The BowerBird Bugle

15 April 2016 Ken Walker (kwalker@museum.vic.gov.au) Museum Victoria. Edition 41.

Hi All – I thought I would begin by sharing this wonderful natural history specimen restoration museum story –

In the summer of 1909, an entomologist named Anton Krausse strolled the narrow streets of Sardinia netting bumblebees. He plunked his haul in a jar of ethanol and shipped the bees back to the American Museum of Natural History, in New York, where they've been sitting on a dusty shelf for the past hundred and six years. On a recent Friday morning, Melody Doering grabbed Krausse's jar from among a jumble of yellowing vials and bottles. The bees inside were dishevelled from their century-long submersion. "The longer you keep things in alcohol, the crispier they get," she said.

CREDITILLUSTRATION BY TOM BACHTELL

Doering, who is sixty-four, has a greying pixie cut and wears electric-blue eyeglasses. She works two days a week preparing specimens for storage in the museum’s research collection. By head count, the entomology department contributes the majority of the museum’s thirty-three-million-strong collection of specimens. “Certainly, we have the most by leg count,” Doering said. She works mainly with bees and wasps, sorting them into families after mounting them with steel pins, ready to be poked at by entomologists.

Specimens sometimes come from the field preserved in ethanol, which makes them gooey and unfit for display. (The chemical leeches the insects’ lipids, turning the alcohol a nice shade of yellow.) Doering’s job is to get the bees looking as much like themselves as possible, which means washing, drying, and brushing their matted fur. This isn’t just for aesthetic reasons; beautifying the insects helps their features stand out, making them easier to study.

Doering has worked at the museum since 2007, when she answered an ad in the*Times* for a “part-time preparator” with fine motor skills. A former professional organist and a knitting buff, she has steady hands and an eye for detail, two qualities that made her a perfect stylist for hymenoptera. “And my hair weaves are just amazing!” she said. She operates the bee salon out of her fifth-floor office, crammed with chairs, microscopes, and intimidating posters of enlarged wasp heads. At her worktable the other day, Doering extracted the first of Krausse’s bees using a long pair of tweezers. “This is No. 1,” she said. She dunked the bee in a tiny bottle containing her special blend of “bee shampoo”: a few drops of archival soap and deionized water. She held the bottle up to the light and gave it a firm swirl. One of No. 1’s legs fell off. “She’s old, she’s tired—she’s falling apart,” Doering said. (Most of the bees she works with are female; male bees generally exist only to mate with females.)

Plucking No. 1 back out, Doering drove a tiny pin through the bee’s front section, just behind the wing bud, and mounted her on a small block of foam. (The leg, still floating around in the bottle, would be extracted later and glued back on.) Shampooing had done little to improve No. 1’s appearance: she looked as ratty as she had before. Doering explained that bees have branched hairs—their coiffures get clumpy when wet. “Split ends,” she said. “That’s the technical term.” Humidity doesn’t help, either. Wasps, by comparison, don’t suffer from frizz, so they can just be blotted and air-dried. Doering carefully unfurled No. 1’s antennae and legs using tweezers.

It was time for the blow-dry. Doering set No. 1 down a few inches from an electric air pump similar to the ones used to inflate air mattresses. (She stopped using a hairdryer after the bees kept losing their extremities.) With the pump on, No. 1’s wings flapped gently in the artificial breeze. “She’s starting to fuzz, but her butt is still pretty wet,” Doering observed.

The finishing touches were completed under a microscope. Using a small sable paintbrush, Doering tamed the remaining spikes in No. 1’s fur. “I’m brushing out the goth look,” she said. The result: No. 1 no longer resembled a raisin. Her vivid, black-and-yellow stripes had returned. Doering usually only prepares about twenty bees a day. Hers is one of the most time-consuming prep processes in the museum. (A close second: the ichthyology department’s practice of bleaching fish specimens to make their skin transparent, and dying the bones and cartilage to give researchers a better view.)

When No. 1 had been dried, pinned, and labelled, Doering stood back to admire her work. “She’ll stay like that for the next hundred years, or more, one hopes,” she said.

Native Australian Bee Identifications

A Bugle reader recently contacted me and asked if I and other specialists could write article to help identification - in my case, native Australian bees. It's an interesting request as it brings to the surface many of the problems associated with identification by image alone. For bees, important diagnostic characters include the shape and length of the tongue, the wing venation, where pollen collecting hairs occur on the body (legs – which part or under the abdomen), the shape of the inner hind tibial spur and of course, the minute sculpture and punctations that occur across of the body. Under a microscope, most if not all of these characters can be seen by rotating and flipping the specimen into various positions that best display the character in question. However, you cannot rotate or flip an image and for many images a number of the diagnostic characters remain hidden.

When I identify a bee from an image, I often need to use my 35 years of experience looking at bees under a microscope to fill in or imagine the diagnostic character gaps that I cannot see and then add them to the characters that I can see. Sometimes, I have to run through in my mind various combinations of characters that I cannot see and combine them with characters I can see and then think what genus or species could have that range of characters – imagined and seen in the image. If I sometimes find it difficult to decide on the genus or species name then I can imagine how difficult it is for someone who is relatively new to identifications to make such a decision. I recently smiled at a wonderful set of images that was originally identified as belonging to one particular Order but when I checked with an expert, the identification was in a different

Order. An identification change at the Order rank is extraordinary but typical of image only identifications.

And so to bees – What actually is a bee? Well, it is simply a wasp that uses pollen as a protein source to feed its young rather than using animal as do wasps. Although, there is exception in the wasp subfamily Masarinae (Family Vespidae) which also use pollen to feed their young. However, masarine wasps do not have any branched hair – a character developed by bees to carry pollen. Wasps have simple, unbranched hair which cannot carry pollen whereas bees have branched hair they use to carry pollen. Of course as with nature, there are always exceptions and the only other Hymenoptera (wasps, bees and ants) that have branched hairs are the velvet ants (Family Mutillidae) but this family use the parasite pathway to rear their young.

There are just under 1700 named species of native Australian bees and we believe the final number of named species will exceed 2000 species. The world fauna of bees is about 25,000 species so Australia has around 10% of the world fauna of bees.

Australia has five of the world's seven families of bees: Colletidae (871 species), Stenotritidae (21 species) and Halictidae (384 species) – which are called the "short-tongued" bees. And the families Megachilidae (169 species) and Apidae (192 species) which are called the "long-tongued" bees. Australia does not have the bee families Andrenidae or Melittidae. Australia is unique in being dominated by the short-tongue bee families – 1276 species versus 361 long tongued bees. We believe the dominance of the short-tongue bees in Australia is due to the long isolation the Australian land mass has had from other land masses and the predominance of the primitive plant family Myrtaceae (eucalypts and gums tree).

Here are examples of bees from the five Australian bee families:

Short-tongue families

Stenotritidae:

Ctenocolletes sp. Photo by Linda Rogan

Colletidae:

Euryglossa ephippiata Photo Linda Rogan

Leioproctus clarki Photo Linda Rogan

Halictidae:

Lasioglossum Parasphecodes hiltacum Photo by Matt Campbell

Nomia Hoplonomia rubroviridis Photo by Laurence Sanders

Long-tongue bees – Megachilidae

Megachile Amegachile mystacea Photo by Erica Siegel

Megachile punctata Photo by Erica Siegel

Apidae

Amegilla Asaropoda bombiformis Photo by Erica Siegel

Exoneura sp. Photo by Reiner Richter

Here is my typical diagnostic checklist I use to begin identifying a bee ***that I can put under a microscope***:

I check these three characters which usually places the bee into a Family and often to genus:

- Glossa (tongue) shape
- Wing venation
- Scopae (pollen carrying hair locations)

Here is a typical bee image. Notice how you cannot see the mouthparts nor the wing character so all you really have is the hairy hind legs character.

Photo by Cindy Tomamichel

This bee was originally identified as *Euryglossa adelaidae*. Now the body colours are somewhat similar to that species but

Euryglossa belongs to the subfamily Euryglossinae which along with the Hylaeinae are the only bees in the world that carry their pollen loads exclusively in the first section of the stomach called the crop.

Taxonomic Tip!

The word's ending tells you its taxonomic rank.

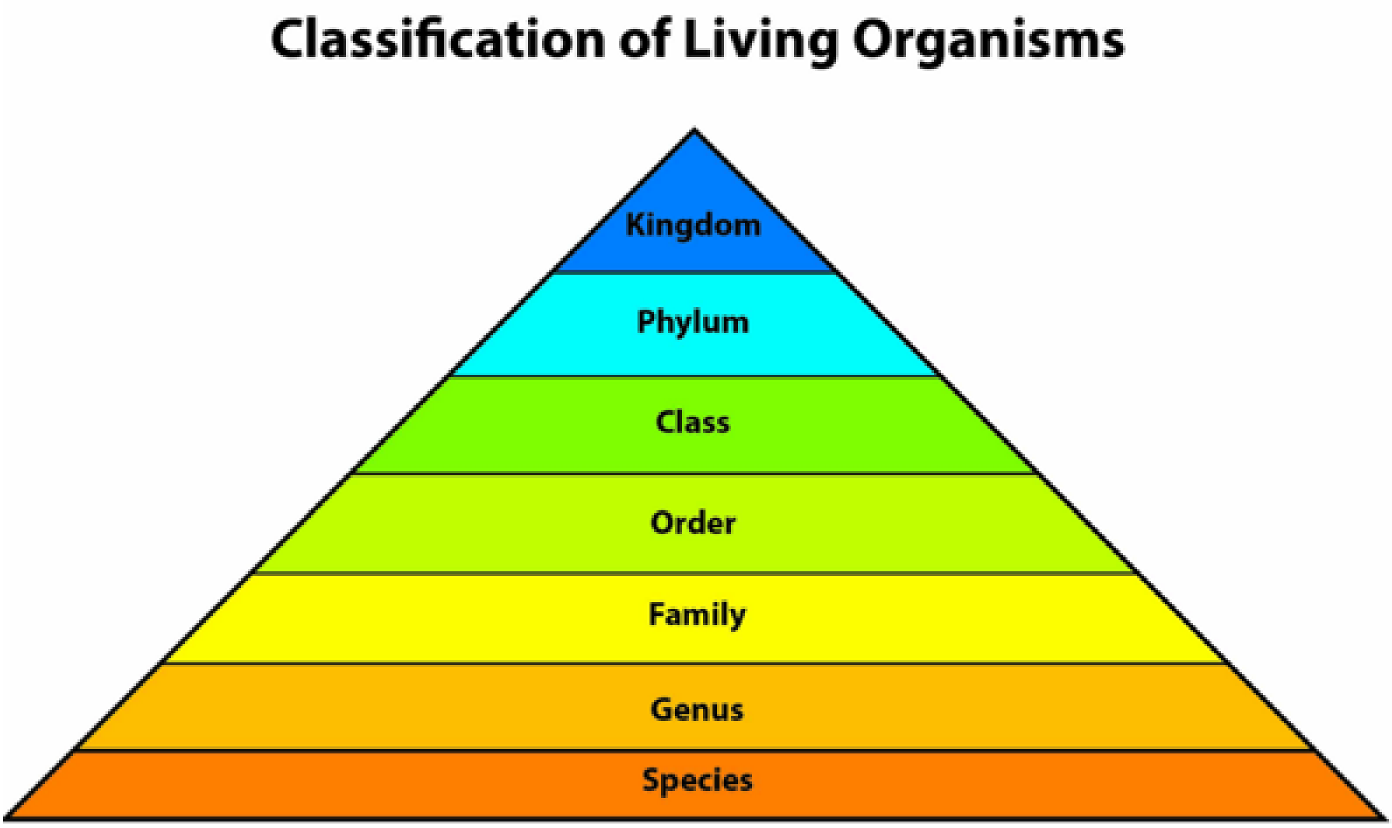
Order names end in "ptera" eg. Hymenoptera, Diptera

Family names end in "idae" eg. Halictidae, Apidae

Subfamily name end in "inae" eg. Euryglossinae, Hylaeinae

Tribe names end in "ini" eg. Halictini, Nomiini

Subfamily and Tribe ranks are inbetween the Family and Genus ranks.



Euryglossinae and Hylaeinae bees are often mistakenly identified as wasps as they do not have any external pollen carrying hairs areas on the outside of the body. Look at the abundance of hair (scopae) on the hind legs so I could rule out initial ID. This is where experience comes to play and I could recognise this bee as a Colletidae bee and as *Callomelitta picta* but someone without such experience cannot run this image through the missing mouthpart and wing characters to get to family rank. Hopefully, you are beginning to see the “issues” with image only identifications.

But, let’s take a look at the three characters I use to help place a bee into a family.

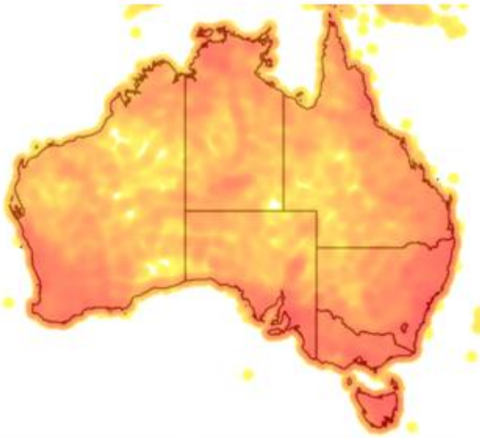
Mouthparts. The most useful part of the mouthparts is the tongue called the glossa. Bee families are divided into two major groups based solely on the length of the glossa – short or long tongued.

The short-tongued bees come in two shapes. The first is “blunt and broad”. The tip of the glossa has been described to resemble a household cleaning mop and this is exactly how the bee uses this blunt, broad mop like glossa.

As I mentioned above, the Australian flora is dominated by two groups of native plants: *Acacia* and Myrtaceae (gums, eucalypts and many other genera). Australian *Acacia* species do not offer nectar with their flowers so even though a flowering *Acacia* looks like it should be a magnet for bees, collecting on *Acacia* for bees is almost always disappointing. The Myrtaceae flowers offer their nectar in a broad, shallow cup flower that any bee with a short, broad, mop like glossa can simply sit of the side of the flower and lap up the nectar to their heart’s content.

Corymbia ficifolia flowers Photo by Bigee

Below are some image showing short tongue Colletidae bees making use of Myrtaceae flowers. Notice how the bees simply sit on the side of the “nectar pool” and lap it up. Sometimes the bees just jump right into the “nectar pool” and have whoopee – like children in a wading pool. A blunt, broad mop like glossa is exactly what you need to extract nectar from these types of flowers. Here is an ALA map showing the distribution of Myrtaceae – it’s everywhere! This helps to explain the dominance of short-tongue bees in Australia.



Brachyhesma sp. Photo by Jean and Fred Hort

Brachyhesma houstoni females inside a Marri flower Photo by Jean and Fred Hort.

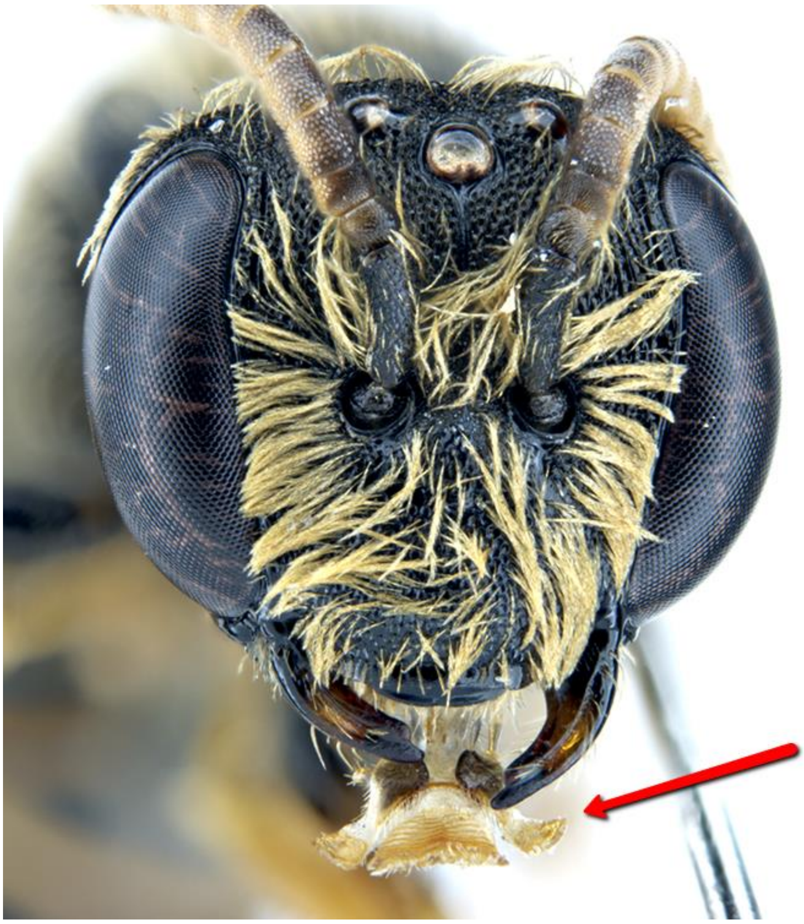
Hylaeus sp. walking into a *Corymbia* flower. Photo by Ken Walker

Euryglossa aureopilosa standing on the flower edge Photo by Reiner Richter

Pachyprosopis Parapachyprosopis eucyrta inside of flower Photo by Jean and Fred Hort

Leioproctus sp. standing on the edge Photo by Laurence Sanders

Here is that broad, flat, mop-like glossa found on Colletidae.

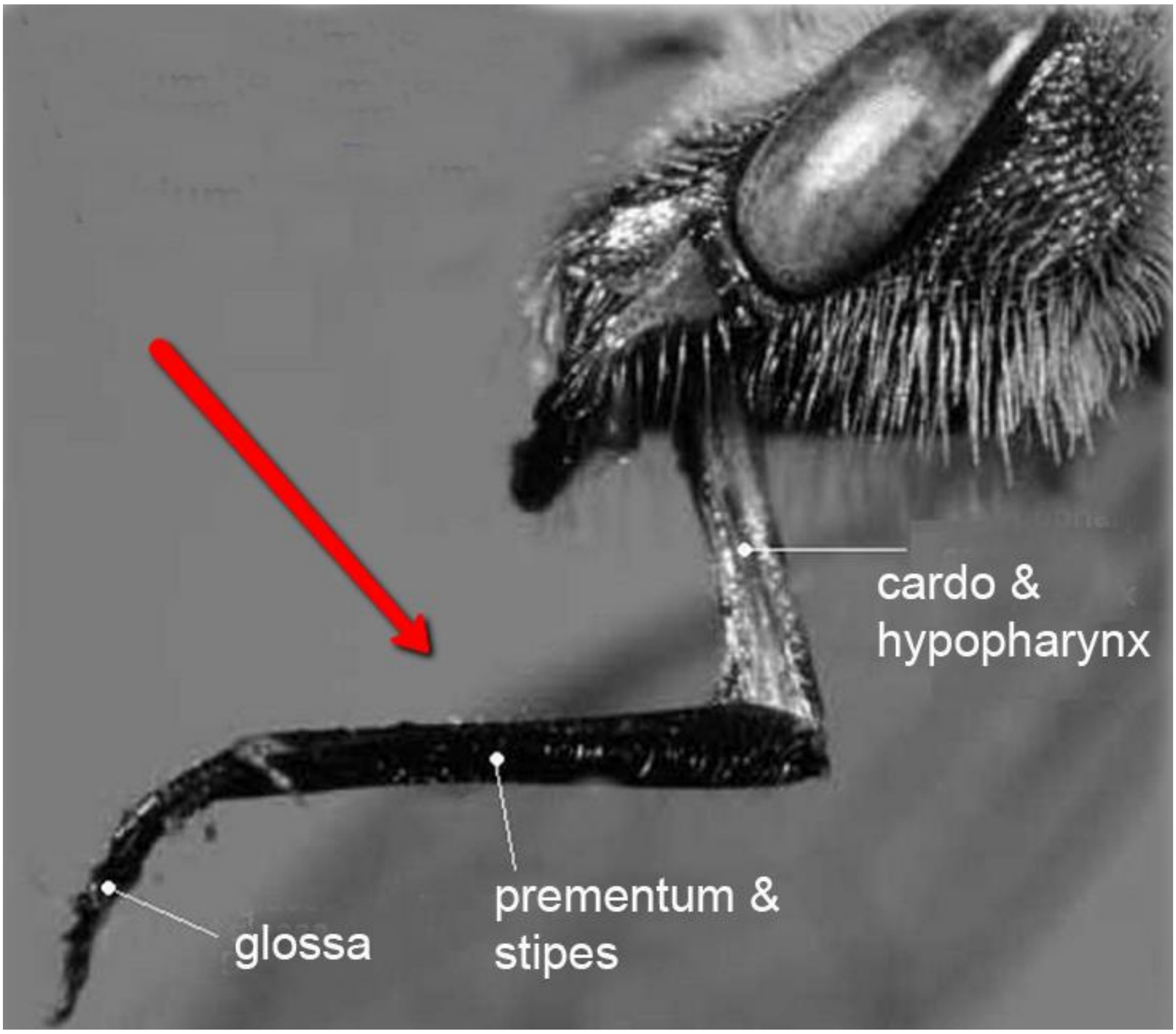


Photos by Ken

Halictidae bees have a short tongue but it is dagger shaped.

Photos by Ken

Even though halictid bees have a short, dagger shaped tongue, their big advantage over colletid bees is that the glossa (tongue) is attached to mouthparts that are articulated and work like an extendable “arm”. This “arm” allows halictid bees to push their glossa into almost any type of flower shape as compared to the restricted use of the colletid short, broad tongue. We sometimes call halictid bees the “trash bees of the world” as they feed on a wide variety of different flower families and flower types.



Below are two examples of halictid bees feeding on flowers with their glossa on the end of the extended mouthpart “arm”.

Lasioglossum Callalictus callomelittinum Photo by David Francis

Lasioglossum Chilalictus platychilum Photo by Jean & Fred Hort

Now, let's look at wing venation ... the soul to the heart of bees!

The forewing venation characters of some bees can immediately determine the family, genus or even species identification.

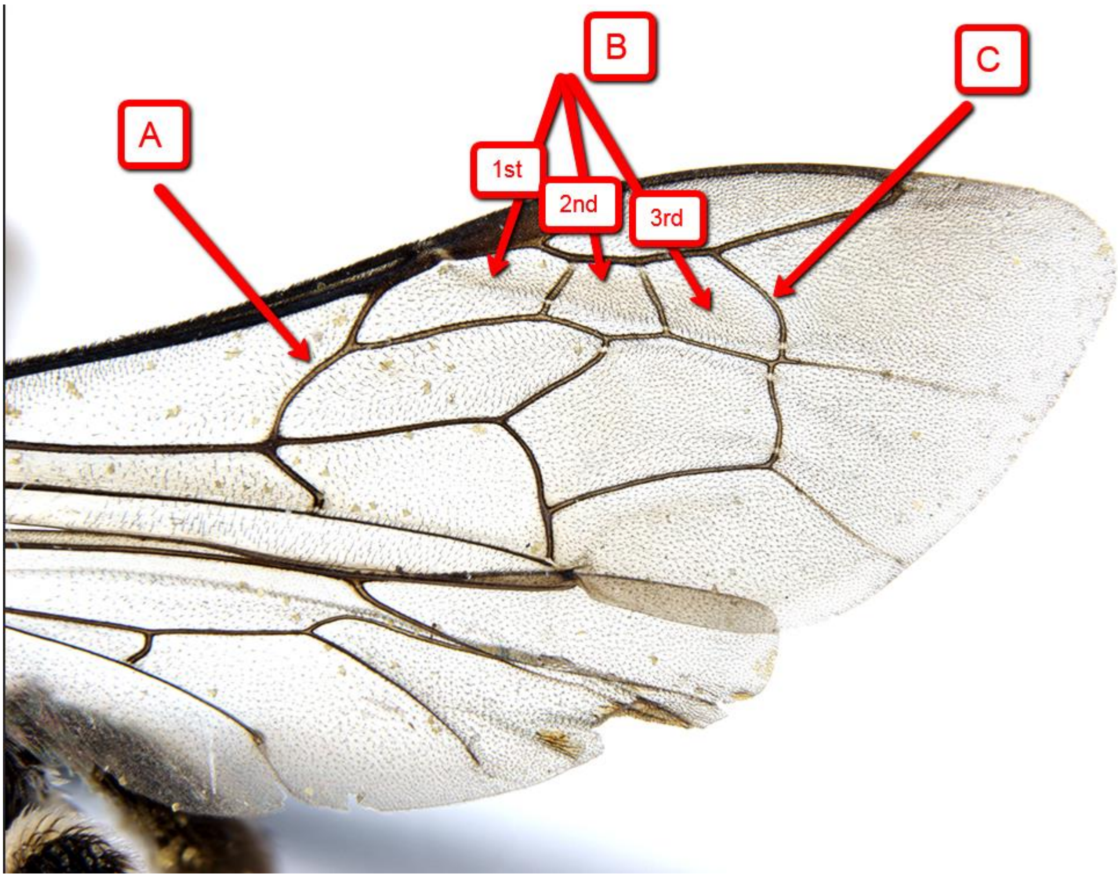
The important veins and cells to look at on a bee wing are:

A - Basal or M vein – look at the shape (straight or curved)

B - Submarginal cells – Count how many submarginal cells, the size of the right cell (called the 3rd submarginal cell)

C - The strength of the 3rd submarginal cell vein – weak or strong.

The wing below is a typical Colletidae, *Leioproctus* forewing – Basal vein almost straight with not much of a curve, 3 submarginal cells, 3rd submarginal cell vein as strong as previous veins.



The entire family Halictidae can be diagnosed by the strongly curved shape of the Basal or M vein seen arrowed as A (Compare with the above *Leioproctus* Basal vein shape)

The ubiquitious genera *Lasioglossum* (top image) and *Homalictus* (bottom image) can be diagnosed by having the vein of the 3rd submarginal cell weaker than those veins of the 1st or 2nd submarginal cells. Easy hey!

Lasioglossum forewing venation

Homalictus forewing venation

Notice in the above two photos, the vein of the 2nd submarginal cell (with the up arrow) is as strong as the 1st submarginal cell.

Well, all species belonging to the subgenus *Lasioglossum (Austrevylaeus)* can be easily placed in this subgenus by having the 2nd submarginal cell vein weaker than the 1st subcell.

Austrevylaeus sp. forewing

And, one species of *Lasioglossum (Chilalictus)* (*L. cognatum*) can be distinguished from all other 130+ species in the subgenus. It has the 1st recurrent vein entering the 3rd submarginal cell whereas all other *Chilalictus* species have the 1st recurrent vein entering the 2nd submarginal cell.

Lasioglossum cognatum unique wing venation.

Now, the Family Halictidae is divided into two subfamilies: Halictinae and Nomiinae. All of the genera in the Halictinae have the 3rd submarginal cells about or slightly larger than the 2nd submarginal cell. Look at the above Halictinae wings.

All of the Nomiinae genera are characterised by having the 3rd submarginal cell significantly larger than the 2nd submarginal cell. The below images are for *Nomia* and *Lipotriches* species. Notice the Halictidae Family characters of the curved Basal vein but these bees have an elongate 3rd submarginal cell.

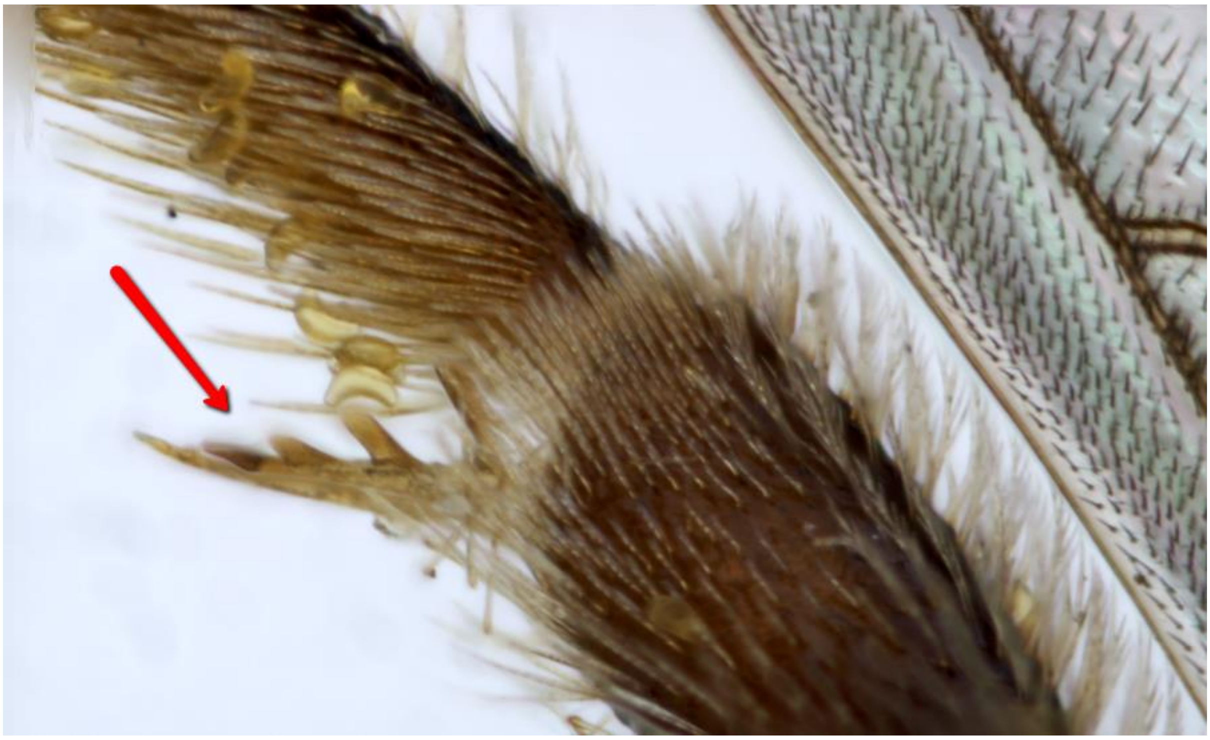
Nomia sp.

Lipotriches sp,

There are all sorts of characters that can be used to differentiate different genera of bees. I'll stick with the Halictidae in this edition of the Bugle and if people want to learn more about different groups, then I will continue.

There is a lovely character on the hind leg of bees called the inner hind tibial spur. You need a microscope of see it and the hind leg has to be in a certain position for you to see it as the spur occurs on the inside of leg. These spurs are used when the female bee climbs up and down their earthen tubes they dig when nesting. The spur has teeth and these teeth can range from large (called pectinate) to fine (called serrate). The size and shape of these teeth can be used to differentiate genera and subgenera. Here are some examples:

This is the inner hind tibial spur found on *Homalictus* species. It is pectinate – large with multiple teeth.



Homalictus inner hind tibial spur.

This is inner tibial spur shape found on all *Lasioglossum (Chilalictus)* species. It is characterised by one large tooth followed by a wavy margin moving to the end of the spur.

Lasioglossum (Chilalictus) inner hind tibial spur.

This is the inner hind tibial spur shape found on all *Lasioglossum (Parasphecodes)* species. It is called serrate.

Lasioglossum (Parasphecodes) inner hind tibial spur

And finally, pollen carrying areas called the scopae (the singular is scopa) are diagnostic as well. We can characterise scopal differences between Families, subfamilies and genera on the basis of:

- Where they occur?
- Where is the primary and secondary and sometimes tertiary scopal areas?
- What is the hair shape?

Here is a quick run-down.

All bee families have their primary scopae somewhere on the hind legs except for the Megachilidae which has its primary scopa on the underneath of the metasoma and of course, Euryglossinae and Hylaeinae which do not have any scopae.

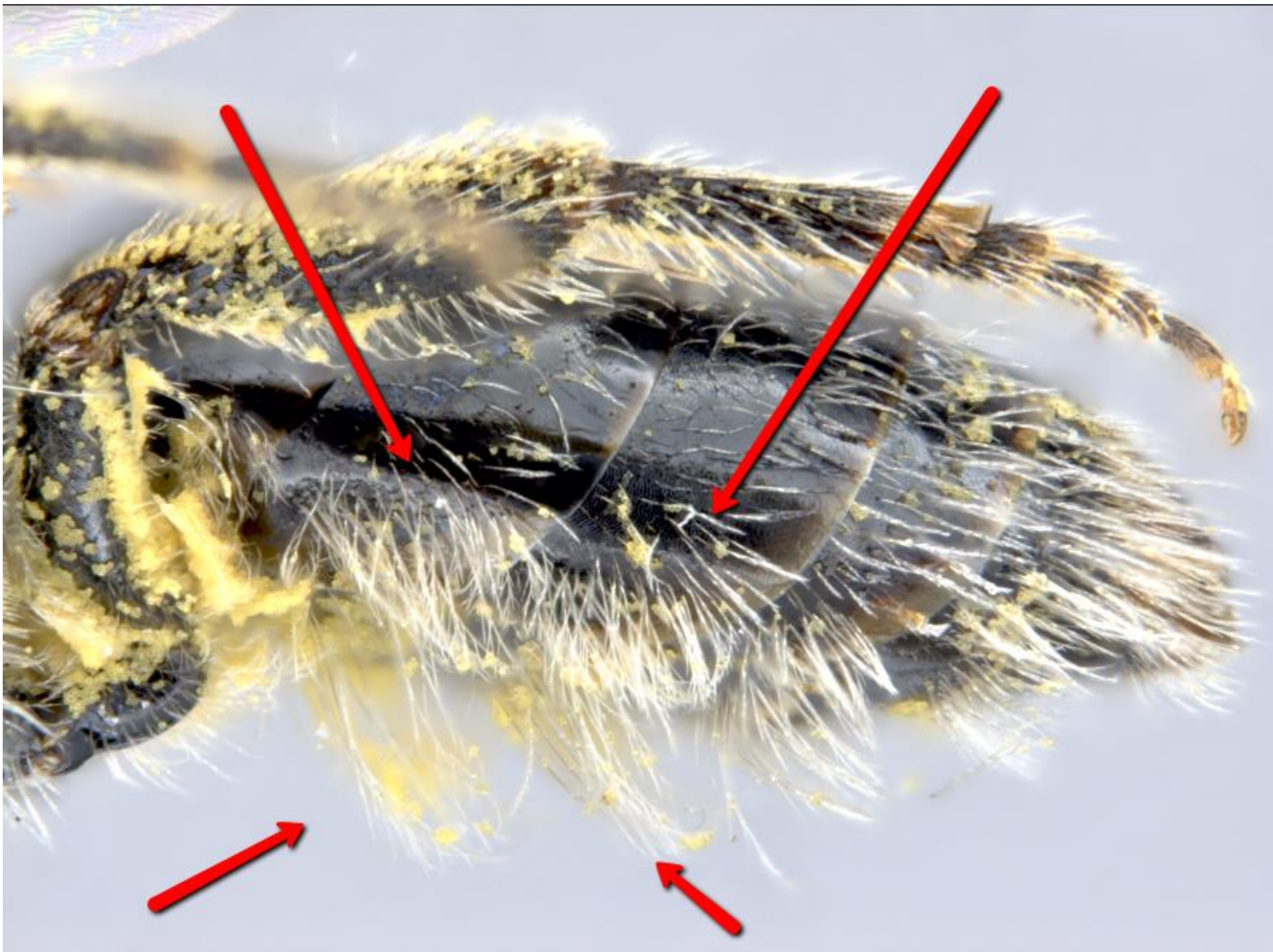
What is the metasoma? Well, the thorax of a hymenopteran insect (wasp, bee or ant) is called an “apparent” thorax because what looks like the thorax but is actually the thorax fused with the first segment of the abdomen (called the propodeum). It’s the second abdominal segment that has the constricted waist shape that allows the abdomen to move up and down for egg laying (in particular for parasitic insects) and protection through defensive stings. So, the thorax and fused 1st abdominal segment is called the mesosoma while the apparent abdomen, which is actually missing one segment, is called the metasoma.

The beautiful images below of Megachilidae clearly shows a dense scopa of pollen collecting hairs on the underneath of the metasoma and another megachilid returning with a full pollen load in the metasomal scopa.

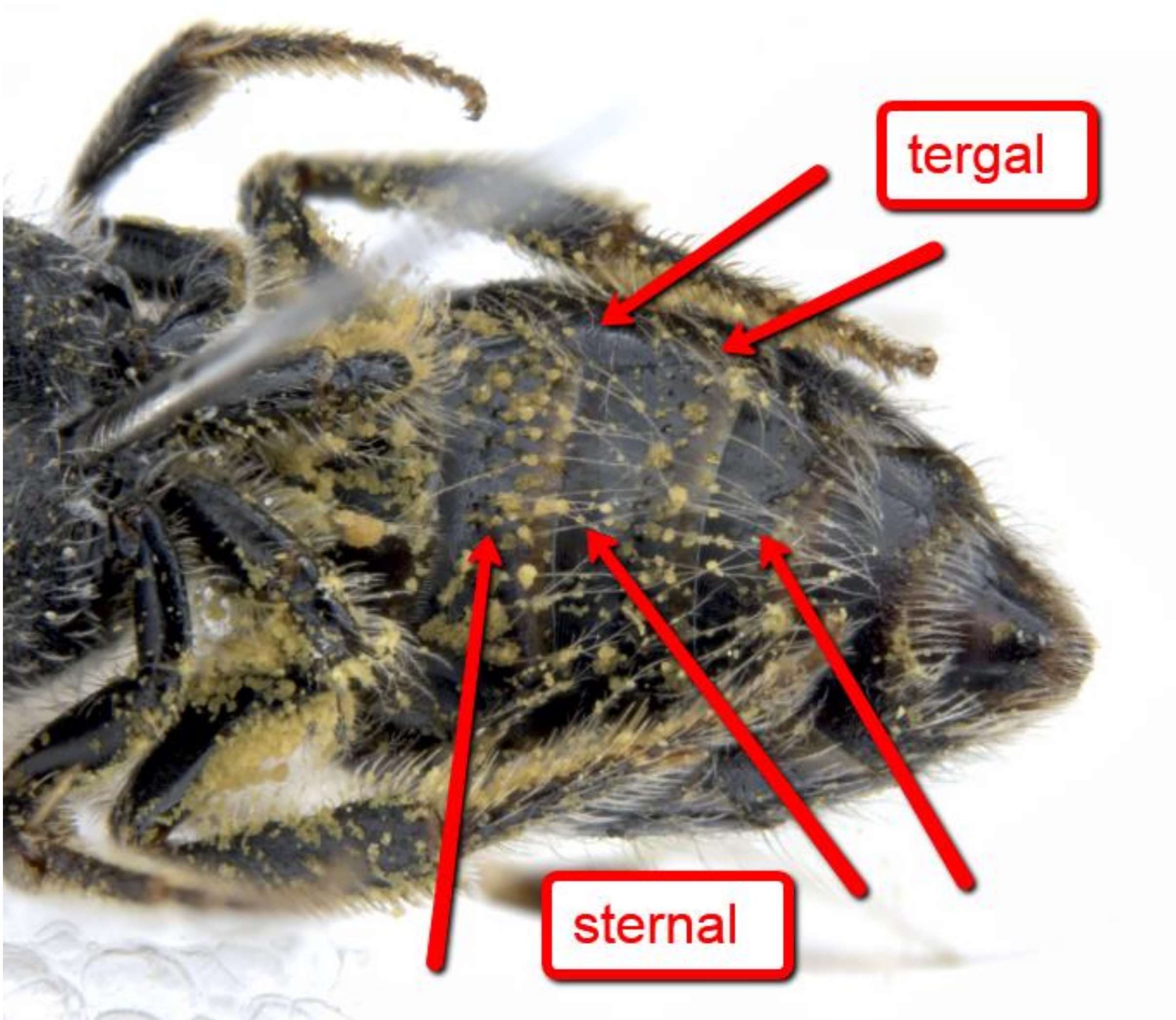
Megachile pictiventris showing the metasomal pollen hairs. Photo by Erica Siegel

Megachile macularis with full metasomal pollen load. Photo by Laurence Sanders

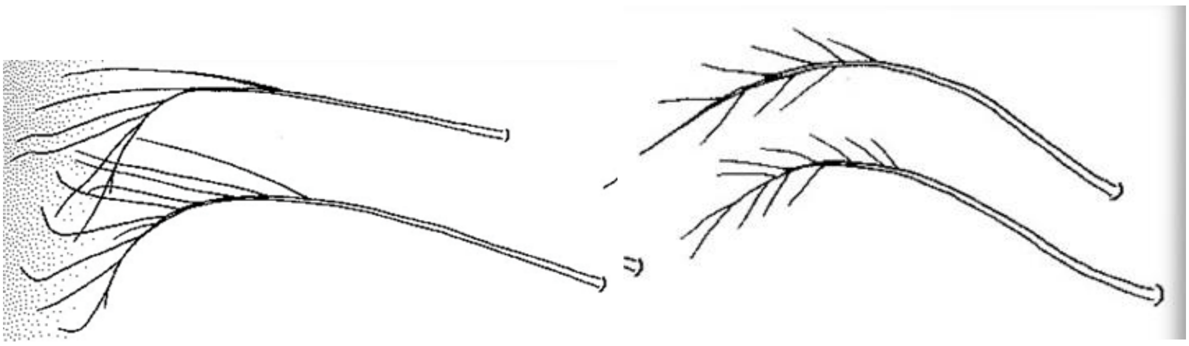
In this edition, I want to show you the difference between various Halictidae scopae and how they can be used to assist with identification. The scopae on Homalictus is unique as it combine both tergal (top) segments and sternal (underneath) segment. You can see in the image below, that the lateral margins of the tergites (top cover) curve around at the side and continue onto the underneath of the body. These underneath curved tergal segments have large tufts of plumose hairs which form part of the ventral scopae.



The image below shows how the Homalictus scopae is a combination of hairs from both the tergal and sternal metasomal segment. This is the PRIMARY scopae for *Homalictus* species.



Did you notice that I used the term "plumose" to define the scopal hairs on *Homalictus*? Scopal hairs come in two types: Branched and Plumose. Branched hairs have a long shaft and the end of the hair is branched. Plumose hairs are like a bird feather and have side branched along the length of the hair.



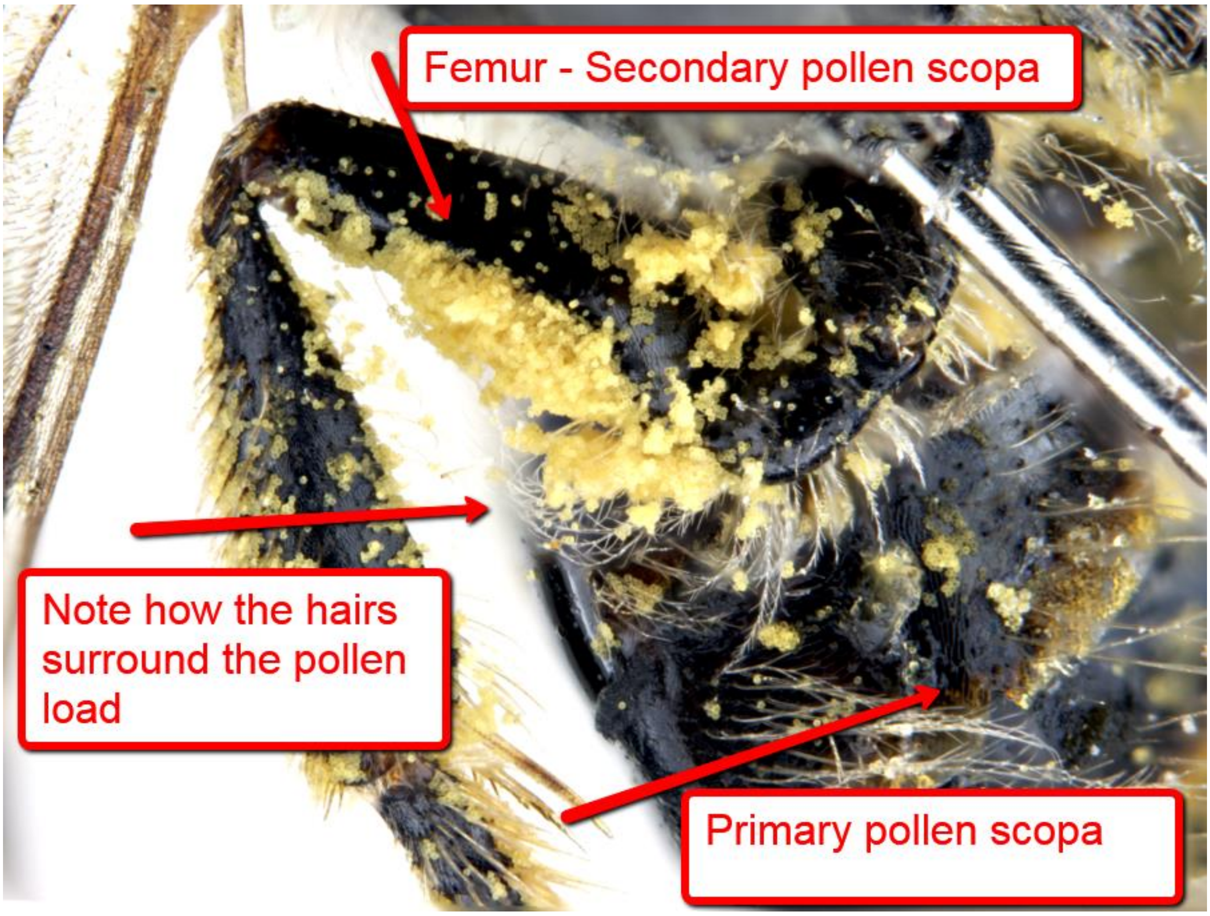
Branched hair type

Plumose Hair type

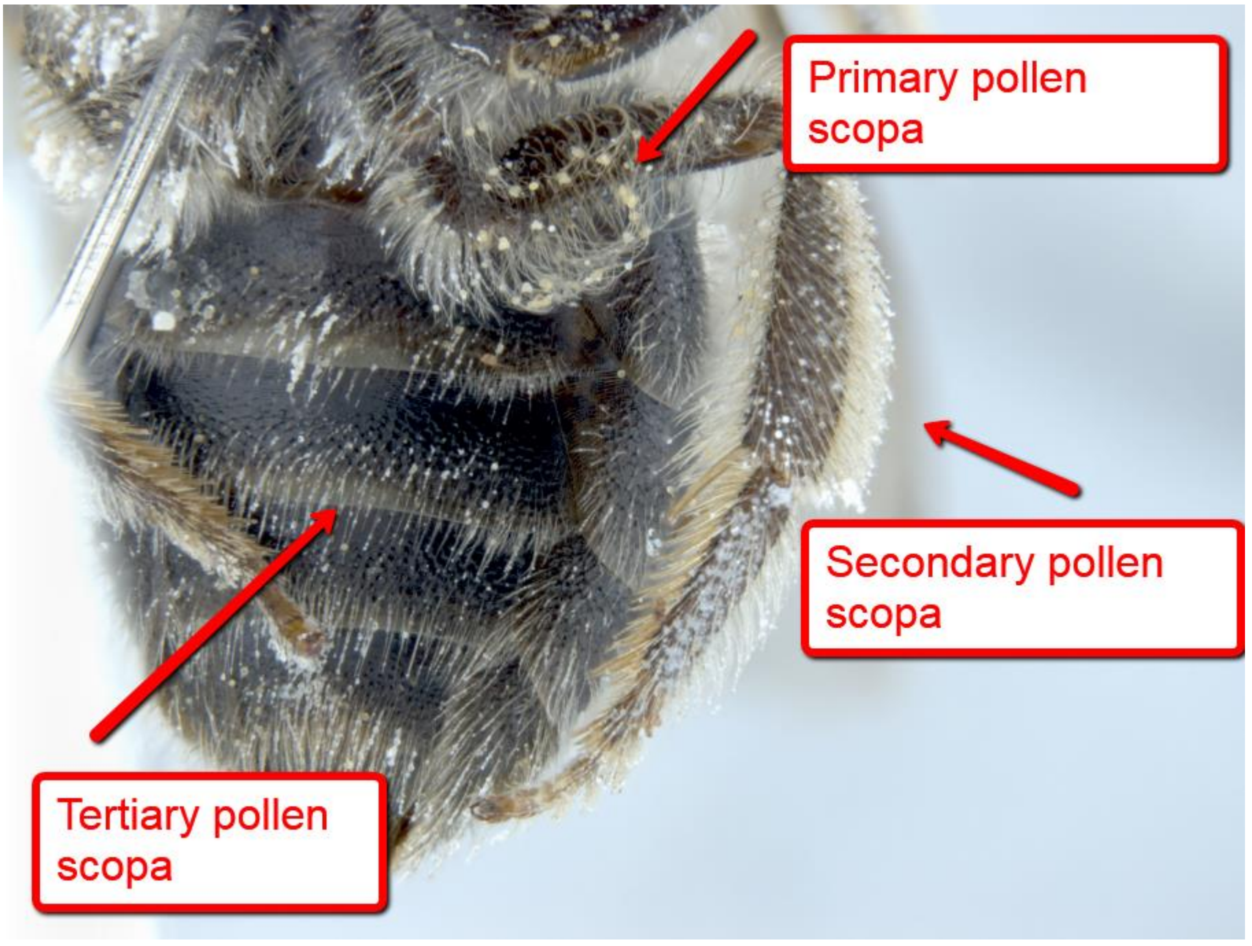
These different hair types seem to be used in two different ways. Bee with the branched hair type push pollen onto the branched hairs and this gives the pollen ball “internal stability” with the branched hairs fanning out inside the pollen ball being carried by the bee. Bees with plumose hair type keep the plumose hairs on the outside of the pollen ball. The plumose hairs surround the pollen ball and hold it like in a basket.

Homalictus has the Plumose hair type while *Lasioglossum* has the branched hair type. Below is an example of the Homalictus plumose hair type.

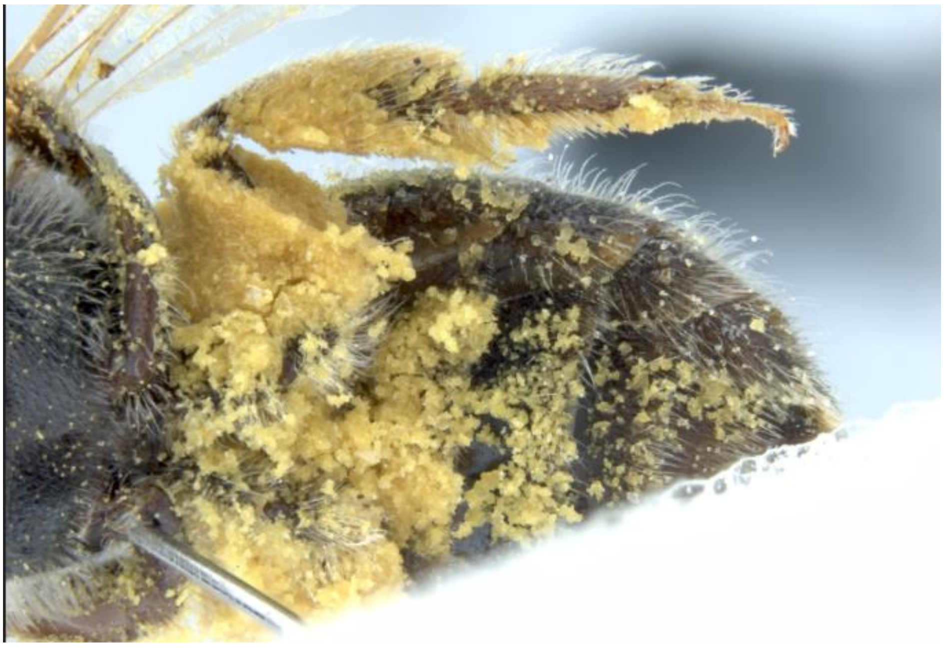
The hind leg femur is the SECONDARY pollen carrying area on *Homalictus*. Here is a good example of plumose hair surrounding the pollen ball rather than spreading throughout the pollen ball.


Femur - Secondary pollen scopa
Note how the hairs surround the pollen load
Primary pollen scopa

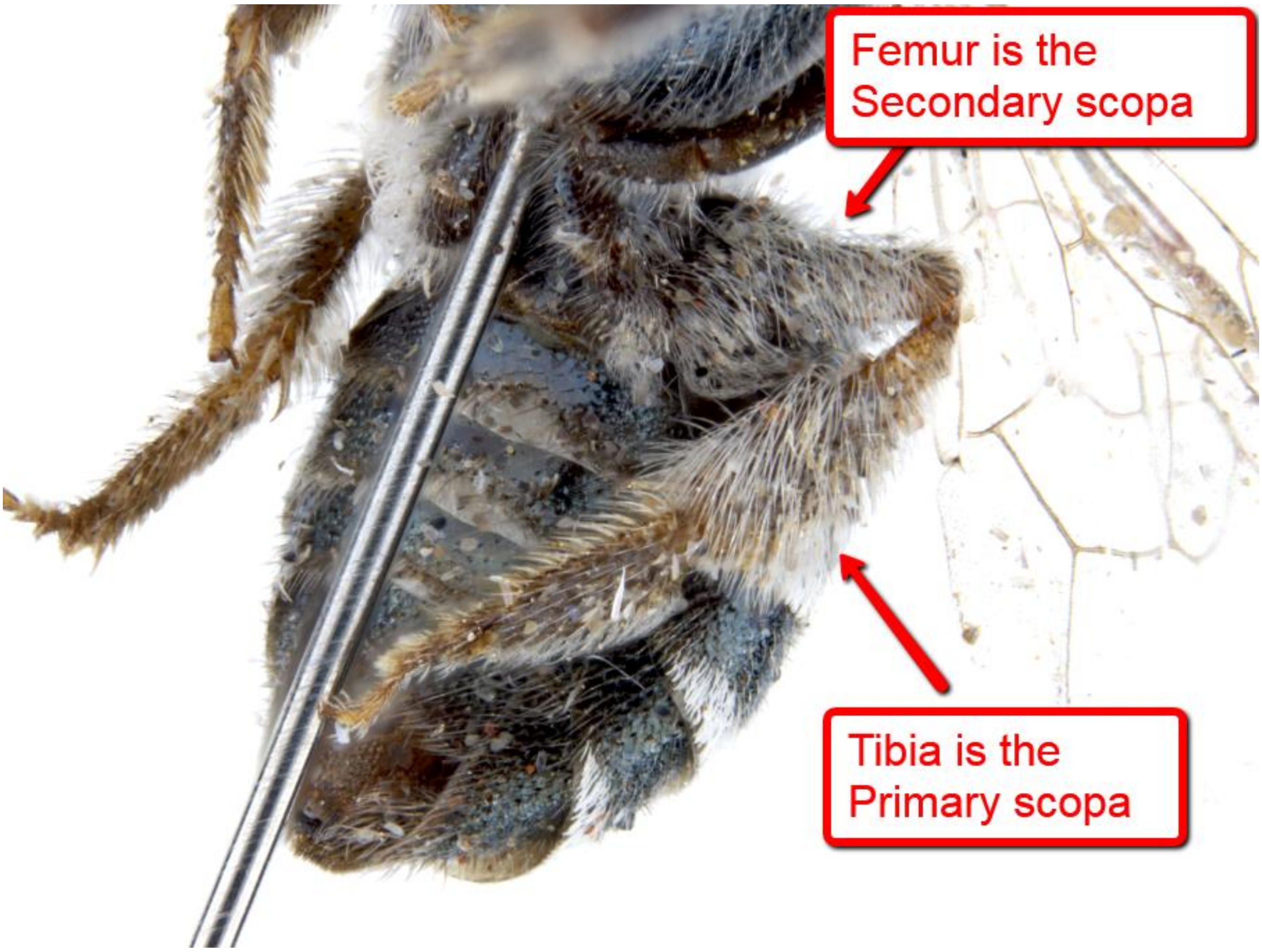
Here is the situation on Lasioglossum – The Femur is the Primary scopa, the Tibia is the Secondary scopa and the underneath of the metasoma is the Tertiary scopa.



Here is an image showing these scopae in use.



And there is the scopal arrangement on both Nomia and Lipotriches. Both scopae are on the hind leg but reversed to Lasioglossum with the Tibia being the Primary scopa and Femur being the Secondary scopa. The underneath of the metasoma is rarely used to carry pollen.



So, this demonstrates the scopal differences in the Primary, Secondary and Tertiary pollen carrying areas with the Halictidae and across the various genera.

I have one final TIP to distinguish *Lasioglossum* from *Lipotriches* using the tomentum (hair bands) across the metasomal tergites (top segments). In *Lasioglossum*, the tomentum is fine and dense so that you cannot see individual hairs while in *Lipotriches* the tomentum is weaker and you can see individual hairs.

Metasomal tergal tomentum on *Lasioglossum*

Metasomal tergal tomentum on *Lipotriches*

Well, that was a quick overall introduction to the identification of Australian bees and then an in-depth look at the identification within one family, the Halictidae.

Currently, there are 384 described Halictidae species. There are more undescribed species that I have in my bee collection and I am currently working on writing scientific papers to name these new species.

But, I hope these pages have given you an insight into the differences between identifying a bee from an image compared to identification with the bee under a microscope and being able to turn it around.

Recently someone contacted me to express a bit of disappointment that not of their images were identified to species. It is just so difficult unless you know the particular group so well that you can fill in the character gaps that are always missing in an image.

Which hopefully will encourage BowerBird users to upload several image of the same specimen with photos taken from different angles.

Finally, while examining a specimen under a microscope is the most effective way to reach an identification, the value of an image cannot be under-estimated as the image so often show behavioural characteristics that you never get to see on a dead specimen.

Just as an example of the value of an image for behavioural attributes of animals, below are but a few wonderful examples I have chosen from the BowerBird image set.

There is a place in science for both specimens and images and both forms of data have different but important strengths.

Bees bubbling !

Hylaeus Hylaeorhiza nubilosus Photo by Laurence Sanders

Hylaeus sp. Photo by Dianne Clarke

Who could forget Laurence's amazing leaf cutter bee/wolf spider interaction images – you will not see this with the bee dead on a pin and the spider in a jar of alcohol. This behaviour had never before seen or recorded in the world.

Photos by Laurence Sanders

A curious kookaburra at Crow's Nest

Glenda Walter is an avid naturalist in SE Qld with a keen eye for the unusual. Glenda recently uploaded a wonderful image of a laughing kookaburra but she also uploaded an image of a page from a book showing caterpillars – Why? I thought. Well, it was not until I read Glenda's explanation that I roared with laughter and amazement. Read on: Glenda wrote:

http://www.bowerbird.org.au/observations/60913

"A friend and I sat at a picnic table, having a cuppa and a biscuit, and looking at a large book containing images of plants and insects. A Kookaburra sat in a tree above our heads. As we examined the page showing bees and sawfly larvae, down he came with a "whoosh", and landed on the page in front of us, so close that he was touching us. He sat there for a minute until I touched him, when he flew back to his branch.When we got to the page showing *Neola semiaurata* caterpillars, down he came again, and plumping himself down on the open book. He ignored our cheese and biscuits, was focused on the caterpillar images. I have had kookaburras steal food from my hands before, but didn't imagine that they could interpret 2D images in a book.

Has anyone had a similar experience? I need to go with more images, and conduct experiments, if I can find the same kookaburra."

Great story Glenda and good luck with your experiments. The next page show Glenda's BowerBird images from this usual encounter. If you look back in a past Bugle issue I told a story of how Glenda found a never before photographed fly on the inside of her car front windscreen as she drove through a National Park".


Laughing kookaburra, Crows Nest


Images in book, Crows Nest

Photos by Glenda Walter

Curious millipede find in WA.

Does anyone our famous “shark teaser” Lily Kumpe? Remember Lily and her husband were out on their surfboards “teasing” sharks when one shark decided enough was enough and took a “nibble” out of Lily’s surf board. Lily assures me her subsequent activities and been primarily terrestrial orientated rather than marine! – Good move Lily. Teasing sharks was always going to end bad ... real bad ....

Well, Lily recently came across some millipedes that caught the interest of BowerBird’s resident millipede expert, Bob Mesibov down in Tasmania.

Taxonomy: Animalia: Arthropoda: Diplopoda: Sphaerotheriida: Sphaerotheriidae: *Cynotelopus notabilis*

Lily added these comments:

“In roughly an hour worth of mid-day searching spread over 2 days, we found a half dozen of these. The experts say *Cynotelopus notablis* is generally known from deep litter and under logs (Holloway, 1956; Jeekel, 1981), but 5 out of 6 pill millipedes we found were sauntering in the sunshine and Mike even found one on the cliff face while rock climbing.

He managed a decent photo mid climb, which I think redefines the limits of both rock climbing and citizen science!

It is worth noting that we only saw females out wandering. The only specimen to be found nestled snuggly in the soil was a male.

(Males can be identified by their smaller size and odd hooked shaped terminal segment.)”

Thanks Lily – fascinating find and great photography.

PS. Lily - Leave the sharks alone ....

Nothing like a bit of humour

I loved this title and accompanying image!

Clap Your Hands & Take a Bow

Insecta: Diptera: Tachinidae: *Cylindromyia* sp. Photo by Reiner Richter

Wonderful image set of a pair of mating rare predatory scorpionflies.

Insecta: Mecoptera: Choristidae: *Chorista australis* Photos by Mitch Smith

The line between art and science blurs ..

Insecta: Hymenoptera: Vespidae: *Delta bicinctus* Photo by Laurence Sanders

Insecta: Hymenoptera: Megachilidae: *Megachile nigrovittata* Photo by Laurence Sanders

Fungi: Basidiomycota: Mycenaceae: Mycena: viscidocruenta Photo by Steve Young

Insecta: Coleoptera: Chrysomelidae: *Paropsisterna gloriosa* Photo by Joan Hales

And finally, what’s a Bugle without Mark Berkery’s

Nature Place

Out in the field, on the edge of the forest, myself and Deb – AussieBugs - went exploring. For bugs, what else.

There is always something to be found when you take your time, some places are better than others, everything to its season.

There are no rules but to walk, watch and wait. What presents nobody can design. That’s something you have to rest in, not knowing, and accept what comes.

Everything has its time, learn from whom you can, how you can, and be grateful. But eventually you have to stop looking over your shoulder at what others think is right or good.

In the endeavour to improve, thinking what others may think, however masterful they may be, eventually casts its own sticky web.

Of course there’s always another angle or composition to be explored, whatever the art.

And it’s all for peace of mind, what else …

Wonderful woody Shield Bug, with bonus blue sky.

Jewel Bug, wag those antennae at me.

Wandering Weevil on the tree trunk.

Healthy looking fly, a type rarely seen in the garden

Hopper on the dead tree full of life.

Cricket amongst the leaf litter.

She is laying while he appears to be guarding ...

Now – I have a lot of fun writing the Bugle each month 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)