

<https://doi.org/10.11646/zootaxa.4379.3.8>
http://zoobank.org/urn:lsid:zoobank.org:pub:28C7C5CD-7C44-4D49-B55B-FDEA6A035BF9

Separation of monophyletic groups into distinct genera should consider phenotypic discontinuities: the case of Lasiurini (Chiroptera: Vespertilionidae)

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“Given consistency with its proper basis, classification should be as stable as possible, changed only when changing knowledge tends to make it definitely less useful or reveals inconsistency”

George Gaylord Simpson (1961)

Baird *et al.* (2015) split *Lasiurus* into three distinct genera (*Aeorestes*, *Dasypterus* and *Lasiurus*) based on tree topology and divergence times for the tribe Lasiurini. This arrangement has not been widely adopted by the scientific community and was criticized by Ziegler *et al.* (2016). More recently, Baird *et al.* (2017) reinforced the taxonomic arrangement of Lasiurini comprised by three genera. Baird *et al.* (2015, 2017) provided the most comprehensive phylogenetic analyses of *Lasiurus* and offer important insights on the phylogeny and alpha-taxonomy of the group. However, we disagree with the taxonomic arrangement proposed at the genus level and explain our point below.

Baird *et al.* (2015, 2017) recovered Lasiurini as a monophyletic group with three internal clades (see Baird *et al.* 2015:1262, fig. 5), which are equivalent to the three traditionally-recognized and informally-named species groups: red, hoary, and yellow bats. The split between yellow bats and the ancestor of red and hoary bats was estimated to have occurred ca. 12.2–26.5 Ma, followed by the subsequent split of red and hoary bats between 9.1 and 20.8 Ma (Baird *et al.* 2015). Their rationale for separating these clades into three distinct genera is based on genetic distances (obtained from the nucleotide substitution using the Kimura 2-parameter model); cranial features described by Tate (1942); and the argument that internal groups are already informally named as red bats, yellow bats, and hoary bats, and that these names should be reflected in the scientific nomenclature of the group (Baird *et al.* 2015). Here, we discuss point-to-point Baird *et al.*’s (2015, 2017) rationale to show the lack of support to recognize three different genera within Lasiurini. Firstly, genetic distance and divergence time are not evidence for recognizing different genera (see Garbino 2015), inasmuch as these categories are not comparable among taxa—for example, primate genus *Tarsius* is at least 45 Ma old, while *Homo* and *Pan* diverged from each other about 6 Ma. About the morphological distinction, Baird *et al.* (2015, 2017) do not report the skull characters that they judge useful to distinguish the three genera. Moreover, it is noteworthy that Tate (1942) did recognize two genera (not three) within Lasiurini based uniquely the occurrence of the upper second premolars (p2). Therefore, the skull differences cited by Baird *et al.* (2015) cannot be reassessed, and there are no clear phenotypic discontinuities supporting Tate’s (1942) hypothesis, which has been subsequently refuted (see Hoofer & Van Den Bussche 2003; Roehrs *et al.* 2010). Finally, the congruence between vernacular names and natural unities (i.e. clades) cannot be used as an argument to take taxonomic decisions.

Baird *et al.* (2017) reject the criticism of Ziegler *et al.* (2016) arguing that the subgenus category is frequently ignored, and that separation of *Lasiurus* into three genera would improve the taxonomy of the group, indicating the divergence among the main internal clades of Lasiurini. Considering only the genus-level taxonomy of Lasiurini, we disagree that the split of this well-defined genus will bring any clarification to the taxonomy because the genus has not been retrieved as paraphyletic and thus there is no need to split it into different genera based on a falsified premise of

monophyly. Besides, the arrangement recognizing *Aeoreutes*, *Dasypterus* and *Lasiurus* as subgenera of *Lasiurus* would represent better the topology found by Baird *et al.* (2015), as this arrangement conveys the information that there are three monophyletic groups within *Lasiurus*.

We agree that clades may be separated into different genera if well-marked phenotypic discontinuities are detected among them. However, the decision will always be arbitrary, but if supported by a suite of consistent characters, preferably from multiple datasets, it is more likely that the proposed arrangement will be accepted by the scientific community. In this case, Baird *et al.*'s (2015, 2017) arrangement into three distinct genera of Lasiurini is not the most appropriate decision, because it attributes unnecessary weight to clades whose phenotypic distinction is merely superficial. Thus, this arrangement does not add any information for the current understanding of the evolutionary history of the group. In addition, it also introduces nomenclatural instability, impairing scientific communication and online indexing (e.g., an exact search in Google Scholar for "Lasiurus cinereus" yields over 5,000 results). The assignment of other names to *Lasiurus* may give the impression of a degree of phylogenetic differentiation that does not represent the established knowledge. Based on the lack of support for Baird *et al.*'s (2015, 2017) hypothesis, and following the principle of stability of the International Code of Zoological Nomenclature (1999), we strongly suggest that all Lasiurini species be kept under the genus *Lasiurus*. To better reflect the topology found by the authors, maintain stability, and avoid the use of informal names, we recommend following Ziegler *et al.* (2016) who consider *Aeoreutes* and *Dasypterus* as subgenera of *Lasiurus*.

Rather than defining genera and discussing the taxonomy of *Lasiurus*, our proposal is to reinforce the idea that if a nomenclatural change does not alter the conception and understanding of a taxon, the most parsimonious decision is to maintain the accepted arrangement.

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