

RESEARCH LETTER

A comparison of biogeographic models: a response to Bastow Wilson

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Abstract. Several misconceptions in a recent paper (Wilson, 1991) comparing dispersal biogeography, vicariance biogeography, and panbiogeography are presented and discussed.

Key words. Dispersal biogeography, vicariance biogeography, cladistics, panbiogeography.

Historical biogeography is going through an extraordinary revolution concerning foundations, basic concepts, methods, and relationships to other disciplines of comparative biology (Nelson & Rosen, 1981; Myers & Giller, 1988). Scientific revolutions are those non-cumulative developmental episodes, in which an older paradigm is replaced in whole or in part by an incompatible new one (Kuhn, 1970). Dispersal biogeography (Darwin, 1859; Darlington, 1957) represents the biogeographic paradigm in crisis. There are two alternative competing paradigms, namely panbiogeography (Croizat, 1958, 1964) and vicariance or cladistic biogeography (Nelson & Platnick, 1981). It must be pointed out that dispersal as a process is part of these two competing paradigms.

In a recent paper Wilson (1991) compares these three main biogeographic schools, in terms of methods applied, assumptions behind them, and answers proposed. Accordingly to Kuhn (1970), the judgement leading to the decision to reject one paradigm and accept another involves the comparison of both paradigms with nature and with each other. In this respect, Bastow Wilson's paper is a valuable contribution to a dynamic and controversial field. But we have found several misconceptions, which we would like to present and discuss.

(1) In relation to dispersal biogeography Wilson (1991) states that 'no special use is made of taxonomy in the analysis.'

According to dispersal biogeographers (e.g. Darlington, 1957), the centre of origin of a taxon may be

estimated by finding the most derived recent members of the group. In this respect, it is obvious that only a taxonomic analysis will determine which are the 'most derived' members of a group.

(2) When referring to vicariance biogeography, Wilson (1991) repeatedly attaches this school to 'transformed cladistics' ('the vicariance school uses transformed cladistics to form a taxonomic cladogram...', 'for each group a taxonomic cladogram is formed by transformed cladistics', 'transformed cladistic taxonomy is used').

'Transformed cladistics' may be traced to Platnick (1979, 1985). While dealing with some issues in cladistic theory, Platnick argued that Hennig's particular points of view on evolutionary processes were irrelevant to justify cladistic methods. Those stated to be transformed cladists have denied that there is any methodological difference between them and the rest of cladists (Carpenter, 1987). Although early proponents of vicariance biogeography (e.g. Rosen, Nelson, Platnick and Patterson) are considered transformed cladists, there is no unequivocal connection between vicariance biogeography and 'transformed cladistics'. Other authors that have contributed to the field of vicariance biogeography (e.g. Cracraft, Wiley, Zandee and Roos) are not considered 'transformed cladists'.

(3) The phrase 'fossil evidence is not used in transformed cladistics, for philosophical and methodological reasons, and hence is not used in vicariance biogeography' is also incorrect.

If there is such a thing as 'transformed cladistics',

Colin Patterson would be one of its leading members (remember Halstead, 1981). Patterson's (1981a, b) vicariance biogeography analyses include fossil evidence.

(4) Bastow Wilson traces vicariance biogeography from Brundin (1966).

We believe that vicariance biogeography may be not properly connected to Brundin's (1966) points of view. This author is one of the proponents of phylogenetic biogeography, another school (not dealt with in the paper), closely related to dispersalism (Brundin, 1966, 1981). The confusion may rest in the fact that both phylogenetic and vicariance biogeography employ cladograms as raw data for their analyses.

(5) Some confusion is present when Bastow Wilson deals with panbiogeographic concepts like 'nodes' and 'main massings' ('the main massing is emphasized, rather than the limits of distribution', 'tracks and nodes can represent the main massing for some species...').

A node is an area/locality where two or more generalized or standard tracks overlap and a main massing is a concentration of diversity within a high level taxon in a biogeographic space (Craw, 1988, 1989).

(6) When referring to fossil evidence and panbiogeography, Wilson (1991) states 'fossil evidence is of interest...'.

On the contrary Croizat gave no importance to fossil records in panbiogeographic analyses (Croizat, 1958).

(7) Although Croizat made frequent references to orthogenesis and 'recombination of characters' as evolutionary processes (Croizat, 1958, 1964), it is not correct to assume that results of panbiogeographic analyses 'suggest that orthogenesis and polyphyletic have been important processes'.

Panbiogeography is not attached to any particular evolutionary process (Climo, 1988).

Wilson's (1991) misconceptions are a reflection of the current revolutionary period of historical biogeography, where there is still some confusion about the differences among biogeographic schools. From a completely different perspective, Craw & Weston (1984) have undertaken another comparative study of the biogeographic schools. These authors applied the methodology of scientific research programmes developed by Lakatos (1970, 1978), to discuss the three biogeographic schools. They concluded that only vicariance biogeography and panbiogeography are progressive research programmes, and that dispersal

biogeography was neither a coherent program nor scientific in Lakatos' sense.

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