

Tropical Topics

An interpretive newsletter for the tourism industry



Spiders

No. 67 May 2001

Notes from the Editor

Few sights pull up visitors quite so quickly as a large golden orb weaver spider in its massive shimmering web. With a mixture of horror and fascination, they peer at this wonderful creature which, despite its size, is docile and relatively harmless.

This *Tropical Topics* tries to address the fascination, for spiders are, indeed, fascinating animals with a long history and a variety of intriguing behaviours. However, since the venomous aspect of spiders is the one which preoccupies many people, this is tackled on page one. The rest of the newsletter is devoted to the most commonly seen species in our area and to the details of how they make a living.

Spiders are not insects but belong to the Arachnid group which includes ticks, mites and scorpions. They are distinguished from insects by having four pairs of legs instead of three, no antennae and only two body segments, the abdomen and the cephalothorax which is a combination of the head and the thorax.

Acknowledgement

I would like to thank Dr Robert Raven, Queensland Museum, for his help with this issue.

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The venomous side of spiders

The vast majority of spiders are venomous because that is the way most of them subdue their prey. However, they are not out to get us humans. They would prefer not to waste their venom on non-prey items, and use it only in defence. Indeed, most spiders are quite timid and prefer to retreat.

Certainly, the venom from a female redback or a male Sydney funnel-web spider is dangerous and can be fatal but the effects of bites from other spiders vary greatly. The level of toxicity often depends on the species but also may depend on how much venom is injected and the size and health of the victim. It also seems that individual reactions, like allergies, vary from person to person.

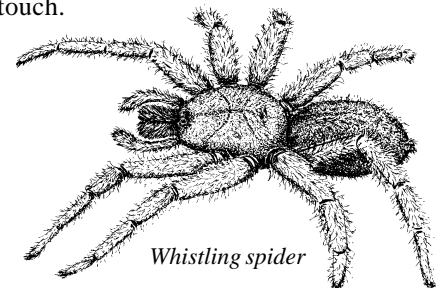
Size is no guide to the risk posed by a spider. The bite of the relatively small redback can cause severe reactions while that of a golden orb weaver, although it can be painful, is not thought to be particularly dangerous. Nonetheless, it is wise to avoid whistling spiders. They can be aggressive when threatened, their fangs are as large as those of some snakes and the bite is painful. While not considered fatal for humans, the venom is strong and can make a person very sick; six hours of vomiting has been recorded. Dogs and cats usually die within half an hour of a bite.

The bites of some spiders have been blamed for serious cases of necrosis, or tissue death, at the site of the bite. Various species have been blamed, notably the white-tailed spider, black house spider and wolf spiders. However, there is much debate about the true source of this infection and the fact that many victims of necrosis did not see the spider which was assumed to have bitten them has cast doubt on the actual origin of the infection. Venom of white-tailed

spiders, when tested, seemed to be rather ineffective and certainly many people are bitten by these spiders without suffering any particularly severe reaction. However, the problem seems to be caused by bacteria and since a spider, when it bites, releases digestive secretions as well as venom, this could possibly be the source of the bacteria.

There is a widely-believed myth that the venom of a daddy-long-legs spider is the most potent of all spider venoms. In fact it has never been tested. These little spiders are venomous and can kill huntsmen, redbacks and white-tailed spiders, but there is no evidence that this venom is especially strong. As far as humans are concerned, there is nothing to fear because their mouths don't open wide enough to bite us.

We live with some quite venomous spiders in our houses, but generally avoid being bitten. On the other hand, it is often possible to find someone who has had a bad reaction to a bite even from species which have been labelled 'harmless'. In the end, the safest approach is not to handle spiders. Look, appreciate, but don't touch.



Whistling spider



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Spider sex

Before sex can take place, a male spider must prepare his palps – appendages next to his mouth which are sometimes mistaken for an extra set of legs. First he spins a small web mat on to which he ejects a drop of sperm. He then dips the end of each palp into the sperm which is drawn into special tubes by capillary action. Now, with his palps charged, he is ready for action.

Approaching a mate must be a nerve-racking experience for many male spiders, given the tendency for females to finish off the sexual experience with a snack of her partner. Some males use tactics to disarm their mates, controlling them physically or tying them down with silk. Others provide a diversionary titbit or a massage to inspire cooperation, while yet other males are so much smaller than the females that they may simply sneak in for a mating when the female is busy, without her noticing at all. Web-dwelling males may attract the attention of the female by twitching strands of the web. This coded signal conveys the message that it is suitor, not supper, which has arrived.

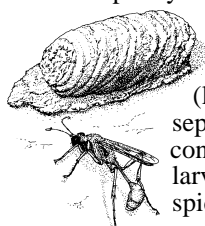
When he has manoeuvred himself into position, the male inserts one of his palps into the genital aperture on his mate's abdomen, and the sperm is expelled. He may then insert the second palp, before making a run for it if he survived the encounter (but see Ultimate sacrifice, below).

Eggs are generally enclosed in a silken egg case. Some mothers fix this to vegetation or bark and take no further interest, while others attach the cocoon to their webs. Many burrowing spiders keep the egg sac on the walls of their protective burrows. The hatched spiderlings stay in the burrow for a while and are fed by their mother until big enough to be independent. Wolf spiders make especially good mothers, carrying the egg cocoons underneath their abdomens and then allowing the spiderlings to ride on their backs, clinging to special knobby spiny hairs, until they are big enough to look after themselves.

Spiderlings emerging from burrows generally take off on foot. However, those of many species glide to their new homes. The little creature raises its abdomen and exudes a length of gossamer. When this catches an air current it lets go and drifts with winds. Spiderlings have been found thousands of metres up in the stratosphere and can travel thousands of kilometres from home. This method of dispersal means that many spider species have a very wide distribution – our golden orb weavers sometimes reach New Zealand, where they invariably die when winter arrives.

Spider enemies

Apart from the well-aimed thong, spiders do fall victim to many other enemies. They are eaten by birds and other vertebrates and many are used by predatory wasps as food for their larvae. Some wasps lay their egg on the spider's body, the larvae feeding on the living spider as it develops. Others paralyse spiders and store them with their eggs.



The little clay pots of the mud-dauber wasp (left) are filled with separate cells, each containing one egg (or larva) and one or more spiders.

Ultimate sacrifice

It is possible that redback males willingly sacrifice themselves to the females during mating. They certainly have a risky habit of somersaulting on the belly of the female during copulation and placing their abdomens temptingly in her open fangs. More than half of the males are eaten, their bodies probably making a protein contribution to the next generation. The greatest advantage, however, may be to ensure paternity; those males which are eaten manage to copulate for longer, thereby transferring more sperm, and studies have shown that their partners are less likely to remate. Since males do not live long and, often having broken their palps during their first coupling, are unlikely to mate again, their self-sacrifice may be worthwhile. Why some female spiders consume prospective mates before copulation, risking remaining virgins, still puzzles scientists.

The beneficial side of spiders

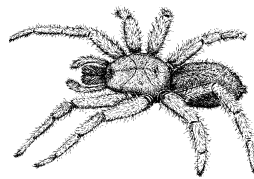
Not many people regard spiders as beneficial but they are probably major controllers of agricultural, garden and household insect pests. Their webs create natural fly-papers – from which the dead flies are regularly removed!

The strength and flexibility of spider silk has long been admired. It has been used in Aboriginal fish traps and for crosshairs in optical instruments – and is an immensely useful material for bird nest-building. If scientists find a way to synthesise it, it could be put to many uses – for industrial clothing and bullet-proof vests as well as components of air- and spacecraft.

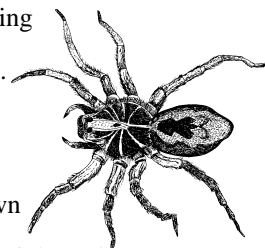
The deadly venom from funnel-web spiders could be used to produce a 'natural' pesticide. Scientists have mapped 45 active compounds in the venom and found a protein which targets insect brain cells, but does not affect humans or any other non-insect creatures so far tested. Researchers hope this can be used to produce a pesticide which could be effective against the cotton moth, in particular. These insects have developed resistance to many pesticides as well as to crops which were genetically engineered to withstand them.

Spider types

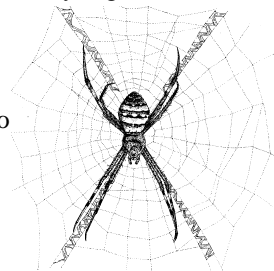
The most primitive spiders – those which have the longest history – are the Mygalomorph group. Including the funnel-web, trap-door, whistling and mouse spiders, members of this group are heavily built with elongated palps – appendages on the front of the head – which make them look as if they have 10 legs. Most live in burrows, some of which are closed with well-camouflaged trap-doors, the spiders ambushing prey from inside. These spiders rear up before striking. This is because their parallel fangs point down and they need to lift the front part of the body in order to strike downwards. The fangs of more modern spiders curve in towards each other.



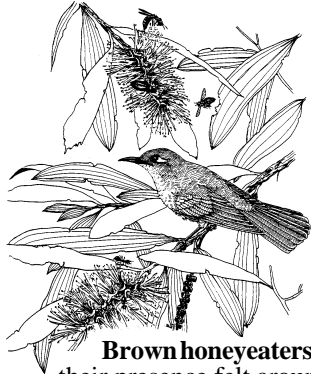
Another group are the hunters – the wolf, huntsmen, jumping and white-tailed spiders among others. Although most are thought to have evolved from web-weaving ancestors, these spiders run down their prey. To do so, they rely on good eyesight and as a result tend to have large eyes.



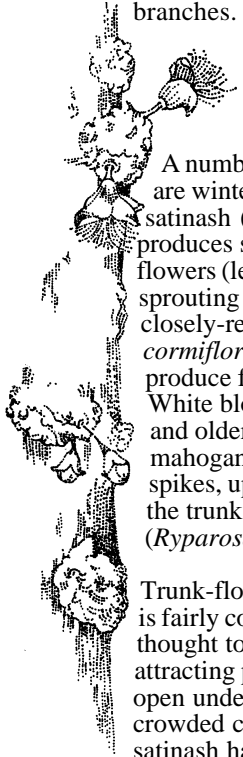
Web-building was a response to the evolution of flying insects which could not be trapped or run down on ground level. As the insects moved up, so did the spiders. The eyesight of these spiders is poor and they rely on vibrations to make sense of the world. Indeed, they are able to weave perfect webs in the dark and even if they are blinded. They are lightly built, often with long legs which also function as important sense organs.



Out and about



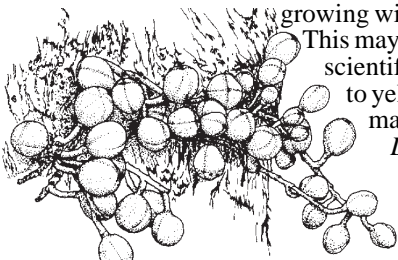
Brown honeyeaters make their presence felt around May singing loudly and mellifluously in preparation for the breeding season. Although we see them all year round, these birds are migratory further south, appearing in coastal NSW from May onwards to nest, usually in the mangroves. They build a cup of bark strips, with a preference for melaleuca, lined with softer materials, which is hung with spiderwebs from thin branches.



A number of **trunk-flowering trees** are winter blossomers. Red bud satinash (*Syzygium erythocalyx*) produces small clusters of greenish flowers (left). Although mainly found sprouting from the trunk, like the closely-related bumpy satinash (*S. cormiflorum*), this tree may also produce flowers on branches as well. White blossoms burst from the trunk and older branches of yellow mahogany, while pink flowering spikes, up to 30 cm long, sprout from the trunk of the red boppel nut (*Ryparosa javanica*).

Trunk-flowering, known as cauliflory, is fairly common in rainforests and is thought to be a useful method of attracting pollinators in the relatively open understorey rather than in the crowded canopy. A study of bumpy satinash has shown that its flowers are visited by blossom bats (the main pollinators), honeyeaters, long-tailed pygmy possums, moths, flies and cockroaches. This strategy puzzled early European botanists who may have thought that the flowers and fruits came from a leafless parasite growing within the tree.

This may explain the scientific name given to yellow mahogany – *Dysoxylum parasiticum*.



Yellow mahogany, fruiting

A **thorny devil** was found in Cairns recently. Since these desert-dwelling lizards are found only in central and western Australia, and in Queensland occur only in the far west, it is assumed that someone brought the animal back to Cairns as a souvenir.

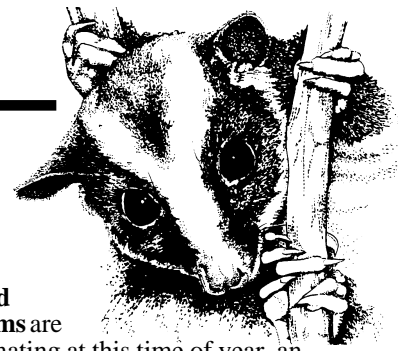
It is important to resist the temptation to pick up unusual animals. Not only is it illegal to transport most native reptiles, birds and mammals without a permit but this can have all sorts of negative consequences.

Many will die in the wrong environment – thorny devils feed exclusively on certain species found only in desert regions and are prone to respiratory infections in humid areas. Others may become pests without their natural predators. Cane toads have shown us how that can happen, and it is not unknown for Australian animals to also become a nuisance. Koalas introduced to Kangaroo Island in South Australia are damaging the vegetation, and freshwater crocs, dumped in Wet Tropics streams, are eating platypuses and other animals.

In addition, there is also a danger animals may be carrying diseases and that they may interbreed with genetically distinct stock of the same species. Carpet pythons, released on the Tablelands, are breeding with a local sub-species and reducing its distinctive characteristics.

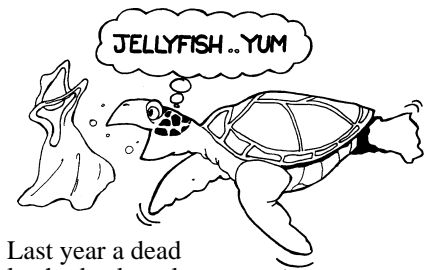


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Issues in Society Vol 145:
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 Justin Healey (ed)
 The Spinney Press (2001)
Australia's Biodiversity, Living Wealth
 Andrew J. Beattie (ed)
 Reed Books (1995)



Striped possums are busy mating at this time of year, an occupation which often involves a noisy and vigorous struggle between these normally solitary animals. Rival males have been heard emitting loud guttural shrieks as they battle over a female while actual mating has been compared to that of domestic cats, with both animals thrashing tails and screaming. Usually two young are reared – the female has two teats in her pouch.

Despite its boldly striped black and white coat, this possum is less often seen than heard or smelt. It has a strong musky odour and its presence is often indicated by the sound of scratching and falling debris as it rips into dead wood in search of larvae or the crashing noise it makes when leaping from branch to branch. Its high-energy diet of insects, fruits, honey and pollen makes it more active than most of the leaf-eating possums.

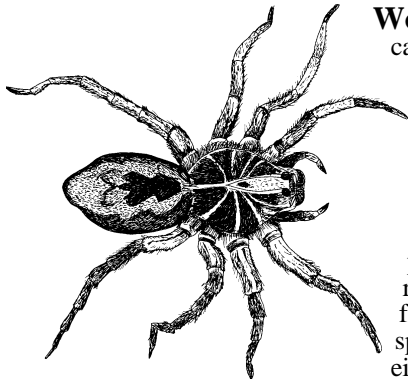


Last year a dead leatherback turtle, retrieved from waters off Bribie Island, was discovered to have five plastic bait bags blocking its guts. There is now hope that this sort of pointless death may be a thing of the past with the development of **biodegradable bags**. Looking and feeling like plastic, they are made from corn starch and break down to produce just water, carbon dioxide and carbon based humus. The material, which is manufactured in Queensland, is to be used initially to provide environmentally sensitive options for bait bags, dog poo bags and municipal compost collection bags. If it can be used for supermarket shopping bags and plastic bottles, maybe we can look forward to a future when our waterways are no longer clogged with this unsightly plastic litter.

A sample of spiders

With at least 9800 species of spiders in Australia, many of them found in the Wet Tropics, it is impossible to include them all here. This is a sample of some commonly encountered species.

Hunters



Wolf spiders, some of which can be almost as large as whistling spiders, are fast-moving hunters which run down their insect prey. They live on the ground, many constructing burrows, some with trapdoors. Most are brown, and many have a pattern of radial lines reminiscent of the Union Jack flag on their heads. These spiders have good eyesight, with eight eyes placed at the front of

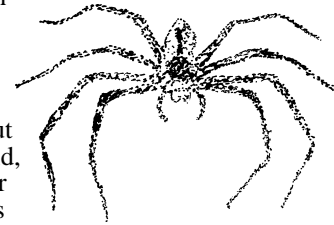
their heads, four smaller ones in a row and the others arranged in a square above. Looking like the headlights of a well-endowed, but miniature 4WD, these often catch the light of a torch at night. This is because there is a mirror-like membrane (tapetum) at the back of the eyes which reflects light back through the retina, a feature common in nocturnal animals. Two species of wolf spiders prey on cane toads.

Jumping spiders are mostly quite small. They are commonly found on plants and in the house, hopping around in search of prey. They have extraordinarily good eyesight; indeed, one northern species, *Portia fimbriata*, has telephoto vision almost as good as an eagle's. They are also the only spiders able to turn their heads. There are more than 252 species of jumping spiders in Australia. Many tropical species are brightly coloured – this common one (left) is bright green with a red and white patterned 'face'. However, some are quite dull. A fairly large black one, with quite a long body, is

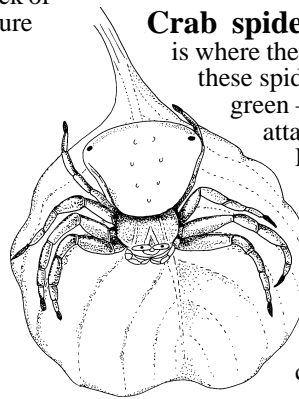


commonly seen inside the house where it could be mistaken for a white-tailed spider. Jumping spiders can leap as much as 25 times their body length. This is done by suddenly increasing their blood pressure and extending their third or fourth pairs of legs.

Huntsmen spiders are speedy spiders with long legs which can reach up to a handspan in diameter. They often scare people by racing out suddenly when disturbed – a habit which has been blamed for some road accidents when they have suddenly startled drivers. However, apart from the fright factor, most are not considered dangerous. Only the bite of the shield huntsmen may give cause for alarm. Common on tree trunks, on the ground, in forested areas, gardens and buildings, their flattened bodies allow them to hide under bark and similar crevices by day, coming out at night to look for prey. The shield, or badge, huntsmen, are named for the black, yellow and red markings underneath the body.



Crab spiders are also known as flower spiders because that is where they are often found. The most common is white but these spiders also come in shades of orange, red, yellow or green – apparently good camouflage for their ambush attacks on visiting pollinators and other insects.



However, it would be interesting to know if these spiders, like the flowers they sit upon, reflect UV light. A yellow flower appears blue to a UV-sensitive bee so does a yellow crab spider appear as a shadow or does it manage to blend in? On the other hand, to a predatory bird a yellow spider may be well-disguised against the flower – although we now know that many birds can also see UV rays!

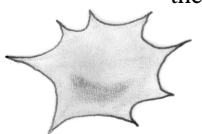
Some crab spiders take deception to extremes by disguising themselves as bird droppings. Coloured creamy-white and brown/black they sit on a pad of silk which not only looks like faeces but also smells like it, the foul odour apparently attracting flies and even dung-feeding butterflies to their doom. These spiders are found in north Queensland so next time you see a bird dropping, take a closer look.

The common name, crab spider, comes from the habit these spiders have of capturing prey, crab-like, with their spiny front legs. They do not build webs, females bending over leaves and gluing them with silk to produce egg chambers.

Around the house

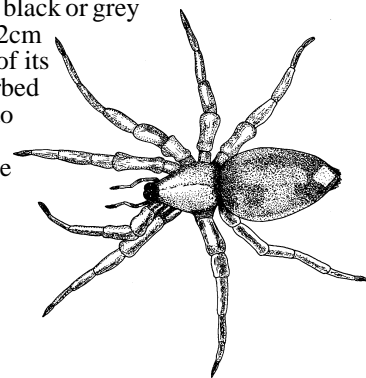
Black house (window) spiders are responsible for the dense untidy webs found around houses and other buildings, often in corners of windows, doors and so on as well as in vegetation. Vaguely funnel-shaped entrances lead to this timid spider's retreat. They eat moths and other spiders, including redbacks, so their presence may reduce the chances of redbacks moving in.

The **grey house spider** has two very long striped front legs, often held out straight in front of its body. Although easily overlooked, this common spider is quite distinctive when spotted in its messy web. On close inspection, its abdomen can be seen to have a peak on the top. More obvious than the animal itself, is its egg case (left). It is greenish-grey and oval with a series of points around the edge. This species belongs to one of only two non-venomous spider families.



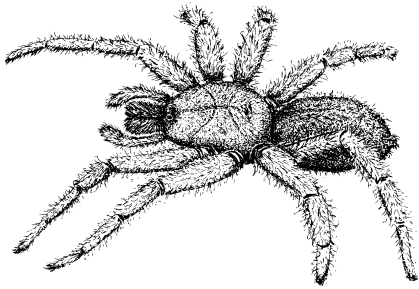
Daddy-long-legs are unmistakable with their small bodies and very long spindly legs. They build fine extensive webs and have a habit of bouncing rapidly up and down in them when disturbed. Feasting on redbacks and white-tailed spiders, they are a useful, if untidy, addition to a household. The most commonly seen spiders in this group have been introduced to Australia.

The **white-tailed spider** is a black or grey spider with a cylindrical body 1-2cm long and a white tip on the end of its abdomen. It is common in disturbed and urban areas where it tends to hide in crevices by day but is often seen wandering around the walls of houses at night looking for prey. It does not build a web but ambushes its prey, feeding largely on other spiders, with a particular taste for black house spiders.



Redback spiders, although they are associated particularly with drier areas, can be found all over Australia. However, they are rare north of Rockhampton so it is possible that those found in the Wet Tropics have hitched a ride here. The female is black with a red stripe on the back. The male is much smaller, brown with a white, rather than red, stripe and is not often seen. The web is messy with a broad funnel, built in quiet corners, under logs and so on.

Primitive spiders



Barking/whistling/bird-eating spiders are our 'tarantulas'. As big as a handspan, with thick hairy legs, they are the spiders of an arachnophobe's nightmares – but others find them endearing pets. They are Australia's largest spiders and second only to the South American bird-eating spider in size. On the whole, they tend to stay well out of sight in open silk-lined burrows, up to a metre deep, coming out at night and dawn to feed. However, during wet spells they are sometimes forced out of their burrows and may wander into houses. Males also travel in search of mates.

These spiders feed mainly on insects, lizards and frogs, pouncing on prey of their own size and immobilising it quickly with strong poison. They have even been seen eating fish. Although sometimes called bird-eating spiders this is not their prey of choice, although an easily overwhelmed bird on the ground may occasionally fall victim and one was caught making off with a turkey chick. The whistling, or hissing noise, produced when the spider is alarmed, can be heard from two metres away. It is created by the spider rubbing together special spines on the base of the palps and the jaw. No one is sure why they are called barking spiders but it has been suggested that the origin of this name may be the noise made by nearby quails (birds).

There are several types of whistling spiders. One species, living in dry areas, is thought to pull snail shells over the entrance to its burrow to avoid being burnt in bush fires.

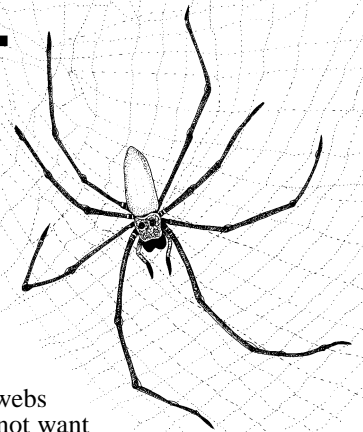
Funnel-web spiders in the tropics

There are over 30 species of funnel-web spiders in Australia although only 15 have been named. Most are found in the south-east of the continent, with the very dangerous Sydney funnel-web restricted to a relatively small area around Sydney. No funnel-webs were thought to exist north of about Gladstone – until the recent discovery of a new species, 1000km to the north, in the Wet Tropics.

However, there is no need to worry. To find one of these funnel-webs you would have to march for one day through rugged terrain into relatively inaccessible upland mountain rainforests on the edge of the Carbine Tableland, to the west of Mossman – and know what you are looking for. Spider experts have so far only been able to find three individuals.

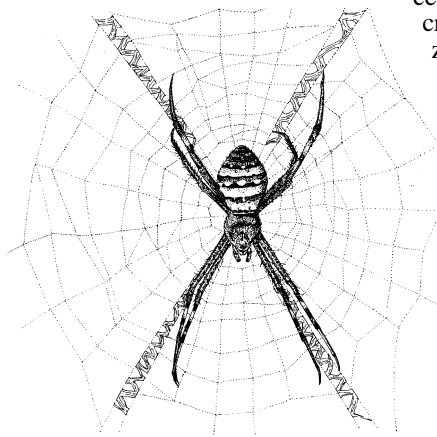
Weavers

Golden orb weavers are among the most spectacular and visible of our spiders. Hanging in the centre of her magnificent shining golden web, day and night, the female of some species can measure almost 5cm in body length with legs to match. The males, by contrast, are tiny dark-coloured spiders which may be seen around the edge of the web (but not to be confused with dewdrop spiders, see below). The golden colour of the web serves to attract insects, working rather like the UV-reflecting strands on the St Andrew's Cross web (see below). It may also help to warn off potential predators such as birds. The silk of these webs is unusually heavy and very strong so birds would not want to become entangled. Indeed small ones which occasionally become trapped do not live to avoid making the same mistake again, but are eaten by the spider. The price of the meal, however, is a badly damaged web.



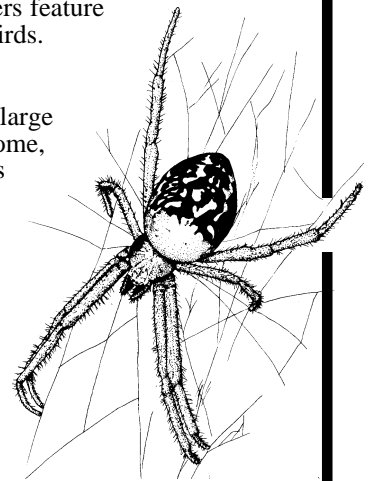
Garden orb weavers are smaller, stouter spiders which build large sticky silver webs at night. In the morning they eat them up again, leaving foundation lines in place, and hide away carefully for the rest of the day.

St Andrew's cross spiders make a distinctive web with a trademark cross in the centre. Reminiscent of the shape of the St Andrew's cross on the Scottish flag, it is formed from a thick zig-zag of white silk. The spider normally sits in the centre of this cross with its eight legs arranged neatly on the diagonals. It is believed that both the thicker strands of the cross and the body of the spider reflect UV light, fooling insects into believing they are either visiting flowers or heading towards the light of an open space. (Incidentally, the spiders are unable to see UV.) Although flying insects are the main prey, these spiders have been known to feed on skinks which have become trapped. On the other hand, the spiders feature on the menu of friarbirds.



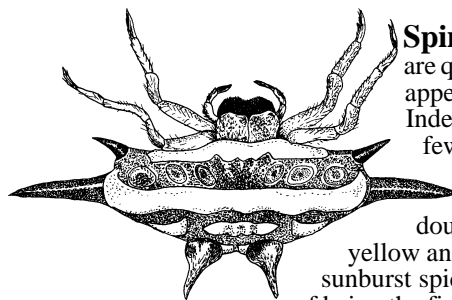
Tent spiders

Tent spiders build large tangled webs, almost a metre in diameter, with a central dome, or tent, which may be more or less obvious. Some species hide inside this tent, others hang in the open. The adult spider may be quite colourfully patterned, depending on species. Sometimes many spiders build their webs together in huge sheets and for this reason have earned the names corroboree, or community, spiders.



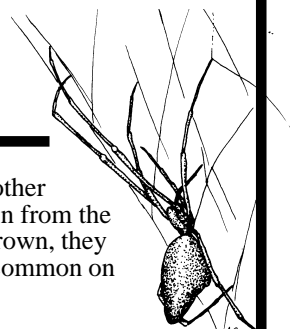
Spiny spiders

Spiny spiders are quite bizarre in appearance. Indeed, it requires a few moment's inspection to work out that this creature is actually a spider, its strange spiny shape no doubt baffling predators as well. Striped with yellow and maroon, this species is also called the sunburst spider, or jewel spider, and has the distinction of being the first spider collected in Australia by Cook and crew. Other species in this mainly tropical group of spiders are equally bizarre in appearance. They build webs quite low down in vegetation and can sometimes be seen in gardens.



Squatters

Dewdrop spiders are squatters. These tiny spiders live on other spiders' webs stealing food from their hosts and sometimes even from the mouths of the larger spiders. Ranging in colour from silver to brown, they are often mistaken for mates, or children, of the host. They are common on the webs of golden orb weavers and tent spiders.



Questions & Answers

Q Is it possible to tell the age of an individual king fern (*Angiopteris evecta*)?



A It is difficult. These magnificent plants grow quickly, producing 2-3m fronds within a few years. However, they are slow to make butts. One plant in the Royal Botanic Gardens in Sydney was removed when it started poking through the roof. By that time its butt was about one metre high and one metre wide and it had been in place for about 50 years. Since it is likely that a large specimen was originally chosen, it may actually have been up to 100 years old. However, that is an educated (botanist's) guess.

Aging these plants is complicated by the fact that, like many ferns, they grow from suckers. At the base of the king fern stem are two ear-like structures called auricles which are capable of growing into new plants. Indeed, this seems to be their main method of propagation since their spores do not germinate readily. The original king fern plant may have long ago died and rotted away, leaving behind clones which are technically part of the parent. It is therefore likely that all the plants in one area are genetically identical, having descended in this way from a very ancient progenitor. Elsewhere in the world great ages have been attributed to other types of plants which reproduce by suckering, the original plant never having actually died.

King ferns need a lot of water and grow well near creeks. Interestingly the huge fronds, which can reach 8m in length, have no structural tissue and are held up by water pressure

alone. If the plant becomes dry, the leaves sag. It is important when constructing tracks and paths to consider the impact any disruption to the water flow may have on these lovely plants.

Acknowledgements to Peter Hind, Royal Botanic Gardens, Sydney.

Q Could you give me some information on the lifecycles and predators of leeches?

A Leeches are segmented worms (each has 34 segments) and although closely related to earthworms are rather more specialised. There are a number of species which range in size from 7mm to 200mm when extended. Most live in freshwater but some are marine and others live on the land, in damp areas such as rainforests.

Leeches are hermaphrodites, with both male and female sex organs. Two animals intertwine, exchanging sperm. An area of thickened skin, forming a cocoon containing eggs and nutrients, is then shrugged off over the leech's head. This is buried or attached to a rock or suchlike where it dries into a tough foamy crust. After a period ranging from weeks to months miniature adults emerge. Leeches die after they have reproduced once or twice.

There are several predators of leeches. Fish, turtles, frogs and some birds as well as damselfly and dragonfly larvae feed on freshwater leeches. Pittas have been seen carrying wriggling beakfuls of leeches to their young, though how they cope with them is a mystery.

For more information have a look at the Australian Museum website on www.amonline.net.au/factsheets/leeches.htm

Facts and stats

There are about 36 000 spider species in the world with at least 9800, belonging to 70 families, in Australia. Only about 2500 of these have been named.

Some spiders, such as the whistling spider, live for over 20 years in captivity but many, including some large orb weavers, survive only one or two years.

Although female spiders are notorious for eating their mates, one flower spider in southern Australia (*Diaea ergandros*) sacrifices herself to the next generation, allowing her developing young to feed on her body.

In the 1960s spiders were given psychotropic – mind-altering – drugs as well as blood and urine from schizophrenic patients who were thought to be producing hallucinogenic chemicals naturally. This led to some chaotic web-building but helped scientists to determine differences between some of the chemicals involved.

Some insect larvae, notably caterpillars, can spin silk but spiders are the only adult invertebrates which can do so.

Female whistling, trapdoor and funnelweb spiders continue to moult even after they are mature, allowing them to shed unused sperm and to become virgins once again! Males, and most other spiders, stop moulting when they reach maturity.

The effect on humans of venom from the male Sydney funnel-web spider seems to be just an unlucky chemical coincidence. Although it also affects monkeys and newborn mice, the component which kills humans has little or no effect on other mammals. Additionally, it is not as concentrated in females which thrive perfectly well without it.

Some spiders, notably from the jumping and sac spider groups, mimic ants. Their elongated abdomen, or sometimes the cephalothorax (head-thorax), has a waist, giving them an ant-like appearance. The first pair of legs may be held up to imitate antennae and the spider runs around like an ant. Thus disguised they join ant trails, picking off their fellow travellers. The disguise may also be protective since an ant is less likely than a spider to be eaten by a bird.

The name 'tarantula' is used for a number of different animals – a giant tail-less whip scorpion in eastern Asia, thick-legged spiders from America and Australia and a large black spider from southern Europe. A bite from this spider is believed to cause dancing mania (tarantism), the origin of the rapid whirling southern Italian dance, performed to the tarantella (music).

Spiders are being taken up into space to see how they weave weightless webs.

Tourist talk

ENGLISH	GERMAN	JAPANESE
spider	Spinne	kumo くも
web	Netz	kumo no su くもの巣
spider silk	Spinnengewebe	ito 糸
venom	Gift	doku 毒
to hunt	jagen	kari o suru 狩りをする
to weave a web	weben	haru 張る
to trap	fangen	wana o kakeru わなをかける
to spin	spinnen	ito o dasu 糸を出す
burrow	sicheingraben	ana 穴
adhesive/sticky	klebrig	nebari tsuku 粘りつく

The silk spinners

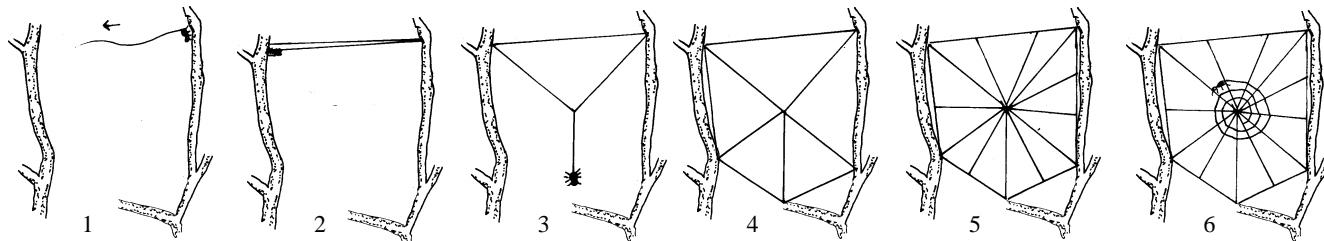
All spiders can spin silk, whether they make webs or not, and put it to a number of uses.

It is thought that the original function of silk was reproductive. All spider eggs are wrapped in silk and the male uses it when transferring sperm to his palps for mating (see page 2). Then, when the spiderlings are ready to disperse, many hitch a ride on air currents using a fine strand of gossamer. Most spiders, including hunting ones, lay down a dragline when moving about which acts as a safety line if they are knocked off their perch or need to flee and many use silk to wrap and immobilise captured prey. This versatile substance is also used to build nests and to line tunnels.

Silk is produced from protein and is extruded through spinnerets. There may be up to six or even eight of these located, often quite visibly, at the end of the body. Within these spinnerets are as many as a thousand short conical structures, known as spigots which are connected to six silk glands in the abdomen. Each gland opens through a specific set of spigots and produces chemically and physically different silks with different functions.

It used to be thought that the mechanical action of pulling the thread caused the liquid silk to harden into a solid elastic form as it left the spider's body. However, it was recently discovered that the spider is able to extract hydrogen ions from water and use them to make an 'acid bath' which serves to harden the silk as it passes through at the last minute. Acid baths are used in the manufacture of industrial fibres, but the spider's methods are much more efficient and economical.

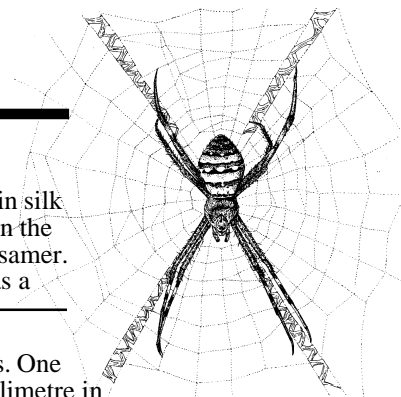
Web weavers



The standard web starts with one strand of silk which is carried by air currents (1) until it attaches itself to an object and can be pulled tight. The spider climbs along the line, spinning another as it goes (2). It then climbs half way back and, when it reaches the centre, drops down on a new vertical line. When tightened, this creates a Y shape (3). More radiating spokes are put in place along with perimeter frame lines (4&5). Then the spider, starting at the inside, lays down a spiral of dry thread (6). This is a temporary scaffold which is later removed as the spider works its way back from the perimeter to the centre, putting the final adhesive silk spiral in place. This entire production may take as little as 20 minutes, even though it involves over 1500 junction points and requires 10-30 metres of silk.

Some spiders build a new web each night. Others replace the adhesive silk every few days. Old silk is eaten and the protein recycled into the new web. The habit of eating web silk at dawn is thought to increase a spider's water intake. It would be inconvenient for a web-weaving spider to roam around in search of water, but the gluey droplets on the web silk absorb quite a lot from the atmosphere.

Spiders do not get stuck on their own webs because the silk threads slide through special claws on the ends of their feet.



Silk varieties

Spider silk is nothing less than miraculous. One thread may be as thin as 25,000th of a millimetre in diameter but it is second only to fused quartz in breaking strength. It has been calculated that (in terms of speed per unit weight) an orb web can withstand an impact equivalent to that of a jet aircraft each time an insect flies into it.

Two main types of silk are used in the making of webs. The oldest is a dry (cribellar) silk which is thought to have been developed by the most ancient spiders. It consists of numerous very fine and closely packed threads, composed of at least three different types of silk, drawn simultaneously out of many spigots using comb-like features on the end of the last pair of legs. Although not a sticky silk, this type of fibre effectively traps prey. It has a fuzzy structure and it is thought that electrostatic attraction may also be involved. The messy webs of black house spiders are made from this silk.

A new improved silk, developed later, is now used by the majority of web builders. More economical and faster to produce it is also finer, and therefore less visible and, being sticky, is more effective at trapping insects. The central one of three spigots produces two dry support lines on which the other two spigots deposit sticky droplets – a type of silk which does not harden. The product looks like well-spaced beads on a string; the 'beads' are like drops of glue with a large surface area for effective capture of prey. This sort of adhesive silk is produced mainly by the orb-weaving spiders and their relatives, which include the redbacks.

Unconventional webs

The net-casting spider builds a lacy rectangular web which it holds between its long front legs, hanging upside down until a suitable insect walks underneath. It then pulls out its legs to stretch the net and lunges down to trap the victim underneath. This spider is sometimes known as the ogre-faced spider because two of its eight eyes are enormous; they are needed to focus well for an accurate attack.

The female bolas spider uses a single line, with one or more sticky droplets on the end, to fish for the innocent love-struck male moths which form her exclusive diet. By emitting a scent which mimics the smell of a female moth, she attracts the males towards her. Sensing their presence, through vibrations of hairs on her legs, she then begins to whirl her 'fishing' line in circles until she makes a strike. Their coating of loose, disposable scales allows moths a better chance of escaping from spiders' webs than most insects but the bolas spider's trap is just too sticky. Young bolas spiders cannot cope with large male moths, so seem to employ a different scent which attracts moths of a smaller, more manageable, species.

Bookshelf

Wildlife of Tropical North Queensland Queensland Museum (2000)

The section on spiders, in this comprehensive book, gives a useful identification chart for the most common spiders along with photos and descriptions of 44 species.

Toxic Plants and Animals

A Guide for Australia
Queensland Museum (1987)

There is a useful chapter entitled *An easy guide to common spiders of the northeast and their allies* along with other chapters on the redback spider, distribution of funnel-web spiders and treatment of tick, scorpion and spider bites.

Invertebrate Zoology

E.E. Ruppert & R.D. Barnes
Saunders College Publishing (1994)
Good general spider biology.

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**A new species of funnel-web spider
(Hadronyche: Hexathelidae:
Mygalomorphae) from North**

Queensland

Robert J. Raven
A paper on the Wet Tropics funnel-web.

Australia's tarantula or whistling spiders

Robert J. Raven
Queensland Museum
Leaflet on collecting and keeping these spiders.

Articles on St Andrew's Cross spiders:

Geo Vol 14 No 2 May-July 1992

Courting disaster

Ronald Rose

Nature Australia Vol 25 No 3

UV invitations

Nature Australia Vol 25 No 10

Silky lures

Other articles

Australian Natural History Vol 23 No 2

Picking up the threads

Mike Gray
A detailed article about different silks.

Australian Natural History Vol 23 No 4
Spiders that smell

Australian Natural History Vol 24 No 8
Watery webs

Nature Australia Vol 25 No 6

Supreme sacrifice

The mother spider eaten by her young.

Nature Australia Vol 25 No 9

Redback suicide

New Scientist 17 May 1997

Spider gives kiss of death to pests

Wilson da Silva
Funnel-web venom pesticide development.

Nature Australia Vol 26 No 7

Spider silk production line?

Acid bath silk production method.

Websites:

Queensland Museum:
www.qmuseum.qld.gov.au/features/spiders/

Also:
www.uq.edu.au/~xxraven/spiders.html

Australian Museum:
www.austmus.gov.au/is/sand/inf.htm

This newsletter was produced by the Queensland Department of Environment and Heritage (now The Environmental Protection Agency) with funding from the Wet Tropics Management Authority.

Opinions expressed in *Tropical Topics* are not necessarily those of the Department of Environment and Heritage (EPA).

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Environmental Protection Agency

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