Article

ZOOTAXA

Areas of endemism in the Neotropical region based on the geographical distribution of Tabanomorpha (Diptera: Brachycera)

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Abstract

We aim to investigate the geographical distribution patterns of the infraorder Tabanomorpha and to delimit primary hypotheses of areas of endemism for the group in the Neotropical region. The results were compared to areas of endemism proposed in previous works for other taxa and particularly with the recent Morrone's regionalisation proposal. An endemicity analysis was performed with the NDM/VNDM algorithm using 3826 occurrence records for 1361 species of Tabanomorpha. Areas of endemism were established based on a grid size of 6° and consensus cut-off of 42%. We identified 13 areas of endemism comprising five main components: Northern South America (NSA), Southeastern South America (SESA), Central America (CA), Brazilian Savannah (BS), Central Andes (CAn). In a broad sense, the main areas of endemism recovered for Tabanomorpha are congruent with the recent proposals of regionalisation for the Neotropical region.

Key words: biogeographical regions, Diptera, geographical distribution, NDM/VNDM, regionalisation

Introduction

One of the main purposes of historical biogeography is to identify congruent patterns of relationship between areas that allow us to explain possible evolutionary processes acting on life on Earth (Croizat 1964). The first step consists in the delimitation of areas of endemism, the units of analysis in biogeography, through the recognition of spatial homology. This issue have been considered since the early 1980's and still lacks general agreement, due to semantic problems with the term 'areas of endemism', and also to different analytical methodologies to identify such areas (Nelson & Platnick 1981; Cracraft 1985; Rosen 1988; Platnick 1991; Anderson 1994; Morrone 1994; Hovenkamp 1997; Linder 2001; Hausdorf 2002; Szumik *et al.* 2002; Crisci *et al.* 2003; Dominguez *et al.* 2006; Morrone 2014a).

Therefore, a taxon whose distribution is confined to a given area is said to be endemic to that area. This is not the same as calling such area an area of endemism. According to Platnick (1991), an area of endemism is defined by the congruent distributional limits of at least two taxa. Platnick's definition of area of endemism is one of the most quoted, but, as noted by Harold & Mooi (1994), the simple concordance in distribution of unrelated taxa does not make an area a historical unity, since the distribution of those taxa could be due to more than one allochronic event (as considered by Amorim *et al.* 2009). The distributional congruence just delimits centers of higher endemicity—it does not delimit an endemic area. Areas of endemism rely on restricted distributional congruence and the taxa involved may not occur in other areas. Otherwise, the distribution of living beings could only be explained by present climatic factors and latitudinal zonation, and not by evolutionary history. The existence of multiple definitions for areas of endemism and the lack of a more precise terminology make difficult the comparison of results derived from different methodological protocols, blurring the possibility of investigating the biogeographical historical relationships.

Herein, we consider appropriate the definition of Harold & Mooi (1994, p. 262), which treats an area of endemism as "a geographic region that comprises two or more natural taxa (i.e., monophyletic groups), exhibiting