



The PhyloCode, types, ranks and monophyly: a response to Pickett

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Abstract

A report from the First International Phylogenetic Nomenclature Meeting recently published in *Cladistics* conveys several misconceptions about the PhyloCode and presents an erroneous interpretation of discussions that took place at that meeting. Contrary to Pickett's assertions, the PhyloCode is designed to name clades, not paraphyletic groups; the rejection of ranks has never been a fundamental principle of phylogenetic nomenclature; and specifiers under the PhyloCode differ in several ways from types under rank-based nomenclature.

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The First International Phylogenetic Nomenclature Meeting, which convened in Paris in July 2004 (Laurin and Cantino, 2004), marked a turning point in the history of biological nomenclature by inaugurating an international society that will soon ratify and publish the PhyloCode (Cantino and de Queiroz, 2004). The draft PhyloCode represents the culmination of two decades of development of principles of phylogenetic nomenclature, a new approach to biological nomenclature based on methods that specify the references of taxon names in terms of common descent (Gauthier, 1986; de Queiroz and Gauthier, 1990, 1992, 1994; Pleijel and Rouse, 2000). Pickett (2005) provided a brief report on the First International Phylogenetic Nomenclature Meeting (referred to as the Paris meeting below), which erroneously asserts that the proponents of the PhyloCode have abandoned the “allegedly important principles that gave it birth”. In support of this assertion, Pickett (2005) argues three main points about the

PhyloCode: (1) it will not require taxa to be monophyletic; (2) it allows ranks; and (3) specifiers used under the PhyloCode are essentially types. Below, we attempt to clarify these issues and address a few related points raised by Pickett (2005).

The PhyloCode and monophyly

Pickett (2005) erroneously stated that the PhyloCode “will be agnostic on the issue of monophyly just as our standing nomenclatural rules are.” He apparently confused a statement by Kevin de Queiroz concerning the general properties of phylogenetic definitions with the requirements for establishment of a taxon name under the PhyloCode. As explained by de Queiroz at the meeting, phylogenetic nomenclature could *in theory* be used to define the names of paraphyletic or polyphyletic groups (de Queiroz and Gauthier, 1990, p. 311), although this is something that no practitioner of phylogenetic nomenclature has chosen to do. This statement does not imply that the names of paraphyletic

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groups could be established under the PhyloCode, which provides rules only for applying names to clades, and not to paraphyletic taxa (Preamble, section 2 and Article 1 of the PhyloCode). The only exception concerns species names, because some concepts of species (such as the biological species concept) do not imply monophyly; thus, species names will be governed by a separate code (provisionally referred to as the Species Code) that will be implemented independently from the PhyloCode for clade names (provisionally called the Clade Code).

Phylogenetic nomenclature and ranks

Pickett (2005) was puzzled that the PhyloCode allows the use of ranks (Linnean categories). Contrary to Pickett's view, the rejection of categorical ranks has never been a fundamental principle of phylogenetic nomenclature. Instead, the fundamental principle of phylogenetic nomenclature is that the definitions of taxon names must be specified in terms of common ancestry relationships and not in terms of categorical ranks. This principle does not prohibit the use of categorical ranks, although it does mean that categorical ranks, if used, have no bearing on the spelling or application of taxon names (de Queiroz, 1997; de Queiroz and Cantino, 2001).

Specifiers and types

Pickett (2005) argued that specifiers, which are used in the PhyloCode, are “essentially types”. This is misleading, and the citation (from a talk given by K. de Queiroz) that Pickett (2005) used to justify this statement is more cautious: “specifiers ... are roughly analogous to types.” Wings of birds and airplanes are also “roughly analogous”, but this doesn't mean that they are the same thing. Under the PhyloCode, specifiers are used as reference points upon which phylogenetic definitions are anchored, and in that sense they function analogously to the name-bearing types of rank-based nomenclature (see de Queiroz and Cantino, 2001 for a detailed discussion of the similarities and differences between types and specifiers). However, in contrast to types, specifiers can be apomorphies. Moreover, external specifiers, which are by definition excluded from the taxa whose names they define, have no counterpart in rank-based nomenclature (internal specifiers, like types, will always be part of the taxa whose names they are used to define). Finally, at least two specifiers are used to apply a name to a taxon under the PhyloCode, in the context of a reference phylogeny. Such applications, and the resulting circumscriptions of taxa, are unambiguous and precise; they change only if the reference phylogeny changes. Under rank-based nomenclature, names are

applied to taxa through a combination of a single type and a rank. The taxa to which particular names are applied using this method can fluctuate widely in composition, even when there is no disagreement about the phylogeny, because the rank of a taxon can be changed and taxa of the same rank can be lumped (de Queiroz and Gauthier, 1994; Pleijel and Rouse, 2000). Thus, taxon composition under rank-based codes is less stable and objective (because of subjective components in rank assignment) than under the PhyloCode, and this relates to differences between types and specifiers.

Arguments against the PhyloCode, popularity and other issues

Some additional comments from Pickett (2005) about the PhyloCode and statements made at the Paris meeting also deserve clarification. Pickett (2005, p. 79) stated that “...the substantive arguments against the PhyloCode are being ignored ...” Similar claims have been made previously by opponents of the PhyloCode (Wenzel et al., 2004, p. 19). These statements are puzzling because numerous detailed responses to the arguments against phylogenetic nomenclature and the PhyloCode have been published (e.g., Lee, 1996, 1999, 2001; de Queiroz, 1997; Cantino, 2000, 2004; de Queiroz and Cantino, 2001; Bryant and Cantino, 2002; Bertrand and Pleijel, 2003; Pleijel and Härlin, 2004; Laurin, 2005).

Pickett (2005, p. 80) also took a statement out of context when he reported that Nico Cellinese said “systematists are lazy”. Cellinese discussed the applicability of the PhyloCode to the arrangement of natural history collections, in particular, herbaria. A systematist herself, she analyzed arguments against arranging collections phylogenetically (TAXACOM listserv, January 2002 [message 42], April 1999 [message 77], December 1995 [message 22]; HERBARIA listserv, 23 October 2003). She demonstrated that the PhyloCode and rankless nomenclature are not only practical but that they facilitate the often tedious process of day-to-day curation, i.e., updating the arrangement of the collection can be achieved simply by shifting specimens from one cabinet to another without having to change names or modify labels.

Last but not least, Pickett (2005, p. 79) claimed that “...the PhyloCode is gaining popularity among the press while not gaining popularity among scientists...” This statement is both unsubstantiated and questionable. Many of the 70 systematists who participated in the Paris meeting were not members of the PhyloCode Advisory Committee (a group of 26 members composed largely of the earliest advocates of phylogenetic nomenclature), and some had never previously used phylogenetic nomenclature (including graduate students whose thesis advisors are not practitioners of phylo-

genetic nomenclature). Moreover, the participants in the Paris meeting did not include several long-term supporters of phylogenetic nomenclature (some members of the PhyloCode Advisory Committee), and several other systematists expressed interest in attending the meeting but were prevented because of other commitments. In addition, the number of hits on the PhyloCode web site has been steadily increasing (e.g., 15 581 hits in November 2004, compared to 9576 hits in November 2003). Thus, although we also lack hard data, there are reasons to believe that the popularity of the PhyloCode is growing among scientists.

Conclusion

We hope to have shown that the proponents of the PhyloCode have not abandoned the principles that justified its creation, and that the criticisms of the PhyloCode expressed by Pickett (2005) are unwarranted.

References

- Bertrand, Y., Pleijel, F., 2003. Nomenclature phylogénétique: One réponse Bull. Soc. Fr. Syst. 29, 24–27.
- Bryant, H.N., Cantino, P.D., 2002. A review of criticisms of phylogenetic nomenclature: is taxonomic freedom the fundamental issue? Biol. Rev. Cambridge Philos. Soc. 77, 39–55.
- Cantino, P.D., 2000. Phylogenetic nomenclature: addressing some concerns. Taxon, 49, 85–93.
- Cantino, P.D., 2004. Classifying species versus naming clades. Taxon, 53, 795–798.
- Cantino, P.D., de Queiroz, K., 2004. PhyloCode: a Phylogenetic Code of Biological Nomenclature, Version 2b. <http://www.ohiou.edu/phylocode/>.
- Gauthier, J., 1986. Saurischian monophyly and the origin of birds. In: Padian, K. (Eds.), Saurischian Monophyly and the Origin of Birds. California Academy of Sciences, San Francisco, pp. 1–55.
- HERBARIA Listserv. <http://scarab.science.oregonstate.edu/mailman/listinfo/herbaria>.
- Laurin, M., 2005. Dites oui au PhyloCode. Bull. Soc. Fr. Syst., 34, 25–31.
- Laurin, M., Cantino, P.D., 2004. First international phylogenetic nomenclature meeting: a report. Zool. Scripta, 33, 475–479.
- Lee, M.S.Y., 1996. The phylogenetic approach to biological taxonomy: practical aspects. Zool. Scripta, 25, 187–190.
- Lee, M.S.Y., 1999. Stability of higher taxa in phylogenetic nomenclature—some comments on Moore (1998). Zool. Scripta, 28, 361–366.
- Lee, M.S.Y., 2001. On recent arguments for phylogenetic nomenclature. Taxon, 50, 175–180.
- Pickett, K.M., 2005. The new and improved PhyloCode, now with types, ranks, and even polyphyly: a conference report from the First International Phylogenetic Nomenclature Meeting. Cladistics, 21, 79–82.
- Pleijel, F., Härlin, M., 2004. Phylogenetic nomenclature is compatible with diverse philosophical perspectives. Zool. Scripta, 33, 587–591.
- Pleijel, F., Rouse, G.W., 2000. Least-inclusive taxonomic unit: a new taxonomic concept for biology. Proc. Roy. Soc. Lond., Ser. B, Biol. Sci. 267, 627–630.
- de Queiroz, K., 1997. Misunderstandings about the phylogenetic approach to biological nomenclature: a reply to Lidén and Oxelman. Zool. Scripta, 26, 67–70.
- de Queiroz, K., Cantino, P.D., 2001. Phylogenetic nomenclature and the PhyloCode. Bull. Zool. Nomencl. 58, 254–271.
- de Queiroz, K., Gauthier, J., 1990. Phylogeny as a central principle in taxonomy: phylogenetic definitions of taxon names. Syst. Zool. 39, 307–322.
- de Queiroz, K., Gauthier, J., 1992. Phylogenetic taxonomy. Annu. Rev. Ecol. Syst. 23, 449–480.
- de Queiroz, K., Gauthier, J., 1994. Toward a phylogenetic system of biological nomenclature. Trends Ecol. Evol. 9, 27–31.
- TAXACOM Listserv. <http://listserv.nhm.ku.edu/archives/taxacom.html>.
- Wenzel, J.W., Nixon, K.C., Cuccodoro, G., 2004. Dites non au PhyloCode! Bull. Soc. Fr. Syst. 31, 19–23.