

References

- Baines, A. (1981). [An Etymological Dictionary of] *Australian Plant Genera*. Society for Growing Australian Plants, Sydney.
- Beolens, B., Watkins, M. (2003). *Whose Bird? Men and Women Commemorated in the Common Names of Birds*. Christopher Helm Publishers, London.
- Duff, A., Lawson, A. (2004). *Mammals of the World: A Checklist*. A. & C. Black, London.
- Firkin, B. G., Whitworth, J. A. (2002). *Dictionary of Medical Eponyms*, 3rd edition. Parthenon Publishing, Pearl River NY.
- Gledhill, D. (1989). *The Names of Plants*, 2nd edition. Cambridge University Press, Cambridge.
- Gordon, S. (ed.) (2005). *Plant Names Explained: Botanical Terms and Their Meaning*. David & Charles, Newton Abbot, U.K.
- Gotch, A. F. (1995). *Latin Names Explained: A Guide to the Scientific Classification of Reptiles, Birds and Mammals*. Blandford, London.
- Jobling, J. (1991). *A Dictionary of Scientific Bird Names*. Oxford University Press, Oxford.
- Pande, S.A. (2010). *Latin Names of Indian Birds – Explained*. Oxford University Press India, New Delhi.
- Pankhurst, R.J., Hyam, R. (1995). *Plants and Their Names: A Concise Dictionary*. Oxford University Press, Oxford.
- Plowden, C.C. (1972). *A Manual of Plant Names*, 3rd edition. George Allen & Unwin, London.
- Schroeter, A.I., Panasiuk, V.A. (1999). *Dictionary of Plant Names*. Koeltz Scientific Books, Koenigstein, Germany.
- Sharr, F.A. (1996). *Western Australian Plant Names and Their Meanings: A Glossary*, 2nd edition. University of Western Australia Press, Nedlands, Australia.
- Stearn, W.T. (1992). *Stearn's Dictionary of Plant Names for Gardeners: A Handbook on the Origin and Meaning of the Botanical Names of Some Cultivated Plants*. Cassell, London.
- Strahan, R. (1981). *A Dictionary of Australian Mammal Names*. Angus & Robertson, Sydney.

Beyond Cladistics?

David Morrison
Section for Parasitology (SWEPAR)

Beyond Cladistics: The Branching of a Paradigm. Edited by David M. Williams and Sandra Knapp. 2010. University of California Press, Berkeley. ISBN 978-0-520-26772-5, xiv+330 pp, £44.95 \$65 (hardback). ISBN 978-0-520-94799-3 \$52 (e-book).

In 1977 the rock band Slade released an album called “Whatever Happened to Slade?” This title was a reference to the fact that between 1971 and 1974 they had had 12 consecutive singles in the top four in the U.K. singles chart (an unparalleled feat), but by 1977 they had returned to the obscurity from whence they had once come. In spite of this, the band did continue with the same personnel until the end of 1991 and, indeed, they had six more top-30 hits during their comeback in the 1980s. The band still officially exists today, with two of the four original members.

This seems like a very good metaphor for the history of cladistics, although being half a decade later. That is, it came out of relative obscurity, dominated phylogenetics by the end of the 70s and especially during the early 80s, and then seemed

to disappear again, to be replaced by a somewhat different phylogenetic paradigm. Nevertheless, it does continue to exist today, with a subset of the original proponents plus some younger blood.

This metaphor should not be pushed too far, of course. Slade’s slide from the top of the pile coincided with the emergence of punk rock, which put paid to both glam rock and disco music. (This is a pity, because the uniting theme of early 70s music was that music could be fun, an idea that slipped into relative obscurity during the 80s and 90s.) Cladistics’ fall from grace, on the other hand, seems to be much more self-generated; and it also seems that a widespread comeback, however brief, is unlikely.

This new book, *Beyond Cladistics* edited by David Williams and Sandra Knapp, is a compilation of papers by some of the old guard and some of the young guns of cladistics. It covers the gamut of topics in which cladistics has had (or tried to have) a major influence: phylogenetics, classification, biogeography and conservation. There are few backward-looking articles, but instead the book “represents an attempt to document the nature and anticipate the future of cladistics” [p. xi].

Clearly, I am somewhat sceptical about the second of these stated aims. It seems to me that cladistics faded away for a reason that is clearly stated in Chapter 9 of the book. This is actually

a quotation from an unpublished manuscript by Colin Patterson:

“As I understand it, cladistics is theoretically neutral so far as evolution is concerned — it has nothing to say about evolution, and no knowledge of evolution or belief in it is necessary to do cladistic analysis. All cladistics demands is that groups have characters and that groups are non-overlapping” [p. 153].

This emphasizes the distinction, long made by cladists, between a cladogram and a tree. This claim seems to me to have two important problems, which have combined to marginalize cladistics. The relevance of cladistics to phylogenetics was thereby obscured, and then ultimately ignored by the majority of practitioners.

(I should emphasize that I see myself as the messenger here, rather than necessarily a supporter of either message. Indeed, Colin Patterson is quoted in the book as believing that the cladistics revolution “was virtually complete by the eighties”, while Gary Nelson contends that it is suffering “arrested development”. Both of these provide alternative explanations for the apparent lack of current interest in cladistics.)

The first problem is that phylogenetic analysis makes no sense whatsoever without a belief in evolution. The separation of pattern and process, emphasized by so many cladists, was not an entirely successful one because most systematists are not interested in it. Cladistic methodology can, indeed, be applied to any data set, and if there is a hierarchical pattern in the data then cladistics will find it. However, the objective of analyzing taxa, and the interpretation of the resulting cladogram, is predicated on the existence of a phylogenetic history. A cladistic analysis of taxa is quite different from a cladistic analysis of, say, pasta (an exemplar provided in the book by Olivier Rieppel).

My point here is that systematists are, at heart, phylogeneticists. For example, there is the persistent claim that a taxonomic hierarchy should reflect phylogeny rather than reflecting some other form of hierarchical pattern. So, phylogeneticists have simply asked: if cladistics is not an explicit method for phylogenetic analysis then what relevance does it have? They

then moved on to using forms of analysis that are overtly phylogenetic, in the sense that they model the supposed evolutionary process(es) as part of the analysis. These analyses were, and still are, based on mathematical likelihood, either as maximum likelihood or integrated likelihood (i.e. bayesian analysis).

Note that the point I have made here actually refers to an apparent split among groups of cladists, as not all cladists agree with Patterson’s characterization of cladistics. Gradists, pattern cladists, transformed cladists and numerical cladists have all used the same analysis methods, but they differ in the way they interpret their results. The obvious differences in interpretation has, I think, obscured to casual observers the commonality inherent in the methods.

The second problem is that cladistic methods will always retrieve a hierarchy, even for non-hierarchical data sets involving different types of pasta. What is worse, they will also retrieve a hierarchy from data formed by an anastomosing plexus, such as the history of plants and prokaryotes. This limitation was noted in the late-1970s by Kåre Bremer & Hans-Erik Wanntorp and by Peter Sneath, respectively. It was never satisfactorily resolved in cladistics, in spite of a series of early papers by Vicki Funk, Chris Humphries, Gary Nelson, Warren Wagner and Wanntorp, and later ones by Lucinda McDade and Skála & Zrzavy. Indeed, it is usually presented as the principal argument against the use of cladistics in the study of cultural evolution (e.g. archaeology, linguistics). Of course, this issue is still a thorn in the side of likelihood-based methods, but the issue is at least being directly addressed within that paradigm.

The mention of Chris Humphries in that paragraph is appropriate, because *Beyond Cladistics* is actually a festschrift for him (the editors do not call it that but most of the contributors do), loosely based on a symposium held in October 2008. Chris was one of the prime international movers, along with Kåre Bremer, bringing cladistics to botanical systematics. (Sadly, Roger Carolin and Trevor Whiffin, who were contemporaneously introducing cladistics into Australian botany, are rarely mentioned in any history of cladistics.)

My first encounter with Chris was at the Hennig IX meeting in Canberra in 1990 (along with the associated ASBS meeting). The image that my mind has retained is of Steve Farris sitting in an armchair with a group of acolytes sitting at his feet (literally!). Chris's place was made quite clear — he was also sitting in a chair but slightly to one side. Steve and Chris were both smoking cigars, which even at that time was becoming a no-no indoors in public. This looked very much like a deliberately and unnecessarily aggressive performance by the pair of them — a point was being made and it was not a welcoming one.

I mention this because it is another possible reason for the slip of cladistics from the public consciousness — its overt association with far too many hostile and contentious personalities. Not everyone thinks that a revolution needs to be bloody (although I suspect that they are being rather naïve). Indeed, Joe Felsenstein has re-written the history of phylogenetics to virtually dismiss cladistics, explicitly expressing his personal distress over many of the events surrounding its rise to prominence. The early cladists are no longer angry young men (the few women seemed to be much less angry in the first place), but the young guns still seem to find it a necessary image. My most recent encounter with hard-core cladists was at the Hennig XXVI meeting in New Orleans in 2007, and there was definitely the same undercurrent of aggression and deliberate rudeness. It all seemed very unnecessary at this late stage.

Fortunately, Chris Humphries was prepared to be contentious but he was not necessarily hostile, as several of my readers will attest. Indeed, I believe that I still owe him a beer from our meeting in London later in 1990, although being deceased he is no longer in a position to collect it. He never received the beer at the time because of the ridiculous English custom of suddenly closing the pubs in the middle of the afternoon, something that

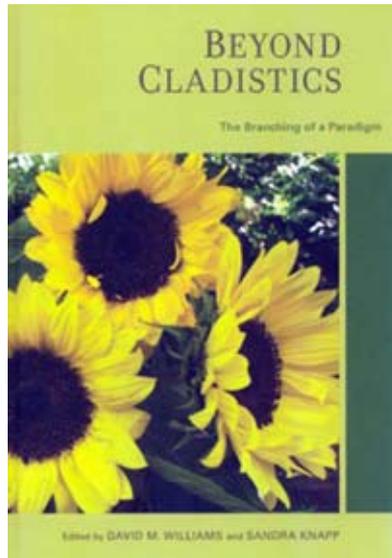
no civilized culture would tolerate. (Incidentally, the photo of Chris chosen for the book shows him sitting in a pub, looking rather pleased to be there.)

This brings us back to the book that I am supposed to be reviewing. I doubt that the editors and authors of the book would necessarily agree with too much of what I have said so far. I suspect that they see cladistics as thriving, or at least moving along very nicely. There is plenty left to discuss, plenty left to clarify, and plenty to improve upon. Indeed, the editors note that “Our original intention was to explore the possibilities that lie beyond cladistics, regarding cladistics as the single dominating methodology of systematics” [p. xi].

The theme of the book is thus, using my original metaphor, that cladistics is alive and well and still producing worthwhile music, although some of the band members have retired and others have gone the way of all old rock musicians. The book is intended to tell fans (and potential fans) about the new music. This is no longer glam rock, and is no longer recorded for a major label.

What we have here is an indie band, although I am at a loss to describe the new musical style. Some of the original band members make their appearance as chapter authors (e.g. Kåre Bremer, Gary Nelson), while others make guest appearances on the back cover as endorsers (Norman Platnick, Vicki Funk). Although there are 26 authors, three of them each appear on two of the 15 chapters (David Williams, Sandra Knapp, Malte Ebach).

The chapters are grouped into four sections, the first one being centered on Chris Humphries, followed by sections on Botany, Cladistics, and Biogeography. In common with all such books, there is very little uniting the chapters other than their common core in cladistics. The subject matter ranges from general theory to specific empirical studies of particular organisms and locations. The



topics include ontogeny, descriptive taxonomy, species richness, monophyly, species concepts, the tree of life, and (yes!) phenetics.

The word “cladistics” is variously interpreted by the authors. Indeed, in some cases it is treated as being synonymous with “phylogenetic analysis”, of whatever sort, and in other chapters the discussion is about the uses of phylogenies, so that the word cladistics is not necessarily even used. This diversity is best expressed by Peter Forey:

“The title of this volume, *Beyond Cladistics*, is somewhat enigmatic as it may imply preference for systematic methodologies that are outside the traditional practices of cladistics, such as maximum likelihood or Bayesian analysis. It may also imply that there are deep methodological issues within the cladistic realm that remain to be resolved, and this may be true since cladistics is an evolving discipline ... But ... I prefer to live in the past and believe that cladistics in its current form is alive and well” [p. 243].

The three ‘Biogeography’ chapters provide the only original phylogenetic analyses in the book, each either implicitly or explicitly using parsimony analyses (i.e. strict cladistics). The phylogenies are put to different uses, however, one chapter examining the current distribution of eucalypts (Chapter 14), one examining the rates of taxic and morphological evolution within teleost fishes (Chapter 13), and one defining major biogeographical areas of the Indo-Pacific (Chapter 15). Phylogenetics does indeed reach its tentacles into most areas of biology.

Oddly, two of the four chapters in the section labelled ‘Cladistics’ do not actually contain much cladistics. Indeed, in one of them (Chapter 12) the only diagram looks like neither a cladogram nor even a phylogenetic tree, as it is drawn unrooted, although the author does treat it as rooted on the central polychotomy, thus delimiting a series of monophyletic groups. Chapter 11 does not have a tree of any sort. Neither of these papers was presented at the 2008 symposium. (There were also 10 of the presentations that do not appear in the book, including one by Chris.) The other two chapters in the ‘Cladistics’ section (Chapter 9 on monophyly, and 10 on phenetics) leave me somewhat mystified, as I am not quite sure what

points are being made by the authors.

Only one of the three chapters in the ‘Botany’ section contains any reference to cladistics (Chapter 7) covering the contribution that cladistic analyses have made to knowledge of the Macaronesian flora. The other two chapters cover topics that exist independently of anything to do with cladistics: the likely effect of climate change on the diversity of island floras (Chapter 6), and the extent to which pre-Linnean botanists knew about the Macaronesian flora (Chapter 8).

The fourth section, labelled ‘On Chris’, covers an eclectic series of topics that directly interested Chris Humphries: ontogeny, conservation and taxonomy. The most interesting of the chapters is the one by Richard Vane-Wright (Chapter 3), which is written as a personal account of the attempts to introduce phylogenetic information into conservation evaluation. It is the only chapter that directly addresses cladistics in any detail.

Molecular data are mentioned throughout the book, but the focus of most of the authors is phenotypic data, particularly morphology. I suspect that this reflects another limitation of cladistics. Many neophytes do not see beyond the original tie-in to comparative morphology, classification and systematics, which are unknown territories to many (if not most) molecular geneticists. In this sense, after the 1980s cladistics was seen by many as “the past” while likelihood was “the future”. This suggestion has been emphasized by both Joe Felsenstein and David Hillis, who noted that the focus of phylogenetics shifted dramatically away from systematics with the molecular revolution. Austin Hughes is even quoted as referring to an “era of morphological systematics”, after which “the availability of molecular data ... made many old controversies obsolete” [p. 171].

When we read, as we do in Chapter 2, that “the Heliantheae, considered to hold a relatively basal position within the family in 1975, are now known to be among the most derived groups” [p. 36], then we weep, as we realize just how little impact cladistics has had on some aspects of phylogenetics. Chris Humphries may be resting uneasily, if this is his legacy. Cladistics has taught us that only characters can be ancestral or derived, not taxa (all taxa have both ancestral and derived

states, no matter where they are on the tree), and neither side of a tree is more basal than the other (being less speciose does not make a lineage more basal). A phylogenetic tree is not a pine tree, with a central stem and various side-branches emerging, but is more like a mallee, with all lineages leading equally to the base.

The production editing of the book betrays its American publication (e.g. American spelling; U.S. locations do not have their country specified but all others do) and anglophile leanings (e.g. UK institutions do not have their country specified but others do; only Britishers are given their formal titles). The references are quite current: there are even some from 2010.

I have given you rather a lot of quotations so far, so I will end with another one (from Chapter 1) as a suitable summary of the book:

“In spite of times moving on — and rapidly backwards, if some of the more recent contributions to *Taxon* are anything to go by — ... it is of greater importance to recognize that the sweep of systematics, the last two centuries of endeavor, ... captures the essence of cladistics, a project — or research program — that seems to slip off the tracks every now and then” [p. 29]. This is a very good metaphor for the book itself.

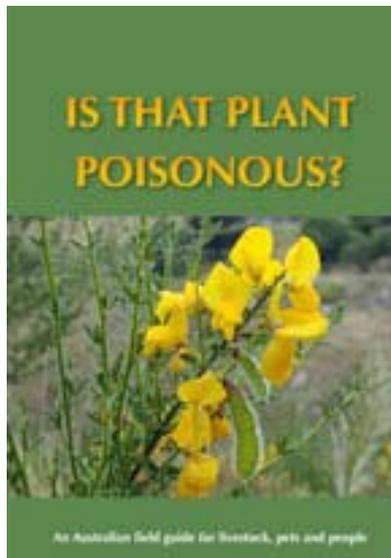
Book Notices

‘Is that plant poisonous?

An Australian field guide for livestock, pets and people’ by R.C.H.

Shepherd, published by R.G. and F.J. Richardson, PO Box 42, Meredith, Victoria 3333, Australia, in 2010; gatefold cover, 264 pages, full colour, ISBN 9780980388527.

The book covers the large number of plants found on farms and bush blocks, along roadsides, in waste places and as weeds in gardens. The book includes hundreds of colour photographs to aid identification



and information about who the plant is poisonous to (cattle, sheep, goats, horses, domestic pets, humans), which parts of the plant are poisonous and the toxins likely to be encountered, as well as symptoms of poisoning. Symptoms are also listed according to plant species and animal in a comprehensive appendix.

Supported by: Council of Australasian Weed Societies, Weed Society of Victoria, The Weed Society of New South Wales and The Weed Society of Western Australia.

Medicinal Plants in Australia volume one: Bush Pharmacy by Cheryll Williams. Rosenberg Publishing 2010. Large octavo, laminated boards, 285 x 210 mm, 304 pp, 377 colour plates. ISBN 9781877058790, AU\$69.95.

Medicinal plants in Australia, volume two: gums, resins, tannin and essential oils. by Cheryll Williams. Rosenberg Publishing 2010. Large octavo, laminated boards, 344 pp., colour illustrations and photographs. ISBN 9781877058943, AU\$70.00.