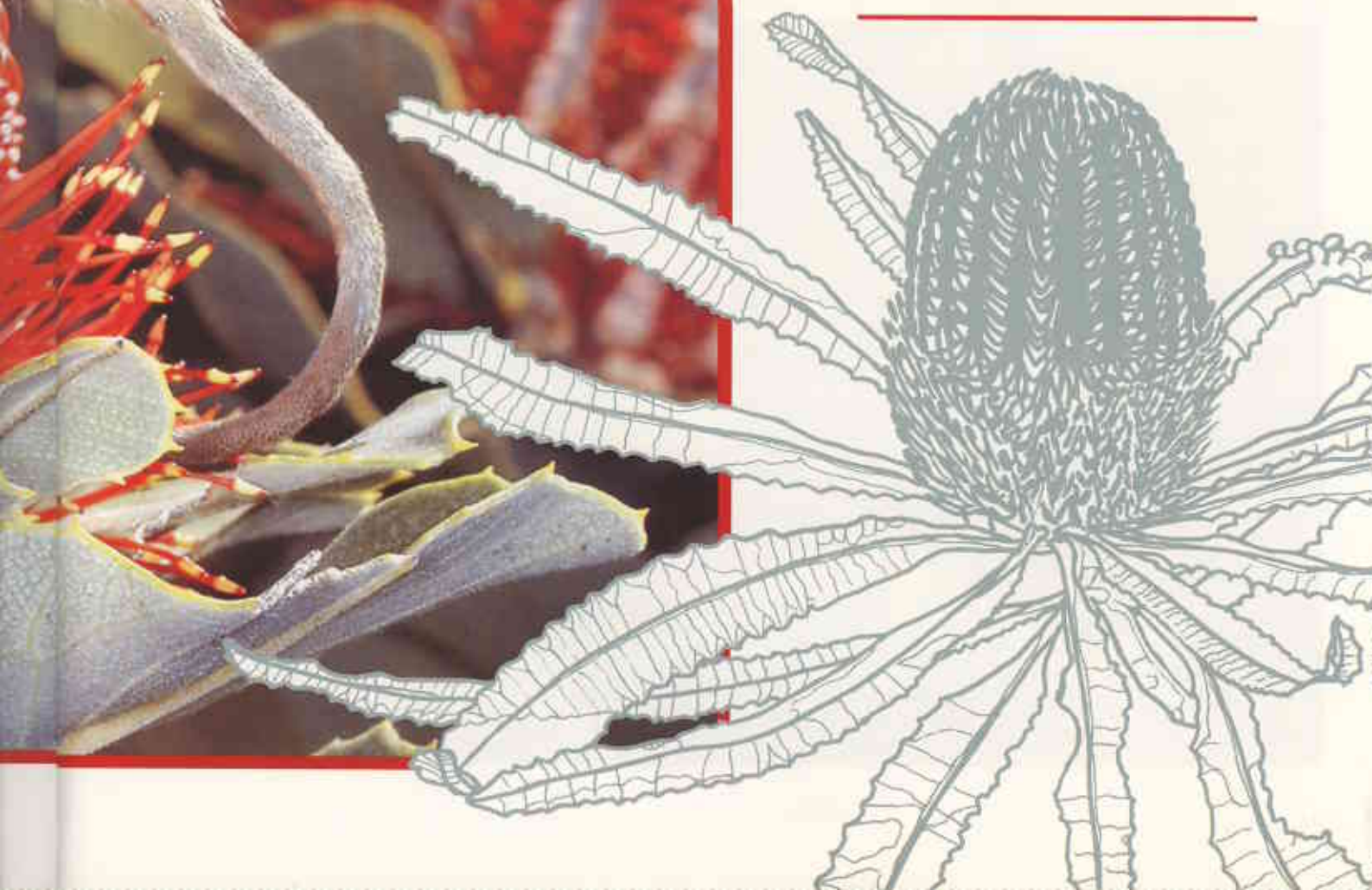
POSSUM in Peril

by Gordon Friend

Tiny honey possums are still common in heathlands of the south-west... but for how much longer? They rely on a range of flowering plants for a year-round supply of nectar and pollen - the very same plants that are threatened by the killer dieback fungus.



The species-rich heathlands and shrublands of the south-west of Western Australia are home to one of Australia's most unusual mammals, the honey possum, or *noolbenger*, as it was known to the Aborigines. In fact, it is no more a possum than it is a bandicoot or a dunnart, being so distinct that it is in a category all of its own: the superfamily Tarsipedoidea.

This tiny marsupial is highly specialised for feeding on nectar and pollen. Its long, pointed snout and brush-tipped tongue are perfectly suited for probing the flowers of banksias and other plants. Apart from some bats, the honey possum is the only mammal in the world that feeds exclusively on nectar and pollen. This amazing species has the smallest newborn young of any mammal, but the largest sperm. Reflecting the latter's size, the testes are suspended in a large scrotum which represents a significant proportion of the animal's body weight (the testes alone being more than four per cent). Its breeding is not related to seasons, but is closely tied to the flowering patterns of the nectar-producing plants on which it relies.

Although the honey possum is of great scientific interest, there was little, if any, ecological research on the species until the late 1970s. This was mainly because no-one knew how to catch the animals, as they would not enter the usual metal or wire-cage trap. In 1976 a team of Murdoch University researchers (Ron Wooller, Marilyn Renfree and Eleanor Russell) working in the Albany area heard that local farmers often found honey possums in newly dug post holes, particularly in sandy areas near remnant bush. These scientists established a pitfall

Previous Page:
The honey possum, seen here feeding on a *Banksia coccinea,* pollinates several heathland banksia species.
Photo - Bert and Babs Wells

Above:
Banksia grandis and *Banksia caleyi* are important food sources for honey possums.
Photos - Jiri Lochman

Below:
The honey possum is so distinct it is in a category all of its own.
Photo - Jiri Lochman

trapping technique which readily caught the possums, and over the next 15 years the Murdoch team, together with researchers from other organisations, assembled a vast amount of information on the population dynamics, habitat preferences, breeding and diet of the species. Ken Richardson and Ron Wooller gathered much of the recent data from the Fitzgerald River National Park, in a project supported by the World Wide Fund for Nature Australia (WWF).

Honey possums are found only in the south-west of Western Australia, where they occur in heathlands on sandy soils which support a rich assemblage of plant species of the families Proteaceae (banksias, dryandras, grevilleas and so on) and Myrtaceae (such as eucalypts and bottlebrushes). This habitat restriction reflects the animal's specialised diet of pollen and nectar. Studies of pollen samples from the head fur of honey possums have shown that, although the plant species used differ between areas in accordance with species' distributions, the possums consistently relied on proteaceous species, particularly banksias. For example, in the heathlands along the south coast near Albany, Ron Wooller and his colleagues from Murdoch, and Steve Hopper from the Department of Conservation and Land Management (CALM), found that honey possums collected food from at least 13 species of plants, 11 from the Proteaceae and two from the Myrtaceae (see Table). Particularly important were a bottlebrush (*Beaufortia anisandra*), which was used during summer, nodding banksia (*Banksia nutans*), which was important from autumn to spring, and scarlet banksia (*Banksia coccinea*), used throughout spring and early summer.

Above left:
Young possums accompany their mothers for the last three to four weeks of a 12-week suckling period.
Photo - Bert and Babs Wells

Top right:
Honey possums probe banksia flowers with their long pointed snouts and brush-tipped tongues for nectar and pollen.
Photo - Jiri Lochman

Above right:
Honey possums sometimes shelter in abandoned bird nests.
Photo - Bert and Babs Wells

Right:
They have the smallest newborn young of any mammal.
Photo - Bert and Babs Wells

More recent work by Ken Richardson and Ron Wooller in the western half of Fitzgerald River National Park showed that nodding banksia is the main summer food there, with woolly banksia (*Banksia baueri*) and four species of *Dryandra* important over winter. Scarlet banksia, however, was relatively unimportant.

Further north, in the heathlands within the jarrah forest near Dwellingup and Pinjarra, consultants surveying mammals for the Worsley Alumina project found that the possums relied mainly on various species of *Dryandra*, particularly couch honeypot (*Dryandra nivea*), as well as woollybush (*Adenanthos cygnorum*), one-sided bottlebrush (*Calothamnus quadrifidus*) and graceful honeymyrtle (*Melaleuca radula*). Similarly, near Mt Lesueur north of Perth, Steve van Leeuwen from CALM found the possums relied on a number of Proteaceous and Myrtaceous species, in particular pine banksia (*Banksia tricuspis*), *Banksia micrantha,* couch honeypot and silky-leaved blood flower (*Calothamnus sanguineus*).

This work on the food preferences of honey possums showed that, in some areas, the possums' reliance on certain plant species differed somewhat from that of the honeyeaters. In the jarrah heaths, for example, the honey possum appeared to be a major pollinator of ground-hugging species with inconspicuous flowers, plants that are seldom visited by honeyeaters. This research also showed that in any

A CONFUSION OF NAMES

Photo - Michael Morcombe

This diminutive creature (males weigh only about nine grams and females 11 grams) came to the attention of the scientific world in the 1840s, when specimens from the King George Sound area were sent to England. It was given the generic name *Tarsipes* because its long, slender foot (*pes*) was similar to that of the small primate *Tarsius* from Indonesia and the Philippines. However, there was considerable confusion over the specific name; it was called *rostratus* by Gervais and Verreaux and *spenserae* by Gray, both in early 1842. Gray named the species after Eliza Lucy Spencer, wife of Governor George Grey, but misspelt it. There were thus three specific names in common usage - *rostratus, spenserae* and *spencerae,* and this caused turmoil in the scientific literature. In the early 1980s some careful detective work by Jack Mahoney from the University of Sydney established that a communication by Gervais and Verreaux, in which they describe *Tarsipes rostratus,* was published on 3 March 1842, only five days before Gray's description was published. By the law of taxonomic priority the honey possum is therefore called *Tarsipes rostratus.*

heathland area there are always several plant species in flower, providing a source of pollen and nectar for the possums throughout the year.

The honey possum and the plants on which it lives have thus evolved together, with the possum relying on the plants for food, and the plants being pollinated by the possum. The honey possum's highly specialised adaptations enable it to respond in a very fine-tuned way to the seasonal and annual changes in its habitat and its food. This may become the species' downfall, however, in an environment increasingly subject to disturbance.

UNDER THREAT

Apart from direct destruction of heathlands through clearing, two kinds of disturbance threaten the honey possum. The first, fire, is likely to be a problem mainly on a local scale, and then only if large tracts of habitat are burnt by high intensity wildfire at frequent intervals leaving few unburnt patches. Research being carried out by CALM on the south coast is showing that honey possums can use areas burnt at low to moderate intensity, provided there are nearby patches of unburnt vegetation from which the animals can recolonise. Management strategies that reduce the intensity, frequency and extent of wildfires are therefore likely to enhance the survival of local populations of honey possums.

The other threat to the future of this species leaves no room for complacency. Soil and airborne fungi which attack and kill plants through either their aerial shoots or root systems are an enormous threat to south-west ecosystems (see *LANDSCOPE*, Spring 1991). There is, as yet, no practical cure for these diseases.

The best-known and most widely researched of these pathogens is the dieback fungus, *Phytophthora cinnamomi* (see *LANDSCOPE*, Spring 1989 and 1991). Since the soil-borne fungus was shown to be the cause of the mysterious death of patches of jarrah forest in 1965, scientists have learnt much of the dynamics of the organism, the conditions under which it rapidly spreads, and the quarantine techniques needed to limit its spread. Most of this research, however, has concentrated on the jarrah forest, and only in the last few years did work commence on the

heathland and shrubland ecosystems which are just as susceptible to dieback. Furthermore, a poorly known group of aerially dispersed canker fungi was recently identified as the cause of the crown-induced dieback of many south coast heathland species, particularly in the Fitzgerald River National Park.

Many of the plants most susceptible to dieback and the canker fungi belong to the Proteaceae and Myrtaceae families that dominate the heathlands. These are the same plants upon which the honey possum is dependent. Of the 13 major food plants used by honey possums on the south coast near Albany, five are highly susceptible to dieback (80 per cent killed at any site), seven are of variable susceptibility (20-80 per cent killed depending on site conditions), and one species (*Calothamnus gracilis*) is resistant (see Table). Similar statistics are likely to apply to areas where honey possums occur in the jarrah forest, and in the heathlands north of Perth.

More than any other small vertebrate, the honey possum is on a collision course with these dieback fungi. If their advance cannot be checked in the near future, we may witness a dramatic alteration in the structure and composition of heathland animal and plant communities, and our unique honey possum may become a new species under threat. ⊡

Top:
Typical honey possum habitat in the south-west heathlands.
Photo - Bert and Babs Wells

Above:
The mammals are extremely agile and use their tail and unusual feet for climbing.
Photo - Michael Morcombe

Some major food plants of honey possums on the south coast near Albany and their susceptibility to *Phytophthora cinnamomi*

Species[1]	Susceptibility[2]
Proteaceae	
Adenanthos cuneata	***
Banksia attenuata	**
Banksia baxteri	***
Banksia caleyi	**
Banksia coccinea	***
Banksia gardneri	**
Banksia grandis	***
Banksia nutans	***
Banksia occidentalis	**
Banksia quercifolia	**
Banksia sphaerocarpa	**
Myrtaceae	
Beaufortia anisandra	**
Calothamnus gracilis	R

** variable susceptibility (20-80% killed, depending on site conditions)
*** highly susceptible (>80% killed at any site; species at risk)
R resistant
1. Data from Dr R D Wooller and colleagues, Murdoch University, and Dr S D Hopper, CALM.
2. Data from Dr R T Wills, CALM.

Gordon Friend is a CALM research scientist studying the impact of fire on small vertebrates in the south-west heathlands. He can be contacted at CALM's Wildlife Research Centre on (09) 405 5100.

Each year more people seek wilderness experiences, but many are unprepared for the difficulties they might encounter. Learn about the basics of outback safety and bushcraft on page 35.

Botanists search for a eucalypt last seen by Giles in his expedition across WA deserts 115 years ago. See page 28.

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Will the honey possum become a secondary victim of dieback disease? See page 22.

Australia is a land of lizards - tough competitors evolving amid spinifex and wildfires in the Great Victoria Desert. Turn to page 10.

Straight and vigorous pines don't grow by accident. Years of research and breeding have gone into producing the perfect pine. See page 49.

FEATURES

REGULARS

SPECIALS

COVER

*The tiny honey possum (*Tarsipes rostratus*), seen in our cover illustration by Philippa Nikulinsky, feeds almost exclusively on nectar and pollen. However, most of its important food plants are threatened by dieback disease caused by the* Phytopthora *fungi. The endangered scarlet banksia (*Banksia coccinea*) is one plant species used by the possums that is highly susceptible to the dieback disease. See story on page 22.*

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