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Ocorrência de formas imaturas de
Aedes (Stegomyia) aegypti (Diptera, Culicidae) em
Bromeliaceae durante surto de dengue no litoral
paranaense, Sul do Brasil

The occurrence of immature forms of
Aedes (Stegomyia) aegypti (Diptera, Culicidae) in
Bromeliaceae during an outbreak of dengue in the
Paraná Coast, Southern Brazil.

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Species of mosquitoes (Diptera, Culicidae) that have ecological valence that enables them to occupy regions with different environmental characteristics, increasing the risk of transmission of infectious agents, in the same way as various arboviruses that attack the human population. Cosmopolitans species of mosquitoes such as *Aedes (Stegomyia) aegypti* (Lannaeus, 1762) and *Aedes (Stegomyia) albopictus* (Skuse, 1894) are more important in epidemiological aspect (MARCONDES & XIMENES, 2016).

Understanding the changes in the behavior of those species may contribute to more efficient vector control.

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In this research, the occurrence of mosquitoes in the Paraná Coast, emphasizing the occurrence of immatures forms of *A. aegypti* in bromeliads at urban areas where an outbreak of dengue was happening.

A research of immature forms of mosquitoes in potential breeding places of seven locations in the Paraná Coast was realized in the period between 29 to 31 July 2015, in the cities of Matinhos, Paranaguá, Antonina e Pontal do Paraná. The immature forms were collected with the aid of a net fishing-larvae, a mouth-operated aspirator, larvae dippers and the total depletion of the water contained in small artificial reservoirs. The conditioning of the samples was in glass tubing containing 70 % alcohol labelled according to the field information.

In total, 219 immature forms of mosquitoes were collected, of which 214 were larvae and five were in the pupal stage. The taxonomic identification showed that *A. albopictus* and *A. (Georgecraigius) fluviatilis* (Lutz, 1904. In: Bourroul, 1904) were the species found in higher density (N = 83; 37,9 %, each). After, *Limatus durhamii* Theobald, 1901 (N = 22; 10,1 %), *Wyeomyia (Triamyia) aporonomia* Dyar & Knab, 1906 (N = 16; 7,3%), *A. aegypti* (N = 14; 6,4 %) and only one specimen of *Culex (Microculex)* sp. (Table 1).

The most important finding of this study was the occurrence of immature forms of *A. aegypti* in large bromeliads arranged on the courtyard of the “Secretaria Municipal de de Educação de Paranaguá (PR)” (Fig. 1), while on the inside of the establishment, adult forms of *A. aegypti* (uma fêmea e um macho) and *A. albopictus* (uma fêmea) were collected with the aid of a dip net. This observation instigates us to consider the importance of bromeliads in the household infestation by this species and their dispersion to forested environments of the Paraná Coast.

In the entomological surveys for the “Rapid Survey of *Aedes aegypti* Infestation Index” conducted by the “Secretaria de Estado da Saúde do Paraná” in 2015, immature forms of *A. aegypti* and *A. albopictus* were collected in natural breeding places in Paranaguá, with index of 23,53 % and 2,94 % respectively. Although the field information did not allow to identify if they were fitotelmatas, the occurrence of immature forms of *A. albopictus* was previously related by SILVA, NUNES & LOPES (2004).

The habit of using ornamental bromeliads in the urban landscape increased the potential breeding places and the infestation of *A. aegypti* and *A. albopictus* in the home environment (MARQUES, SANTOS & FORATTINI, 2001; CUNHA ET AL., 2002). The fact of *A. aegypti* using bromeliad plants for the development of immature forms can constitute serious problems for the control of this specie. The presence of immature

Table 1. Distribution of mosquito species collected along the Paraná Coast, July 26-27, 2015.

City / location *	Breeding places **	Species***
Matinhos Francisco dos Santos Junior Educational Center (urban area), schoolyard, coord. 25°49'52,4"S-48°32'58,2"W, 2 m.n.m.m., 29/VII/2015	tire (pool - 2)	<i>Ae. (Stg.) albopictus</i> (46L; 4P)
		<i>Wye. (Tra.) aporonomia</i> (16L)
Paranaguá 1 st Regional of Health of Paranaguá (urban area), courtyard, coord. 25°30'48,7"S-48°30'20,5"W, 9 m.n.m.m., 30/VII/2015	bromeliads (pool - 5)	<i>Culex (Microculex) sp.</i> (1L)
	gutters	Negative collection
Municipal Secretariat of Education of Paranaguá (urban area), courtyard, coord. 25°31'03,9"S-48°30'33,2"W, 4 m.n.m.m., 30/VII/2015	bromeliad	<i>Ae. (Stg.) aegypti</i> (13L; 1P)
	Adult form of mosquito collected	<i>Ae. (Stg.) aegypti</i> (1♀; 1♂) <i>Ae. (Stg.) albopictus</i> (1♀)
Antonina Municipal cemetery (urban area), open environment, coord. 25°26'05,2"S-48°43'30,2"W, 15 m.n.m.m., 31/VII/2015	Various containers (flower boxes, plastic vase, paint can and preserving jars)	<i>Ae. (Grg.) fluviatilis</i> (38L) <i>Li. durhamii</i> (22L)
	Pontal do Paraná Balneário Santa Teresa, Ilha do Mel Pools (urban area), courtyard, coord. 25°41'08,9"S-48°28'11,3"W, 9 m.n.m.m., 31/VII/2015	tire and pools (pool - 12)

Legenda: * Places sampled with the geographical coordinate, altitude relative to the mean sea level (m.n.m.m.) and date of collection. ** Type of breeding site. *** Results—immature forms (L) = larvae and (P) = pupal stage; adult forms (♂) = male and (♀) = female.



Fig. 1. Collection site of immature forms of *Aedes (Stegomyia) aegypti*, Paranaguá, state of Paraná (Brazil).

forms of *A. aegypti* in bromeliads from the public roads has been reported during the outbreak of dengue in Paraná (SILVA & GOMES, 2008).

This occurrence of *A. aegypti* in bromeliads happened before the simultaneous circulation of three arbovirus in Paranaguá. In the period between August 2015 and March 2016, the total of 2.456 dengue autochthonous and imported cases, eight autochthonous Zika cases and two imported chikungunya cases was registered (SESA-PR, 2016). Between August 2016 and June 2017, 36 dengue autochthonous cases in the cities of Paraná Coast were notified. Of them, 35 cases happened in Paranaguá simultaneously with a Zika virus and ten chikungunya cases, all autochthonous cases confirmed by laboratory (SESA-PR, 2017).

The relation of *A. aegypti* in the communicable arboviruses epidemiology in urban areas of the Paraná Coast seems to be evident. However, there is a possibility of infestation by this specie in forest ecosystems that are seen as risk areas for the transmission of other arboviruses. Accordingly, the occurrence of *A. albopictus* in cut bamboos along the edge of the forest in an area of Paranaguá was observed (SILVA, NUNES & LOPES, 2004).

There are problems of vector control in bromeliads because it is difficult to deplete their net content and because it is not disposable (FORATTINI & MARQUES, 2000). The solution for the mechanical control in bromeliads was proposed by SILVA & GOMES (2008) through the application of wood shavings on the imbrication of the leaves. Such a measure can constitute a good option for the control of immature forms in fitotelmatas in the coastal region where there is a wide variety of natural reservoirs, including remaining bromeliaceae from the Atlantic Forest.

One specimen of *Culex (Microculex)* sp. was also collected on a pool of epiphytic bromeliads. The other species of mosquitoes identified in this study had their immature forms collected in artificial breeding places, mainly in tires and pools, and also in small reservoirs abandoned under open sky, as flower boxes, plastic vase, paint can and preserving jars. The occurrence of *Wyeomyia (Tryomyia) aporonoma* in artificial reservoirs was the subject of an article published by SILVA, ARÁUJO & CARNEIRO (2016), in which the possibility of the development of this species in man-made environments is discussed.

Finally, the realization of new researches is suggested to verify if this occurrence was uncommon or if the bromeliads are important breeding places for the immature forms of *A. aegypti* and their interaction with other mosquito species in the Paraná Coast.

Conflicts of interest

The authors declare no conflicts of interest.

SUMÁRIO

Relata-se a ocorrência de formas imaturas de *Aedes (Stegomyia) aegypti* em bromélia, durante o surto de dengue no litoral paranaense, com considerações sobre as implicações dessa constação para o controle desse mosquito.

PALAVRAS-CHAVE: Bromeliaceae; Culicinae; vigilância entomológica; mosquitos; ecologia de vetor

SUMMARY

The occurrence of immature forms of *Aedes (Stegomyia) aegypti* in bromeliads during an outbreak of dengue in the Paraná Coast, considering the implications of it for the control of this mosquito is related.

KEYWORDS: Bromeliaceae; Culicinae; entomological surveillance; mosquitoes; vector ecology

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