



FLIGHT CAPACITY OF *T. SHERLOCKI*, *T. JUAZEIRENSIS* AND THEIR LABORATORIAL HYBRIDS

Correia, N¹;

Oliveira, H.L.²; Almeida, C.E.^{1,3}; Gumiel, M.¹; Galvão, C.^{2,*}; Costa J.¹

¹ Laboratório de Biodiversidade Entomológica, Instituto Oswaldo Cruz Fiocruz, Av. Brasil, 4365, RJ. Email: n.correia@ioc.fiocruz.br

² Laboratório Nacional e Internacional de Referência em Taxonomia de Triatomíneos do Instituto Oswaldo Cruz Fiocruz.

³ Departamento de Ciências Biológicas, Faculdade de Ciências Farmacêuticas - UNESP

INTRODUÇÃO

Chagas disease is caused by a flagellated protozoan parasite, *Trypanosoma cruzi*, and is transmitted to humans mainly by blood-sucking true bugs, the triatomines. Approximately nine million Latin American people are at risk of contracting *T. cruzi* (Schofield *et al.*, 2006), placing this illness among the most serious parasitic diseases in the hemisphere.

The wild triatomines are progressively adapting to the domestic environment, such as *Triatoma sherlocki* (Almeida *et al.*, 2009) and *Triatoma juazeirensis* (Costa & Felix, 2007). They are phylogenetically related species found in the same ecotope (rock piles), and around 44 km far apart from each other. The latter species exhibits wings that extend to variable levels from middle to apex of the seventh urotergite, being able to reach the eighth, however *T. sherlocki* exhibits some degree of brachiptery, with wings that never reach the apex of the sixth urotergite. Given that both species are geographically, ecological, and genetically related, laboratorial hybrids between them were included in the experiment. These hybrids exhibited wings that extend to variable levels of the sixth and seventh urotergite.

Despite its smaller wings, *T. sherlocki* has been found invading and colonizing homes in a quarry mining community in Gentio do Ouro, Bahia, Brazil (Almeida *et al.*, 2009). In the light of this finding, and since flight dispersion is one of the most important mechanisms for house infestation, the question about whether *T. sherlocki* could fly arose.

OBJETIVOS

This work compared the flight capacity among *T. sherlocki*, *T. juazeirensis* and their hybrids. In addition, traditional morphometric analysis were applied using morphological structures related to mobility, aiming to obtain insights about how *T. sherlocki* compensates its dispersion ability and the pattern of inheritance for these characters.

MATERIAL E MÉTODOS

Specimens were provided from F1 (N= 40 for *T. sherlocki*, 30 for *T. juazeirensis* and 15 for hybrids) picked up by chance from colonies of insects collected in the State of Bahia, composed by 75 founder for *T. sherlocki* and 44 for *T. juazeirensis*. Hybrids were formed with F1 of individual crosses of couples between *T. sherlocki* females and *T. juazeirensis* males and vice versa.

The three groups analyzed were kept in starvation, as already reported as a cause of flight initiation (Lehane & Schofield, 1982), in an apparatus designed to distinguish flyers from non flyers samples (Galvão *et al.*, 2001). For registering flight events each bug was marked on the pronotum with different colors and position combinations. All flight events were registered according to the sample.

Morphometric measurements of body parts associated with the mobility and total size, such as body length, width of pronotum, length of segmental parts of legs, and the total length and width of wings were taken by the same researcher using optical microscope. Meas-

rements were analyzed using PCA and ANOVA. Tukey - Kramer test was applied for each variable.

RESULTADOS

Fifty, and 47 per cent of *T. juazeirensis* and hybrids, respectively, were represented by flyers, whereas no samples of *T. sherlocki* flew, ending up dying hungry. The number of flight events was similar for *T. juazeirensis* and hybrids, being an average of seven and six, respectively. Males exhibited a lower number of flight events than females for both groups of flyers. Morphometric analysis of the main structures associated to the mobility showed that *T. sherlocki* has significantly longer legs, but smaller wings and shorter width of pronotum. Hybrids exhibited intermediate character for all analyzed, except for the length of tarsus and total size, which were equal for all groups. The width of pronotum of both hybrids and *T. juazeirensis* was significantly larger if compared with *T. sherlocki*, indicating it as a dominant character that might be related to the ability to fly for these groups.

According to Zera & Denno (1997) and Marden (2000), to inquire about the contributions of genes and environment to determine the absence of developed flight muscles, it would be necessary to assure whether these morphs are stable. The absence of developed flight muscles was evidenced for all *T. sherlocki* adults, but not for all *T. juazeirensis* samples, neither for all hybrids. Here we report for the first time that flight muscle development in *T. sherlocki* is genetically mediated, being responsible for its incapacity to fly and the pattern of inheritance for this character in hybrids, which were able to fly.

CONCLUSÃO

We showed evidences that the incapacity to fly of *T. sherlocki* is related with the strength of fly muscles en-

closed inside a shorter thoracic box. The mobility of *T. sherlocki* might be compensated by its significantly longer legs, probably providing the capacity to invade human dwellings.

(Financial support: FAPESP; Convênio Bilateral Fio-cruz/Centro Nacional de Pesquisa Científica - CNRS, França. *Co - last authors in alphabetical order)

REFERÊNCIAS

- Almeida C.E., Folly - Ramos E., Peterson A.T., Lima - Neiva V., Gumiel M., Duarte R., Lima M.M., Locks M., Beltrão M., Costa J. 2009. Could the bug *Triatoma sherlocki* be vectoring Chagas disease in small mining communities in Bahia, Brazil? Med and Vet Entomol, 23, 410417.
- Costa J. & Felix M. 2007. *Triatoma juazeirensis* sp. nov. from Bahia state, northeastern Brazil (Hemiptera: Reduviidae: Triatominae). Mem Inst Oswaldo Cruz, 102, 8790.
- Galvão C., Rocha D.S., Jurberg J., Carcavallo R. 2001. Início da Atividade de Voo em *Triatoma infestans* (Klug, 1834) e *T. melanosoma* Martínez, Olmedo & Carcavallo, 1987 (Hemiptera, Reduviidae). Mem Inst Oswaldo Cruz, 96, 137 - 40.
- Lehane M.J. & Schofield C.J. 1982. Flight initiation in *Triatoma infestans* (Klug) (Hemiptera: Reduviidae). Bull Entomol Res, 72,497510.
- Marden J.H. 2000. Variability in the size, composition, and function of insect flight muscles. Annu Rev Physiol, 62, 157178.
- Schofield C.J., Jannin J., Salvatella R. 2006. The future of Chagas disease control. Trends in Parasitology, 22, 583588.
- Zera A.J. & Denno R.F. 1997. Physiology and ecology of dispersal polymorphism in insects. Annu Rev Entomol, 42, 207230.