

New interactive key for species identification of the subfamily Triatominae (Hemiptera, Reduviidae)

**Rodrigo Gurgel-Gonçalves¹, Maxwell Ramos de Almeida², Jainaine
Abrantes de Sena Batista³, Douglas de Almeida Rocha⁴**

¹Laboratório de Parasitologia Médica e Biologia de Vetores, Área de Patologia, Faculdade de Medicina, Universidade de Brasília, Distrito Federal, Brasil. ²Real Comércio e Indústria de Alumínio Ltda, Distrito Federal, Brasil ³H2J Comunicação & Marketing, Distrito Federal, Brasil ⁴Núcleo de Medicina Tropical, Universidade de Brasília, Distrito Federal, Brasil

Abstract

There are 150 triatomine species described and their correct identification is fundamental for Chagas' disease surveillance. As most triatomines can be identified using external morphological characters, dichotomous keys have been a valuable tool for taxonomic identification, although their use is limited by the need for experienced taxonomists. Alternatives such as identification based on molecular taxonomy have been explored, but their excessive cost and limited efficacy for some groups diminish their applicability on a large scale. Thus, it is necessary to develop new strategies to identify triatomines that i) are easier to use, ii) are more illustrated and self-explanatory, iii) reach a larger audience of entomologists, and iv) promote rapid identification. The objective was to develop an interactive key to identify all species of the subfamily Triatominae. The currently available keys were consulted and photographs of triatomines from scientific collections were obtained to select the most important characters for identification. A database with images of structures, triatomine photos and maps has been organized and used to build an application (App) for use on Android phones. The App (Triatodex) was developed using an Android studio software in conjunction with a library developed by Google with Java Version 8. At any time of identification, Triatodex shows the possible species and still allows to return to previous questions. In total, 148 living triatomine species were included (two fossil species were not included). Triatodex includes 78 questions with up to 8 answers. In total, 262 images of morphological structures, 148 complete dorsal photos of triatomines and 148 maps were used. Triatodex presents a main menu with five options: i) search: access the questions used for identification, ii) morphological structures: visualization of the main structures used during identification (head, thorax, legs, abdomen), iii) possible species: visualization of the species included in the App, iv) recent answers: visualization of the questions answered, where it is possible to delete and correct any errors during the process, v) reset search: allows to restart an identification process. For example, the first question (rostrum morphology) presents 3 answers: i) with 3 segments, rectum, short, with membranous connection between the 2nd and 3rd, ii) with 3 segments, curved and iii) with 4 segments, long. Next to each answer there is an icon that gives access to the image corresponding to each answer. In the lower right corner Triatodex shows the number of remaining species. The user, when selecting an option, is taken directly to another question until the identification is finished, when the color photo of the identified triatomine, its geographical distribution, size and other information (descriptors, habitat and medical importance) are presented. Triatodex is currently being validated by experts and will soon be

available in google play store for free access. It is hoped that Triatodex will be widely used to assist professionals dealing with vector control and surveillance of Chagas' disease, providing a means to more effectively identify triatomines.

Key-words: Cybertaxonomy, Triatominae, morphology, Android, identifications key.