Hierarchies and orders in systematics and phylogenetics

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Abstract

Following a general conception of hierarchies in systematics and phylogenetics (e.g. Mayr, 1982), these are of two kinds, i.e. division and grouping. Within this framework, some authors (Williams, 1992; Knox, 1998) have criticized Hennig for conflating the phylogenetic tree (a hierarchy of division) with the phylogenetic system (a hierarchy of grouping). As a result, it is impossible to deduce the phylogenetic tree from the phylogenetic system while the converse is possible (Dayrat, 2005).
However, these criticisms lead to several problems. First, there are not two but at least three kinds of hierarchies in systematics and phylogenetics: (1) the tree-like genealogy of species, (2) the cladistic hierarchy and (3) the Linnaean hierarchy. Second, the distinction between the ontological (the species/non-species distinction), epistemological and formal aspects are not discussed by the critics.

I argue that, from a formal point of view, there is a particular concept of order which subsumes all the systematic and phylogenetic hierarchies of taxa. Within it, there is a more restricted concept which formalizes both the tree-like genealogy of species and the cladistic hierarchy, i.e. both are isomorphic. However, these two kinds of hierarchies are not biologically equivalent.
I conclude that either evolution is a matter of succession of transitory species and cladistics is instrumentalist, or cladistics represents correctly the result of (the process of) evolution (in terms of kinship) and evolution is a matter of differentiation of new clades inside old and persistent clades (i.e. all clades evolves, not only the species).

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