Less is more stable: arguing for few names in turtle's taxonomy

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Background. Beyond the International Codes of Zoological (ICZN) and Botanical Nomenclature and the PhyloCode, there is an alternative taxonomic system for phylogenetic systematics proposed. This phylogenetic nomenclature suggests the elimination of suprageneric names and the use of negative indexes instead of it. This system of nomenclature has a basic principle to identify clades: the presence of nominal heterobathmy, which is analogous to Hennig's "heterobathmy of characters", but applied to taxa names. Here I argue for an extensive use of heterobathmy as basic criteria to determinate "good" nodes to identify higher level taxa names.

Methods. I used a previews published dataset (doi:10.5061/dryad.f2h6r) and ran several searches for Most Parsimonious Trees (MPT) using different search algorithms and assumptions in TNT. After that, I compared the results of different searches, mapped the characters transformations, and calculate the Bremer supports. The results were then compared with the current taxonomy proposed for Pelomedusoides, with emphasis on Bothremydidae.

Results. The remarkable divergences with the current taxonomy of Bothremydidae are: (1) Kurmademydini and Bothremydini need to be redefined; (2) Cearachelyini and *Galianemys* lack diagnostic characters and, therefore, are not monophyletic; and (3) Bothremydidae do not possess common diagnostic characters in all MPT, thus, lacks a well supported heterobathmy with its sister-group, Podocnemidinura (=*Pan-Podocnemididae*). Moreover, the Infrafamily Bothremydodda has Bremer support of 3. However, given that all bothremydids are extinct, it is impossible to define a panstem clade based on a crown group. The result is an unstable nomenclature with more names than necessary.

Discussion. The use of heterobathmy is a center point in Hennig's argumentation for phylogenetic reconstruction. Indeed, it implies the zero length collapsing rule applied to cladistic reconstruction (which is the TNT default option). Nonetheless, ambiguous characters or several equal MPT can imply on phylogenetic reconstructions that lack a consistent

heterobathmy (i.e.: a common diagnostic character in the ancestor eidophoront of a given node in all MPT; as is the case of Bothremydidae). A possible solution is to use the suffix "formes" to designate extinct lineages with stem-species when some nodes are not well supported in a given phylogeny. In the example presented here, it would consist on naming ICZN's Bothremydodda as "Bothremydidae" (*sensu stricto*) and ICZN's Bothremydidae (*sensu lato*, i.e.: including stem-Bothremydidae) as "Bothremydidiformes" and avoid naming each node of the consensus tree unless it has high Bremer support. By taking into account this delimitation criterion, we can propose a more stable and clean taxonomy.

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