more or less at the same level all the time. In the main, then, water deposits to the west of the river consisted in these large drainage channels and the numerous ditches throughout the low cane fields. There are extensive water deposits present at all seasons of the year.

The Plazuela Central draws water from Caño Tiburones through an open canal and discharges it through another into the river.

To the east of the river, in addition to two large drainage channels, one draining to the west into the river and the other to the east into the ocean; and the low lands as described above, there are three large bayous, probably old river beds, lying between one to two kilometers from the town. Reference is made to those with the names Caño San José, Caño de los Machos, and Afluente. There are also several large springs which result in numerous small streams constantly having water. Near the beach in this region there is a small mangrove swamp unconnected with the ocean which contains water the greater part of the year. A similar one, but with direct connection with the ocean is found on the opposite side of the river.

The soils are more or less alkaline, as are the waters, and as one approaches the ocean the salt content rises rapidly. All waters near the ocean, where water deposits are more extensive, are brackish.

Crops and Industry.

The greater portion of the strip of coastal plain is planted to cane, though a large part of it is too wet to permit growth. There are two centrals at Arecibo, one at Barceloneta, and one at Manatí for extracting the sugar. One of the larger sugar factories, La Central Plazuela, is located in the center of the area and north of the town. The lands to the west of the river belong mainly to this company and one other man, Don Fernando Suria, while those to the east mainly belong to the Borda Estate.

The average yield of cane is low, being around twenty tons per acre. The better lands yield forty to fifty tons in good years but there is a large proportion of the land which is water soaked and only yields twelve to fifteen tons. Some land is so low that it has not paid to plant cane, and in others the seed cane must be planted two to three times before it comes up.

Distribution of Population.

In an area of about five square miles a population of six thousand people was taken in census, of which all but a little over one thou-

sand, was outside the town. It can easily be appreciated, then, how dense the rural population is in this region. The houses are found in the region which cannot be cultivated, except in the case of the town of Barceloneta. Along a narrow strip on the beach there is a dense rural population, and as the hills rise from the cane fields away from the ocean there is also a fairly heavy rural population.

Houses are scattered over the sides of the hills from the edge of the cane field to far back into the interior, successive ridges of hills separating the interior from the low lands. Between the coast and hills there is the town of Barceloneta on the west bank of the Manatí river. There are also several isolated groups of houses in the center of the cane fields—one to the west and one to the east of Barceloneta.

Housing Conditions.

The majority of the houses, especially on the beach, are made of palm leaves or cane straw or the walls poorly made of wood and the roof of cane leaves. Houses are being continuously destroyed and new ones built nearby. As a rule the sleeping room has only one or two windows, and if there is much wind these may be closed most of the time so that the rooms in many cases are very dark at midday. During the cane season new arrivals will often hang up their hammocks at dusk, sleep through the night and then take them down in the morning. Large numbers of people may be thus temporarily crowded into small houses. The Central has several large well-constructed buildings in which some labor is housed. One is found on a slight elevation of ground in the center of the low lands at Paja, and other near the Central. The managers, chemists, etc., of the Central live in well-constructed houses more or less screened, and near the factory.

Use of Screens and Bed Nets.

Screening is done not at all except in a few houses at the Central, nor is it practicable in the majority of the houses because of their poor construction. Bed nets are used very extensively even in the poorest families though it is probable that this is of greater protection to babies and the female population, as adult males sleep commonly in hammocks which are not protected by nets.

Habits of People.

In the country districts the people usually sit around in the early hours of the night along the roads or in front of houses. They go to bed quite early and rise early in the morning. The town people

and those living near the towns usually congregate in the town plaza or square in the evening, in the principal streets or in the moving-picture house. They do not go to bed as early as the country people and do not rise as early in the morning.

Occupation.

The majority of the male population is employed in the cultivation of sugar cane or in cutting the crop, or extracting the sugar. During slack seasons those on the beach devote considerable time to fishing while others do odd jobs or seek work in other parts of the Island.

