

Western Australia's incredible underground orchid

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Rhizanthella gardneri is a cute, quirky and critically endangered orchid that lives all its life underground. It even blooms underground, making it virtually unique amongst plants.

Last year, using radioactive tracers, scientists at The University of Western Australia showed that the orchid gets all its [nutrients](#) by parasitising [fungi](#) associated with the roots of broom bush, a woody shrub of the WA outback.

Now, with less than 50 individuals left in the wild, scientists have made a timely and remarkable discovery about its genome.

Despite the fact that this fully subterranean orchid cannot photosynthesise and has no green parts at all, it still retains chloroplasts – the site of photosynthesis in plants.

"We found that compared with normal plants, 70 per cent of the genes in the chloroplast have been lost," said Dr Etienne Delannoy, of the ARC Centre for Excellence in Plant Energy Biology, the lead researcher of a study published in *Molecular Biology and Evolution*. "With only 37 genes, this makes it the smallest of all known plant chloroplast genomes."

"The chloroplast genome was known to code for functions other than photosynthesis, but in normal [plants](#), these functions are hard to study," said ARC Centre Director Professor Ian Small.

"In *Rhizanthella*, everything that isn't essential for its parasitic lifestyle has gone. We discovered that it has retained a chloroplast genome to make only four crucial proteins.

Our results are relevant to understanding gene loss in other parasites, for example, the *Plasmodium* parasite that causes malaria."

Associate Professor Mark Brundrett from the Wheatbelt Orchid Rescue Project describes *Rhizanthella* as one of the most beautiful, strange and iconic orchids in the world.

"Combining on-the-ground conservation efforts with cutting edge laboratory technologies has led to a great discovery with impacts for both science and conservation. The [genome](#) sequence is a very valuable resource, as it makes it possible to estimate the genetic diversity of this Declared Rare plant".

Professor Brundrett has been working with the Department of Environment and Conservation and volunteers from the West Australian Native Orchid Study and Conservation Group to locate these unique orchids.

"We needed all the help we could get since it often took hours of searching under shrubs on hands and knees to find just one underground [orchid](#)!"

Provided by University of Western Australia

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