

SOUTH AUSTRALIAN BUTTERFLIES

Data Sheet

Papilio demoleus sthenelus W.S. Macleay (Chequered Swallowtail)



Interesting aspects: A powerful flying butterfly, which tends to fly 1 - 2 m above the ground. Like most of the swallowtails, they usually feed from flowers while on the wing, similar to hummingbirds. If disturbed before it is ready for flying, such as early in the morning or while it is hardening its wings after emerging from its pupa, the butterfly will suddenly open its wings to its fullest extent, exposing the two pairs of eye like ocelli on the hindwings. This response is very startling to bird predators.

It is a pretty sight to see these large butterflies fluttering over the broad acres of hostplant in the ephemeral creek systems in the Far North of the state after rain. Some are feeding like hummingbirds from the purple flower heads of the tall scurf-pea hostplant, while the females are busily laying eggs. Large quantities of eggs are laid by the females on the hostplant in the Far North after rains. Most of these are consumed by various tiny predators that suck out the contents of the egg. The first instar larvae are also very temperamental, having a habit of dying. The surviving larvae are also hammered by parasitoids, and consequently a low percentage of the laid eggs actually produce a new generation of butterflies. In the hot tropics and sometimes in the Far North, large numbers of the butterflies are sometimes seen puddling at the edges of water on a hot day, sometimes with wings stationary, and sometimes while flapping or vibrating their wings. They imbibe (suck) the water up through their proboscis, remove any water soluble nutrients in their stomach, then squirt out the remaining water from their rear ends, the whole process working like a windmill water pump on an irrigation farm.

It is a widely distributed butterfly, occurring through much of the Orient and into India and the Middle East. It is replaced in Africa by a very similar sister species *Papilio demodocus*.

Life History

Larval food-host: Normally *Cullen*(*Psoralea*) spp including *C. australasicum* (tall scurf-pea), *C. cinereum* (annual scurf-pea), *C. graveolens* (native lucerne), *C. patens* (spreading scurf-pea), **Psoralea pinnata* (African scurf-pea) (Fabaceae). Overseas, the larvae feed on **Citrus* spp and other Rutaceae plants, and sometimes **Ziziphus jujuba* (Rhamnaceae) but will rarely utilise these hostplants in Australia. Larvae eat the softer green parts of the hostplants.

Eggs: Large, pale yellow, nearly spherical about 1.5 mm, basally flattened, smooth. If fertile a small red mark or cross develops at the apex of the egg. Laid singly near the edges of the hostplant leaves. Those females utilising *Citrus* will lay eggs on both new and old growth. Larval development within the egg commences immediately after being laid. The egg shell is eaten by the larva after its emergence.

Larvae: Initially, black coloured, with two subdorsal rows of short, bristly, fleshy spines. The head is also black. Second, third and fourth instars are dark brown, shiny, with the anterior, middle and posterior parts with broad transverse off-white bands, giving the larva a 'bird dropping' camouflage pattern typical for the swallowtail group of butterflies. The fleshy spines are less prominent and not as bristly. They also acquire an additional row of paired fleshy spines on the thorax. Head brown, smooth, shining, with some short hairs. The immature larva eats the egg shell after emergence, before proceeding to scour the leaf surface. Later instars devour the entire leaf, from any part of the plant.

Mature larvae from southern areas are about 45 mm long, cylindrical shaped, tapered anteriorly, with a very short pair of fleshy spines located posteriorly and again immediately behind the head. Green coloured with a lateral row and two pairs of subdorsal rows of orange or pink spots edged black. There are some additional black transverse markings anteriorly, with further scattered black markings both laterally and at the rear end, and there is a white sublateral line along the abdominal area just above the legs. The fleshy spines are orange coloured. The head is large, brown coloured with a dull orange inverted V mark. The final instar after moulting from the fourth instar is yellowish-orange coloured and closely resembles the dying discoloured older leaves of the hostplant. The orange colour gradually changes to green, which is a normal leaf camouflage colour. Larvae from the hot north of the state tend to have few black markings, and the pink spots may also be absent, and these larvae then bear some resemblance to the mature larvae found in overseas tropical areas.

All larvae remain exposed on the hostplant. When disturbed, the larvae can evert a reddish orange coloured, fleshy bifid osmeterium from behind the head that emits a distinct pungent odoriferous secretion, which acts as a deterrent to both vertebrate (birds, lizards and mice) and invertebrate (ants, spiders and wasps) predators. It is more effective if the chemical can be deposited on the predator, hence the larvae will attempt to throw their heads (and osmeterium) either backwards or sideways if a predator attacks from the rear. The secretion is usually composed of a butyric acid compound having irritant properties. This osmeterium is present in all stages of the larvae, and is found in all the Papilionidae group of butterflies. In other species the osmeterium can have a different colour such as green, blue or black.

The early stage biology of this butterfly is very unusual. Outside of the Australian Region its larvae prefer to feed on *Citrus* where the [mature larvae](#) are green with a pair of subdorsal eye spots on the thorax, and often with white or brown diagonally striped patches on their sides. In Australia the female butterfly does not normally lay eggs on *Citrus* (either introduced or endemic species), although very recently it has been reported to utilise domestic garden *Citrus* (orange and lemon) growing at Alice Springs in Central Australia. However, females can be induced to lay eggs on *Citrus* in captivity and the resultant young larvae will eat the *Citrus* through to maturity. Similarly, larvae collected from *Cullen* in the wild can sometimes be transferred successfully onto *Citrus* in captivity. Such larvae may eventually pupate, but the resultant butterflies are usually smaller than those that utilise *Cullen* as a hostplant. White patched larvae feeding on *Cullen* have been seen in the Far North of the state, but when young larvae from this population were taken south to the cooler areas of Adelaide and reared to maturity on *Cullen*, the resultant larvae were either the orange dotted form described above or had markings in between the two (i.e. with either no orange spots or a reduced number of spots, and no white patch).

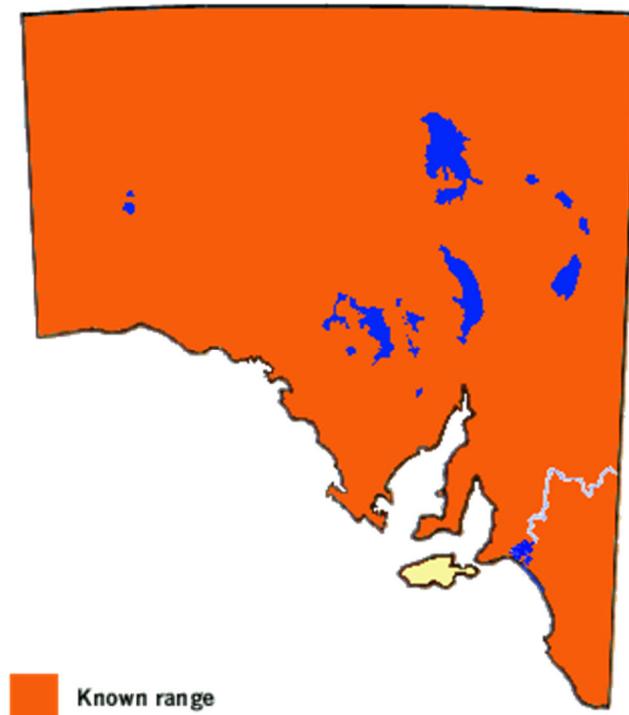
Interestingly, the sister species *Papilio demodocus* also has two forms of larvae in which one form results from feeding on *Citrus* (Rutaceae) that is green coloured with a white or brown diagonal stripe half way along the body, similar to *Papilio aegeus*. (This form is similar to the larvae of *P. demoleus* found in the tropical Orient). The other form, that is similar to larvae of *P. demoleus* found in Australia, occurs when larvae feed on other types of hostplants like fennel (Umbelliferae).

Pupae: Reasonably stout, rugose, about 30 mm long, the ventral part containing the wing cases and the dorsal abdominal part are bowed, anterior end produced into a short pair of flattened projections, the thorax has prominent projections dorsally and laterally, and there is an additional projection laterally where the abdomen meets the wing case. There are also ridges laterally along the thorax and again between the dorsal and lateral-abdominal projections. It is sometimes attached to the thicker stems of the hostplant, but prefers to leave the hostplant to pupate on adjacent plants, sticks and rocks. It reclines from the vertical, and is attached by the posterior cremaster and a central silken girdle. The colour is dimorphic, typical for many swallowtails, being either pale green or pink-brown with other variable cryptic markings. The green form is usually marked dorsally with yellow. The colour pattern imitates the dominant surrounding colour to which the pupa is attached. If the surrounding parts are leafy and green, then the pupal colour is green, or if the surrounds are mostly of dead leaves or are rocky then the pupa is brown. The pupal duration is variable. In southern settled areas it is about 30 days in spring, reducing to 18 days in summer, but often those pupae formed in captivity during autumn will not produce adults until the following spring, or even longer with one diapause record of 280 days.

Flight period in S.A.: A somewhat nomadic butterfly. In northern pastoral areas it is possible to find the butterfly throughout the year, but is most common after rainy periods when its perennial hostplant flushes into a lush growing condition. In the southern settled areas it is usually seen during the warmer months, particularly in spring and early summer when it tends to fly south from the northern areas. It will breed continuously during the warmer months of the year, providing its hostplant remains in a growing condition. In the south a brood can be completed in 7 - 10 weeks.



Distribution: Occurs throughout mainland Australia, but yet to be recorded from Kangaroo Island. It is most common in the tropical and subtropical north of Australia. In South Australia it readily breeds in northern pastoral areas after rain. Rarely seen in southern settled areas, where it may occur at great distances from its *Cullen* hostplants. It sometimes takes up residence in southern settled areas if its hostplants are present, but these colonies are usually not permanent as the hostplant often dies back to its perennial base during summer, and the growing area of hostplant is often too small to sustain viable populations of the butterfly, and under these circumstances the early stages of the butterfly are prone to disease and parasitoids.



Habitat: The *Cullen* hostplant grows in open woodland and grassland, particularly in floodplain areas. In the Far North pastoral areas the hostplant is common after rains, both roadside and along the ephemeral creek systems.

Conservation Status in S.A.: A vagrant, locally common in northern pastoral areas, rare in the southern settled areas.

Threats: Only threatened in the southern settled areas where its *Cullen* hostplants have been largely grazed out of existence. In the northern pastoral areas the same hostplant is the

preferred plant for grazing by cattle after rains, and it is therefore surprising the butterfly is as common as it is.

Conservation Strategy: None required. It is likely to occur in large numbers on aboriginal lands in the Far North, where cattle grazing no longer occurs. Its attractive hostplant should be considered for revegetation projects in the southern settled areas.

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Last update 20 March 2007.