

Tropical Topics

An interpretive newsletter for the tourism industry



Night in the forest

No. 48 July 1998

Notes from the Editor

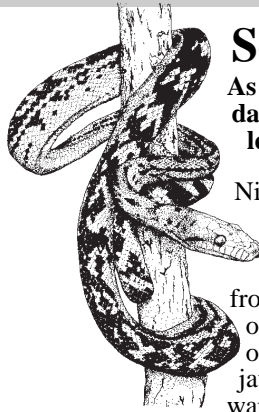
Why are so many animals nocturnal? Why not? As mammals who function by day, we are in the minority. But as a top predator we have little need to hide. Most Australian mammals — as well as insects, small reptiles and frogs — are potential meals for something else so it is to their advantage to function under cover of darkness, when many predatory birds and reptiles are asleep.

But where there is potential food, there are potential predators. Although most birds are diurnal, owls feed by night and for pythons, cool nighttime conditions are ideal for hunting. Nonetheless, night is, on balance, safer for many.

From the predators' point of view, night offers the opportunity to take advantage of food which is unavailable by day — from nocturnal mammals to worms which come to the surface. Competition is also reduced — owls do not have to compete with diurnal birds of prey and frogmouths and nightjars can take the place of swallows, swifts and flycatchers.

In Australia, avoiding the sometimes searing daytime temperatures is an additional advantage for many animals, reducing their need to conserve water.

I would like to thank Jenny Smith, Tamara Smith, Bernice Sigley, Jane Gray, Mike Trenerry (DEH) and Robyn Wilson (CSIRO), for their help with this issue and Kirsty Oxlee for her magnificent illustrations.



Senses on the night shift

As primarily visual creatures, we do not function well in the dark. Many animals, however, prefer darkness, relying at least partly on non-visual senses.

Nighttime gives pythons a distinct advantage. Apart from smell, they rely on heat-sensing organs below their jaws to detect warmth radiating

from bird and mammal prey. During the day, ground heated by the sun confuses this heat-picture but at night, when the surroundings are cool, a potential warm dinner stands out.

Owls, like many nocturnal animals, have good night vision but rely also on their excellent hearing — up to four times better than any other animal tested — which allows some to hunt in complete darkness. Because their left and right ears are placed at different levels on their heads there is a slight difference in the time taken for a particular sound to reach each ear.

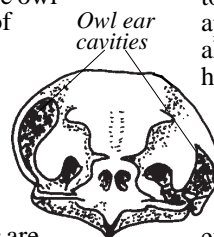
This time-lag enables the owl to pinpoint the source of the sound more accurately. The higher ear has an opening facing downwards and is more sensitive to sounds from below. Feathers within the characteristic facial disc are positioned so as to funnel sound to the ears. Stiff feathers bordering the ear slits are attached to moveable flaps so an owl can change the shape of its ear opening and focus its hearing.

Insectivorous bats are the noise experts, building up a complex sound-picture of the world with sonar which

is so accurate they can detect spider webs. Some moths, however, are able to detect the sonar and immediately adopt evasive manoeuvres — or even jam the sonar system with signals of their own. Some moths emit sounds which tell the bat that they are distasteful — the audible, nocturnal, version of bright warning colours.

Night-blooming flowers attract moth and bat pollinators with strong smells. Male moth antennae are also sensitive to chemical signals (pheromones) released by female moths to summon mates. An effective nocturnal alternative to the bright colours of diurnal butterflies, pheromones can attract his attention from over 10km away (where there may be as little as one molecule of the chemical in a cubic metre of air).

With often poor eyesight, many invertebrates rely on their sense of touch. Long antennae, rear appendages (cerci) and sensory hairs all serve this purpose. Many mammals have touch-sensitive whiskers and birds have special bristle-like feathers which can detect variations in airflow. Specialised touch organs situated on tongues and bills help birds to find food (for example, when probing in the mud), while on legs similar organs detect vibrations on the ground or perch and even, in some cases, can 'hear' — of great help to roosting birds. Electroreceptors on the snouts of echidnas and the bills of platypus detect food, the latter diving with eyes and nose closed.

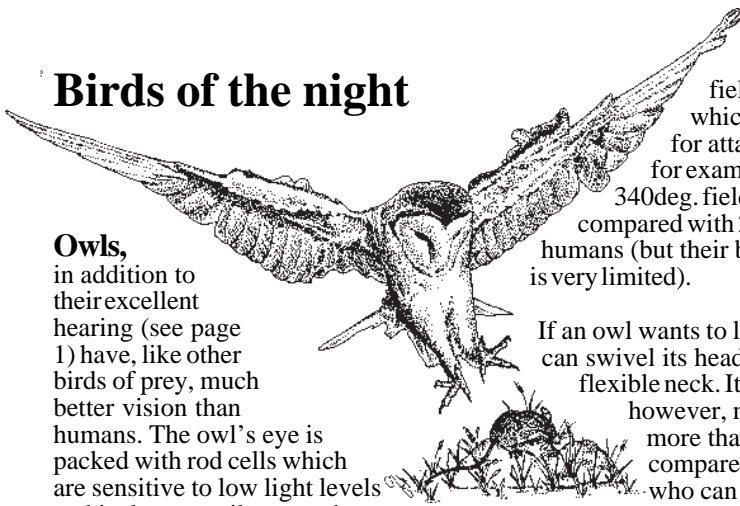


WET TROPICS
MANAGEMENT AUTHORITY



Department of
Environment and
Heritage

Birds of the night



Owls, in addition to their excellent hearing (see page 1) have, like other birds of prey, much better vision than humans. The owl's eye is packed with rod cells which are sensitive to low light levels and its large pupil means that an image is about two and a half times brighter to an owl than to a human.

field of vision from which to keep watch for attackers. Pigeons, for example, have a 340deg. field of view compared with 200deg. in humans (but their binocular vision is very limited).

If an owl wants to look behind, it can swivel its head round on its flexible neck. It cannot, however, move its eyeballs more than two degrees, compared with humans who can swivel theirs about 100deg.

When swooping on its prey one of the owl's outer toes can be brought around so the four talons grip from four different directions. Large amounts of indigestible fur, feathers and bones are swallowed but once or twice a day these items are regurgitated, in tightly-packed pellets. Researchers can often learn a lot about animals living in a particular area by examining these pellets; bones of the rarely-trapped prehensile-tailed rat are the only indication that it is more common than sightings would suggest.

Two groups of owls inhabit the wet tropics; hawk owls (southern boobook, barking and rufous owls) and the masked owls (barn, masked, grass and lesser sooty owls). Hawk owls, which have incomplete facial discs and very large eyes, have relatively better night vision than hearing. They hunt by perching,

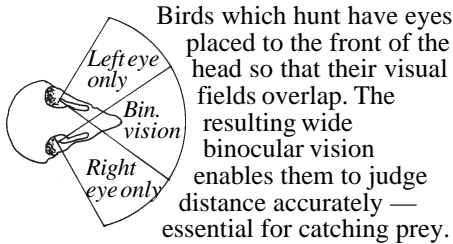
looking and diving, then carrying their prey in their talons and tearing it up before eating. Masked owls, which have a more silent flight, huge ears and better hearing, hunt by patrolling their territory on the wing and pouncing, after which the prey is carried in the beak and usually swallowed whole.

Nightjars and frogmouths have large eyes, giving them good night vision, wide gaping bills for feeding on insects and much weaker feet than owls. They are only distantly related to owls.

Frogmouths flit from perch to perch, pouncing on prey which they detect by movement. Tawny frogmouths eat only nocturnal insects but Papuan frogmouths also catch lizards, frogs, rodents and small birds.

Nightjars are ground-dwelling birds which feed mainly at dusk and dawn by flying, with open bills, trawling for insects. Bristles, which are very fine, barbless feathers, extend forward at the sides of their mouths. These were once thought to funnel flying insects into the bird's mouth but it is now thought that they actually protect the bird's eyes as it flies through clouds of airborne insects.

White-throated and large-tailed nightjars are found in the Wet Tropics, in dry forests and rainforest margins.



Birds which hunt have eyes placed to the front of the head so that their visual fields overlap. The resulting wide binocular vision enables them to judge distance accurately — essential for catching prey.

Owls have binocular vision, covering 60-70deg., and it is thought that they are the only birds with true stereoscopic (three-dimensional) vision and, therefore, a sensation of depth. Among birds, they are the only ones in which the nerve fibres from both eyes link up on each side of the brain (like mammals) instead of going only to one side of the brain.

By contrast, birds which are likely to become prey have eyes more to the sides of their heads giving them a wide

Eyeshine



Many nocturnal animals have eyes which are adapted to low light conditions — a feature which makes finding them at night with a spotlight much easier. When light enters our eyes it passes through the retina, where some is absorbed, and the rest is lost in background tissues. Many nocturnal animals, however, have a mirror-like membrane (tapetum) behind the retina which reflects the light back through the retina again for a second grab. The remainder passes out through the eye again — this is the light which we see reflected in our spotlights.

The brightness and colour of this varies between animals. Caught in flash photos, we see ourselves with dull red eyes — an indication of our poor night vision. By contrast, the bright reflection from cats' eyes caught in the headlamps indicates their refined night vision.

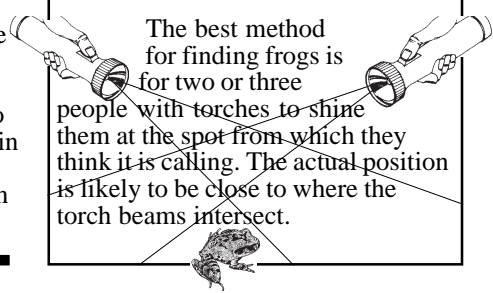
Possum-spotting experts can often tell which species of possum they are looking at depending on the eyeshine colour. That of Herbert River ringtails is pink or yellow, green ringtails is dull red and brushtails and striped possums look pinkish. The lemuroid possum has the brightest eyeshine — a white or yellow glare. Possums are not the only animals with eyeshine. Tree-kangaroos reflect only a dull red shine but the eyes of spiders, geckos and many other nocturnal animals glisten or sparkle.

Rod cells, which dominate in nocturnal creatures' eyes, contain a highly sensitive chemical called rhodopsin. When light reaches it, the rhodopsin breaks down, a process which sets up electrical impulse transmissions (information) to the brain. The rhodopsin is instantly rebuilt (using Vitamin A) as soon as it breaks down so vision can be continuous. Glare, however, breaks down too much of the rhodopsin so more time is needed for it to be rebuilt. Large rods contain more rhodopsin — but fewer of them can be packed into a given area, with a consequent reduction in visual detail.

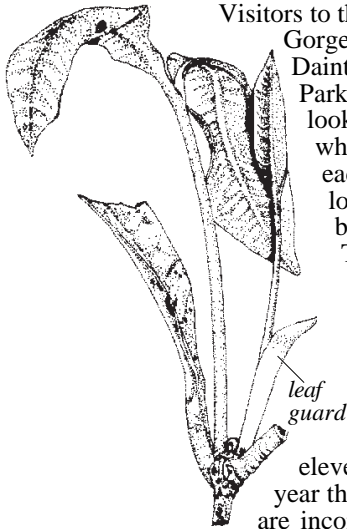
Find that frog

Frog calls are a prominent feature of the soundscape at night, each species making its distinct call. A useful exercise, before a walk, is to play a tape of these calls (see Bookshelf) and ask participants to give them a 'name'. Then, during the walk, they can be listening out for the 'squeaky wheel-bearing frog' or the 'rattle-frog' — rather easier than using sometimes long official names.

The best method for finding frogs is for two or three people with torches to shine them at the spot from which they think it is calling. The actual position is likely to be close to where the torch beams intersect.



Out and about



Visitors to the Mossman Gorge section of Daintree National Park will notice what look like narrow white petals — each about 4cm long — scattered beside the paths. These structures are in fact the cast-off guards for leaves of an interesting small tree called *Bosistoa brassii*. For eleven months of the year these leaf guards are inconspicuous

covers on small green buds. But in winter the buds swell and elongate in a very short space of time. When the guards are thrown off, the end of each twig is adorned with a new pair of handsome leaves, between which nestles another set of buds ready for action twelve months hence.

Voluntary protection of land ... with financial benefits!

Cairns City Council has received funding from the Natural Heritage Trust (Bushcare component), to develop and implement voluntary co-operative management agreements in the region. The aim is to promote the protection of land with high conservation values — a concept which is supported in the FNQ2010 Regional Environment Strategy and the Environmental Audit of the Queensland Canegrowing Industry.

The Land Management Agreement project provides an opportunity for freehold landowners to be actively involved in the protection of the area's natural assets for future generations. By participating in the project, the landowner may be eligible to receive a rate refund, financial assistance and technical advice for the management of their property. In all cases, ownership and management of the land remains with the landowner.

If you would like more information, please contact Rachel Small, Cairns City Council's Scenic Rim Liaison Officer on (07) 4050 1710.



Spot a Croc?

Innisfail-Cairns-Port Douglas-Mossman

call 4035 4625 or 0412574 521



Queensland Government Department of Environment

In response to public concerns about crocodiles, DEH is trialing a new management program for estuarine crocodiles in the Far North. Known as TIMAC (Trial Intensive Management Area for Crocodiles) the program began in May 1998 for a trial period of three years.

The goals of the TIMAC program are threefold:

- To remove estuarine crocodiles from clearly defined areas near Cairns, Innisfail, Mossman and Port Douglas.
- To increase scientific knowledge of estuarine crocodiles so as to improve their conservation and management in Queensland.
- To teach people about crocodiles and promote safe behaviour in crocodile habitat.

You can help by reporting any crocodile sightings. The necessary information is

who are you — a contact name and address?

what did you see — how big was the croc?

when did you see it — date and time?

where was it — geographical location and the position of the croc (in the water, on a bank ...)?

how did you see it — were you bushwalking, fishing, in a boat ...?

Crocodile sightings should be reported to the Crocodile Research Group, PO Box 2066, Cairns, Qld 4870 or by calling 4035 4625 or 0412 574521.

Please note

that you are welcome to photocopy *Tropical Topics*. However, if the text is reproduced separately it must not be altered and must acknowledge the Environmental Protection Agency as the source. Illustrations must not be reused without permission. Please contact the editor (details on the back page) if in doubt.

Daintree Rescue Program Visitor Facilities

Dubuji, the new visitor site at Cape Tribulation is fast taking shape — under the watchful eye of project staff and a juvenile cassowary which has only recently begun using the area. The facility, which will include a large parking area, toilets, picnic facilities and a small unstaffed information facility also provides visitors with access to a 1200m interpretive boardwalk loop through coastal rainforest and swamp communities and access to Myall Beach. The facility is expected to be open to the public towards the end of this year.

At the Marrdja Boardwalk the new toilet is nearly complete and about 150m of new boardwalk constructed.



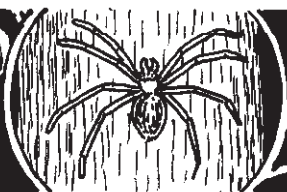
Early winter is a time for **cassowary courting** — as reports of pairs 'consorting peacefully' suggest. These birds

are normally solitary and if the dominant female encounters a male outside the mating season she stretches up to her full height and stares him into flight. In the mating season, however, she will usually tolerate him as he moves around her making deep rumbling noises.


Eggs produced from these encounters will hatch during the maximum fruiting period. In the meantime the father is in for a long haul as he sits on them almost constantly for 50 days. He looks after the chicks for about nine months — until the next mating season, at which point the young are evicted from the home range. This means that early winter is a hazardous time for the juvenile birds. Not only is food in short supply but the birds are also learning to fend for themselves in competition with intolerant breeding adults.

Night signs


It is not always easy to find animals at night. However, signs of their presence can give us clues to what is there and what is not too far away.



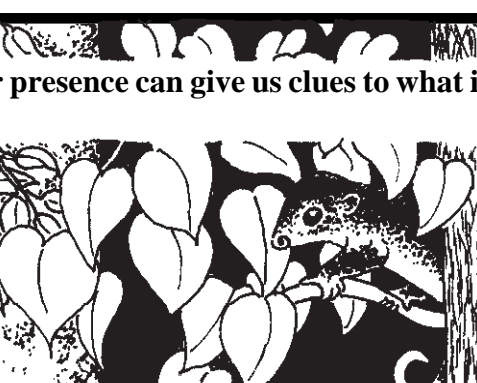
Spiders' eyes often glisten in the spotlight. Those which are active at night are usually dull cryptic ones which are well camouflaged or hide under bark or in burrows by day.



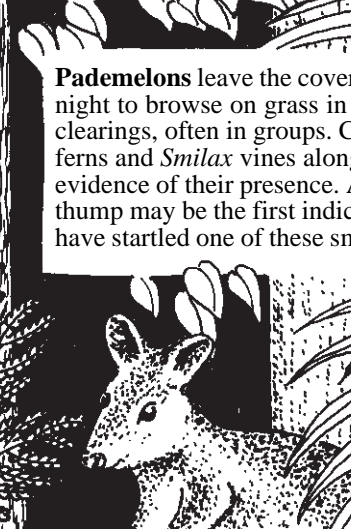
Feral pigs are the largest mammals likely to be seen at night. Churned-up earth indicates favourite feeding sites — but be wary of these potentially dangerous animals.




Flying foxes may draw attention to themselves with their loud squabbling but they can also be surprisingly quiet. These bats usually press the fruit against the roof of the mouth to extract the juice and then spit out the remains. These spits can be found under popular feeding trees.




Chewed leaves pattering on to the ground may have been dropped by **possums**. Herbert River ringtails prefer secondary regrowth and often make their dens in epiphytic ferns. Green ringtails and brushtails feed on secondary and pioneer species while lemuroid ringtails are in the high canopy of primary forest.



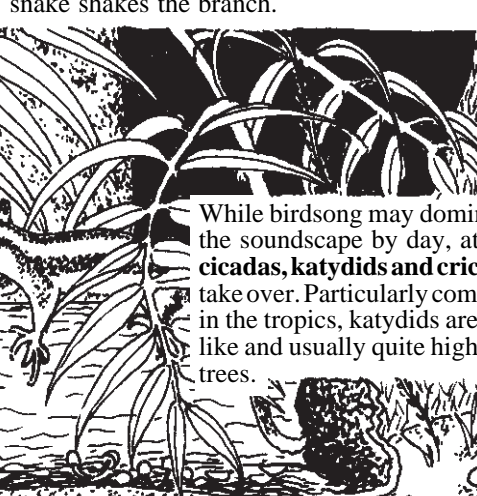
Pademelons leave the cover of the forest at night to browse on grass in nearby clearings, often in groups. Chewed rasp ferns and *Smilax* vines along the track are evidence of their presence. A loud, warning thump may be the first indication that you have startled one of these small wallabies.




Splatters of white droppings on the ground may indicate a **roosting bird** above. While sleeping, a bird is vulnerable to attack from snakes so many choose to perch at the end of a thin branch. There it receives advance warning as the weight of an approaching snake shakes the branch.




Gouged logs (and a strong musky smell) may indicate the presence of **striped possums** which use their very long lower incisors to dig out wood-boring grubs. White-tailed rats also tear up dead wood, in a similar quest.




While birdsong may dominate the soundscape by day, at night **cicadas, katydids and crickets** take over. Particularly common in the tropics, katydids are leaf-like and usually quite high in trees.




Brown tree snakes, unlike the green ones, are nocturnal. Sleeping birds, lizards and frogs feature on the menu, the latter possibly attracting them to ground level.



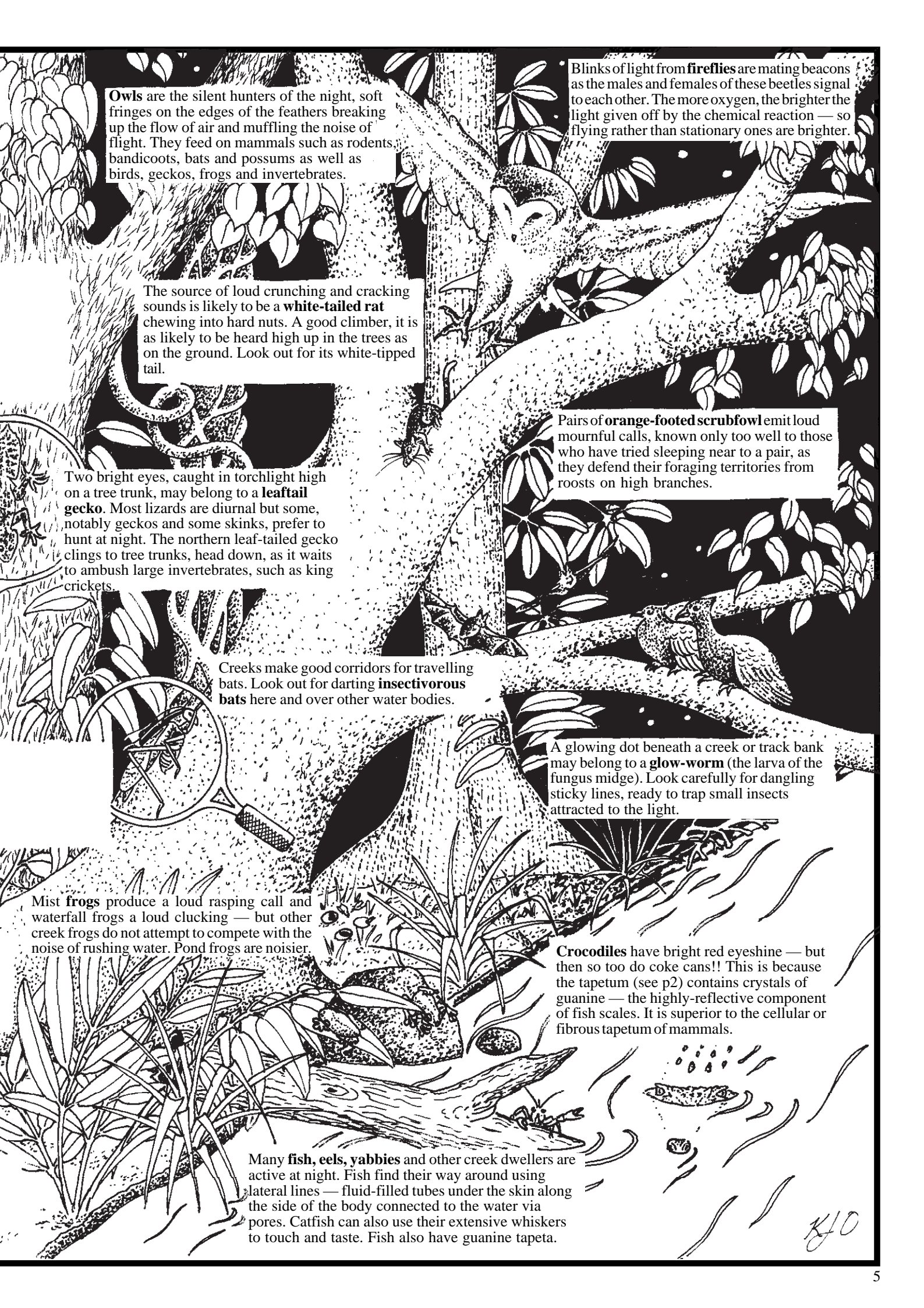
Luminous fungi are a highlight of many night walks — turn off the light to see them. No one is sure why they glow — it may be incidental or it may serve to attract gnats which disperse spores.



Bandicoots dig holes in the ground when searching for invertebrates. Those of the long-nosed bandicoot are generally deeper and more conical than those of the northern brown bandicoots. Both species occur in the Wet Tropics the former preferring deeper rainforest and higher areas while the latter is more common in clearings.



Toads prefer open grassy areas to rainforest. They have bright eyeshine and blink regularly.



Owls are the silent hunters of the night, soft fringes on the edges of the feathers breaking up the flow of air and muffling the noise of flight. They feed on mammals such as rodents, bandicoots, bats and possums as well as birds, geckos, frogs and invertebrates.

Blinks of light from **fireflies** are mating beacons as the males and females of these beetles signal to each other. The more oxygen, the brighter the light given off by the chemical reaction — so flying rather than stationary ones are brighter.

The source of loud crunching and cracking sounds is likely to be a **white-tailed rat** chewing into hard nuts. A good climber, it is as likely to be heard high up in the trees as on the ground. Look out for its white-tipped tail.

Two bright eyes, caught in torchlight high on a tree trunk, may belong to a **leaf-tail gecko**. Most lizards are diurnal but some, notably geckos and some skinks, prefer to hunt at night. The northern leaf-tailed gecko clings to tree trunks, head down, as it waits to ambush large invertebrates, such as king crickets.

Pairs of **orange-footed scrubfowl** emit loud mournful calls, known only too well to those who have tried sleeping near to a pair, as they defend their foraging territories from roosts on high branches.

Creeks make good corridors for travelling bats. Look out for darting **insectivorous bats** here and over other water bodies.

A glowing dot beneath a creek or track bank may belong to a **glow-worm** (the larva of the fungus midge). Look carefully for dangling sticky lines, ready to trap small insects attracted to the light.

Mist **frogs** produce a loud rasping call and waterfall frogs a loud clucking — but other creek frogs do not attempt to compete with the noise of rushing water. Pond frogs are noisier.

Crocodiles have bright red eyeshine — but then so too do coke cans!! This is because the tapetum (see p2) contains crystals of guanine — the highly-reflective component of fish scales. It is superior to the cellular or fibrous tapetum of mammals.

Many **fish, eels, yabbies** and other creek dwellers are active at night. Fish find their way around using lateral lines — fluid-filled tubes under the skin along the side of the body connected to the water via pores. Catfish can also use their extensive whiskers to touch and taste. Fish also have guanine tapeta.

K/O



Questions & Answers

Q In the evening I see thousands of starlings zooming down Lake and Grafton Streets (in Cairns). It's quite a spectacle — they move so fast, often travelling in groups of about 30 and at intervals of five seconds. Where are they going? Where have they been?

A They were heading towards trees in the Mall, in the middle of Cairns, where they congregated in deafeningly noisy flocks with a large proportion of juveniles. Presumably they had been feeding in forests and gardens around Cairns during the day. These flocks were particularly large at the end of summer, when this observation was made.

Some birds roost alone but others do so in large flocks. In cold climates, this strategy helps them to keep warm as they huddle together. There is also safety in numbers, since there will always be a few birds awake to call the alarm and it is harder for predators to single out an individual from a flock (as with a shoal of fish).

However, a roost may also attract predators. Birds at the edge, and those entering and leaving the roost, are most at risk — which may be why many enter in dense, fast-flying formations. Communal roosting may also give birds a chance to exchange information — those which fed well the previous day may lead others to the source of food, particularly useful for juvenile birds which are still learning.

Metallic starlings move north in winter but many stay put in the Cairns area where conditions are suitable. Those from further south may 'leapfrog' over them and move as far as New Guinea. Possibly some Cairns locals migrate and others remain — but without an extensive banding program this is speculative.

Q I have often heard that taipans can breed with pythons to produce venomous pythons. Is this true?

A There is no truth whatsoever in this belief. It is absolutely impossible for a taipan and python to breed — they are completely different species of snakes and in fact belong to different families. If this was possible then dolphins and rats, or kangaroos and sheep would also be able to breed. (And chickens could be crossed with centipedes to increase drumstick production.)

Pythons will bite, if provoked, but they do not produce venom. However, like wildlife in general, their oral hygiene isn't particularly good so the bite can become infected. It is therefore best to avoid them.

Q Once a jellyfish loses a tentacle does it grow another one? Or does it die?

A The jellyfish does not die, but simply grows another tentacle. The tentacle, however does die.

Facts and stats

The nocturnal habits of many mammals may date back to the time of the dinosaurs when they evolved from reptiles. Warm-blooded, they were able to function at night when reptiles — probably their main predators — became inactive.

In wet sclerophyll forest yellow-bellied gliders make deep slashes in the trunks of stringybark (*Eucalyptus resinifera*) trees and feed on the sap, returning night after night. Sugar gliders and feather-tailed gliders may also visit for a feed.

Insectivorous bats have whiskers which can feel an insect when it is near enough to be snapped up.

The higher the pitch of a bat's sonar the smaller the surface its echo can reveal — some can detect a wire the size of a human hair. The louder the click the further it goes. A bat's sensitive hearing would be overloaded by its own very loud clicks, so each time a click is made a special muscle disconnects the bones which carry sound from the ear drum. The connection is then re-established in time to catch the returning echo. This can happen one hundred times a second. The faster the clicks, the more accurate the information. Some bats make 200 clicks a second, each 1/2000 of a second — and are able to distinguish the echoes between them.

Mammals sometimes leave scent trails using special glands. This enables them to move quickly at night along familiar routes.

In spring (Sept/Oct) there is a noticeable increase in diurnal birdsong at night. The most prominent of these songsters is the willie wagtail, using its sweet song not its scolding one. Presumably this has something to do with territory at the beginning of the breeding season — but no one really knows.

Possums in the roof can be a nuisance so many people trap and remove them to another area. Studies of relocated common brushtails, in Victoria, however, have shown that most of them die. Of 12 possums fitted with radio collars, only two were alive after 10 weeks. A better solution is to block access to the roof (at night) — or get to love your possums. You should also check the source of the noise — the racket in the roof is very likely to be rat-related, especially if you live on the lowlands.

The southern boobook owl does not often fly off when people walk by. Instead it stands upright with feathers pressed tightly against its body and turns side-on to the intruder giving it a very long and slender appearance

Tourist talk

ENGLISH	GERMAN	JAPANESE
nocturnal	nachtaktiv	yakousei no 夜行性の
diurnal	tagaktiv	nitchu 日中活動性の
spotlight	Scheinwerferlicht	katsudousei no スポットライト
torch	Taschenlampe	kaichu dentou 懐中電灯
filter	Filter	filter フィルター
vision	Sehvermögen	shikaku 視覚
sensitive	empfindlich	binkan na 敏感な
noise	Lärm	zatsuon 雑音
possum	Kletterbeutler	possum ポッサム
owl	Eule	fukurou ふくろう

Night moves

How do nocturnal animals feel about being watched by diurnal humans? Spotlighting is popular. It's the only way to watch nocturnal mammals in the wild — but if the wildlife reacts badly to being observed, the quality of the spotlighting tour sooner or later is reduced. The trick is to reach a compromise — to find methods which suit both groups of animals.

Too light or not too light?

Nocturnal eyes are very light-sensitive so the strength of the spotlight is important. Although actual brightness is influenced by various factors, the simplest way to judge a light's strength is the wattage.

W H A A T T ? Robyn Wilson, of the Cooperative Research Centre for Tropical Rainforest Ecology and Management, suggests that using filtered lights of less than 30W increases both the chance of finding animals and the viewing time. Robyn's study showed that brighter bulbs penetrate deeper into the forest, warning animals of the imminent approach of observers. When being observed, animals were less agitated by filtered lights below 30W and therefore less likely to move away. Lights under 30W are also thought to reduce observer fatigue, an important issue when considering safety of others and efficiency of a spotlighting program.

Filters can be opaque, red or green — there is debate as to whether possums and other nocturnal animals can see colour. Robyn found that a single layer of clear Nylex contact, from a stationary shop, caused considerably less stress to the animals than a light with no filter — but also allowed efficient searching.

Right on the night

Visitor behaviour can influence the success — or otherwise — of a spotlighting tour. Minimise disturbance by establishing some rules before moving into the forest.

- Animals can be upset by noise such as rowdy behaviour. Studies also indicate that crunching gravel — a common sound as spotters step off a sealed road — causes great stress to possums. Similarly disturbing are sliding van doors (as opposed to a normal car door slam) and high pitched voices (rather than lower adult voices). To avoid disturbance, it is important to explain the activity, where you are going and what you are doing before moving into the forest.
- Using wildlife call tapes and feeding or handling wildlife can, in the longterm, reduce the animals' chance of survival.
- Wildlife is very easily distressed by predator species so leave pets at home.



Please help us animals by doing the right thing. For a copy of the DEH Code of Practice for conducting a spotlighting tour within a protected area, contact Mike Procriv on Tel: (07) 4046 6641

Great expectations

Possums with babies on their back, tree-kangaroos jumping around, wombats digging holes for their night time meal, spotted quolls growling ...

Visitor expectations, based on glossy advertising, are often unrealistically high. Instead, promotion of guided spotlighting tours should focus on themes like 'discovery' or 'exploration' and not infer guaranteed wildlife encounters. A focus on frogs, crickets, glowing fungi and fireflies is less likely to lead to disappointment. Promotional material should also never use images depicting humanised wildlife, for example, animals being fed or in unnatural circumstances such as picnic tables or rubbish bins.

It is a good idea to submit all promotional materials to an interpretive expert prior to final production to check for erroneous or misleading content. DEH interpretive rangers can help you set up your spotlighting theme walks and interpretive training is available for tour operator guides who have Commercial Activity Permits.

Clues for cruisin'

Minimise the numbers of vehicles — no more than two.

- When encountering another vehicle turn off spotlights and torches until well clear.
- Use only standard vehicle lights to illuminate the road.
- A telescope connected to a TV monitor in the vehicle minimises disturbance and is useful for less able walkers.

Spot-on hints

- A group should be no larger than 12.
- Place the spotlight in front of your face and observe along the beam to detect animal's eyeshine.
- Use individual torches only for safety.
- Use good binoculars or telescopes.
- Focus on sounds and smells.
- Do not shine spotlights on nesting birds or people.



Bookshelf

Spotlight on Possums

Rupert Russell
University of Queensland Press (1980)

Beautifully illustrated, this is a personal and anecdotal account of encounters with most rainforest and open forest possums and gliders of North Queensland.

Tracks, Scats and Other Traces

Barbara Triggs
Oxford University Press (1997)

A thorough field guide, dealing mainly with mammals of Australia, this book is richly illustrated with drawings and photographs of feet, tracks, scratches, bones — and numerous scats.

Frog calls of North-east Queensland

Produced by Jean-Marc Hero, JCU
Townsville

This useful cassette tape is available in some environment shops.

Using rainforest research (leaflet)

Possums under the spotlight

CRC TREM (1997)

This leaflet summarising Robyn Wilson's research into the effect of different spotlights on possum behaviour is available from CRC TREM, PO Box 6811, Cairns, QLD 4870. Ph: (07)4042 1246; Fax: (07)4042 1247.

Look out also for an article by Robyn in a forthcoming *Nature Australia* magazine.

Wildlife Australia Spring 1997

Uninvited guests

Ian Temby

A look at problems with relocated possums and suggestions for discouraging them from your patch.

Bird Behaviour

Robert Burton
Granada (1985)

This fascinating book includes useful information on nocturnal birds, senses, roosting and so on.

Birds of the Night: Owls, frogmouths and nightjars of Australia

David Hollands
Reed Books (1991)



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).

While all efforts have been made to verify facts, the Department of Environment and Heritage (EPA) takes no responsibility for the accuracy of information supplied in *Tropical Topics*.

© The State of Queensland.
Environmental Protection Agency

For further information contact...

Stella Martin
The Editor
Tropical Topics
Environmental Protection Agency
PO Box 2066
CAIRNS QLD 4870

Ph: (07)40466674
Fax: (07)40466751
e-mail: Stella.Martin@epa.qld.gov.au

Wet Tropics Management Agency
(For general information on the Wet Tropics World Heritage Area only.)
PO Box 2050
CAIRNS QLD 4870
Ph: (07)40520555
Fax: (07)40311364
Website: www.wettropics.gov.au



**WET TROPICS
MANAGEMENT AUTHORITY**



Queensland Government
Environmental Protection Agency
Queensland Parks and Wildlife Service