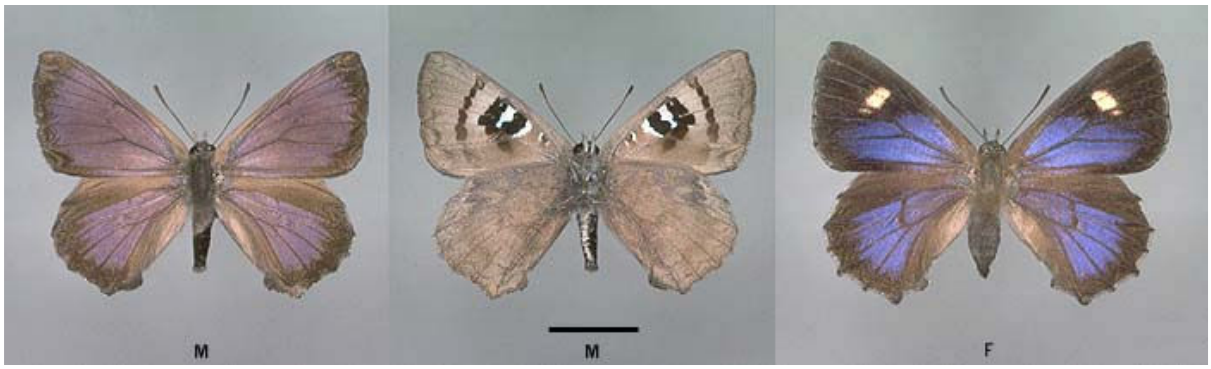
SOUTH AUSTRALIAN BUTTERFLIES
Data Sheet

Ogyris otanes otanes (C. and R. Felder) (Small Bronze Azure)*



Interesting aspects: This beautiful butterfly is now rarely seen on the mainland. It was once a reasonably common butterfly in sandy mallee scrub containing its foodplant, where it was often seen by the early lepidopterists feeding at flowers. Flying butterflies are irresistibly attracted to low bushes of the white flowering *Pimelea glauca* and *P. octophylla*. The massive clearing of native vegetation, particularly after the Second World War, has caused a significant decline in its distribution.

The butterfly belongs to the compact *O. genoveva-O. idmo* Species Group of interesting Lycaenid butterflies within the Ogyrini Tribe having very similar morphology and which are closely associated with the large *Camponotus* sugar-ants. *O. otanes*, along with *O. halmaturia* and *O. subterrestris* in South Australia and *O. idmo* (found in Western Australia) form the isolated *O. idmo* Species Subgroup within this group, as these four species have very similar adult morphology and early stages that associate only with *C. terebrans*. Some of the more specialised species of the sub-group have larvae that are believed to be either predatory on the immature stages of the *Camponotus* ants, or perhaps are fed by the ants at least when the larvae are very immature, which has allowed these species to overcome the adverse effects of the periodic loss of the foodplant, particularly from bush-fires, from which *Ogyris otanes* can directly suffer.

Male butterflies are the first to be active in the morning, and they will usually collect together on the ground, on the nearest low rise or hilltop to the colony, where they will warm themselves in the early rays of the sun. They are particularly attracted to the hilltops that have very little vegetation. When warm enough they fly off to feed, usually from the low growing, white flowering pimeleas. Once they have fed then they start to actively seek out the newly emerging females. They will set up a territory over or adjacent to an active portion of the colony, and actively defend it from other males. If females are scarce, then the males will all collect on the nearest hill or dune top adjacent to the colony, where they will either wait, settled on or near the ground with closed wings, for a newly emerged female to arrive for mating, or they will actively patrol the area by doing circuits of the hilltop and foodplants. The females become active in the mornings about an hour after the males (at about the same time the males become very active), and they will fly directly to the pimelea

flowers to feed before they become interested in egg laying. New males are also usually the first to emerge from pupae in the mornings.

The butterflies fly below about head height, and are normally not rapid flyers unless disturbed. Females are usually seen near the foodplant, in an egg-laying mode. The butterfly is not very timid, and both sexes can be approached once settled. These butterflies, like all other *Ogyris* species, have cryptically marked undersides that make the butterflies indistinguishable from the rough bark of trees and bushes, or the ground (especially in the case of *O. otanes*), when they are settled with wings folded. The yellow patches on the females can vary in size. The areal extent of the bronze and blue areas on the wings tend to be smaller in Kangaroo Island populations, although this may partly be a thermoregulation effect due to the generally colder conditions on the island.

On Kangaroo Island where there may locally be prolific colonies and therefore intense larval competition, larval development is variable such that there is extreme variation in adult size from 30 - 40 mm (opened wings) that sometimes gives the appearance that two species may be flying together.

This butterfly will sometimes fly with the much rarer *Ogyris halmaturia*, as both species associate with the same *Camponotus* sugar ant. In this situation, even though *O. halmaturia* is the larger butterfly, they are usually impossible to distinguish in flight. Once settled however, in South Australia the males can be quickly differentiated by the morphology of the hindwing underside, which is a uniform brown in *O. otanes* (see picture above), while *O. halmaturia* has a well-developed grey pattern. The females are difficult to distinguish as the morphologies of the hindwing undersides are similar, with the main difference being that the markings are grey coloured and more sharper in *O. halmaturia*. Their spring flight period also tends to be different in a given area, with *O. halmaturia* being the first to start flying, to later overlap with the beginning of the *O. otanes* flight before dying off.

Life History

Larval food-host: ***Choretrum glomeratum*** (berry broombush or common sour-bush), *C. spicatum* (spiked sour-bush), *Leptomeria preissiana* (currant bush) (Santalaceae). These are root-parasite plants, with yellow broom-like foliage. The larvae eat the soft foliage by scouring the bark, which causes the foliage to die, producing a brown burnt appearance to the plant. Larger larvae will also eat the young growing tips of the foodplant, and if the larvae are numerous, then they will produce a hedging effect to the foodplant. Fruit cuticle is also sometimes eaten.

Choretrum grows very well on Kangaroo Island where it often occurs in secondary regrowth, particularly after fires, provided there are adjacent unburnt areas containing the *Choretrum* and birds are present to distribute the seed. In this instance, *O. otanes* may actually benefit from fire, although this aspect has yet to be scientifically studied to provide proof on the matter. The direct impact of the fire is to destroy the butterfly colony, but it also burns off the undergrowth that is in direct competition to the *Choretrum* and also opens up the woodland that the butterfly prefers. Several years after the fire and after a proliferation of the *Choretrum*, and provided the fragmentation of surrounding (unburnt) conserved native vegetation is not too severe, the butterfly can recolonise the regrowth area and in many cases can proliferate. The high density of both *Choretrum* and butterfly can continue for many

years before the woodland again becomes too overgrown and the *Choretrum* once again declines in density and hence also a commensurate decline of the butterfly. On the mainland however, where fragmentation of native vegetation has been very severe, fire has the potential to permanently destroy *O. otanes*colonies, and is probably the main reason for the decline of this species on the mainland. It is also known that *Choretrum* can proliferate along tracks, the result of redistribution of *Choretrum* seed by emus.

Larval attendant ant: Larvae are attended by numerous large, sand dwelling sugar-ants ***Camponotus terebrans***. Interestingly, like *Ogyris halmaturia*, the butterfly associates with the southern, dark coloured form of the ant.

The ants are nocturnal, large, and in the case of this particular form of the ant, only moderately ferocious (but without a sting). They have formed a symbiotic relationship with the butterfly, whereby the ants provide protection to the early stages of the butterfly from predators and parasitoids, and in return the ants receive sugary secretions from the median dorsal secretionary organ (honey gland or Newcomer's organ) situated at the posterior end of the larvae. Adult ants are able to live off these secretions. Unlike the situation with *Ogyris subterrestris* in which adult butterflies are often killed by the ants on contact, *Ogyris otanes* is not instantly attacked unless it remains within the ant chamber after emergence from the pupa.

Eggs: Large, usually dark grey-brown with a white ring dorsally, the micropylar area is white, of hemispherical shape, base flattened, with a very fine reticulated pattern. The reticulations are hexagonal. Some eggs may be a washed out grey or white colour. The eggs are typical for the species-group. They are usually laid in small clusters at the base of the foodplant at the narrow entrance to ant chambers or galleries specially constructed below ground by the attendant ants for sheltering the early stages of this butterfly. There is usually only a single entrance to these chambers at the base of the foodplant. These chambers are normally only a narrow space not much wider than the mature larvae or pupae, and occur under the base of the foodplant or along its roots. Eggs hatch in about 10-14 days in early summer. Hatched empty egg shells laid on the foodplants are eventually destroyed by the ants.

Females actively seek out foodplant harbouring existing early stage colonies of the butterfly. They will land near the base of the foodplant, either on the ground or on the foodplant, then walk to the base of the foodplant where they will lay their clutch of eggs. The females will only lay on foodplant that has the specially prepared ant chambers present.

Female butterflies have an egg laying preference for very small foodplants, below 1 m (although this small size may partly be induced by the cropping of new foodplant growth by the feeding larvae already present in the colony). The choice of small foodplants obviously aids the very immature larvae to reach the foliage of the foodplant, as larvae of all sizes including those newly hatched from eggs have to ascend the foodplant each night to feed. The downside of this choice is that the foodplant is often quickly stripped of edible foliage by the larvae, and it is believed the larvae cannot make the move (above ground) to another foodplant for survival. The presence of the attendant ants is also a requirement for egg laying, and these ants will only associate with sandy soils.

Larvae: *O. otanes* is unusual in that it can require six larval instars before pupation occurs. The first instar is pale pinkish yellow, with the pink colour being concentrated on the

intra-segmental areas, causing the larva to take on a ringed or 'zebra' appearance to its pattern. There is a large dark brown area dorsally on the first segment above the head (containing the prothoracic plate), and a smaller brown area on the last segment (anal plate). Long onisciform shape, with scalloped lateral edges. The posterior dorso-lateral organs are not developed. The head is large, smooth, yellowish brown, hidden beneath the body. The peripheral surfaces have long hairs, that are much longer anteriorly and posteriorly, and there are shorter bristly hairs scattered over the body. There is a pair of very long recurved dorsal hairs on the second and third anterior segments (TS 2 and 3). On abdominal segment (AS) 7 there is a further, long, dorsal, bristly pair (but much shorter than the recurved pairs), that is depressed towards the posterior end (similar to *Ogyris subterrestris*). The long dorso-anterior hairs differentiate this species from the very similar *Ogyris halmaturia* and *O. subterrestris* as the first instar larvae of those two species do not possess these hairs.

The second instar is similar to the first, but the long hairs are fewer and shorter (relative to the body size). There are one or sometimes two pairs of long hairs anteriorly on the first segment, a single long peripheral hair on thoracic segments TS 2 and 3, and again on AS 8 adjacent to the dorsolateral organ, and there are a further one or sometimes two pairs at the extreme end of the larva. There is also a dorsal pair of long recurved hairs on TS 2 and 3. There are sometimes further short dorsal pairs on the posterior abdominal segments 4, 5, 6 and 7, but the presence of these hairs (in part or entirety) is variable. The long hairs probably serve as sensory hairs for the larvae to negotiate the narrow ant tunnels. The 'zebra' colour pattern is usually well developed and the larvae sometimes develop green coloured areas. The third instar is similar to the second instar. Its colour is initially similar to the late stage second instar, but with increasing growth, it gradually acquires a semi-translucent pinkish grey-white colour. From the second instar, the dorso-lateral organs are prominent at the posterior end.

The early instars are very mobile due to well-developed thoracic legs, and are quite capable of climbing the foodplant with ease every evening. (The first instar is about 2 mm long when it hatches from the egg). Like the larvae of *O. subterrestris*, the larvae of *O. otanes*, particularly the younger larvae, have a habit of rapidly thumping the substrate with either their heads or rear ends when they are agitated. This immediately invokes a reaction from the attendant ants to seek out the cause of the disturbance or interference to the larvae.

In the fourth instar, there is a slight change in the pattern of setae distribution. The hairs are shorter and more bristly, and occur in dorsal pair groups on TS 2 and 3, and AS 3, 4, 5 and 6, and the bristles in the groups can occur either singly, or in doublets or in triplets. There are also peripheral bristles, usually one per segment (but sometimes in doublets and triplets), except on AS 7 and 8 where there are none, and except again on the first and last segments where there are multiple pairs. Except for the dorsal hairs on TS 2 and 3, the presence of the other hairs (in part or entirety) is variable. There are also sublateral bristles, which are finer than the other bristles. The colour is initially similar to the late stage third instar, but it gradually loses the dorsal reddish marks and becomes a semi-translucent greenish white, with pink anterior and posterior lateral parts, and there is a narrow dark dorsal line and conspicuous lateral black spiracles.

The final instar can either be a fifth or sixth instar stage, depending on how quickly the earlier stages evolved, and the time of year. The normally developed final instar is about 25 mm long. It is initially a greenish white colour, sometimes with pink ends, but near the end of its

growth it becomes a ghostly, translucent yellowish white, with a slightly darker dorsal line and black spiracles. Long onisciform shape, the lateral edges are weakly scalloped, and the anterior and posterior areas are flattened. The dorsal and peripheral surfaces bear a few short bristly hairs in the same pattern as for the fourth and fifth instars. The body is sparsely covered in minute secondary setae, which are flattened and pointed, shaped like a spear blade, set on a base that is simple and smooth. The posterior, dorso-lateral organs are large and well developed. The head is small, smooth, yellowish brown, hidden beneath the body.

Larvae feed only during the night, accompanied by many attendant ants. They will not emerge from the ant chamber or remain on the foodplant while the moon is brightly shining, although light cloud cover obscuring the moon is sufficient for the larvae to remain on the plant. The late instar larvae are the first to emerge from the chambers at night, and quickly gather near the tips of the foodplant looking like little white Christmas-tree decorations. When feeding, they are easily disturbed, with the least disturbance causing them to quickly return to the ant chamber. Some will even drop off the foodplant, where they are quickly rounded up by the ants and herded back to the ant chamber. The small first and second instars that drop off are actually picked up by the ants in their large jaws and returned to the ant chamber entrance. Presence of larvae on a foodplant is readily discernible by the scoring (eat marks) of the foodplant leaves, (actually a pseudo-leaf).

During the day the larvae hide from predators by remaining below the ground surface in the ant chambers. Ant chambers that are only harbouring early instar larvae have the entrances sealed off by the ants during the day. Those chambers containing late instar larvae and pupae are not sealed off, but are actively guarded by the ants. Larval excrement (frass) within the chambers is removed by the ants. Where the foodplants occur adjacent to one another then the ant chambers interconnect, allowing the larvae a choice of foodplants.

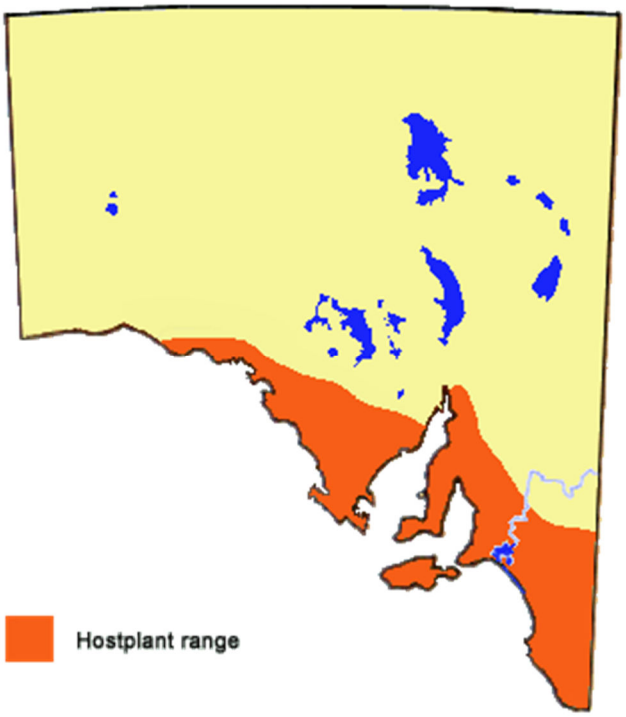
The larval period is variable, depending on the time of the year and the condition of the foodplant. The sustenance value of the cuticle of the foodplant is probably low, particularly during the hot, dry summer and autumn months. During winter, larval development is very slow. Over the warmer months the colonies usually contain larvae at all stages of development. In captivity, the first three instars develop quickly, but the last two or three instars are usually prolonged in their development, possibly as a result of these larvae preferring the more mature (less nutritious) parts of the foliage.

Pupae: About 14-17 mm long, pale yellowish brown to yellowish white, with the thorax and wing areas being darker, usually covered with a white powdery bloom, long cylindrical, rounded anteriorly, the abdomen is strongly arched, and there are some very short bristles on the abdomen and again on top of the head where they are more numerous. Weakly attached to the base or roots of the foodplant beneath the ground surface within the ant chambers, by anal hooks and a very weak central girdle. The pupae are fragile and are easily damaged. The butterflies normally emerge during the morning, and crawl quickly out of the chamber up into the top parts of the foodplant before expanding their wings. Butterflies that emerge deformed are destroyed by the ants. The empty pupal shells are also eventually destroyed by the ants after the adult butterflies emerge. The pupal period is normally 2-3 weeks, but can extend to 12 weeks, and pupae formed in late autumn will overwinter.

Flight period in S.A.: October to April, with stragglers into May. The main emergence is during late spring and early summer, and a secondary peak occurs in early autumn. The length of its brood period probably limits it to the two main broods, which require about 16

weeks to complete in the warmer months, although some of the smaller Kangaroo Island butterflies can require only 12 weeks. It overwinters as larvae and pupae.

Distribution: Found only in the southern temperate parts of the state, including Kangaroo Island, wherever its foodplants occur in sufficient numbers. The butterfly is now extinct in the Adelaide Region. The same subspecies (used to) occur in western Victoria. It has also been historically reported to occur in the Broken Hill area of southwest New South Wales, but this needs reconfirmation as its foodplants are not reported from this area. A similar subspecies occurs in southwest Western Australia, while a very different subspecies that looks similar to *O. idmo* and *O. halmaturia* occurs coastally north of Perth.



Habitat: The only known hostplant to be used in S.A. is *Choretrum glomeratum*, which grows mainly in mallee country, but sometimes in dry woodland or tall dry shrubland habitat, on a variety of soils, but chiefly on sandy-loam overlying limestone, and is often best developed on hill-tops. The *Choretrum* also frequently generates in newly disturbed mallee, especially along the edges of new road works such as access fire-trails, where seed is distributed by birds and particularly emus. *Choretrum* on the mainland is usually very local in its occurrence, particularly in any significant numbers. The butterfly can only survive where there is a critical density of the hostplant. In some areas it will only utilise one plant

out of about thirty, while in other areas where the butterfly colonies are less disturbed, it will utilise most of the plants. The obligate attendant ants only associate with sandy soils.

On Kangaroo Island the density of *Choretrum* is still very high, and in some secondary regrowth habitats (particularly after fire) in the southern parts of the island, can be the dominant vegetation (2003). In this situation the butterfly on the island has probably benefited from the coming of European farming with partial clearing (fragmentation) and infrequent fires that can allow the *Choretrum* to flourish.

Conservation Status in S.A.: Endangered on the mainland, stable on Kangaroo Island in 2003. Recent surveys for the butterfly on the mainland indicate its existence is precarious due to its refugial, fragmented colonies being affected by bushfires and the recent extended drought (2002-2010). Colonies were reasonably stable on Kangaroo Island in 2003 where large tracts of mallee containing *Choretrum* have been conserved and remained unburnt after previous bushfires over the previous 10 years. At that time the butterfly was seen to be sometimes locally common. However, the widespread catastrophic bushfires of 2007 that burnt 20% of the island may have induced threatening processes.

Threats: The butterfly is now only found within or adjacent to large, conserved, pristine mallee areas. Conserved sites on the mainland containing *Choretrum glomeratum* at the critical density suitable for supporting a butterfly colony, are now severely fragmented. This fragmentation makes these butterfly colonies highly vulnerable to any major disturbance such as bush-fires or the effects of toxic spray drift from the aerial spraying of adjacent agricultural areas, as there are no longer adequate connecting corridors of vegetation between the fragmented sites. The diggings of large burrowing animals, particularly rabbits, could disrupt small colonies. Interestingly, kangaroos actively target *Choretrum* and cause havoc on the foliage by breaking off large branches. They also like resting under *Choretrum*during the heat of the day in their specially dug scrapes, which may cause disruption to any *O. otanes* bearing ant chambers. Due to its rarity and brilliance butterfly collectors often target this butterfly, and the manner of collection usually inflicts irreparable damage on the breeding colonies.

Conservation Strategy: Ideally, its foodplant on the mainland needs to be re-established at critical densities in large, conserved areas of pristine mallee, dry woodland or tall dry shrubland habitat. Unfortunately, the *Choretrum glomeratum* is a root-parasite, and many plant conservationists are not happy about its presence. However, like other root-parasites, such as *Santalum* species (quandongs, sandalwoods) and *Exocarpos* spp (native cherries), the *Choretrum* does not appear to have any adverse effect on surrounding vegetation. Propagation of the *Choretrum glomeratum* from seed is hindered by the fact that more than 98% of its fruit can be riddled by a small moth, and therefore special preparatory methods of propagation would have to be introduced.