Editorial

Numerical cladistics, an unintentional refuge for phenetics—a reply to Wiley et al.*

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Abstract

The assertion that phylogenetic inference algorithms are not authoritarian because results are repeatable, predictable and freely available misses the point that the authority resides in underlying algorithm models that are not cladistic. We show that optimization procedures can group using symplesiomorphy and that optimization is not always equivalent to cladistic argumentation. Because parsimony and Bayesian algorithms can obtain the same answer from the same data set is not evidence that they are Hennigian; examples exist where these methods do not provide the same result from the same data. Using 'reversals' as evidence in systematics is problematic because the question, "Reversal to what?" has no straightforward answer. This confusion can be eliminated by recognizing that homologues are the parts of organisms and homologies are the relationships between the parts, and that the latter is a hierarchical concept rather than transformational. We clarify that Hennig's auxiliary principle pertains to *potential* synapomorphy, meaning for molecular work that it is the presence of a particular *derived* nucleotide that is shared in a given position of aligned sequences of two or more taxa that should be considered homologous until proven otherwise, not simply the alignments themselves. We reiterate that not all data are evidence and we specifically reject homoplasy as a source of 'evidence' for systematics. We further reject the view that conflict among data should be resolved through methodology. It is the data that should be our primary focus, as it is our attempts to identify and clarify homologues worthy of suggesting relationships (homology) that are primary in systematics.

Introduction

Recently, two of us wrote a paper addressing what we perceived to be a crisis in systematic ichthyology (Mooi & Gill 2010a). It has subsequently received some attention, including an evaluation from Wiley et al. (2011). They felt that Mooi & Gill's arguments could be reduced to four basic claims, all of which they argued were either false or irrelevant:

1　The reliance on optimization algorithms is the modern incarnation of authority-based taxonomy;
2　Outgroup comparisons no longer play a critical role in determining character polarity;
3　The use of optimizations to build trees is not cladistic;
4　Not showing synapomorphies on a phylogeny obscures the readers' ability to judge alternative hypotheses, and measures of node support (and other statistical manipulations) do not refer to the quality of individual characters and their states.

Here we address the criticisms of those four claims and in so doing, expand on and restate a few related issues. Wiley et al.'s response is largely based on issues concerning the claim headings, but additional (and often tangential) matters are also discussed under the same headings. In addition, some issues are discussed across several head-