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The use of the prefix Pan- and other problems in zoological family-series nomenclature

ANTOINE LOUCHART[1,3], LAURENT VIRIOT[1] & ALAIN DUBOIS[2]

[1]*IGFL, équipe « évo-dévo de la denture chez les vertébrés », Centre National de la Recherche Scientifique, ENS de Lyon, 46 allée d'Italie, 69364 Lyon cedex 07, France*
[2]*Reptiles & Amphibiens, UMR 7205 OSEB, Muséum national d'Histoire naturelle, CP 30, 25 rue Cuvier, 75005 Paris, France*
[3]*Corresponding author. E-mail: antoine.louchart@ens-lyon.fr*

Zoological nomenclature is the obligate medium by which we communicate taxonomic information, and a series of precise nomenclatural rules are designed to minimize confusion and ambiguity. The longest used, internationally applicable system of nomenclature is "Linnaean Nomenclature" (LN) (Polaszek & Wilson 2005), which has provided a stable platform capable of simultaneously designating discrete taxa and conveying their phylogenetic relationships, through the use of scientific names (nomina; Dubois 2000). Precise adherence to the rules of nomenclature as defined by the International Commission on Zoological Nomenclature (ICZN) is all the more important today when zoologists have millions of taxa to name. The recent importation of exogenous practices into LN is both confusing and inacceptable under the rules of the ICZN. Such practices include the use of a prefix Pan- in the family-series nomenclature. The nomenclature of all taxa from rank subspecies to superfamily is regulated by the International Code of Zoological Nomenclature (ICZN Code; Anonymous 1999). This means that all zoologists who endorse LN should use nomina complying with the rules of the ICZN Code for taxa of all ranks, including those from superfamily to subtribe and additional intermediate ranks of the nominal family group, also called family-series. However, some recent publications using LN do not follow the ICZN Code in several respects, concerning in particular (1) the rules of formation of nomina and (2) their authorship and date. Recent articles involving fossil birds (Smith 2011, 2013; Smith & Mayr 2013), explicitly or implicitly following the ICZN Code, illustrate both problems, representative of these recent practices. We wish to emphasize that our comments are in no way criticisms directed toward the core information of these studies, otherwise extremely useful, but rather a more general and formal invitation to follow more closely the ICZN Code. We found few other published examples of similar practice concerning birds ("Pan-Apodidae" in Mayr & Manegold 2002, also used by Ksepka et al. 2013; "Pan-Trochilidae" in Mayr & Manegold 2002 and Mayr 2007; "Pan-Hemiprocnidae" in Mayr & Manegold 2002; for articles published in a LN frame). We use hereafter the "Pan-Alcidae" example.

Family-series nomina such as "Pan-Alcidae" (Smith 2011, 2013; Smith & Mayr 2013) are not acceptable in zoological LN. Nevertheless, in these articles LN and the ICZN Code are, in principle, followed (implicitly or explicitly). Smith's (2011, 2013) papers, in particular, were written explicitly within the frame of the ICZN Code when naming new genera and species. Under the ICZN Code, to be available and valid, a family-series nomen must be a term in the nominative plural formed by adding a simple suffix (like –idae for a family) to the stem of a genus-series nomen, that of its type genus (Articles 29.3 and 63). The practice consisting in the addition of a prefix Pan- to a family-series nomen, first introduced by Lauterbach (1989), followed by Meier & Richter (1992), and now recommended by the PhyloCode (Cantino & de Queiroz 2010), is not ICZN Code-compliant, and is not needed as perfectly appropriate LN nomina will be available in all cases. Whatever the taxonomic method used to delimit a taxon (e.g., through a stem-based definition under a paradigm of phylogenetic taxonomy as defined by de Queiroz & Gauthier 1990), its valid nomen in LN cannot include a prefix. Here we show, using the same taxonomy and the same taxonomic contents for Alcidae as Smith (2011), that available nomina exist for the taxon referred to as "Pan-Alcidae" and other, more inclusive taxa. The nomen Pan-Alcidae introduced by Smith (2011) is unavailable and therefore invalid under the ICZN Code. The taxon at stake, with the same definition and content, includes all taxa phylogenetically closer to the extant Alcidae than to the extant sister taxon of Alcidae, which is the family Stercorariidae G.R. Gray, 1870 (1831), according to Ericson *et al.* (2003), Paton & Baker (2006), Baker *et al.* (2007), Fain & Houde (2007), Pereira & Baker (2008) and Weir & Mursleen (2012). This taxon can be referred to the rank epifamily (Dubois & Raffaëlli 2012) and should then be called Alcoidae. As for its author and date, they are discussed below.

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Under the ICZN Code, nomina of taxa are referred to nominal series and within these series to nomenclatural ranks. Using an unranked nomenclature is incompatible with LN. The number of ranks is not fixed and depends on the needs. Ranks are arbitrary, but very useful to express hypotheses of phylogenetic relationships between taxa, provided sister taxa are always referred to the same rank (Dubois 2008). In a given taxonomy based on a given tree, not all nodes or branches need to be recognized as taxa, and in turn not all taxa need to be named and referred to formal ranks. But whenever a node or branch is recognized as a taxon and formally named under LN, its nomen should comply with the ICZN Code. In the family-series, there is no limitation in the number of ranks below superfamily, but five standard endings must be used for the five most often used ranks: –oidea for superfamilies, –idae for families, –inae for subfamilies, –ini for tribes and –ina for subtribes. The ICZN Code adds that these five suffixes must not be used at other ranks but that no standard suffixes are imposed for nomina of taxa at all other ranks of the family-series, which must just be in the nominative plural.

These conditions allow introducing a second mistake which is sometimes found in recent publications and which is also exemplified in Smith & Mayr (2013)—that of introducing different authors for nomina of different rank in one nominal series, e.g., family-series. These authors used three of the standard endings in their nomenclatural hierarchy: Alcidae, Alcinae and Alcini. Although they did not state the ranks of these taxa, these spellings impose to consider that they designate respectively a family, a subfamily and a tribe. These three different spellings are credited with different authors and dates, as if they were different nomina. However, they are not different nomina but avatars or paronyms (Dubois 2000) of the same nomen. Affording different authors and dates to paronyms ignores the Principle of Coordination of the ICZN Code (Article 36.1), which states that a nomen introduced in zoological nomenclature for a taxon at any rank in the family-series is deemed to have been simultaneously introduced for nominal taxa at all other ranks in this nominal-series. At these different ranks, the suffix changes, but this remains the same nomen, with the same author, date and type genus. Thus, the different taxa recognized by Smith & Mayr (2013) as the family "Alcidae Leach 1820", the subfamily "Alcinae sensu Smith 2011" and the subfamily "Alcini Storer 1960" are in fact different paronyms of a single nomen, having the same author and date. According to Bock (1994:138), the first published work where was introduced a family-series nomen based on the generic nomen *Alca* Linnaeus, 1758 was that of Leach (1820:70), so that the valid designation of these three taxa under the *Code* are family Alcidae Leach, 1820, subfamily Alcinae Leach, 1820 and tribe Alcini Leach, 1820, to which epifamily Alcoidae Leach, 1820 and superfamily Alcoidea Leach, 1820 (not "Alcioidea Vigors, 1825" as stated in error by Livezey 2010) should be added. Incidentally, Alcidae Leach, 1820 is a justifiable emendation of Alcadae Leach, 1820 (Kashin 1974). In the taxonomy used by Smith & Mayr (2013), superfamily Alcoidea is the suitable nomen for the least inclusive taxon comprising Alcidae and Stercorariidae.

In alternative phylogenetic hypotheses, much less frequently and with weak support, Alcidae are sister to other clades than Stercorariidae. Nevertheless, all these alternative sister clades are members of the suborder Lari. Such alternative sister clades to Alcidae are either the Laridae Rafinesque, 1815, Sternidae Vigors, 1825, Rynchopidae Bonaparte, 1838, or even Glareolidae C.L. Brehm, 1831 (e.g., Thomas *et al.* 2004). Hence, in most alternatives, in the current state of knowledge, the superfamily nomen Alcoidea Leach, 1820 has priority over any other nomen to designate the taxon uniting all auks plus its extant sister taxon. Only in the hypothesis of Laridae being closest to Alcidae would the superfamily nomen differ with Laroidea Rafinesque, 1815 then having priority. But again, this and the other phylogenetic hypotheses alternative to Stercorariidae as sister to Alcidae, are comparatively much less supported, and currently have almost no followers.

It should further be added that the notation Alcinae "sensu Smith 2011" (Smith & Mayr 2013) is inappropriate to designate the authorship of a nomen. This formula points to an emended taxonomic concept of the taxon, but not to a different nomen for the latter. Nomina are not taxa, and reciprocally. The author's name and date which follow a nomen in a taxonomic publication are those of this nomen, not those of the taxon, the taxonomic concept designated by this nomen (for more details see Dubois 2012). Nevertheless, it is useful to precise the taxonomic concept in some cases, and this might be done, in the present example, as follows: "subfamily Alcinae Leach, 1820 (taxon composition sensu Smith 2011)".

We therefore draw the attention of taxonomists and all users of scientific names, to the fact that such practices are conflicting with the valid use of family-series nomina as regulated by the ICZN Code. They are acceptable under alternative nomenclatural systems such as the "Phylogenetic Nomenclature" (PN) of the PhyloCode, which is actually a composite system being both a code of taxonomy and a code of nomenclature, in which the confusion between nomen and taxon is a permanent issue. Contrary to what some authors believe (e.g., Kuntner & Agnarsson 2006), the ICZN Code and the PhyloCode are based on widely different and incompatible nomenclatural practices, the first one being ostensional and the second one intensional (e.g., Dubois 2008), and they are therefore not miscible within a single classification or publication. A small minority of researchers adheres to the rules of PN. Authors who use LN, explicitly

or implicitly, should conform to the rules of the ICZN Code and prohibit practices such as described above. In any given work, a clear choice has to be made among both nomenclatural systems, and a single system has to be used throughout the work.

Strict application of rules of nomenclature is often considered secondary, because it is not really a scientific activity, and it does not produce systematic knowledge. Indeed, nomenclature is only a tool, but in our world of fast growing knowledge on fast increasing numbers of taxa, this tool needs to be robust, and rules need to be applied rigorously, otherwise confusion might increase too. We encourage ornithologists, and all systematists, to adhere more closely to the ICZN Code. Alternatively, if one prefers to use another system of nomenclature, at least this should be clearly stated in articles, and the system in question should not be mixed with the ICZN Code (or elements of the latter).

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