

# Higher-level names: What is it about them that make us fight so much?

Professor Peter F. Stevens

Botany, University of Missouri and Curator, Missouri Botanical Gardens, USA

Keynote opening address presented at:

*National Herbarium of Victoria 150 conference – celebrating 150 years of plant research in Australia.*

29 September 2003

A number of phylogenetically-inclined systematists think that the only groups recognised formally should be monophyletic, that is, they contain the ancestor of a group and all its descendants. Hennig (1950, 1966) had in fact borrowed and refined the term monophyly. This redefinition did not sit well with some evolutionary systematists, who preferred to call Hennigian monophyly, holophyly (e.g. Ashlock 1971; Mayr and Ashlock 1991). Their definition of monophyly was somewhat broader. A monophyletic taxon descended from another taxon of the same or lower rank (Mayr 1968, 1969; Mayr & Ashlock 1991). This definition can be amended to the ancestor of a group and only but not all its descendents; such groups are also called paraphyletic, the term I will use below.

Organisms have hitherto been named by both phylogenetic and evolutionary systematists using versions of "Linnaean" nomenclature – that is, a binomial for species, various names with accepted terminations for taxa of higher ranks, and various infraspecific categories (only the subspecies if one were a zoologist). Recently, however, almost a decade of discussions have resulted in proposals for a new system of naming, the Phylocode. The debate over how to name monophyletic groups, or whether only monophyletic groups should be named, has now become more confused and acrimonious. Two main sets of issues are involved, one taxonomic (what kind of groups should be named?), the other nomenclatural (how should they be named?). Many of the protagonists in the debate have attempted to link the two, and a hefty dose of philosophy, logic and history has been interjected, although I will argue below that this for the most part has only polarised the arguments.

Two taxonomic positions and two nomenclatural positions are taken: 1, name only monophyletic groups, and use only uninomials that have no connotation of rank (below called the Phylocode position); 2, name only monophyletic groups, but use "Linnaean" nomenclature (radical "Linnaean" - although some would consider this a double oxymoron), and 3, name both paraphyletic and monophyletic groups, again using "Linnaean" nomenclature (conventional "Linnaean").

Below I list some of the major arguments invoked by proponents of the three positions. The arguments fall into four main groups, taxonomic, philosophical, historical, and nomenclatural, although any simple classification fails.

## **Taxonomic.**

1. Names in a truly evolutionary system should refer only to monophyletic groups, clades.

2. Ancestors cannot be included in any "Linnaean"-type classification that purports to be exhaustive, that is, refers all organisms to e.g. genera, and then all the members of that genus to subgenera.

### **Philosophical.**

3. Clades are individuals of various levels of inclusivity, and clade names should reflect this.

### **Historical.**

4. Linnaeus's belief that groups had essences means that the system he devised to name these groups cannot be used for groups that have no essences, but are the result of evolution.

5. Darwin's use of affinity, rather than homology, when discussing relationships justifies the recognition of paraphyletic groups.

### **Nomenclatural.**

6. There are not enough ranks to name all clades in a fully resolved tree of life.

7. A ranked classification is misleading, *or* a ranked classification is essential..

8. Classifications of whatever variety are inherently unstable.

9. A naming system must be universal.

The last two issues lead to a reexamination of the goals of nomenclature. Generally stated, the goals of any biological nomenclatural system have included stability, comprehensibility and universality (e.g. Davis & Heywood 1963; Wiley 1979; de Queiroz & Gauthier 1992, 1994; Stuessy 1990; Mayr & Ashlock 1991). Lists of the desired properties of a nomenclatural system have sometimes included taxonomic elements, e.g. that it should be evolutionary (Mayr 1982), or that it should have a high hierarchical information content (Lidén et al. 1997; Moore 1998; Nixon & Carpenter 2000: this can also be interpreted as a more specifically nomenclatural matter).

However, particularly in the nomenclatural part of the debate it is not simply words that matter, but particular interpretations of those words. Thus stability can refer either to content of a named taxon, as has especially been emphasized in phylocode proposals (e.g. de Queiroz & Gauthier 1992, 1994; Bryant 1996; de Queiroz 1997), or to the continued use of the same name despite its changing content (Simpson 1961; Benton 2000).

I by no means suggest that proponents of any one position over naming will agree on all the points that I list, that they should be separated in the way I have separated them, or even think that they are all important. It will also become clear that issues surrounding the naming of species may differ from those involved in naming more inclusive groups. Some arguments also hinge on the distinction between cladograms, nested synapomorphy schemes, and phylogenetic trees, similar, but with ancestors either implicit or explicit.

### **PREAMBLE**

To clarify the following discussion, the distinction between stem-, node- and apomorphy-based phylocode naming (Fig. 1: e.g. de Queiroz & Gauthier 1990, 1992) must be borne in mind. Whether the node, an apomorphy, or the stem above the next node is chosen to limit the taxon will affect the how future findings outside the group of immediate interest affect the taxonomic content of the name.

Secondly, I discuss three main kinds of hierarchies below. In **ahierarchic naming** (the "informal hierarchy" of Stevens 2002), names suggest nothing about the position of the taxon or clade named relative to others, even if the relationships of these taxa or clades can be represented by a hierarchy or a diagram with the form of a hierarchy. In a **rank hierarchy** the form of the name suggests a particular position of the taxon bearing the name relative to others, and also that there is a class of taxa in nature that are given similar names and that have similar properties. In a **flagged hierarchy** the form of the name conveys some information on the position of one taxon relative to others, but without any implication that there are classes of taxa in nature (Stevens 2002).

Finally, much of the argument about the phylocode basically reduces to language, and how we understand it. That parts of the argument are semiotic issues is not the half of it! Thus nouns are not simply words that can be qualified by adjectives, but noun-adjective combinations allow structuring and summarizing of information; knowledge seems hardly possible if we can refer only to particulars. This theme will inform much of the ensuing discussion.