

The importance of the environment in the *Trypanosoma cruzi* (Chagas disease) transmission

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Statement of the Problem: *Trypanosoma cruzi*, the etiological agent of Chagas disease, presents a complex life cycle and its transmission occurs in different enzootic scenarios, where each region has a peculiar transmission network. One example of this is the Atlantic Forest biome, located in Espírito Santo state (ES), Southeast Brazil. *Triatoma vitticeps* adult triatomines present high *T. cruzi* infection rates and are constantly found invading dwellings in rural areas. There is no colonization of *T. vitticeps* inside households and animals in the surroundings were not infected. This is a peculiar scenario and so far, little is known about the biotic and abiotic variables involved and capable to modulate the transmission. The aim was to understand the variables that modulate the *T. cruzi* infection in *T. vitticeps* triatomines in this region.

Methodology & Theoretical Orientation: *Triatoma vitticeps* and *T. cruzi* infection occurrence data from different ES state municipality were obtained from 2010 to 2012. The data were georeferenced for distribution analysis. To assess infection modulation, statistical (generalized linear models, discriminant analysis and multiple linear regression) and map algebra modeling were used for the response variables of *T. vitticeps* and *T. cruzi* with the explanatory variables: climate (minimum, maximum and average temperature; air relative humidity and precipitation), altitude elevation, mammal species richness, vegetation and soil types. The global and local Moran index were calculated to determine the spatial correlation and hotspot areas.

Findings: Data georeferencing and the distribution analysis showed that Central and Southern Es state mesoregions presented *T. vitticeps* and *T. cruzi* greatest distribution. Air relative humidity, soil type and mammal species richness were the variables that were most correlated with *T. vitticeps* occurrence. For the infected specimens, average temperature, air relative humidity, altitude and soil type were the most correlated variables. The Moran index and map algebra showed that the municipalities located on the border between the central and Southern mesoregions are hotspot areas and present favorable environmental conditions for *T. vitticeps* and *T. cruzi*.

Conclusion & Significance: We can conclude that triatomines acquired the infection in distant areas from residences, where it presents higher temperatures and altitudes (~700 meters), possibly in areas of more conserved forest. In addition, multidisciplinary studies, especially involving environment variables, are essential and should be used more often when it comes to vector-borne parasites.

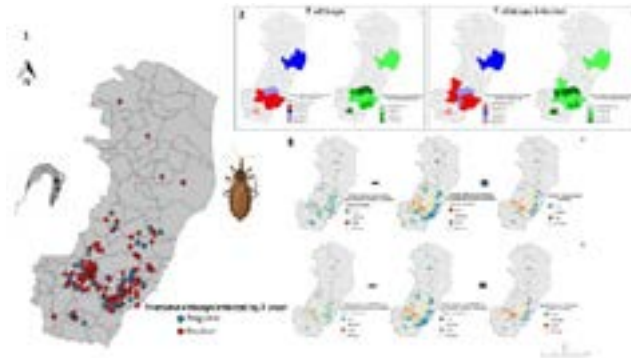


Figure: *Triatoma vitticeps* occurrence and *Trypanosoma cruzi* infection distribution (1) and hotspot areas (2 and 3) in the Atlantic Forest of Espírito Santo state, southeast Brazil.

Biography

Maria Augusta Dario has a degree in Pharmacy, a master's degree in infectious diseases and a PhD in Parasitic Biology. She has experience in the field of parasitology, with an emphasis on research on trypanosomatids (*Trypanosoma cruzi*) in small mammals and vectors. Her main experiences are in the identification of trypanosomatids using molecular techniques (Sanger and next-generation sequencing). She is currently doing her postdoctoral research in spatial analysis to understand the transmission cycle of *T. cruzi* in the sylvatic environment.