

Tropical Topics

An interpretive newsletter for the tourism industry



Macropods of the wet tropics

No. 42 September 1997

Notes from the Editor

Yes it's green!

Thanks largely to lobbying by Daintree tour operators, funds have been made available from the Daintree Rescue Program to also rescue the wet tropics issues of *Tropical Topics*. As a result, you will again receive eight issues per year, alternating, as before, between blue issues with marine themes and green ones with wet tropics themes. If, however, you are interested in reading only the marine issues, please let me know (address at the back) and I will endeavour to adjust the mailing list accordingly.

This issue looks at macropods in the wet tropics. The Macropod, or 'big feet', superfamily is divided into two families. The Potoroidae family includes rat-kangaroos, potoroos and bettongs and the Macropodidae is made up of the various kangaroos, wallabies and pademelons. Both of these are represented in the wet tropics by particularly interesting species.

Please note

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Tree roots — evolutionary U-turners

Along with possums, the three types of rainforest macropods — musky rat-kangaroos, pademelons and tree-kangaroos — represent different chapters in the story of macropod evolution in the rainforest.

All macropods are thought to have evolved from possum-like animals. In the days when most of the Australian continent was clothed in rainforest, life must have been easy for these tree-dwelling, leaf-munching marsupials. However, some of them, at some stage, seem to have descended to the ground, perhaps in search of fallen fruit and fungi. Finding it to their liking, some stayed there.



Green possum



While many of these venturesome animals changed shape quite radically when adapting to life on the ground, one species found in today's rainforests, has retained several possum characteristics. The musky rat-kangaroo is the only macropod to have a 'thumb toe' — an opposable toe on each hind foot. Possums use this

for climbing, but the musky rat-kangaroo is essentially a forest floor animal, doing little more than clambering through fallen tree branches. Musky rat-kangaroos have also retained the ability to clutch with their tails; possums make good use of their prehensile tails when climbing whereas kangaroos and wallabies have heavy straight tails which they use for balance and support.



Musky rat-kangaroo



Over time, as climates changed, Australian rainforests shrank and grasslands spread. Ground-dwelling macropods continued to adapt to the new lifestyle and diet, changing in shape accordingly. Their hindlegs got longer, tails became less flexible and teeth and stomachs adapted to grazing rather than browsing. Some kangaroos and wallabies left the forests far behind them as they ranged into arid regions.

Meanwhile, some kangaroos made an unpredictable choice. They looked back up at the trees and recognised a food source or, perhaps, a refuge from predators. Having evolved quite thoroughly from tree-dwelling possums to ground-dwelling kangaroos, having lost their opposable toes and prehensile tails, they headed back up into the trees.

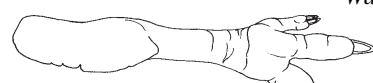
Tree-kangaroos have since readapted to an arboreal life (see page 4) but are still, essentially, kangaroos in trees. However, the bizarre decision of their ancestors to return to the canopy seems to have paid off. Tree-kangaroos have managed to survive successfully for millions of years side by side with their possum ancestors.



Tree-kangaroo



Wallaby



WET TROPICS
MANAGEMENT AUTHORITY



Department
of Environment

Outside the rainforests

In addition to rainforests, the wet tropics includes other habitat types which appeal to various macropods.



Agile wallaby

The agile wallaby is the most common wallaby in tropical coastal Australia — it ranges all across the top end from Broome in WA to Rockhampton in Queensland — and is probably the most commonly seen wallaby in the wet tropics. Mobs of agile wallabies can be seen grazing when they emerge from resting places in dense vegetation in the late afternoon — or even earlier on gloomy days. Unfortunately, they are also likely to be seen dead at the side of the road.

Swamp wallaby

The swamp wallaby is a peculiar creature. Although it looks like a typical wallaby, its teeth are different, it has a different reproduction strategy and it behaves in a different way. Also, while other 'typical' wallabies* have 16 chromosomes, the male swamp wallaby has only 11 and the female 10. It is thought to be the only surviving member of the genus *Wallabia*.

The swamp wallaby can be found all along the east coast. It hides in thick undergrowth in forests and woodlands during the day, coming out at night to eat. A browsing rather than grazing animal, it prefers coarser shrubs and bushes to grass. It also eats agricultural crops close to shelter as well as plants such as hemlock which are highly poisonous to cattle and people. Despite its name, the swamp wallaby is more likely to be found in hills than swamps.

In the wet tropics, the swamp wallaby is less common than the agile wallaby and although similar in size can be distinguished from it by its very dark colour. It has a yellow to rufous front and Queensland animals tend to have a white tip to the tail. It is also more solitary than the agile wallaby.

*In the genus *macropus*.

Northern bettong

Belonging to the same family (potoroid) as the musky rat-kangaroo, bettongs also retain some 'primitive' characteristics from their possum-like ancestors. Their tails are prehensile and, although not as strong as a possum's, are used to carry nesting material. Their stomachs, teeth and limb proportions are also different from those of more typical macropods.

Only three populations of the northern bettong are known to exist — small ones on the Mt Windsor and the Carbine Tablelands and the other on the Lamb Range, in the vicinity of Davies Creek National Park. This animal's preferred habitat is wet sclerophyll forest which generally occupies a fairly narrow strip between rainforest and dry sclerophyll. With the decrease in burning by Aboriginal people and graziers, rainforest is advancing into wet sclerophyll and this little animal's habitat is in danger of shrinking.

The northern bettong is strictly nocturnal, sleeping in a grassy nest under the skirt of a grass tree or in a hollow log during the day. Using its well-clawed forefeet and elongated third toes, it digs up grass roots, tubers and the fruiting bodies of underground fungi. Known as truffles, these are a very important part of the bettong's diet. They are

Rock-wallabies

There are at least 15 species of rock-wallabies in Australia, living in rocky habitats where they can easily find shelter from predators and from the sun. With granulated soles, which have been compared with off-road tyres, they hop easily through this inhospitable environment, arching their tails over their backs to aid their balance. They become active in the late afternoon, feeding throughout the night on a wide variety of plants.

Mareeba rock-wallaby

A number of rock-wallaby species which lack any distinct markings were regarded as the same species until the 1970s when scientists discovered that their chromosome numbers and shapes differed.

In 1992 three distinct species — the allied, Sharman's and, in the wet tropics, the Mareeba rock-wallaby — were formally described, distinguished only by their chromosome make-up. (They also look similar to the unadorned rock-wallaby, with which they were once all grouped.) Just to confuse the issue further, the Mareeba rock-wallaby interbreeds with Godman's rock-wallaby and a hybrid race, with mixed characteristics, exists where the ranges of the two species meet.

The Mareeba rock-wallaby is found from the Mitchell River, near Mount Carbine, in the north to south of Mount Garnet, and inland to Mungana. (Godman's is found north from Mount Carbine to Bathurst. Although once common on Black Mountain, near Cooktown, it is now rare there.)

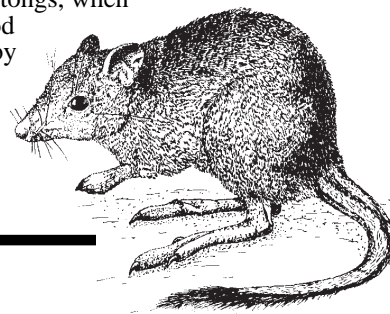
Like the two similar species, the colour of the Mareeba rock-wallaby varies, from almost black to light brown, according to the colour of the rock on which it lives.



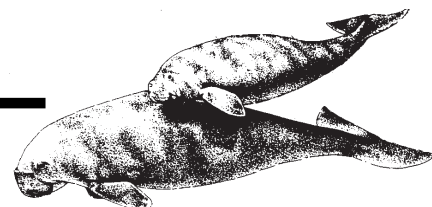
composed of a soft nutritious core and an outer coating which contains reproductive spores.

Numbers of these truffles seem to increase dramatically after fire. The reason for this may be connected to the relationship between the parent fungi and the forest. Known as mycorrhizae, these fungi form associations with trees. Wrapping themselves around the tree roots they extract sugars produced by the plants but also feed back water, nitrogen and phosphorus. It is a close relationship without which either party could die.

When the forest is burnt, the stress experienced by the trees may be transmitted to the fungi which, faced with possible death, reproduce. The resulting abundance of truffles may come at the best time for the bettongs, when conditions are dry and other food scarce. In return, the bettongs, by consuming the truffles, disperse the fungal spores. Bettongs are therefore a vital part of these forest ecosystems.



Out and about



Note: Items past their 'use-by date' have been removed from this page for website.

Report stranded marine wildlife

The Department of Environment and the Great Barrier Reef Marine Park Authority need your help in reporting any stranded marine wildlife, in particular, deaths of dugong.

The causes of deaths of this vulnerable marine mammal can then be determined and action taken to avoid further deaths.

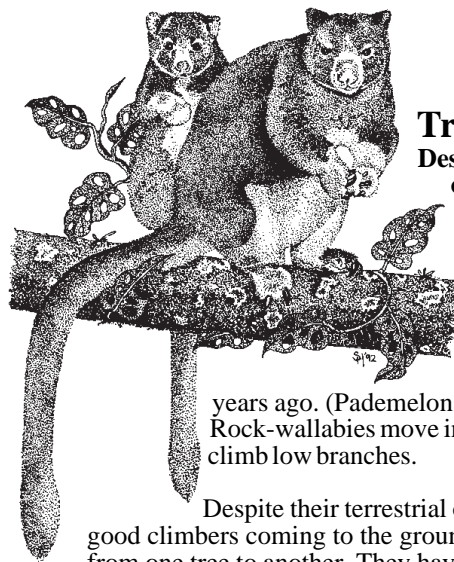
Since 1992, Queensland dugong populations have fallen markedly. Numbers have declined particularly in areas between Townsville and Gladstone and in Hervey Bay.

Please report stranded and dead dugong, or any other marine wildlife, by calling the distressed marine wildlife hotline,

1300 360 898

at any time.

Big feet in the rainforest



Tree-kangaroos

Despite being regarded as an oddity, the 10 species of tree-kangaroos make up about one-sixth of the entire kangaroo family. Two species reside in north Queensland and eight in New Guinea.

Scientists now believe, because of anatomical similarities, that tree-kangaroos evolved from rock-wallabies at least five million

years ago. (Pademelons are also closely related.) Rock-wallabies move in a similar way and occasionally climb low branches.

Despite their terrestrial origins, tree-kangaroos are very good climbers coming to the ground only infrequently to cross from one tree to another. They have a choice of movements, walking or hopping, but usually hop when on the ground and on larger branches. When descending, a tree-roo moves rather like a human, walking or sliding down backwards and jumping the last few metres. Animals have been recorded jumping to the ground from up to 20 metres without coming to harm but others have been known to sustain internal injuries from shorter leaps.

Most tree-kangaroos spend the day resting inconspicuously on a branch, moving about in the canopy at night to feed on leaves and fruit. They are not very energetic animals. One researcher calculated that only 10 percent of the average Lumholtz's tree-kangaroo's time is spent actively — feeding, grooming, moving and so on. However, a diet of leaves, often high in toxins, does not fuel a frantic lifestyle.

In order to digest its leafy diet, the tree-kangaroo needs a large stomach. This is true of all leaf eaters and, in general, gives an arboreal leaf-eating mammal a lower size limit; about 500 gms adult weight is thought to be the minimum practical size. (Smaller possums eat high-energy food such as insects, nectar and pollen.)

The hair of all mammals grows in a particular pattern. Many have a hair-whorl which can be seen at the apex of the crown in humans

and is also a prominent feature of kangaroos, particularly tree-kangaroos, where one or two whorls (Lumholtz's) are situated on the shoulders. The whorl serves to direct rain off the coat of the animal, which tends to sit in a hunched position. This is a useful feature in a wet climate, for an animal which is too large to seek shelter under a log or in a hole.

Adapting to life in the trees

Tree-kangaroos had to adapt considerably to live in trees:

- They regained the ability (present in their possum-like ancestors) to walk.
- Their forelimbs, vital for climbing, are proportionally much bigger and stronger than those of terrestrial kangaroos.
- The wrists and ankles of a tree-kangaroo allow sideways movement, useful for gripping branches; movement in the ankles of 'normal' kangaroos is restricted, thus preventing the hopping animal from twisting its ankle.
- Tree-kangaroo hind feet are much less elongated than those of kangaroos, having become relatively short and broad giving a large surface area to improve grip.
- Both front and hind feet have long curved claws.
- A tail able to grasp a branch would be of great advantage to a tree-dwelling kangaroo, but it seems that this particular feature has not been re-evolved by tree-kangaroos. Instead, the tree-kangaroo's tail is used for balance and as a rudder when the animal leaps from branch to branch.
- Tree-kangaroos redeveloped teeth capable of shearing, rather than grinding.

Red-legged pademelon

Only one ground-dwelling wallaby lives in the rainforests of the wet tropics. The red-legged pademelon is not confined to the region, however, also inhabiting forests in New Guinea and Cape York as well as south-eastern Queensland and north-eastern New South Wales. As its name suggests, this small macropod has rufous fur on its hind legs as well as on its cheeks and forearms. Otherwise it is grey-brown with a cream front.

The red-legged pademelon's day is a long one. Dozing for only a few hours during the middle of the day and the middle of the night, it is essentially active almost 24 hours a day. There is some variety in this little wallaby's routine, however, dusk and dawn bringing quite sudden changes.

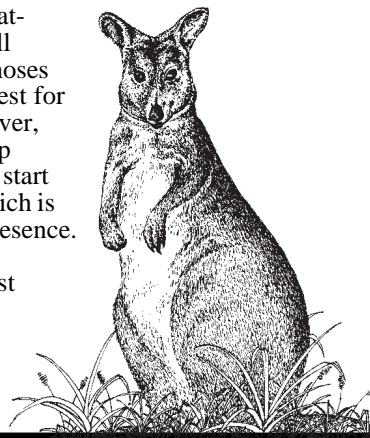
During the day the pademelon browses around the forest floor, eating fallen leaves — some of them quite dry and crunchy at times — and fruits. Favourites seem to be fig fruits and leaves and Burdekin plums. It moves slowly around its daytime territory, inside the rainforest, until the light begins to fade, at which point it heads out of the forest to surrounding open grasslands. There it switches to a diet of grass, grazing until the first light of dawn sends it back into the forest. (Curiously those red-legged pademelons which live in New South Wales rarely leave the forest, perhaps because of competition from red-necked pademelons in more open areas.)

When the pademelon feels sleepy during the night it usually heads back into the cover of the forest for a snooze. As at afternoon siesta time, it then tucks its tail forward, through its legs and, sitting on the base of the tail, extends its hind legs, leans back on a tree or log and lets its head nod forward.

The pademelon is usually fairly close to the forest edge. Its daytime range is often only a few hundred metres inside the rainforest and at night it is usually within 20m of the forest. For this reason, although much of its rainforest habitat has been destroyed, it may actually benefit from clearing in that a number of forest fragments mean proportionally more edge and adjacent pastures provide abundant grass. Within the forest, pademelons are generally solitary but may group together at night when feeding on grasslands.

When moving slowly, like musky rat-kangaroos, pademelons move on all fours, using their front legs, with noses close to the forest floor as they quest for food. When moving quickly, however, they use only their hind legs to hop kangaroo-style. If frightened, they start up with a loud, warning thump, which is often the first you know of their presence.

Although pademelons are rainforest animals they are also found in wet sclerophyll and in deciduous vine thickets.



Bennett's tree-kangaroo

Of the two Australian species this is the larger tree-kangaroo. Males can weigh up to 14kg and females 10kg. Bennett's is found north of the Daintree River in a small 75km by 50km area stretching to the south of Cooktown and from the coast to the Mt Windsor Tablelands. Adult males occupy territories of up to 25ha, overlapping several female territories but fighting fiercely with intruding males. Leaves of trees, vines and epiphytes are eaten, favourites being staghorn ferns and umbrella tree leaves, as well as fruit of figs and native olives.

Bennett's tree-kangaroo is unusual among mammals in that it is darker on the undersurface than on the back, but this serves to camouflage it well. A pale belly would be much easier to spot from below. It is also unusual among tree-kangaroos in that it has contrasting colours on the shoulder and lower back. This is a feature of rock-wallabies and other terrestrial kangaroos and is thought to have been retained from its ancestor. In fact, Bennett's is thought to be one of the most primitive of the tree-

kangaroos, retaining most characteristics of a ground-dwelling ancestor. Another interesting feature is the tuft at the end of its tail which is thought to increase wind resistance of this 'rudder' when the animal is jumping from tree to tree. In common with Lumholtz's tree-kangaroo, the tail of a Bennett's is pale on top and dark below.

Hazards for a tree-roo

Probably the greatest predator of tree-kangaroos has been humans. Said to be quite tasty (their scientific name *Dendrolagus*, which means 'tree hare', is thought to reflect the culinary experience of early European discoverers) they are a traditional food for indigenous people in Australia and New Guinea.

The greatest threat to tree-kangaroos now is forest clearing. When a 'hot spot' for Lumholtz's tree-kangaroos on the Atherton Tableland was cleared recently, instead of moving off to nearby forest, the resident

tree-kangaroos simply remained on the fallen trees. Of the seven animals studied, three were killed within six months, all by dogs and/or dingoes.

Tree-kangaroos are vulnerable when they are on the ground, not only to dogs but also to vehicles; of 27 dead tree roos examined on the Atherton Tableland from 1992 to 1994, 11 had been hit by cars. (Six had been killed by dogs, four by parasites and the others by other causes.) Please be careful when driving at night.

Lumholtz's tree-kangaroo

This is the smallest of all tree-kangaroos, adults weighing just over half as much as Bennett's tree-kangaroos. It occupies upland forests between Ingham and the Carbine Tableland, where the territory of Bennett's tree-kangaroo takes over. It was apparently once common on the lowlands before the forests there were cleared. Its diet consists almost entirely of mature leaves from a wide variety of trees.

Although it is also very cryptic, Lumholtz's tree kangaroo is easier to find than Bennett's tree-kangaroo, partly because it is present in quite large numbers in some places, because it prefers forest edges and because its pale cream belly contrasts with its black feet. It also has a distinctive pale band across the forehead and on the sides of the face. Although densities may approach 1 per hectare in some places, these animals are essentially solitary, males fighting to the death if enclosed together.

Musky rat-kangaroo

The musky rat-kangaroo is the smallest of all macropod species. Averaging only about 230mm in head and body length and about half a kilogram in weight, this little dark brown animal is smaller than a rabbit or a brushtail possum and more similar to a large guinea pig in size.

As pointed out on page one, the musky rat-kangaroo is in many ways more similar to possums than to other macropods. Apart from its 'thumb toes' and prehensile tail, it has never developed the macropod hop, always bounding along on all fours, possum-style, instead. The relative proportions of front and back limbs are also much more like that of possums — typical macropods have much shorter front limbs. In addition, the musky rat-kangaroo is the only macropod to regularly give birth to more than one young at a time, producing, like some possums, twins and even triplets. Internally, while other macropods have chambered stomachs, the musky rat-kangaroo has a simple possum-like stomach.

In common with its closest relatives, the potoroos and bettongs, the musky rat-kangaroo has a pair of blade-like pre-molar teeth on each side of the upper and lower jaw, used to split or slice hard seeds or nuts (often quite audibly). These specialised teeth were a feature of early marsupials and occur in the mountain pygmy possum of NSW and Victoria, but not in any other modern possums.

Unlike most other macropods, the musky rat-kangaroo is active during the day, foraging on the forest floor for fruits and seeds as well as fungi and invertebrates. Its lifestyle is largely determined by the fruiting seasons; young are produced in times of plenty (triplets when fruit production is high) while in times of scarcity adults may lose up to 21 percent of their body weight.

Many of the fruits consumed by musky rat-kangaroos are too toxic to be eaten by other forest animals. Recent observations* have

shown that they even eat fruits of the highly toxic ribbonwood (*Idiospermum australiense*) and zamia palm (*Lepidozamia hopei*). Along with cassowaries and flying foxes, musky rat-kangaroos are probably the main dispersers of many large fruits. They either simply drop seeds from which they have stripped the fleshy fruit, or they may 'scatterhoard' — bury uneaten fruits and seeds in various spots for a future meal. If forgotten, those seeds have, in effect, been carefully 'planted'.

At night the musky rat-kangaroo sleeps in a nest of leaves, lined inside with lichens and ferns, the nest materials having been carried there grasped in the animal's coiled tail. It is often placed between the buttresses of a tree or, sometimes, on a fallen log, up to a metre off the ground.

Generally musky rat-kangaroos keep to themselves but sometimes groups can be seen under fruiting trees. They inhabit almost the entire wet tropics, both lowland and upland forests, to about 1200m, but are found nowhere else.

The musky rat-kangaroo is sometimes referred to as 'hypsi', a shortened form of its scientific name, *Hypsiprymnodon moschatus*. It is the only member of the subfamily left since its nearest relatives, in Victoria, became extinct four million years ago.



*Alison Drew, SIT student at Cape Tribulation Tropical Research Station.

Questions & Answers

Q Recently I observed a group of about five fusilier fish which appeared to be a cross between blue-and-gold fusiliers (*Caesio teres*) and Mari's fusiliers (*Pterocaesio marri*). Is it possible for hybridisation between these two species to occur or for other fish species for that matter?

A According to Dave Williams of AIMS (Australian Institute of Marine Science) hybridisation is known to take place in some fish species, notably butterfly fish, but it is unknown to date in fusiliers. What you have seen is more likely to be different species which could possibly be identified from a photograph.

Q Can you tell me how Agincourt and St Crispin's reefs got their names?

A The answer to this question is proving elusive! Neither the Naval Hydrographic office nor the Department of Lands, which officially sets the placenames of Queensland, holds any information on when or why these reefs were so named. So we can only guess!

The English defeated the French at the battle of Agincourt (now Pas-de-Calais, in France) on 25th October 1415. According to Shakespeare, in his play Henry V, this was also St Crispin's Day — so that explains the connection between the two names. Possibly the reefs were named on the 25th October by someone with an interest in history (or Shakespeare) or perhaps a ship named the Agincourt (or St Crispin) encountered the reef. We will keep investigating — but if any readers know any more please let us know.

Q What causes king tides?

A The term 'king tide' often refers to higher than normal tides caused by local meteorological effects like low pressure and strong onshore winds. 'Storm tides' and 'storm surges' are other terms for this effect. In north Queensland, many people refer to the particularly large spring tidal range around February and August as 'king tides'.

Tides are caused by the gravitational influence of the sun and moon on the water of the earth's oceans. When the sun and moon are in line with respect to the earth (new moon and full moon) the two influences reinforce, causing spring tides. When the sun and moon are at right angles to the earth, the influences counteract, producing neap tides.

Both the moon's orbit of the earth and the earth's orbit of the sun are elliptical. Once every 27.5 days, the moon is closer to the earth and once every 365 days, the earth is closer to the sun. When these periodic proximities coincide with alignment of the three bodies, larger than normal spring tides occur. This is known as the perigeon influence.

Another factor contributing to higher than normal spring tides is the earth's axis of spin which is tilted with respect to the earth's plane of rotation about the sun. The gravitational influence of the sun on places near the equator is greatest during the equinoxes — the two periods of the year when the coincidence of the axis of spin and rotation keeps the sun over the equator. This is known as the equinoctial influence. There are also a number of smaller and more complicated factors which influence the tides.

Acknowledgments to Geoff Kelly, DoE.

Facts and Stats

Several species of macropods live in the wet tropics margins.

Whiptail wallabies are common in hilly country and open forests of southern Queensland and northern NSW and can be seen occasionally around Ravenshoe.

Rufousbettongs, inhabiting drier country than the northern bettong, can also be seen around Ravenshoe.

Wallaroos (euros) — rather shaggy-haired kangaroos — include rocky country around the Carbine Tablelands and Mt Spurgeon in their almost Australia-wide range.

The eastern grey kangaroo, which is found on grassy areas throughout eastern Australia, was the first kangaroo collected by Europeans; one was taken near Cooktown by members of Cook's expedition in 1770.

Fossils of a giant tree-kangaroo, the size of a mature red kangaroo, have been found in NSW. They are at least 50 000 years old.

In New Guinea there are eight species and 17 subspecies of tree-kangaroos. This diversity may be due to the preference of some species for isolated mountain tops which, combined with New Guinea's active geology which has caused mountains to grow rapidly, has cut populations off from one another and allowed them to develop differently.

In captivity, tree-kangaroos have been recorded living into their late teens.

The dingiso tree-kangaroo of PNG spends most of its time on the ground and has re-evolved features of terrestrial kangaroos with a narrower foot, longer toes and a lump corresponding to the 'toe thumb' of the musky rat-kangaroo.

Generally, wallabies do not exceed 20kg in weight while kangaroos are larger. There are some differences in dentition and uro-genital tract

The earliest possums probably evolved from the very first marsupials, thought to have been about the size of a mouse and perhaps similar to the present-day antechinus or pygmy possum.

Studies, which involved large hopping kangaroos on treadmills with oxygen-measuring masks on their faces, have indicated that a kangaroo actually spends less energy when moving faster.

No one is certain why kangaroos hop. It has been suggested that it is the best way to prevent joeys from being lost from the pouch as the mother travels at speed.

Grinding is tough on the teeth — so kangaroos, like elephants, can bring in new teeth as the old ones wear down.

Tourist talk

ENGLISH	GERMAN	JAPANESE
kangaroo	Känguruh	kangaroo カンガルー
wallaby	Wallaby	wallaby フラビー
tree-kangaroo	Baumkänguruh	kinobori kangaroo 木登りカンガルー
to climb	klettern	noboru koto 登る事
to walk	gehen	aruku koto 歩く事
to hop	hüpfen	tobihaneru koto 飛び跳ねる事
thumb	Daumen	oyayubi 親指
pouch	Bauchtasche	onaka no fukuro お腹の袋
prehensile tail	Greifschwanz	makitsuku noni tekishita o 巻き付くのに適した尾

Family planning

Many human mothers are of the opinion that the marsupials have worked out the business of birth pretty well. (Although, the adult female macropod is more or less permanently pregnant!)

When it is born, the tiny blind baby has only been developing for three to six weeks. Its hindlimbs are mere buds but its forelimbs are better developed and are used by the baby to haul itself through its mother's belly hair to reach her pouch, a journey taking only a couple of minutes.

Shortly after giving birth the female macropod* becomes sexually receptive and, if she mates, becomes pregnant again. (In the female swamp wallaby this happens up to eight days *before* the birth.) However, with the newborn youngster needing to stay in the pouch for up to seven months (red kangaroos), it would not be a good strategy for the mother to give birth again in just a few weeks.

Instead, the new embryo (known as a blastocyst) is put on the back burner. The presence of the youngster suckling at a teat causes development of the blastocyst to cease and it remains in this state of suspended animation until big brother or sister is almost ready to move out of the pouch. Then development resumes and, a few weeks later, another little kangaroo is born. If the female mates again, she now has three dependant young — a 'young-at-foot', a baby in the pouch and a stalled embryo in her womb.

Macropods have four teats but usually produce only one baby. When the newborn reaches the pouch it attaches itself to one teat and remains loyal to that food source until it is weaned. Even when a youngster leaves the pouch it often pops its head back in for a suckle, but continues to use only its own personal teat. That way the mother is able to supply two different types of milk simultaneously, to both the older sibling and to the developing baby.

This extraordinary reproduction system, known as embryonic diapause, is not confined to macropods and can also be found in the honey possum and in bats and seals. It is an efficient production method. If a young animal dies or is lost from the pouch, immediate development of the back-burner blastocyst replaces it quite quickly.

*With the exception of musky rat-kangaroos and, probably, tree-kangaroos.

Caring for road-injured roos

Sadly, it is not uncommon to see macropods, particularly wallabies, which have been injured on the road. If the animal is still alive it is likely to be suffering from back or spinal injuries, especially if it cannot get up or move far. In this case it is important to move the animal as little as possible, and to get expert help. The emergency telephone number of the Far North Queensland Wildlife Rescue Association is 40534467.

If the animal is dead it may, if it is a female, have a living joey in its pouch or nearby. Pouch young have been reported still alive a week after the death of the mother and can certainly last for three or four days. In our climate a carcass may appear 'blown up' within half a day of death, so even if an animal appears to have been dead for some time, a search may still reveal a little living joey.

If you do find a joey, bear in mind that it has already been greatly stressed by the accident, the death of its mother and, now, its 'capture' by an apparent predator. Its greatest need is warmth, which is best supplied by putting the joey in a padded bag or wrapping it in several layers of jumpers.



Looking at roos

Some macropods will make themselves all too obvious by dashing in front of your car at night, but if you are deliberately looking for them bear in mind their habits.



Musky rat-kangaroos can often be seen dashing away in the forest during the day and pademelons can best be seen at the forest margins at dusk. Lumholtz's tree-kangaroos seem to prefer scrubby forest margins and are more easily found there than in rainforest proper but Bennett's tree-kangaroos prefer deep rainforest. Tree-kangaroos seem to have excellent hearing and generally move off before they are spotted.

The best way to find most nocturnal animals at night is to look along the beam of a 30 watt spotlight until you pick up their eyeshine. This is created by the 'tapetum', a layer of cells at the back of the eye-ball which enhances night vision by reflecting light back through the eye a second time. Once you have found the animal, it will usually be disturbed by your light so it is important to quickly cover it with a red filter, such as red cellophane.

Tree-kangaroos, however, lack the bright eyeshine of other nocturnal animals, reflecting back a dull red light instead — possibly because they lack a tapetum. They are also very sensitive to lights, even with a red filter. The best you can do, if you are lucky enough to find one at night, is to double your filter and keep disturbance to a minimum.

Please do not feed wallabies — or any wild animals. They are programmed to consume a diet suited to their own particular needs and, although they seem to welcome 'human' foods, these are often nutritionally inappropriate. For example, the gums of wallabies which have been fed bread tend to deteriorate, leading to a fungal infection known as lumpy jaw. This can lead to tooth rot, abscesses and infection of the bone. In addition, tame animals are more likely to fall victim to dogs and other predators.

Include a warm bottle — a fruit juice bottle with warm water in it will do — as a source of heat. Preferably do not put the joey inside your own clothing as close contact with the 'predator' will cause it further stress.

Do not try to feed the joey. If you are unlikely to reach expert help within four or five hours you can give it a little warm boiled water with a little honey (1 teaspoon to one cup of water) or, if it is very dehydrated from exposure to the sun, give it water alone.

Finally, after you have checked it, please move a dead animal off the road and out of sight. That saves all the caring travellers on the road behind you from pointlessly rechecking the carcass, possibly at risk to themselves.



Bookshelf

The Mammals of Australia

Ronald Strahan (ed)
Reed Books (1995)

This is the latest edition of the bible of Australian mammals and has detailed entries on all of those mentioned in this issue.

Tree Kangaroos

A Curious Natural History

Timothy Flannery, Roger Martin and Alexandra Szalay
Reed books (1996)

This is a fascinating and very readable book. Although most species of tree-kangaroo are found in New Guinea, much of the information is general and much is derived from

studies of our two species. A series of exquisite plates illustrate all species and there is a 30-page account of Roger Martin's study of Bennett's tree-kangaroo.

Wildlife Australia Winter 1995

A day in the life

Karl Vernes and Peter Johnson

This refers to the daily routine of a pademelon.

Natural History Jan. 1990

Kangaroos up a Tree

Elizabeth Procter-Gray

This summarises the author's 20-month study of Lumholtz's tree-kangaroos.

Nature Australia Vol 25 No 4

Autumn 1996

Wallabies on the Rocks

Andy Sharp

This is a general article on rock-wallabies and threats posed to them.

Nature Australia Vol 25 No 6

Spring 1996

Hopping mad

Uwe Proske

This article looks at the mechanics of the kangaroo hop and examines its efficiency.



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

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