Notes on Butterflies in general

Original 2013 text by Tony Morton updated by Euan Moore.

This question is often asked: What is the difference between a moth and a butterfly? Not much! They are both in the Order *Lepidoptera* i.e. scale-winged insects.

Here is a rough guide:

Butterflies usually fly by day, fold their wings above their backs, are more colourful and have clubbed antennae.

You can see all these features on this Yellow Admiral, *Vanessa itea (right).*

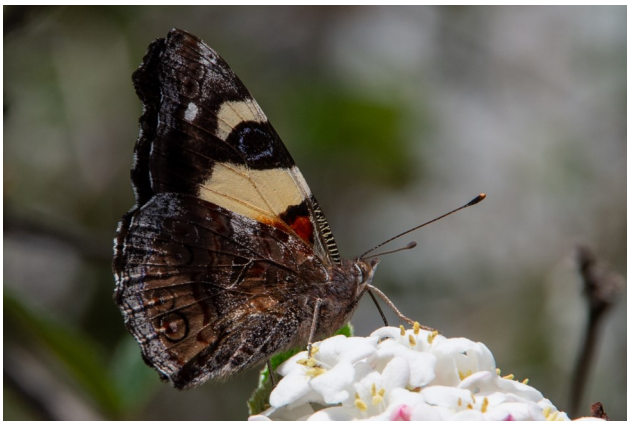


Photo: Euan Moore

Moths often fly by night, hold their wings flat or tent-like against their body, tend to be drably coloured, antennae are feathery, fern -like, or tapering to a point.

This photo of a *Pterolocera sp. (*right), shows the feathery antennae held back along the leading edge of the wing and the wings held flat in a typical resting position.

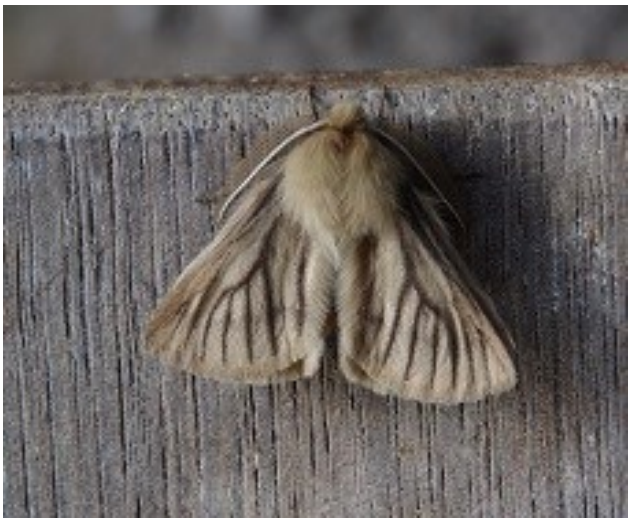


Photo: Euan Moore

But there are exceptions to all the above rules! Some moths are brilliantly coloured, some are day-flying, some have clubbed antennae. Some butterflies are crepuscular and others hold their wings out flat.

In the 19th Century, butterflies were classified as *Rhopalocera* (insects with clubbed antennae) and the moths as *Heterocera* (those with differently formed antennae).

A few decades ago, however, the taxonomists divided Moths and Butterflies by the way their wings are coupled together – butterflies overlapping their wings on each side, moths using a frenulum (a hook and bristle arrangement). This remains the rule applied to distinguish between them. There is only one exception to this rule that we know of – the male of an Australian skipper, the Regent Skipper, *Euschemon rafflesia,* which has a frenulum. Current classifications place what we commonly call butterflies into the superfamily *Papilionoidea,* while the moths are placed in a number of other superfamilies.

Life History

The female lays a hundred or so eggs on a certain, very particular species of plant which will provide food for the caterpillars. In this case (right) the Red-spotted Jezebel has laid its eggs on the stems of an *Exocarpos sp.*

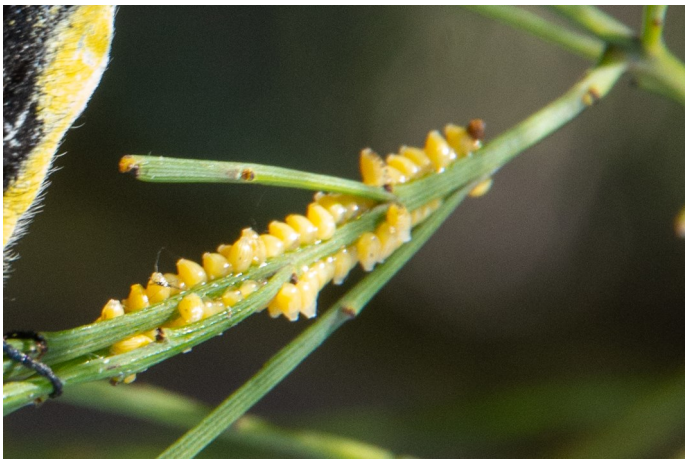


Photo: Euan Moore

The young caterpillar or larva eats its way out of its eggshell, eats that, and then starts on the young leaves of the plant. It will not eat anything else. If given a leaf from a related species of plant to eat, it may accept it, but it probably won't complete its development. When full, the larva bursts out of its skin and comes out in a bigger one. These changes of skin are called instars. Most butterfly caterpillars have four or five instars.

The caterpillar of the Wanderer or Monarch Butterfly, *Danaus plexippus (right),* feed son the leaves of Swan Plant *Gomphocarpus fruticosus.* Both the butterfly and its food plant are species that have been introduced to Australia.

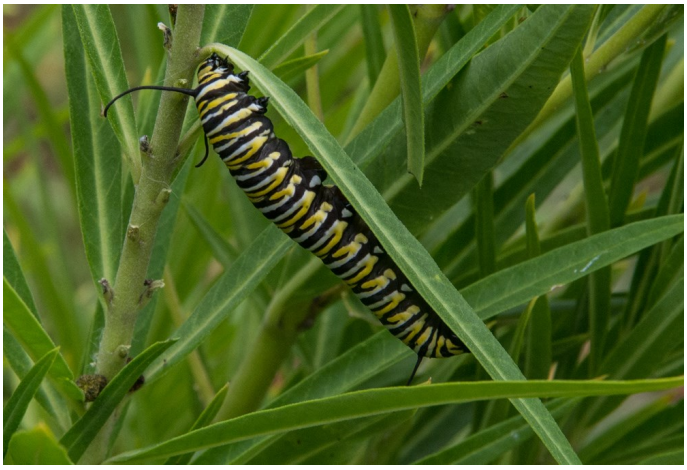


Photo: Euan Moore

After the final skin splits, the pupa (below left) appears, which often looks completely different to the caterpillar. Inside is a sort of thick soup in which metamorphosis is taking place, the insect re-organizing itself into the winged, sexually mature adult, called the imago.

When this adult insect has pulled itself out of the pupa, it pumps fluid, called haemolymph, into its wings; they harden, and in about half an hour the creature is ready to fly. The time taken for all this development varies and depends on the species and perhaps the weather. It may vary from a few weeks to several years to complete the life cycle.

Perfectly formed when they emerge, butterflies may live for a few days or a few months, depending on their behaviour, and that depends on what species they are. The function of the adult butterfly is to mate, often within a few hours of eclosion, and to colonize new territory. Some butterflies feed on nectar from flowers, others scarcely feed at all. They've done their eating as caterpillars. Some silk-moths, for instance, have no mouthparts and do not live above a week. Gradually the scales that give the wings their colour are lost, their wings become shattered, their bodies seem to dry up. The tarsi, or claws, on their legs break off; they become food for ants and other scavengers.

Monarch pupa, photo Geraldine Harris.

Monarch emerging from pupa, photo Geraldine Harris.

Behaviour

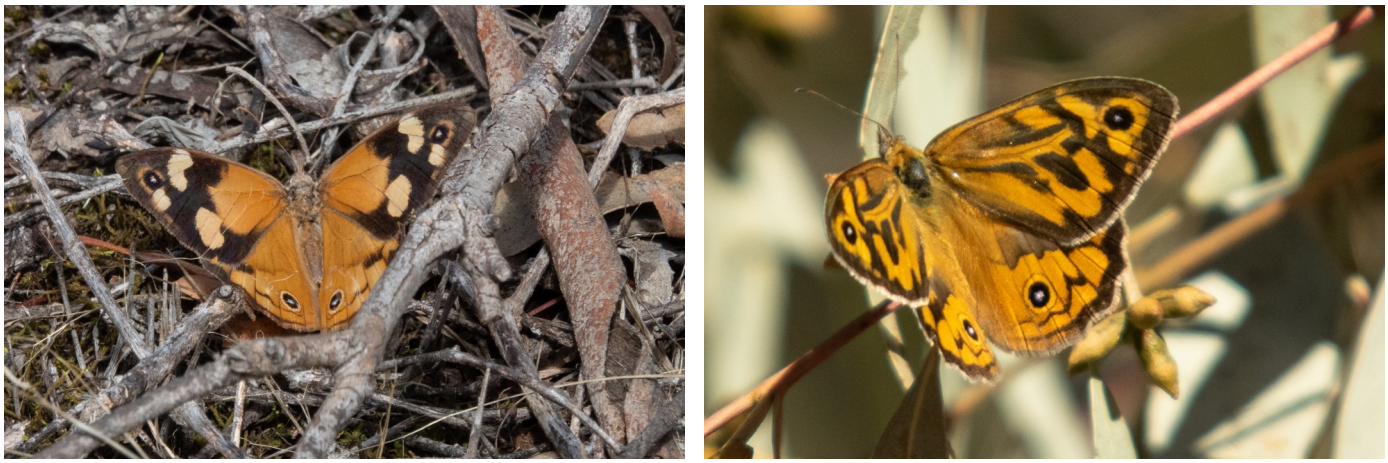
The average person's view of butterflies is that they are foolish, useless things! They flit from flower to flower. In Capek's *The Insect Play*, the butterflies appear as gorgeously apparelled lounge-lizards, flitting from partner to partner. But in fact, butterflies are very single-minded. Like all creatures, they know exactly what they have to do. The caterpillar has to eat and try to avoid being eaten. The adult has to mate.

Although an equal quantity of males and females emerge from the pupae, females are encountered much less often than males. Generally speaking, the sexes' behaviour is very different, and curiously familiar to us.

Males like doing three things:

- Showing off on the games field, which for many species is often a hill-top, or a ridge, or even a favoured twig or rock. There they sit and challenge any other insect – or sometimes bird - that appears, or indulge in aerial skirmishes with rival males.
- Going to the pub, in the case of butterflies a *Pimelea* flower, a *Kunzea* or Tea-tree bush and having a few drinks.
- Patrolling their territory in search of recently emerged females.

To avoid attracting attention, females are often more drably coloured than males, sometimes so different that they could be different species; they are usually larger, their wings and abdomens tend to be more rounded; they fly low around the clumps of foodplant, but often high up in the tree canopy, settling frequently and, if laying, they palpate the leaf with their forelegs (to check they have the correct sort of plant?) and then, curving their abdomen under the leaf, glue a single egg onto its underside. Some species, however, lay a cluster of 30 or 40 eggs on a stem of the foodplant; all the caterpillars emerge together and feed and pupate together, the adult insects emerging within a few days of each other. This gregarious existence may offer some protection against predators, of which there are many.



Female (left) and male (right) of the Common Brown, *Heteronympha merope,* showing the differences in wing pattern between the sexes. Photos Euan Moore

Larval foodplants of our butterflies

These are almost exclusively native plants like grasses and sedges, wattles and mistletoes. Many butterfly species are highly specialised in their choice of food plants, particularly during the larval stage, and will be dependent on just a few, often related species. Very few of our butterflies have been able to adapt to exotic plants for their larvae to feed on.

Predators

Butterflies have many predators. A lot of eggs are lost to other insects, especially ants. The young caterpillar's life is a hazardous one. Many birds prey on butterfly larvae and pupae. So do reptiles and other insects. Some species have gained protection from this through feeding on poisonous plants which in turn make the larvae toxic to predators and are therefore able to feed openly during the day without being attacked. You might have seen a bird catch one of these distasteful species and drop it at once. Ants take many larvae as well as eggs. Other ants, however, live in symbiosis with certain *Lycaenid* ('Blue') butterfly larvae, and offer them some protection in return for a milky exudate from the larvae.

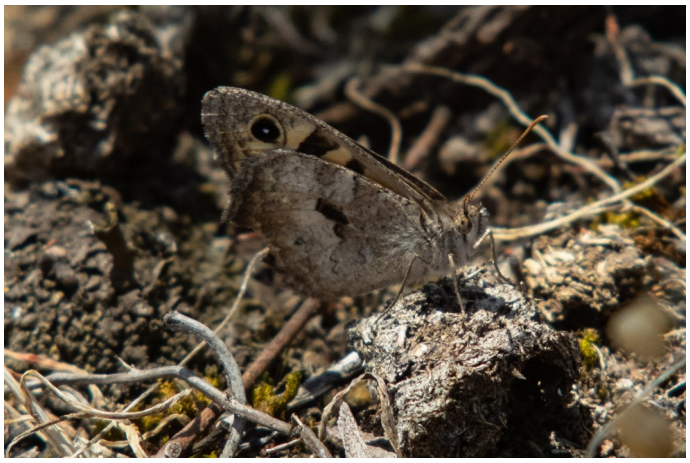
All stages of the insect are threatened by sudden changes in the weather. Storms will drown many small larvae and dash the adult insect to its death from where it is sheltering. A sudden cold snap will kill many more.

Parasites

Many butterflies are lost due to parasites. It is the early stages of the insect that are parasitized. Tachinid flies, ichneumon, braconid and other wasps lay their eggs on the butterfly eggs, larvae or pupae and the wasp larvae eventually kill it when they are fully fed and themselves ready to pupate.

Camouflage

Some spiders use camouflage to ambush insects, and many butterflies try, often successfully, to preserve themselves through disguise. The egg looks like a tiny gall on the leaf, the larva or pupa like a bird dropping or a curled leaf. The underside of the wings is often cryptically patterned, so when the insect is settled it looks like a dead leaf or a piece of bark. The flight of some butterflies seems to mimic the fall of a leaf or a leaf rising in a gust of wind. The Common Brown and other Browns will, when settled, angle their wings to reduce their shadow on the ground to a minimum. The sudden opening of the wings and the displaying of bright colour in an aposomatic display is supposed to scare off any predator, or at least give the butterfly enough time to fly out of danger. "Tails" on some of the "blues'' hind-wings are seen as an attempt to mimic the head of the butterfly, and draw off an attack to a less vital area than the head. Of course, all these theories are the product of man's fertile imagination, and could be a lot of codswallop! The fact remains that all stages of the insect are often very hard to see.



Cryptic colouring on the underwing and shadow minimisation make this resting Marbled Xenica, *Geitoneura klugii*, harder to spot. Photo Euan Moore

Mimicry

The presently accepted theory of mimicry is being questioned once more at the moment. *Batesian* mimicry suggests that Darwinian evolution has favoured any tendency for a palatable species to resemble a distasteful species. So, a butterfly that looks like another species, one that birds or reptiles find distasteful, will also be ignored and thus gain some protection, which will cause its genes to dominate and succeeding generations to resemble the distasteful species even more. However, this only works while the distasteful species has a higher population than the palatable species.

Müllerian mimicry suggests that two distasteful species will gain added protection by resembling each other, thus reinforcing the idea of their distastefulness to predators. There is a lot to be said for these theories, which do explain some similarities between unrelated species in a very satisfactory way.

However, are many adult butterflies actually caught by birds or reptiles? I have only ever seen two, although I have often seen flycatchers pursuing butterflies and I have caught about a hundred that look, from the pieces missing from their wings, as if they've had a narrow escape from a beak.

Distribution

Australia only has some 400 species of butterfly. This compares poorly with Thailand or Malaysia, which each have about 1200 species, or even much smaller Hong Kong, which has 250. The island of Singapore has close on a thousand. Europe has 525. Britain about 90. New Zealand only 20. This shows clearly that butterflies are tropical insects. The weather suits them. There can be several generations a year instead of only one or two. This accelerates the divergence of different species over time.

Our Australian species are particularly interesting because nearly half of them are only found in Australia. Most of the non-endemic species are to be found in North Queensland and the Kimberley and many of these species can also be found in New Guinea, Malaysia, Indonesia, and even India and Sri Lanka. Within Australia, once more the greatest number of species is to be found in the Tropics. Queensland has 335 species, New South Wales 214, the Northern Territory has 135 species, the A.C.T. 88, Victoria 121, Tasmania 39, South Australia 72, and Western Australia 125. In 2013 Tony Morton wrote "I saw twenty-seven species last year round Castlemaine" indicating that there plenty of butterflies to see in this area.

With climate and habitat changes the distributions of butterflies will also change. It is possible that we may see more northern species becoming common in our region in the future.

Pest Species

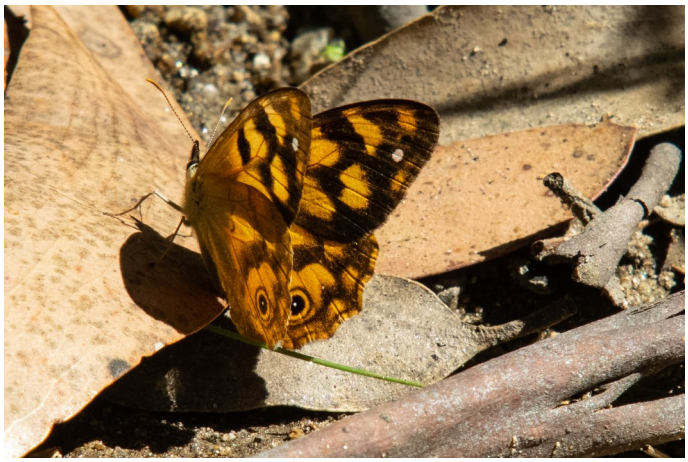
Only one exotic species of butterfly has become a pest - The Cabbage White, *Pieris rapae*, which came from Europe in 1937 or so and has now spread over the Southern states. These were so common in the '40s, a friend told me, that he could make 10 bob at 1/- a hundred, in an afternoon, from market gardeners on the outskirts of Melbourne. This butterfly has been brought under control up to a point, not by my friend, but by a parasitic wasp, introduced from Europe, that lays its eggs on the recently pupated caterpillar, which it eventually kills.

Cabbage White, *Pieris rapae.* Photo: Noel Young

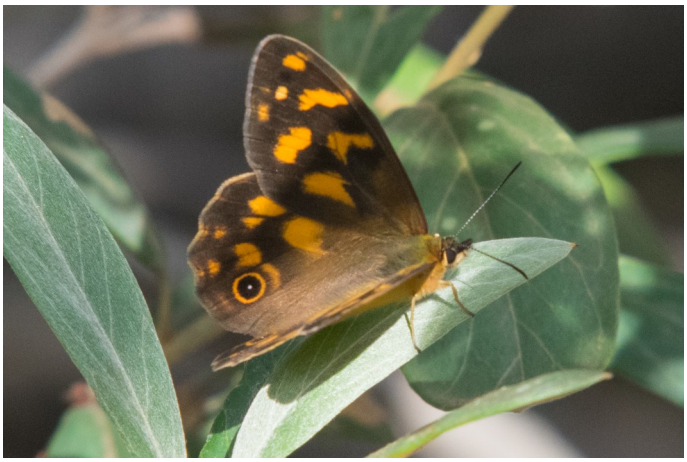
Finally, a few words on butterfly literature and the history of collecting these insects:

The very first Australian butterfly collection was made on Captain Cook's visit to these shores. They were named by Fabricius, a pupil of Linnaeus, and can still be seen in the British Museum of Natural History. Two of our 'browns' are named for Banks and Solander, *Heteronympha banksii* and *Heteronympha solandri*.

The first comprehensive study of Australian butterflies was partly the work of a Gisborne man, George Lyell, who, with G. A. Waterhouse, published *Butterflies of Australia* in 1914.



Banks' Brown, *Heteronympha banksii,* is a species of wet montane forests and the Grampians. Photo Euan Moore



Solander'sBrown, *Heteronympha solandri,* is a species of alpine and sub-alpine grassy woodlands. Photo Euan Moore

Conservation Status

A number of Victorian butterflies are listed on the Advisory List of Threatened Invertebrate Fauna with status ranging from Locally Extinct to Vulnerable. The conservation status will be given in the notes for some species however all native butterflies should be treated as protected native fauna.

The CFNC hopes you find these pages helpful in identifying butterflies that you may find in the Castlemaine area. Where available photos have been provided showing the insects in the wild in the poses that you are likely to see. It is probable that more species will be observed locally in addition to those shown here. We welcome information about new sightings for the district and photos that you may be willing to share to fill in some of the gaps on the website.

Further reading

An excellent book, mainly on Victorian butterflies, by Ross Field was published by Museum Victoria and is available from their shop. It confirms that 90% of our knowledge of these lovely insects comes from the work of amateurs over the years.

References

Braby, Michael F., Second edition 2016. The Complete Field Guide to Butterflies of Australia. CSIRO Publishing.

Field, Ross P., 2013. Butterflies: Identification and Life History. Museum Victoria

Victorian Department of Sustainability and Environment (2021) Flora and Fauna Guarantee Act Threatened List. Department of Environment, Land, Water and Planning, East Melbourne, Victoria (https://www.environment.vic.gov.au/conserving-threatened-species/threatened-list)