The BowerBird Bugle

30 October 2015 Ken Walker (kwalker@museum.vic.gov.au) Museum Victoria. Edition 32.

Hi All – I thought I would follow up last week's hierarchical nomenclature Biodiversity missive with two tales from a few years ago. In 1994, I made my first visit to the Mecca even Holy Grail of all morphological taxonomists – I visited the British Museum of Natural History in London. I well remember turning the corner into Cromwell Road and losing my breath at my first site of the BM. Interestingly, they changed the name about 10 years ago to the "Natural History Museum of London" but the scientific acronym they insist we use for scientific publications is the century's old "BMNH".

I remember being ushered in the front doors and escorted down the famous front dinosaur corridor, up the right side of the grand staircase and to behind the scenes where the Hymenoptera collections are stored. (see image next page)

So large is the BM's insect collections that entire floors are devoted to just one Order. The think the beetles takes up several floors. So, I was taken to the Hymenoptera floor and I finally met the collection managers and curators that I had corresponded with since the early 1980s when I borrowed holotypes to complete a revision of the bee genus *Homalictus.*

I was treated very well. Indeed, there was a well-known BMNH hymenopterist, O.W. Richards, had worked in Australia for several years when he revised the Australian paperwasp genera. They gave me Richard's microscope to use while I was there – I was in awe.

One day, I met up with Bernard d'Abrera, the butterfly worker, whom I knew from Australia. Bernard gained permission to show me the BM's rare book library – what a lifetime experience so see books from the 15th and 16th centuries. It was a big room with so many rare books. Our Museum Victoria's rare book room is but a mere shadow against that of the BM.

At lunchtime each day, I would stroll around the BM public exhibitions. Unlike our new Museum here in Victoria where all exhibitions are housed in 4 separate modules, at the BM every turn of a corner leads onto a new experience – a room or a corridor - and I loved it. One day, I saw at the end of a long

corridor and almost lost and forgotten exhibition that I decided to visit. It was unlike any other exhibition I had seen at the BM. I read the story about the person who put on this exhibition. He was a visiting “Artist in Residence” assigned to the Natural History collections. The artist had no background in science or experience with collections. When I spoke to the BM staff section about this exhibition I was told: “Oh him – He didn’t understand what we do here.” Or “They should pull down that exhibition as it does not explain what we do here.” So what was this polarising exhibition that really was anathema to the scientific staff at the BM.

Well, the exhibition was titled – “**An exercise in futility.**”

The exhibition consisted only of rows and rows of shark teeth. There were about 20 rows of teeth with about 100 teeth per row. Visually it was impressive but none of the teeth were identified at all and they seemed to be a random assortment of teeth of all shapes and sizes – the only linking thread was that they were shark teeth. But, there was a text panel to the side of the display which I think had caused the staff's consternation. The text read something like this:

"Natural History Museums around the world attempt to collect and represent the World's Biodiversity in all of its shapes and forms.

However, no collection will ever fully represent all of this Biodiversity and so the larger the collection the larger it is an example of failure to its own goals."

Wow! Ok – thought provoking indeed. I could now see why the staff labelled this exhibition "Does not understand what we do."

But really, here was a person from outside of both the Museum and Science objectively looking at the goals of a Natural History institution and judging them by their intended long term goal – which admittedly, no Museum will ever achieve.

As a relative "youngster" in the Museum world, this exhibition gave me cause to stop and assess; and I still think about it.

When I first began at the Museum we were told to collect to "fill gaps" but now with a new Museum built for Victoria in 2001 which could only hold 70% our 2001 collections we now do not collect to fill gaps but instead we target our collecting to our defined curatorial specialities. When I go out to collect bees, I do not set up light traps at night to collect moths. I do collect and take back everything I collect around flowers so that we get

a full picture of the pollinators – not just bees. But, nowadays we collect strategically and with a purpose in mind. This is a double edge sword as we do not know what species in the future may become extinct or may be affected by environmental changes and so documenting, for the future, what we have now should be a justifiable goal but conversely when the cost of space is at a premium let alone the cost of curating a large collection then other factors come to into play.

I had another sobering interaction along somewhat similar lines within the last 10 years. We had a visit from the Victorian Auditor-Generals office. I was asked to show the person around the insect collection – which consists of about 3 million specimens stored in about 5,500 drawers. At the end of the tour, the Auditor-General's representative asked me: "If a drawer of insects is not accessed over a 10 year period – why do you keep it?"

Again – a sobering question of keeping a Natural History Legacy collection versus the cost of keeping that collection. I guess you tend to sit of whichever side is or is not paying to store such a collection.

I have always found these questions and dilemmas to be of interest. For me, the answer is to better explain what we do and why we do it. BowerBird is a great example of that. I am always popping into the 3 million insect collection to match a photo with a pinned specimen and adding a name to an image. Someone had to collect the museum specimen, label it and probably someone else identified it – and we may have had the specimen in the collection for 50 or 100 years. As I said last week, the biggest problem for taxonomy and collections is that we answer questions before the questions have been asked.

So, how do Acacia plants get ants to help disperse their seeds?

Answer – You offer something and they take your seed.

The Acacia plants want their seeds to spread further afield than what gravity will provide when the seed is dropped. So, the plant adds an Elaiosome to the seed. Elaiosomes are fleshy structures attached to the seeds of many plant species. The elaiosome is rich in lipids and proteins. The food packed inside the elaiosomes attract ants, which take the seed to their nest and feed the elaiosome to their larvae. Hey presto, the seed is now dispersed from where it was produced and it is underground safe and sound and ready to sprout.

Jenny Thynne caught these ants carrying an Acacia seed with their elaiosomes (the white bits on the seed).

Location: Sunnybank, Qld.

The Walking Dead – Fungi that kills flies!

David Akers posted a series fly images that caught my eye. My first thought was the Tachinid fly *Trigonospila* –see below

Location: Won Wron VIC. Photo by David Akers.

Trigonospila Location: Mount Chalmers, Qld. Photo by Geoff Lotton

Here is another of David's photos – notice the fly's mouthparts appear to be "stuck" to the leaf.

Location: Won Wron VIC. Photo by David Akers.

Now, I will hand over to Tony Daley from Tasmania to tell the story.

"A dead muscoid fly (most likely Muscidae), killed by, and exuding spores of, an Entomophthora fungus (Class: Zygomycetes, Order: Entomophthorales).

Order: Entomophthorales

Obligate insect fungal pathogens that feed within the live host until all the resources are spent, thereby killing the insect - at which time the fungus must sporulate to infect new living hosts. They produce short term infecting spores (conidia) under favourable conditions (eg. good humidity) and long term hardy

resting structures such as chlamydospores when conditions are not favourable. The resting structures will produce conidia when favourable conditions return. Entomophthora muscae is a well-known species of this order that attacks the common housefly.

Entomophthora muscae

Infecting spores attach themselves to the fly's cuticle, penetrate it to reach the hemocoel (this is the common method of entry for insect pathogenic fungi), and then the fungus will grow within using the fly's nutrients (favouring the abdomen). When the fly dies, 5-8 days later, the white conidia will begin to disperse from between the abdominal segments within 3 hours and continue to do so for the next 10-21 hours.

Odd Behaviours and Lures

This fungus has fascinated me, especially for the way it is reported to hijack host behaviour and to set lures for potential hosts - both very successfully serving its own greater good.

You'll notice that the fly has died in a peculiar position. Infected flies will die in high positions, on the underside of overhanging objects, and with wings and legs outstretched - such positioning just prior to death is also observed for many other insects lethally infected with similar fungi. It is thought that this odd host behaviour rewiring by the pathogen increases successful spore dispersion and infection, especially of aerial insects.

Another trick *Entomophthora muscae* plays is to ensure greater spread through host populations is to make the dead female highly attractive to males. It has not yet been determined how the fungus achieves this but male flies who happen upon a sporulating female cadaver have no power to resist it and will immediately engage in "extensive courtship". Hence, potentially

becoming infected themselves or even carrying infecting spores to another mate.

The Co-evolutionary Battle Heats Up

Flies invaded with *Entomophthora* fungi have clearly demonstrated 'behavioural fever' whereby they deliberately seek, and bask, in heats above 40 degrees Celsius in the first days of infection. The high raising of body temperatures acts to suppress the pathogen. The obvious benefits of fever are an increase in the onset time of the disease giving the fly a greater chance to complete its lifecycle and thus pass on this beneficial trait. Fever therapy has also been observed in infected grasshoppers and caterpillars resulting in reduced mortality rates. So should you find your pet house fly 'liaising' with an infected dead fly, a program of sauna therapy is highly recommended!

References: Interactions between fungal pathogens and insect hosts. AE Hajek & RJS Leger. Annual Review of Entomology, 1999, vol. 39, pp. 293-322.

Effect of the entomophathogenic fungus, Entomophthora muscae (Zygomycetes: Entomophthoraceae), on sex pheromone and other cuticular hydrocarbons of the house fly, Musca domestica. L Zurek, DD Watson, SB Krasnoff & C Schal. Journal of Invertebrate Pathology, 2002, vol.80, pp. 171-176.

Bizarre interactions and endgames: entomopathogenic fungi and their arthropod hosts. HE Roy, DC Steinkraus, J Eilenberg, AE Hajek & JK Pell. Annual Review of Entomology, 2006, vol. 51, pp. 331-357.”

David posted images of another fly he spotted sitting in a most unusual position. Notice the mouthparts attached to the leaf, the fly standing on tippy-toes and the wings spread. Pretty sure this fly is dead and being attacked by fungus – the fungus has not yet broken out.

Location: Won Wron VIC. Photo by David Akers.

Care to Dance?

One of our unique Australian animals. What surprised me was seeing this Echidna entirely above ground! Looks like it may be feeding on ants or termites.

I only see Echidnas crossing roads (at a slow pace) or shuffled well down in the dirt. I'm not an Echidna magnet – snakes … that's a different story!

Location: Morwell National Park Photo by Matt Campbell.

The return of our Mallee favourite farmer - Maree

The other day I was working away at my computer when it started to “ding” continuously. It dings when an email arrives and it just did not stop! The first message was from Maree warning me of an “avalanche” of emails each with a series of images. I do enjoy seeing Maree’s image. Remember there was an entire set taken with Maree lying beside her bird drinking fountain. Then we had the Lawn Hill series. I have told Maree that I intend to nominate her front yard as a National Park due of all of the wonderful records that occur there.

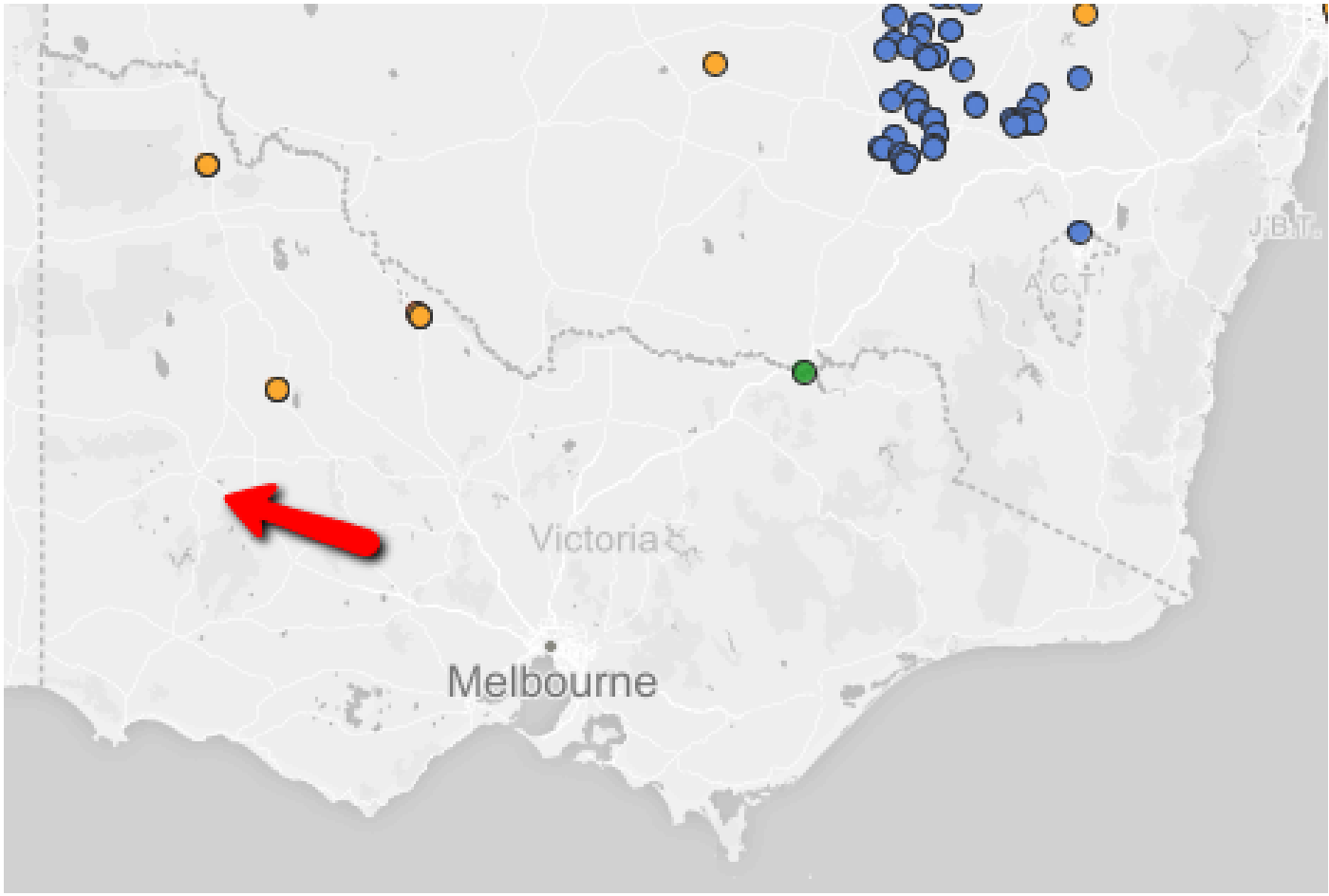
Well, the first set of images initially confused me because the bee species had never before been recorded so far south – another first for Maree’s National Park.

Maree managed to image capture both sexes of a Resin Megachilid bee. The interesting thing about this species is that it does not use tree resin to seal its nest hollow in a piece of wood. It chews up pieces of plant leaf material into a green, mushy “wad” which it deposits into the entrance and pats down with its mouthparts. I’ll give Maree her dues – she sat and watched these bees long enough to find out which plant in her garden the bees were visiting to gather the plant material. So, the story was complete with scientific plant name (which is Maree’s forte) and bee nesting images to boot.

I hope you enjoy Maree’s images as much as I did when I first opened them.

Remember, Maree lives at Wail, Vic, north of Horsham.

The species is *Megachile semiluctuosa* and it is only known in Victoria by a few records and none as far south as Maree's property. I have arrowed approximately where Maree photographed this bee.



The first two images are of the male bee. Notice I have arrowed the expanded, white foreleg of the male bee. Actually, the expanded part is only the first segment of the tarsus called the basitarsus. To mate, the male bee moves onto the back of the female bee and he places his expanded "feet" over the eyes of the female. The light passing through his "feet" to the female eyes provides a unique code for mate recognition. I have spoken about these male sex-recognition features before. No two species of males with these expanded "fore feet" have the same colour patterns.

Here now is an image of a female. Notice the green, mushy wad the female is using to seal the entrance of the hole in wood where she has provisioned a cell with pollen and laid an egg.

This is a bit hard to appreciate but have a look at her mandibles. Do they look “big” to you in comparison to her head? They sure are …….

My Grandma – what big teeth you have ……

This is an image of a set specimen I took a few years ago.

What a set of choppers! Made for hard work.

Look at those serrated, slicing ends.

Thank goodness insects are as small as they are –

else it would be a very scary world.

And finally, Maree’s patience and observations were rewarded with a photo of the female collecting leafy material from Spreading Eutaxia.

Maree commented: “I sat for hours watching 'it' make its nest/home. I couldn't work out what the vegetation that it was regurgitating to cover the hole with. Later on I spotted one on a *Eutaxia diffusa* and realised it was collecting green matter for the closing of its hole. How fascinating. “

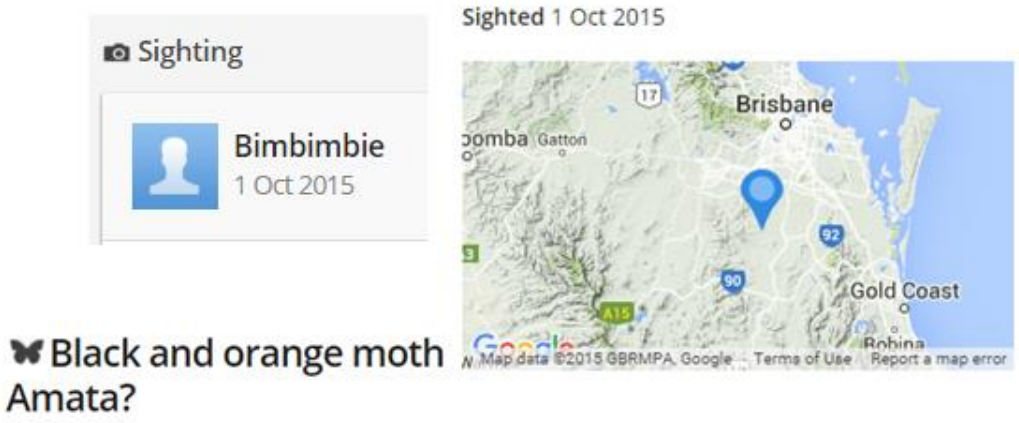
Thanks Maree for facilitating this story and sharing with us on BowerBird.

Bee Hotels are active in QLD.

Dianne Clarke from Mapleton in SE Qld posted a wonderful series of images showing a female specimen of *Megachile (Callomegachile) mystaceana* emerging from her bee hotel. Dianne commented: “These nesting chambers have been in place since early this year. Luckily today I was in place to see this one chewing its way out - start to end about 5 minutes and then it was gone but not to the Salvia where they fed on last year. Perhaps the sun will come out soon and I will find it somewhere in the garden.” Obviously, Dianne “loves” her bees and the “love” is reciprocated!

Using the available resources to assist with identifications.

I did an identification today of a tiger moth. The author of the record suggested her image may belong to the genus *Amata* and asked for confirmation. Here is how I used the available resources to suggest a generic and species name.



Location: South Maclean QLD Photo by Bimbimbie.

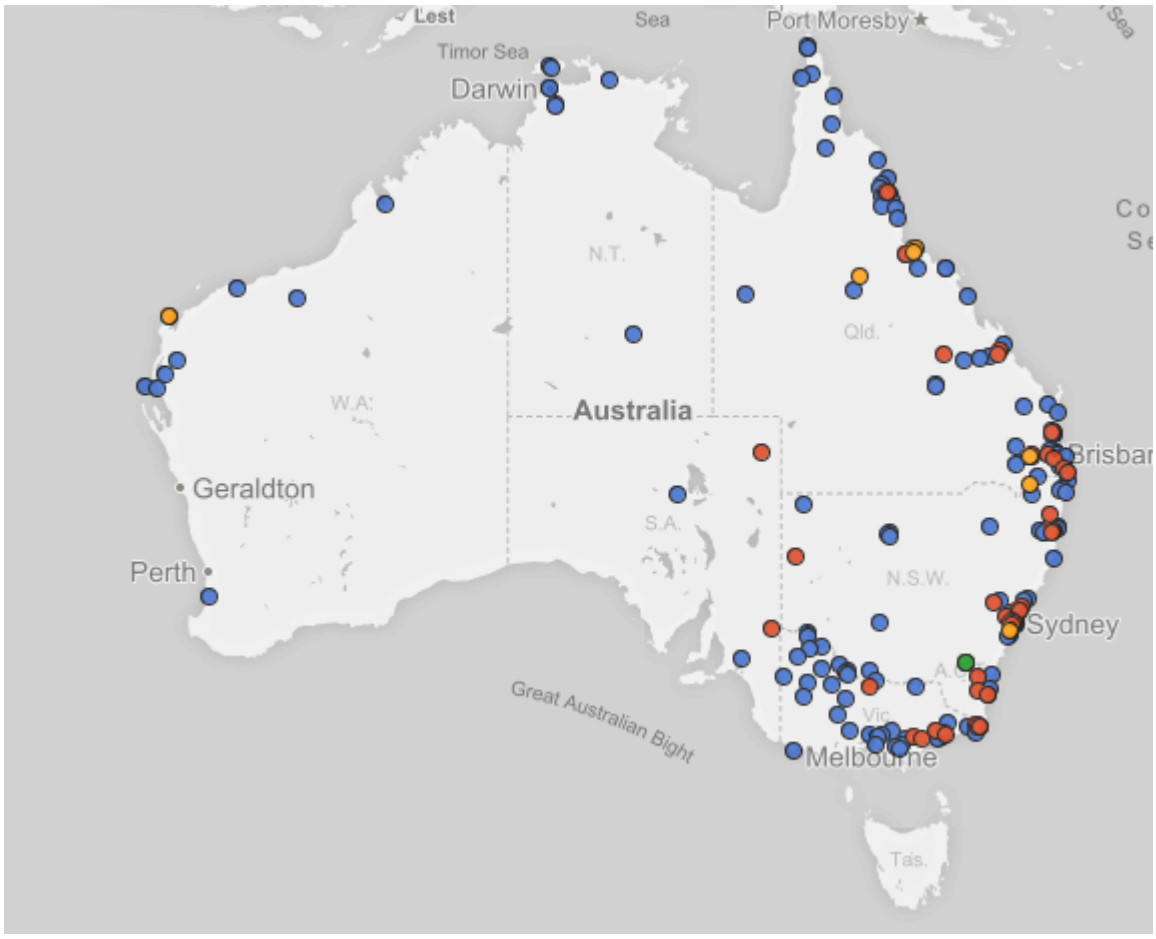
First question - Is it even a member of the genus *Amata*?

I queried ALA (Atlas of Living Australia www.ala.org.au) for the generic records of *Amata* and I found 815 records so I mapped those records.

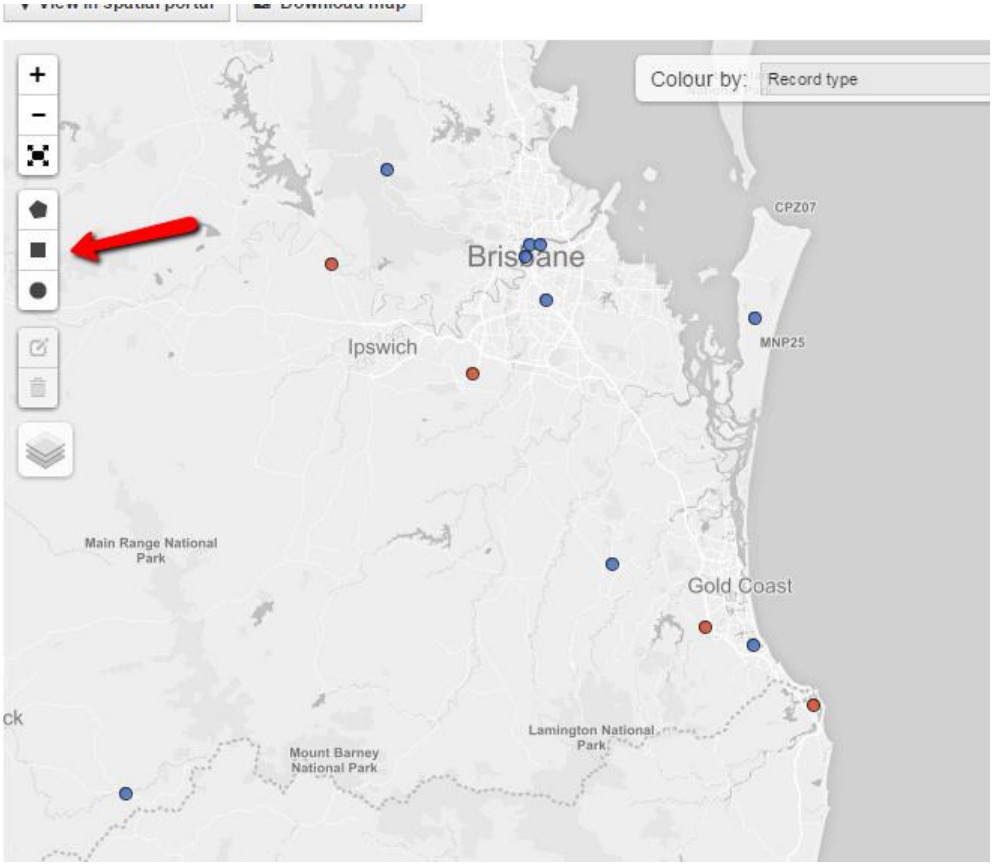
Genus: *Amata* Fabricius, 1807

Kingdom: ANIMALIA

Record a sighting/share a photo Occurrences: 815 View images of species



Then I enlarged the map to show records between Brisbane and the Gold Coast – which would include the South Maclean region. Below is the expanded map showing records around Brisbane and down to the Gold Coast. You can click the square icon on the left tool bar to create a spatial search for any area on the map.



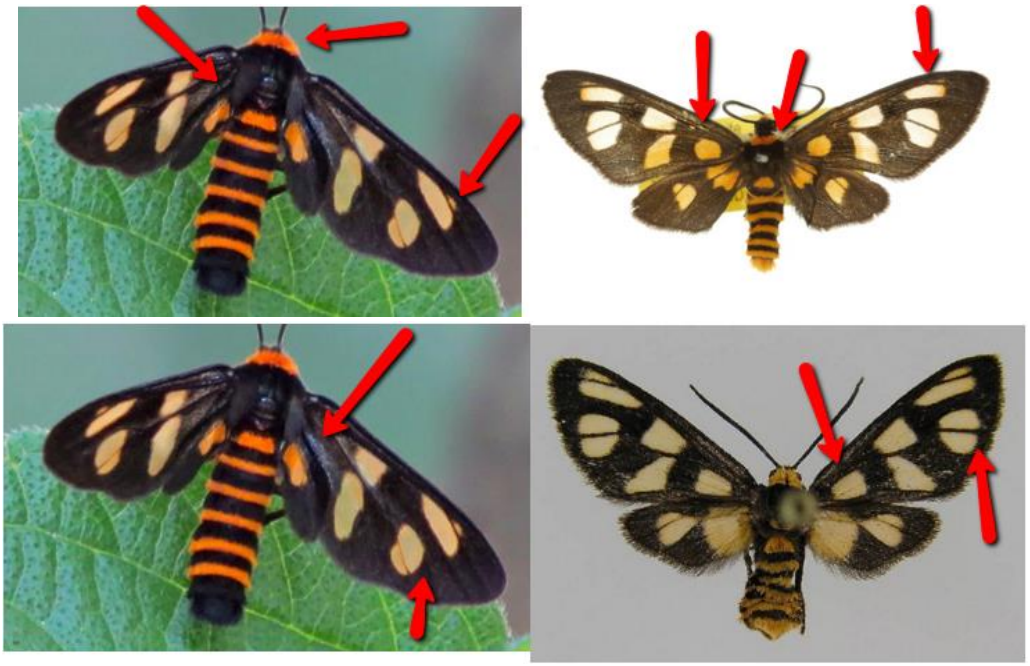
The green shaded area shows the area I chose to spatially search. It returned 10 species name in 53 records.

Here is the list of species recorded within the spatial area I chose to query. Note that only two species have 10 or more records for the same species.

Refine your search

	Scientific name	Count
☐	Amata	4
☐	Amata annulata	22
☐	Amata antitheta	1
☐	Amata aperta	8
☐	Amata chromatica	2
☐	Amata nigriceps	2
☐	Amata paradelpha	2
☐	Amata prosomoea	1
☐	Amata pyrocoma	10
☐	Amata trigonophora	1

I then compared Bimbimbie's and the BOLD System images for all of these returned names and none correctly matched Bimbimbie's image. In particular Amata images had a yellow at the base of the forewing which is missing in Bimbimbie's image.



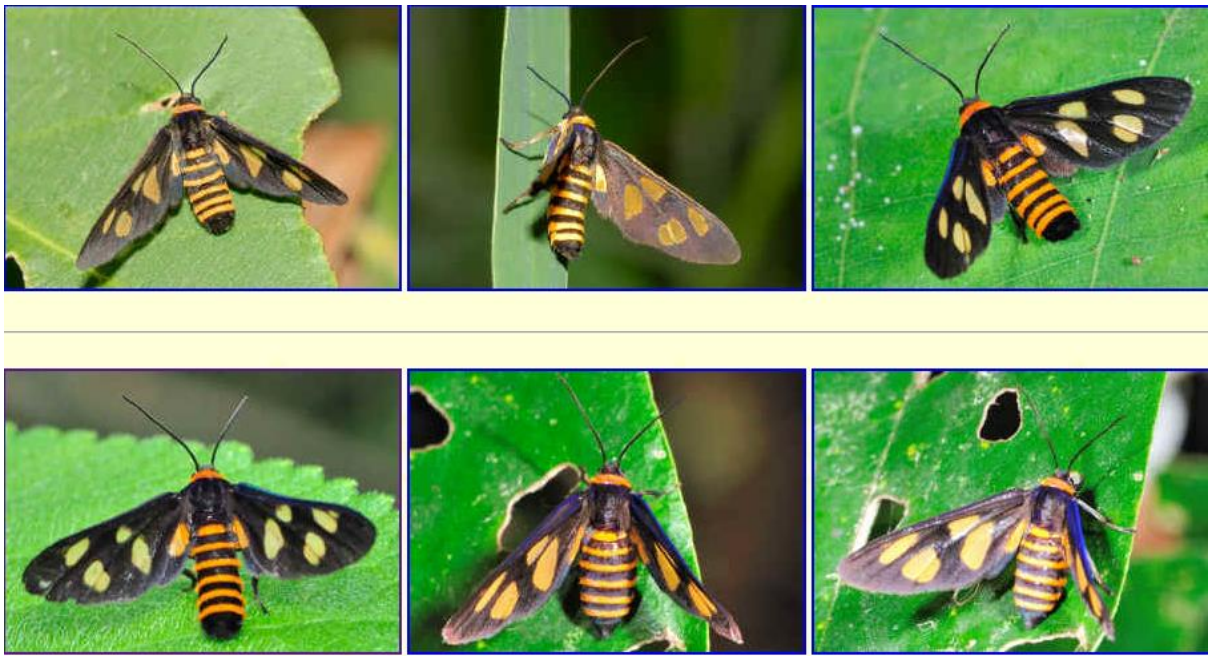
So, I looked further afield from the genus *Amata*. If I queried for the entire Family Arctiidae, I received 61 species for an areas search between Brisbane and the Gold Coast:

So, I began searching generic names other than *Amata*:

☐	Amerila crokeri	2
☐	Anestia semiochrea	1
☐	Argina astraea	23
☐	Asura cervicalis	2
☐	Asura lydia	7
☐	Brunia replana	9
☐	Calamidia hirta	8
☐	Chiriphe dichotoma	6
☐	Chiriphe dictyota	1
☐	Eilema plana	4
☐	Eressa geographica	18
☐	Graphosia stenopepla	2
☐	Halone interspersa	5
☐	Halone pteridaula	1
☐	Halone sejuncta	3

I soon found a match. The genus *Eressa* was the only genus I could see that lacked a yellow band near the base of the forewing. It also had the small yellow spot near the distal end of the wing and a joined yellow band on the lower distal half. The hind wing basal marking is orange and the there is a strong orange band behind the head. This species image on the right is *Eressa angustipenna* from the Brisbane Insects webpage.

There is only one record for this species on ALA from central Queensland but the species is recorded and well photographed in the Brisbane Insects website. I finally named the genus but only commented the species. What an effort but I got a result in the end. Use the available resources and be persistent.



Reiner’s Flatworm Forays

Reiner has been out and about finding flatworms including one that turned out not to be a flatworm! Leigh Winsor, our resident “flatwormologist” gave us insights into Reiner delightful finds while down in Tasmania.

Location: Liffey, Tasmania. Photo by Reiner Richter

Leigh commented: “Reiner's clear photos are of a species of *Australoplana*. There are at least four or more species in Tasmania and as yet they cannot be reliably separated on the basis of external morphology.”

Location: Liffey, Tasmania. Photo by Reiner Richter

Leigh commented: “Reiner's great photos - especially the one of the anterior tip that is most helpful in identifications - are of an *Australopacifica* species with which I am unfamiliar. The greenish-blue ventral surface grading into a strong yellow colour anteriorly is quite distinctive. The dark brown dorsal colouration appears to be comprised of closely aggregated brown mottling.”

Location: Musselroe Bay, Tasmania. Photos by Reiner Richter.

Leigh commented: "Reiner's lovely photos are of another as yet undescribed native Tasmanian land planarian. I have previously found this species at Jestonville in NE Tasmania, and also just south of Catamaran, SE Tasmania. The dorsal ground colour varies from the brownish colour and greenish bloom in Reiner's photo, to a darker chocolate brown."

Location: Waterhouse, Tasmania. Photos by Reiner Richter.

Leigh commented: “Reiner's superb images are of an as yet undescribed species of *Australopacifica*. This land planarian has two interesting external features - the eyes are crowded anterolaterally in a lens-like aggregation that is unfortunately not clear in the photos. The other feature is a pointed posterior tip just evident in the photo of the coiled specimen. The eye pattern, and the general morphology of the colour and pattern suggest that this species may well proved to be a new species of the south eastern Australian land planarian genus Lenkunya.”

Just when you thought you could spot a flatworm – wrong! It’s a "ribbon worm" or "proboscis worms".

Leigh commented: “Reiner's superb photos are of *Argonemertes australiensis*, one of four species of terrestrial nemerteans known from Australia, and the only one present in Tasmania. The range of this species extends from Tasmania to the Mackay region of Queensland. The species exhibits marked intraspecific variation in its colour and pattern, especially in Tasmania. Reiner's specimen shows markings (dark single dorsal stripe merging onto a dark head, with cream ground colour) that are commonly noted in specimens from Tasmania and Queensland. However the markings of the species can vary from plain pale cream to dark reddish brown without dorsal stripes, through brown and cream mottled dorsum, to specimens with one, two or three stripes. As the genus name suggests, the species has clusters of eyes around the anterior end. Reiner's specimen was well behaved and did not evert it's proboscis in an escape reaction.”

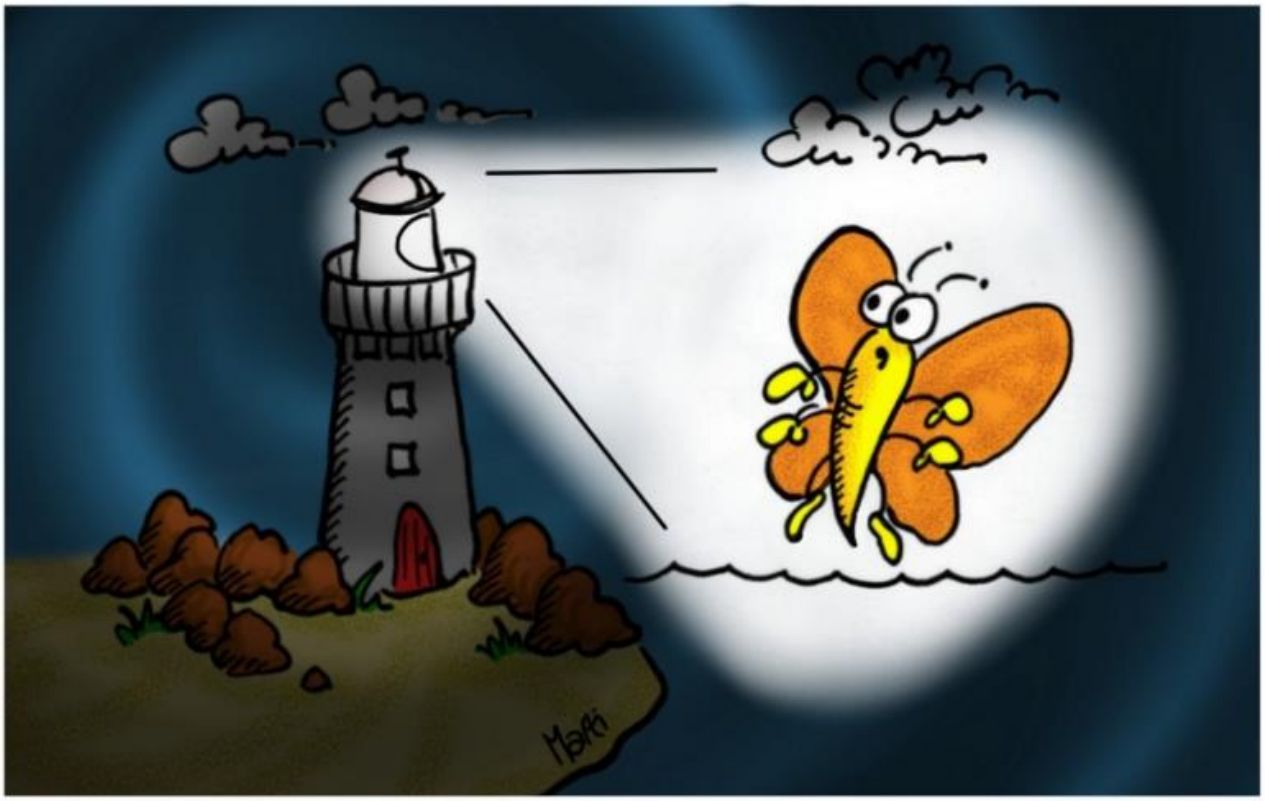
Here is an example of what this worm can do to escape and how it gets it common name "proboscis worms". I remember being on the Victorian Alps BioBlitz two years ago when someone collected this species and was holding it in his hand and it suddenly shot out its long proboscis – it was so quickly extended.

Until that day, I did not know that a worm could fly across a room or cause such a reaction …….

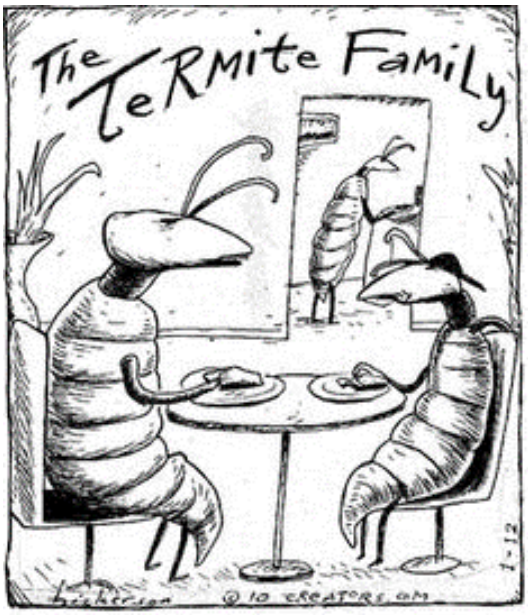
Retracting the extended proboscis look a lot longer than extending it. What a hoot when something more than triples its length in the blink of an eye.

Photo by David Fenwick

Insect Humour!



It was equivalent to the ancient Chinese water torture. Just as moth thought the torture was over, it would all of a sudden reappear, leaving him in suspended animation.



"I know times are tough, honey, but particleboard again?"

Mark Berkery's Nature's Place

AMBUSH - *Everything needs to eat, it's fundamental to existence. Things die so other things can live, that's the way it is in the closed system of energy the earth is. It's basically an exchange of energy from one form to another. That's just nature the way it is, no problem.*

Spiders have various methods of capture, too many to go into here and I am disinclined to too many words these days anyway, words without purpose – why write again what someone has already done well enough.

Right now though there is this ambush spider active in the garden, a few in fact, and though they are known to take on the colourings of their particular hunting environment, for camouflage no doubt, this one stands in stark contrast.
It can get away with this because of the structure of the flowers, it can slip in between and beneath so as to almost disappear to the unwary eye. It must be effective since the spider, let's call it she, she is still alive after a week or so and growing bigger all the time.

I have also recently seen a starkly white spider sitting on purple flowers catch a blue green fly as it came within reach, focus for a short time on immobilising the prey before pulling it into the comfortable shelter of the flowers. An amazing display of speed and dexterity in colour, clearly intelligent, to me.

At another time I saw it miss its prey and slip back into hiding, without a sign of emotion, disappointment, sullenness or regret. Most creatures have no discernible emotion, behaving primarily from instinct, but nevertheless are as clever as any person – it is our nature after all, clever, cunning, savage. Not what we like to believe, I know.

There is nothing we are that isn't already in nature, as much as we like to think we are special. What makes us special is the potential to transcend all that in the clarity of being – our 'other' nature, a place of stillness inside uncluttered by thought or emotion, imagery and its genesis. But it's not for everyone, apparently.

Relative to some people I know nature, for all its manifest savagery, is at least honest. Not imagining it is something it is not, it can be itself without the problem of emotion imagining generates, you can't have the up without the down – that's not something I made up, and the delusional complications that arise from it. A problem to which the solution is so simple, to love – not as easy as it sounds.

But, just as the spider has little to no self awareness beyond it's immediate needs, so is the person but with an expanded cognizance of what those needs are – is what makes us think we're special. And that's all right, for the person – every thing has its time, and the spider – who can be no other way.
She still hasn't caught a bee as far as I know, loved it in her way. I don't think she's big or strong enough, perhaps not venomous enough. And she knows it, so she only goes for the certain kill.

Or the bees are just too fast for that form of love, of a spider. Remember how quick you got out of the way of that 'danger', bees are quicker, more intelligent, having no 'minding' in the way.

Can we get back to that state before mind as random thinking and emotion, with all its accumulated experience.
Can we love that clarity enough to do what is necessary and what is essential to make it incorruptible.
That's the only question, what matters, for me. Everything else is noise.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Now – I have a lot of fun writing the Bugle each week and I would like to share that fun. If anyone has a BowerBird related story they would like to tell, please send me your story and I will include it in the next Bugle.

As always ….. from BowerBird .. that's your lot for this week.

Haveagoodweekend all …. Happy photographing …

Cheers – Ken

(If you wish to leave this email list, please contact me directly at kwalker@museum.vic.gov.au – else share with your friends)