

Ghost bat

## Microbats

Microbats are found all over the world except in the driest desert areas and the poles. Interestingly, although they are exclusively insect and meat eaters elsewhere, in the Americas, where there are no megabats, many microbats eat nectar, pollen and fruit.

Most microbats are social. Almost all avoid daylight by roosting in crevices, caves, treehollows, folded leaves, under bark or in roofs. Unfortunately many of these sites are being destroyed by human activity. This is particularly important when it affects maternity sites, where temperature, humidity and freedom from disturbance and predators are critical.

The newborn young at first hangs on to its mother using its claws and teeth (attached to her nipple) as she flies around. Later the hairless youngsters remain in the maternity site huddled together with one mature female left behind as the 'babysitter'. Mothers are able to locate their own particular babies among thousands, probably using their sense of smell. It seems that females of many species spend little time with the males, forming instead their own close-knit groups and residing in stable colonies, while the males tend to rove around.

### Fears and cures

Traditionally bats have been symbols of evil, presumably because of association with night and darkness. On the other hand, they are symbols of health and prosperity for the Chinese (and luck for gamblers) and they have long been associated with medicine.

Bats have become the subject of modern research. For example, study of sonar has proved useful for producing a walking stick with echolocation for blind people and for developing non-destructive testing using ultrasound.

### Combatants

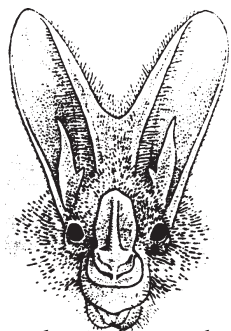
Bat droppings are a rich source of nitrates which were once used to produce gunpowder. Tonnes of bat guano were mined from Johannsons Cave near Rockhampton during the First World War. Odder still was an American plan, during the Second World War, to attach small bombs to freetail bats. The idea was to drop numbers of these mini-bombers from planes on to enemy territory. They would then find their way into buildings where the bombs would detonate. The plan backfired, however, when armed escapee bats roosted in the army's own buildings and blew them up! When several hundred mini-bombers roosted under an elevated petrol tank in a nearby town the project was abandoned and the Americans moved on to the development of the atomic bomb.

## Micros in the Wet Tropics

The Wet Tropics is home to representatives of all six groups of Australian bats — evening, freetail, Megadermatidae (big-skin), sheath-tail bats and two groups of horseshoe bats. A few of the 40 or so Wet Tropics species are featured here.

### Ghost bat

(*Macroderma gigas*)

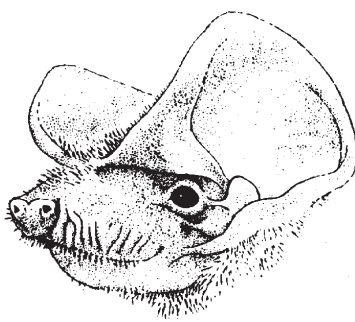


Australia's only carnivorous bat, the ghost bat, eats frogs, lizards, birds, small mammals (including other bats) as well as large insects. It has good vision and huge ears which are used to listen for noises made by prey, as its sonar is quite weak. It then swoops down on its prey, enveloping it with its wings and killing it with powerful bites.

The ghost bat, at 150g (about the size of a magpie lark) is one of the largest microbats in the world. Its distribution is patchy over northern Australia and it is particularly at risk due to limestone mining threatening its habitat.

### Northern freetail bat

(*Chaerophon jobensis*)



Every year in Cairns and Kuranda there is a rash of enquiries about 'baby flying foxes' found in people's houses. These usually turn out to be freetail bats, one of the commonest of the microbats found in urban areas where they have found house roofs much to their liking. They tolerate the high temperatures that exist in roof spaces but it is possible that finds coincide with the onset of hot weather when roofs become too hot, forcing the bats to leave. They are small (20-30g) with big ears, faces like cocker spaniels, very short hair and long tails. (They are also called mastiff bats.)

### Tube-nosed insect bat

(*Murina florium*)



This bat was caught for the first time in Australia (16th time in the world) on the Atherton Tableland in 1981. Although thought to be confined to misty mountainous areas two were later caught on coastal lowlands north of the Bloomfield River. It is not now considered as rare as originally supposed.

### Large-footed mouse-eared bat

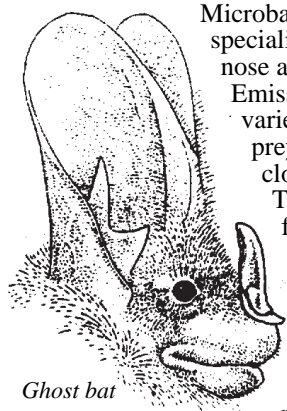
(*Myotis moluccarium*\*)

This is Australia's equivalent of the Central American fishing bats. The large-footed myotis frequents still bodies of water where it flies across the surface raking the water with the claws on its large feet to catch aquatic insects. These bats often roost under bridges above rivers where breeding males defend harems of females.

\*Formerly *M. adversus*

## Hearing the way

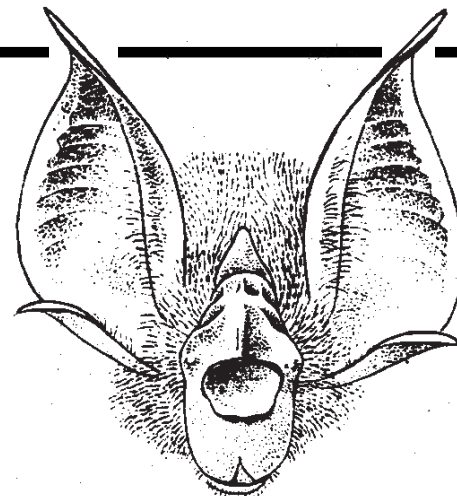
No bats are blind, although many have small eyes. Microbats depend largely on sonar, or echolocation. Sonar is distance-measuring with sound (not to be confused with radar, which is distance-measuring with radio waves). Some other animals, such as whales, dolphins and shrews also use sonar.



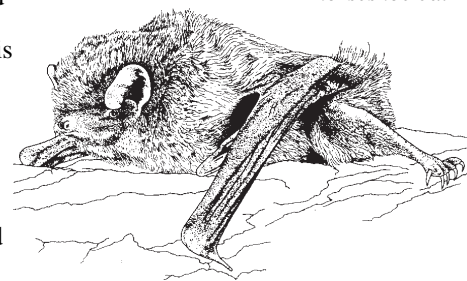
Ghost bat

Microbat sonar, at frequencies of 15-200KHz, is produced by a very specialised larynx (voice box) and beamed out through the mouth or the nose at rates up to 200 pulses a second. Sonar is a complex process. Emissions may vary in intensity, frequency and pulse rate and can be varied depending on whether a bat is 'searching' or 'homing in on' prey. If the bat is a nose-sonar specialist, it flies with its mouth closed and has folds of skin around its nose to 'beam' the sound. These are usually called nose-leaves and can be quite bizarre in form. The mouth-sonar bats (such as our little freetail bats) fly with their mouth open and usually lack facial decorations.

Since microbats rely on hearing the reflection of sound waves, they often have big ears with all sorts of wonderful convoluted trumpet and horn-like shapes, to catch and focus the fainter sonar echoes. Those with small ears have a mouth sonar which is probably particularly loud.



Large-eared horseshoe bat



Little bent-winged bat

A large part of a bat's mid-brain is used to interpret the sonar input to the ears. It is thought that the signals are processed to construct the equivalent of our visual picture of the world. It is certainly very accurate. Scientists have been able to train a microbat to distinguish between fine-grade and medium-grade sand-paper to find food! The rare golden-tipped bat (*Kerivoula papuensis*) can detect spiders' webs. It probably hovers and picks its prey from the web — some have been found with stomachs full of orb-weaving spiders. It has the quietest sonar of all Australian bats and probably flies very slowly. It quite easily detects and avoids mist nets used to trap other microbats.

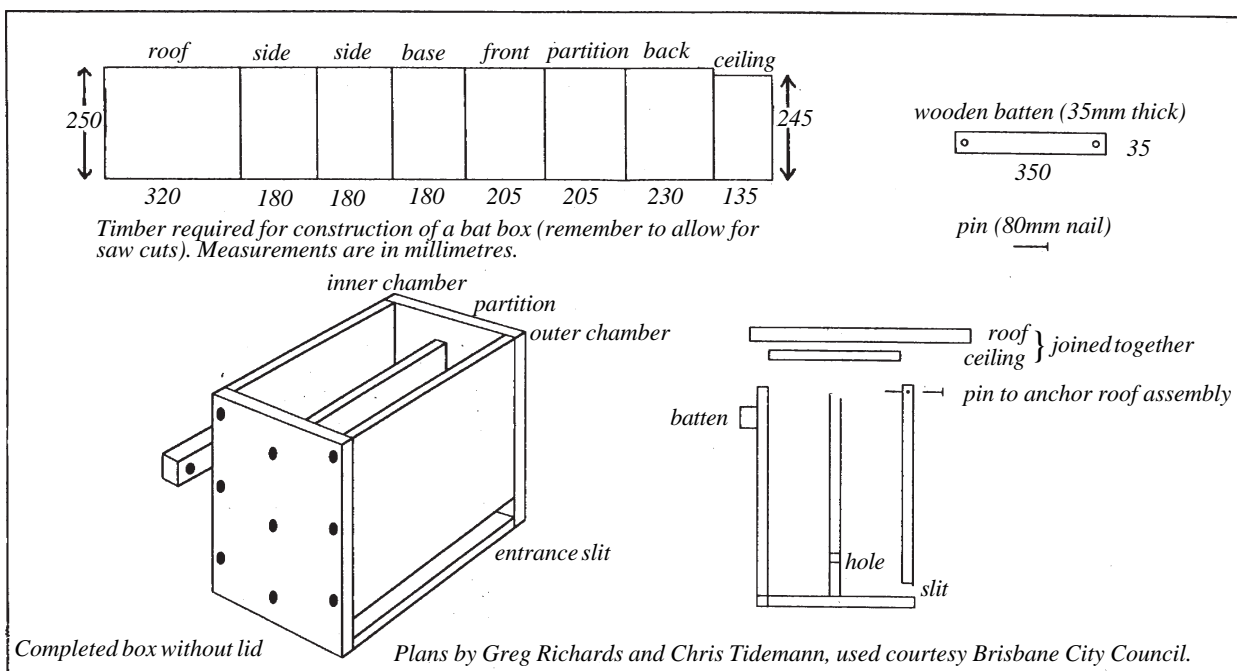
## Batty pesticides

Little microbats are able to eat between a third and a half of their own body weight in insects each night — that is up to an estimated 3 500 for one pipistrelle! A colony of 100 000 individuals may eat between 200 and 400 tonnes of insects in a year!

Encouraging bats into our backyards could help reduce the number of mosquitoes — and the diseases they spread. If you want to do this you could try making and installing a bat box. We are therefore reproducing a design for one here.

It should be mentioned that this design is based on a

European one and will not necessarily appeal to Aussie bats. In fact, different species may need different types of boxes. For example, a cardboard carpet tube capped at the top, waterproofed and lined with carpet with a side hole near the bottom might be a hit with some bats. However, as long as you realise that success is not guaranteed, there is no harm in trying this design. Perhaps you could experiment — the research needs to be done! In the meantime, remember that the roofs of our houses are among the



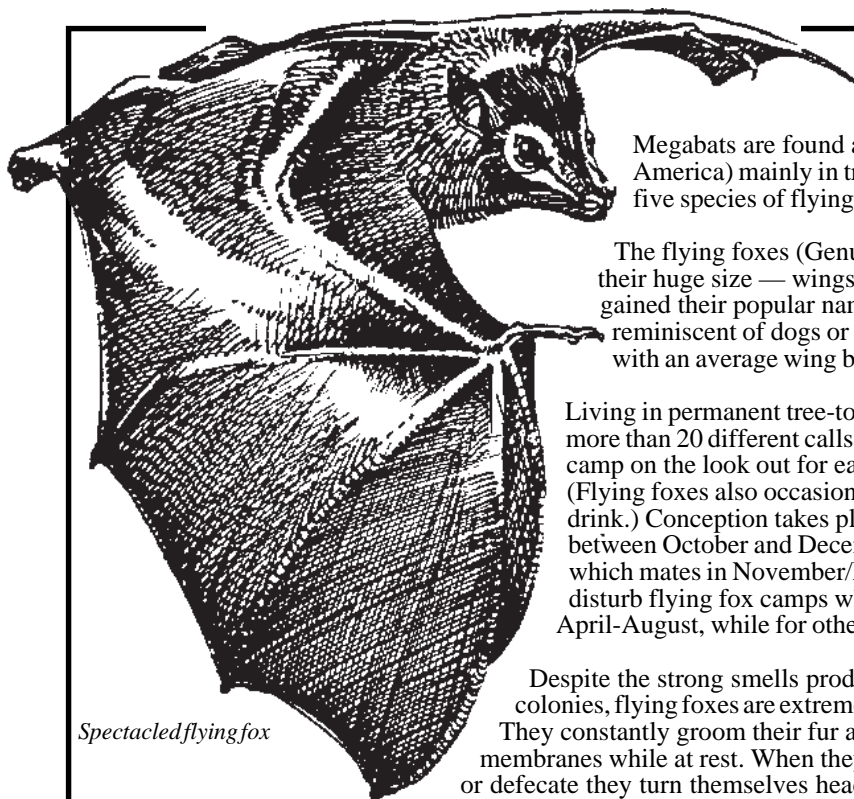
best bat boxes and that the removal of trees with hollows may destroy some homes — and our natural pesticides.

### Bat box hints

- Untreated, unpainted timber is best.
- Keep it simple. An old hollow log mounted upside down with a small entry at the bottom will be just as attractive to many bats.
- Place the box at least four metres above the ground — in the bats' flight path.
- The box will be easiest for a bat to find if it is

facing the north-eastern aspect and is in a tree without dense foliage.

- If you have a lot of trees, the box is best placed in one on the edge of the group — again, it's easier to find.
- Gum trees and paperbarks are ideal.
- Don't secure the box with a permanent wire or band around the trunk as it could harm the tree's growth.
- Make the entry to your box small — if the hole is too big, other animals such as birds will move in and discourage bats.



Spectacled flying fox

# Megabats

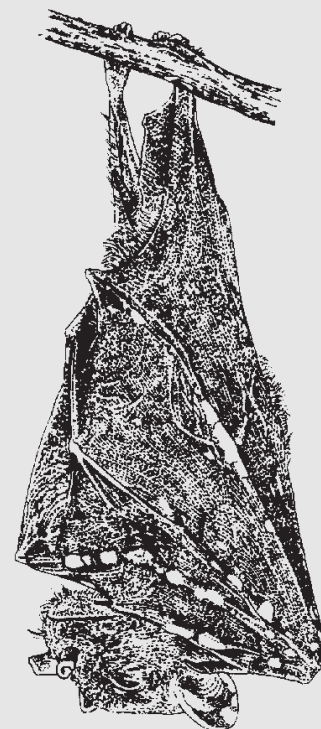
Megabats are found all over the world (outside Europe and North and South America) mainly in tropical areas. There are 11 species in Australia. These include five species of flying fox, plus six of their cousins.

The flying foxes (Genus *Pteropus*) are the best known tropical bats largely because their huge size — wingspans reach up to 1.6m — makes them so obvious. They have gained their popular name because their large eyes, simple ears and long snouts are reminiscent of dogs or foxes. Studies have shown that they fly at a rate of 35-40km/h with an average wing beat of 120 a minute, travelling as far as 50km each night.

Living in permanent tree-top camps, flying foxes have a complex social system and use more than 20 different calls for communication. Old males guard the perimeters of the camp on the look out for eagles and pythons which are their main natural predators. (Flying foxes also occasionally fall victim to crocodiles as they swoop over water to drink.) Conception takes place in March/April and one young is born to each female between October and December. An exception to this rule is the little red flying fox which mates in November/December, giving birth in April/May. It is important not to disturb flying fox camps when the young are being suckled. For little reds this means April-August, while for others summer is the vulnerable period.

Despite the strong smells produced by their colonies, flying foxes are extremely clean animals. They constantly groom their fur and wing membranes while at rest. When they wish to urinate or defecate they turn themselves head up.

## Megas ...



Queensland tube-nosed bat (*Nyctimene robinsoni*)

The 3mm long tubes protruding from this animal's nose make it one of the strangest looking bats. It has been suggested that these tubes allow the bat to smell in 'stereo', thus allowing it to locate food more easily. It is a significant disperser of below-canopy fruits, particularly of figs, its favourite tucker.

This bat has never been seen to roost communally. It is well camouflaged by the white or yellow spots on its wings and ears which cause it to blend in well with sun-dappled foliage. (So good is this disguise one researcher has reported the successful capture of hundreds of dead leaves camouflaged as tube-nosed bats!)

## Of ticks, lychees and flying scapegoats

**When it comes to flying foxes passions run high. There are those who love them and fear for their future and there are those who call them vermin and want to see them exterminated.**

Among the former is a growing group of foster mums and dads who have taken the growing number of flying fox orphans under their wings (so to speak) and found them to be affectionate and intelligent. For many years these came mainly from mothers caught on power lines but recently orphans have been created as huge numbers of spectacled flying foxes on the Atherton Tableland have fallen victim to tick paralysis. This is almost certainly a new phenomenon, not a natural part of the bats' lifecycle. It has been suggested that deforestation is to blame and that the flying foxes, deprived of a food source high in the canopy, are visiting lower food sources, particularly (non-native) tobacco bushes. By coming uncharacteristically close to the ground the bats are coming into contact with the ticks.

Fruit farmers are often unsympathetic. They see no reason to protect the animals which are raiding their orchards at night. As long ago as the 1930s Mr Francis Ratcliffe was employed to estimate their population numbers and suggest a method of control. He came to the conclusion, after several years of research, that flying foxes are mainly blossom feeders which will choose cultivated fruit only as second best to native fruit. It is likely that bat raids on commercial fruits may be a warning sign that all is not well with the forest. Ratcliffe also pointed out that much commercial fruit is picked by growers before it is ripe — before it can be eaten by the flying

foxes. More damage may be done by birds than by bats.

These findings still apply today. Indeed recent research indicates that some fruit farmers have every reason to be grateful to flying foxes. Many fruit species such as bananas have been dependent on bats for pollination and seed dispersal during their evolution. Although genetic engineering can produce many desirable characteristics, when plant breeders want to combat a problem such as fungus attack they need to go back to wild stock for fresh genetic attributes. Without flying foxes and their relatives it would not be there.

The best solution for fruit growers seems to be total exclusion netting which has the added advantage of keeping out birds and protecting crops from hail. A mesh size under 44mm<sup>2</sup> is recommended to exclude bats as well as birds. Perhaps different solutions can apply to different fruits. Cashew growers have found that flying foxes will carry the fruit to certain perches and drop the valuable seeds. A grove of native trees in the middle of a plantation could allow the growers to harvest the cashews, neatly cleaned of their fruits, from a central spot in their orchard! Perhaps the best long-term answer is to give the bats back their natural, preferred food in the form of native trees. Advice on suitable plant species as well as netting can be obtained from the **Cape Tribulation Tropical Research Station**, PMB 5, Cape Tribulation, Qld 4873; Ph/Fax: (07) 4098 0063; email: hugh.spencer@austrop.org.au

## Flying foresters

As night falls millions of flying foxes leave their treetop camps and stream across the sky. At the same time pale blossoms open in the canopy and eucalypt trees increase the supply of nectar to their flowers. These events are linked; the bats and the trees need each other.

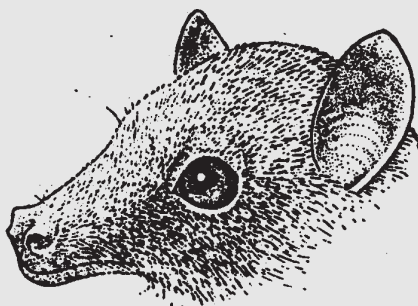
The favourite food of flying foxes is pollen and nectar so nectar is the inducement offered by many forest trees for pollination services. In these cases the flowers are usually white or pale, making them more obvious for the bats at night. Like huge honey bees the bats land and, while feeding on the flowers, collect a load of pollen on their fur to be transferred to the next blossom.

It is now considered that bats, rather than insects or birds, are the prime pollinators of a number of important timber as well as many fruit species. (It has been estimated that 70 percent of fruit sold on S.E. Asian markets is bat-pollinated.) An additional advantage of bat pollination is the great distance which the animals are able to fly (50km in one night) allowing cross-fertilisation between distant trees. This is particularly important for isolated rainforest patches which otherwise would have no way to 'interbreed'.

Flying foxes also distribute seeds. Forest trees with pale fruits attract bats and often while they are feeding they swallow small seeds such as those of figs. Unlike birds which tend to sit in trees before depositing the seeds which they have ingested, bats can do so in flight and for this reason are considered vital for the regeneration of forest in areas which have been cleared (and thus have no bird perches). A study in Africa found that up to 95 percent of aerial seed dispersal was due to bats. This service is not limited to small seeds. In order to protect their find from other hungry bats flying foxes often carry away large fruits such as mangoes, dropping the seeds some distance from the parent tree.

Megabats are now being referred to as 'linchpin' or 'keystone' species by research scientists. The linchpin keeps the wheel on the axle and the keystone locks the stones of an arch; without them neither would hold together. Similarly, without flying foxes to pollinate and distribute species on which so many other animals, including the cassowary, depend, our rainforest systems could collapse. As Dr Norman Myers expressed it, 'The loss could trigger a cascade of linked extinctions'. 'Loss', in this case, may mean not the extinction of the bat population but a critical reduction in numbers. A colony of 25 000 in a camp covering 1-3ha may seem like a huge number but camps are few and far between (one per 20-50km) so the average may be less than one bat per 10ha. It is possible that many more bats are needed to service the ecosystem. Present bat numbers are only a fraction of previous populations; even now we could be reaching critically low numbers.

### ... in the ...



#### Common blossom bat

(*Syconycteris australis*)

#### Northern blossom bat

(*Macroglossus lagochilus*)

The main differences between these two species are to be found in their teeth and their distribution.

Although it is a mega, each blossom bat, at about 15g, is smaller than a mouse. Its pointed nose and long thin tongue are highly specialised for penetrating flowers and licking up the nectar. Any of the trees with 'shaving-brush' flowers are likely to be visited by this bat. A CSIRO study proved its significance as a pollinator of the bumpy satinash tree (*Syzigium cormiflorum*). Various cages were placed over blossoms to allow selected access to flowers by insects, honeyeaters and blossom bats. Results showed that blossom bats performed 46 percent of the pollination while birds and insects were responsible for only 20 percent each.

### ... Wet Tropics

#### Spectacled flying fox

(*Pteropus conspicillatus*)

A specifically rainforest species, this is the main flying fox inhabitant of the Cairns central swamp.

#### Little red flying fox

(*Pteropus scapulatus*)

Our most widely-distributed flying fox, it is not found outside Australia. Huge numbers of this wandering bat move to coastal areas in years of inland drought and poor eucalypt flowering.

#### Black flying fox

(*Pteropus alecto*)

Camps of up to hundreds of thousands of bats are often situated in mangrove and paperbark swamps.

#### Bare-backed fruit bat

(*Dobsonia moluccensis*)

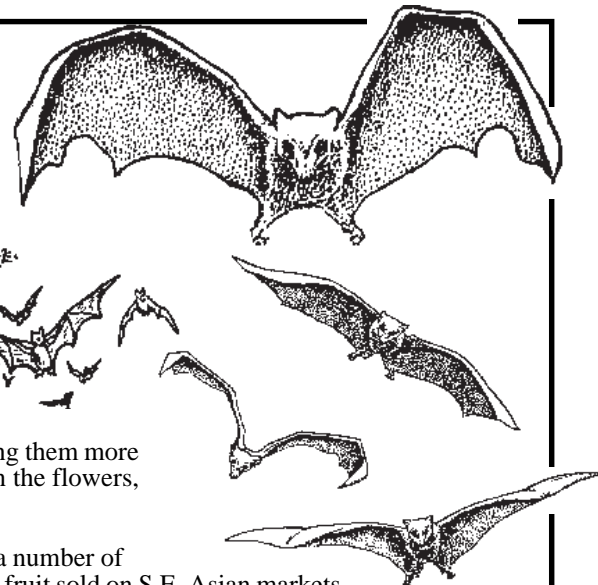
Restricted, in Australia, to northern Cape York including the Black Mountains, near Cooktown, this is the only Australian mega to roost in the semi-darkness of caves. It is also the only fruit bat which can fly backwards!

### Wanted, dead or alive

All Tableland flying foxes reared and released into the wild have had metal thumb bands attached. If you find one of these (dead or alive) please contact the address of the Australian bird and bat banding scheme printed on the band or the **Cape Tribulation Tropical Research Station** Ph/Fax: (07) 4098 0063. Each reported find represents a great deal of useful information.

### Bats as tucker

Bats, particularly flying foxes, are a source of food in many parts of the world. They are also believed to have medicinal properties effective against anything from snake bite and asthma to fractures. Sadly the human appetite for bats is seriously endangering many species and with locals in Guam paying up to \$25 a kilo for them a brisk export business has sprung up in other areas. This has led to the extinction of some island species.



## Questions & Answers

**Q Are dingos to be protected under new legislation? If not, why not? They act as predators on rabbits and pigs. Surely there is a justification for protection.**

**A** There is an argument for protecting dingos. They are actually probably opportunistic, eating cattle which are already dead while being beneficial to native wildlife by preying on foxes, rabbits and pigs. (They are particularly useful for breaking up large families of pigs.) However, they are classed as vermin and pressure from farmers will probably keep them that way. The greatest threat to dingos is from interbreeding with domestic dogs which changes their stock genetically.

**Q Sometimes hard corals are seen feeding during the day. What factors govern when hard corals feed?**

**A** First, there are two distinct groups of corals - hard corals (scleractinians) and soft corals (alcyonaceans). Most soft corals have their tentacles extended during the day. They are active carnivores and are constantly trying to capture their food.

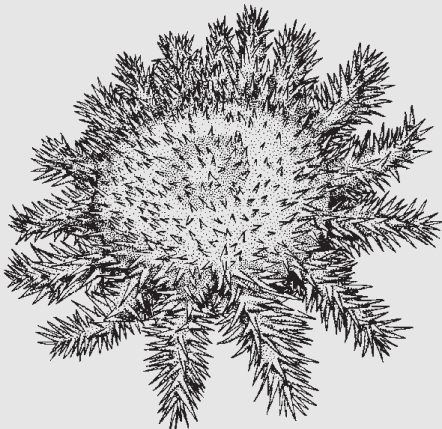
The hard corals are divided into two further groups - hermatypic (with resident zooxanthellae, or plant cells) and ahermatypic (without the plant cells). The hermatypic corals have 90% of their energy needs provided by the photosynthesis of their algal residents. They seem to make just a token effort at food capture and are lazy enough to do it only when the food is at its most abundant. That is at dusk when the plankton come out from their reef hiding places. As perfect fish food these tiny animals appear only when the fish are going to sleep. They then head vertically

up the water column to feed on the floating phyto- (plant) plankton. This is when the hermatypic corals extend their tentacles for an easy feed.

The rest of the day is pretty hard going as the plankton have tucked themselves back in their reef hiding places. The ahermatypic corals, however, receive no free food and must rely much more on active food capture to meet their energy requirements. Like the soft corals they must spend the maximum amount of time with their tentacles extended in an effort to catch as much food as possible.

**Q We know that the crown-of-thorns starfish has a mucus layer which possesses bacteria and causes infection if you get 'spiked' by one. However, are the crown-of-thorns also venomous?**

**A** The skin covering the crown-of-thorns' spikes contains a toxic compound, a saponin, which can cause nausea, vomiting and swelling. However no poison is actually injected by the spines. Infection can also come from bacteria in the water getting into a wound.



## Facts and stats

on bats



There are between 800 and 1000 species of bats in the world (depending on the taxonomy used.) Australia has over 70 species, representing six out of 16 families. About half of them are endemic (found only in Australia). They represent about 30 percent of our land mammal species, the second most numerous group after marsupials (45 percent approx.). Over 60 percent are found in the Wet Tropics.



**Bats are the only mammals which can fly (some others can glide) and are the third group of vertebrate animals to have taken to the air, after the prehistoric pterosaurs and birds.**



By hanging upside down bats are able to reduce the size of muscles in their hips and legs. Tiny legs reduce flight loadings — an evolutionary trade-off for flight.



**Some microbats drink by wetting their fur as they fly over water, licking up the moisture later.**



Hibernating microbats in high altitudes and latitudes allow their body temperature to fall within a few degrees of air temperature. If the external temperature falls below zero the bat's thermostat switches on an internal heater. Once the temperature reaches about 15deg., which is the point at which the majority of insects start to fly, some mechanism wakes the bats for a feed. Many hibernating bats mate before winter but the females store the sperm through the winter and become pregnant as soon as they wake up in the spring.



**Two rare bats are New Zealand's only native land mammals. One of them lives in burrows and eats fungus!**



The smallest bat (and mammal) in the world weighs 1.5g. The bumble-bee bat from Thailand is highly endangered because locals catch and mount them for sale to tourists! One found its way, in a perspex paperweight, to the British Museum where it was discovered to be not only a new species but an entirely new family! Our smallest bat is the Timor pipistrelle which, at 3-5g, weighs the same as an empty matchbox.



**A 54g Queensland tube-nosed bat has been caught carrying a 30g fig fruit 50m from the nearest fig tree — indicating the potential of these bats as dispersers.**

## Tourist talk

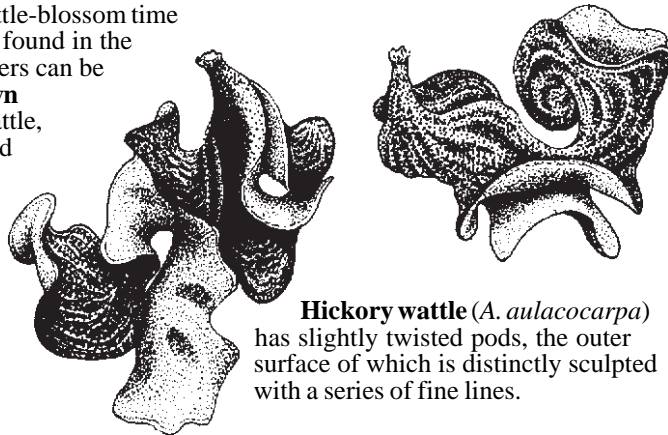
ENGLISH	GERMAN	JAPANESE	
bat	Fledermaus	komori	こうもり
flying fox	Fledermaus die sich von Früchten ernährt	ookomori	おおこうもり
primate	Primat	reichorui	霊長類
nectar	Nektar	hana no mitsu	花の蜜
pollen	Pollen	kafun	花粉
fruit	Frucht	kajitsu	果実
insects	Insekten	konchu	昆虫
sonar	Echolot	onpa hankyo	音波反響
tick	Zecke	da ni	だに
roost	sitzplatz	negurani tsuku	ねぐらにつく

## Nature notes

A diary of natural events creates a pleasing journal which grows richer with the passage of time. Watching for the recurrence of an event after noting it in a previous year, and trying to understand what could have caused changes in timing, is intriguing.

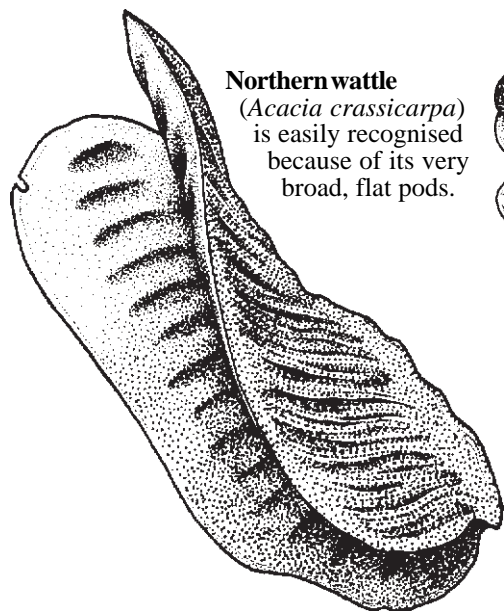
These notes are from the author's own notebook, or were offered by researchers and fellow naturalists. Readers will, inevitably, note variations between their observations and those appearing here. If you do not keep a nature diary perhaps this will inspire you to begin one.

April is usually wattle-blossom time for several species found in the Wet Tropics. Flowers can be expected from **brown salwood** or sally wattle, **northern wattle** and **hickory wattle**. These three are common species along rainforest margins and in exposed situations such as beaches, steep ridges and large gaps within rainforest.

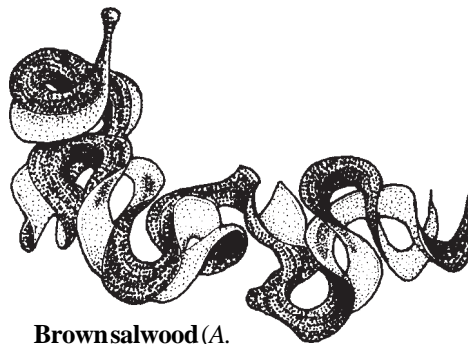


**Hickory wattle** (*A. aulacocarpa*) has slightly twisted pods, the outer surface of which is distinctly sculpted with a series of fine lines.

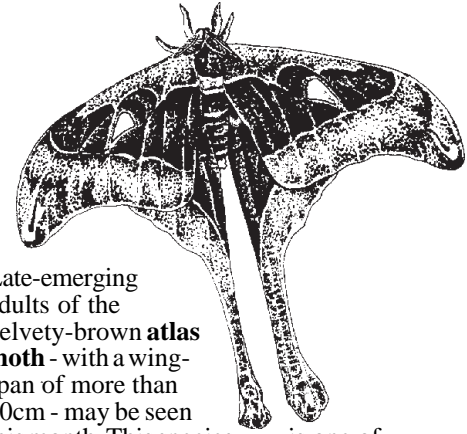
April air may also carry the scent of paperbark blossom when **weeping tea-tree** and **cajeput tea-tree** put out their creamy sprays. The generous supply of pollen and nectar in the blossoms attracts numerous birds and bees by day and noisy flying foxes after dark. Both weeping tea-tree (*Melaleuca leucadendron*) and cajeput tea-tree (*M. cajuputi*) grow into big trees. The former has a long narrow leaf in contrast with the latter which has short, broad leaves.



**Northern wattle** (*Acacia crassicarpa*) is easily recognised because of its very broad, flat pods.



**Brownsalwood** (*A. mangium*) develops tightly coiled seed pods. About the middle of the year sulphur-crested cockatoos will be extracting seeds from these pods, littering the earth with their leftovers.



Late-emerging adults of the velvety-brown **atlas moth** - with a wing-span of more than 20cm - may be seen this month. This species is one of the largest moths in the world but the adults cannot feed because they have no proboscis (the tube through which moths and butterflies suck up their food). Atlas moth caterpillars feed on leaves of bleeding heart tree (*Omalanthus populifolius*).

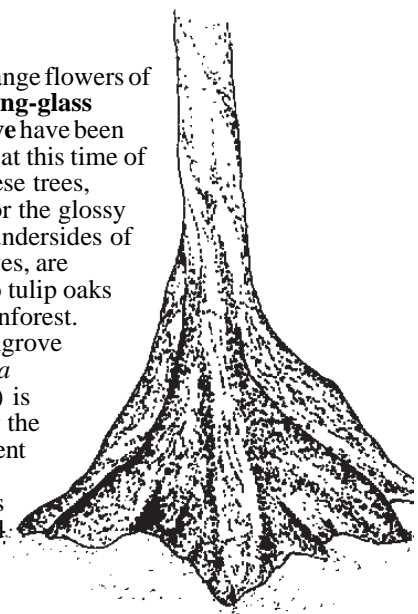
As autumn shortens the days, birds which visit us from varying distances to the north will be moving away. **Waders** which breed in the opposite hemisphere will go far beyond the equator. Of the large numbers of **shining starlings** which breed here, some will travel to New Guinea this month but many are reported to over-winter on Cape York with some recorded around Cairns throughout the year.

Mature **green turtles** which went south to lay their eggs and mate will now be travelling north to particular feeding grounds off the Wet Tropics coastline. Studies of tagged females show they have a strong attachment to particular sites. For example there are multiple records of one green turtle which swam 2000 kilometres from her marine pastures in Princess Charlotte Bay to lay her eggs at a rookery near Gladstone.

(Acknowledgments to Col Limpus, QNPWS Marine National Parks)



Small orange flowers of the **looking-glass mangrove** have been recorded at this time of year. These trees, named for the glossy whitish undersides of their leaves, are related to tulip oaks of the rainforest. This mangrove (*Heritiera littoralis*) is noted for the magnificent plank buttresses developed by large trees.



## Bookshelf

### Complete Book of Australian Mammals

Ronald Strahan (ed)  
Angus and Robertson Publishers  
(1995)

Over 130 pages of this excellent book deal with all the bats known (in 1995) to exist in Australia. Each species is described and illustrated with photo(s) and there is a good general introduction.

### Bats A Natural History

J.E. Hill and J. D. Smith  
British Museum (Natural History)  
(1984)

A comprehensive and fascinating look at bats: structure, origins, flight, food, thermoregulation, reproduction, echolocation, population, man and bats and families.

*Australian Natural History Vol. 24 No. 4 Autumn 1993*

### The Contentious Flying Fox

Chris Tidemann

This article looks at the ecological importance of flying foxes.



*Wildlife Australia Vol. 21 Issue 4 Summer 1984*

### Like Bats into Hell

Catherine Creevey

A protest after flying foxes were removed from Queensland's protected fauna list.

*Australian Natural History Vol.24 No.12 Autumn 1995*

### The bat with the stereo nose

Les Hall and Jack Pettigrew

Some interesting findings (and more questions) on the Queensland tube-nosed bat.

*Geo Vol. 10 No. 3 1988*

### Echoes in the Dark

Dr W.R. Phillips

This informative article deals largely with microbats although megas are mentioned. The focus is on north Queensland bats.

*Australian Natural History Vol 22 No 10 (p450) Spring 1988*

### Maybe Bats Ain't Bats

Dan Walton

*Ecos No 43 1985 (back cover)*

### Learning from Bat's Ultrasound

Andrew Bell

A short article dealing with sonar.

*Australian Mammalogy 13: 17-31*

### The Spectacled Flying Fox in North Queensland: Roost sites, distribution patterns, diet, seed dispersal and feeding ecology

G.C. Richards

An academic study of our local bat.

Video:

### The Flying Foresters

BBC video narrated by David Attenborough



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*.

### For further information contact...

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

Ph: (07) 4046 6674  
Fax: (07) 4046 6751  
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) 4052 0555  
Fax: (07) 4031 1364  
Website: www.wettropics.gov.au

