Ant Plant (*Myrmecoda tuberosa*) host plant for the Apollo Jewel (*Hypochrysops apollo phoebus*) with attendant ant *Philidris cordatus stewartii*

METAMORPHOSIS

AUSTRALIA

Magazine of the Butterfly & Other Invertebrates Club

ISSUE NO: 74 DATE: SEPTEMBER 2014 ISSN: 1839-9819
Price $6.00 http://www.boic.org.au

The intriguing Apollo Jewel butterfly (*Hypochrysops apollo* Miskin, 1891); its remarkable hostplants and ant associations – *John T Moss*

This medium sized butterfly is one of 18 Australian *Hypochrysops* species in a genus of spectacularly coloured butterflies in the family Lycaenidae. There are a further 39 species scattered across the western Indonesian islands, Papua-New Guinea and the Solomons. The Apollo Jewel (wingspan: male 34 mm; female 36 mm) is one of the largest in the genus, and because of the bright orange livery of its upperside wings, one of the prettiest. Additionally, as in most species, the underside markings include iridescent pale blue lines and spots; thus the origin of the generic popular name "jewels"! There are three named subspecies: two, including the nominate (*H. apollo apollo*), in North Queensland and a further subspecies in PNG. We share one subspecies (*H. apollo phoebus*) with our northern neighbour. Parsons (1999), quoting Don Sands' 1986 *Hypochrysops* revisionary monograph, notes that " a specimen from Sulawesi and those from the Bismarcks, probably represent two additional races" bringing the total to 5 subspecies.

Distribution and hostplants

The southern (nominate) subspecies (*H. apollo apollo*) is restricted to the coastal area adjacent to the wet tropics and occurs from Cooktown south to Ingham, usually inhabiting melaleuca paperbark woodlands and wetlands, where the larval food plants (known as "ant-plants") grow as bulbous epiphytes, particularly on the trunks and branches of papery-barked *Melaleuca viridiflora* and *Lophostemon suaveolens*. Near Cooktown and Innisfail, both butterfly and hostplants also occur commonly in mangroves (C. J. Muller, in Braby, 2000).

Hypochrysops apollo apollo (male) Innisfail NQ
Photo Geoff Walker

However the distribution is not continuous, as the populations are highly fragmented due to habitat loss from widespread land burning and clearing for sugar cane crops and pine plantations (Sands, 1990). More recently clearing has also been for prawn farming and tourist resorts! The larval food plant for the southern subspecies, *Myrmecodia beccarii* (family Rubiaceae), is known to occur as far south as Saltwater Creek, just north of Townsville, but the butterfly has never been recorded there. Due to these factors, there has been a gradual decline in the numbers of both butterfly and ant-plant over the last century. Because this subspecies remains threatened it has been

given the Queensland conservation status of Vulnerable and all activities that may impact its continued existence have to be considered in the environmental impact assessments (Curtis et al, 2012).

The northern subspecies (*H. apollo phoebus*) occurs from near Port Moresby in PNG, some Torres Strait islands, and fairly continuously in suitable habitat, from Cape York to the McIlwraith Range and the Rocky River (Braby, 2000). In some areas such as Iron Range it can be fairly common. Compared to the previous subspecies its populations are reasonably stable and secure.The hostplant of this subspecies is another ant-plant, *M. tuberosa* but unlike the southern species this epiphyte is not often found on paperbark melaleucas. It prefers to grow on rough-barked eucalypts, often in company of a related species *M. platytyrea* subsp. *antoinii*, which is itself not known as a host for the butterfly (Kapitany & Rowe, 2012).

Hypochrysops apollo phoebus (female)
Photo Geoff Walker

Kapitany & Rowe state that another factor which may have influenced the decline of the butterfly's southern subspecies and its hostplant, "was butterfly collecting in the last century. Only a few plants have larvae inside and there is usually only one larva per plant. As a result many plants were destroyed in an endeavour to obtain larvae or pupae that eventually could provide pristine, freshly (emerged) butterflies". Since 1992 when it was first established that the southern subspecies was seriously threatened, all *Myrmecodia* species ant-plants were given protection by law in Queensland.

Butterfly, ant and hostplant relationships

The association of butterfly, an ant and the hostplant itself exhibit a remarkable case of mutualistic symbiosis or interdependence. As the ant-plant grows it develops small hollows, many of which join to form tunnels and chambers. These so-called 'galleries' become occupied by a species of small ant, *Philidris cordatus*, formerly *Iridomyrmex cordatus* (family Dolichoderinae), and known as the Golden Ant.

Adult butterflies deposit eggs on the lower surface of the tuber and the resultant larvae penetrate the bulbous base and commence feeding on plant tissue within the galleries, thereby creating more tunnels and chambers, which the ants utilise for nesting. The larvae are also known to feed on leaves of the plant at night and can access them by making a small irregular hole to the outside, usually at the very base of the tuber (Common & Waterhouse, 1972). They also use this exit hole, from which the adult butterfly will eventually emerge, to eject their droppings or frass. Pupation occurs

within an enlarged chamber near the exit hole, the pupa being attached to the substrate by anal hooks and a central silken girdle. Generally not more than one larva is found in any one plant, although larger plants occasionally house two or more larvae (Braby, 2000).

Hypochrysops apollo phoebus, Apollo Jewel larva – Photo W. Jenkinson

Hypochrysops apollo phoebus, Apollo Jewel pupa Photo W. Jenkinson

The ants obtain nutritional substances such as peptides and sugars from glands on the dorsum of the butterfly larvae. In return the larvae are protected from predators by the presence of the ants, which also give the plant some protection from 'pest' browsers. Meanwhile the plant benefits from certain nutrients in organic debris, brought in by the ants from the outside, from areas far beyond the possible reach of its own roots, and deposited in some of the chambers (Kapitany & Rowe, 2012).

Ant-plant *M. tuberosa* (close-up showing spiny armour) - Photo Attila Kapitany

Golden Ants (*Philidris cordatus*) on *M. beccarii* stem - Photo Attila Kapitany

Dissected *Myrmecodia beccarii* tuber showing galleries containing *Philidris cordatus* ants and larvae of Apollo Jewel. The chambers at the top of the tuber show debris left by ants. Darker walled chambers/tunnels have a rough surface and prominent "white warts" which can absorb nutrients for the plant's needs. The main ant entrance is the cavity at the very base of the tuber. Image doesn't show separate Apollo Jewel larval tunnelling.

Ant-plant *Myrmecodia beccarii* - two adult plants, in company with the epiphytic aesclepiad "Button Orchid" *Dischidia nummularia*, on the paperbark tree (*Melaleuca viridiflora*).

M. beccarii (juvenile plant)
Photos this page Attila Kapitany

As well as its relationship with the Apollo Jewel, *Philidris cordatus* also has mutualistic associations with several other lycaenid butterflies, including four other jewels viz: *Hypochrysops elgneri*, *H. hippuris*, *H. theon* and *H. narcissus* as well as *Ogyris aenone* and *Jamides cyta*, although this last-named association is more incidental (facultative) rather than essential (obligately) as in the remainder (Eastwood & Fraser, 1999).

Acknowledgements
I thank Graham Forbes for the loan of some historical set specimens for photography and likewise Wesley Jenkinson for photos of some of his set specimens, larvae and pupae. Geoff Walker generously provided high quality photographs of live adults of both subspecies

from his extensive butterfly photogallery website. Gwenda White and Attila Kapitany (at short notice!) kindly provided the images of the ant-plants for which I am most grateful.

Hypochrysops apollo phoebus set specimens from Iron Range NQ
Photo W. Jenkinson

Hypochrysops apollo apollo set specimens from Annan River, Cooktown NQ
Photo J. Moss

References

Braby, M.F., 2000. *Butterflies of Australia: Their Identification, Biology and Distribution.* Vol 2. CSIRO Publishing, Melbourne.

Common, I.F.B. and Waterhouse, D.F., 1972. *Butterflies of Australia*. Angus and Robertson, Publishers.

Curtis, L.K., Dennis, A.J., McDonald, K.R., Kyne, P.M. & Debus, S.J.S., 2012. *Queensland's Threatened Animals*. CSIRO Publishing, Melbourne.

Eastwood, R. and Fraser, A.M., 1999. Associations between lycaenid butterflies and ants in Australia. *Australian Journal of Ecology* **24**: pp 503-507.

Kapitany, A. and Rowe, D., 2012. *Australian Ant-Plants.* Published privately, Melbourne.

Parsons, M., 1999. *The Butterflies of Papua New Guinea: Their Systematics and Biology*. Academic Press, London.

Sands, D.P.A., 1990. Australia's endangered butterflies. *News Bulletin of the Entomological Society of Queensland* **18**: pp 63-68.

Copies of Attila Kapitany's Ant-Plant book (no.5 in a series) are available from Kapitany Concepts, 3 Norwich St, Boronia VIC 3155 (or gecko@connexus.net.au). His interesting website, www australiansucculents.com, is worth a look. It also has details of his other publications.

PLANT PROFILE

Ant-Plants - *Gwenda White*

These are technically called *myrmecophytes* which translates as ‘ant-plants’.

In Australia a range of very different species have evolved to form this grouping. These are unusual and fascinating because they have developed close relationships with ants that primarily involve providing them with ready-made homes within hollow stems or leaves.

These plants have adapted to habitats that are often nutritionally very poor, so living ants provide essential nutrients to ant-house plants. This is achieved by filling specially evolved plant cavities with nutrient-rich organic matter brought from areas far beyond the possible reach of ant-plant roots. In return the ants receive a measure of protection from pests. In Australia the ant species that inhabit the tunnels and chambers is the Golden Ant (*Philidris cordatus*).

Ant-Plant (*Myrmecoda tuberosa*)
Photo G&K White

There are three species of *Myrmecoda* in North Queensland – *M. platytyrea* in Mossman Gorge, Daintree N.P. and Cape York Peninsula, *M. beccarii* in Coastal Queensland from Ingham to Cooktown, and *M. tuberosa* in Cape York Peninsula.

Ant-Plant (*Myrmecoda tuberosa*)
Photo G&K White

The very attractive Apollo Jewel butterfly (*Hypochrysops apollo apollo* and *H. apollo phoebus*) is dependent on *Myrmecoda* for its survival. The larvae of this butterfly feed exclusively on various parts of the plant and shelter within. The ants also nurture the larvae and protect them from predators in exchange for a sugary secretion from the larvae.

My painting, which appears on the cover of this issue, is of *M. tuberosa.* I have visited Iron Range in Cape York Peninsula on several occasions and camped under trees where they were growing. At both Claudie River and Gordon Creek camp grounds there were numerous plants on many of the trees, some within easy reach for photographers. On one occasion I found one that had fallen to the ground - a bonus for a botanic artist. It brings back memories of one of my favourite holiday destinations.

Reference

Kapitany, Attila and Rowe, Derrick. *Australian Ant-Plants* The Australian Series Vol.5

ITEMS OF INTEREST

Happy 20th birthday to the Butterfly & Other Invertebrates Club – how it all got started and musings - *Helen Schwencke*, Founding and Past President (1994 – 2006)

The seed, first planted in 1983, has grown over the last 20 years into the Butterfly & Other Invertebrates Club (BOIC) a respected citizen science organisation. The seed was a New Scientist article highlighting how much harder it was to run a "Save the Snail" campaign than a campaign based on "Save the Whale". The article referred to invertebrate conservation and focused on a species of snail that was down to its last eight live members.

The New Scientist article formed the basis of my first public speech on invertebrate conservation. Also in 1983 Frank Jordan and I came upon information that identified many of the host plants for specific butterflies. That information, not well known at