A rare hybrid beauty

Albany woollybush

Genetic detective work by a Department of Conservation and Land Management (CALM) scientist Margaret Byrne and her honours student Esther Walker provided the key to a better understanding of the nature of the unique and beautiful plant, Albany woollybush (*Adenanthos cunninghamii*).

by Anne Cochrane, Sarah Barrett and Margaret Byrne

Facing page
Main Albany woollybush showing the flattened leaf segments that differentiate it from coastal woollybush.
Inset The red flower of the Albany woollybush.

Above Birds, such as this red wattlebird, feed on the nectar of the Albany woollybush flowers and transfer pollen from plant to plant.
Photos – Sallyanne Cousans

Albany woollybush is an erect, spreading shrub of up to one-and-a-half metres high from the banksia family (Proteaceae). The first plant was collected in 1827 from King George Sound (near Albany) by Charles Fraser, colonial botanist of New South Wales, during a survey voyage with Captain James Stirling. The species was named after brothers Richard and Allan Cunningham, early colonial botanists from New South Wales. The single, dull red flowers can be held at the tips or in the axils of the branchlets. The leaves are deeply divided into three parts, like a trident. Each part is further divided into two, so there are generally six segments. The segments are soft to the touch and hairy, hence the common name 'woollybush'. It is very similar to the common coastal woollybush (*Adenanthos sericeous*), but differs in having flattened leaf segments rather than the terete (cylindrical or slightly tapering) leaf segments of coastal woollybush.

In 1973, the Irish botanist E Charles Nelson found only three plants when collecting in Western Australia. He noted that it grew in low scrub on sandy soil, in association with coastal woollybush and coastal jugflower (*A. cuneatus*). On his recommendation, the species was declared 'rare'.

Since then, a range of specimens has been collected from near the south coast city of Albany. The plants were never found in large numbers and were usually scattered among plants of the common woollybush. Some plants found at Two Peoples Bay occurred among plants of coastal woollybush and coastal jugflower. But there were also a large number of plants that had wide variation in leaf shapes, from the terete leaves of coastal woollybush to the broad, only slightly divided leaves of coastal jugflower. The wide variation in leaf shape suggested that this was a site of hybridisation between coastal woollybush and coastal jugflower, where the hybrids were then crossing back to the parental species. This is known as a hybrid swarm.

The presence of Albany woollybush among these plants led botanists to suggest that Albany woollybush was possibly the first generation hybrid of the two species, whereas the other plants with various leaf shapes were later generation hybrids. Both coastal woollybush and coastal jugflower are pollinated by bees and birds, such as honeyeaters, which also feed on the nectar, so hybridisation could easily occur. Coastal woollybush only regenerates from seed and coastal jugflower is a resprouter, but Albany woollybush itself is killed by fire and regenerates from seed.

In Spring 2001, seed traps were erected around five Albany woollybush plants in Torndirrup National Park, near Albany. These seed traps (described in 'The defiant seed', *LANDSCOPE*, Summer 1999–2000) were used to collect seed for both germination and genetic research. Albany local Peta Ireland spent many hours over the following six months collecting material that fell into the traps, and sending the bags to CALM's Threatened Flora Seed Centre in Perth. The material, which contained mainly old flowers, twigs and leaves, was carefully sieved to find the seed. The seed was germinated but the seedlings did not have the flattened leaf segments characteristic of Albany woollybush. Instead, they showed a range of leaf shapes, from broad, slightly divided leaves to fine terete leaves (see photo).

Above Leaves of several seedlings grown from seed collected from a single Albany woollybush plant. Note the range of leaf shapes in the seedlings.
Photo – Carole Elliott

Above left Albany woollybush plants grow scattered throughout Torndirrup National Park on the south coast.
Photo – Rob Olver

Left New leaf growth on Albany woollybush has a pinkish colour.
Photo – Sallyanne Cousans

Around the same time, geneticist Margaret Byrne and Murdoch University Honours student Esther Walker visited two populations of Albany woollybush to collect leaf material for DNA analysis. They also collected material from the suspected parents, coastal woollybush and coastal jugflower. Genetic analysis showed that the samples of the two parental species were different from each other, and each species contained DNA variation that was specific to that species. In comparison, the Albany woollybush samples contained DNA variation from each of the two parental species, and no DNA variation that was unique to these plants. This confirmed that Albany woollybush is not a genetically discrete species, but a hybrid between coastal woollybush and coastal jugflower!

Some hybrids can be stable—that is, they produce seedlings that consistently look like the parent plants. But Albany woollybush is not a stable hybrid, because the seedlings produced from seed collections did not have the same appearance as Albany woollybush. Albany woollybush plants were never found in large numbers, indicating that hybridisation, and establishment of plants from seed produced through hybridisation, is a random effect.

Now that we know that Albany woollybush is not a true species, it does not fit the criteria for Declared Rare Flora and will be removed from the rare list. Nevertheless, this hybrid is unique and interesting, the result of evolutionary processes occurring right before our very eyes, and it will remain a protected plant under the CALM listing of Priority 4. Plants under this listing are monitored regularly to ensure their survival in the wild is not compromised.

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