Proposals for the incorporation of nomina of higher-ranked taxa into the Code

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*Note.* In order to avoid semantic ambiguity, the following terms (Dubois, 2000, 2005a-c) are used here: (1) *nomen* (plural *nomina*) for ‘scientific name’ in the Code (to avoid possible confusions with authors’ names, vernacular names, etc.); (2) *nominal-series* for a set of nomina that interact concerning synonymy, homonymy, priority, etc.: thus, *family-series* is used here instead of ‘family group’ as used in the Code, etc., to avoid confusions such as between the formula ‘species group’ to designate either a taxon or a nomenclatural level.

**Introduction**

The Code currently regulates only the nomina of taxa of the species-, genus- and family-series, i.e. from the rank subspecies to the rank superfamily. For a short period, i.e. between the 1953 Copenhagen Congress (Hemming, 1953) and the 1958 London Congress, Rules for the naming of orders and other higher ranked taxa were incorporated in the international ‘Règles’, with use of type genera for such nomina (Linsley & Usinger, 1959), but these Rules had been deleted when the first edition of the Code (ICZN, 1961) was published. Currently these nomina are not covered by the Code, which raises increasing problems as new phylogenetic analyses of zoological groups are produced: such works usually tend to increase the number of higher taxa and to modify the contents and definitions of these taxa. The absence of Rules for the naming of higher taxa currently results in ambiguity and confusion, and if this situation persists it may result in chaos, different authors applying either the same nomen to different taxa or different nomina to the same taxon. This prompted me to propose formal rules for the incorporation of the nomina of higher taxa into the Code. These proposals are widely different and much more detailed than previous proposals already published in _BZN_ (Rasnitsyn, 1982; Brothers, 1983; Starobogatov, 1991). Given the space limitations of this paper, they cannot be presented and discussed here in detail, but details of the project are provided elsewhere (Dubois, 2005a-c).

**Premises**

The proposed Rules are presented here in the context of a philosophy of zoological nomenclature that relies on a few simple premises, in agreement with those of the Code for nomina of lower-ranked taxa (Dubois, 2005b):

1. Nomenclature is distinct from taxonomy: the role of the latter is to define or recognize classificatory units or taxa, whereas the role of the former is to provide nomina for these units. Accordingly, nomina are just labels allowing unambiguous, universal and automatic designation of taxa within the frame of any given taxonomy. They are not taxa, or definitions of taxa, or theories about taxa, their properties or
their evolution. They have no meaning or value in isolation. Their function is to allow storage and retrieval of taxonomic information about organisms, not to replace this information.

2. Establishment of the status of a nomen is a three-step or three-storey process (Dubois, 2005a-b):

(a) Availability of a nomen is provided by its publication under certain conditions (date, Latin or Latin-like term, presence of a description, definition or indication purported to differentiate the taxon designated by the nomen).

(b) Allocation of a nomen to any potential taxon is not made through any kind of definition (be it phylogenetic, phenetic or other), but through the use of a tool unique to biological nomenclature, the ‘name-bearing type’ or onomatophore (Simpson, 1940, 1961), which establishes an objective and permanent link between the real world of organisms and the world of language (Dubois & Ohler, 1997; Dubois, 2005b). Onomatophores provide a means of ‘labelling’ taxa by ostension (Keller et al., 2003), but do not define taxa. Any onomatophore is included in several (usually many) more or less inclusive taxa of various hierarchical ranks, so that the nomen potentially applies to all of these taxa; which ones will in the end have to bear this nomen will be determined by the next step.

(c) In the three nominal-series covered by the Code, combination of the Rule of Coordination and of the Rule of Priority allows the automatic establishment of the hierarchical relationships between nomina designating more or less inclusive taxa. Among several nomina of which the onomatophores are included in a given taxon, the first published is the valid one, and this applies to taxa at all ranks including these onomatophores, up to the most inclusive one: at each rank, a more inclusive taxon bears the same nomen as its nominotypical subordinate taxon, which is the first named of all its subordinate taxa; this nomen may be either modified at different ranks as in the family-series, or not as in the other two nominal-series. Therefore, validity of nomen among several synonyms applying potentially to the same taxon is normally determined by priority of publication. However, in a few special cases, in order to preserve well-known nomina, this can be overruled by taking prevalent usage into account.

3. Nomina are historical entities with a given nomenclatural status (regarding their publication date and their onomatophore) which cannot be changed later. Under the Code, because of this ‘founder effect’, a nomen cannot be redefined after its creation. The only changes that can be brought to the nomenclatural status of nomina are through first-reviser actions, but such actions are strictly regulated and can occur only in a few situations, whenever some ambiguity remained after the original creation of the nomen (no onomatophore designation, contemporaneous publication of two synonymous or homonymous nomina, etc.).

4. Ranking of taxa in the nomenclatural hierarchy does not provide any information on the ‘nature’ or properties of taxa, but merely has the function of providing an organizational model (Knox, 1998) for indexing taxonomic information. This means that ranks are largely arbitrary and that by no means should a family of beetles be construed as equivalent by any criterion to a family of birds. However, in both groups any subfamily is subordinate to a single family and both
taxa occupy a unique and identifiable place in the system, thus allowing unambiguous allocation of any given organism to a single taxon bearing a single nomen, at all levels of the hierarchy.

5. Although very important for communication, nomenclature is at the service of taxonomy, not the reverse, and nomenclatural rules should be devised in such a way as to be able to work simply and automatically, in order for two specialists working on opposite sides of the planet to be able to reach independently the same conclusion as to the valid nomen that a given taxon should bear within the frame of a given taxonomy. This means that the reply to the question ‘do we want a Code or a committee?’ (Fosberg, 1964) should clearly be ‘a Code’. Rules for the allocation of nomina to taxa should therefore be universal, simple, and leave no ground for personal opinions, tastes or interpretations. This is in contrast with the situation currently illustrated by supporters of the PhyloCode, an alternative nomenclatural system, who are engaged in endless discussions about the status of nomina (e.g., Laurin & Anderson, 2004). We are at the beginning of the ‘century of extinctions’ (Dubois, 2003), and taxonomists, if they act responsibly, have other things to do than to quibble on the status of nomina: they must collect, study and describe our planet’s remaining species before they become extinct.

Differences

The proposed new Rules have been devised in agreement with these five premises. They differ from all previously proposed systems for the nomenclature of higher taxa (references in Dubois, 2005c) in several important respects:

1. In all previous systems, two or more nominal-series were recognized above the family-series. In the new system, following the original proposal of Dubois (1984), a single nominal-series is recognized for higher taxa: the class-series. This is because, as stated above under 4, ranks are largely arbitrary, and there would be no point in discussing whether a given taxon ‘is’ a class or an order: the important point for communication among biologists is not the name given to the rank of the taxon, but the hierarchical arrangement of taxa among which this taxon occupies a unique position.

2. Two other proposals of previous authors were not retained, for reasons explained in detail in Dubois (2005c): (a) the use of standard endings for class-series taxa of a given rank; (b) the use of a Rule of Coordination between nomina of the class-series: this means that, unlike the situation for the three nominal-series covered by the Code, a given class-series nomen can apply to only one taxon at a given hierarchical rank, not to several coordinate taxa (including ‘nominotypical’ taxa).

3. Concerning the onomatophores of class-series nomina, previous proposals were in favour of designating either a type-genus or a type-family for each nomen. The latter proposal was rejected already in Dubois (1984, 1987). The former proposal, first adopted by Dubois (1984), proved to be impractical because of the absence of a Rule of Coordination for higher nomina. In the class-series, as no nominotypical taxa exist, with a single type-genus it would be impossible to know which nomen applies to the most inclusive taxon and which ones to any of its subordinate taxa having the same onomatophore. A new solution was therefore devised in order to allocate unambiguously each class-series nomen to a single taxon within the frame of a given taxonomy.
Rationale

The rules proposed rely on a detailed rationale that cannot be fully described here, but the most noteworthy elements of which are briefly presented below:

1. **Availability** of nomina of the class-series relies on criteria similar to those concerning other nomina governed by the Code: formal publication after 1757 in a permanent medium; nomen first created as a Latin or Latin-like term, or subsequently latinised if created in another language; nomen published associated with a diagnosis or definition of the taxon it designates, relying on ‘characters purported to differentiate the taxon’. Objective criteria are also proposed to distinguish between class-series and family-series nomina, a distinction which is not always easy.

2. **Allocation** of nomina to taxa relies on onomatophores of a new kind, combined with a new tool called onomatostasis. This complication is needed in order to allow unambiguous allocation of each nomen to a single taxon in the hierarchical succession of taxa despite the absence of a Rule of Coordination.
   (a) For reasons already explained by Dubois (1984, 1987), the onomatophores of class-series nomina should be genus-series nomina (nomina of genera or subgenera), not specimens or nomina of other nominal-series.
   (b) It is proposed that the onomatophore of any class-series nomen be composed of its conucleogenera, i.e. the indissoluble set of all genus-series nomina referred to the taxon in the original publication. This set is indissoluble, which means that it is impossible to restrict it by exclusion of any genus-series nomen (unlike e.g. the situation in the genus-series, where a type-species may be designated among several originally included species). Application of the nomen will therefore be possible only to taxa that include all these conucleogenera: the exclusion of even a single one of them prevents application of the nomen to the taxon. However, this is not enough to know exactly to which taxon the nomen will apply whenever several (and often many) hierarchically related higher taxa include the same conucleogenera.
   (c) In order to go further, it is proposed to take into account the alienogenera of the new taxon, i.e. the genera originally excluded from the taxon for which the new nomen was created, and which provided an external limit for this taxon.
   (d) As usual in nomenclature regulated by the Code, the current allocation of a nomen to a taxon is not given once and for all at the creation of the nomen, but depends on the taxonomy adopted. A class-series nomen potentially applies to any higher taxon that includes all its conucleogenera, but its more precise allocation requires knowledge of the current taxonomic allocation of its alienogenera. Three different situations are possible, for which the following treatments are proposed:
      (d) (1) Whenever a new nomen was proposed for a class-series taxon defined only by its conucleogenera (i.e., without mention of alienogenera), this nomen applies now to the least inclusive taxon, in the taxonomy adopted, that includes all its conucleogenera.
      (d) (2) In both other cases, the new nomen was proposed for a class-series taxon defined both by its conucleogenera and its alienogenera. Two situations remain possible:
         (d) (2) (1) All original alienogenera are currently extragenera, i.e. genera now placed in taxa excluded from the least inclusive taxon including all the
conucleogenera. In such a case, the nomen now applies to the *most inclusive* taxon including all its conucleogenera and excluding all its extragenera. The latter play a new, particular role in zoological nomenclature: that of *onomatostasis*, i.e. they provide an external limit for the extension of the taxon designated by the nomen. In this case, the combination of onomatophere and onomatostasis provides a stable reference for the allocation of the nomen to a taxon, but this is true only as long as the taxonomy does not change, because if it does some alienogenera may well become intragenera, as explained below.

(d) (2) The original alienogenera include one or several *intragenera*, i.e. genera that are currently classified within the taxon that includes all the conucleogenera. In such a case, there is no onomatostasis and the taxon to which the nomen applies, just like in situation (d) (1), is the *least inclusive* taxon including all its conucleogenera.

The process described above is illustrated in Fig. 1. More details and examples are provided in Dubois (2005c). Implementation of these Rules in any concrete situation results in a completely unambiguous allocation of any given nomen to a single taxon in the taxonomic hierarchy, despite the absence of a Rule of Coordination.

(3) Among several synonyms applying to the same taxon, *validity* of one of them is established through the following succession of Rules:

(a) As with other nomina, the basic rule suggested here for validity of these nomina is *priority of publication*, concerning both synonymy and homonymy. Hopefully, if the Rules here proposed or Rules derived from them are incorporated into the Code, after their implementation Priority will become progressively the only principle regulating validity of higher nomina. However, as higher nomina have until now not been regulated by formal Rules, the sudden request for strict respect of Priority for nomina of the past would have dramatic consequences in some cases, as it would require the replacement of well-known nomina by poorly known or unknown nomina. In order to avoid these problems, attention has been paid to the need to protect well-known nomina even when they do not have priority to designate the taxa. However, in order to avoid arbitrary decisions in this respect, strict Rules are needed to recognize these well-known nomina.

(b) The rationale used in this respect relies on making a difference between nomina used only among systematists (i.e., working on taxonomy, phylogeny or faunistics) and nomina used outside this community of specialists (i.e., among other biologists or even in the 'general literature'). A nomen that is known and used only, even largely, among specialists of systematics, cannot be considered 'well-known' and worthy of protection or conservation simply on that account. If priority requires that this nomen be changed, all these specialists are (or should be) able to understand the reasons for this change, should not be perturbed by it, and should accept it, as nomina are just labels allowing unambiguous communication but have no meaning or value in isolation. On the other hand, nomina that have been regularly used in non-systematic literature, and are likely to be known to many biologists and even laymen, should be maintained for this reason. A criterion to recognize the fact that a nomen is well-known and widely used is its presence in the titles of publications, as titles have to be explicit enough to be understood even by
non-specialists. Furthermore they are easy to find in bibliographic databases without having to read all publications in detail. These ideas led me to define strictly several categories of usage for nomina. More details on this rather complex matter are provided in Dubois (2005b-c), and only the final conclusions of this reflection are given here.

(c) Whenever working on the class-series nomenclature of a given zoological group, all nomina should be referred to one of the following categories: (A) symphony: nomen used as valid for a taxon by all authors and in all publications after 31.XII.1899; (B) aphony: nomen considered as available

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**Fig. 1.** Diagrammatic illustration of different kinds of relations between taxa (genera G1-G8, families F1-F4, orders O1-O2, class C1) in a given taxonomy (Fig. 1a) and twelve nomina N1-N12, originally proposed for taxa of the class-series including some of the genera G1-G8. Two major situations exist:

(A) In one of them (Fig. 1b-d), all the genera originally placed in the taxon (its conucleogenera, which act as onomatophores for the nomina) are still placed in this taxon, and all the genera originally excluded from this taxon (its alienogenera) are now excluded from the taxon. The latter are therefore its extragenera and act as onomatostasis for the nomen. The nomen is then applied to the *most inclusive* taxon (i.e. of highest rank in the current taxonomy) including all its conucleogenera and excluding all its extragenera. In Fig. 1b, all genera originally placed in the taxon designated by the nomen N1 are still placed in the taxon O1, and all those of N2 are still in O2: the nomina N1 and N2 designate respectively the taxa O1 and O2. The same applies in Fig. 1c and 1d, although in these cases the conucleogenera and the extragenera represent only part of the genera, and even of the families, included in each order.

(B) In the second situation (Fig. 1e-g), there is an overlap between the taxa as currently recognized and the taxa of the original taxonomy for which the nomina had been created, some alienogenera of the original taxon being currently included in the taxon. The nomen is then allocated to the *least inclusive* taxon (i.e. of lowest rank, in the current taxonomy) including all its conucleogenera. In some cases (Fig. 1f-g) this can result in two nomina initially created for taxa considered sister-taxa having now to be considered synonyms, although they do not share a single conucleogenus: this is the case of N9 and N10 in Fig. 1f and of N11 and N12 in Fig. 1g, all these four nomina designating the class C1.
but invalid by at least one author and in at least one publication after 31.XII.1899; (C) eneonym: nomen never mentioned as available by any author and in any publication after 31.XII.1899; (D) diaphonym: nomen used as valid by at least one author and in at least one publication after 31.XII.1899. The last category includes two major subcategories: (C1) eurydiaphonym: nomen that has been significantly used as valid for a taxon in non-systematic literature after 31.XII.1899; (C2) stenodiaphonym: nomen that has not been significantly used as valid in non-systematic literature after 31.XII.1899. The subcategory of eurydiaphonym consists of two further infracategories: (C1a) paneurydiaphonym: eurydiaphonym that is the only one to have been used as valid for a taxon in non-systematic literature after 31.XII.1899; (C1b) schizeurydiaphonym: eurydiaphonym that has been used as valid for a taxon in non-systematic literature after 31.XII.1899, but alternatively to another eurydiaphonym for the same taxon. For the purpose of this Rule, the term significantly is to be understood as follows: to be considered a diaphonym, a nomen should have been used for a taxon, either in its Latin form or as a vernacular nomen in any recent language (A) either in the titles of at least 25 non-purely systematic books, written by at least 25 independent-authors and published in at least 10 different countries after 31.XII.1899, or (B) in the titles of at least 100 non-purely systematic publications of any kind written by 100 independent-authors and published in at least 10 different countries after 31.XII.1899. In what precedes: (a) purely systematic publications are publications dealing only or mostly with taxonomý, phylogeny and/or faunistcs; (b) non-purely systematic publications are publications a significant portion of which (i.e., at least half of their total volume) deals with non-systematic matters, such as various fields of biology, medicine, agronomy, etc., or even is addressed to non-scientific users, such as members of administrations, governments, customs, conservation organizations, etc.; (c) independent authors are defined as authors who never published together (as co-authors) on the zoological group concerned before the case is considered (Dubois, 1997).

(d) These detailed categories of nomina can be grouped in two major groups regarding their need for conservation: sozonyms (symphonyms and paneurydiaphonyms) and distagonymis (eurydiaphonyms, stenodiaphonyms and aphonyms). Sozonyms are nomina which, being well-known to non-specialists, should be protected in their usual sense, even if this sense is not the original one at the creation of the nomen. In the latter case, the sozonym should be conserved, but credited to the first author who used it in the usual sense, i.e. with an onomatophore in agreement with its current usage. The earlier nomen with a different onomatophore should then be rejected as an invalid senior homonym. In contrast, distagonyms do not have to be so protected. It is not proposed, however, to use strict priority to validate them, but to have a more sensible rule, according to which, if several nomina are available for a taxon, schizeurydiaphonyms have precedence over stenodiaphonyms, the latter over aphonyms and the latter over eneonyms. Only among these categories will priority allow a choice among competing nomina.

(e) These rules of validation of nomina are devised in order to take into account the long period during which higher nomina were not subject to any rules, to
respect real usage outside specialized literature, and to allow a smooth transition into the future, when the automatic Principle of Priority will hopefully play a growing role in order to avoid prolonged debate to settle the valid nomen of any higher taxon.

(f) A single example will be given here to illustrate the difference between sozonyms and distagonyms: that of the vertebrate class-series nomina AMPHIBIA and LISSAMPHIBIA (for more details, see Dubois, 2004). The nomen AMPHIBIA Linnaeus, 1758 was introduced for a taxon much more comprehensive than the current amphibians of all zoologists, as it included, beside them, several groups of ‘reptiles’ and ‘fishes’: according to the Rules of allocation of nomina to taxa presented above, this nomen applies to the taxon currently known as VERTEBRATA Cuvier, 1800. However, the nomen AMPHIBIA being a sozonym should be conserved in its usual sense, first found in AMPHIBIA De Blainville, 1816: the latter should be validated as a sozonym, and its senior homonym AMPHIBIA Linnaeus, 1758 definitively invalidated. Among amphibians, the nomen LISSAMPHIBIA Haeckel, 1866 was created for a taxon including the anurans and urodèles, but excluding the gymnophiones, thus being a strict junior invalid synonym of BATRACHIA Brongniart, 1800. Although in recent years the nomen LISSAMPHIBIA has had a growing use to designate a taxon including the anurans, urodèles and gymnophiones, this use is incorrect and the valid nomen of the latter taxon, according to the proposed Rules, is NEOBATRACII Sarasin & Sarasin, 1890. The nomen LISSAMPHIBIA is completely unknown to non-specialists and, in contrast with the nomen AMPHIBIA, unlikely to be used in the titles of books written for a vast audience: it should be abandoned.

(g) The Rules presented above provide only a general framework for the establishment of the valid nomen of a higher taxon. A number of particular cases, situations and exceptions remain, for which specific solutions had to be proposed. This information is given in Dubois (2005c), which also contains a detailed discussion of the use of ranks in higher (and lower) nomenclature, with proposals of standardization of the designation and treatment of nomenclatural ranks over the whole of zoology, a question that is not addressed here. The complete proposal is summarised under a set of 24 formal Rules.

Discussion and conclusion

The proposed rules are offered to the community of zoologists and taxonomists for consideration and discussion, prior to their possible incorporation into the Code. They are considered to be an efficient way of solving the problems posed by the growing need to have rational and universal rules for the nomenclature of higher taxa, agreeing in their basic philosophy with the current rules of the Code. Attention is drawn here to the following major aspects of these rules: (1) they respect the independence between taxonomy and nomenclature and do not ‘infringe upon taxonomic freedom’: they are thus compatible with any philosophy of classification, including ‘phylogenetic taxonomy’; (2) they allow nomina to be used according to their original sense, just as with other nomina covered by the Code, thus avoiding endless discussions and redefinitions of nomina, a major weakness of recent alternative proposals to the Code; (3) they are largely automatic in use, allowing any
two zoologists confronted with the same problem to find the same solution by simple rigour, not through personal taste or opinion and without having to petition Committees or to rely on the help of lobbies; (4) once such Rules have been implemented, after a period of transition, the allocation of nomina to higher taxa will become a routine practice that will not require the expense of time, money and energy. Given the current state of our planet, the latter should be concentrated on the real priority of the beginning of the ‘century of extinctions’, which is not to redefine nomina, but to accelerate the exploration, inventory and study of organisms, in order in some cases to be able to struggle for their conservation, but in many more cases to simply (but importantly) store information and specimens for the future generations (Dubois, 2003). In the light of these comments, the heavy investment of hundreds of working hours by dozens of zoologists to discuss pros and cons of a new proposal for an alternative Code appears at best as a mistake and at worst as a criminal operation against the study of biodiversity (Dubois, 2005b). 

In order to limit as much as possible the duration of the ‘period of transition’ mentioned above, it is proposed to build up a Nomenclator zoologicus for class-series nomina, i.e. a database of all zoological higher nomina ever published since 1758 with information on their status (date, conucleogenera, alienogenera), and with a possibility to find this information online. Work is in progress for the implementation of this database with its associated software (Dubois & Gérard, in preparation). Colleagues worldwide who are interested in this project are welcome to contact us.

References


