Flies - Diptera

of Belair National Park and surrounds

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The word Diptera comes from the Ancient Greek and literally means 'two wings'. It is this that distinguishes flies from most other insects which have four wings. In flies, the second pair of wings has evolved into a pair of club-like 'halteres' which serve as flight stabilisers. All flies have halteres. Many other insects are also given the common name 'fly' but it is the Diptera that are the true flies and have only one pair of wings.

Diptera are divided into two subgroups: the more primitive **Nematoceran Flies** and the more advanced **Brachyceran Flies**. The Nematocera have a longer body, longer legs, are more delicate and often have aquatic larvae. Their antennae can be quite elaborate. In this publication they include Mosquitoes, Midges, Gnats and Crane Flies. The Brachycera are more robust and are what we would ordinarily think of when we hear the word 'fly'. They have shorter antennae and their larvae are terrestrial. They include the remainder of the flies from March Flies onward..

As much as possible, I have organized this publication in the standard way, which is to follow this line of evolutionary development, from Mosquitoes through to Tachinid Flies.

The flies in Belair National Park are quite astonishing in variety and number, and yet I'm sure I've only just scratched the surface. Almost every week I find a 'new' fly I haven't seen before. I have photographed flies that are almost invisible to the naked eye, and seen others, like the Black-and-white Giant Fly, that take my breath away with their size.

On the one hand it surprises me that I am so passionate about insects and insect photography, but on the other, if I think back to my childhood, I kept Weevils as pets, and loved to wander my backyard with a Bug Catcher in hand. Perhaps life has a way of coming full circle.

I didn't start out taking photos of bugs though. Initially I took photos of fungi, kangaroos, flowers, trees, landscapes … But over time, as I looked at all these things, it became glaringly obvious that fundamental to our natural world, were BUGS. They were behind everything. Simply by doing what they do, they were keeping the whole ecosystem chugging along nicely, and yet most humans seemed oblivious to that fact. And not only that, we humans so often chose to malign bugs as undesirable or unpleasant, without ever looking closer or trying to understand them.

Bugs are truly amazing! Bugs fill every ecological niche … pollination, recycling, decomposition, symbiosis, predator, prey … it doesn't stop. When I walk around in the bush I see that every little bit is connected and vital to every other little bit. It takes my breath away and I walk around in awe.

I imagine this publication on Flies to be part of a larger publication on all the insects of Belair National Park. I hope it will open others' eyes to their beauty and their necessity. (And also the diversity of Belair NP!) Yes, flies can be annoying, but those annoying ones are only the tiniest minority … the rest are … well take a look! They're magnificent!

Acknowledgements

Thanks to **Tony Daley** of **www.tasmanianinsectfieldguide.com** for his passion for flies and his taxonomic expertise. Having someone to definitively identify the flies I found was invaluable and in many ways further stoked my passion for them (and for all insects).

Thanks to **Brett Smith** of Ellura Sanctuary, for his expertise and the extraordinary database he has put together of all critters great and small **www.ellura.info.** Additionally, his personal help and suggestions are always very much appreciated.

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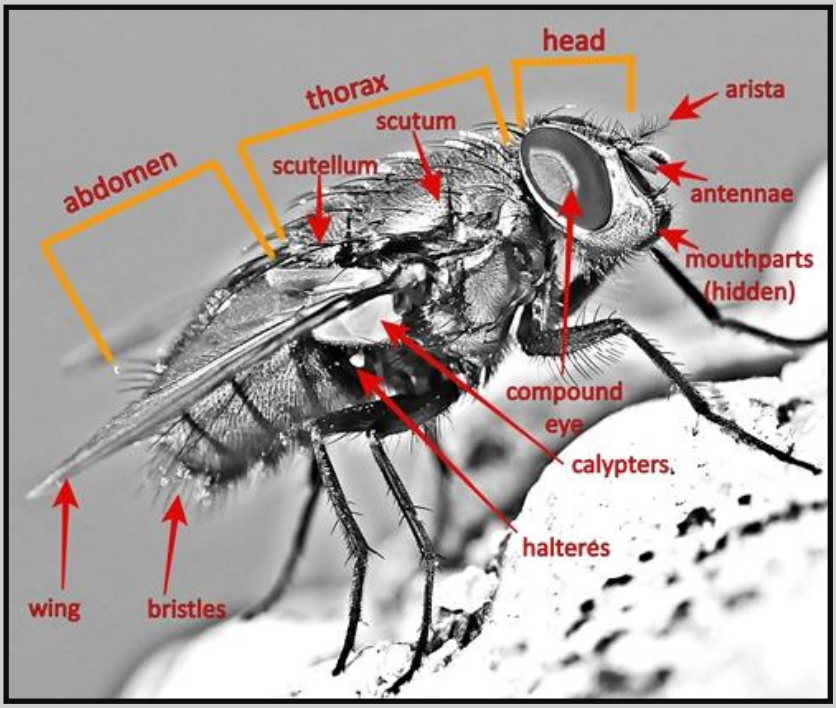
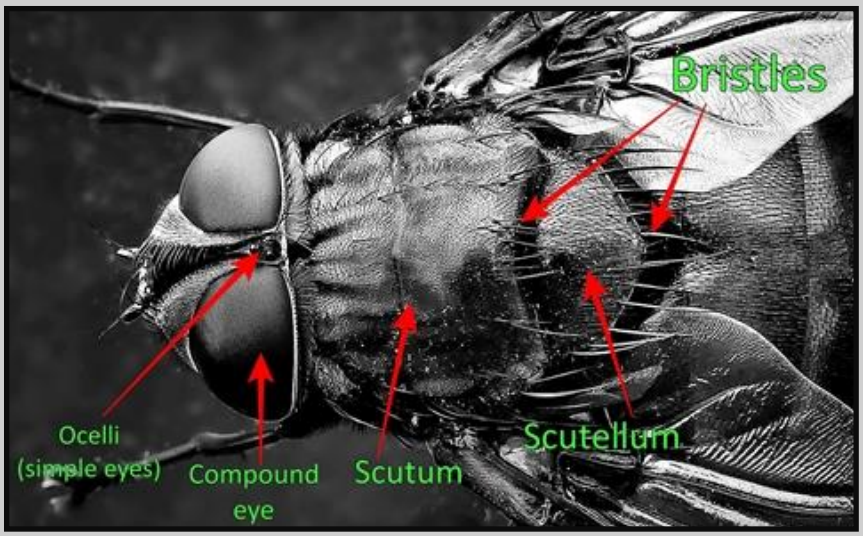
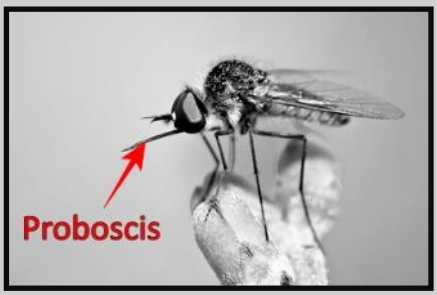
Front cover image: Eurygastropsis tasmaniae, a Tachinid (Bristle) Fly.

Anatomy







Life stages

Although none of these photos are from the same species, and there is immense variation in behaviour between species, they still give a good idea of the life stages of flies.

Adult Flies mating.

Eggs (circled) laid on caterpillar.

Larvae feeding on fungi.

Pupae in remains of carcass.

Fly freshly emerged from its pupa. Wings have yet to develop.

Mosquitoes - Culicidae

Mosquitoes are immediately recognisable by their small head and long needle-like proboscis through which they suck blood from their prey. Their proboscis also distinguishes them from the many other beautiful and useful Nematoceran flies. I have only photographed two Mosquito species in the park. Undoubtedly there are many others.

Left: **Aedes nigrithorax** trying to bite me through my pants as I was sitting near water. Its substantial proboscis can be clearly seen as it tries to penetrate the fabric of my pants. It didn't succeed!

Right: **Aedes notoscriptus** briefly stuck in a spider's web near Playford Lake. A rare sighting for Belair NP.

Phantom Midges - Chaoboridae

I came across the **Phantom Midges** quite by chance. I was walking around Playford Lake one day and wondered what the tiny little bits of white 'fluff' in the air were. Looking through a macro lens I realized they were tiny tiny flies (1-2mm). As I watched I saw that they were everywhere. They are a very important part of the food chain and ecosystem of the lake area, providing food for dragonflies, spiders, fish and many others. These are at the size limit of what I am able to photograph.

Left: **Chaoborus sp.** caught in the web of a tiny spider (see to the left of the photo). Of note are their very plumose antennae. All photos are **Chaoborus sp.**

Gall Midges - Cecidomyiidae

The actual **Olearia Gall Midge, Trigonomyia ananas**, is unlikely to be seen, but its galls, which are protection for its larvae, are fairly common in Belair NP. They always appear on the host plant, Olearia ramulosa. They are spherical in shape with many 'leaves' radiating out.

Non-biting Midges - Chironomidae

Chironomidae are often mistaken for Mosquitoes but it is immediately apparent that they have no biting proboscis. I have found **Chironomidae** everywhere in the park. The males have plumed antennae and some may be green in colour. They are very small and an essential part of the food chain and eco-system. Left: Male **Chironomidae**. Below: **Chironomidae** mating on my car. Right below: **Chironomidae** on **Pterostylis nana** orchid, perhaps as pollinator. Right: A myriad of **Chironomidae** caught in the viscosity of **Elegant Blue Webcap, Cortinarius rotundisporus.**

Dark-winged Fungus Gnats - Sciaridae

I had always wondered about the identity of the tiny flies (1-3mm) that are active in the bush in winter. With a macro lens I was able to see that they are **Dark-winged Fungus Gnats** of which there are many species. I have seen them mating on fungi (right) - presumably to then lay eggs in it - and caught in both spiders' webs and the stickiness of Drosera. Undoubtedly they are essential to the winter food chain.

Lovebugs - Bibionidae

Left: **Bibio imitator.** These flies are given the common name of **Lovebugs** because they're so often found mating. They are however not a bug but a Nematoceran Fly. They are also called **Compost Flies** because they're found near garden compost bins. These photos were taken near Railway Dam.

Crane Flies - Tipuloidea (superfamily)

Above: **Short-palped Crane Fly, Symplecta pilipes.**

Crane Flies may be mistaken for Mosquitoes but they are larger in size, have longer legs, a longer abdomen and have no piercing proboscis. I have only found these irregularly in Belair NP often near water, but also in dry-land bush habitats.

Above: **Long-palped Crane Fly, Leptotarsus humilis,** with close -up view of mouth parts and thorax.

Above: **Discobola australis** has translucent patterns in black and yellow on the wings, very long thin legs, and short clear halteres.

Left: The very beautiful **Orange-striped Crane Fly, Gynoplistia bella,** momentarily holding onto a reed near Playford Lake**.** Note the exquisite antennae.

March Flies - Tabanidae

Tabanidae are the first of the Brachyceran Flies in this publication. Their shape is quite different to the Nematoceran Flies that precede it. March Flies are generally known as a nuisance fly because they can inflict a painful bite on animals and humans. It is only the females that bite, as the blood provides the protein they need to produce eggs.

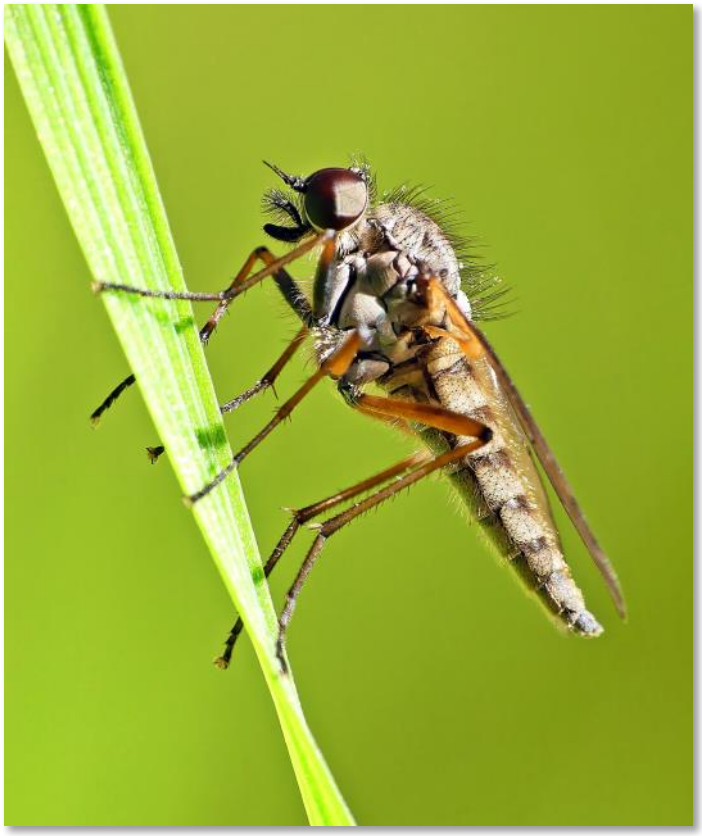
The large **Flower-feeding March Fly, Scaptia auriflua** is one of my favourite insects in the park. Unlike other March Flies it does not bite and feeds solely on nectar. Its colouring and bright green eyes are very striking and beautiful. They seem to be quite solitary. Above: This fly landed briefly on a twig beside me as I was walking and I took a quick photo. Below: Feeding on Leptospermum.

Above: I have only photographed the large biting **Tabanidae** when they have landed on my car in the park. At other times I have simply been avoiding their bite! I have not been able to identify any of these **Tabanidae** to species or even genus.

Snipe Flies - Rhagionidae

Rhagionidae or **Snipe Flies** are a small family of flies related to the **March Flies** (see previous page). Their common name comes from the fact that their prominent proboscis can look a bit like the beak of a snipe (bird). Snipe Flies are medium sized, with slender bodies and stilt-like legs. **Rhagionidae** have piercing mouthparts, with many of this species feeding on blood, whilst others are predatory on other insects.

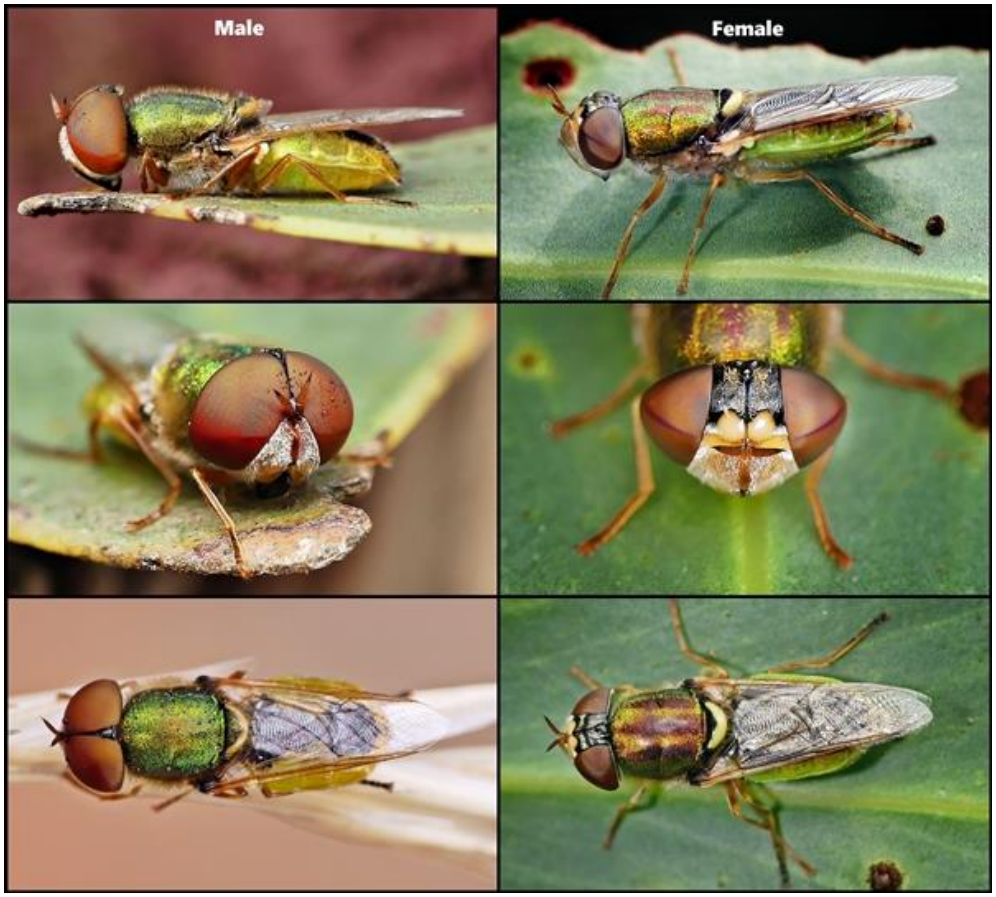
Photos right, below and below right: **Atherimorpha sp.** is a **Snipe Fly** I see fairly frequently. Leaving its back legs dangling in mid-air over the edge of a leaf or flower is characteristic of this species! Apparently this can sometimes be to its detriment … exposing it to the unnecessary risk of being nabbed by a spider lurking underneath!



Left: An unidentified **Snipe Fly** seen on the path in front of me.

Soldier Flies - Stratiomyidae

Soldier flies have a distinctive flattened body and large and often multi-coloured eyes. In my experience they can be quite placid.



Right: A collage comparison of the male and female **Green Soldier Fly, Odontomyia decipiens.** I've only seen these sporadically in Belair NP. Of particular note is the spacing of the eyes. The male has eyes touching and the female has eyes separated. Additionally the eyes are a very different shape and the female has a purple streak in the eyes. Perhaps this is an adaption for finding a male or for mating, but this is only conjecture. Also the colours on the scutum and scutellum between male and female are quite markedly different. A beautiful fly.

Left: A small **Octarthria sp. Solider Fly** with stunning colour bands in its eyes. These lines are a classic adaption in insects with good vision, allowing them to detect a much wider range of colour than with just standard photoreceptors.

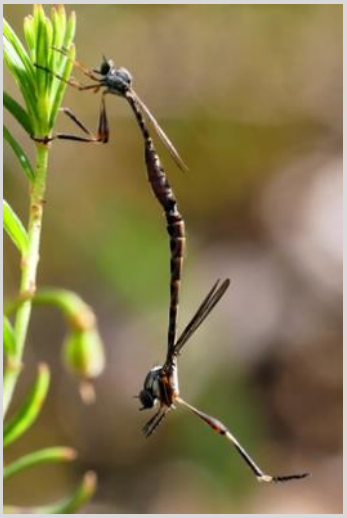
I have found **Chiromyza sp. Soldier Flies** very plentiful everywhere in the park, particularly during April and May. They are quite unspectacular so perhaps easy to dismiss as insignificant or annoying, but undoubtedly they are an important part of the food chain and ecosystem. Right below: A female laying eggs in a grass head.

Above: Distinctive **Soldier Fly** larvae feeding on the fungus **Common Grey Disco, Mollisia cinerea**.

Robber Flies - Asilidae

Robber Flies are very common throughout the park. They are impressive hunters. A number of times I have seen them catching prey on the wing right in front of me, impaling it with their beak-like mouthparts.
Right is a close-up photo of a **Herculean Robber Fly, Neoaratus hercules** that landed on my car right next to me when I was parked in Belair NP. It was a perfect opportunity to photograph this powerful animal and its majestic bearded head. It was perhaps 45mm long. Bottom right on this page is the whole fly.

Smaller Robber Flies



Not all Robber Flies are large. Here are two of the very small and delicate flies, not immediately recognisable as Robber Flies. Above: **Austrosaropogon sp.** with tiny winged prey. Left: **Slender Robberflies, Leptogaster sp.** mating. They are most vulnerable to predation when mating.

Above: **Cerdistus rusticanoides**. Below left: **Colepia rufiventris** caught this Dragonfly in mid-air right in front of me. Below: The very impressive **Herculean Robber Fly, Neoaratus Hercules**.

Stiletto Flies - Therevidae

Stiletto Fly, Taenogerella elizabethae. An elegant and distinctive fly seen both on my car and on an Acacia bush (right).

Anabarhynchus species.

Ectinorhynchus sp,. Stiletto Fly. I saw this fly briefly and even debated whether to take a photo or not. In the end I was pleased that I did. It is an undescribed species within this genus and the sighting was of particular interest to researchers and taxonomists with the Queensland Museum. The photo will be included in research papers.

Agapophytus queenslandi, seen on my car in Belair NP. Apparently it has a much wider distribution in Australia than its name would suggest! Many **Stiletto Flies** are often wasp mimics, in the hope that they will look more ferocious than they actually are.

Bee Flies - Bombyliidae

I love the Bee Flies!

Bombyliidae is a large family. They are often quite fluffy and may be mistaken for a wasp or a bee. They can hover motionlessly, but also move very quickly and abruptly. At times it can be frustrating to get good photos of them! Many Bee Flies such as **Staurostichus sp.** (right) have a very large pointed proboscis for probing deep down into flowers. **Banded Bee Flies** (bottom right) do not have this long thin proboscis.

Genus Geron, Subgenus Plichtamyia. I had been aware of these tiny flies for a few seasons before realising that they were in fact **Bee Flies**!
As with many small flies, it is easy to disregard them as inconsequential, when they are actually vital within the ecosystem, both as pollinators and prey. I have watched as these were actively stalked by an **Australian Green Mantis**! Of note is their very sharp and long proboscis for stabbing deep into flowers, such as **Ixodia achillaeoides** (left).

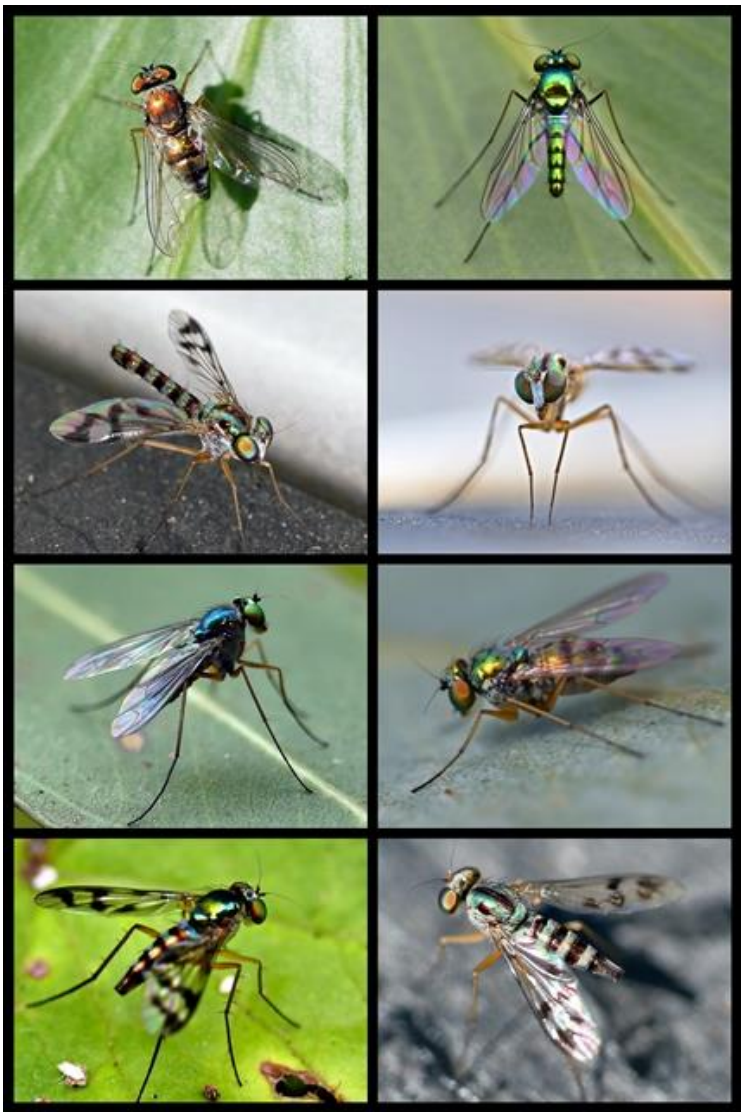
Above: A **Long-winged Bee Fly, Aleucosia sp.**

Left: Two photos of a **Black and Grey Striped Bee Fly, Meomyia sericans**. Its movements are so quick that it is very difficult to get a good photo. Note the distinctive black and grey colouring and its long thin proboscis.

Petite Bee Fly, Zaclava sp. An undescribed species. I knew this was something different when I saw its behaviour but in no way did I think it would be a Bee Fly! Very quick and very small. Note the halteres and bulbous legs. On **Ixodia achillaeoides.**

Banded Bee Fly, Tribe Villini. Note the distinctive banded abdomen and the lack of a long thin proboscis.

Long-legged Flies - Dolichopodidae



Dolichopodidae or Long-legged Flies are small (under 10mm) and often very shiny and metallic. Most have slender bodies and a distinctively elevated stance when at rest. They are very common in Belair NP, often seen sitting on leaves and other foliage, before taking quickly to flight. It is almost impossible to ID these small flies to species so I chose to make a collage (left) hoping to show their incredible variation in colour, shape and wing patterining.

Below: **Heteropsilopus trifasciatus** on my car.

Hydrophorinae, are a subfamily in **Dolichopodidae**. They are found in or near fresh water. I found these small flies in puddles on Lodge Track after a period of prolonged rain. In the mating photo on the left, the female is eating something. I wondered whether the male had brought a 'gift' prior to mating as can be the case with some fly species (see Dance Flies). Of note is their use of the surface tension of the water.

Hover Flies - Syrphidae

Comparison

Left: **Yellow-shouldered Stout Hoverfly, Simosyrphus grandicornis** clearly showing the distinctive yellow 'shoulders' on the thorax. On Thysanotus patersonii.

Right: **Common Halfband, Melangyna viridiceps**, can initially look similar to the Yellow-shouldered Stout Hoverfly, but has a wholly black thorax. On Xanthorrhoea semiplana.

Below: A **Yellow-shouldered Stout Hoverfly, Simosyrphus grandicornis** showing its characteristic 'hovering' behaviour as it approaches a Brunonia australis flower. **Syrphidae** are important pollinators and are very active around all flowers in the park. I find them delightful to watch.

Above: An **Inflated Hoverfly, Cyphipelta rufocyanea** on Leptospermum sp. The reason for the distinctive 'inflated' bits is unknown. A rare sighting.

Left: A small dark Hoverfly, **Psilota sp.**

Comparison

Left and above: **Native Drone Fly , Eristalinus punctulatus**, with its striking spotted eyes.

★ Above: **Common Drone Fly, Eristalis tenax,** is an introduced species seen here in the Old Government House gardens.

Shore Flies - Ephydridae

Left: **Water Floating Fly, Brachydeutera sydneyensis**.
Although these are called Shore Flies they are not necessarily restricted to coastlines. I saw many of these tiny flies in seasonal wet sludge by the side of the road. Specialised hairs on their feet allow them to 'walk' on water.

Fruit Flies - Tephritidae

Unfortunately Fruit Flies have a bad name, but as is so often the case, it is only a tiny handful of this family that pose problems as pest species. The vast majority are exquisite little flies with beautifully patterned wings and a vital place within the ecosystem. The first time I spotted a tiny fly with what appeared to be black suns on its wings I was smitten. I went in search of more and have so far seen seven species, always on flowers. Undoubtedly there are more in the park and I will continue looking for them. Names of the flies are included on the collage.

Signal Flies - Platystomatidae

Rivellia sp. (below) showing the characteristic wing movements that give Signal Flies their name. Signal Flies are often in constant motion 'signaling' with their wings and moving around in elaborate mating rituals.

Euprosopia sp. I have seen these beautifully patterned flies in great numbers walking around and posturing on the trunks of Eucalypt trees.

Lenophila achilles has a very striking yellow 'nose' and distinctive patterning on its wings. Seen on Xanthorrhoea semiplana.

Lauxaniid Flies - Lauxaniidae

Lauxaniidae are difficult to describe, except for the fact that they are small (2 - 7mm) and sometimes orange-ish. Many are quite beautiful when seen close-up. Some of my sightings in Belair NP have been on my car, simply because they are easy to see on a blank background.

Homoneura binotata

Sapromyza brunneovittata, male and female.

Meiosimyza sp.

Meiosimyza appula

Flat-footed Flies - Platypezidae

Lindneromyia sp.
A very small fly that moves in rapid angles over a surface. Left is the lighter-coloured female with separated eyes. Below is the darker male with eyes touching. This difference in the eyes between male and female occurs in many species of fly, but not all. (See also my photos of Odontomyia decipiens under Soldier Flies).

Cheese Skipper Flies - Piophilidae

Piophilosoma antipodum. I found a myriad of these small flies on a kangaroo carcass. The **Piophilidae** family as a whole are scavengers of animal waste, carrion and fungi. Interestingly these are the flies that are used in forensic entymology and medicocriminal investigations, often being able to suggest the time of death. Additionally, their ecological value in decomposition cannot be underestimated, as it underlies much of the web of life. Without them we would be waist-high in dead things.

Humpbacked Flies - Phoridae

The aptly-named **Humpbacked Fly, Family Phoridae**, on my car in Belair NP. I find it fascinating to come back to my car after a walk and see what is on it. On bark, trees, or on the ground these tiny flies would be invisible. There were quite a number of these flies, perhaps 2mm in length and they seemed to prefer running along rather than taking flight.

Dance Flies - Empididae

My first encounters with **Dance Flies** were quite fleeting, simply because they are so very small and quick.

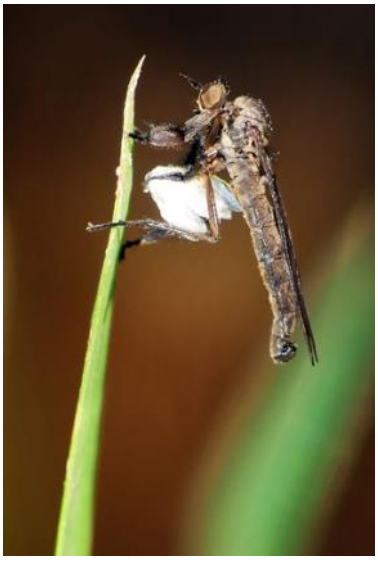
I saw the very small (2mm) **Dance Fly** (top left) on an Acacia pycnantha leaf one day while looking at Psyllids. I researched it a little, and read that these flies are mostly predatory with piercing mouthparts. Shortly after, I saw the tiny fly (bottom right) with an even tinier Fungus Gnat as prey and knew it must be a Dance Fly. Both are **Dance Flies, Tribe Chelipodini**.

Waterbuzz Danceflies, Hilarempis sp.

I saw many of these small flies skimming rapidly over the surface of a winter creek. I was intrigued by their behaviour so sat on a log and watched them. I later did some research.

The males (left) have an enlarged basitarsi on their front legs which has silk producing glands. They use this silk to wrap 'nuptial' gifts (typically small prey, other objects or sometimes just silk) for a potential interested female (two females see right).

Below are males carrying their silk-wrapped gift and below right is a meeting between male and female at the water's edge, and the exchange of the gift. This happened very rapidly and with much commotion.



Heleomyzid Flies - Heleomyzidae

Fungus Fly, Tapeigaster cinctipes (three photos above and right)**.** This is one of my favourite interactions with a fly. I was actually trying to take a photo of the mushroom it was sitting on, but the little fly just wouldn't budge regardless of my activities. Flies are usually very flighty so I wondered why this one was not. When I got home I did some research. Apparently the male claims a mushroom as its territory and then sits and protects it. It waits for a female to mate with and the eggs are then laid in his mushroom on which the larvae then feed. He will stand up to any males (or photographers apparently) who wish to claim his mushroom. Beautiful markings.

Pentachaeta sp. I have found these tiny flies en masse on entrails and dung. Their larvae feed on animal waste, carrion and fungi..

Tapeigaster nigricornis is the most common Tapeigaster species I see. As with its family member showcased above it is associated with fungi and is approx. 6mm in body length.

House Flies and Allies - Muscidae

Muscidae have the common name of **House Flies** because some are synanthropic - they live near humans and benefit from our changes to the environment. We tend to see them as pests because they live in such close proximity to us and feed on 'waste', even though this activity is vital to keeping ecosystems healthy. Although this minority can transmit bacteria and disease from rubbish and faeces, the majority of Muscidae go about their business far removed from our lives.

Muscidae, along with the families of flies that follow are all 'Calyptrate' flies and are what most people think of when the word 'fly' is used. All the previous families do not have calypters and are called Acalyptrate Flies. See photo below of Helina sp. with red arrow pointing to the calypters, the two membranous lobes hidden below the wings. They are over the halteres (balancing organs) which are also at the base of the wings but shaped like small clubs. All flies have halteres.

Helina sp. is a very large genus of Muscid Fly, with around 40 Australian species. Photos show Muscids caught in Hound's Tongue (right) and also by a Long Green Crab spider (left below). Red arrow shows location of the **calypters.**

Tribe Muscini.

Black Dump Fly, Hydrotaea sp.

Black Carrion Fly, Australophyra rostrata seen on a Kangaroo carcass.

Helinomydaea flavofusca.

Pygophora apicalis.

Blow Flies - Calliphoridae

Although the **Calliphoridae** are known for eating meat from carrion and open wounds, the majority are actually parasites of other invertabrates. Their common name derives from the fact that we speak of livestock or meat being "fly-blown". As with the **Piophilidae** they are used by forensic investigators to ascertain a 'time of death'. Many are metallic green or blue in colour, hence the names **Greenbottle** or **Bluebottle.**

Bluebottle Fly, Genus Calliphora.

Left: **Genus Amenia**. Not a great photo but I was so pleased to see this beautiful spotted fly. I only had a moment to take a photo before it flew off.

Right: **Calliphora dubia**. Also not a great photo, but a fly I see reasonably often, but have had great difficulty photographing. Distinctive yellow, blue and white abdomen.

Greenbottle Fly, Genus Lucilia.

Flesh Flies - Sarcophagidae

Sarcophagidae have similar habits to Calliphoridae. Left: **Common Flesh Fly, Genus Sarcophaga.** Flesh Flies are generally grey, although can be pale yellow as is the case here. They have three distinctive stripes along their thorax.

Fly pupae in the stomach remains of a decomposed Kangaroo carcass. These are most probably from carrion flies (ie. Flesh or Blow Flies).

Bristle Flies - Tachinidae

The **Tachinidae** are a very large group of Flies that I frequently see in Belair NP. They play an enormous role in the environment as parasites of plant-eating insects. Eggs are laid mostly on caterpillars but also other bugs. Their larvae (maggots) bury themselves inside the host, eventually killing it. When ready to pupate it will move into the soil, although some will remain and pupate in the host. Most Tachinids have prominent bristles on their rear end, but also on their thorax.

Above: A nail-biting encounter! **Exoristinae sp.** actively stalking a **Painted Apple Moth** caterpillar to lay eggs/parasitise it. I came upon this fascinating interaction by the side of the path. Very slowly and methodically the fly tried to determine its best angle of attack through the caterpillar's spines/setae. The fly's abdomen then curved under and the ovipositor slowly and carefully moved forward to lay an egg. The fly was utterly intent on its task, seemingly ignoring my presence.

Right**: Trigonospila sp.** I've seen these fairly frequently in recent seasons.

Left: **Rutilia sp.** A beautiful large fly seen on my car.

Right: **Black and White Giant Fly, Formosia speciosa.** Such an exciting encounter with a large fly. It was freshly emerged from its puparium, which had most probably been in the ground. The wings are still undeveloped. In the third photo the remains of the ptilinum can be seen (circled) as it starts to collapse. This is a special structure used by Schizopheran Flies to escape the puparium. In the first photo (which was taken later) the ptilinum has disappeared. The fly itself was slowly making its way up the tree, eventually to disappear from sight. Another fly of the same species was continually flying around, well aware of this one's presence.

Above: **Eurygastropsis tasmaniae.** A distinctive and placid fly with a white bottom. Despite the species name, it is widespread on the mainland, though easily missed because it's not a fly that annoys us humans!

Above: **Senostoma sp.** Seen quite frequently in Belair NP mostly walking around on tree

Above: **Rutiliini** (tribe). A very large and colourful fly seen only briefly before it

Chlorotachina (genus)

Microrutilia (subgenus) on Bursaria spinosa. Proboscis visible.

Macrochloria sp. An interesting fly quite similar to both Eurygastropsis and also Calliphoridae. Confirmed by its wing venation to be a relatively rare Tachinid.

Golden Tachinid Fly, Microtropesa sinuata. A large fat Tachinid and a firm favourite of mine. Their buzz as they fly is quite audible and unique; I often hear them before I see them. It has large reddish eyes on a golden-coloured head and many bright white markings on its abdomen and thorax. A beautiful fly.