

# DNA sequences and fossils show Proteaceae spread by continental drift and transoceanic dispersal to modern continents

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Using DNA sequence data, botanists have shown that the large southern hemisphere plant family Proteaceae lived on the super-continent Gondwanaland almost 120 million years ago.

As Gondwanaland broke up, it was originally thought that these plants merely moved with the newly formed continents. But now a new study published in the *Journal of Biogeography* has shown that, while this is the case for some of these plants, others are far too recent to have lived at the time when the super-continent broke up. They must therefore have dispersed across oceans to reach their current distribution ranges.

Barker et al. apply a technique known as molecular dating to DNA sequences from over 40 representatives of the family from all southern continents. Using carefully selected fossils that are of known age and affinity, the mutation rate of the DNA sequences was calculated, allowing these scientists to provide age estimates for evolutionary events in the family.

“Our results show that ancestors of some of the modern Proteaceae must have crossed the Atlantic and Indian Oceans. Thus, in Africa, for example, the spectacular genus *Protea* is truly Gondwanan, but 250 species from other genera that occur in the ‘fynbos’ vegetation (literally, ‘fine leaved shrubs’) of the highly diverse south-western Cape biodiversity hotspot are much younger, and have Australian relatives”

says Nigel Barker of Rhodes University, South Africa.

This new finding is important, as it challenges the dogma that Gondwanaland's biota merely moved in situ with the continents as they broke up. "We have to reconsider the possibility of transoceanic dispersal, as unlikely as it sounds for these plants" says Peter Weston, a researcher at the Royal Botanic Gardens, Sydney, Australia. While this is not the first study to invoke dispersal, it is the first on a major and diverse Gondwanan plant family with complex distribution patterns.

These results are not only relevant to botanists. Ornithologists will be intrigued to find that the age of the Embothriinae, a bird-pollinated group of Proteaceae in Australia, coincides with the estimated age of the Honey-eaters, Australian nectar-feeding birds.

Nigel Barker, the first author of the work enthuses "this study is the culmination of 11 years of work. I generated much of the data while working with Peter Weston at the Royal Botanic Gardens in Sydney in 1996. It was only when I met up with Frank Rutschmann in Zurich, who had the expertise on molecular dating, and Hervé Sauquet, a postdoc at the Royal Botanic Gardens, Kew, United Kingdom with an extensive knowledge of the fossil record of the Proteaceae, that it became possible to undertake this rigorous analysis. Sometimes science is about getting the right people with the right skills together in order to make advances".

Source: Blackwell Publishing

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