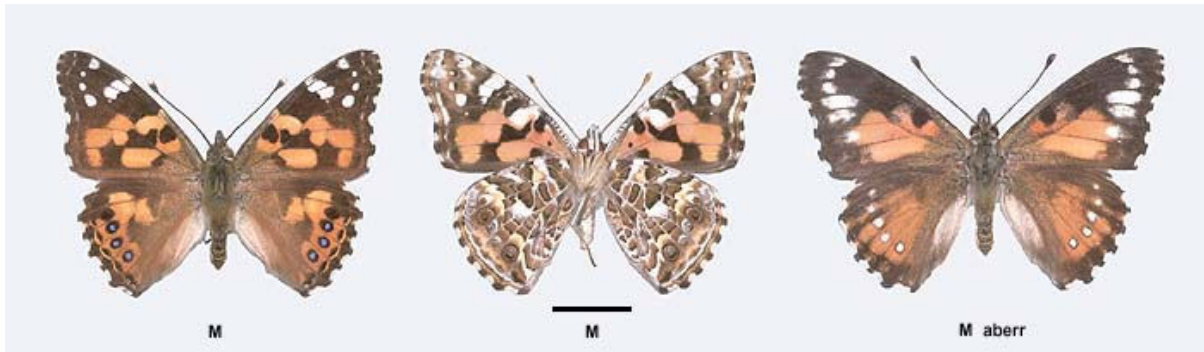


# SOUTH AUSTRALIAN BUTTERFLIES

## *Data Sheet*

*Vanessa kershawi* (McCoy) (Australian Painted Lady)



**Interesting aspects:** This butterfly is Australia's representative to the Painted Lady group of butterflies in other parts of the world, but most notably in the Americas. It is not known if this butterfly is the descendant result of an ancient migration of the Painted Lady of the northern hemisphere (*Vanessa cardui*) or is part of Australia's ancient Gondwanaland fauna. The Australian Painted Lady is a strong migrant and although mostly confined to Australia, has managed to disperse itself on upwelling, prevailing westerly winds to islands east of Australia, including New Zealand. It has even been reported on Macquarie Island some 1800 km south of Tasmania (halfway to Antarctica). Migrations are mainly in a southerly direction during spring, with a lesser northerly migration reported for autumn.

It is regarded by some lepidopterists as a subspecies of *Vanessa cardui*, from which it differs by being slightly smaller, and by normally having blue centres to the curved postmedian row of black spots on the hindwing uppersides. This latter feature however, also occurs in some populations of *V. cardui*, and interestingly is also found in the similar *Vanessa annabella* of North America and *V. carye* of South America. (Conversely the blue spots are sometimes lacking in *V. kershawi*.) The forewings of *V. kershawi* are also slightly less elongated compared to *V. cardui*, and the hindwing tornus is less angulate. In Australia, the latter butterfly is known to occur only to the south of Perth in Western Australia, where it leads a tenuous existence in competition with the Australian Painted Lady. *V. cardui* has been known from Perth since the Second World War, and is believed to have made it to Perth either as the result of a freak migration from Africa (Madagascar - Reunion) or Indonesia, or as an accidental transport by aircraft or ship. The fact that *V. cardui* has not extended its range in Australia (even though its larval hostplants are common), may suggest there is active interbreeding occurring between it and *V. kershawi* and that the resultant mating is either incompatible (infertile eggs), or it produces offspring that are either sterile or that there exists a regressive genetic interbreeding relationship between *V. cardui* and *V. kershawi* as regards wing pattern morphology.

The *Vanessa* group of butterflies have three generic sub-groups, comprising the *Bassaris* Subgroup that include the more primitive *V. itea* and *V. gonerilla*, the *Vanessa*

Subgroup that include the Red Admirals (such as *V. atalanta* and *V. indica*), and the *Cynthia* Subgroup containing the Painted Ladies (such as *V. kershawi* and *V. cardui*).

The Australian Painted Lady has been reported to migrate in immense numbers in the eastern states, where one such migration lasted for eight weeks on a 600 km front, with the butterflies moving in a general southerly direction. Most of the big migrations have occurred in historical times. During one big migration in Victoria in 1889, numbers were so prolific as to 'darken' the sky, and shop windows in Melbourne trapped many specimens which had to be swept out every morning. In the countryside, every footstep disturbed butterflies, and trains could not proceed because the butterflies resting on the rail tracks were so prolific as to prevent the locomotives from acquiring sufficient traction. This butterfly has also been reported flying around ships midway between Australia and New Zealand, and in 1860 multitudes of the butterfly were reported to inundate a ship off Cape Otway in Victoria. Sadly, such mass sightings are no longer reported.

Only one migration has been reported from South Australia, which surprisingly, was seen only very recently on 17 October, 2005. A large amount of rain had fallen in the interior areas of South Australia during late September and early October, and the migration was seen to occur immediately preceding a northerly monsoon storm-front as it descended upon Adelaide. During most of the day the butterflies (mostly in fresh condition) were seen migrating, helped by a warm north-westerly wind. Although difficult to see due to their dark colouration against a dark background, migrating butterfly numbers were estimated at three every 2 minutes over a 30 m line of sight, and similar records were made at both Marion and Torrens Park, some 7 km apart. (The flight was not checked on coastal beaches to see if the migration was coming in over the sea.) The flight was rapid and steady, below human head height, and continued on through open woodland, although dense vegetation thickets would eventually cause the butterflies to rise above the vegetation. Odd butterflies stopped to feed on flowers. Butterflies were often waylaid by resident Meadow Argus butterflies, causing a territorial flutter before the Painted Lady resumed its south-easterly flight. The odd Meadow Argus and Australian Admiral were also seen to be caught up in the migration. At the same time, Caper White butterflies were seen to be migrating in low numbers from the northeast.

Small numbers of the butterfly regularly appear in urban Adelaide during the period mid-August to mid September, which are probably the result of small migrations from the northern pastoral areas assisted by the hot northerly winds that start up during that time. Butterflies are also sometimes seen flying southwest over the 20 km expanse of seawater in the Backstairs Passage that separates the mainland Fleurieu Peninsula from Kangaroo Island. Butterflies in these migrations usually have large reserves of fat with the females being in a non-gravid state (eggs not developed). (In Africa, the related *V. cardui* often makes a mass emergence with the butterflies immediately grouping and flying off enmasse, without mating). Large numbers of the butterfly are produced in warmer northern pastoral areas after rain when their everlasting daisy hostplants grow prolifically to carpet the countryside.

Resident males often rest on bare ground with wings open, from where they will periodically undertake patrols of the vicinity searching for newly emerged females with which to mate. They will also gather on hilltops in the afternoons for the same purpose. They have a rapid flight, usually below head height, and both sexes spend a lot of time nectaring at flowers. When migrating, their flight is normally direct and swift, below head height.

Due to the sometimes short periods of rain and hostplant blooming in the arid inland areas, the larval stage duration of the butterfly is often very rapid and incomplete, producing butterflies of variable size. In such areas, they are capable of completing a brood within 6 weeks. The butterfly sometimes produces aberrations of consistent morphology (see photo above).

## Life History

**Larval food-host:** Numerous native and introduced herbs and ornamental plants, mainly Asteraceae including *\*\*Ammobium alatum* (paper daisy), *\*Arctotheca calendula* (cape weed), *\*Artemisia* spp (wormwoods), *Asteridea athrxioides f. athrxioides* (wirewort), *Calocephalus platycephalus* (billybuttons), *\*Carduus* spp (prickly thistles), *Chrysocephalum apiculatum* (common everlasting), *C. semipapposum* (yellow buttons), *\*Gamochaeta americana* (spiked cudweed), *Gnaphalium* spp (cudweeds), *Helichrysum* spp incl. *H. scorpioides* (button everlasting), *Leucochrysum* spp (sunrays), *\*Onopordum acanthium* (scotch thistle), *\*O. illyricum* (Illyrian thistle), *Pseudognaphalium luteo-album* (cudweed), *Rhodanthe chlorocephala rosea* (western sunray), *Xerochrysum bracteata* (strawflower); also *\*Lavandula angustifolia* (lavender) (Lamiaceae). The hostplants are mostly annual but will often remain perennial if there is sufficient moisture. The larvae usually eat the leaves of the hostplant, but will also eat the flowers and softer green stems if they are hungry enough. Butterflies resulting from larvae that feed on Cape Weed often emit a foul odour, particularly when newly emerged.

**Eggs:** Pale green, turning greyish yellow near larval emergence, small, barrel or thimble shaped, the height slightly greater than the width, with 13-15 well developed, wing-like transparent longitudinal ribs that enlarge apically and continue onto the top edge of the egg. There are also numerous indistinct lateral ridges. Usually laid singly on the hostplant, and mostly on the undersides of leaves low on the plant if it exposed, but will lay on the leaf uppersides when the surrounding growth is congested. Larval development within the egg commences immediately after being laid and hatches in about eleven days during spring. The egg shell is eaten by the larva after its emergence.

The female butterfly, when in egg laying mode, will briefly flutter about the hostplant before alighting on a leaf, (she can detect the presence of the hostplant by chemoreceptors in her antennae). She will then walk to a suitable position on the leaf and briefly test its chemical suitability by rapidly scraping the leaf surface with her two forelegs (she can taste the leaf through chemoreceptor organs on her front legs), and if happy will lay a single egg before quickly flying away again, the entire process taking less than a minute. Some females will also sometimes alight on the ground next to the hostplant and then walk over and onto the hostplant to carry out the egg laying process.

**Larvae:** Initially pale greyish yellow, long cylindrical shaped, with long dark fine hairs set on raised simple bases. Head black, shining, with some hairs. After eating the green leaves of the hostplant, the larva first turns green and then eventually brown. Newly hatched larvae eat the leaf surface by first scouring out a small hole without breaking through to the other side of the leaf, then they web themselves in by constructing a flimsy silk-web strung on leaf hairs above the hole, after which they continue to eat and enlarge the hole. This process leaves tiny transparent windows in the leaf, which are readily visible. As the first instar larvae grow they will construct a larger shelter either within a bent portion of the hostplant

leaf, or they will construct a flimsy web shelter over any concave part of the leaf such as the midrib and then position themselves beneath the web.

Subsequent instars become darker and the hairs develop into pointed, branched fleshy spines (scoli), which become progressively larger and better developed with each instar. The web shelters also become progressively larger and better developed, and the larva may use an entire leaf for a shelter by partly folding over the leaf and securely webbing it together. Safely sealed within the shelter it will continue to feed on the leaf, eventually filling up the shelter cavity with dung pellets. As the larva gets bigger, it may use two or more leaves, or eventually when too large for the leaves of the plant, will make a webbed shelter in debris beneath the hostplant. However, the final instar larva does not bother to make a shelter. Early instar larvae continue to make transparent windows in the leaves. Older larvae tend to eat the leaf by making web-like holes in the leaf surface. Feeding occurs at any time once the larvae are secure inside their shelters.

The final instar is about 32 mm long, cylindrical, covered in regular arrays of large scoli on each segment, typical for the subfamily. There are usually seven scoli on each segment, excepting the first segment which has none, the second and third segments which have four scoli each, while the posterior two segments have only two scoli each. There are numerous small secondary setae, consisting of a fine white pointed hair set on a simple raised white base. The final posterior segment is rounded. The head is rounded, dorsally furrowed, smooth, but covered in spinose setae set on a simple short base, which differentiates these larvae from those of *V. itea* which have head setae set on long thickened bases. There are sublateral hairs along the body. The colour is variable, being usually some shade of black, dark grey or brown, with the intersegment areas being paler than the rest of the body often producing a ringed appearance. There is a narrow dark dorsal line broadly edged pale yellow, and there is also a broad pale yellow lateral line. A broad reddish subdorsal line can sometimes be distinguished. The markings tend to be blurred on the anterior segments. The scoli are dark coloured in dark larvae, but pale translucent in pale coloured larvae. Feeding by the final instar larva occurs mainly at night, and whole leaves, young stems and flower petals are eaten. When not feeding, the larvae may remain hidden on the plant or will hide in the darker recesses at the base of the plant. The larval duration is about 6-7 weeks during spring in temperate areas, but decreases significantly during summer or in northern hotter areas.

**Pupae:** Narrow elongate, angular, with a slightly roughened surface, about 18 mm long ending in a short posterior cremaster. Wedge shaped anteriorly with a pair of very short apical horns, the thorax is dorsally keeled with a prominent angular projection, and there is a prominent angular lateral projection at the base of the wings. There are also series of small dorsal, subdorsal, lateral and sublateral abdominal projections, the subdorsal projections being the best developed. The subdorsal projections continue onto the thorax and head. There are also two pairs of very short, black, abdominal projections. The colour of the pupae is variable, from greyish brown, to brown or reddish brown, with darker, longitudinal abdominal bands. After pupation, the pupae usually acquire a brushed, metallic copper lustre. Some pupae acquire a bright burnished gold lustre, especially on the wings. Those that do not acquire the metallic lustre have the thorax and wing areas finely marked in brown and dark grey. The subdorsal and dorsal projections on the anterior half of the pupa are associated with gold spots, of varying intensity. The subdorsal pair of gold spots at the posterior end of the thorax are the largest. Suspended head downwards by the cremaster.

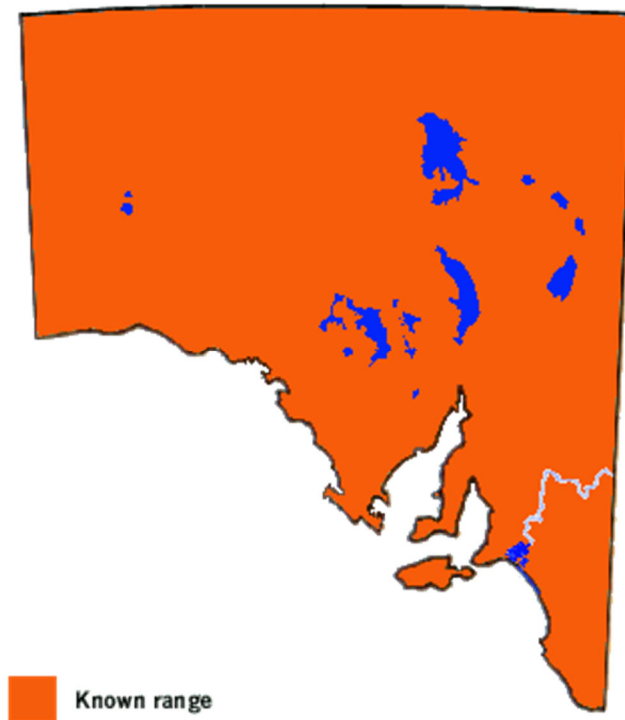
Pupation occurs either on the hostplant or on an adjacent plant or object, and sometimes at a considerable distance from the hostplant. The larva when ready to pupate constructs a large, loosely webbed enclosure, by silking together leaves or similar material. It then pupates within the closure by hanging down from the roof of the structure. The pupal duration is about 12-17 days during the warmer months.

**Flight period in S.A.:** It is possible to find flying butterflies throughout the year, particularly in the Far North of the state. Although no studies have been undertaken, it is probable this butterfly is nomadic as well as migratory, populating inland areas after rains, then moving on to new areas as the host and nectaring plants dry off. In southern areas they are most common during the spring and autumn. Adults will sometimes hibernate during winter in southern areas, but adults formed in late autumn are more likely to migrate north to overwinter in warmer pastoral areas.

In southern temperate areas, small numbers are produced throughout the warmer months, even though the abundant hostplants are rarely seen to carry early stages. During spring they are capable of completing a brood within about 9 weeks in these areas. This period is considerably shorter during summer or in the hotter northern pastoral areas.



**Distribution:** Due to its migrant tendencies, the butterfly can be found throughout subtropical and temperate Australia, including Kangaroo Island and Tasmania. The butterfly will not normally tolerate hot, humid tropical conditions, and does not occur in tropical northern Australia, Papua-New Guinea or adjacent Indonesia. A record for Cocos and Keeling Islands in the Indian Ocean southwest of Sumatra is likely to be the result of an accidental introduction. It is replaced in Indonesia by tropical tolerant *V. cardui*. It is interesting, considering the migratory abilities of *V. cardui* that the latter butterfly has not made landfall in northwest Australia and taken up residence.



**Habitat:** The butterfly prefers open temperate to arid habitats, and in such conditions can generally be found wherever its hostplants occur, and these can be common and widespread after good rains. The butterfly will not normally tolerate hot, humid tropical conditions, but can exist in hot, arid areas.

**Conservation Status in S.A.:** A migrant, locally common in breeding areas and during migrations.

**Threats:** No major threats, although it is probable that migration numbers have decreased due to overgrazing by domestic stock and feral rabbits, the use of locust sprays by the more devastating method of aerial application, and the loss of breeding grounds due to the massive use of inland areas by the irrigation (particularly cotton) industry.

**Conservation Strategy:** None required. Will thrive in urban gardens.

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