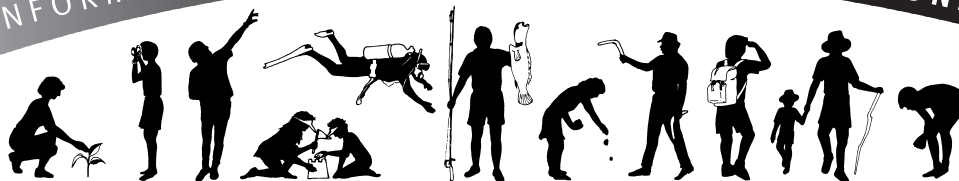


TROPICAL TOPICS

AN INFORMATIVE NEWSLETTER ABOUT THE ENVIRONMENT



Notes from the Editor

There are six main snake families in Australia – elapids (venomous snakes, the largest group), colubrids ('harmless' snakes) pythons, blindsnakes, filesnakes and seasnakes.

Australia is the only continent where venomous snakes (70 percent) outnumber non-venomous ones. Despite this, as the graph on page one illustrates, very few deaths result from snake bites. It is estimated that between 50 000 and 60 000 people die of snake bite each year around the world. By comparison, in Australia there have been only 38 deaths from snake bites during the last 23 years – fewer than two a year.

Rather than focusing on the danger our snakes pose, it is much more interesting to concentrate on how fascinating these creatures are.

I would like to thank Greg Watson, Gavin Bedford, Junko Godwin and Brigitta Flick for their help with this issue.

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Very venomous but ...

Australia is home to some of the most venomous snakes in the world. Why?

It is possible that strong venom may have evolved chiefly as a self-defence strategy. It is interesting to look at the habits of different venomous snakes. Some, such as the coastal taipan (*Oxyuranus scutellatus*), bite their prey quickly, delivering a large amount of venom, and then let go. The strong venom means that the prey doesn't get far before succumbing so the snake is able to follow at a safe distance. Taipans eat only mammals – which are able to bite back, viciously. This strategy therefore allows the snake to avoid injury.

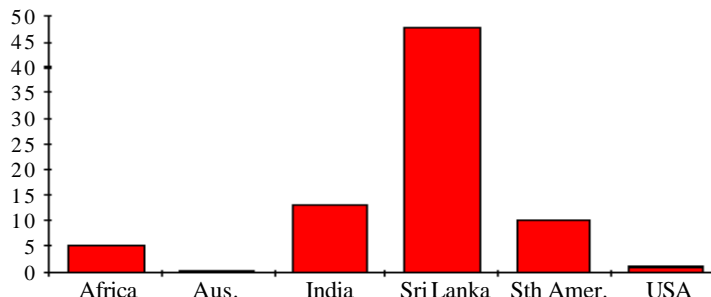
On the other hand, the most venomous snake, the inland taipan (*O. microlepidotus*), also known as the small-scaled or fierce snake, tends to live in the burrows of its main prey, the long-haired rat. Unable to retreat from its prey in this confined space it has a greater need to finish it off quickly. Its more risky attack strategy entails holding its prey with its body and biting repeatedly. However, this snake can deliver, in one bite, more than 40 000 times the venom needed to kill a 200g rat and it contains a special component which causes the toxin to rapidly invade the body. Its prey has

little chance to fight back.

While coastal and inland taipans eat only mammals, other venomous snakes feed largely on reptiles and frogs. Venom acts slowly on these 'cold-blooded' creatures with slow metabolic rates, so perhaps it needs to be especially strong. In addition, as many prey species develop a degree of immunity to snake venom, a form of evolutionary arms race may have been taking place.

... not necessarily deadly

Some Australian snakes may be particularly venomous, but they are not the most dangerous for humans, as the graph below shows. The low fatality rate, compared with many other parts of the world, is attributed to Australia's sparse population, use of better footwear and better medical treatment, including availability of antivenoms. Also, Australian snakes are shy and comparatively reluctant to bite, often not injecting venom when they do bite. Indeed, a New South Wales study showed that it is humans who are more aggressive with people 100 times more likely to attack a snake than the other way round.



Graph courtesy Brian Bush

A comparison of annual snakebite fatalities per million people from around the world. To standardise comparisons, published data compiled between 1945-1960 was used. Australia's current figure is 0.13 per million but during the period used here it was 0.45 per million.



Snake venom

Venom is modified saliva which is designed, in carnivores, to break down body tissue.



If human saliva was injected into another human they would react as if affected by a toxin – but people are not considered a venomous species. Saliva simply contains poisonous compounds.

Sometimes, however, it has been modified further and contains components which cause paralysis, blood-clotting and other serious symptoms. When an animal has also developed long teeth attached to storage glands, to deliver the venom deep into its victim, the result is potentially fatal. Nonetheless, while venom is often used by a snake to subdue and kill prey, it is also important for starting digestion – useful when a large animal is to be processed in the stomach of a cold-blooded reptile. This could be the primary function of many snake venoms.

Venom is thought to have evolved when snakes began to attack and eat the first small, primitive mammals. It has long been thought that this happened several times in different snake species. However, following analysis of venom from snakes all over the world, Dr Bryan Fry*, of the University of Melbourne, says evidence indicates that it evolved only once, a few hundred million years ago, in a large swamp monster similar to today's anacondas. Dr Fry argues that it was the different fang designs which evolved separately, developing only when there was something useful – venom – to deliver.

On the positive side, there is potential for snake venom to be used in drug design, just as the deadly venom from cone shells has been used to create pain killers. Snake venom often

causes blood pressure to drop and extracts from cobra venom are used to lower blood pressure in stroke victims.

Fang design

Many snakes, such as pythons, have lots of sharp teeth, but none dedicated to delivering venom. However, various groups have evolved pairs of hollow, elongated teeth which are connected to venom glands. As the snake bites, muscles in this gland contract and venom is squeezed through the teeth.

Some snakes have fangs in the back of their mouths where leverage enables the snake to drive the tooth well into the victim – as long as it has been caught securely. Rear-fanged snakes include the brown tree snake, Macleay's water snake and mangrove snakes. These are not considered dangerous to humans.

The more dangerous snakes, from an Australian point of view, are those with fangs at the front of their mouths. The fangs of almost all dangerous Australian snakes are fixed – they cannot move – so their length is determined by the need to fit in the mouth. The longest fangs are found in the taipan, with the mulga, western brown, death adder and Collett's black snake coming close.

Vipers, found outside Australia, have the longest fangs, hinged to fold back into the mouth. Only one Australian species, the death adder, has fangs which fold back, but only to a limited extent.

*See Bookshelf, p.8, for a link to Dr Fry's work.

Toxicity ratings

The toxicity of snake venom is gauged by the amount required to kill 50 percent of a sample of mice. However, this does not necessarily relate to the effects in humans and different individual humans vary in susceptibility. When determining how dangerous a snake really is, other factors need to be taken into account. How much venom does the snake inject? How long are its fangs? Is the snake likely to attack? How often are people likely to encounter the snake? Australia's venomous snakes are relatively shy and reluctant to bite.

Although the venom of the inland taipan is almost four times as toxic as that of its cousin, the coastal taipan, when all other factors are taken into account it is the coastal taipan which tops the list of Australia's most dangerous snakes. That is because the inland taipan lives in a sparsely populated area, is shy and does not have long fangs or deliver a large amount of venom. The coastal taipan, however, has long fangs, injects more venom, lives in populated areas and is more likely to attack.

Eastern brown snakes, with the second most toxic venom, deliver only small amounts and have small fangs but

because of their temperament and strike rate are considered one of the most dangerous snakes. The brown snake group (several species) is blamed for 22 of the 38 human deaths recorded between 1980 and 2003.

The mulga (king brown) snake injects more venom in one bite than any other snake – but it is of comparatively low toxicity and few human deaths have been blamed on this species.

Bite stats

North Queensland has the highest number of reported snake bites in Australia. A report recently released from the Cairns Base Hospital** showed that 264 people were treated at the hospital for snake bites over a five-year period (1 January 1996-31 December 2000). Of those bitten, 61 percent tested positive for venom, but only 10 percent showed clinical symptoms. Antivenom was administered to 20 patients (7.6 percent). One patient died of a bite from a brown snake. Perhaps the most disturbing finding from this study was that only two patients had received correct first aid following their bite. (See Safety first.)

**See Bookshelf, p.8.

Safety first

In Australia, more than 80 percent of bites occur when people try to catch or kill snakes. The golden rule is not to corner or attack a snake. As identification is often difficult, people are advised not to handle a snake even if they believe it is non-venomous.

When dealing with a snake bite the priority is to prevent the poisons from moving from the bite site into the general circulation.

- Do not try to catch a snake, or kill it.
- Do not apply a tourniquet or suck the wound.
- Do not wash the wound. Traces of venom help medical authorities identify the snake.
- The victim must keep calm and as still as possible.
- Wrap the affected limb firmly with an elastic bandage or clothing, starting from the toes or fingers and moving towards the trunk. Splint the limb to prevent movement. Do not remove the bandage.
- Call an ambulance or transport the victim to hospital.

Snake history

Snakes are generally believed to have evolved from lizards. Why they lost their legs (though pythons retain traces of legs in the form of small spurs) has been disputed. Originally this was thought to have happened to allow these creatures to slide more easily along narrow burrows. However, studies of the features of early snakes suggest they were not burrowers but may instead have developed from swimming, eel-like, marine goannas called mosasaurs.

We know about Australia's earliest snakes only from fossils. Many of these belonged to the Madtsoiidae group, some of which are thought to have been enormous – 6-10m in length with the girth of a telegraph pole. Remains of these snakes have also been found in Africa and South America suggesting they evolved before the ancient continent of Gondwana began to break up about 180 million years ago. Curiously, although they became extinct on all other continents about 55 million years ago, in Australia – where their remains are particularly abundant, especially at the Riversleigh Australian Fossil Mammal Site in Boodjamulla National Park in

Queensland – they started to decline only about 15 million years ago. It is thought that some of these impressive animals were still around within the last 100 000 years so it is possible that Aboriginal people encountered them when they arrived. There may, in fact, be links to the Rainbow Serpent Dreamtime beliefs, widespread among Aboriginal people.

It is believed that venomous snakes – the elapids – arrived here from Asia about 20 million years ago when Australia, moving north, collided with the Asian plate thus allowing a number of animals to island hop to Australia for the first time. They are thought to have spread quickly and now inhabit the entire continent. Pythons, also widespread, may have come with the venomous snakes or may have already evolved here. The colubrids arrived much more recently and have spread only as far as the coastal and tropical fringes. Many species are also found in New Guinea and Asia, having evolved little in the short time they have been in Australia.



The next generation

At breeding time, male snakes, particularly pythons and elapid (venomous) snakes, can be quite competitive over their mates. They sometimes engage in wrestling matches when each tries to push its head higher than its rival.

Male snakes (and lizards) have two penises which are stored, inside out, within sheaths at the base of the tail. Only one, usually the one on the appropriate side, is used at a time. Each species has a different design, with various ornaments, spines and hooks, the latter used to 'lock' the pair together during mating. Sperm can be stored in special parts of the female's reproductive system and not used until the eggs are released into the uterus, sometimes months or years after mating.

Many Australian snakes lay eggs. This reduces the time the pregnant mother needs to carry around heavy offspring, which can equal a quarter of her body weight. Eggs are usually laid within a few weeks of fertilisation but live births take one or two months longer. Live-bearing probably evolved as eggs were retained for longer and longer periods in cooler areas, where temperatures were too low for the eggs to hatch successfully. Certainly, in Australia, the cooler the climate, the more likely snakes (and lizards) are to produce live young. However, some snakes in the tropics, such as death adders, give birth to live young. Many of the live-bearers – mangrove snakes, filesnakes and some seasnakes – live in water. Although this must be more convenient in a water environment, it is thought that since many of these are recent arrivals, their live-bearing habit actually evolved in a cooler climate elsewhere.

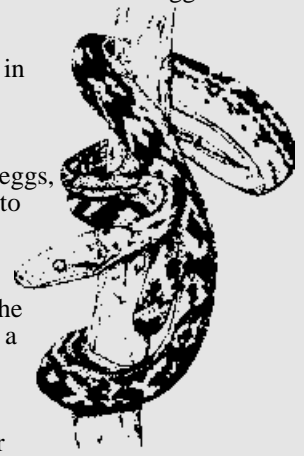
Most snakes in temperate zones give birth in summer when temperatures are highest, but those in the tropics have variable seasons. Some may reproduce all year round or their preferred season may be determined by wet or dry seasons. Females do not necessarily reproduce every year. Arafura filesnakes probably produce young only every 10 years, on average. Since female snakes often stop feeding while pregnant, it may take them some years to recover sufficiently to do so again.

Apart from pythons, most Australian snakes desert their eggs as soon as they have been laid although there have been reports of eastern brown, mulga and keelback snakes being found with their eggs and maternal care may be more widespread than thought.

Shivering pythons

The eggs of most Australian snakes take from two to three months to hatch at 30deg., but an increase of just a few degrees in temperature can reduce the time required. Python mothers take steps to ensure that their eggs are kept as warm as possible, even generating heat with their own bodies, a feat almost unheard of in 'cold-blooded' reptiles.

Most female pythons coil themselves tightly around their eggs, which are soft shelled and stick to each other. During the day, the mother may leave her eggs and bask in sunshine, returning to wrap her warmed body around the eggs. When temperatures fall to a certain level, many species act like mammals – their muscles contract rhythmically and they shiver. This serves to warm their eggs.



Studies have shown that pythons use two types of shivering. Species in cooler, temperate areas shiver more like mammals, with more prolonged muscle contractions. This is the most efficient method. Diamond pythons have been recorded exceeding air temperature by almost 7deg and carpet pythons can raise their body temperatures by over 3deg. above the surrounding air. Pythons in tropical areas use a less efficient periodic pulsing method. Water pythons studied gained only 2-2.5deg. above air temperature.

When python eggs hatch the mothers, their work done, slide off and leave their offspring to fend for themselves. Having invested up to six months and two-thirds of her body weight in this enterprise, it is time for the female to look after herself.

Scales in the savanna

Elapids

There are at least 65 species of elapid snakes in Australia, though further study is likely to increase this number considerably; some scientists currently recognise 90. They are all characterised by fixed front fangs and are all venomous, though only about 20 are considered potentially fatal to humans. Many are small. Most elapids are ground dwellers – only three species are regularly found in trees, although some others will climb up, especially when threatened by flooding.

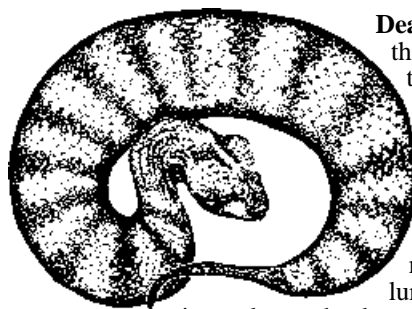
Brown snakes

Not all brown snakes are brown. Indeed, they are very variable in appearance.

Members of the same species can be orange or almost black, striped or plain and even hatchlings from the same clutch of eggs can look different. Their most distinctive feature is their pronounced brow ridge. Brown snakes are the cause of most snake bite fatalities in Australia.

The **eastern brown snake** (*Pseudonaja textilis*) which inhabits most of the eastern half of the continent, is one of Australia's most dangerous snakes. It is common in farming areas, towns and suburbs – it is fond of house mice – and becomes very aggressive when threatened. However, its offensive temperament has probably been overstated. Like all snakes, it prefers to quietly disappear. A study in New South Wales found that half of all eastern brown snakes retreated when people came near, many others remained stationary and only three percent moved towards the intruder. Less than one percent behaved aggressively, usually after being touched or trodden upon. Nonetheless, when cornered this snake is impressively assertive, hissing, rising up and striking rapidly.

The **mulga snake** (*Pseudechis australis*) is also commonly known as the king brown. It is not one of the brown snake group but instead belongs to the 'black snake' genus (not all of which are black!). It is Australia's most widespread snake and can be found throughout much of the continent. It is a large snake; individuals in the Northern Territory and Cape York Peninsula grow to almost three metres. The mulga snake feeds on other snakes, quickly killing them with its venom although it is apparently not vulnerable to their toxins. It also eats lizards, small mammals, birds and frogs. Numbers appear to be dropping in areas colonised by the poisonous cane toad.



Mulga snake

The western brown snake

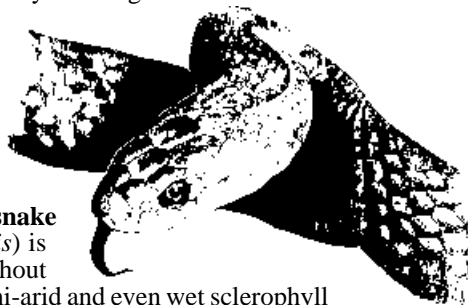
(*Pseudonaja nuchalis*) is found widely throughout Australia in arid, semi-arid and even wet sclerophyll areas, but is absent from much of the east coast. However, there are thought to be at least seven distinct groups and because at least three cannot interbreed, they are almost certainly different species. Colours are variable and these snakes tend to be darker in winter and paler in summer.

The western brown is active by day, but nocturnal in hot weather, and eats lizards and small mammals, such as house mice, birds and small snakes. It is shy and reluctant to bite humans unless cornered. Although it has long fangs and delivers a large amount of venom, it is less toxic than that of the eastern brown.

Death adders (*Acanthophis* spp) are the closest thing we have to vipers in Australia. In addition to their teeth (see p.2) they also resemble these dangerous snakes in shape, behaviour and ecology – but they are not related. Death adders are ambush predators which hide, curled, in leaf litter. The end of a death adder's tail abruptly narrows to a worm-like lure and when potential prey such as lizards, birds, mammals or frogs come near the snake flicks this lure. Mistaking it for a tasty morsel, for example an

insect larva, the duped animal often pounces, only to find itself swiftly pounced upon. This ambush habit of the death adder means that it does not, like other snakes, retreat when people come near. However, it seems reluctant to bite people, even when gently trodden upon. Nevertheless, a bite from a death adder is a very dangerous one and should be avoided.

There are three species of death adders in Australia. They vary in colour with grey ones more abundant in cooler areas where their colour may help them to warm up quickly. Reddish coloured ones are more common in hotter areas.



Filesnakes

There are only three species of filesnakes in the world, two of them found in Australia. Sharp, pointed scales give them the rough texture for which they are named and undoubtedly help them to grasp slippery fish prey as they constrict it before swallowing. They can even anchor themselves by the tail when catching large fish. Their skin hangs loosely on their bodies giving them a baggy appearance.

Filesnakes are non-venomous and completely aquatic. The little filesnake is confined to coastal fringes of northern Australia and has a salt-excreting gland. The **Arafura filesnake** (*Acrochordus arafurae*) lives further inland, in freshwater billabongs and slow-moving rivers across the Top End and around the Gulf of Carpentaria. It was not described as a separate species until 1980. It is estimated that individuals manage to catch only about one fish a month, on average. This is a slow-growing snake which is also slow to mature, females not reproducing until they are about nine years old, and even then infrequently.



Colubrids

Colubrids are also known as the 'harmless' snakes, although some of them do produce venom. However, this is delivered through fangs in the rear of the mouth and is not of a strength considered dangerous to humans. Most of the snakes in this group live either in the water or in trees. Although this family dominates most parts of the world, in Australia colubrid snakes are well-outnumbered by the elapids.

The **common tree snake** (*Dendrelaphis punctulata*) is a slender, agile snake living in tropical and temperate forests, and in vegetation close to water, along eastern Australia and across the north. Although it is often known as the green tree snake, this species can vary in colour from black, brown or grey to bright green, yellow and turquoise. It is fond of frogs but also eats small reptiles, fish and tadpoles. It hunts on the ground and in the trees, where it climbs and moves rapidly.

The northern tree snake, which is very similar in appearance, apart from a dark stripe along the side of its head, inhabits the east coast of Queensland, north from Townsville.

The **brown tree snake** (*Boiga irregularis*) does not belong to the same genus as the other tree snakes. It is similar in its tree-dwelling habits but possesses venom glands associated with fangs at the back of its mouth. This is a nocturnal hunter and has remarkably large eyes, to help its vision at night. It eats lizards, small mammals and birds, including eggs and nestlings. Since its accidental introduction into the Pacific island of Guam, in the 1940s, the population of this snake has exploded and is blamed for the extinction of 12 bird species.

This is a very feisty snake which, if confronted, reacts in a frighteningly aggressive manner. Although it is not considered harmful to people, many small children in Guam have been treated for bites.

Brown tree snakes are found across northern Australia and in the east, north of about Sydney. Those west of the Gulf of Carpentaria, tend to be strongly banded, whereas those in the east have much less distinctive markings and are considered, by some, to be a different species.

The **white-bellied mangrove snake** (*Fordonia leucobalia*) inhabits the coastal fringe of Australia, living in crab-holes in the mangrove mud. It crawls around the mud at night feeding largely on crustaceans. Mangrove snakes are the only snakes known to dismember prey before eating. When catching a crab, this snake leaps over it and presses it down against the mud, or a harder surface. It bites its prey, using venom from the fangs in the rear of its mouth to immobilise it and then, keeping its victim pinned down, tears off its legs. Small crabs are swallowed whole. This snake is very variable in colour ranging from black and white to red, yellow and brown, even at the same location.



White-bellied mangrove snake

The **slatey-grey snake** (*Stegonotus cucullatus*) is rather unusual for a colubrid in that it is most often found on the ground, where it searches for frogs and small mammals. It is a plain dark grey or brown above with a pale white or yellow belly. Particularly active after rain, it is found near water and often near houses, moving around at night. This snake is not venomous.

Pythons

Pythons have been in Australia for a long time and may have evolved here. No pythons are venomous, instead using a very effective constriction method for killing their prey, usually a mammal or bird. With lightning speed, a python coils its body around its victim. As the animal breathes out, the coils are tightened. The animal is unable to breathe in, and quickly suffocates. Pythons generally hunt at night and most have heat-sensing pits around their mouths which help them locate warm-blooded prey. They also flick their tongues in and out to 'smell' it. When prey is caught, a python disengages its lower and upper jaws in order to swallow it. Although non-venomous, pythons have sharp teeth and can deliver a nasty bite.

The **black-headed python** (*Aspidites melanocephalus*) is found throughout the savanna region. Its shiny black head contrasts with its paler, banded body. Considered a member of the more 'primitive' python line, it lacks the heat-sensitive pits on its mouth which would not be useful for detecting its main prey, other snakes. Males can be very aggressive towards each other during the mating season.

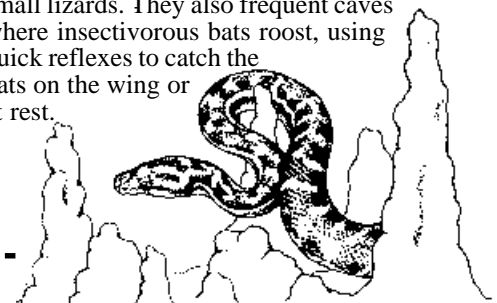
It is not only pythons which constrict their prey. Many venomous snakes, including all brown snakes, as well as mangrove, slatey-grey and brown tree snakes also do so. It is an important method for subduing prey often while venom takes effect, thus reducing injury.

The **water python** (*Liasis fuscus*) is found around water across the top of Australia, sometimes in very large numbers. Studies in the floodplains of Humpty Doo, in the Northern Territory, found hundreds per hectare, one of the highest densities of predators on earth.

This snake feeds on rats and other mammals, and waterbirds. It is flexible in its lifestyle, hunting on dry land or in the water depending on prey abundance. Although it generally stays at ground level, it does occasionally climb; one was found several metres up a tree attracted by a flying fox colony. This snake lacks the markings of many pythons and is a plain dark colour with a beautiful sheen in good light.

The **children's python** (*Liasis childreni*) (named after a Mr Children) is found from the Kimberley east to the Gulf of Carpentaria. The similar spotted python (*L. maculosus*), once considered to be the same species, is found on the east coast to northern New South Wales.

These pythons live largely among rocks, caves and in termite mounds, eating lizards, particularly geckos, frogs and small lizards. They also frequent caves where insectivorous bats roost, using quick reflexes to catch the bats on the wing or at rest.



QUESTIONS & ANSWERS

Q If the growing tops of multi-branched pandanus palm species are harvested for palm heart bush tucker or leaves for hat-making, will the health of the tree be threatened?

A Despite their resemblance, pandanus plants are not palms. The fruits of some pandanus species are eaten, but the hearts are not harvested for food. The inner core has a bitter taste but is sometimes taken from a young tree and eaten to treat diarrhoea and stomach cramps. The upper inner core is eaten as a treatment for colds and a white substance, pounded from the inner wood, is used for toothache, mouth sores and wounds. Pandanus plants tend to have a multi-stemmed growth habit so careful harvesting should not kill the plant.

Pandanus leaves are used widely around the world to weave baskets, mats, dilly bags, arm-bands, rope and so on. The leaves of screw palm (*Pandanus spiralis*) are commonly used, harvested from the tops of the tree where the new tender leaves sprout. They are then stripped, the sharp thorny edges removed and prepared for weaving. Harvesting of leaves should not kill the plant.



The growing hearts of many species of palms are a traditional staple food, earning the name cabbage palm for *Livistona* spp. However, removing the core of the palm tree kills the plant and palm populations can

Pandanus

suffer if over-harvested. Palm cabbage was eaten by early European settlers, including Cook and his crew. They fed on them at Endeavour River while repairing their ship.

Q Is there any chance that the sex of brush-turkey and scrub-fowl chicks is determined by the temperature in the mound as is the case with crocodiles and turtles?

A It is extremely unlikely. The sex of birds' eggs is determined at the time of fertilisation. However, as far as can be determined, the influence of temperature on eggs in a megapode mound has not been tested, so this cannot be ruled out entirely.

Acknowledgements to Clifford Frith.

Q Does the northern brown bandicoot have a pouch for its babies or are they kept in a ground nest?

A The mother has a pouch, which opens to the rear. She gives birth 12.5 days after mating – the shortest gestation period known for any mammal. Between one and seven (four, on average) tiny, pink, 13mm-long babies crawl into her pouch and attach themselves to some of her eight teats. At eight and half weeks of age, the babies are evicted from the pouch to make way for the next generation. Within two or three months they are mature enough to become parents. They live for only 18 months (females) or two years (males). During the day, bandicoots shelter in nests composed of ground litter covering a depression in the ground. In wet weather, they may scrape soil on top of this for waterproofing.

Facts and stats

Russell's viper, widespread in Asia, certain pit-vipers from South America, and the saw-scaled vipers of northern Africa, the Middle East, India and Sri Lanka are together blamed for tens of thousands of deaths a year. The saw-scaled viper probably causes the most fatalities.

It has been calculated that there is enough venom in just one bite of an inland taipan to kill more than 100 men of average size.

If fatalities are used as an indicator, the deadliest animal in Australia, apart from the human, is the horse: in one year an average of 21 people die in riding-related accidents. Our deadliest venomous animal is the introduced honeybee, responsible for up to 10 deaths a year.

A female Tasmanian tiger snake produced 109 youngsters – the highest recorded litter from any Australian snake.

The flowerpot snake seems to reproduce without mating. Only females have ever been found. This tiny blindsnake is found in the Torres Strait and the Darwin region (possibly introduced) as well as in New Guinea and Asia. Parthenogenesis – reproduction without male sperm – is also found in some lizards and enables one transported female to start a new population.

The amethystine python is Australia's longest snake. The official record is of a 5.7m specimen found north of Cairns, but there is an unofficial record of one measuring 8.5m found near Gordonvale, south of Cairns. The world's longest snake is the reticulated python of South-east Asia which can grow to about 10m.

Blindsnakes and mangrove snakes are the only Australian species to feed on invertebrates (ants and termites, and crustaceans, respectively).

A dangerous rumour persists in many places that pythons can breed with venomous snakes such as taipans, mulgas or brown snakes, producing a venomous hybrid. This is absolutely impossible, since they belong to completely different families, as different as dogs and whales. One man died as a result of this myth, some time ago. Having been bitten by a python, which he was told was a dangerous hybrid, he received antivenom – which caused a fatal allergic reaction.

TOURIST TALK

ENGLISH	GERMAN	JAPANESE	
snake	Schlange	hebi	蛇
venomous	giftig	yuudoku na	有毒な
non-venomous	nicht giftig	mudoku na	無毒な
saliva	Speichel	daeki	唾液
fang	Giftzahn	doku no kiba	毒の牙
prey	Beute	ejiki	餌食
to bite	beißen	kamu	噛む
to constrict	würgen	shimetsukeru	締めつける
to shiver	sich schütteln	furueru	震える
bandage	Verband	houtai	包帯

Out and about



Kookaburras nest during the summer months. They like to use cavities in trees or, like many kingfishers, termite mounds. They lay one to four eggs. Kookaburras are cooperative breeders. Instead of being chased from the parental territory when they are independent, the young hang around the family home for up to four years helping supply food to the new nestlings.

This extended type of family life is relatively common in Australian birds, and is practised by at least 80 different species. It is thought that a lack of seasonal food abundance is the reason, the young also learning valuable child-rearing skills while helping to promote their genes (the aim of all breeding) in the form of brothers and sisters. The bigger and noisier the group, the more likely they are to claim a good territory.

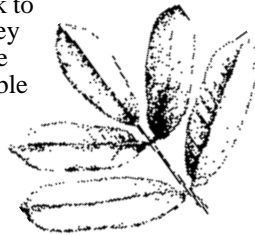
While laughing kookaburras live in the east, blue-winged kookaburras (above) are present across the savannas. Their predominantly blue wings and the blue tail of the male distinguish this species as well as their particularly unpleasant howling, raucous call which is quite unlike laughter. They also form larger family groups, numbering up to 12. This species prefers termite mounds and boab trees for nesting.

Bruce Henderson is seeking information about **Clyde Coleman**, arachnologist and former president of the North Queensland Naturalists Club, who died in Edmonton, south of Cairns, in April 1981. He is particularly interested in items from scrap books and/or old newspaper clippings, particularly for 1960-1981. If you have any information please contact Bruce Henderson, 27 Crichton Drive, Port Augusta, West SA 5700; Ph: (08) 8642 5930; Mob: 0400 103 898; e-mail: bruce.henderson@bigpond.com

Fruit ripens on the branches of **tuckeroo** (*Cupaniopsis anacardioides*) during summer/wet season months. This tree grows in rainforest, monsoon forest and vine-thickets, in coastal areas (where it is very tolerant of salt-laden winds), rocky areas and woodlands. It is found on much of the east coast of Australia and across the north. Growing to over 10m in sheltered areas, it may remain a low dense shrub in exposed coastal areas.



Small white, or greenish-yellow, flowers are produced in August to September. The fruits appear as massed bunches which turn yellow when ripe. These capsules, which are hairy and velvety on the outside and the inside, open up to reveal shiny black seeds surrounded with a red or yellow aril. The contrast of the yellow capsule, the red aril and the black seed presumably attracts birds, which love the seeds of this plant. Currawongs, fig birds and other fruit-eating birds flock to the tree when they are available. The fruits are not edible for humans, however.



The majority of **water-rat** litters are born in the warmer months. Females can reach maturity at the age of four months and may produce up to five litters a year. Most nests are built in tunnels in banks. Three or four young are produced and stay with their mothers for about two months.

With broad, partially webbed feet, this animal is well-suited to a semi-aquatic lifestyle. (Marsupials do not live in water because their pouches would get flooded.) In poor light it is sometimes mistaken for a platypus, but the white tip to its tail reveals its true identity. The water-rat feeds on any suitably sized prey found in or near water – including cane toads. It deals with these toxic pests by flipping them over and eating the internal organs without contacting the poisonous skin on the back, leaving disembowelled corpses at the sides of waterholes.



In response to a plea in *Tropical Topics* 78 for first-hand reports of kites – ‘**fire hawks**’ – transporting burning sticks to spread fire, two readers have responded with very interesting observations. Both mentioned having been told about it by Aboriginal people before witnessing it themselves.



Denise Angelo said she had “personally (and often) witnessed ‘fire hawks’, in the Katherine region of the Northern Territory, picking up smouldering sticks and dropping them further ahead of a fire front.” She also mentioned that the bush fire brigade in Katherine is reluctant to predict the spread of a fire due to the activities of the “blasted fire hawks”.

Dick Eussen, when working as a team leader in a fire department in Kakadu in the 1980s, recalled an occasion when they were trying to restrict a fire to one side of a road. Kites were swooping on insects and other animals as they escaped the fire but then Dick noticed a kite flying across the track with “what resembled a smoking stick in one of its claws. It dropped the object on the other side of the track and smoke began to curl up from the dry grass.” Dick noticed that at least two other kites were adept at picking up smouldering sticks, up to 20cm long, and dropping them on the other side of the track. Seven spot fires, which could not be explained in any other way, had to be extinguished. Although initially sceptical, two members of his team subsequently reported this behaviour on different occasions. Dick later observed a kite successfully carrying a lit stick across the Arnhem Highway.

Dick Eussen says that the birds he saw exhibiting this behaviour were whistling kites but Denise Angelo thought they were black kites. It is possible that both species are involved. Most reports have come from the Arnhem Land to Katherine region of the Northern Territory, with one from Lakefield National Park in Queensland. Scepticism has been expressed about whether the birds are actually deliberately spreading fires, but it is difficult to explain their behaviour in any other way. They certainly are not collecting nesting material! They choose sticks which are smouldering, rather than actively burning, and drop them quite quickly, as soon as they reach an unburnt area. Observers do not believe that they have mistaken the sticks for burnt prey.

BOOKSHELF

Australian snakes A natural history
Richard Shine
Reed Books (1994)

Reptiles and Amphibians of Australia
Harold G. Cogger
Reed New Holland (2000)

A Complete Guide to Reptiles of Australia
S. Wilson and G. Swan
Reed New Holland (2003)

Encyclopedia of Australian Animals: Reptiles
Harald Ehmann
Angus & Robertson (1992)

Australian Tropical Reptiles and Frogs
Clifford and Dawn Frith
Frith and Frith Books (1991)

Articles
Nature Australia Vol 25 No 9
Snake toxins aren't all venom
A short article on saliva and venom.

Nature Australia Vol 26 No 9
Snake penises
Scott Keogh

Nature Australia Vol 26 No 10
A coil to account (brown tree snakes)
Steve van Dyck

Nature Australia Vol 27 No 3
The Serpent Dreamtime (snake evolution)
John Scanlon and Michael Lee

Nature Australia Vol 27 No 9
Crab-cracking snakes

Ecos 103 April-June 2000
Walking with snakes
Steve Davidson
An article on human responses to snakes.

Queensland Museum leaflet No 2
Dangerous snakes in Queensland
This leaflet rates the potential danger of snakes according to all relevant criteria.

Papers
White, J. (1991) **Snake bite: an Australian perspective** *Review Journal of Wilderness Medicine* 2, pp219-244

Barrett, R. and Little, M. (1993) **Five years of snake envenoming in far north Queensland. *Emergency Medicine* 15(5-6): 500.

Gavin S. Bedford and Keith A. Christian
The energetics of brooding in Australian pythons
(submitted) *Journal of Thermal Biology*

Web links
Australia's Venomous Snakes: The Modern Myth or Are You A Man Or A Mouse? Brian Bush <<http://members.iinet.net.au/~bush/myth.html>>

*ABC National Radio Science Show, **interview with Bryan Fry.** See: <www.abc.net.au/rn/science/ss/stories/s973126.htm>

Opinions expressed in *Tropical Topics* are not necessarily those of the Environmental Protection Agency.

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Orange (savanna) issues of *Tropical Topics* (nos. 64, 68, 71, 73, 75 & 78) can be found on the CRC for Tropical Savannas Management website: savanna.ntu.edu.au/publications/tropical_topics.html



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