

Supporting species in *ODE*: explaining and citing

Olaf R. P. Bininda-Emonds

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Species represent the fundamental unit in biology. This remains true despite a huge and ongoing debate as to exactly what species are and how best to delineate those species in the world around us. Indeed, taxonomic disagreements as to the species status of a particular taxon can often rest on the species criterion that has been applied. As shown by the study of Agapow et al. (2004), the choice of species concept can often result in large differences in the number of recognized species, even for well-studied groups. Although DNA taxonomy (Tautz et al. 2003) has been disparaged by some for potentially making the problem worse or the species delineations more subjective (Lipscomb et al. 2003; Seberg et al. 2003), molecular data merely add another source of data to an already subjective exercise.

Thus, it is important that descriptions of new species as well as redefinitions of existing ones be accompanied by an explicit statement of the species concept upon which these judgments are based. As of the current issue of *Organisms Diversity & Evolution (ODE)*, this will become a formal requirement for all relevant papers. Inclusion of this extra bit of information will by no means end any taxonomic disagreements over a particular taxon, but could help inform if the disagreement at least derives from the application of two different species concepts and might somehow be reconcilable. As de Queiroz (2007) has recently in part argued, many species concepts might not be mutually

exclusive, but instead segregated along a temporal dimension, characterizing and emphasizing different processes during speciation. In other words, apparent taxonomic conflict might not be true conflict, something that the additional information could help to tease out.

In this, it should be apparent that species descriptions and redefinitions — and indeed the analogous processes for taxa of any level — represent clear scientific hypotheses that ought to be cited as such. (An article expanding on these ideas should hopefully appear later this year in *ODE*.) Very often, however, this is not the case, even in the taxonomic literature. Either the authors responsible for the species names are not cited whatsoever or are presented after the species name in the main text, but without the corresponding paper being included in the reference list. The latter, in fact, represents the halfway-house strategy that *ODE* has used since its inception. It is only in rare cases (e.g., *Zootaxa*), that a journal consistently requires the full and proper citation of papers associated with a species description.

Why exactly this has become the case is largely unclear. What is clear, however, is that such practices effectively undermine the impact of taxonomic work. There have been any number of discussions as to whether or not the impact factor is a valid measure of the importance of any particular paper, journal, or research efforts of a particular scientist, or if the impact factor is naturally biased against this field or the other (Ha et al. 2006; Krell 2002; Schweizer 2010; van Nierop 2009). (Interestingly, the latter debates extend far beyond taxonomy, with other fields such as statistics feeling equally discriminated against.) These questions aside, much of any apparent bias against taxonomic papers results simply from the general failure to cite taxonomic papers fully. If we see the need to cite computer programs (e.g. MrBayes, with its 12000+ citations for the two associated

O. R. P. Bininda-Emonds (✉)
AG Systematik und Evolutionsbiologie, IBU – Fakultät V,
Carl von Ossietzky Universität Oldenburg,
Carl von Ossietzky Strasse 9–11,
26111 Oldenburg, Germany
e-mail: olaf.bininda@uni-oldenburg.de

publications (Huelsenbeck and Ronquist 2001; Ronquist and Huelsenbeck 2003), each of which can now add one more), many of which merely implement methods that are described more fully in other publications, why should the same not be true of taxonomic articles?

Accordingly, *ODE* will now require that author citations for species names be supported by inclusion of the full, accompanying reference. This change, admittedly, is not without practical difficulties. For instance, the scope of phylogenetic analysis has increased dramatically, with phylogenetic studies now often including hundreds, if not thousands, of individual species. Should the reference lists in papers based on such comprehensive analyses swell accordingly? Strictly speaking, yes. Practically, however, probably not. Thus, although again far from ideal (or idealistic), *ODE* will initially pursue a strategy where only those species names mentioned in the main text are to be accompanied by fully cited references.

Together, these two arguably minor changes will have large, positive effects. In the first instance, the delineation of species, whether new or reworked, will be that much more transparent and explicitly hypothesis-driven through the explicit inclusion of the underlying species concept. In the second instance, full and proper citation of species descriptions will emphasize that such taxonomic activities are indeed hypothesis-driven and “reward” them with the usual scientific credit.

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