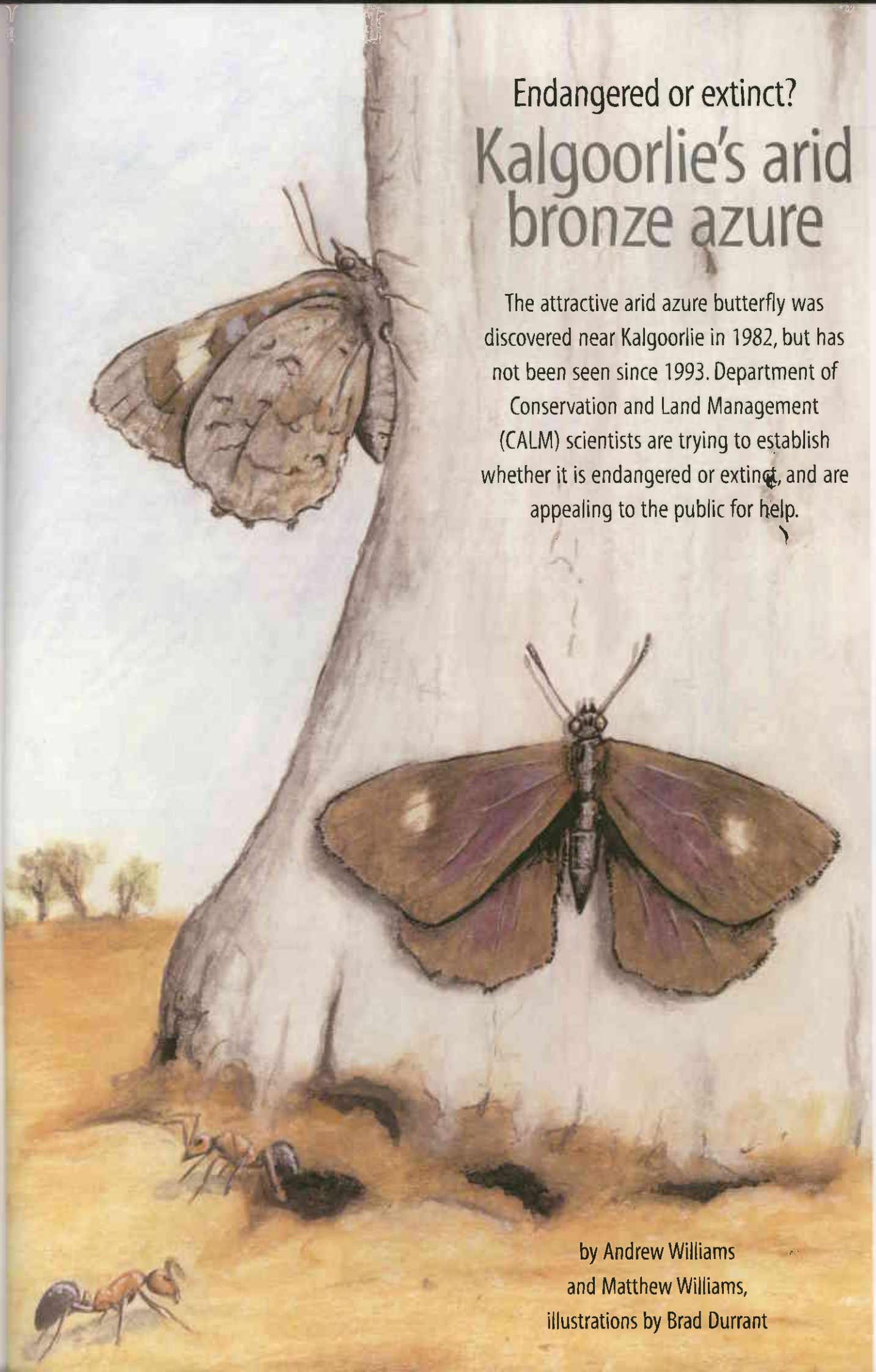

Endangered or extinct?

Kalgoorlie's arid bronze azure

The attractive arid azure butterfly was discovered near Kalgoorlie in 1982, but has not been seen since 1993. Department of Conservation and Land Management (CALM) scientists are trying to establish whether it is endangered or extinct, and are appealing to the public for help.

by Andrew Williams
and Matthew Williams,
illustrations by Brad Durrant

There are 131 butterfly species and subspecies recorded from Western Australia, 51 of which belong to a family known collectively as the lycaenids or 'blues'. They are so-named because, in many species, the upper surface of the wings is a metallic blue or purple colour. Within the lycaenid family are the 'azures', a group of spectacular blue and purple butterflies endemic to Australia. Seven species of these are found in WA.

South-western Australia has relatively few butterfly species, and many of them are small, sombre in colour or restricted in distribution. However, several butterflies found in this region are of great scientific interest. The arid bronze azure (*Ogyris subterrestris petrina*) is one such species. This species was discovered by Professor Alan Graham in 1982 near Lake Douglas, where it occurred in a very restricted area of mixed mallee woodland, 12 kilometres south-west of Kalgoorlie.

At first, the butterfly was thought to be an unusual form of the widespread large bronze azure (*Ogyris idmo*) but, before long, Alan and others realised that this was a new species. However, the insect was not described and officially named until 1999. During the process of naming this new species, museum collections around the world were searched to determine if any other specimens had been collected before. Only one was found, in the British Museum of Natural History. This had been collected by W Subiaco and was labelled 'S.W. Australia, Kalgoorlie District, 23 October 1911'. This demonstrated that the butterfly had been present in the area for more than 80 years.

The scientific name given to the butterfly was *Ogyris subterrestris petrina*.

The genus *Ogyris* contains all the azures, and the specific name *subterrestris* alludes to the fact that the immature stages (caterpillars and pupae) spend all their time under the ground. The subspecific name *petrina* means 'small rock', on which the female butterflies often choose to lay their eggs. The other subspecies, *Ogyris subterrestris subterrestris*, is found in south-eastern and southern Australia, where it is currently known from four locations. The subspecies *petrina* is very distinct, and is known only from Lake Douglas near Kalgoorlie.

Sugary associates

An interesting feature of lycaenid butterflies is that the immature stages of many species have a close association, or symbiotic relationship, with ants. Both the ants and the butterflies derive benefit from the arrangement. The butterfly larvae are protected by the ants, which ward off parasitic wasps and potential predators such as spiders. The ants are rewarded with sugary nectar, produced by a specialised 'nectary organ' or 'honey gland' on the back of the larva. The degree of larvae-ant association varies considerably between different species. Some lycaenid butterfly larvae have only limited ant attendance, while for others it is extreme. This is certainly the case for the azure butterflies of WA, where the species have developed differing levels of ant dependence.

The seven species of azure butterfly in WA are: the satin azure (*Ogyris amaryllis*), silky azure (*Ogyris oroetes*), northern purple azure (*Ogyris zosine*), southern purple azure (*Ogyris genoveva*), small bronze azure (*Ogyris otanes*), large

Previous page
Main A female arid bronze azure on the trunk of a mallee tree close to the entrance to a sugar ant nest.

Above Sugar ants drinking.
Photo – Jiri Lochman

Left Known habitat of the arid bronze azure, near Lake Douglas, Kalgoorlie.
Photo – Andrew Williams/CALM

Top The arid bronze azure as seen from above. The female is on the left and the male is on the right.

Above Underside of the arid bronze azure butterfly.
Photos – Andrew Williams

bronze azure (*Ogyris idmo*) and the arid bronze azure (*Ogyris subterrestris*).

The larvae of the satin, silky, northern purple and southern purple azures all feed on foliage and flowers of stem parasitic mistletoes. The larvae of the small bronze azure feed at night on foliage and flowers of the root parasitic plants: common sour bush (*Choretrum glomeratum*) and Preiss's leptomeria (*Leptomeria preissiana*). The larvae of all these butterflies are associated to a greater or lesser extent with sugar ants (*Camponotus* spp.).

While the larvae of satin, silky, northern purple and southern purple azures are cryptically coloured, those of the small bronze azure are white, having lost the need for camouflage. This is because they reside during the day in the dark confines of an ant nest, and emerge only at night to feed on the *Choretrum* or *Leptomeria* food plant. Before dawn, the larvae return to the nest underground.

Ant nest cocoon

This evolutionary path has been taken a step further by the large bronze azure and the arid bronze azure. The larvae of both these butterflies no longer depend on plant foliage for nourishment. They do not feed on vegetation at all, spending their entire time inside sugar ant nests. They are believed to feed on the ant brood, or may be fed by the ants, just as the ants feed their own brood.

The larvae grow and develop, completing their life cycle underground, then pupate within the nest. When the butterfly finally emerges from the pupa, it makes its way to the nest entrance and clambers up the nearest shrub or tree trunk. Only then does it pump fluid into its soft, crumpled wing veins to make the wings expand. Within a few minutes, its wings will harden, enabling the insect to fly away.

The habitat of the arid bronze azure at Lake Douglas is a mallee-dominated woodland growing in undulating country on rocky soils. Several tracks and pathways intersect the site. Within this area, nests of the sugar ant

Above Sugar-ant worker moving a piece of rock.
Photo – Jiri Lochman

Left Host ant.

(*Camponotus* sp. *wiedekehri* group) are frequently found at the bases of the mallee eucalypts. These ant colonies are crucial to the survival of the arid bronze azure.

Adult life

The flight period for the adult butterflies is unusually long. They have been seen flying at Lake Douglas from September to May, with numbers usually peaking in mid-spring and late summer. The males are dark purple above and sometimes appear almost black in flight. They patrol pathways and tracks, usually flying close to the ground. They settle frequently with wings closed, the greyish-brown patterning on the underside of their wings perfectly matching the rocky ground. Males have also been seen hill-topping on low rises. The females, generally larger than the males, are purple above and have a small but distinct white patch on the forewing that is quite noticeable in flight. The male butterflies seek out the females to mate. Having mated, the female then seeks out a suitable sugar ant nest, where she will lay her eggs on a rock or on the trunk of a tree adjacent to the nest entrance. When the eggs hatch, the tiny larvae either walk down into the nest or are carried in by the ants.

Caged females will lay their eggs readily, but only between 11:45 am and 1 pm. During the heat of the day the predominantly nocturnal sugar ants tend to retreat further underground. The female butterflies are therefore better able to approach the entrance of the ant nests and lay their eggs undisturbed.

Crisis at Lake Douglas

The decline of the arid bronze azure at Lake Douglas has been well documented by Alan, who visited the site regularly between 1982 and 2001, except for a period between January 1990 and February 1992, when he was overseas in Java. In 1982, the butterflies were locally abundant, and remained very common until 1990. The population then crashed, and in 1992 and 1993 only two individuals were observed. The butterflies have not been seen since, despite careful searches

Above left Azure butterfly larvae with attendant ants.
Photo – Peter Marsack/Lochman Transparencies

Above Sugar ant workers and soldier ants at their nest entrance.
Photo – Jiri Lochman

being undertaken at Lake Douglas and around the Kalgoorlie area by Alan, the authors of this article and many other butterfly enthusiasts.

The Lake Douglas site has been subject to considerable disturbance. It is crossed by numerous tracks and suffers from use by off-road vehicles and motorcycles. The butterflies and the sugar ants may be particularly susceptible to this kind of disturbance. The plight of this rare butterfly was recently highlighted in the *Action Plan for Australian Butterflies*, which recommended that the butterfly be listed as critically endangered under the Federal Environment Protection and Biodiversity Conservation Act.

Formal listing has not yet been approved; so federal funding is not yet available to implement a recovery plan for the butterfly. In the meantime, the Department of Conservation and Land Management (CALM) has set up monitoring transects at the location where the butterflies were originally so abundant. Monitoring over spring, summer and autumn has so far failed to reveal any sign of the butterflies. Regular searches have also been conducted in the area for the sugar ants, without which the butterflies cannot survive. These ant colonies have declined enormously, and this may be linked to an apparent increase in the numbers of very aggressive meat ants (*Iridomyrmex purpureus*), which are known to invade and occupy disturbed areas.

So what's the way ahead? First, we need to find a population of the arid bronze azure. *LANDSCOPE* readers who are willing to look out for this elusive butterfly, are encouraged to be part of this search, and report any possible sightings to the authors, CALM researchers Andrew Williams or Matthew Williams.

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