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Anopheles cruzii larvae found in bromelias in an urban area on the Brazilian coast

ABSTRACT

The occurrence of *Anopheles (Kerteszia) cruzii* larvae is reported for the first time in bromelias on the ground located in an urban area within the municipality of Ilhabela, on the northern coast of the State of São Paulo. From March 1998 to July 1999 312 immature forms of *An. cruzii* were captured, being that 8.6% of them were in bromelias in the urban environment, 40.1% in periurban bromelias and 51.3% in the forest. The average number of bromelias containing *An. cruzii* was 4.0% of the total investigated. The positive rate in the periurban and forested environments presented similar values. The presence of *An. cruzii* is probably due to their having been present previously in the forest, together with the frequent presence of these breeding places, food sources and appropriate shelter in the urban area. This set of factors makes it necessary to warn against the possibility of transferring infections from one environment to the other.

DESCRIPTORS: *Anopheles.* Insect Vectors. Bromeliaceae. Malaria, Vivax, transmission. Urban Zones. Brasil.

INTRODUCTION

Anopheles (Kerteszia) cruzii is a species of mosquito highly specialized in using bromelia tanks for its reproduction. Water remains within the tanks of these plants even in periods of drought, guaranteeing living conditions for the fauna and flora that inhabit it. [3]

Several authors have pointed out the presence of immature forms of mosquitoes in bromelia water tanks located in primitive environments. Some species are specialized in this type of micro-habitat, while this occurs occasionally among others. In Brazil, among the species specialized in utilizing these nurseries are the *An. cruzii* and *An. bellator,* whose adult forms are important transmitters of malaria, essentially in forest environments.[2,5] Furthermore, this study area is situated in a domain within the Atlantic Forest, considered a region of autochthonous malaria transmission within the State of São Paulo.[5]

METHODS

An cruzii were captured between March, 1998 and July 1999, during the execution of a research project in the island of Ilhabela, located between the coordinates 23°29'28''S and 23°46'28''O, in the northern coast of the State of São Paulo (Figure).

Three distinct areas were studied. The urban environment included the space between the neighborhood Praia Ponta das Canas, extending itself towards the southeast until the ferry boat (22 km), that permits access to the island, where

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the most intense processes of occupation are situated. The peri urban environment was represented by the area that extends from the official entry to the State Park of Ilhabela for 12 km until the beginning of the costal plain. It is constituted by open tracts of land, with or without constructions, residential gardens and country houses. The forest environment begins at the official entry of the State Park and extends itself for 16 km along a road that is difficult to access and that leads to the Castelhanos beach, on the other side of the island.

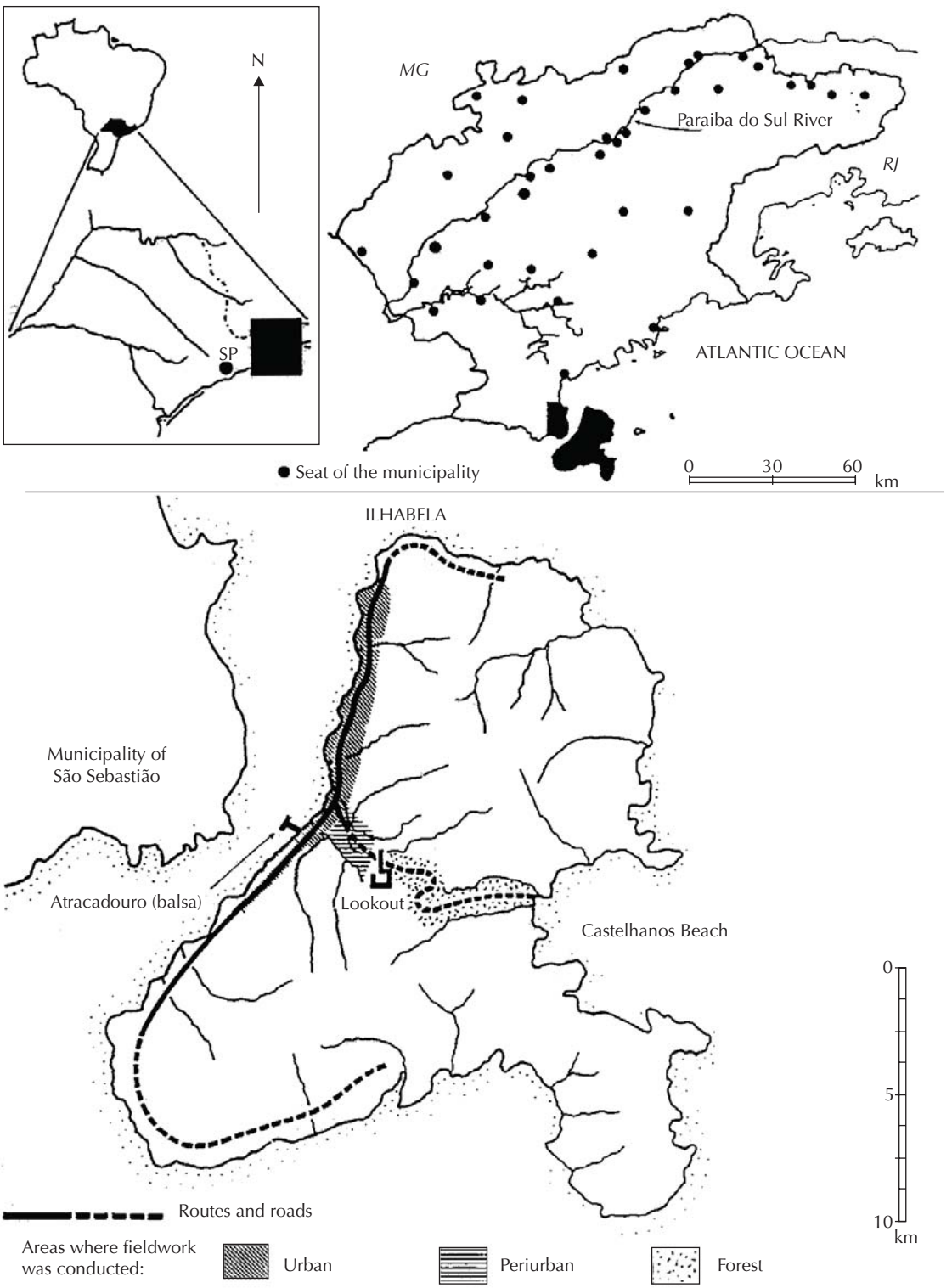

Figure. Geographic location of the municipality and schematic representation of the study area. Ilhabela, Southeast Brazil.

In each environment, 50 different bromelias were inspected every 15 days according to the methodology described in Marques & Forattini 2005.[3] The species captured in the field were transferred to the laboratory and maintained alive for one week, enough time to develop to the fourth stage. At the end of this period, they were sacrificed and identified afterwards. A representative sample was deposited in the Entomological Collection of the School of Public Health of the University of São Paulo.

RESULTS

A total of 312 immature forms of *An. cruzii* were captured, being that they were more abundant during the months that were less hot. On the average, positive results among the total number of captures in bromelias with culidae amounted to 4.0%.

The presence of *An. cruzii* in larger numbers were registered in bromelias situated in the forest (160 larvae, 51.3%), followed by the periurban environment (125, 40.1%) and, last of all, in the urban environment (27, 8.6%). The presence of *An. cruzii* was similar in the periurban environment and in the forest. The distribution also varied according to the gradient of altitude, increasing from the urban environment to the forest.

In the urban environment and several times within the same nursery, the immature forms of *An. cruzii* were found in association with *Aedes albopictus*. In the periurban environment this occurred only once and in the forest this was not observed.

DISCUSSION

In this study, a larger number of immature *An. cruzii* was observed in bromelias situated in the forest environment, reiterating its preferentially forest nature.[1,4,5] It's presence in bromelias cultivated in the urban and periurban environment suggests an adaptation to a modified environment. This suggests the possibility of creating new ecological niches that may be occupied by populations of forest culicidae.[2] These findings may represent alterations in the epidemiological profile of the transmission of human malaria in the region of the northern coast of São Paulo State. The *Serra do Mar* [Mountain Range of the Sea] is considered hypoendemic for malaria, although its epidemiology is an issue currently under debate.[4]

In Ilhabela's urban environment, decorative bromelias are constantly watered. The majority of these plants are utilized in residential gardens among the richer population. This practice may explain the maintenance and even the increase in the number of mosquitoes.[3]

The presence of *An. cruzii* in bromelias in the urban, periurban or forest environments has different implications due to the specific ecological conditions of these nurseries in the various habitats mentioned above. This indicates the dispersive role of the anopheline to new ecotopes in the choice of new habitats for the development of its immature forms and consequently, for adaptation to a modified environment.[2]

An. cruzii in bromelias in the urban environment is probably the result of its previous occurrence in the Atlantic Forest region, allied to the elevated presence of these nurseries, sources of both food and shelter. The utilization of these plants in landscaping projects stimulates their commercialization and even extractivism, which might contribute towards explaining the presence of this mosquito within this environment. This set of factors implies that the transmission of human malaria is possible in this region of the coast of São Paulo State.

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