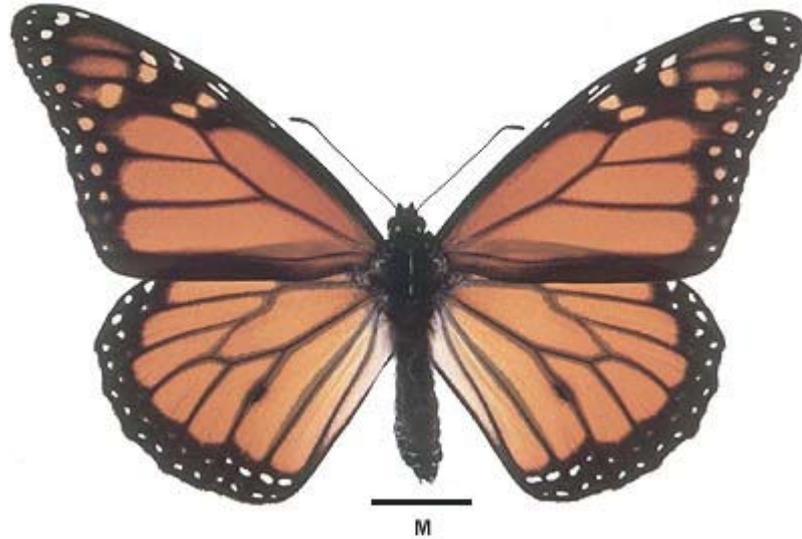


SOUTH AUSTRALIAN BUTTERFLIES

Data Sheet

Danaus plexippus plexippus (Linnaeus) (Monarch or Wanderer)



Interesting aspects: This butterfly is indigenous to the Americas, but has a prodigious migratory power that takes it across oceans to many other parts of the world. Its larvae feed on milkweeds and if they are present in an area where the butterfly makes landfall then it may remain to colonise. The butterfly was first reported from the Hawaiian Islands in about 1840 after the introduction of milkweed plants. (It is not known if the butterfly found its own way to Hawaii or was introduced, either accidentally or purposely). Using those islands as a staging post, the butterfly extended its range into the Southwest Pacific Region. The butterfly was first reported in Australia in 1856 from Sydney in New South Wales. There are also reports of it being in New Zealand by 1840 and local Maoris had indicated the butterfly was known to them before Europeans arrived.

There was a sudden distribution explosion of the butterfly in Australia during the mid 1870's, undoubtedly due to the rampant infestation of an introduced milkweed hostplant for the butterfly, the South African Broad-leaved cotton-bush (*Gomphocarpus cancellatus*) that was proliferating into areas that had been cleared for agriculture. The butterfly was noted in northeast Australia in 1870-71, perhaps the result of a Pacific Ocean migration, and again in Melbourne in 1872, but by March 1873 was suddenly seen in large numbers around Melbourne. A few butterflies were then subsequently documented for the first time in South Australia in 1874, and by 1875 the butterflies were being noted in many places in South Australia, including Adelaide. By 1878 the butterfly was quite common around Adelaide, and even at Blinman in the North Flinders Ranges the butterflies were very common during the winter of 1878. During the same year the butterfly was documented for the first time in Tasmania. It was first documented in Western Australia from near Perth in 1898, but did not become common there until the late 1960's. An early South Australian naturalist, Charles Wilson documented the earliest appearance of the butterfly in South

Australia (in *The Garden and The Field*, 1878), when the butterfly was then known as *Danais archippus*.

Both sexes of the butterfly are similar, but males can be distinguished by the presence of a single, small raised black sex pouch in the lower-centre of each hindwing. The males also have a pair of grey "hairpencils" enclosed near the tip of their abdomens, which they can protrude and expand into a feather-like mop and dispense a characteristic scented pheromone which is required for successful courtship. The butterfly is a strong migrant and powerful flyer, capable of spanning oceans and continents. It conserves flight energy on these long trips by gliding on the wind currents where possible, like the albatross' occurring in the Southern Ocean that can circumnavigate the world non-stop with hardly a wing beat. Butterflies have been recorded flying 130 km a day during migrations in North America, during which they frequently fly at heights of 100m or more. There is a record of a butterfly tagged and released in New York making the 3,800 km trip to Mexico in 5 weeks! Major migratory flights have not been observed in South Australia, although small local flights are occasionally witnessed. The presence of a large gathering of the butterflies at Blinman (during 1878) may have been the result of a migration from southern areas. In temperate areas it usually has a slow graceful gliding flight, but if disturbed can make off with great speed. The slow flight is typical for poisonous species of butterflies, which gives predatory birds sufficient time for recognition. The bright brownish-orange colour of the butterfly is also a readily visible colour. However, in the hot tropics the flight is often more active, particularly when the butterfly is still in a migratory mode.

Males tend to congregate around groves of the hostplant, and early in the season they stake out their particular portion of the grove, patrolling and waiting for newly emerged females to mate with. They will aggressively chase off any other males that venture into their territory. They may also wait around a good flowering plant or a sunny spot not too far away from the hostplants. During the cool evening of a hot day, they have also been seen to career around sunny glade areas seemingly enjoying themselves and their use of flight. The females are strong vagrants and actively seek out the larval hostplants, and most major centres of human habitation in South Australia with milkweed growing have at some time been populated by a few Wanderers. Later in the season both sexes seem to just mill about, happy to do just nothing except feed and stay cool in the shade. In some years the Wanderer occurs with the Lesser Wanderer in southern settled areas, and the larvae of both species can sometimes be found together on the one hostplant. It is usually the Wanderer that is the more common butterfly in these situations.

The entire life history of the butterfly is poisonous. Their larval milkweed hostplants contain poisons which the larva of the Wanderer is able to isolate and retain in its body as a protection against vertebrate predation. These poisons are cardiac glycosides (cardenolide heart poisons), and can be passed on to the pupa and the adult butterfly. The latter can further top up its poisons by imbibing (sucking and assimilating) the sap and surface exudates from the hostplant again, or from other poisonous plants. From the latter the male butterfly obtains further poisons (pyrrolizidine alkaloids) which are necessary for the production of the hair-pencil pheromones. The pyrrolizidine poisons are also emitted as a defence mechanism through the hair-pencils when the male butterfly is attacked, or even when it is roughly man-handled. The cardiac glycoside poisons are passed onto the eggs by the female to complete the cycle. These poisons are usually in sufficient concentrations to only sicken the vertebrate predators or at least taste unpalatable, so that the predators can

learn from the experience and pass on the mistake. They are not meant to cause death as this would likely result in larger numbers of the insect being killed.

This butterfly is probably the longest lived of any butterfly, due to its tough wings, durable body, and inedible poisonous properties. The overwintering generation can live for 8-9 months.

Life History

Larval food-host: **Araujia sericifera*(hortorum) (cruel plant or white bladder-flower), **Asclepias curassavica* (red-head cotton-bush), **Gomphocarpus*(*Asclepias*) *fruticosus* (garden swan plant or narrow-leaf cotton-bush), **G. physocarpus* (balloon cotton-bush), **G. cancellatus*(*rotundifolia*) (broad-leaf cotton-bush), **Calotropis* species including **C. procera* (king's crown or sodom apple), **Orbea*(*Stapelia*) *variegata* (carrion flower) (Asclepiadaceae). *Asclepias* species are the milkweeds of the Americas while *Gomphocarpus* species are the milkweeds of Africa. Interestingly, the larvae will not normally eat native milkweeds, in particular *Cynanchum* or *Sarcostemma* spp, although they will eat the plants belonging to those two genera in the Americas. However, there is a recent unconfirmed report (2009) that in north Queensland, even though the females do not lay eggs on *Marsdenia* spp (Asclepiadaceae), the mature larvae may wander onto this plant and continue feeding to maturity. The poisonous properties of native milkweeds are not well known, but appear to be different to the introduced milk-weeds from Africa and the Americas which contain the cardenolide poisons. The toxicity of each plant species varies. The larvae prefer to eat the leaves of the hostplant, but if the larvae are numerous they will eat all the softer parts of the plant, including flowers and the swan shaped fruiting capsules. Around Adelaide, *Gomphocarpus cancellatus* and *G. fruticosus* are the main hostplants, and it is usually the former which is preferred, and the first to be attacked if both plants are growing together.

Eggs: Initially pale yellow, later becoming white. Subconical elongate, about one and a half times as high as wide, bluntly pointed apically, flattened basally, finely ribbed vertically with about 21-23 ribs (some incomplete), and with numerous indistinct lateral ridges. The egg pits are rectangular shaped. Laid singly, usually on the leaves of the hostplant, but sometimes on other softer parts of the plant. The females prefer those hostplants growing in full sun. At least one or two females remain near the hostplant, continuing to lay eggs so long as the hostplant has leaves remaining. The eggs hatch in about 8 days. The larvae eat their egg shells before proceeding to eat other parts of the hostplant. They will also sometimes eat other eggs if they happen across them.

Larvae: Initially pale grey, with indistinct darker banding, and a few short black hairs that are more common posteriorly. A pair of black patches occur behind the head on the prothoracic plate, and another black patch occurs dorsally at the posterior end on the anal plate. The head is black and shining with a few short black hairs. A pair of red tipped, black fleshy protuberances occur behind the prothoracic plate, and again at the posterior end. After eating the hostplant, the larva acquires distinct black coloured rings and becomes yellowish dorsally and laterally. Subsequent instars acquire the typical bright warning colours of white, yellow and black rings to the body and head. The fleshy protuberances become progressively longer with each instar, developing into flexible fleshy spines or filaments.

Initially the larvae feed by scouring the leaf surface, avoiding the major veins as puncturing the latter would cause a flow of the milky-white sticky sap which may engulf the larva and disable it. Older larvae will eat the entire leaf and if hungry enough, also other soft parts of the hostplant, including any unhatched eggs. They feed openly during the day, with their bright warning colours affording them protection against bird predators. When strongly handled or attacked, the larva will regurgitate a fluid which is much more poisonous than the rest of its body. The larva will swing its head about in an attempt to spread the poisonous regurgitant onto the predator. Like many other butterfly species, the older heavier larvae will silk the leaf to the stem in case the leaf should accidentally detach with them still upon it.

The final instar is about 45 mm long, essentially smooth, but with a few very small spinose secondary setae. Black beneath, with each body segment having a broad black central transverse band, separated by adjacent finer bands of white, yellow and black, the finer black bands being discontinuous laterally, and there is a large white spot on the side of each ventral proleg. There is a long pair of flexible, black fleshy tentacular spines or sensory filaments behind the head, and a further shorter pair at the posterior end. The long anterior tentacular filaments can be moved about independently by the larvae. The head is smooth, rounded, black, with a few short black hairs, edged yellow, and there is a yellow inverted frontal V mark with a further yellow triangular shaped spot inside the V, and the mouth is yellow. The larval duration is about 18 days.

Those larvae that can survive during the winter period tend to be much darker than the summer larvae because of the increased melanin buildup in their bodies due to the extended growth period that they require because of the cold.

The larvae of the Wanderer are quickly differentiated from the larvae of the Lesser Wanderer by the presence of only two pairs of tentacular filaments, rather than three pairs in the Lesser Wanderer.

Pupae: Large, stout, smooth, about 25 mm long (including the cremaster), rounded posteriorly but ending in a short black cremaster. Slightly wedge shaped anteriorly with a pair of apical protuberances, the wing bases are slightly protuberant, and there is a finely beaded slightly raised transverse ridge dorsally on the abdomen. Pale green coloured with five pairs of shining golden spots occurring on the thorax (two pairs), at the wing bases, on the anterior protuberances, and ventrally. After pupation there is a series of transverse dorsal yellow lines on the abdomen, but these are lost after a couple of days. The transverse dorsal abdominal ridge is outlined in gold, edged black anteriorly. There is also some paired black dots abdominally near the cremaster, and a further small black patch dorsally near the cremaster.

The mature summer larvae usually leave the hostplant to pupate, sometimes travelling a great distance before stopping. Some have been known to pupate 15 m from the hostplant. This trait is probably a necessity as later larvae may completely denude the hostplant of the leaves necessary for pupal camouflage, or at worst may snip off a pupal attachment causing the pupa to fall to the ground, to be then subject to predation or cooking on the hot exposed earth. If the exodus occurs during daylight hours then many of the larvae are predated upon by ants, the contained toxins within the larvae apparently having no undue effect upon the ants when they attack enmasse in a feeding frenzy. However the larvae are usually not attacked by the same ants while the larvae are feeding on the

hostplant. Those larvae which remain on the hostplant to pupate are often diseased or parasitized. Winter larvae tend to remain on or near the hostplant. Around Adelaide an individual hostplant can usually support larvae for 2-3 months before it is completely stripped of edible parts. Most plants can regenerate new growth and continue to support the butterfly broods for several years before completely dying off. Larvae present on the hostplant at the end of the season are often diseased, as this butterfly has its own peculiar diseases that build up in the colonies over the season. Some hostplants during the late stage of the brood cycle can have 60 or more mature larvae feeding off the foliage, stripping the hostplant back to the bare upright stalks, and yet at the end, not one pupa is to be seen on the plant.

The pupa is suspended head downwards by the cremaster, usually in a leafy situation which provides camouflage. The pupal stage lasts about 8-13 days in the warmer months. If the pupation medium is a potentially deciduous leaf, then the larva will make sure the leaf remains secure for the duration of the pupal period by spinning silk between the base of the leaf and the stem.

Flight period in S.A.: It is possible to find the butterfly throughout the year in southern settled areas. During the winter months it tends to either stay close to its hostplant growing in sheltered, frost free warm areas, or form large overwintering clusters in similar situations where the average temperature remains above about 10 degrees C. The butterflies occurring in these clusters have large fat reserves and usually do not breed during winter, and mated females remain reproductively dormant. However there is still some minor larval activity during winter in the sheltered areas of its hostplant, particularly in the maritime coastal areas free from the cold southerly and westerly winds. Early stage development ceases below about 12 degrees C. The clusters tend to break up during September, with the butterflies dispersing. The butterfly becomes reproductively active during October, and there are then continuous broods into Autumn, which can be completed in about 5-6 weeks.



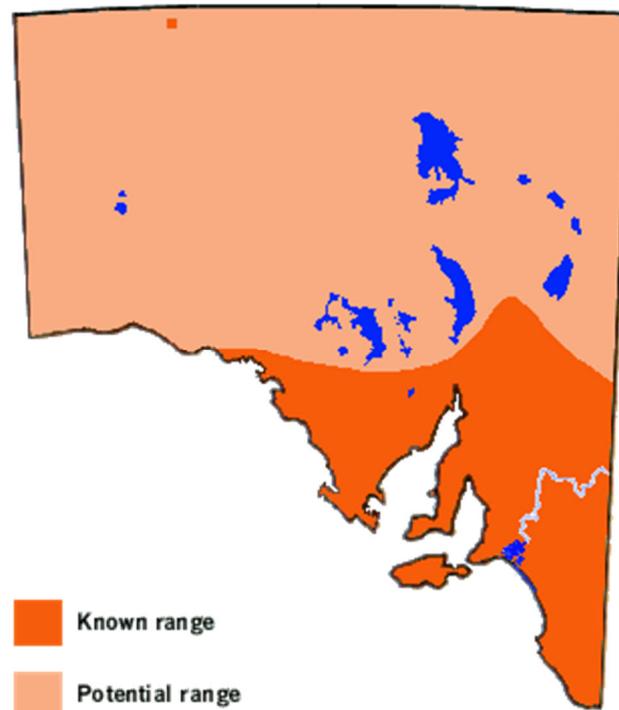
Distribution: It survives naturally in the south and east of Australia, including Kangaroo Island and Tasmania. In South Australia it occurs commonly in southern settled areas where its introduced hostplants are cultivated or have become weeds. It has only been documented once in northern pastoral areas, but as the butterfly is a strong vagrant one should not be surprised to see the odd transient butterfly flying in this region. It is present in the Alice Springs area of the southern Northern Territory. The recent surge since year 2000 in the use of this butterfly for releases at weddings may see the butterfly pop up in unexpected places in the future.

The Wanderer used to be extremely common in the Adelaide hills in the historical past, due to large areas of the hillsides being covered in the introduced milkweed (Broad-leaved Cotton-bush). Sadly for the butterfly, this weed now has a reduced presence due to weed controls or itself being overtaken by more advantageous weeds. Consequently, the butterfly has also diminished in these areas and large overwintering clusters no longer occur. The

butterfly until recently, was maintaining a strong presence along the coast south of Adelaide, but weed control measures seem to have caught up with these areas as well.

Recently (2003), overwintering clusters have been reported in the Rendelsham area of the Lower Southeast Region, which is interesting considering the area has a cold wet winter.

Its original range was the Americas, where it is renowned for its major migrations between southern Canada and Mexico, and its overwintering sites, particularly in Mexico where vast numbers (500 million) aggregate. These migratory habits also take it to Europe and the western Pacific, where it will colonise provided its milk-weed hostplants are present. Interestingly, the butterfly has not yet established itself in southern Africa even though a hostplant (*Gomphocarpus*) is present. However, it has been reported on Reunion Island east of Madagascar since 1985, and even earlier on nearby Mauritius Island. The latter occurrence is likely the result of an introduction, while the former is likely derived from Mauritius either by migration or deliberate introduction.



Habitat: The introduced hostplants occur as weeds in a wide variety of habitats, but survive best in areas with assured rainfall. The butterfly is not known to utilise native milk-sap plants.

Conservation Status in S.A.: A vagrant, locally common in breeding areas.

Threats: The hostplants are considered weeds outside of cultivation, and there have been recent concerted efforts to remove the broad-leaved cotton-bush from the environment and this has caused a significant reduction in butterfly numbers.

Conservation Strategy: Thrives in urban gardens, and every garden should have at least one swan-plant tucked away in it so that the house-hold occupants can enjoy the presence of these large graceful butterflies. Consideration could be given to monitoring small areas of the broad-leaved cotton-bush in the natural environment rather than totally removing the weed. There are far worse weeds that occur out there and remember, all human habitation on Australia is due to immigration, just like this butterfly.

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