Tropical Topics

An interpretive newsletter for the tourism industry

Wet tropics lizards No. 33 January 1996

Notes from the Editor

While mammals and snakes are a fairly rare sight in the rainforests, lizards are one of the few types of animal we can be almost certain to see.

The wet tropics rainforests have an extraordinarily high number of lizard species — at least 14 — which are found nowhere else. Some only occur in very restricted areas such as the summit of Bartle Frere, while others can be seen throughout the region.

JCU researcher Geordie Torr has been studying Boyd's forest dragons in depth for several years and has discovered a great deal about them. He very kindly offered to write about them for *Tropical Topics* and decided to share his knowledge of other rainforest lizards with us too. I'd like to thank Geordie for all the hard work he has put into this issue and his mother, Eleanor Torr, for the magnificent illustrations she has produced to accompany his text.

Illustration of prickly forest skink by Eleanor Torr

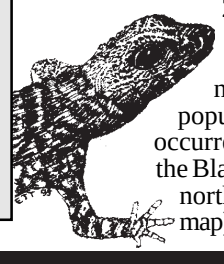
Lizards tell a tale of history

A prickly forest skink from Cardwell and a prickly forest skink from Cooktown look the same but recent studies of their genetic make-up have revealed hidden differences which tell a tale of history.

The wet tropics contain the remnants of tropical rainforests which once covered much of Australia. As the climate became drier only the mountainous regions of the north-east coast remained constantly moist and became the last refuges of Australia's ancient tropical rainforests.

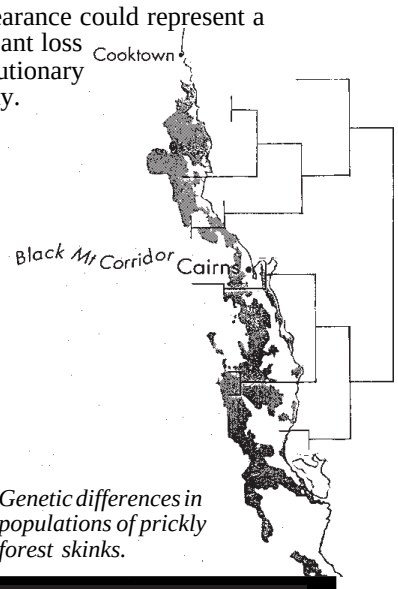
However, the area currently occupied by rainforest has fluctuated. Several times as the Earth went through glacial periods, cool, dry conditions caused the rainforest to recede into even smaller and more fragmented patches. This shrinking habitat isolated populations of rainforest plant and animal species from each other. Unable to mix, populations of the same species began to diverge — they began to develop slight differences, some to such an extent that they became separate species. The differences are not necessarily obvious — the two may be indistinguishable from each other from the outside — but can be detected in their genes.

Researchers studying this focussed mainly on endemic species — those living only in the wet tropics. They began by taking samples from animals at different sites throughout the region. Genetic analysis of the prickly forest skink from various sites in its 275 kilometre range revealed a dramatic difference between northern and southern populations. This break occurred at what is termed the Black Mountain Barrier, north-west of Cairns (see map).



Studies of birds, skinks, frogs, geckos and snails as well as some mammals revealed genetic breaks at exactly the same location. It is thought that a dry corridor cut through the wet tropics at this point for hundreds of thousands of years, preventing rainforest animals on either side from mixing with each other at all. This affected not just individual species but whole communities of plants and animals.

The presence of two different evolutionary lines within a species which occurs in only a small part of the world has important implications for the management of the rainforest. The disappearance of a species, for example the cassowary, from one area may amount to much more than just a 'local' extinction. They may have been the only representatives of that population and quite different from their relatives elsewhere. Their disappearance could represent a significant loss of evolutionary diversity.



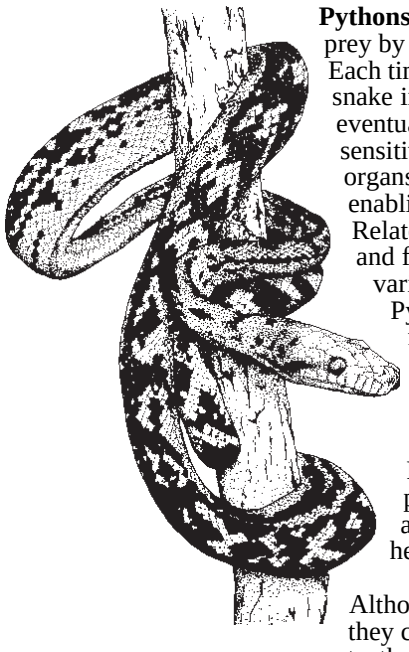
Genetic differences in populations of prickly forest skinks.

WET TROPICS MANAGEMENT AUTHORITY

Queensland Department of Environment and Heritage

Harmless snakes of the wet tropics

In *Tropical Topics* 31 we looked at venomous snakes but the majority of snakes encountered in the wet tropics are totally or virtually harmless to humans either because they lack venom or because it is not very toxic and/or the position and size of the fangs makes it difficult for humans to be affected.



Pythons do not possess any poison glands. They kill prey by trapping it with sharp teeth and squeezing it. Each time the unfortunate victim breathes out the snake increases the pressure until the prey is eventually suffocated. Pythons smell their food with a sensitive flickering tongue and most have a series of organs in pits along the jaw which can sense heat, enabling the snake to find warm-blooded animals. Related pythons from overseas have been tested and found capable of detecting temperature variations as small as one thirtieth of a degree. Pythons feed on birds and mammals such as rats, flying foxes, possums and wallabies. Spurs at each side of the anus in pythons are the remains of legs, indicating the evolutionary link of all snakes with a lizard-like ancestor.

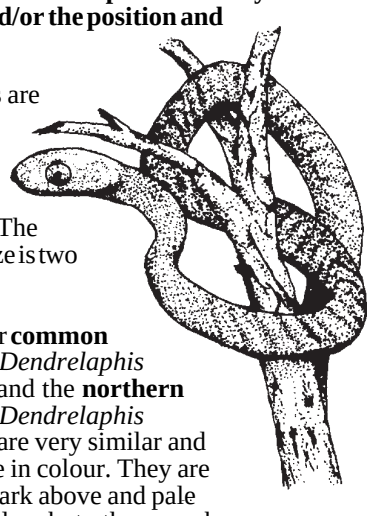
Pythons lay four to 47 eggs which the mother protects and incubates by coiling herself around them, even producing heat by shivering her body.

Although pythons are non-venomous, if annoyed they can deliver a nasty bite with their very sharp teeth.

The **amethystine python**, (*Morelia amethistina*) also known as the **scrub python** (above), is Australia's largest snake, averaging three metres in length but with occasional specimens over seven metres. (The longest recorded, at 8.5 metres, was found at Green Hill near Gordonvale.) It is patterned brown and yellow with a hazy sheen.

Small amethystine pythons look rather like **carpet pythons** (*Morelia spilota*) and **spotted (children's) pythons** (*Liasis maculosus*). However, the scales on the head of the amethystine are much bigger than the small scales on the carpet snake's head. Scales on the spotted python's head are large at the front, above the eyes, but small behind.

The **water python** (*Liasis fuscus*) is not blotchy like the other pythons mentioned and is sadly sometimes killed by people who believe it is a dangerous brown snake.* It is usually seen near water, where it hunts, and in good light can be seen to have a beautiful iridescent sheen.



Tree snakes are slim, agile climbers most often seen above the ground. The maximum size is two metres.

The **green**, or **common tree snake** (*Dendrelaphis punctulata*) and the **northern tree snake** (*Dendrelaphis calligastra*) are very similar and very variable in colour. They are commonly dark above and pale yellowish below but others can be bright green and around Gordonvale there is a sky blue variation. They feed mainly on frogs and lizards. These tree snakes have no venom glands but if cornered might bite. Before doing this they inflate the body and neck, exposing the startlingly bright blue skin between the scales.

The **brown tree snake** (*Boiga irregularis*) (above) has got venom glands but these are connected to fangs at the back of the upper jaw ('rear-fanged') and not considered dangerous. Its most distinctive feature is its large amber eyes with vertical pupils. It is largely nocturnal, feeding on small mammals, lizards and birds including eggs and nestlings. It sometimes turns up in bird cages and in roof spaces. It acts aggressively towards humans, holding its body in tight loops and striking repeatedly, but is more frightening than dangerous.

The harmless, non-venomous **keelback**, or **freshwater snake** (*Tropidonophis mairii*) bears an unfortunate resemblance to the dangerous rough-scaled snake and is sometimes killed as a result.* This is doubly unfortunate because it is one of the few animals which eats small cane toads without coming to grief. This snake is usually some shade of brown and averages half a metre in length. Each scale is keeled and these line up to give the skin a ridged appearance. It is often found near water. The keelback has an interesting ability to shed the end of its tail when under stress, the only Australian snake to perform what is quite a common feat among lizards.

The **slaty grey snake** (*Stegonotus cucullatus*) normally forages on the ground for frogs and small mammals. Nocturnal, it is often found near water and near houses and is particularly active during or after rain. It is dark grey above with a pale belly. Although it can be aggressive it is non-venomous and harmless, its most effective defence being the strong smell produced from its anal glands.

Macleay's water snake (*Enhydris polylepis*) is a dark brown snake commonly found in creeks, rivers and waterholes, particularly in vegetation by banks. It is a venomous rear-fanged snake but poses more of a threat to tadpoles than to humans and is most reluctant to bite.

Filesnakes (*Acrochordus* sp.) are peculiar baggy-skinned snakes with very rough scales which live in water and feed on fish. They are non-venomous and reluctant to bite.

A note on whips

A number of **whipsnakes** (*Demansia* sp.) are found in the wet tropics. They are slender with large eyes, active by day and very speedy. These snakes are venomous but, on the whole, not considered dangerous. However, some can give a nasty bite and a child or someone in poor health could be at some risk if bitten by a large specimen.

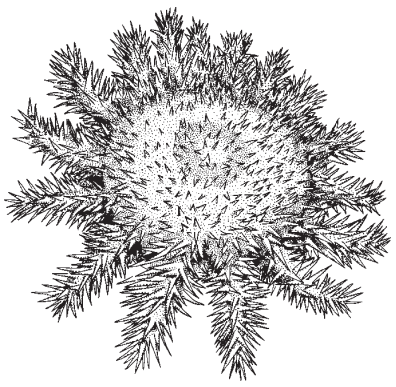
**Please remember that all native snakes are protected and it is illegal to kill them. To avoid trouble leave all snakes alone. If worried by one in your garden, turning the hose on it should get rid of it safely. If it is in your house, open doors and windows and allow it to leave of its own accord.*

Out and about

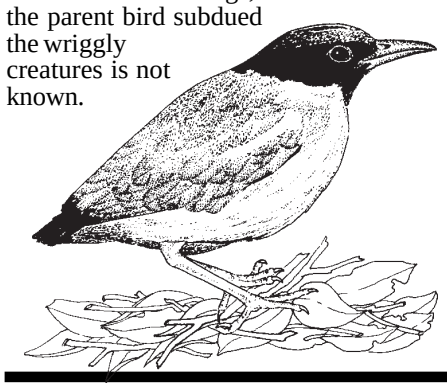
Recent monitoring of **crown-of-thorns starfish** numbers in the Cairns to Lizard Island area of the Marine Park is leading scientists to believe that another major outbreak is imminent. Twenty percent of reefs in the area have been affected with densities three to eight times higher than those considered normal.

Outbreaks are characterised by the presence of both juvenile and adult starfish with the potential for further increases in numbers as the populations mature and reproduce. So far there are no indications of new outbreaks south of Cairns.

Feedback from reef-users such as tourist operators is an important part of the monitoring. COTS survey forms are available from GBRMPA and most offices of DEH. All visitors to the reef are urged to report their sightings, including zero-sightings which are just as significant.



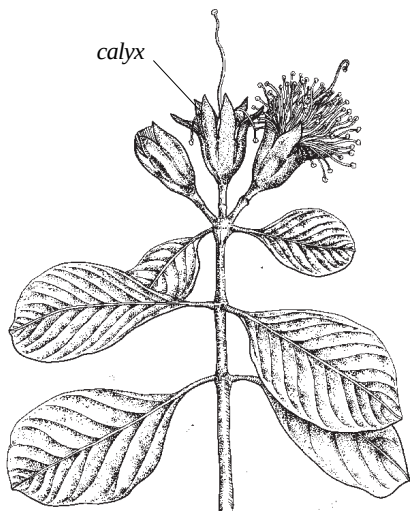
Noisy pittas, birds with a distinctive '*walk to work*' call but secretive manners, will be busy raising nestlings soon. The nest is an igloo of sticks built between buttress roots in rainforest. The domed construction is sometimes supplied with a doormat of moss or dung, but the young are successfully raised even when nests do not have this sophistication. In one photograph, by naturalists Clifford and Dawn Frith, an adult noisy pitta can be seen carrying a beakful of leeches to its nestlings, but how the parent bird subdued the wriggly creatures is not known.



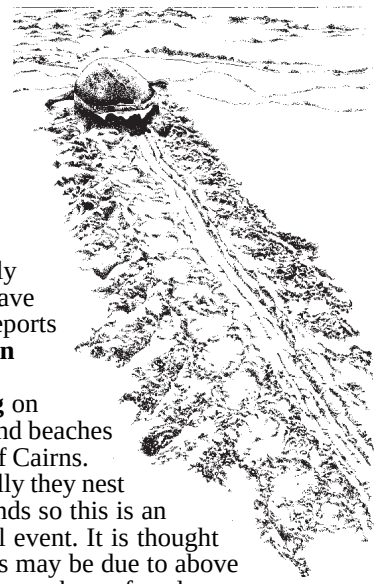
After reporting, in the last issue of *Tropical Topics*, the unusual sighting of a **purple-crowned pigeon** at Agincourt Reef, in October, it was interesting to hear that another purple-crowned pigeon had been spotted at Arlington Reef at about the same time. Or perhaps it was the same one, moving south along the reef by pontoon-hopping?
Acknowledgments to Ted Woolley of Sunlover.

According to the Reader's Digest Complete Book of Australian Birds:
'Nothing is known of the bird's movements except that it is rather nomadic and often travels long distances ... There are many records of single birds flying into lighted windows and lighthouses, which indicate that the birds travel at night. Whether nomadic or migratory, these large-scale movements involve only part of the population.'

It was also interesting to note an article in the *Cairns Post* reporting an exhausted **fruit bat** on the pontoon at Arlington Reef, 25 nautical miles from shore, on 21 December.



The lovely, but short-lived flowers of a mangrove known as the **red-flowered pornupan** will be scattering long red stamens on tidal waters. Flowering in this species frequently extends throughout the warmer months. This pornupan is considered to have the most handsome flower of all mangroves, with a mass of stamens, each about four centimetres long. When these stamens fall, the large green calyx lobes spread out like a star, with a disc-like fruit developing in the middle. A member of the family Sonneratiaceae, this species is called *Sonneratia caseolaris*.



Recently there have been reports of **green turtles nesting** on mainland beaches north of Cairns. Normally they nest on islands so this is an unusual event. It is thought that this may be due to above average numbers of turtles breeding this year, those unable to find room on the island beaches perhaps wandering off to places where they do not normally nest.

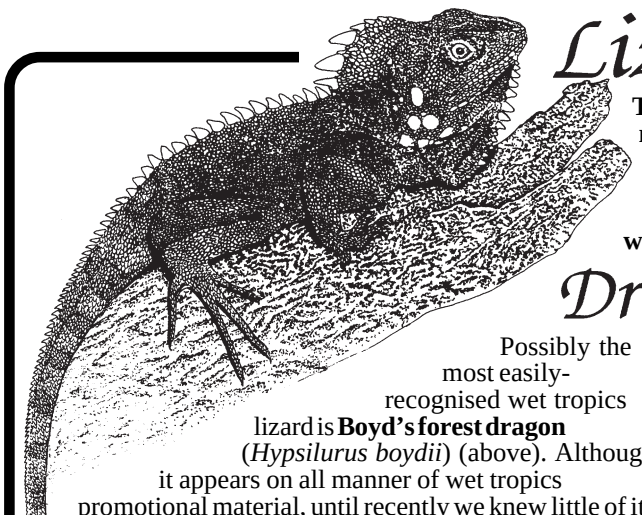
This, in turn, is thought to be linked to El Niño. This periodic climatic phenomenon, which has dominated summer weather for the last few years, warms the sea water. Algae and seagrass grow well in warm water, these good food supplies possibly encouraging more turtles than usual to breed. This has been known to happen before, two years after a major El Niño year, and would explain why Port Douglas residents remember the turtles nesting on mainland beaches about seven years ago.

The greater number of turtles nesting does not necessarily mean that the population will increase. More turtles nesting in a limited area means that they are more likely to accidentally dig up each others' nests when excavating their own nest chambers so the mortality rate is higher.

Some people, curious about the nesting, have been digging up eggs to have them identified. This is not a good idea. Apart from being illegal, moving a turtle egg more than a few hours after it has been laid means almost certain death to the embryo.

Camping permits are not issued for certain National Park islands between 1 October and 31 March each year. These islands are Stephens Island, Three Islands, Two Islands and Rocky Islets. This is because significant numbers of breeding seabirds have been recorded on the islands and are particularly vulnerable to human disturbance. Seasonal closures apply to permitted tourist operations, restricting access to the intertidal zone surrounding these islands.

Lizards of the wet tropics



The wet tropics is home to a large diversity of lizards, many of them found nowhere else. They range from small, nondescript skinks, skittering amongst the leaf litter to the large, impressively ornamented Boyd's forest dragon, perched imperiously on the side of a rainforest tree. Australia is home to five families of lizard and of these four are found in wet tropics rainforests.

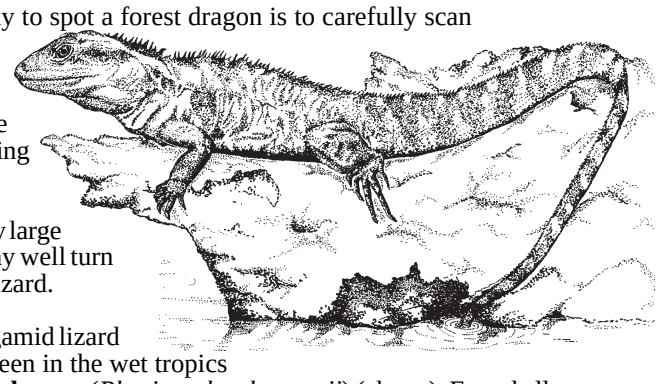
Dragon lizards (Family Agamidae)

Possibly the most easily-recognised wet tropics lizard is **Boyd's forest dragon** (*Hypsilurus boydii*) (above). Although it appears on all manner of wet tropics promotional material, until recently we knew little of its ecology. The forest dragon is primarily arboreal, perching on small trees about one to two metres from the ground. Like most dragons the male is larger than the female and can be distinguished by its larger, blockier head. Both sexes have a large yellow dewlap below their chins which they can erect using a bone called the hyoid. The dewlap is used for displaying to each other and to scare off predators.

In general the forest dragon relies on its superb camouflage to escape predators. It will usually stay very still, only moving when it is sure it has been spotted. Then it slowly folds in its arms and legs and slides around the back of the tree, keeping on the opposite side to its observer.

Forest dragons are territorial with the larger male territory usually containing one or more small female territories. Sometimes lizards have one or two favourite trees within their territory to which they will regularly return. Although they spend most of their time perching, forest dragons move around quite a bit on the forest floor. Their diet consists of insects and other invertebrates with ants the most common prey item. They will also take beetles, grasshoppers and have a special fondness for earthworms. Although they may occasionally eat rainforest fruits, this seems to be rare.

The best way to spot a forest dragon is to carefully scan the sides of trees at about head height, while slowly walking through the rainforest. Examine any large bump - it may well turn out to be a lizard.

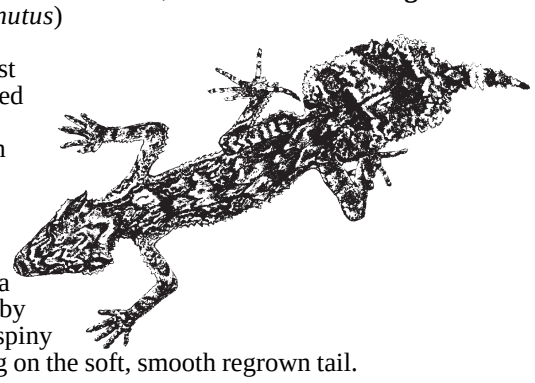


The other agamid lizard frequently seen in the wet tropics is the **water dragon** (*Physignathus lesueurii*) (above). Found all along the east coast of Australia, as its name suggests the water dragon is always found associated with water bodies such as creeks, rivers or lakes. Males can be distinguished by their larger size and red chest. Water dragons are often quite wary and will quickly escape into water if they feel threatened, swimming strongly and sometimes spending several minutes submerged. Although mainly found on the ground, these lizards usually sleep in trees beside the water into which they drop if disturbed.

Geckos (Family Gekkonidae)

Only two species of gecko are found in the rainforests of Australia's wet tropics and as they are both nocturnal they're usually only encountered whilst spotlighting at night.

At over 14cm from snout to vent, the **northern leaftail gecko** (*Saltuarius cornutus*) (right) is one of Australia's largest geckos. It is named for its large, leaf-shaped tail which can be dropped and regrown. You can easily distinguish an original tail from a regenerated one by the presence of spiny tubercles, lacking on the soft, smooth regrown tail.

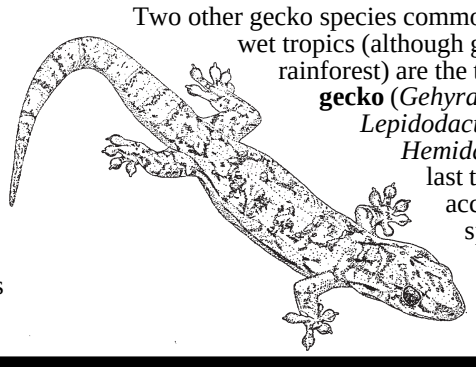


Leaftail geckos may be various shades of brown or green with a mottling that looks so much like lichen that they can be very difficult to distinguish from the trees on which they live. Males can be distinguished from females by the presence of the two large swellings at the base of the tail indicating the presence of hemipenes - the male reproductive organs.

The leaftail gecko is generally found, at night, perched head down on a large rainforest tree waiting to ambush its prey - large invertebrates such as spiders and cockroaches. Like most geckos this species lays two eggs at a time, often under the shed bark at the base of a tree. The eggs are laid in November or December and hatch about three months later. Although no one knows for certain, it seems likely that leaftail geckos spend the daytime sheltering in tree hollows or in epiphytic ferns.

The other species of gecko found in the rainforests of the wet tropics is the **chameleon gecko** (*Carphodactylus laevis*). This gecko is named for its slow, jerky movements and unusual vertically flattened body which gives it a passing resemblance to a chameleon. It has a large carrot-shaped tail with strong white bands which is shed readily. The tail has been reported to actually squeak as it thrashes around distracting predators away from the escaping lizard. The regrown tail is orange-brown with dark blotches.

This species is restricted to upland rainforest above 300m and like the leaf-tailed gecko is generally found perching head down on trees. It too is quite large, growing to about 14cm.



Two other gecko species commonly encountered in the wet tropics (although generally not in rainforest) are the three species of **house gecko** (*Gehyra dubia* (left), *Lepidodactylus lugubris* and *Hemidactylus frenatus*). The last two are actually accidentally introduced species. *Hemidactylus frenatus* can be distinguished by its slightly spiny tail.

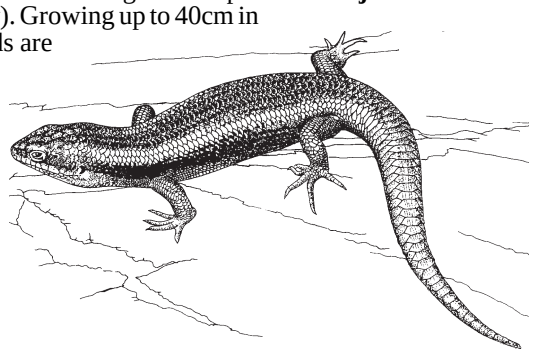
Illustration by Eleanor Torr

Skinks (Family Scincidae)

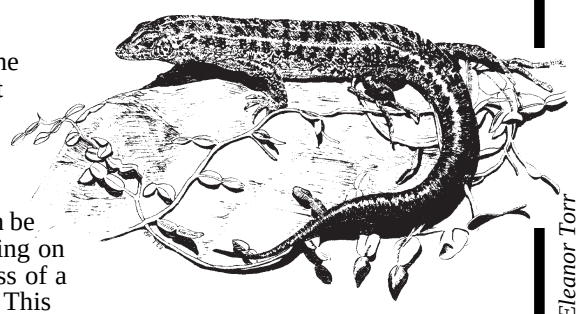
Although less glamorous than some of the others, skinks are by far the most numerous and diverse group of lizards in the wet tropics and, indeed, in Australia. There are over 350 species of Australian skinks, the majority of which are small and brown. They are often seen foraging for small invertebrates in the leaf litter.

Probably the most commonly encountered skink in the wet tropics is the **red-throated skink** (*Carlia rubrigularis*).
This small, brown lizard is often seen basking in a patch of sunlight, its body flattened out to catch as much warmth as possible. When it senses it is being watched it will often lash its tail violently, suggesting that if you're going to eat it, its expendable tail would be a good place to start.

Another sun-loving skink is the large and impressive **Major's skink** (*Egernia frerei*) (below). Growing up to 40cm in total length these lizards are often found in small colonies with parents and offspring sharing a complex burrow system. In common with many other wet tropics species, this lizard is also found in New Guinea.

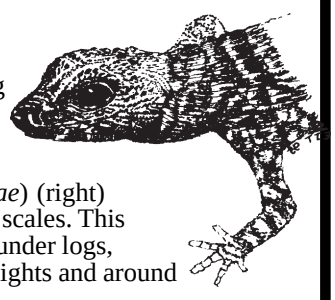


Under the rainforest canopy, the **rainforest water skink** (*Eulamprus tigrinus*) (right) can be found sitting on the buttress of a large tree. This attractively mottled skink gives birth to live young. Like many wet tropics lizards it has a very restricted distribution, from around Cardwell to Cooktown.



Illustrations by Eleanor Torr

Occasionally, as you walk through the rainforest, you'll see a small brown head poking out of the end of a fallen log. This probably belongs to a **prickly forest skink** (*Gnypetoscincus queenslandiae*) (right) named for its extremely rough scales. This lizard spends most of its time under logs, emerging to forage on warm nights and around twilight.



Goannas (Family Varanidae)

Goannas are also known as monitor lizards; Varanus, the family name, is a Latinisation of the Arabic name which means monitor. These lizards earned this name because they had a reputation for giving warning of the presence of crocodiles - they were monitors of danger. The name goanna comes from the Spanish/English term iguana, used for certain large lizards found in America.

Goannas are very ancient - they would have walked with the dinosaurs 200 million years ago. Compared with other lizards they are more intelligent, have a higher metabolism, use more oxygen and tire less easily but need more food. Some, at least, are able to increase their body temperature internally by two degrees, in the manner of mammals. Unlike other lizards, their tongues are deeply forked and constantly taste the air for food.

Although people tend to think of goannas as large lizards, many of them are actually quite small. (At 23cm total length, the pygmy goanna (*Varanus brevicauda*), found in Australia's central deserts, is the world's smallest goanna.)

The **spotted tree monitor** (*Varanus scalaris*) (below) is often heard by visitors to the wet tropics but rarely seen. It reaches only about 60cm in total length and its skin is characterised by a pattern of light circles on a dark background. It likes to bask in patches of sunlight but when disturbed rushes off at high speed, climbing a nearby tree to escape. The characteristic scrabbling sound it makes in the leaf litter as it escapes is usually the closest you'll come to one of these speedy little lizards.

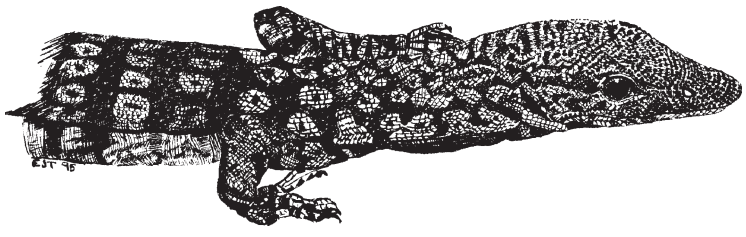


Illustration by Eleanor Torr

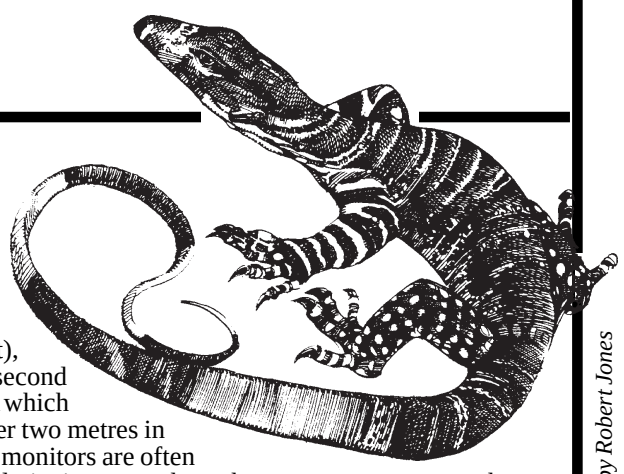
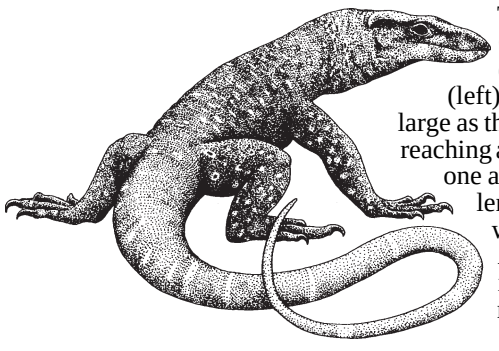


Illustration by Robert Jones

More commonly encountered is the **lace monitor** (*Varanus varius*) (right), Australia's second largest lizard which can grow over two metres in length. Lace monitors are often found around picnic areas where they scavenge amongst the rubbish. Away from human influence they will also scavenge any dead animal they find or catch live prey including anything from insects to possums.

Females lay their eggs inside termite mounds, digging a hole, depositing the eggs inside and letting the termites seal up the entrance. The temperature inside the mounds is high and stable, perfect for incubation. No one is quite sure how the babies get out but it has been speculated that the mother returns at the right time and digs a passage for them.



The **sand monitor**, or **Gould's goanna** (*Varanus gouldii*) (left) does not grow as large as the lace monitor, reaching a maximum of about one and half metres in length. It is the most widespread monitor in Australia and is found in sandy beach areas rather than rainforest.

Questions & Answers

Q I have some questions regarding rainforest mites and would be grateful for any information. I have heard that they are related to spiders. Do they crawl or fly? What time of the year are they most prevalent? If untreated, how long do they stay on your body? How does scrub typhus affect you?

A There are more than 2000 species of mites in Australia living in a wide variety of habitats, from marine environments to rainforests, feeding on juices extracted from plants or animals. Some live on birds' feathers, others on moth or beetle larvae, under the scales of lizards, in the lungs of seals or sea snakes or even on other parasites. Some have even adapted to live on cheese or wine corks. We all have mites on us which live at the bases of our eyelashes and inside the oil glands of our skin, doing us no harm. Mites are everywhere!

Mites, including ticks which are large mites, are related to spiders. The adult forms have eight legs although the larval forms, which develop from eggs, are usually six-legged. They crawl but cannot fly.

A number of mite species bite people, causing itchy rashes and occasionally passing on diseases. Although they may be parasitic on other animals, if they come into contact with humans they may feed on human blood. In the tropics a couple of mites cause trouble. The Queensland scrub itch mite (*Eutrombicula hirsti*) occurs in coastal rainforests and the Atherton Tableland. The larvae attack lizards, marsupials, rats and humans. They live in soil, leaf litter and under bark and are commonly picked up when people sit on logs. They tend to head for skin folds and areas of tight clothing, such as waistbands, where their bites cause itchy spots.

Other members of the Trombiculidae family, most commonly *Leptotrombidium deliense*, may carry scrub typhus. Adults live in moist soils, but the larvae, known as chiggers, feed on mammal blood. Too small to be seen with the naked eye, they wait in low vegetation ready to cling on to passing animals. Some of these chiggers may be infected with bacteria which are pumped into the host's bloodstream with the chigger's saliva. The bites are not noticed, but if bacteria were present black-scabbed sores appear at the site of the bites 7-10 days later. A severe headache, fever and a general rash develop making the victim very ill for two weeks or more unless treated with antibiotics. Many soldiers in northern Australia and New Guinea were afflicted with scrub typhus during World War II.

It is not certain how long these mites stay on the skin. Some may drop off after feeding for a few hours but some may hang around for weeks, given the chance. Washing the body and clothes in which they might be hiding seems to be the best way of getting rid of them. They do not seem to be seasonal.

The most dangerous mites are ticks. While only some members of a particular mite population may carry scrub typhus, just as only some mosquitoes carry disease, *all* ticks carry the toxin in their saliva which is capable of causing paralysis (see *Tropical Topics* 31). Ticks tend to drop off their hosts after 4-7 days but sometimes hang on for up to three weeks. They are most common from June to December.

Tourist talk

ENGLISH	GERMAN	JAPANESE	
lizard	Eidechse	tokage	とかげ
skink	Glattechse	tokage*	とかげ
goanna	Waran	o tokage*	大とかげ
gecko	Gecko	yamori	家守
dragon lizard	australische Drachenechse	o tokage*	大とかげ
legless lizard	Flossenechse	ashi nashi tokage	足無しとかげ
tail	Schwanz	shippo	尻尾
snake	Schlange	hebi	蛇
harmless	harmlos	mugai no	無害の
python	Python	nishiki hebi	にしき蛇

*Apart from gecko, other types of lizards do not have common Japanese names; *o tokage* means *big lizard*.

Facts and Stats

There are over 500 species of lizards in Australia, more than on any other continent.

Twenty-four of the world's 35 goanna species occur in Australia.

The largest wet tropics lizard is undoubtedly the lace monitor at over 2m in length. The smallest is a species of skink, (*Saproscincus tetradactyla*) which is just over 6cm in total length. It has no common name.

Geckos are among the few lizards that can actually vocalise. Many will squeak when caught and some species call to each other, probably as a territorial display. Legless lizards and some skinks also squeak when handled.

Geckos and legless lizards have no moveable eyelids and lick their eyes to clean them.

Lizards have two penises, called hemipenes, one on either side of the tail. They only use one at a time when mating but may alternate during a copulation bout.

Many lizards are able to shed their tails when caught by a predator. This process is called autotomy and is achieved using special fracture planes between the vertebrae in the tail. Muscles on either side of the planes pull in opposite directions and break the tail in two. Although most species can replace the tail, the new one has a rod of cartilage running through it instead of bone.

The largest lizard in the world is the Komodo dragon from Indonesia. It grows up to 3m in length and can weigh 250kg. However, fossils indicate that a much bigger lizard once lived in Australia. The *Megalania* is estimated to have reached 7m in length and weighed up to 2 200kg.

The children's python was named after the naturalist, J.G. Children.

The only endemic snake in the wet tropics is *Cacophis churchilli*, the northern crowned snake. It has recently been described as distinct from the southern version. It is dark with a pale collar which may encircle the head. A nocturnal hunter, it occasionally appears in gardens. It is venomous but not considered harmful to humans.

Clutch puzzles

Lizards come in all shapes and sizes and this diversity is also seen in the ways they reproduce. Most lay eggs, the numbers related to their body size and way of life. The small skinks may only lay one or two eggs in a clutch whereas the much larger water dragons can have clutches of up to 18 eggs.

Two interesting exceptions to this general rule are the geckos and forest dragons. Worldwide, for some mysterious reason, the vast majority of geckos, no matter what size, lay a maximum of two eggs per clutch, with the smaller species laying only one. Forest dragons, despite their relatively large size, also have small clutch sizes (one to five eggs), probably because of their arboreal lifestyle and habit of hiding behind tree trunks — a larger clutch might cause the pregnant females to bulge beyond the trunk line.

Although egg-laying is the most common form of reproduction, some lizards give birth to live young. This reproductive mode, known as viviparity, has evolved many times in different reptile groups. Although it is unclear why it has evolved, it seems to be most common in species living in cool climates. Viviparous lizards in the wet tropics include the rainforest water skink and Major's skink.

Legless lizards

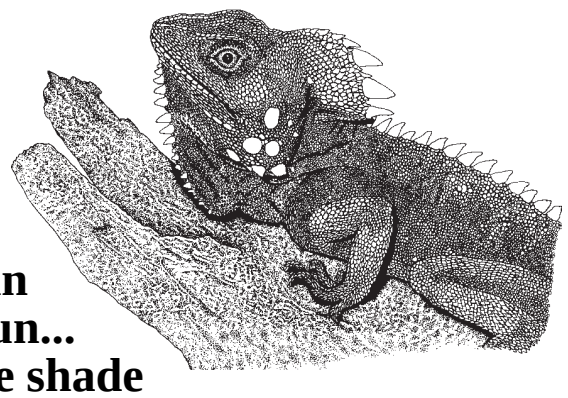
Although not found in the rainforests, a few species of legless lizards belonging to the pygopodid family occur in the wet tropics region. Only two of the 30-35 species in this family are found outside Australia — in New Guinea — making this the only reptile family endemic to the Australian region.

Legless lizards are most closely related to geckos and, like their relatives, have no eyelids. Looking very similar to snakes, they have no front legs but there is a scaly flap where the back legs once were, back in their evolutionary past. It is impossible to say why these lizards lost their legs. Perhaps it simply made it easier for them to enter small spaces and so burrow in soil and leaf litter but it is not unusual for animals which are non-venomous to mimic venomous ones. They then benefit from the wide berth given to them by most other animals.

However, this means that legless lizards are commonly killed by humans despite being completely harmless. They can be distinguished from snakes by their broad fleshy unforked tongue and external ear openings. They also have more numerous head scales and, like geckos and skinks, shed their tails under stress, growing them back later.

The most widely distributed legless lizard is **Burton's snake-lizard** (*Lialis burtonis*) (above), distinctive because of its long pointed snout. It feeds mainly on other lizards.

The only legless lizard known to be found in wet tropics rainforest is the **limbless snake-tooth skink** (*Coeranoscincus frontalis*). It is not a pygopodid but one of a number of skink species which lack legs or have very small ones. It is large — up to 29cm long — and is found only in the wet tropics, usually above 200m. Although probably common it is rarely seen.



Fun in the sun... or the shade

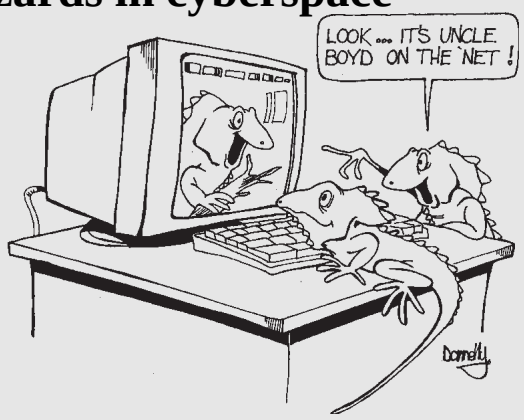
Lizards are often referred to as cold-blooded because, unlike the so-called warm-blooded mammals and birds, they do not produce their body heat internally. Instead, they bask in the sun, its warm rays raising their body temperature until they're hot enough to move around — thermoregulating.

Some desert lizards have been recorded with body temperatures in the high 40s (deg. C.) — not exactly cold-blooded. However, sunlight is not always available in the rainforest, the thick canopy blocking most of it. Hence several lizard species have abandoned basking in favour of a lifestyle known as thermoconforming. This is where the lizard's body temperature simply conforms to that of the air around it.

Rainforest lizards such as Boyd's forest dragon and the rainforest water skink seem to use this strategy. Other species such as the red-throated skink and Major's skink still need the sun to warm them up and will usually only be found on the rainforest margins or in areas such as tree-falls where there is a gap in the canopy for the sun to get in.

Geckos, although they are nocturnal, choose their daytime retreats to thermoregulate and will also use various surfaces that have been warmed by the sun when they first emerge.

Lizards in cyberspace



The internet may not seem like the most obvious place to look for lizards but it's actually teeming with them. There is even an area devoted especially to wet tropics lizards, complete with full colour images of most of the species. It is part of the Australian Herpetological Directory world wide web site which also contains information on Australia's declining frogs, the reptiles and amphibians of the Townsville region and a rundown of current herpetological research at James Cook University along with links to numerous other herpetological sites scattered over the 'net. The site is located at http://www.jcu.edu.au/dept/Zoology/herp/herp2.html.

Bookshelf

Reptiles and Amphibians of Australia
H.G. Cogger
Reed Books (1992)

Now in its fifth edition this 'bible' is regarded as the one book that anyone with an interest in Australian herpetology should own. It features keys, distribution maps and short accounts of each species, many illustrated with colour photos.

Encyclopedia of Australian Animals
H. Ehmann
Angus and Robertson (1992)

Australia's Reptiles; a photographic reference to the terrestrial reptiles of Australia
S.K. Wilson and D.G. Knowles
Collins (1988)

Featuring a more comprehensive collection of photographs of the Australian reptile fauna, these two books supplement Cogger nicely. Both also contain accounts of each species and distribution maps.

Rainforest Animals: Atlas of the Vertebrates Endemic to Australia's Wet Tropics
H. Nix and M.A. Switzer
Kowari (1991)

The reptile section covers the 13 species of lizard endemic to the region. (The leaftail gecko is not covered; at that time it was not considered a separate species from one found near the NSW border.) It includes separate accounts for each species with picture, description, map showing predicted and recorded locations and some information on the species' habits.

Australian Tropical Reptiles and Frogs
Clifford and Dawn Frith
Frith and Frith Books (1987)

For those looking for a less academic, low cost guide, many of the most commonly seen lizards and snakes are included in this paperback book with excellent photos and information.

For the academics:
Biology and Evolution of Australian Lizards
Allen Greer
Surrey Beatty and Sons Pty Ltd (1989)

Ecology of Reptiles
Harold Heatwole and Janet Taylor
Surrey Beatty and Sons Pty Ltd (1987)

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WET TROPICS MANAGEMENT AUTHORITY

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