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Celebrating a new century of wildlife preservation in Australia

Journal of the Wildlife Preservation Society of Australia Limited

(Founded 1909)

Photos by Jessie Panazzolo



Silvereye



Purple-gaped honeyeater



Spotted dove



Noisy miner

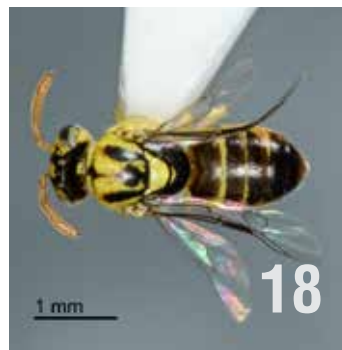


Rainbow lorikeet

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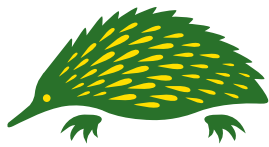


On the cover:

Lucky Bay, Cape Le Grand National Park, Western Australia. In the past year alone, Australia welcomed around 8.8 million international visitors who contributed \$41.3 billion in spend. Of these visitors, approximately 5.5 million (about 68 percent of international visitors) participated in some form of nature-based activity when they were in Australia. Tourism Australia says they are actively involved in promoting the experiences that appeal to international visitors such as Australia's world-class natural beauty, but this does not extend to the protection and conservation of these areas as the responsibility of the sites are with the various state and territory and federal government agencies that have responsibility for the natural environment.

The core principles of Ecotourism – apart from a nature-based focus – are: minimising environmental impacts, providing benefits to local communities and (financially) supporting conservation projects and protected areas.

Tourism Australia advised that Australia's world-class natural beauty is one of the key motivating reasons why international visitors choose Australia over other destinations after 'Safety & Security' and 'Value for Money'.



Australian Wildlife Society

Conserving Australia's Wildlife since 1909

Australian Wildlife

is the official journal of the Australian Wildlife Society (Wildlife Preservation Society of Australia Limited).

Founded in 1909, the Society is dedicated to the conservation of our unique Australian wildlife in all its forms.

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Notice to our members

The Australian Wildlife Society (Wildlife Preservation Society of Australia Limited) is managed and controlled by an elected board of ten volunteer directors. The Society is a registered company limited by guarantee with ASIC and is responsible for complying with all its regulations.

Any member who might like to consider serving as a director of the Society is invited to contact the national office for more details. The most important qualification to serving as a director is 'a commitment to and love of Australian wildlife'.

The Society holds regular monthly meetings on the first Wednesday of each month in Sydney.

The Editor would like to feature a member's profile in the fortnightly email newsletter and occasionally in our quarterly magazine. Members are invited to consider submitting a short article with a photograph for possible publication.

Our Mission

The Australian Wildlife Society (Wildlife Preservation Society of Australia Limited) is an independent, voluntary, non-profit conservation organisation, formed in 1909, and is committed to the preservation of Australia's precious flora and fauna. We act as a watchdog and provide advice to government agencies and institutions regarding environmental and conservation issues concerning all aspects of wildlife preservation. Our mission is to conserve Australia's fauna and flora through education and involvement of the community. We are dedicated to the conservation of our unique Australian wildlife in all its forms through national environmental education programs, political lobbying, advocacy and hands on conservation work.

Our Society has always known that a conservation battle is never really won until the victory is enshrined in legislation. We have always tried to convince politicians of the necessity to include the preservation of Australia's precious wildlife and its vital conservation habitat in all their planning and environmental issues and discussions.

Articles and comments expressed in this magazine do not necessarily reflect the opinions of the Editor, Society or members. Articles contributed from outside sources are included for the reading enjoyment of members and to encourage discussion on different points of view.

Articles may be copied or quoted with appropriate attribution.

From the President's desk

Suzanne Medway AM - President



Did you know that there are over 30 million different species of insects on the planet, and they are just the ones that have been identified so far?

It is also estimated that insects make up the most abundant biomass on earth and, at any point in time, at least ten quintillion insects are buzzing and crawling around the planet. Now, that's enough insects to bug anyone, but which insects bug you the most?

Do you think that insects are nothing more than a nuisance? Would you like the world to be free of these annoying pests? Do you spray them, swat them, or step on them at every opportunity?

Before declaring war on every bug that crosses your path, why not try to learn something about their world? After all, with a population that outnumbers humans by about 200 million to 1, you can be sure that insects are here to stay!

On page 11 of this magazine is an article on some of our most annoying insects and why they are a vital part of this planet's ecology.

Nature-based tourism

I love travelling and wherever possible try to learn as much about the native wildlife of the country we are visiting. I always hope to be lucky enough to spot some species in their native habitat.

Wildlife-based tourism is growing rapidly worldwide as the number of tourists continues to grow and we, as travellers, seek out new and more enriching personal experiences with local cultures and wildlife.

The UN World Tourism Organisation estimates that 7 percent of world tourism relates to wildlife tourism, growing annually at about 3 percent, and much higher in some places, such as UNESCO World Heritage sites. A recent report shows that 93 percent of all natural heritage sites support

recreation and tourism and 91 percent of them provide jobs.

With its vast and varied landscapes, unique wildlife and white-sandy beaches, Australia is one of the most interesting continents in the world. From tropical islands to crocodiles, sharks, and kangaroos, Australia is travel heaven!

Two out of three international visitors to Australia enjoy our aquatic or coastal environments in some way – from scuba diving to simply going to the beach and splashing about in the surf.

Nature-based tourism forms a significant component of Australia's visitor economy, ranking as one of the key motivating factors for international visitors to visit our country. Australia's combination of a pristine natural environment inhabited by unique wildlife has always been a key feature of Australia's tourism story and will continue to play a significant role. Whether it's soaking

up the remarkable scenery or engaging with our unique nature and wildlife up close, visitors to Australia actively seek out our natural attractions and participate in a variety of nature-based activities.

Tourism is a major component of the Australian economy. Tourism Australia published an International Tourism Snapshot as at 30 September 2017. Australia welcomed 8.7 million international visitors as at the year ending September 2017. These visitors injected \$41.2 billion into the Australian economy. Total international visitor spending in 2017 was \$41.2 billion. The Australian Government estimates that by 2020, the Australian tourism industry should be worth up to \$140 billion in expenditure. This growth will mainly be due to key emerging markets, including the China market, which is estimated to be the most significant economic contributor to the Australian tourism industry by 2020.



Stokes Bay, Kangaroo Island. Photo: Tourism Australia

There is one young lady who is doing something about the impact tourism has on native wildlife. On page 21 of this magazine, learn about Jessie and what one person can do to encourage positive and sustainable practices and to aid the conservation of local species and communities. Jess believes we can discontinue supporting ventures which supports the mistreatment of animals or environmental and community degradation. Upon realising this, Jess' conservation initiative 'Heroic Tourism' was born.

Koalas and the Society

The first meeting of the Wildlife Life Preservation Society of Australia Inc. (now named Australian Wildlife Society) was held at the offices of the Royal Swedish Consulate on 11 May, 1909. The koalas' protection had been one of the primary reasons for the formation of the Society in 1909. It is of interest to note two of the matters which occupied attention at this first meeting. One was the necessity for protecting the rapidly disappearing koala, and the other was a complaint as to the use of potassium cyanide for killing marsupials.

And now over 100 years later, our Society is again raising awareness on the plight of koalas.

We were very excited to learn that there is a remnant population of koalas living on the outskirts of Sydney in the south-west. In April 2016 the local council commissioned a pilot study of koalas throughout Appin and Wilton. Fifty-eight sites were surveyed by two wildlife ecologists, and eight koalas were found in a week. A koala was found in every 15 hectares of habitat surveyed, which indicates that there could be more than 2,500 koalas in habitats across the Wollondilly Shire.

The result of this report was the foundation for the development of the Wollondilly Koala Conservation Project, which is a working partnership between Wollondilly Shire Council, NSW Office of Environment and Heritage (OEH), University of Sydney's Koala Health Hub, Conservation Volunteers Australia and Wollondilly WIRES.

As part of the project, the partnership has been monitoring koala roadkill with several hotspots identified. This data has been provided to the Roads

and Maritime Services and funding has been announced for protective wildlife fencing.

The project has identified that there is a healthy, expanding population of koalas in the region. The koalas north of Picton Rd from Wilton through Appin to Campbelltown form the largest disease-free population in New South Wales. Connected healthy corridors with safe road crossings are critical to the survival of this population for generations to come.

Wollondilly Council is requesting a halt to any further progress of the Wilton and Greater Macarthur growth areas until a comprehensive koala plan of management is put in place for South Western Sydney to protect New South Wales' largest disease-free koala population and their habitat that link the Georges, Nepean, Cataract and Bargo Rivers.

The Australian Wildlife Society is holding its annual ball on Saturday 7 July in the south-west region of Sydney and has adopted the theme of the plight of koalas in the Wollondilly Shire.



A dragonfly found in Frank Smith Park in Coromandel Valley, South Australia. Photo: Brendon Carrick

Into the chipper

Brendon Carrick

As we know – and as has become all too clear to us – our actions, behaviours and overall existence is a threat to the biodiversity, survival and wellbeing of wildlife on this planet.

In fact, just this year, scientists predict that nearly 60,000 species worldwide have already gone extinct. That's an average of 150–200 species of plant, insect, bird and mammal becoming extinct every 24 hours. Although extinction is a normal and fundamental part of life, human influence has now sped up this process 1,000 - 10,000 times what this rate was previously. Unfortunately, here in Australia, the rates are even worse than that of the global average.

Australia's extinction rate is higher than that of any other country. Thirty native mammals have become extinct since the settlement of the Europeans. In a global context, one out of three mammal extinctions in the last 400 years have occurred in Australia. Birds are also in danger, with 29 species going extinct since settlement and over 100 becoming endangered. Reptiles, amphibians, insects, spiders and other invertebrate species are also disappearing at alarming rates.

Something significant needs to happen, and it needs to happen now if we wish our grandkids to be able to see the world as we see it, and not one devoid of animal and plant life. Although an abstract concept, if this trend continues, we and the wildlife on this planet will all become extinct. Let us rejoice in the time we have left with these creatures and look into some of their stories.

This beautiful little fella (identified as a male by his Hemipenial bulges), along with his countless relatives, were at the risk of being thrown into an industrial wood chipper last week. Sadly, many more met their fate that day and will continue to. I currently work for a company that specialises in landscaping, gardening, public-space cleaning, weeding and tree clearing. For a nature lover like myself, I find working outdoors in the bush around wildlife

extremely enjoyable. However, there are times at work that make me rather disheartened and concerned. Last week I was assigned to clear a dead eucalypt from a public bike track. When we arrived, we began bringing branches and previously cut tree trunks over to the chipper. Because I'm extremely curious and have always been one to pull back the dead bark from a tree, I did so instinctively before chucking the first log into the chipper. When I did, a host of small creatures scurried away; beetles, centipedes, a jumping spider and two large geckos (like the one seen here). Shocked, I quickly removed all the animals I could and transferred them to a safe location. Genuinely rattled by the prospect of grinding up wildlife, the rest of my day consisted of scanning over each branch, trunk and every piece of bark I could rip off, to ensure no creatures would be turned into garden mulch – even going as far as to stop my co-worker before he threw a huge log into the chipper. At the end of the day my tally of macro-sized creatures included two adult female huntsman spiders, countless Salticidae spiders, a trapdoor spider, a slater eater, native

cockroaches, beetles, centipedes, and up to 20 geckos. I felt a bit down, knowing how all those creatures could have met their fate, but equally happy with the fact that I'd saved a bunch of them to pass on their genes and continue creating offspring.

The species seen here could be one of three. It's either a marbled gecko (*Christinus marmoratus*), a variegated dtella (*Gehyra variegata*) or an eastern tree dtella (*Gehyra versicolor*). These three species are extremely variable in colour and patterning and are often unable to be differentiated from one another based on appearance alone. The University of Adelaide published a paper in the journal *Molecular Phylogenetics and Evolution* in 2013 which concluded that these geckos (the latter two of the three) are two distinct types, as they were originally thought to be a single species. The two are, however, so genetically distinct, that visual analysis of their chromosomes alone is enough to reveal which species is which. All three geckos are known to inhabit Queensland, the Northern Territory, New South Wales, Victoria and South Australia, where I found this guy.





This ferocious, fearsome and frightening-looking beast is known as the red-headed mouse spider (*Missulena occatoria*). Imagine walking through the bush minding your own business and having this fella spring out in front of you bearing those massive fangs and striking red head.

This was a reality for my friend Kat, who found him during a group rubbish clean-up in Watiparinga Gorge. Our spider friend was noticeably displeased with all the unwanted attention he was receiving, arching up and exposing his fangs as if to tell us he wasn't messing around. Male spiders of this species, however, are less harmful than their female counterparts, who are known to produce abundant amounts of an extremely toxic venom – potentially rivalling that of the deadly funnel-web spider. Despite this, only a small number of cases of serious envenomation have been reported. Female spiders are also much larger than the males with a very high level of sexual dimorphism exhibited. Females are also all black as opposed to varying colours in males. It was thought initially that the two sexes were a different species until they were seen many years later, mating together. The species seen here is found throughout South Australia, ranging

from bushland to desert shrublands, and is the most widely dispersed *Missulena* species as the spiderlings are wind dispersed. Currently it's thought that of 17 species existing within the genus *Missulena*, all but one are native to Australia. They usually prey on insects and other spiders but have also been known to eat vertebrates such as small snakes, lizards and frogs. They also have their own predators: centipedes, scorpions, parasitic wasps and bandicoots. You might be curious as to why they're called 'mouse' spiders. Well, it's not clear, but as well as being alleged eaters of mice and resembling mice in size, it's thought that in lieu of digging their own burrows, they'll chase mice out of burrows to save the time and effort. I know I wouldn't stay and fight this guy or his massive girlfriend if I was a little mouse!

Many species cohabit within the same niche. This means they share the same food, space and nesting sites. Even species known to predate on each other – such as this huntsman and jumping spider – can be found living harmoniously in the right conditions. These two were both taking refuge under a piece of eucalypt bark in Laratinga Wetlands, Mount Barker.



The *Servaea incana* jumping spider takes advantage of the loose bark, not only for protection from predators and the harsh elements but as a nursery for its young. When her offspring emerge from their eggs, they too inhabit the same tree as their ancestors, as will their descendants for generations to come. Like the jumping spider, the huntsman will also utilise the bark, in a way that ensures its colours have not gone to waste. By camouflaging into his surroundings, it becomes a fierce hunter. Coupled with its flat body and very quick demeanour, the huntsman is the epitome of the perfect predator.



This is 'Seven', the seven-legged huntsman. My girlfriend, Kelly, found her on a tree in our backyard. At this time, we had recently found a male of what looked to be of the same species and made a nice terrarium for him. We'd been feeding him earwigs, flies, roaches and slaters and he was living the life of a happy bachelor. We called him Gonzales because he was speedy and didn't hesitate to pounce when there was food to be eaten. We decided to let Seven and Gonzales meet, but this blind date was less than ideal for these lovebirds. We awoke the following morning to find Gonzales no longer with us, rolled up into a tidy little ball. Seven was looking plump and proud of herself and what can only be assumed to be full of our old friend, Gonzales. We let her free, back out into the wild (our backyard) and come out five minutes later to discover she was on her second course – a sweet dessert of European honey bee.



This rather large spider is an Australian golden orb weaver (*Nephila edulis*). This species belongs to the Araneidae family and has a remarkably charming attribute. To attract flies and other insects into her reach, she incorporates the smelly and decaying remains of her past prey items into her web. Once a prey item has been entangled, subdued and killed by the spider, it becomes the same thing that it was attracted to in the first place – an odorous corpse whose purpose it is to seduce other insects to their death. What may be a dark concept to us is just everyday life for the golden orb weaver. Because of the leftovers in the web, smaller species of spider will also inhabit it. Known as kleptoparasites, these spiders have no adverse effects on the golden orb and are only there to eat what's left over. What's even more shocking is that due to the very strong silk fibres of their web, the golden orb weaver spiders are sometime able to catch small snakes, other reptiles and even small birds and bats. Species in the genus *Nephila* sure have an appetite, as do the indigenous people of New Guinea, who will regularly eat these large spiders after roasting them over a

fire. The species name *edulis* literally translates to 'edible'. The sheer size and visibility of these spiders makes the fact they were the second Australian spider to be documented by a European naturalist more reasonable. Like the red-headed mouse spider, this species shows sexual dimorphism, the males of this species being almost invisibly small in comparison to the females. It's for this reason that the male must play it smart when attempting to mate, having to wait for the female to be eating and distracted in order not to be eaten himself. In fact, the courtship between males and females of this species is almost exclusively initiated by an insect being trapped in the web. Talk about a strange aphrodisiac! After mating and pregnancy are over, the female will lay an egg sack with, on average, 383 spiderlings inside. The female only has to mate once to produce multiple fertilised egg sacks throughout her lifetime.

This genus has been around for a long time, with the largest spider fossil ever found thought to be a member, excavated in China in 2011, dating back to 165 million years ago. The scientists who discovered her named the species *Nephila jurassica*.



With the common theme of large females and tiny males throughout this article, male readers might rejoice in the fact that the males of this species are the bigger ones. This is known as the bronze hopper (or the bronze Aussie hopper, if you want to get all patriotic about it). Formally referred to as *Helpis minitabunda*, it is an exceptionally rare case in the world of spiders, where the females are usually the larger ones. Maybe this is because in this species the males protect the nest during and after the female lays her eggs. For reproduction to happen in the Salticidae world, the males must impress the females with their often very complex and elaborate visual displays. Not only are the males often the glamorous ones of the two (in this species the male possesses a set of elongated front legs and vibrant head colours), but they must also seduce the females with their sexy moves. They create vibrations, zigzagging dances and move their limbs about in an orchestrated, often seemingly choreographed fashion. The males of this species are of no match, looks-wise, to the peacock jumping spiders found in Western Australia. Their visual beauty and large range of colours and complex courtship behaviours have led scientists and entomologists to believe that jumping spiders have colour vision and eyesight comparable to our own.

This dragonfly is known as the Australian duskhawker (*Austrogynacantha heterogena*). He was found in the Mount Lofty Botanical Gardens and demonstrated the fact that dragonflies are very territorial. This is an attribute which makes a photographer's job that much easier, as they will often land in the same place again and again. The male dragonflies are territorial because the females prefer a male who offers territory that will ensure the survival and safe maturation of her offspring. Things that make for a good piece of dragonfly real estate include clean, open water, certain types of aquatic plants and areas that get direct sunlight. This is because dragonflies, like all insects, are cold-blooded and require warmth from sunlight before they can become active. Once the baby dragonflies (nymphs) have hatched, some species can remain in the water for over a year, using gills to breathe and feeding on other aquatic invertebrates, small fish and even tadpoles. After emerging from the water, they exist for another month, spending most of the time looking for a mate. When a male dragonfly possesses a space that another male desires, it is not a fight to the death but an aerodynamic, nimble and non-physical altercation where the fastest and fittest individual will come out supreme.



This beautiful common huntsman lady was found, like a few of the other creatures seen here in Watiparinga gorge, in Adelaide. She was resting on a piece of eucalypt bark looking as though she'd been combined with a kiwi fruit. Because the number of species native to Australia is vast, often it can be quite difficult to pinpoint the exact species, due to the lack of accurate documentation of these spiders. Huntsmen have relatively long lifespans in comparison to other spiders, with some living for over two years. During this time, they can have multiple sets of offspring – often up to 200 spiderlings at a time. Male spiders of the species *Heteropoda venatoria* have recently been discovered to make a sound when they become aware of a female's pheromones. These sounds are called 'stridulations' and are the act of creating sound by rubbing together certain body parts. Among spiders of the genus *Isopoda*, the courtship is very long and involves the male drumming his palps on the tree trunk as a way of seducing the female. The more complicated and rhythmically



satisfying it is to the female, the higher the likelihood of copulation. Even if she is uninterested, huntsman males are very rarely attacked by the females, which happens to be a very common behaviour seen in spiders. In fact, some species of huntsman live in large colonies.

With every one of these creature's populations declining since the colonisation of Australia, I will leave you with a quote from Jane Goodall: "Only if we understand can we care. Only if we care will we help. Only if we help shall all be saved."



Blowfly

Annoying insects?

Suzanne Medway

I detest household bugs. Loathe them. There isn't a word strong enough to describe how I feel about bugs in my home. That hatred provokes guilt because I fancy myself an environmentalist. As such, I'm supposed to feel a kinship with all creatures.

Many insects are considered to be pests by humans. However, insects are also very important for numerous reasons. A brief look at just a few of the reasons these amazing creatures are essential to life on Earth might well convince you (and me) that insects deserve our respect.

Ecological Importance

Insects can be found in every environment on Earth. While a select few insects live in the harsh Arctic

climate, the majority of insects are located in the warm and moist tropics. Insects have adapted to a broad range of habitats, successfully finding their niche, because they will eat almost any substance that has nutritional value.

Insects are crucial components of many ecosystems, where they perform many important functions. They aerate the soil, pollinate blossoms, and control insect and plant pests. Many insects, especially beetles, are scavengers, feeding on dead animals and fallen trees, thereby recycling nutrients back into the soil. As decomposers, insects help create topsoil, the nutrient rich layer of soil that helps plants grow. Burrowing bugs, such as ants and beetles, dig tunnels that provide channels for water, benefiting plants. Bees, wasps, butterflies and ants pollinate flowering

plants. Gardeners love the big-eyed bug and praying mantis because they control the size of certain insect populations, such as aphids and caterpillars, which feed on new plant growth. Finally, all insects fertilise the soil with the nutrients from their droppings.

Economic Importance

Insects have tremendous economic importance. Some insects produce useful substances, such as honey, wax, lacquer, and silk. Humans have raised honeybees for thousands of years for honey. The silkworm significantly affected human history. When the Chinese used worms to develop silk, the silk trade connected China to the rest of the world. Adult insects, such as crickets, as well as insect larvae, are also commonly used as fishing bait.

Insects as Food

Insects, of course, are sometimes eaten by people, but they are the sole food source for many amphibians, reptiles, birds and mammals, making their roles in food chains and food webs extremely important. It is possible that food webs could collapse if insect populations decline.

In some parts of the world, insects are used for food by humans. Insects are a rich source of protein, vitamins and minerals, and are prized as delicacies in many Third-World countries. In fact, it is difficult to find an insect that is not eaten in one form or another by people. Among the most popular are cicadas, locusts, mantises, grubs, caterpillars, crickets, ants, and wasps. Many people support this idea to provide a source of protein in human nutrition. From South America to Japan, people eat roasted insects, such as grasshoppers or beetles.

Insects in medicine

Insects have also been used in medicine. In the past, fly larvae (maggots) were used to treat wounds to prevent or stop gangrene. Infection of dead flesh causes gangrene. Maggots only eat dead flesh, so when they are placed on the dead flesh of humans, they clean the wound and can prevent infection. Some hospitals still use this type of treatment.

Masters of flight, marvels of sight

Many insects are masters of flight. Consider some examples. Mosquitoes can fly upside down. Some can even fly through the rain without getting wet – yes, actually dodging the raindrops! Some tropical wasps and bees buzz around at speeds of up to 72 km per hour. One monarch butterfly of North America logged 3,010 km on its migration flight. Hoverflies can beat their wings more than a thousand times per second – much faster than hummingbirds. Dragonflies can fly backwards, a fact that has stimulated the curiosity – and close study – of researchers.

If you have ever tried to swat a fly, you know that these insects have exceptionally keen eyesight, which is coupled with a reflex that is ten times quicker than ours. Interestingly, the fly has a compound eye, containing thousands of six-sided lenses, each of which works independently. Likely, then, the fly's view is broken up into

tiny bits.

Some insects can perceive ultraviolet light, which is invisible to humans. Thus, what looks to us like a dull white butterfly is anything but dull to the male butterfly. Indeed, when seen in ultraviolet light, the female has attractive patterns that are ideal for grabbing the attention of courting males and also helps them see some patterns on flowers invisible to the human eye.

The eyes of many insects serve as a compass. Bees and wasps, for instance, can detect the plane of polarised light, enabling them to locate the sun's position in the sky – even when clouds hide it. Thanks to this ability, these insects can forage far from their nests and still find their way home unerringly.

On the other hand, there are also some insect species that are incredibly annoying, destroying our food, causing painful stings, transmitting diseases, or making unbearable noises.

Mosquitoes



Mosquito

Mosquitoes seem to serve no purpose other than to annoy us. But from the mosquitoes' point of view, their purpose is to make more mosquitoes.

But does the world need mosquitoes?

For birds, fishes, frogs and other animals that eat them, their purpose is to provide a source of food.

Even the most avid insect-lover will slap a mosquito without thinking twice. Sure, they all have a place in the bigger scheme of things, but some insects can be annoying. If it buzzes in your ears incessantly, persists in biting you, or takes up residence in your home, you're probably not feeling the

love for that particular insect.

Who hasn't had an encounter with a mosquito? From the backwoods to our backyards, mosquitoes seem determined to make us miserable. Besides disliking their painful bites, mosquitoes concern us as vectors of diseases, from West Nile virus to malaria.

It's easy to recognise a mosquito when it lands on your arm and bites you. Most people don't take a close look at this insect, tending instead to slap it the moment it bites.

Mosquitoes belong to the order Diptera, suborder Nematocera – true flies with long antennae. Mosquito antennae have six or more segments. The male's antennae are quite plumose, providing lots of surface area for detecting female mates. Female antennae are short-haired. Mosquito wings have scales along the veins and the margins. The mouthparts – a long proboscis – allow the adult mosquito to drink nectar, and in the case of the female, blood.

If mosquitoes disappeared from Earth, fish, frogs, lizards, spiders and other animals that eat mosquito larvae or adult mosquitoes would lose a food source. Mosquitoes make up a small part of the diet of some, but others, like the mosquito fish or gambusia, which specialises in eating the larvae, might become extinct. But most animals already eat enough of something else or could change their diet so that they wouldn't go hungry without mosquitoes.

Mosquito larvae consume a lot of organic matter in wetlands, helping recycle nutrients back into the ecosystem, but other larvae and water-dwelling creatures also do the same and could take over that job.

Adult mosquitoes feed on nectar as well as blood – in fact, nectar is all the adult males eat – so some plants might suffer due to lack of pollinators if mosquitoes stopped visiting. Though this might alter things somewhat, the plants aren't necessarily crucial to the ecosystem.

The most significant effect is that fewer people would die of mosquito-spread diseases, so there would be more humans on the Earth, especially in countries that are already having trouble supporting their populations. But humans would be healthier, more productive, and not have to spend so

much time and effort caring for those who are sick.

So even though mosquitoes don't seem to have a purpose other than to cause us annoyance and misery, we can't just get rid of them right now without doing more harm to other species that are more useful.

Fleas

Fleas have (literally) plagued humankind for centuries, but how much do you know about these common insects?

In a broad sense, fleas, like all species, simply fulfilled an available ecological niche. It's believed fleas were once free-living, flying insects. Then they started living in the dens of small mammals, feeding on the debris there. Eventually, they started feeding directly on the animal. They lost their wings as they were no longer necessary.

All organisms, including fleas, are part of the food chain. Whether animals, micro-organisms or fungi consume them, they help keep nutrients flowing through the system of life.

Blood-sucking parasites are vectors for pathogens. They may help spread disease to re-balance populations that are out of control.

Fleas are infamous for their role in transmitting the Black Death. During the Middle Ages, tens of millions of people died of the plague, or Black Death, as it spread across Asia and Europe. Cities were particularly hard hit. London lost 20 percent of its population to the plague in just two years during the mid-1600s.

It wasn't until the dawn of the 20th century, however, that we identified the cause of the plague – a bacterium called *Yersinia pestis*. What does this have to do with fleas? Fleas carry the plague bacteria and transmit them to humans. An outbreak of the plague often kills a large number of rodents, particularly rats, and those bloodthirsty, plague-infected fleas are forced to find a new food source – humans. And the plague isn't a disease of the past, either. We're fortunate to live in an age when antibiotics and good sanitation practices keep plague deaths to a minimum.

Fleas lay their eggs on other animals, not in your carpet. A common misunderstanding about fleas is that they lay their eggs in your carpeting and furniture. Fleas lay their eggs on

their animal host, meaning if your dog or cat has adult fleas living in its fur, those adult fleas are doing their best to keep him infested with their offspring.

Flea eggs, however, aren't particularly sticky or well-suited for staying put, so they mostly roll off your pet and land in a dog bed or on the carpet.

Fleas lay a lot of eggs. Without intervention, a few fleas on your cat or dog can quickly become a maddening flea infestation that feels impossible to defeat. That's because fleas, like bed bugs and other bloodsucking pests, will multiply quickly once they've found a suitable host animal. A single adult flea can lay 50 eggs per day if it's well fed on an animal's blood, and in its short lifespan can produce 2,000 eggs.

Fleas prefer humid environments, so anything you can do to dry out the air in your home will help you win the battle against these bloodthirsty pests.

Biting midges

Ceratopogonidae, or biting midges, are a family of small flies about the size of a pinhead. They are well-known for the severe reaction that some people have to their bites. Often they are incorrectly referred to as sandflies. More than 200 species of biting midges are found across Australia, but only a few cause a severe nuisance to humans. Biting midges may attack exposed skin in large numbers, and their bites can be irritating and painful. Only the females bite, using the blood they obtain as a protein source to develop their eggs.

These annoying insects are found in almost any aquatic or semiaquatic habitat throughout the world, as well as in mountain areas. Females of most species are adapted to suck blood from some host animal for reproduction.

The bite of midges in the genus *Culicoides* causes an allergic response. In humans, their bites can cause intensely itchy, red welts that can persist for more than a week. Biting midges use highly specialised mouthparts to grasp your skin, puncture a hole in you, spit some saliva into the wound, and feed on your blood. The discomfort arises from a localised allergic reaction to the proteins in their saliva, which can be somewhat alleviated by topical antihistamines.

The smaller members of the family

are tiny enough to pass through the apertures in typical window screens.

Sandflies, like other blood-feeding insects, are an essential part of the environment. They're food for a lot of animals, and they help regulate animal populations.

Flies



Eye of a fly

Flies (order Diptera) form one of the five most diverse insect orders, including about 150,000 described species in 150 families. It's estimated that there are 30,000 species of fly in Australia, of which only 6,400 have been described.

Flies can be distinguished from other insects because they have only one pair of functional wings. Almost all flies have mouthparts that are adapted for lapping or piercing and sucking. A significant component of the world's fly fauna is unique to Australia. Flies are found everywhere and often abundantly in Australian terrestrial ecosystems.

They perform important ecological functions such as nutrient recycling, predation and pollination, and their larvae are often parasitoids of other insects.

Many species of fly are regarded as a nuisance, including the bush fly, mosquitoes, sandflies and blackflies.



Sandfly

Biting flies include horse flies, deer flies, and other members of the Tabanidae family. Biting flies feed on mammal blood, usually during the daylight hours, which is precisely when you are likely to be outdoors enjoying yourself. Repellents do little or nothing to stop their feasting since flies primarily use visual clues to find their targets.

Flies are responsible for the transmission of a wide variety of disease-causing micro-organisms in humans and animals. Most of these diseases are absent from Australia, with exceptions such as dengue fever and some types of encephalitis.

House flies are one of the most common insects on the planet. They breed and feed in filth, including garbage, faeces, and rotting or spoiled food. Poor sanitation and ripped screens and unsealed cracks in windows and doors can lead to house fly infestations.

Ants

Ask any insect enthusiast how they became so interested in bugs, and they'll probably mention childhood hours spent watching ants. There's something fascinating about social insects, especially ones as diverse and evolved as ants, the family Formicidae (order Hymenoptera).

Ants thrive throughout the world, living everywhere except Antarctica, Greenland, Iceland, and a few isolated islands. Most ants live underground or in dead or decaying wood. Scientists have described nearly 9,000 species of formicids.

Ants play an important role in the environment. Ants turn and aerate the soil, allowing water and oxygen to reach plant roots. Ants take seeds down into their nest to eat the nutritious elaiosomes that are part of the seed. These seeds often sprout and grow new plants (seed dispersal).

It's easy to recognise ants, with narrow waists, bulbous abdomens, and elbowed antennae. In most cases, when you observe ants, you are only seeing the workers, all of which are female.

Ants live underground, in dead wood, or sometimes in plant cavities. Most ants are black, brown, tan, or red.

All ants are social insects. With few exceptions, ant colonies divide labour between sterile workers, queens,



Fire ant

and male reproductives, called alates. Winged queens and males fly in swarms to mate. Once mated, queens lose their wings and establish a new nest site; males die. Workers tend to the colony's offspring, even rescuing the pupae should the nest be disturbed. The all female workforce also gathers food, constructs the nest, and keeps the colony clean.

Ants perform important tasks in the ecosystems where they live. Formicids turn and aerate the soil, disperse seeds, and aid in pollination. Some ants defend their plant partners from attacks by herbivores.

Feeding habits vary in the ant family. Most ants prey on small insects or scavenge bits of dead organisms. Many

also feed on nectar or honeydew, the sweet substance exuded by aphids, and they often tend aphid colonies. Some ants garden, using gathered leaf bits to grow fungus in their nests.

The complete metamorphosis of an ant may take from six weeks to two months.

There are 1,300 ant species known in Australia, but there are relatively few that we commonly see as pests. These include the Argentine ant, black house ant, bull ant, carpenter ant, coastal brown ant, flying ant, fire ant, garden ant and ghost ant. Some people can become allergic to Jack jumper ant stings, and this has become the subject of medical research in Tasmania to develop a desensitisation program.

Bed bugs



Bed bug

A pest of the past? Not anymore. Bed bugs are making a comeback. People associate this biting pest with filthy living conditions, but bed bugs are just as likely to live in clean, uncluttered homes.

Increasing numbers of bed bug infestations have been reported in Australia, often in accommodation venues such as backpackers' hostels and motels. Bed bugs can be transported long distances in the seams of clothing, luggage, bedding and furniture. Adult bugs can survive more than a year without a blood meal.

The adult bed bug is oval, flat and only about 6 mm long. Bed bugs lack wings, so you won't see them flying around your bedroom. They use a proboscis to penetrate the skin of their host. Adults are brown, but appear reddish-brown when engorged with blood. Young bed bugs look like smaller versions of their parents. First stage nymphs are colourless; with each moult, the nymph darkens. White eggs measure less than 1 mm in length and may be laid singly or in clusters of up to 50 eggs.

Although you won't usually see bed bug activity during daylight hours, you may see other signs of bed bugs. As nymphs moult, they leave behind their shedding skin, which accumulates as the population rises. Bed bug excrement appears as dark spots, and crushed bed bugs will leave bloody marks on bed linens.

Bed bugs feed on the blood of warm-blooded animals. They usually feed at night, often on people asleep in bed and unaware of the insects biting them.

A few bed bugs can become a massive infestation quickly. One female bed bug may produce up to 500 offspring during its lifetime, and three generations can live per year. Imagine how many bed bugs you'd have in a year if just one reproductive pair finds

its way into your home.

Adult bed bugs live about ten months, though some may live substantially longer.

Bed bugs locate their warm-blooded hosts by detecting exhaled carbon dioxide. The hungry pests can also sense warmth and moisture from the bodies of potential victims. Once the bed bug pierces the skin of a human or another host, it injects salivary fluid to prevent blood from clotting as it drinks. This fluid may cause an itchy, allergic reaction on the skin of the victim. Bed bugs have a habit of leaving several bites in a line along their host.

Bed bugs hide in the folds, crevices, and seams of upholstered furniture and mattresses.

They depend on humans, pets, or other animals for their food, so a suitable host must be available for regular blood meals. Once these pests find a meal ticket, they move in for good.

But why do we need bed bugs? Some species of ants feed on bed bugs, as do a few spiders. Some entomologists agree that, if they could, they would wave a magic wand and eliminate bed bugs.

Cockroaches



Cockroach

Cockroaches are an ancient group, having remained relatively unchanged for hundreds of millions of years. They have a flattened body, long antennae and bristly legs. They have specialised sensors called 'cerci' (which are like rear-mounted antennae) that make them acutely aware of their surroundings. Any sign of danger sends them scuttling away.

There are around 4,000 species of cockroach worldwide and about 450 species in Australia, but very few are pests. The three main types of cockroaches commonly found in homes and businesses in Australia include the German cockroach, Australian cockroach and American cockroach.

German cockroaches are small and

brown. Australian cockroaches are larger and brown overall. American cockroaches are large and black.

The mere mention of cockroaches brings about a strong reaction in many people. However, the fast-moving, shiny, black or brown cockroaches commonly encountered by people in their homes are almost never native Australian cockroaches, but introduced pests.

The reality in Australia is that none of the 400 or so native species is a serious pest. Native cockroaches are an important part of the food web in many natural habitats, being eaten by invertebrates as well as mammals, frogs and reptiles. To repel predators, some species produce a pungent smell. Some of the wood-eating cockroaches also play an important role as decomposers.

Because cockroaches eat a wide range of food, including rotting garbage, it is believed that they spread some diseases to humans including salmonella and gastroenteritis. The cockroach can also harbour viruses such as the poliovirus. Recent studies have indicated cockroaches can also cause allergies.

Like the household fly, the cockroach will eat virtually anything ranging from food spills on a kitchen floor to faecal matter. Ingested bacteria can survive in the cockroach's digestive system, sometimes for months or even years, and are passed in its droppings. Cockroaches will vomit and defecate on food, and it is thought that disease may be transmitted to humans when humans eat food contaminated by cockroaches.

Recent research suggests that the cockroach may also be associated with human allergies.

A cockroach infestation can be treated with a combination of good hygiene practices and insecticide.

A female cockroach lays between 10 and 40 eggs at a time. On average, the female can lay around 30 batches of eggs in her lifetime. The hatched young look the same as adult cockroaches, but smaller and without wings. Depending on the conditions and species, a cockroach can live for up to 12 months. These insects thrive in warm, humid conditions. This is why buildings in the northern parts of Australia are particularly prone to infestations.

Cockroaches prefer to live in kitchens and other food preparation areas so they can feed off food spills and have access to water. Hiding spots for the household cockroach include cracks in walls; confined spaces, such as behind the refrigerator; in a pantry or underneath a stack of magazines, newspapers or cardboard boxes; any furniture items that are generally left undisturbed; kitchen cupboards; below sinks; around water heaters; in drains and grease traps, and in gardens.

Ticks



Tick

Ticks are actually not in the class Insecta but Arachnida, subclass Acari (mites and ticks), so they are more closely related to spiders.

Ticks are bloodsucking parasites. There are at least 74 species of ticks in Australia, but only a handful of these are known to bite people. In the humid coastal region of eastern Australia, almost all tick bites on people are from the Australian paralysis tick, which is considered the most medically important. It can cause paralysis by injecting neurotoxins into its host. It is usually found in a 20-kilometre wide band following the eastern coastline of Australia. Within this range, the tick is most frequently encountered by humans and their pets. As this area also contains the majority of Australia's most densely populated regions, incidents of bites on people, pets and livestock are relatively common. Paralysis ticks are found in many types of habitat, particularly in areas of high rainfall. The natural hosts for the paralysis tick include koalas, bandicoots, possums, kangaroos and reptiles.

Ticks occur in moist, bushy areas. Eggs are typically laid in leaf litter or mulch. Ticks are not very mobile; larvae, nymphs and adults climb onto the grass and the foliage of low bushes where they wait for passing hosts (animals or people) to feed on. Once

on the host, ticks crawl upward on the host's body looking for a place to attack.

Ticks have four distinct stages of development: egg – larva – nymph – adult. Larvae, nymphs and adult females must have a blood meal from a host. After the blood meal, larvae and nymphs drop off the host and rest in the environment as they develop into the next stage; adult females drop off the host and lay eggs. The whole cycle usually takes about a year.

Though it might be hard to see from our perspective as a blood host, ticks do serve an important role in the ecological system. Every organism serves a purpose, and the lowly tick is no exception.

So, why do we need ticks? First, and perhaps most apparent, ticks are food for other animals. Reptiles, amphibians and birds all consume ticks in quantity. They are an essential food source for animals that forage for sustenance in the places where ticks live (which is almost everywhere, really).

Second – and this may not help ticks gain your support – ticks host a remarkable variety of other organisms, namely micro-parasites. Ticks carry viruses, bacteria, protozoa, and other microscopic life wherever they go. While we'd prefer that they didn't, since many of these stowaways are the very source of our tick-borne illnesses, in the grand, ecological scheme of things these micro-organisms are part of the diversity of life on Earth.

And third, by virtue of their blood-draining and disease-causing ways, ticks help control the populations of their larger hosts. We understand concepts like carrying capacity and population control when we study predator-prey relationships, but we are less sympathetic to the tiny parasites that serve the same purpose.

Don't hate the ticks; they're just doing what they've been doing for tens of millions of years. If you don't want them feeding on you, be sure to take precautions to avoid tick bites.

Bees and Wasps

Australia has over 1,500 species of native bee. Bees collect pollen from flowers to feed their young. Wasps and flies do not do this, although they may be seen eating pollen, so identification is not always easy.



Mud-nest wasp

Ten of the species, the social native bees of the genera *Tetragonula* and *Austroplebeia*, have no sting. Of the remainder, which live solitary lives, none are aggressive, and most cannot use their sting on humans because they are too small to do so. Larger examples of Australian native bee are capable of stinging if handled or squashed.

The stings of most Australian native species of bee will cause relatively minor discomfort to most people – and last only a few minutes. However, they may sting more than once and can cause an allergic reaction – increasing effect associated with repeated exposure to the antigen.

Australian native bees do produce honey, but not much as they are relatively primitive bee species. In cool-climate areas of Australia, all the honey the bees produce is needed by the swarm to live through winter.

Collecting honey from Australian native bee nests can cause many of the bees to drown in spilt honey. The honey is tangy in comparison with commercial honey taken from the European honey bee. The bees store their honey in small resinous pots which look like bunches of grapes.

The different species of Australian native bee have different habits and preferences in gathering pollen, so some species are better pollinators of a given plant than other species.

Bees perform a task that is vital to the survival of agriculture: pollination. In fact, one-third of our global food supply is pollinated by bees. Simply put, bees keep plants and crops alive. We need good, clean food, and so do our pollinators.

Australia's early European settlers introduced European honey bees to ensure a good supply of honey. Naturally a few escaped and they



Blue banded bee

are now wild throughout most of Australia's southern states. Honey bees play an important role as pollinators of crops and wildflowers. But some wildflowers have suffered from the presence of honey bees as native bees can only pollinate these flowers. Some native bees use a unique pollination technique required by certain flowers called buzz pollination. Honey bees do not use this technique and remove pollen without pollinating the flowers.

Honey bees defend their nest aggressively. If a bee is driven to sting, the action is fatal as it rips out the bee's lower abdomen. The sting, with venom gland pumping, is left in the victim.

The Australian hornet (superfamily Vespoidea) is a solitary insect, forming small nests against buildings and other structures. The adult wasp feeds off flower nectar, while the larvae are fed caterpillars captured by the female.

The superfamily Vespoidea is one of the largest in Australia with over 5,000 species ranging in size from 1 to 40 mm.

Its colours are usually bright with

many black, yellow and orange combinations to give a warning that it possesses a potent sting and you should avoid it. Interestingly, only the females have a sting, and the wasps have no branched or plumose hairs on any part of their body. The family Vespidae contains 324 species of mostly social wasps and is the best-known group as it includes most major stinging pest species. Wasps live in large colonies underground or cavities in trees and buildings. Nests consist of a paper comb and envelope built inside a subsoil chamber. Each nest can have one to many hundreds of individual wasps. The nest structure varies by species but usually consists of layers or combs which are sometimes spiralling. It can be covered by a layer of paper-like material to help protect larval cells from weather exposure. The nest will have one fertilised queen and a population of workers (many of these suppressed queens). Adults feed on nectar but hunt caterpillars to feed larvae. Food is masticated and fed progressively to larvae in the nest.

They give a very painful sting when defending the nest and recruit other nestmates to join the attack via pheromone secretions.

In early summer wasps, like bees, pollinate plants and flowers as they feed on nectar. If we were to eradicate all wasps, it would cause more problems than it would solve. So, wasps do serve a purpose, and despite being a problem at certain times of the year, they are a beneficial insect.

But European wasps, for example, are threatening the survival of the endangered ptunarra brown butterfly, endemic to Tasmania and restricted to subalpine tussock grasslands. The wasp populations have exploded due to milder winters and they are basically picking off the butterflies as they emerge.

So, have I changed your mind about annoying insects?

The presence of annoying insects, combined with the negativity fostered in our culture through the media has alienated us from having experiences with the 98 percent of insects and bugs that are not a bother. Of course if you are a gardener, aphids, plant hoppers, stink bugs, pear and cherry slugs (sawfly larvae), and cabbage white caterpillars can be quite bothersome. But we can encourage some of the beneficial insects that eat them.

Australia's **little** and **little-known** adorable bees in the subfamily Euryglossinae

Words and images by zoologist and conservation biologist Kit Prendergast (PhD researcher on native bees and Forrest Scholar)



Euryglossina (Microdontura) sp.



Euryglossina (Euryglossina) hypochroma, male.

Australia has an incredible diversity of native bees, yet just a single non-native species – the European honeybee *Apis mellifera* – dominates media attention. While this species certainly plays an important role in the honey industry – especially in Western Australia, which boasts some of the most sought-after honey in the world – and is a pollinator of various flora, including both agriculturally important crops, as well as native flora, it is an introduced species. Hailing from Europe, it was introduced to Australia almost two centuries ago and now exists throughout most of the country in both managed and feral colonies wherever there is free water available.

There are an estimated 2,000 species of native bees in Australia, many of which have yet to be formally named and described. The most species-rich of all major taxa are bees in the subfamily Euryglossinae, family Colletidae. Save for just a few species in New Zealand and New Caledonia, this subfamily is endemic to Australia, found nowhere else in the world. Despite dominating the bee fauna in some species, and often being relatively abundant, few people even know they exist, let alone can recognise them. And indeed, recognising euryglossine bees is no easy feat for the untrained eye, for this group of about 400 species comprises bees that are both very small and don't fit people's conceptions of what a typical bee looks like.

All species in the subfamily Euryglossinae, or euryglossine bees, are small to minute in body size, being less than a centimetre, most much less so. In fact, the smallest bee in Australia is a member of this clade. Euryglossina (*Quasihesma*) *clypearis*, from Cape York in far north Queensland, is Australia's, and perhaps even the world's, tiniest bee. The male is a mere 1.8 mm long, and the female is 2.1 mm long (common to most bee species, and contrary to the typical sexual dimorphism in body size in mammals, the male is smaller than the female).

An unusual feature of euryglossine bees is their lack of pollen-carrying hairs (known as scopae). They share this feature with the closely related

colletid bees in the subfamily Hylaeinae, commonly known as 'masked bees'. Although they do have some sparse hairs, these are short and are simple, as opposed to the branched structure of scopae that are adapted for collecting pollen. Common to all female bees (save the kleptoparasitic 'cuckoo' bee species that lay their eggs in the nests of other bees), euryglossine bees still require pollen as food to provision their young with a source of energy, nutrients and protein. But rather than collecting it with scopae, the females ingest pollen and carry it to their nest in their crop (a thin-walled expanded area of the alimentary tract used for food storage) which they then regurgitate. Their small size, unhairiness and behaviour of swallowing pollen makes them relatively poor pollinators, but euryglossines are nevertheless an important component of ecosystems and an invaluable, irreplaceable component of Australia's natural heritage.

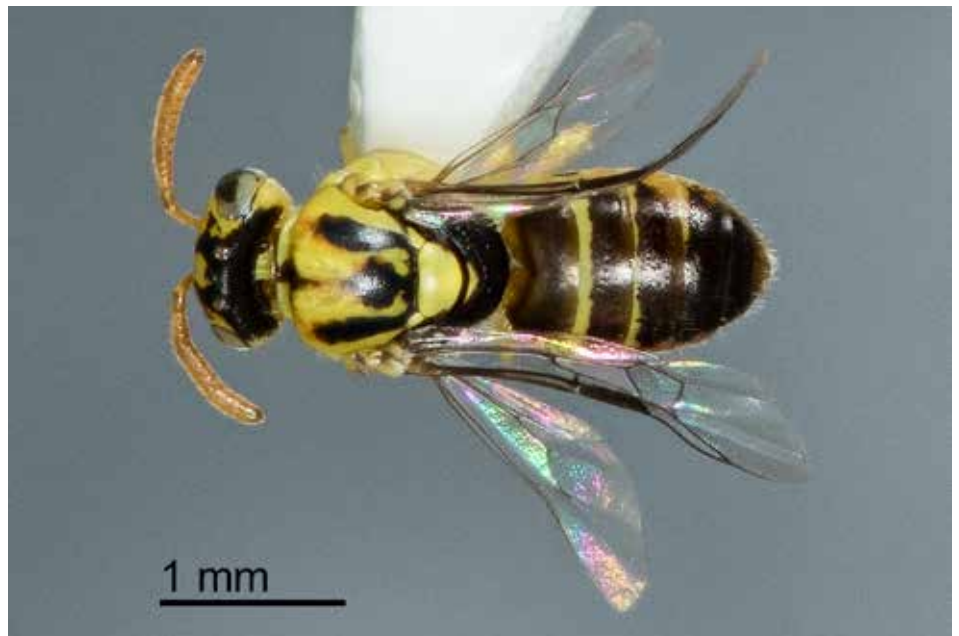
Apart from all being small and relatively unhairly, Euryglossine bees are a diverse group in form and colour. Some species are fairly non-descript, with black or dark brown bodies. Others have brilliant patterns, often of gold or vivid yellow and black.

Because they are small and unhairly, many people may mistake euryglossine bees for flies or small wasps. But closer inspection reveals they differ from flies in having two sets of wings (rather than one pair and a small pair of 'halteres'), longer antennae, usually smaller eyes, and different wing venation. They also differ from wasps in the venation of their wings, having a less jerky flight than wasps, round rather than 'bean-shaped' eyes, and typically antennae that are higher up on the face than in wasps, and a different tongue structure. And unlike wasps, which are parasitoids or predators when it comes to provisioning food for their offspring, euryglossine bees feed exclusively on pollen and nectar.

Very little is known about the reproduction of euryglossine bees and few observations of mating have ever been made. One remarkable reproductive behaviour that has been recorded is the mass mating swarms of species in the subgenus *Xenohesma*, genus *Xanthesma*. In the hotter months hundreds of male bees will form mating swarms where, like a murmur of sparrows, they zip back and forth in a 'cloud'. Females are attracted to the cloud of male bees and fly in where they are quickly taken by a male, with



Xanthesma (Xenohesma) pulchra, female.



Pachyprosopis (Pachyprosopula) purnongensis

copulation ensuing. To aid in seeing the females as soon as they arrive, the males have evolved enlarged bulbous eyes. Having witnessed one of these swarms, with the minute black and bright-yellow males flying back and forth, I can attest it is quite a spectacle. It was all the more remarkable when I saw the amazing eye morphology and vivid colours of some male specimens I collected up close under the microscope.

As with mating behaviour, little is known about the nesting habits of euryglossine bees, and indeed nesting observations are few and far between. It appears the majority nest in the ground, but two genera – *Pachyprosopis* and *Euryglossina* – nest in tiny pre-made cavities in wood created by termites or wood-boring beetles. Indeed, I have observed

females of a species of *Euryglossina* – *Euryglossina (Euryglossina) perpusilla* – nesting in tiny pre-made holes in a branch of an old *Banksia* tree.

As with the majority of bees, and unlike honeybees, euryglossine bees are solitary. They do not live in colonies, and every female is capable of reproducing, unlike with honeybees where a single female – the queen – reproduces, and her daughters are all sterile and live together, helping maintain the hive, care for their younger sisters and forage for food.

After a female euryglossine bee has mated she will dig or locate a nest in a cavity. At the end of a shaft, she will create one or more cells (depending on the species), which she then provisions with nectar and pollen, collected over



Euryglossa jucunda, female.



Euhesma sp.

some foraging forays. Once she has stocked enough food in the cell to meet the energy requirements of a bee to develop from egg to larva, to pupa, to adult, she then lays an egg and seals the cell, thus marking the end of her parental involvement with her offspring. She will then start working on another cell.

As with all bees (and indeed Hymenoptera – bees, wasps, ants and sawflies), euryglossine bees have haplodiploid sex determination: fertilised, and thus diploid, eggs with two sets of chromosomes develop into females, whereas unfertilised, and thus haploid, eggs with only the maternal set of chromosomes develop into males.

Most euryglossine species are restrictive in what plants they forage on. At least 20 species in the subgenus *Euhesma*, genus *Euryglossa*, forage exclusively on plants in the genus *Eremophila* (family Myoporaceae, sometimes subsumed within the family Scrophulariaceae). All 260 or so *Eremophila* species are endemic to Australia and are particularly associated with the more arid regions of the continent, being especially

abundant in southwest Western Australia. With a relatively tubular floral structure, the euryglossine species that specialise on *Eremophila* have co-evolved with the flowers such that they are adapted to match the flower's form: all have modifications to the head and mouthparts, in particular having elongated and enlarged segments.

Other euryglossine bees are strongly associated with Fabaceae, and indeed I have collected many from native pea plants including the southwest Western Australia endemic *Jacksonia furcellata* and *Jacksonia sternbergiana*.

The plants that attract the most euryglossine bees, however, are mass-flowering Myrtaceae, such as marri (*Corymbia calophylla*) and jarrah (*Eucalyptus marginata*). Indeed, I have sweep-netted clouds of tiny euryglossine bees from the blossom-laden branches of these West Australian native trees.

I have been studying native bee assemblages in the urbanised region of southwest Western Australia. The suburbs of Perth are unique in that this city is situated in an internationally

recognised biodiversity hotspot. Biodiversity hotspots are regions where there is a high diversity of species, with over 1,500 endemic plant species. Endemic species are those found nowhere else on the planet. Southwest Western Australia fits this criterion: almost 80 percent of the 7,239 vascular plant species are found nowhere else in the world. Another feature of biodiversity hotspots is that they have undergone extensive land-clearing, with losses of over 70 percent of their original habitat, and unfortunately this is true of southwest Western Australia: it has been estimated that 93 percent of the original vegetation in the Wheatbelt and 80 percent of the Swan Coastal Plain has been completely cleared.

Originally much of the land was cleared for pastoralism, but an increasing threat is land clearing to make way for urban expansion. My study has involved surveying native bee communities in residential gardens and urban bushland remnants. One finding that has emerged is that euryglossine bees, in particular, are strongly tied to bushland remnants. Although they do occur in some residential sites, this is entirely dependent on the presence of native Myrtaceae trees – namely marri (*Corymbia calophylla*), jarrah (*Eucalyptus marginata*) and red-capped gums (*Eucalyptus erythrocorys*) – that line verges. These findings highlight the fundamental role of bushland remnants, and in a time where they are increasingly under threat from being razed for development, we must oppose such ventures, for my findings underscore that residential gardens cannot perform the same role in supporting euryglossine bees. Likewise, councils are often called out to chop down large trees perceived to be a hazard, but this would destroy the only valuable resources for euryglossine bees, as well as a suite of other species, that are strongly tied to such native trees. These trees take decades to grow, and so are not easily replaced.

Euryglossinae are wonders of evolution. This diverse group of tiny bees is an inimitable component of Australian ecosystems. Their tiny forms reveal exquisite details showcasing beauty, bizarreness and also adorableness. If we are to preserve thriving communities of these unique bees, it is vital that we preserve intact, natural bushland ecosystems and prevent further destruction of native ecosystems and their biotic components, including in urban areas.

Australian wildlife heroes

By Jessie Panazzolo



Jessie researching sleepy lizards in Burra in the mallee, South Australia.

Thousands of kilometres away from Australia, I stood week after week in a Madagascan forest watching black lemurs huddle together in fluffy 'lemur balls' sheltering themselves from the rain. As the rain eased up, I tried to keep track of their tight-knit communities as they flung themselves across the canopy with their big bushy tails following behind them. These were the wild lemurs around my local village, a pleasure to watch as their daily drama unfolded with new character developments in every troop we encountered. These troops were a stark contrast to the black lemurs in the tourist park nearby. I studied the differences in the more aggressive manners of these alien lemurs, their missing fur, pot bellies and the unbalanced feel to their community. These strange tourist orientated lemurs, as fat as they were from their constant feeding of sugar-rich bananas, were lucky to be alive. Only ten percent of Madagascar's forests remain which rely heavily on the financial support of tourists which were happily forking out their hard earned cash to see a lemur or two while they could,

endemic to the lands they had flown so far to see.

Back in Australia, I thought late into the night about this catch twenty two. All over the world, habitats are being destroyed for agricultural practices and plantations, and tourism is the only force that protects the last remaining patches of natural habitat in many instances. In stating this, many animals within the tourism industry are being fed incorrect diets, are trained using negative reinforcement, are kept in sub-standard conditions and in most instances, are kept in communities vastly dissimilar to what they would experience in their wild habitats. It was then that I realised that tourism had the power to save vast expanses of the natural wilderness; however it could simultaneously destroy individual species.

In pondering possible solutions to this problem, I came to realise that we, the tourists, are the solution. We have the power to encourage positive and sustainable practices and to aid the conservation of local species and communities. Similarly, we can discontinue supporting ventures in which we believe support the mistreatment of animals or environmental and community degradation. Upon realising this, my conservation initiative 'Heroic Tourism' was born.

Heroic Tourism is a community program aimed at educating and empowering tourists all over the world to become a hero and save the world on their holidays. From the handy advice on our website which suggests ethical alternatives to unethical ventures and our community events which allow for education and discussions on topical issues such as sea parks and elephant riding, Heroic Tourism aims to use positive empowerment in order to encourage everyone to be a conservationist, no matter what your career title may be.

Since creating Heroic Tourism, I have had the pleasure of working with conservationists across the globe from Indonesia and Sri Lanka and have been able to use my knowledge and experience in the field to reach out to Australian students, community members and international online followers. I have hosted charity and education events, spoken at conservation festivals, schools and conferences and have been able to use a ripple effect to reach out further than my immediate communications. Many organisations are aiming to bring tourism into Australia; however, it is my aim to inspire ethically minded Australian tourists to go out into the world to conserve some of Earth's most incredible wildlife and their respective environments.

For more information on Heroic Tourism, visit www.heroictourism.com.

About Jessie

With a background in biodiversity and conservation, I have spent my life exploring and discovering the natural world. Having contributed to over seven different conservation projects across seven different countries, I have used my passion for wildlife to create education programs for schools in Australia, Madagascar and Indonesia as well as researching the spatial ecology of Sumatran elephants and orangutans and the behaviour of black lemurs. In 2014, I created Heroic Tourism as a global conservation initiative and have been inspiring local tourists to save the world on their holidays ever since. In my spare time, I use my camera to help identify more of the world around me, especially avifauna which I love to spend time photographing and watching their unique personalities unfold through the lens. I love learning about the natural world, and I hope that my love for all wildlife helps other to appreciate the understated lives whom we share our neighbourhoods with.

Timely quest for turtle conservation

Gemma Gillette



Green sea turtles cared for in the nursery on Panasesa.

Have you been looking to use your love of our natural environment as a conduit to making a difference? If so, I have discovered the perfect place. In one of the most remote corners of the Earth, there can be found a small atoll adrift in the Pacific Ocean. A three-hour boat journey to the nearest land and a plane trip to Port Moresby, Papua New Guinea's capital, this small group of 21 islands has long existed untouched by modern civilisation. However, as the Western world reaches further into even the most natural of places, life in the atoll, both on land and beneath it, has changed under its hand.

Recently I was called to the Conflict Islands, not by the translucent waters or the world-class corals, the only remains of the volcano sunk long ago, but by a creature so ancient it has outlived even the dinosaurs. Under the surface of the waters that surround the islands swim the endangered green turtle and the critically endangered hawksbill turtle. Sea turtles have roamed the deep oceans of our planet for over 100 million years; however, in the Conflict Islands, it is predicted that at the current rate of depletion these turtles will be devoid of the area within as little as 10 years.

Since 2003 the Conflict Islands have been privately owned by British-based Australian Ian Gowrie-Smith and his family. They are part of an elaborate plan to create a legacy of protected wilderness around the world. With internationally renowned success as a global entrepreneur, Ian Gowrie-Smith is passionately dedicated to ensuring the centurieslong protection of the Conflict Islands. In 2012 Gowrie-Smith went out for the very first turtle tagging season with a local group but was unsuccessful due to community differences. A new approach brought the first P&O cruise in July 2016, with Gowrie-Smith's vision for the islands to become an ecotourism destination. In 2017 the Conflict Island Conservation Initiative (CICI) was formed for the effective protection and conservation of the ecosystems in the atoll. CICI's head marine biologist Natalie Robson, along with a dedicated team, conducted awareness programs on neighbouring islands about turtles as well as sharks, rays, corals and sea cucumbers, established a turtle hatchery and nursery on the main island of Panasesa and founded an internship program, all within the year!

I, along with nine other Australian and PNG students, arrived as the second intern group to be known by the islands. We were promised the opportunity to tag nesting turtles, monitor the hatcheries and conduct basic husbandry duties in the nursery, but we soon found out that our job description was wildly underrated. Little did we know that to tag the female turtles we would be venturing to a different island in the atoll each night and that the turtles we would be looking after were smaller than the size of your palm, or that by monitoring the temperature of the hatchery we could combat a major problem turtles face due to climate change.

We were also unaware that the turtle guides who would accompany us on our nightly tagging adventures were some of the most beautiful people we



An intern holds a green turtle onboard the Underwater Explorer research vessel.

have had the pleasure to meet. So open were they that on occasion, in the quiet moments between patrol walks along the beach, they would light a fire and tell old stories, as is their custom.

On one particular evening, we were patrolling the island of Irai, the longest island of the atoll and most popular nesting site. The night was clear and Lenni, one of our turtle guides, and I were sitting by the fire quite comfortably on a pair of woven mats he had salvaged from a nearby cluster of frond huts. As we sat by the fire, I decided to ask Lenni why the local tribes still came to hunt turtles.

Basic awareness had now been raised on many of the surrounding islands but nonetheless, we still seemed to encounter an alarming number of poachers.

On just one of these occasions, we had found two turtles left on their backs in the blazing day heat. Severely dehydrated, they were left there from the previous night to be picked up by the poachers later that day. For the guides, this is a personal matter. All originally from the nearby island of Panaeati and the Engineer Group, it was not uncommon to find that the poachers were people they knew,



Community awareness program conducted on the Engineer Group islands.

friends or even family members from their home islands. Lenni explained that for generations people would travel by the Conflict Islands, stopping by to harvest the sea for trade on the mainland. The traded supplies, mostly consisting of rice and flour, would be used to provide for their families after making the journey home.

Today, however, as overharvesting devastates the turtle population, Western influence applies greater pressure on the people to grow wealth. Thus the former modest traditional uses for turtles have become as endangered as the turtles themselves, warranting the need for a turtle hatchery located in the safety of Panasesa Island. Where one turtle used to be enough, now many more are sold instead of traded for money. The dramatic increase in harvesting warranted the need for a turtle hatchery located in the safety of the Panasesa island.

A few nights on, while collecting eggs to be relocated into the hatchery, we were faced once more with the reality of our turtle guide's testimony. We were back on the island of Irai and had just spotted a nesting turtle. As we sat on the beach near the female, we were reminded that the nesting process could at times be an arduous one. Mothers are particularly precise about where they are to lay their eggs, pausing frequently to scope out the perfect place as they make the awkward journey from the sea onto land.



A young hawksbill turtle, cared for in the nursery on Panasesa.



Juvenile green turtle upon release.

We sat with fingers crossed hoping she would soon lay, as some turtles go to the expense of climbing out of the ocean and digging a full egg chamber, only to relocate a few metres down the beach or even abandon the site completely. When the conditions are right, and a suitable site along the beach has been chosen, a female turtle will then begin contracting a 'body pit'. This is done by flinging away loose sand until her body can comfortably sit within the pit. She then sets to work cupping her rear flippers, using them as 'shovels' to dig an egg cavity. The shape of the egg cavity is carefully crafted into a bell shape (that is, the cavity is wider at the bottom than at the surface), found to be the optimal shape for oxygen flow within the nest.

It is about now, while the female turtle is moments away from laying her first eggs, that she enters into a trance-like state allowing us to count her eggs or, in this case, slide a cloth bag underneath her cloaca for collection. Once she has finished laying (between 80 and 140 eggs for green turtles, or 80-120 eggs for a hawksbill), the clock starts. The bag is removed from under her and she naturally covers over her nest blissfully unaware of our presence. We have only one hour before the eggs need to be back inside an egg chamber. The nesting mother turtle is tagged, and the eggs must now travel between islands to the safety of Panasesa, free from poachers and predators alike.

We half jogged, half sprinted down the beach towards the boat and arrived only to realise that the other group of interns were still patrolling on the other side of the island. Time slipped away as we desperately radioed them to quicken their pace. We waited in silent agony onboard the boat as Natalie held the bag of turtle eggs close to her chest. Red lights appeared and the three came running out of the bush track that led to the other side of the island, a bag of turtle eggs in their hands. They were patrolling the beach when they spotted a turtle helplessly unable to move while flipped onto its back. The eggs she had just laid had been harvested, and they found them in a bag hidden nearby. The poachers fled when they saw them coming. Steven was last to board the boat, visibly annoyed; the poachers were from his island. Natalie agreed that our presence on the island and the lights that can be seen from sailing canoes passing by is a deterrent



Green turtle on its way to the community awareness program, the Engineer Group.

enough for most poachers. We pushed off from the sand and travelled towards Panasesa. The eggs will be taken to the hatchery where the clock pauses for two months. Natalie now tackles another major threat affecting sea turtles, not only in the Conflict Islands but all over the world.

As climate change slowly warms our Earth, the ratio of male to female hatchlings becomes skewed towards the female side. Turtles are among the few species with temperature-dependent sex-determination. Eggs buried at below 28 degrees hatch as all males while nests above 31 degrees produce females. By relocating a select number of the nests to the cooler areas of Panasesa and monitoring the temperature frequently, Natalie balances out the ratio by ensuring a healthy number of males contribute to the population.

After hatching, time will once again become a critical factor for these turtles. During the first 48 hours of life, a hatchling must travel from the beach to a place of safety, free from predators

and with a suitable supply of food. The majority will not even survive the first few hours. While most of the nests relocated to Panasesa will be left to hatch naturally, a few select turtles will be cared for in the nursery. This is a place where the injured are medicated and the weak are made strong again, all being raised to a suitable size to decrease the number of predators able to feed on them upon release.

As we now travelled across the black water, the line between sea and sky was barely visible. Instead, both spheres joined as one. Our guides turned off their lights; they knew the atoll so well that they could easily navigate the dark blanket that enclosed us. With no light pollution for kilometres, the stars above dotted the vast black sheet. The lights of the heavens were mirrored only by the ones of the sea as the boat stirred up bioluminescent plankton as it passed through. Beneath the plankton in the depths of the ocean there were likely to be more female turtles making their way towards the beach we had just

left. I looked over to Natalie who held their future in her hands. Statistically, Statistically, less than 0.01% of eggs will survive to maturity, meaning that quite possibly none of the turtles in the bag she carried would see Irai again. However, that didn't stop her from holding the eggs more closely to her chest as the soft waves gently rocked the boat.

With one-third of the world's species of marine fish, the Conflict Islands are currently under consideration as a World Heritage Marine Site. Everything from the tiny pygmy seahorses to the huge manta rays and killer whales shares these waters with our beloved sea turtles. The biodiversity in this area is so extensive that new conservation projects are already underway with a new shark and ray internship to be offered in 2019.

Applications for internships commencing late 2018 and early 2019 are now open and can be found via cici.net.au.

Balloons

Suzanne Medway

What goes up does come down

The mass release of balloons has become a popular tool at promotional events or to celebrate a wedding, birth or memorial.

Balloon releases are becoming more popular at funerals as a visual expression of love for the one who has passed. Releases are normally done at the end of the service to symbolise letting go of the loved one and letting the grieving process begin. As the balloons are slowly drifting upward, I am sure no one gives a thought to what happens to the balloons after they are released.

While these releases continue in many parts of Australia and the rest of the world, considerable information from local and overseas sources continues to support the fact that marine creatures are at risk from swallowing these balloons.

Whether the balloon is attached to a string or not, if it is filled with helium, it will float and, eventually, come down still presenting a choking hazard or digestion hazard for marine turtles and many other species.

The law against the release of balloons differs from state to state. New South Wales is the most hardcore state when it comes to releasing balloons. While other states have considered similar bans, nothing has been set in stone just yet.

Our Society was successful in lobbying the New South Wales Government in 2000 to have the mass release of balloons banned in this state. It is now illegal to release 20 or more gas-inflated balloons at or about the same time. The balloons should not have any attachments. On-the-spot fines can be given, and penalties are much higher if over 100 balloons are released. This ruling comes under the Protection of the Environment Operations Amendment (Balloons) Act 2000. There are some exceptions to the offences, for example where the balloons are released for scientific purposes.

If one were to dump 1,000 balloons on the roadway, the action would

incur a penalty for littering. What gives people the right to dump many thousands of balloons in the ocean? That is very likely where helium-filled balloons will end up.

The so-called grey area on littering with balloons is the fact that if balloons are found, the identity of the person/s releasing such balloons cannot be established. This too is a far cry from a rational argument. Litter is litter, whether it goes up or down, and the organisations or individuals mass-releasing balloons can readily be identified at the point of release. This plastic litter comes down somewhere and, in the case of balloons, presents a threat to all marine wildlife. In brief, mass releases of helium balloons present a serious hazard to marine life, especially endangered sea turtles and seabirds, which mistake these items for food.

Queensland hosts the most prolific populations of nesting sea turtles in Australia. Every species of the six species of turtles in Australian waters is either endangered, threatened or vulnerable.

Our concern now is that the proliferation of plastic in the ocean is so great there is no safe place for sea turtles. In a study conducted by researchers in the United States, some

parts of the ocean have so much plastic that the pieces outnumber plankton five to one.

Latex, which is used in the manufacture of balloons, is biodegradable. However, there are many marine creatures constantly searching for food sources. A floating balloon, or a piece thereof, represents a food source, whether it is biodegradable, deflated, blue, green, orange or in small, so-called harmless pieces... it continues to be a significant threat to our precious wildlife, irrespective of the size, colour, texture or shape of the pollutant.

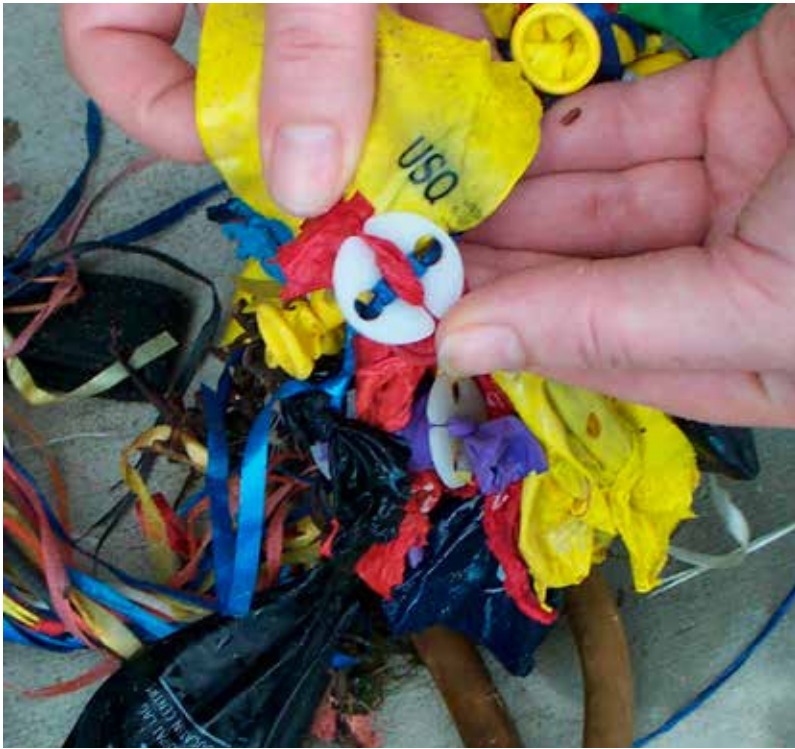
In worldwide studies (US Fisheries and Wildlife; UK Marine Conservation Society) it is estimated that a latex balloon may take as long as twelve months to biodegrade. Meanwhile, as it degrades, thousands more are released into the environment at balloon releases to 'top up' the constant threat to our wildlife.

The jet-stream air flow across the continent is from west to east. Helium balloons are thus likely to reach the height of the jet stream and, eventually, find their way into the ocean.

Have you ever been to a party where helium balloons were floating around



Green sea turtle – named for the green colour of the fat under its shell.



A sample of 40 balloons collected in one hour, on one kilometre of the beach at Angourie, New South Wales.



Balloons littering the coastline.

the room? And for those who stayed late, they would have noticed that these balloons slowly drifted to the floor. There is a simple explanation: helium is an expensive gas. Its atomic structure is very small, in fact, the second smallest atom in the world. A balloon is filled with what is called 'balloon gas' – a mixture of ordinary air and helium – just enough to float the balloon. The helium is small enough, over time, to pass through the wall of the balloon, thus allowing the balloon to descend.

The Beyond Plastic Pollution – Pathways to Cleaner Oceans Conference was held in October 2017



Black albatross, dead from entanglement in balloons and string.

with the aim to try to reduce the eight million tonnes of plastic waste entering our oceans each year. This was the first conference of its kind to be held in Australia with the aim to find pathways to cleaner oceans.

Every person involved in the release of helium balloons creates a real threat

to many endangered species of marine creatures. Assisted by the Australian Funeral Directors Association, we are hoping to address the issue of mass helium balloon releases nationally.

What goes up does come down!

We are losing our endangered species.

The Australian Wildlife Society is an all-volunteer registered, not-for-profit conservation organisation holding tax exemption status with the Australian Taxation Office and is listed on the Register of Environmental Organisations.

The Society was formed in Sydney in May 1909 and is totally committed to the preservation and protection of Australia's unique native fauna and flora in all its forms through national environmental education programs, community involvement, political lobbying and advocacy, as well as practical hands-on wildlife conservation projects.

The Society's members are dedicated to preserving Australia's native wildlife for future generations of young Australians.

The Society celebrated a centenary of wildlife conservation in 2009.

Further details can be found on our website – www.aws.org.au

Lord Howe Island - the woodhen

From the memoirs of Dr Vincent Serventy AM



Dr Vincent Serventy AM

... when I was in the woods amongst the birds I could not help picturing to myself the Golden Age as described by Ovid.

wrote Surgeon Arthur Bowes in 1788 on an exploring visit to Lord Howe Island from the new colony of Sydney.

He was among the first of the early settlers to this romantic place, though no doubt hundreds of years before Polynesians visited, decided it was too small for a home, and travelled on to New Zealand.

On my first trip as a naturalist lecturer, I was on board the Lindblad Explorer, with its affluent passengers who had visited most of the world's famous

tourist havens. When we arrived at Lord Howe most agreed they had arrived at the world's most beautiful island.

On my coming to Sydney in 1965 bird authority Keith Hindwood had given me a paper he had written telling the sad story of the extinction of many bird species on the island. This was due partly to the greed of the settlers, aided by the occasional wrecks. One released rats. The island's wildlife had lived safely on these rocks heaved out of the depths by volcanic outpourings. Mountains had been created on the main island with an offshore spectacularly towering peak named Balls Pyramid. The animal and plants

had either flown, been blown to, or drifted on to this new piece of land thrust out of the sea.

In 1966 I had been encouraged to stand as president of the Wild Life Preservation Society by vice president Jim Brown and his wife Mabel, both councillors of the Society, who were keen scuba divers. For thirty years they had spent three months every summer on the island, diving on the coral reefs, taking wonderful photographs.

The other nine months they did conservation work, lecturing on the beauties of Lord Howe, always working for it to be conserved as a marine national park to protect the reefs, while a land national park could save what was left of the bird life. Even more importantly they educated the Premier Neville Wran and his wife Jill on its charms.

The Lord Howe Islands and reef gradually became conserved in practice, even though the legislative protection hung fire. The Wild Life Preservation Society was busy assisting, particularly regarding a friendly land rail, the woodhen.

These creatures suffered, becoming woodhen pie when the settlers tired of a fish diet. The dogs and cats brought in as pets also created havoc, with farm pigs and goats doing even more damage. Keith Hindwood did not regard the birds as rare in his early days on the island although many years later, Australian Museum research scientist John Disney alarmed our Society with his report.

We wrote to the Minister for Lands who controlled the islands suggesting that parts be declared as a national park. Even more vital was the need to remove goats and pigs. His reply in 1977 was that all was in hand with the government aware of the value of the islands. The government had also encouraged the formation of a National Parks Foundation to raise private money for all national parks.



The Lord Howe woodhen, also known as the Lord Howe Island woodhen or Lord Howe rail, is a flightless bird of the rail family. It is endemic to Lord Howe Island off the Australian coast. It is currently classified as endangered by the IUCN.

Peter Piggot was president and major benefactor, and \$60,000 had been supplied to research the woodhen's needs including captive breeding.

My wife Carol had been encouraged by the Australian Museum's Director, Frank Talbot, to start a Friends Group, a first for museums in Australia. This was a tremendous success with one of its functions to run seminars. She organised one on the future of the woodhen which I chaired. Previously John Disney had told me how endangered the species had become, being saved by the fact a few remained on the two mountains, out of reach of the lone pig which remained.

The curator of birds at Taronga Zoo assured me breeding woodhens would be easy, judging by experience with rails in other parts of the world. A species on Heron Island on the Great Barrier Reef was thriving in spite of tourists. The human inhabitants of Lord Howe had been discouraged from eating woodhen pie and from killing the birds, which stole hen eggs.

The seminar was held, but to my fury, at question time the scientists retreated

into their shells, claiming more research was needed. At the close of the seminar I announced, "Unless we do something, the woodhen will be the best known extinct bird in the world".

I was also a member of the National Parks Advisory Council, and I convinced them we should recommend an immediate breeding program even though the surviving numbers were less than a dozen birds. The zoo man had been equally cautious; not admitting Taronga Zoo could handle the breeding. Both no doubt worried if the scheme failed the blame for making the birds extinct lay with them.

I spoke to Peter Piggot saying all his money was being spent on unnecessary research. We knew what should be done; he should tell the Park Service bluntly, no more money would come except for a breeding programme. That spurred action. Two experts were brought from New Zealand with experience in rearing rare species; a helicopter was hired to bring the precious cargo from their mountain refuge to the safety of a prepared enclosure.

All went well. A new scientist, Dr Ben Miller, came to take charge of the research. Then Jim Brown came back with disturbing news of the breeding programme. John Disney agreed to inspect the island work for the Wild Life Preservation Society. The park service accepted he should be allowed to see the breeding cage.

John was able to talk matters over with all the experts; recommending our Society should take our views to the Service, the Foundation, the minister and the premier, because of his personal interest in the island. Briefly, we indicated the breeding programme should not be wound down but increased. Surplus young birds from the breeding should be released into the wild in areas where they were once abundant, the domestic stock should be removed, while cats should be desexed with no more allowed on the island. No more dogs should be brought over. No more plants and animals should be allowed in without the permission of the park service. All this was based on our scientific friends' advice, and the value of our scientific committee was never more welcome.



A view of Mount Gower on Lord Howe Island.

There should also be another breeding programme at Taronga Zoo in case some natural disaster such as a storm

would destroy the island breeding colony. Action was taken with 93 chicks being released into the wild.



A seat commemorates James Brown, who was a Vice-President of the Wild life Preservation Society of Australia and worked tirelessly to conserve Lord Howe Island and have it nominated for World Heritage listing.

By the year 2000, it was estimated the total woodhen population was 220. Though still classified as endangered, as Lord Howe was nominated for World Heritage listing in 1981 the bird appears reasonably safe. Perhaps other islands might be considered as homes after study has shown present wildlife would not be affected. Norfolk could be considered.

Our last step was to erect a memorial seat on the island with a plaque outlining the services of Jim Brown to Lord Howe. Although Jim has died, Mabel still lives in Sydney. We count this victory as being in line with the Wild Life Preservation Society saving of the koala, the northern hairy-nosed wombat, the Great Barrier Reef. These were not due to our work alone, other conservationists, public servants and private individuals assisted. All added their quota to the final culmination of saving the woodhen from extinction - yet we were the energisers, the driving force.

Platypus Alliance success

Suzanne Medway

The Australian Wildlife Society joined the Victorian Alliance for Platypus-Safe Yabby Traps in 2017 and started spreading the word of the dangers to platypus and other air-breathing freshwater animals of enclosed yabby traps such as Opera House nets.

In the recent summer edition, the Australian Wildlife Society published two platypus articles: Footprints in water - In search of the elusive platypus by Doug Gimesy and Platypus 'death traps' by Geoff Williams of the Australian Platypus Conservancy.

Under the leadership of conservation and wildlife photographer Doug Gimesy, it is with great joy that we can announce:

1. [The Victorian Government will ban the use of Opera House Nets in all Victorian waters](#)

Effective July 2019, the use of Opera House nets in all Victorian waterways will be banned. The Victorian Government will introduce a buyback scheme to try to get these awful nets out of the market for newer air-breathing animal-friendly ones. Exact details of how this will work are still to be announced; however, in addition to the ban, this proposed exchange scheme is a fantastic initiative by the Victorian Fisheries Authority (VFA) to get these nets out of circulation.

2. [All major retailers have stopped selling Opera House nets in Victoria](#)

Working with those who sell enclosed yabby traps (such as Opera House nets) in Victoria, all major retailers – such as eBay, Anglers Warehouse, BCF, Big W, Kmart Australia – have now decided to stop making these available in Victoria. Some have even decided to withdraw them nationally. This is excellent news and means that every major retailer in Victoria (bricks and mortar as well as those who sell online) has now withdrawn the sales of these platypus death traps nearly 12 months ahead of the planned Victorian ban being extended to include all waters.

In dealing with some retailers, interestingly, some were not aware of the dangers these nets could pose to platypus and other air-breathing animals. For example, a senior



manager at Anglers Warehouse told the Alliance: "If we had known these types of nets could drown platypus, we never would have sold them in the first place."

Thank you

This has taken a lot of work by those in the Alliance and those who have positively supported the Alliance in many ways – ranging from taking the time to write letters of support, signing petitions, to posting/re-posting the Alliances' key pieces of communication.

What next?

A ban in July 2019 means that Victoria will still have another summer of use, some potential sales, and of course – even with the exchange scheme – nets will still probably be out there and illegally in use for a while to come.

What can you do?

1. Spread the word – many people are unaware of the current regulations or the upcoming regulation changes. Many are also unaware about the risks that this type of net poses (i.e. drowning air-breathing animals). So, if you can please pass this information on, this will help raise awareness.
2. Report any illegal use – if you find an enclosed yabby trap being used illegally (or any traps being used illegally for that matter), immediately report this to the relevant authorities. In Victoria, you can call 13FISH any time of the day, or DELWP on 136186 during business hours.
3. Report a sighting – if you are ever lucky enough to see a platypus in the wild, please register the sighting using the platypusSPOT app. The more we know about their distribution, the better.

Australian Wildlife Society

University of Technology Sydney Wildlife Ecology Research Scholarship

The Australian Wildlife Society Wildlife Ecology Research Scholarship is open to postgraduate research students from any university in Australia undertaking a research project at University of Technology Sydney that is of direct relevance to the conservation of Australian native wildlife (flora or fauna).

The scholarship totals \$5,000 and is awarded to one candidate, who receives one payment of \$2,500 each semester. The scholarship is provided to support operational costs associated with the successful candidate's research project, such as:

- Travel associated with the research project
- Fieldwork expenses
- Specialist software
- Small items of equipment (i.e. less than \$5,000)



Esty Gayle Yanco

The recipient of the 2018 scholarship is Esty Gayle Yanco who is studying kangaroo management issues and their impact on farmers and graziers.

Prof William Gladstone, Interim Dean, Faculty of Science, UTS acknowledged the prize donors and external partners such as the Australian Wildlife Society and said, "Tonight would not be possible without the generous support of our prize sponsors and industry partners".



Photo: Professor Bill Gladstone Interim Dean of Science at UTS and Patrick W Medway AM at the 2018 Award Ceremony in the Grand Hall.

Book Reviews



Whales of Sydney by Jonas Liebschner

I loved this book! It is a spectacular photographic book that documents the annual migration of Humpback whales past the coast of iconic city of Sydney from mid May to the beginning of December. This is a beautifully presented book with spectacular photography that documents the annual migration of humpback whales past the coast of the iconic city of Sydney from mid-May to the beginning of December. Showcasing not only the majestic whales but all marine life that can be seen during this time, the book demonstrates the whales' breathtaking behaviours and the interaction between them and the humans watching as well. Sydney has one of the longest humpback whale migrations spanning almost six months. It sees a large number of whales swimming past its shores with an estimated number of more than 25,000 individuals at the end of 2016, increasing by about 10 percent each year. All whale photography has been captured over the past ten years by wildlife photographer Jonas Liebschner, who spends most of his days out at sea during whale watching season, trying to capture these magic moments.

Publisher: New Holland Publishers

RRP: A\$35



Sharks: Encounter the Ocean's Top 20 Fiercest Sharks

If your child has an interest in sharks, then you must get this book! Did you know that a shark can grow over 20,000 new teeth in its lifetime? Or that some sharks will eat anything from tiny fish to licence plates from cars? An incredible amount of information about sharks can be revealed by examining the teeth and jaws of the 20 jaw-snapping species covered in Creature Files: Sharks.

Publisher: Allen & Unwin

RRP: A\$18.99

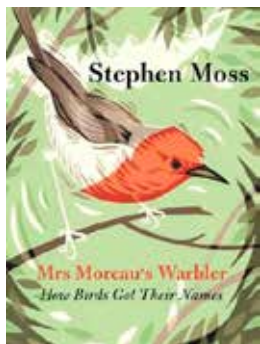


Melody the Mermaid: Adventures in the Kingdoms of the Sea. Written and Illustrated by Valerie Taylor

I was delighted to receive this book for review. The Society and I have had a long association with Valerie Taylor; in fact she and her husband Ron were joint recipients of the Serventy Conservation Medal in 2001. Valerie and Ron are pioneers in underwater photography and marine conservation. To many of us wannabe mermaids Valerie is a childhood hero. But did you know Valerie is also a talented artist? Valerie's children's book is magical. Set in the Coral Sea, the book tells the story of Melody, an adventurous young mermaid who is the daughter of the king and queen of the Kingdom of Pearl. Melody's adventurous nature gets her into trouble when she goes looking for her friend Leafy, a young leafy sea dragon who's gone missing. Melody sees Leafy being lured away by two moray eels and gets caught in a dangerous current. While it reads like a fairy tale, Valerie is quick to tell us it's a true story.

Publisher: Taylor Productions

RRP: A\$24.95



Mrs Moreau's Warbler: How Birds Got Their Names. Written by Stephen Moss

This is an interesting book that will fascinate bird lovers. Stephen Moss combines detective work, natural history, folklore and first-hand observations to explore how birds got their names and our long and eventful relationship with the natural world. We use names so often and with such little thought that we often forget to pause and wonder about their origins. What do they mean? Where did they come from? And who originally created them? Many of our most familiar birds are named after people or places, sometimes after their sound or appearance, or perhaps after their quirky little habits. But sometimes a little more detective work is required to find the deeper meanings and stories behind the names. And a familiar face such as the blackbird may not turn out to be named after its colour after all. Mrs Moreau's Warbler is a journey through time, from when humans and birds first shared the world, up to the present day, as we find ourselves struggling to coexist sustainably with our feathered friends.

Publisher: Allen & Unwin

RRP: A\$32.99

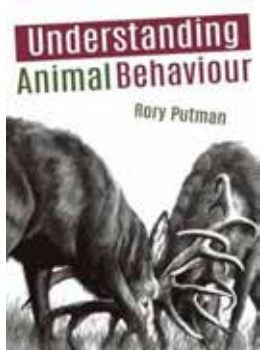


World's Best Bird Songs by Hannu Jännes

Listening to birdsong provides a huge amount of pleasure to people all around the world, but which species are the most melodious and produce the best songs? Hannu Jännes has created this beautifully illustrated and very useful book and App combination, bringing together 70 species with the most remarkable voices from around the world. Listening to the birds' performances will provide the perfect inspiration to get out of bed early and take in the next dawn chorus.

Publisher: Reed New Holland Publishers

RRP: A\$24.99



Understanding Animal Behaviour by Rory Putman

This introduction to animal behaviour provides an authoritative yet reader-friendly guide for the interested naturalist. It presents current knowledge about the way animals behave and will enable readers to derive more pleasure from their observations of animals by gaining a deeper understanding of their behaviour. The concepts are presented in an easily appreciated way with which everyone can associate. The book is illustrated throughout to aid interpretation of the text.

Publisher: Whittles Publishing

RRP: A\$35.99

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Another way which you can support the work of the Australian Wildlife Society is to remember us in your will.

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I bequeath the sum of \$..... to the Wildlife Preservation Society of Australia trading as the Australian Wildlife Society for its general purposes and declare that the receipt of the Treasurer for the time being of the Society shall be complete discharge to my Executors in respect of any sum paid to the Wildlife Preservation Society of Australia Limited trading as the Australian Wildlife Society.

"The challenge to the present adult generation is to reduce the increasing pressures on the Earth and its resources - and to provide youth with an education that will prepare them emotionally and intellectually for the task ahead.

Photos by Jessie Panazzolo



Musk lorikeet



New Holland honeyeater



Rock dove



Pacific duck



Eurasian coot

