

Variety is the spice: The role of morphological variation of *Triatoma infestans* (Hemiptera, Reduviidae) at a macro-scale

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Abstract

Chagas disease is caused by the protozoan parasite *Trypanosoma cruzi* (Chagas, 1909). One of the primary vectors of *T. cruzi* in South America is *Triatoma infestans* (Klug, 1834). This triatomine species is distributed across a huge latitudinal gradient, inhabiting domiciliary, peridomiciliary, and wild environments. Its wide geographic distribution provides an excellent opportunity to study the relationships between environmental gradients and intraspecific morphological variation. In this study, we investigated variations in wing size and shape in *T. infestans* across six ecoregions. We aimed to address the following questions: How do wing size and shape vary on a regional scale, does morphological variation follow specific patterns along an environmental or latitudinal gradient, and what environmental factors might contribute to wing variation? Geometric morphometric methods were applied to the wings of 162 females belonging to 21 *T. infestans* populations, 13 from Argentina ($n = 105$), 5 from Bolivia ($n = 42$), and 3 from Paraguay ($n = 15$). A comparison of wing centroid size across the 21 populations showed significant differences. Canonical Variate Analysis (CVA) revealed significant differences in wing shape between the populations from Argentina, Bolivia, and Paraguay, although there was a considerable overlap, especially among the Argentinian populations. Well-structured populations were observed for the Bolivian and Paraguayan groups. Two analyses were performed to assess the association between wing size and shape, geographic and climatic variables: multiple linear regression analysis (MRA) for size and Partial Least Squares (PLS) regression for shape. The MRA showed a significant general model fit. Six temperature-related variables, one precipitation-related variable, and the latitude showed significant associations with wing size. The PLS analysis revealed a significant correlation between wing shape with latitude, longitude, temperature-related, and rainfall-related variables. Wing size and shape in *T. infestans* populations varied across geographic distribution. Our findings demonstrate that geographic and climatic variables significantly influence *T. infestans* wing morphology.