
Rhizanthella gardneri

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including notes from Ron Heberle
First published March 2011



THE SPECIES ORCHID
SOCIETY OF WA

Rhizanthella gardneri

Last week, Tony Watkinson sent me an interesting short article on *Rhizanthella gardneri*, WA's rare and endangered underground orchid. The following article was written by a former member, the late Ron Heberle and is published on our website with several photos. Take the time to visit this at the address on the front page of this newsletter.

In 1928, Farmer John Trott of Corrigin, unearthed the first specimens of *Rhizanthella gardneri* when ploughing new land that had been previously rolled and burnt. He took the specimen to Charles Gardner, the Government Botanist, who, in turn, forwarded them onto Dr. Sanders Rodgers who named the species in Gardner's honour.

As the common name implies, the species spends most of its life cycle underground, growing in association with, and close to *Melaleuca uncinata*, that sheds its leaves to produce thick layers of leaf mould.

The developing capitulum of tiny, crowded orchids, are exposed when the floral bracts expand and, occasionally push through the leaf mould, allowing light, and presumably pollinators to enter. Since the first finds, just six confirmed sightings were made in Corrigin - Babakin areas.

A breakthrough occurred in 1979 when farmer John McGuinness of Munglinup, East of Ravensthorpe, turned over a mallee root and found an orchid under it. Research then and again in 1980 produced a total of 26 specimens.

Further collections were made at the Oldfield locations, with another 9 plants sighted . Finance was made available from the World Wildlife Fund, for research from the resulting in a well organised research program led by Kings Park research scientists and assisted by the members of the Western Australian Native Orchid Study Group. Around 150 sightings were made and as a result of this and ongoing research, the knowledge of the biology of *Rhizanthella gardneri* has been greatly advanced.

Rhizanthella gardneri are unusual in other ways amongst the orchid family. The flowers are produced in a capitulum, which appears to be one large flower but on closer examination, proves to be a whole group of small flowers grouped together within a series of bracts which gives the appearance of being a single flower.

Ron Heberle

Following is the article, published by the University of WA that Tony found and sent to me that reveals some more amazing facts about this unusual orchid.

Buried flower has rare genes.

Wednesday, 09 February 2011

The University of Western Australia



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!"

But *Rhizanthella gardneri* thought for many years to be monotypic is not the only underground orchid. *Rhizanthella slateri*, the Eastern Underground orchid is found in New South Wales at Bulahdelah, the Watagan Mountains, the Blue Mountains, Wiseman's Ferry area, Agnes Banks and near Nowra . It is also listed as a critically endangered species due to habitat loss and destruction.

As this reclusive species lives underground, it is seldom seen and thus rescue programs that are often effective in translocating orchids (and other plants) and animals impacted by development are ineffective. Fortunately, state governments are now listing this species as critically endangered and providing protection for some known habitats. This includes buying land and setting it aside in reserves, in situ and captive breeding programs with or without associated mycorrhizal fungi, long term germplasm storage and at Kings Park, research to map the genetic diversity of the northern and southern populations. Translocation is another important strategy under investigation along with habitat improvement through removal of weeds and rehabilitation by reintroduction of native species. It is this work that has resulted in the finding that only 37 genes make up the chloroplast genome, the smallest of all known plants.

A third species not yet formally identified has been found in the Lamington area of Southern Queensland. This

species was initially thought to be *Rhizanthella slateri*, however Jones DL regards it as a new species.

Since sending me the first article, Tony has found the following URLs that provide more information about these unique, rare and endangered Australian orchids. If you are interested, look at.

<http://earthsky.org/biodiversity/the-odd-life-of-an-underground-orchid>

and

<http://www.cosmosmagazine.com/news/4036/rare-underground-orchid-genome-unlocked>

for further articles about the outcomes of the WA research.