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Editorial

An introduction to xeromorphy

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Australia today is defined by its arid interior. The arid-adapted vegetation that occupies this part of Australia is largely the result of tens of millions of years of evolution. Australia has not always been so dominated by arid landscapes. Forty-five million years ago, much of the continent was covered in diverse and dense rainforest, with massive river systems cutting through the landscape. Atmospheric carbon dioxide levels were high, the Earth was in a greenhouse climate and water was abundant. However, there is growing evidence that Australia was not a uniformly wet environment and parts of the current arid-adapted vegetation have their origins deep in time. Carpenter and Milne (2020) describe new Proteaceae macrofossils and pollen that further reinforce the view that xeromorphic vegetation is ancient in Australia. Hill *et al*. (2020) demonstrate the complex evolutionary pathways that may have taken place as species that had evolved originally to low soil nutrients responded to declining water availability. Byrne and Murphy (2020) provide evidence from analyses of the phylogenetic relationships of living Australian xeromorphic species to show that the fossil evidence for Eocene origins of some lineages is supported, with later, more extensive diversification occurring from the Oligocene onwards, and possibly increasing from the mid-Miocene.

From the extreme position of large tracts of extremely wet rainforests, Australia slowly began to dry as it separated from Antarctica and commenced a long period of isolation as it moved northward towards its current position. The vegetation change in Australia from those dense Eocene rainforests to the current mosaic of largely arid-adapted plant communities marks one of the great natural experiments in climate change that the Earth has experienced. Macphail *et al*. (2020) record a detailed example of the impact of climatic drying during the Plio–Pleistocene at Lake George. At this time, aridification was occurring reasonably quickly and their study is an excellent example of the magnitude of the resultant vegetation change.

Ebach and Murphy (2020) provide a comprehensive review of the history of our understanding of Australia's arid biome and demonstrate how much scope remains for future research on the living arid-adapted biota of Australia. Finally, Dörken *et al*. (2020) provide us with wonderful examples of the way in which plant species have solved the problem of living in arid landscapes – their detailed anatomical study of a diverse range of species shows just how much remains for us to discover.

The papers in this special issue should act as a catalyst for much more research in the future, especially as the impacts of human-induced climate change make an understanding of our arid zone vegetation so much more critical for our future wellbeing.

Conflicts of interest

Bob Hill is the Guest Editor of the 'Dry adapted vegetation' special issue. Despite this relationship, he did not at any stage have Editor-level access to this manuscript or any other manuscript in this issue that he authored, as is the standard practice when handling manuscripts submitted by an editor to this journal. *Australian Journal of Botany* encourages its editors to publish in the journal and they are kept totally separate from the decision-making process for their manuscripts. The author is also an author of one other paper in this special issue. The author has no further conflicts of interest to declare.

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