SOUTH AUSTRALIAN BUTTERFLIES
Data Sheet

Hypochrysops ignitus ignitus (Leach) (Fiery Jewel)

Female

Interesting aspects: Although small, this is a very pretty butterfly with red and yellow markings edged metallic green on the wing undersides (somewhat reminiscent of an aboriginal dot-painting), while the uppersides are purple in the males and either purple or metallic blue in the females. In the males the forewing uppersides may also have an extensive orange bloom. The adults have yellow coloured, cat like eyes. It belongs to a large group of similarly marked butterflies, centred in distribution in the forests and woodlands of eastern Australia and Papua New Guinea, never more than 400 km (usually much less) from the coast. *H. ignitus* is the most widely distributed species of the group within Australia. They are related to the larger *Ogyris* butterflies. All members of the group are avidly targeted by butterfly collectors. Nearly all the species have a close association with small ants.

The Fiery Jewel is now very rarely seen in South Australia. The male butterflies are either seen about tall (or taller) trees near the hostplants, or more often are seen hill or dune topping near the hostplants. The males are usually not particularly active, and will wait, usually with closed wings, for newly emerged females to show up for mating. They prefer to perch on (or in) leafy vegetation but will use dead vegetation if that is all that occurs. The butterflies are not very cryptic in the latter situation although sometimes they imitate a blackened dead leaf still attached to the bare twigs. Periodically however, the males may fly off to patrol the area by circling the hill/dune top or to check out the

hostplants. Males will settle together and do not normally fight for territory. Their flight is fast, but usually of short duration unless they are on patrol. The females are usually slower in flight, and when not feeding from flowers, spend much of their time searching for suitable hostplant or places on the hostplants to lay eggs.

The area of the purple or blue colouration on the wing uppersides is variable in both sexes. Certain parts of the scaling colour are very dependent on the angle of view. For instance, the underside black markings vary between black and metallic green. In the males the purple colour can change to dull orange or brown. The butterfly is unusual in that each population of the butterfly seems to have its own distinctive pattern. When settled the butterflies are usually not very timid and can be approached with care.

Life History

Larval food-host: Larvae are polyphagous and have been documented to eat numerous hostplants from a variety of families (presently estimated at 17 families Australia wide). Those hostplants which can be found in South Australia include *Cassinia* spp, *Olearia axillaris* (coast daisy-bush) (Asteraceae); *Brachyloma daphnoides* (daphne heath) (Epacridaceae); *Acacia* spp incl. ***A. decurrens* (queen wattle), ***A. leiophylla*** (smooth-leaf wattle), *A. longifolia longifolia* (Sydney golden wattle), *A. mearnsii* (black wattle), ***A. pycnantha*** (golden wattle), ***A. saligna* (golden-wreath wattle) (Mimosaceae); ***Agonis flexuosa*, *Eucalyptus* spp (Myrtaceae); *Banksia* sp, *Grevillea* sp (Proteaceae); *Pomaderris* sp (Rhamnaceae); **Prunus* sp (plum), ornamental **Rosa* sp, **Rubus* "*fruticosus*" (blackberry) (Rosaceae); *Camellia* sp (Theaceae), ***Choretrum glomeratum*** (berry broombrush or common sour-bush), *C. spicatum* (spiked sour-bush), ***Exocarpos aphyllus*** (stiff cherry), *E. cupressiformis* (native cherry) (Santalaceae); ***Alectryon*(*Heterodendrum*) spp, ***Cupaniopsis anacardioides* (tuckeroo), *Dodonaea* spp incl. ***D. humilis*** (dwarf hop-bush), *D. viscosa angustissima* (*attenuata*) (narrow-leaf hop-bush) (Sapindaceae), *Brachychiton* sp (Sterculiaceae).

In South Australia the documented hostplants are few. On Eyre Peninsula the hostplant is *Choretrum glomeratum*; on Yorke Peninsula the hostplants are *Acacia leiophylla*, *Choretrum glomeratum*,*Dodonaea humilis* and *Exocarpos aphyllus*; near Adelaide they used to use *Acacia pycnantha*, while in the Upper Southeast the hostplants have yet to be recorded. In the adjacent parts of western Victoria they have been recorded on *Brachyloma daphnoides* and *Choretrum spicatum.* The larvae usually eat the leaves and soft stem parts of the hostplants, and eat by scouring the cuticle surface such that the underlying parts of the plant eventually die and turn brown, causing the grazing area to look withered and burnt, or in the case of large leaved *Acacia* cause the leaves to become skeletonised. If the colony is large then the larvae will even eat the green bark off the stems and trunk (from either inside or just outside the byre), which may eventually lead to the death of the hostplant.

Larval attendant ant: In South Australia, larvae are attended only by a small dark-brown ant ***Papyrius*** sp (***nitidus*** group). It is a byre-building ant with a distinctive coconut-oil smell. The ants themselves do not live in the byres, which are made of matted fine vegetal debris constructed by the ants about the base of the larval hostplant to house and protect the larvae and pupae of the butterfly from predators during the day. These semi-permanent byres can cover just a portion of the hostplant base, or sometimes can be extensive,

surrounding the entire base of the hostplant at heights of 20 cm or more, sometimes even extending as narrow extensions up the trunk of the hostplant, and in extreme cases can spread as branching extensions away from the hostplant for over a metre or more over decaying logs and other vegetal material on the ground. The ant nest occurs either deeper underground or at some distance from the hostplant. The gap between the byre and the trunk of the hostplant is usually not much wider than the thickness of the mature larvae and pupae. The byres are not always present, but can be quickly constructed by the ants after eggs are laid by the female butterfly, to accommodate the subsequent emergent larvae.

As for the *Ogyris* butterflies there is a symbiotic relationship between the ants and the early stages of the butterfly. The ants provide accommodation and some protection for the early stages, while the larvae provide liquid food for the ants from a special nectary gland (Newcomer's organ) situated at the posterior end of the larvae.

There are several ants that construct byres in S.A., some of which can sting, but the small *Papyrius* ant is harmless and has a characteristic coconut oil smell that is irresistible to cats. The compound(s) producing the smell are also found in catnip and consist of nepetalactone (nepetapyrone) derivatives. It has been found that these compounds have antibacterial and insecticidal repellent properties (to small wasps and flies), and so these ants provide further symbiotic service to the *H. ignitus* larvae by supplying antibacterial measures inside the byre and also may prevent predatory small parasitic wasps and flies from attacking the eggs and larvae of the butterfly. It is not yet known if the nepetalactone compounds can prevent the introduced large European wasp from destroying the ant byre colonies containing the *H. ignitus* larvae. It is also not yet known if the ants produce their own nepetalactone compounds or whether they sequester them from plants. Several other ants (such as *Iridomyrmex* and*Crematogaster* species) also have these nepetalactone compounds in their systems, and some of these ants also provide a symbiotic service to other Lycaenid butterflies.

Eggs: Small, greyish white, hemispherical shape, basally flattened, the top is weakly domed. The micropylar area is very small at the egg apex and dark coloured. The sides are finely reticulated, with mostly hexagonal facets, and some pentagonal adjustment facets. The facets in the lower half of the egg and again adjacent to the micropylar area are smaller than those in the upper half. There are raised, tapering, short projections ending with a hair-like spines, occurring along the facet ridges, over most of the egg but particularly in the upper half.

Eggs are laid in small batches near the base of the intended hostplant or sometimes also on vegetal debris at the base of the hostplant. Individual egg batches to 18 have been noted, but the aggregations of several females can lead to much larger batches. The prime ingredient for egg laying is the presence of the attendant ants, and although the hostplant choice does not seem to be critical the butterfly does have a preference in South Australia for broad-leaved *Acacia* and *Choretrum glomeratum*. If an ant byre is not already present, then the ants will quickly extend or build a new byre to cover the eggs. The eggs begin to hatch in 10 days. The female butterfly has an egg laying preference for small immature plants about one metre in height, and if the colony is vigorous and contains many larvae these plants can be quickly destroyed over a single season.

Larvae: The first instar is initially pale greyish white with a pale pink dorsal line. Long, flat onisciform shape, with a slight dorsal keel. The head is very large, smooth, shiny, with

a few short bristly dark setae (hairs), dark brownish black coloured and partly hidden beneath the body. There is a large dorsal prothoracic plate behind the head, rectangular shaped, dark greyish black, with two pairs of long forward directed dark hairs. The posterior dorsal anal plate is grey, small, triangular shaped. There are very long white (basally darker) peripheral hairs, shorter posteriorly, two per segment laterally, but with additional hairs anteriorly and posteriorly. There are dark paired hairs dorsally; on the 2nd segment there are two widely spaced long recurved hairs, the third segment with two pairs closely spaced shorter hairs, segments 4-6 with one pair of shorter slightly recurved hairs, segments 7-9 with one pair of very short knobbed bristly hairs. The dorsal posterior nectary organ is well developed. The posterior dorso-lateral organs are not developed, but are replaced by a pair of specialised flattened white moveable short flap-like setae. A further double pair of similar but longer specialised setae situate between the previous short flap-hairs and the anal plate, and which extend over the latter plate. There are a few tiny dark secondary setae along the body, elongated vase-shaped. The initial body length is about 1.8 mm, but including the long hairs is about 3.1 mm. After eating, the first instar gradually becomes yellowish pink coloured, with a broad dark dorsal line, a yellow subdorsal line and several dark narrow lateral lines. The second instar acquires the posterior dorso-lateral organs, while by the third instar the flap-like setae adjacent to the latter have completely been lost.

Intermediate instars between the first and final instars are onisciform (slater shaped) and gradually lose the long dorsal setae, and also gradually become mostly brown coloured and acquire the pattern of the final instar. When the larvae undertake moulting the head and prothoracic plate separate joined together, but separately from the rest of the body skin.

First instar larvae are reported to sometimes remain exposed on the leaves of the hostplant. Subsequent instars at least, hide during the day, and feed at night. They shelter during the day inside the ant byre at the base of the hostplant, or deeper still along chambers constructed by the ants around the base of the hostplant or along its roots. As many as 30 larvae have been reported to live inside these byres. Sometimes if the colony is large they will also hide in curled leaves higher on the hostplant that the ants have converted into shelters by sealing off the exposed parts with byre material. At night the larvae leave the byre, along with numerous ants, to feed on the hostplant leaves. The larvae will feed gregariously together. The presence of larvae on a hostplant is readily discernible by the presence of the ant byre, and by the scoring and skeletonising of the hostplant leaves.

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. When fully mature it is about 14-18 mm long, elongate onisciform shaped, the lateral edges are scalloped, and the anterior and posterior areas are flattened. There are some short peripheral hairs that are longer anteriorly and posteriorly, and also some very short dorsal hairs. Generally greyish, pinkish or yellowish brown coloured, with a pale narrow longitudinal dorsal line that is continuous onto the prothoracic plate, pale and dark dorsal and subdorsal chevron markings, and a pale yellow longitudinal and hachured subdorsal line, edged dorsally dark brown. The prothoracic and anal plates are large, mostly black coloured, smooth but densely covered in secondary setae. The body is densely covered in these tiny secondary setae, which consist of an open cup on a short stalk set on a raised simple smooth base. The cup is variable, either symmetrical or asymetrical, with the rim being either smooth, crenulate or with about 5-6 short lateral points and sometimes a central short point. The secondary setae impart a

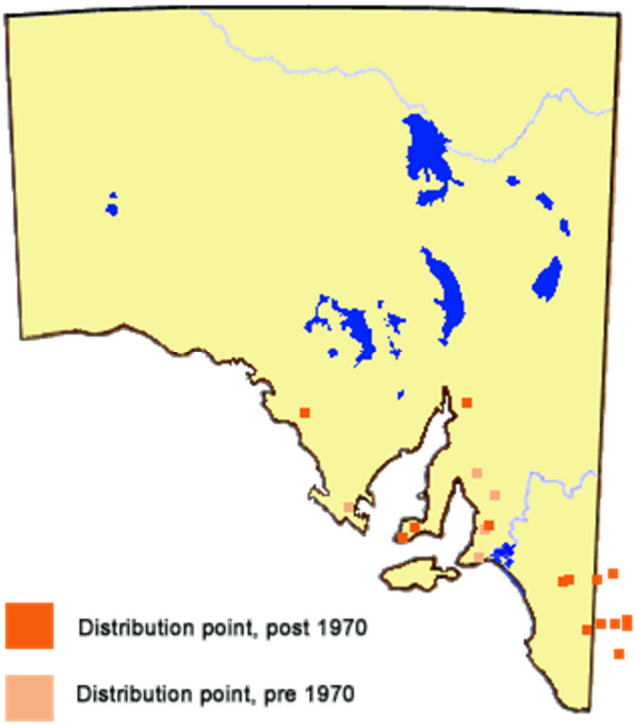
scabrous appearance to the larvae. The posterior dorso-lateral organs are well developed. The head is small, smooth, dark brown or black, hidden beneath the body.

The larval period is variable, depending on the location, time of the year, and the condition of the hostplant, but development is generally slow. During winter, larval development is very slow. Over the warmer months the colonies usually contain larvae at all stages of development.

Pupae: About 9-13 mm long, greyish brown, speckled with darker brown markings, long cylindrical, the abdomen is slightly arched, smooth, rounded anteriorly, the posterior end is also rounded but is noticeably extended into a pad that terminates beneath with the cremaster. Pupae are attached to the hostplant by anal hooks and a central girdle. Pupation occurs either within the byre or more often underground in ant chambers about the base or roots of the hostplant. The latter is preferred as the larvae are cannibalistic and will eat other pupating larvae, and there is a better chance for a successful pupation in areas distal from the byre. The larvae will pupate gregariously together. The empty pupal skins are eventually destroyed by the ants or by other pupating larvae. The pupal duration is about one month. The emerging butterflies leave the chambers and byre to expand their wings.

Flight period in S.A.: The butterfly flies throughout the warmer months, with records from late October to early May. The main flight is late spring to early summer, with a later secondary flight in late summer and early autumn. Butterflies flying after mid-summer produce larvae that over-winter.

Distribution: The butterfly used to occur in most areas of the southern agricultural belt having average annual rainfall in excess of about 300 mm. It occurs in discrete colonies, which in SA are usually very limited in size, although the population in the Upper Southeast is quite large. It has not been seen on Kangaroo Island. There used to be one colony in a conservation park in the Adelaide Hills where it had been breeding continuously on *Acacia pycnantha* over an area of about one hectare for 40 years. Sadly this colony became defunct in the mid-1970's. The local nominotypical subspecies of the butterfly also occurs in similar higher rainfall woodland habitat in the eastern mainland states, usually within 200 km of the coast. Four other similar subspecies occur in southwest WA, northern Australia and southern Papua New Guinea.



Habitat: The butterfly can occur in many habitats, from dry mallee woodlands and heathlands to moist forests, but they must be in pristine condition. The colonies can sometimes occur in roadside reserves, but they are always near large areas of pristine habitat. It is not found in arid or cold alpine areas. Hilly or dune terrain is preferred, although not essential. The early stages are totally dependent on only the one species of attendant ant.

Conservation Status in S.A.: The butterfly is widely distributed but threatened and considered to be vulnerable to any interference. Colonies appear to be stable in the large conservation parks in the Upper Southeast Region, but elsewhere they are very unstable. The butterfly is more common in NSW and Qld.

Threats: This butterfly is unable to adjust to agricultural and urban disturbances. Butterfly collectors frequently target it, and the manner of collection is often terminal for the colony. Hilltops are usually essential for males as lekking areas, and in urban fringe areas these are often used for housing and communication towers, and the butterflies are therefore likely to suffer. Its main threat in conservation areas is likely to be bushfires, although recent evidence suggests some colonies can survive 'cool fires' if they occur beneath the ground along the roots of the host plants. However to subsequently exist, the larvae would have to either become cannabilistic or eat the bark off the roots of the hostplant while it is still moist. Whether the pupae then undergo long diapause until hostplant regrowth occurs is not known. It is also not known if the larvae can temporarily adapt to other less preferred hostplants (of which there are many) while its preferred hostplants regenerate after fire. It is totally dependent on the one species of ant, which is itself quite rare, and usually dependent on undisturbed habitat. Burrowing animals such as rabbits, bandicoots and echidnas (and probably also mice during their periodic plagues) have the potential to destroy larval colonies at the base of the host trees. A proliferation of bird life is also a potential threat to

the butterfly, as its dependence on hill topping places it in a situation where it becomes vulnerable to repetitive bird attacks. Perched male butterflies often display evidence of bird attacks to their wings.

'Friends of native vegetation' and 'Bushcare Volunteers' may also mistakenly destroy the byres and larval colonies, thinking them to be affecting the vegetation (which they are), but the plants they affect are much more common than the butterflies. (The ant byre should not be confused with byres produced by borer beetles and moths, as these byres are very small in area and occur higher up on the plant.) Opening up the byre exposes the early stage larvae and pupae to predators, particularly parasitoids, wasps and other ants, which will quickly destroy the colony. The attendant *Papyrius* ants cannot fully protect the early stages once the byre has been opened.

As the byred colony exists above ground, and due to the proliferation of the introduced European Wasp along the Adelaide Hills, any existing butterfly colonies in this area are likely to be terminally affected by this very efficient predator wasp.

Conservation Strategy: The butterfly requires broad acre pristine habitat for survival. Colonies of early stages need to be left alone. Butterfly collectors should target flying adults, preferably males. If collectors must have perfect specimens, then only a few mature larvae minimally collected from the hostplant at night during the spring and early summer months should occur. Byres need to be left unbroken.