

Protea plants help unlock secrets of species 'hotspots'

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The majority of protea species on Earth are found in the two regions studied by Dr Savolainen.

(PhysOrg.com) -- New species of flowering plants called proteas are exploding onto the scene three times faster in parts of Australia and South Africa than anywhere else in the world, creating exceptional 'hotspots' of species richness, according to new research published today in *Proceedings of the National Academy of Sciences (PNAS)*.

Proteas are best known as the national symbol of South Africa. The international team behind today's new study created an evolutionary 'family tree' of all 2,000 protea plant species on Earth – the majority of

which are found in South Western Australia (SWA) and the Cape Floristic Region (CFR) of South Africa. This 'family tree' enabled the researchers to examine how these and other regions of the planet with Mediterranean-style climates have become so-called 'biodiversity hotspots'.

Until now, scientists have not known exactly why such large numbers of plant and animal species live in these Mediterranean hotspots. They are places of significant conservational importance which, like the rainforests, contain some of the richest and most threatened communities of plant and animal life on Earth.

The research published today provides the first conclusive proof that plant species in two of these hotspots are evolving approximately three times faster than elsewhere on the planet. The study dates this surge in protea speciation as occurring in the last 10-20 million years, following a period of climate change during which SWA and the CFR became hotter, drier, and more prone to vegetation fires.

Dr Vincent Savolainen, a biologist based at Imperial College London and the Royal Botanic Gardens, Kew, one of the authors of the new study, explains its significance, saying:

"Something special is happening in these regions: new species of proteas are appearing notably faster than elsewhere, and we suspect this could be the same case with other plant species too. This study proves that the abundance of different kinds of proteas in these two areas isn't simply due to normal rates of species diversification occurring over a long period of time.

"This is the first step towards understanding why some parts of the planet with a Mediterranean-style climate have become species-rich biodiversity hotspots."

Dr Savolainen and his colleagues believe that climatic changes millions of years ago could be one of the factors that prompted the protea plants' 'hyperdiversification' in SWA and the CFR. As these two regions became hotter, dryer, and prone to seasonal fires, proteas – which are drought-resistant and able to re-grow easily after a fire – would have survived, thrived and diversified into new species when faced with less competition for resources from less hardy plants.

Dr Savolainen concludes: "South Western Australia and the Cape Floristic Region of South Africa are areas of great interest to both evolutionary biologists and conservationists, because they contain such a rich profusion of life but are under threat from mankind's activities.

"Understanding more about the evolutionary history of these biodiversity 'hotspots' is important because it can help make conservation efforts more efficient."

Proteas live in the southern hemisphere and come in many different shapes and sizes, from 35-metre-tall trees to low growing shrubs. All proteas have leathery leaves and cup-shaped groupings of small, brightly coloured flowers that resemble thistles.

The Cape Floristic Region of South Africa and South Western Australia are two of five areas on Earth with a Mediterranean-style climate which have been designated 'biodiversity hotspots' by Conservation International. The others are: central Chile, California, and The Mediterranean basin.

Provided by Imperial College London

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