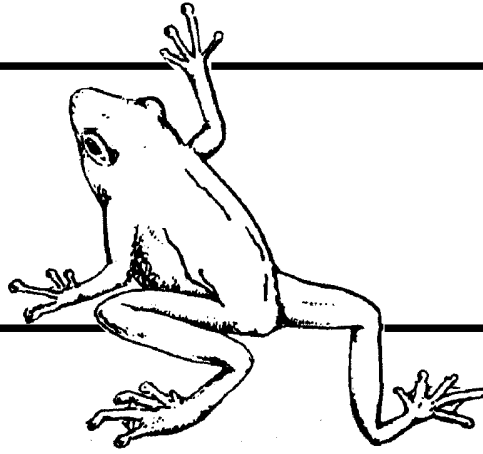


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# FROGFACTS

## No. 4

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The Frog and Tadpole  
FATS GROUP Inc  
Study Group of NSW

P.O. Box 296  
Rockdale 2216

# RAINFOREST FROGS

Frogs are "amphibians". This means that they are dependent during their life on two different environments: water (or at least moisture) is necessary for the eggs and tadpoles to develop, whereas the metamorphosed frog needs land. Many Australian frogs have had to adapt to habitats where water is unreliable (such as the Water-holding Frogs of arid parts). Rainforests, on the other hand, provide reliable quantities of water for frogs. Some types of frogs use the fast-flowing rainforest streams for spawning, but other species have adapted to a breeding cycle away from free water. In fact, the breeding behaviour of some Australian rainforest frogs is quite remarkable - even unique in the animal kingdom, as you will discover when reading about some of the frogs described below.

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### Hip-pocket Frog, *Assa darlingtoni*

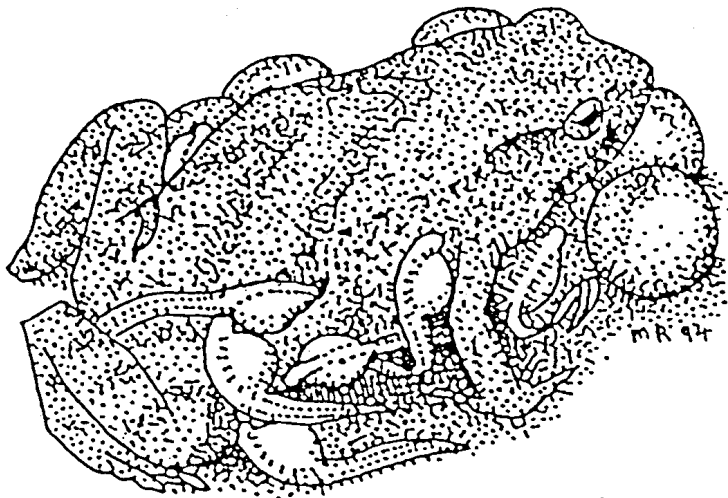
This terrestrial, small (to 28 mm) frog is grey or brown with a cream-coloured underside surface with brown spots. On the back are two ^ - shaped markings. There are two slit-like openings in the hip region of the *male* frog, which open into two extensive pouches under the skin of the back and sides.

Hip-pocket Frogs live in mountainous rainforest in the area near the Queensland / N.S.W. border. They are ground dwelling, calling from among the leaf tiller, or from under rocks or logs. They are often, but not only, found in Antarctic Beech forest.

Males of this extraordinary species carry their tadpoles for up to 70 days in pockets under the skin of their back and sides until the tadpoles develop into tiny frogs.

First the male calls from the leaf litter and a female chooses him as a mate. They amplex (mate) and lay up to 18 eggs (usually between 8-13) eggs in a group on the leaves. The female guards the clutch of eggs while the male continues to call. He is able to fertilise more than one clutch and can carry more than one clutch of eggs in his pocket). When the eggs have developed into tadpoles within the egg capsule (11-12 days) the male squats onto the eggs and this causes the tadpoles to hatch out of the eggs. The white tadpoles, which are still blind and have a large yolk, then squirm into the hip pockets where they metamorphose into little frogs.

*The Hip-pocket Frog*



The male sometimes helps the tadpoles by positioning himself so they can climb up his body and legs. The developing tadpoles can be seen wriggling in their father's pockets and the froglets often peep out of their pockets before finally leaving their father.

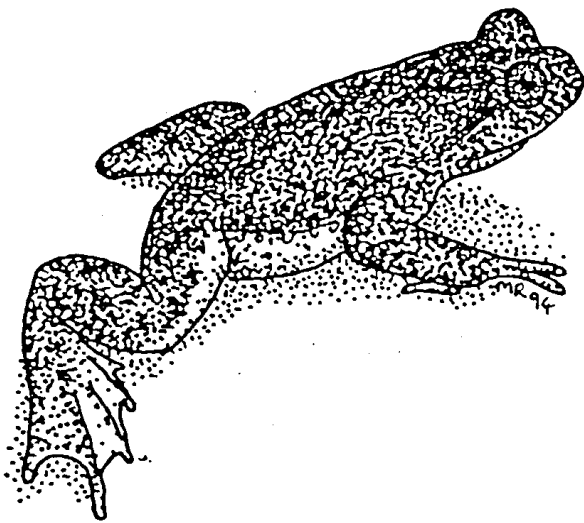
This frog is not dependent on free bodies of water for the development of its offspring. In fact their tadpoles, put in water to develop, soon die. Two suggested reasons for this strange breeding behaviour are 1) that carrying the tadpoles in pockets reduces the dangers of predation and 2) that the tadpoles do not get swept away in the fast-flowing rainforest streams.

### Gastric Brooding Frog, *Rheobatrachus silus*

This is one of our few totally aquatic frog species. It is small (to 50mm), dull brown to grey frog with the eyes set up high like a crocodile, with a pug nose. The skin has many small rounded warts and is very slippery. It has extensive webbing between the back toes, like on a duck's foot. When disturbed the frog disappears under submerged rocks.

The Gastric Brooding Frog lives in rocky fast flowing streams in rainforest near Brisbane.

This animal is unique in the animal kingdom, as the female broods her young in her stomach. How the eggs or tadpoles get into her stomach is not known. Perhaps they are swallowed. Perhaps the female waits for the eggs to hatch into tadpoles, which then may swim into her stomach through her mouth. With the tadpoles in her mouth, the female cannot eat and the stomach's digestive juices are turned off. It has been observed that tadpoles were vomited prematurely when a female Gastric Brooding Frog was disturbed. These tadpoles were not able to survive in water. Birth of froglets out of the mother's mouth has also been observed. For their food supply the tadpoles have enough yolk until after metamorphosis.



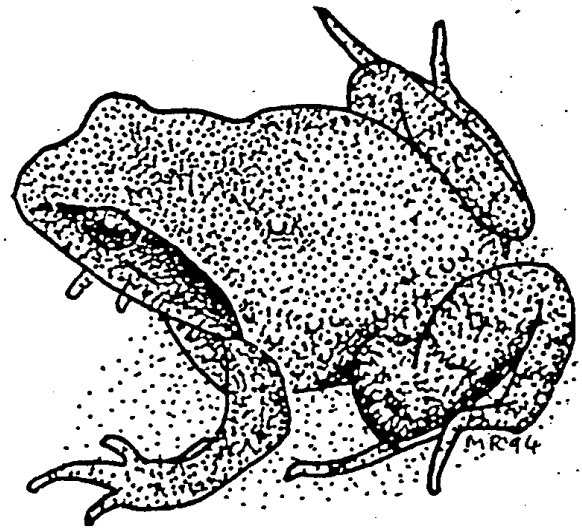
*The Gastric Brooding Frog*

This species is possibly extinct. Despite intensive searching, none have been seen since 1981. From examining preserved museum specimen, it is now known that they had a frog disease, the amphibian chytrid fungus. This fungus is deadly to frogs and has been spreading through large parts of Australia since the late 1970s.

### The Mountain Frogs

(The frogs of the genera *Kyarranus* and *Philoria*)

There are several species of *Kyarranus* (this is an Aboriginal word meaning frog) living in rainforest remnants in N.S.W. Among them are *Kyarranus kundagungan* (Orange Mountain Frog), *Kyarranus loveridgei* (Loveridge's Mountain Frog), and *Kyarranus sphagnicolus* (New England Mountain Frog or Sphagnum Frog).



*Loveridge's Mountain Frog*

There are several species of *Kyarranus* (this is an Aboriginal word meaning frog) living in rainforest remnants in N.S.W. Among them are *Kyarranus kundagungan* (Orange Mountain Frog), *Kyarranus loveridgei* (Loveridge's Mountain Frog), and *Kyarranus sphagnicolus* (New England Mountain Frog or Sphagnum Frog).

All *Kyarranus* species inhabit high altitude rainforest remnants (whether from cool temperate rainforest to warm sub-tropical rainforest). They lay large eggs in wet burrows at the heads of rainforest streams or sphagnum bogs. The tadpoles develop within the nest and do not have a free-swimming phase. They develop directly into froglets. They can be found in Antarctic Beech forests and also in wet sclerophyll forests. They are known to eat spiders, ants, beetles, millipedes and slaters.

### The Tusked Frog, *Adelotus brevis*

The Tusked Frog is medium-sized (40 -50 mm), grey-brown to black and with a large head (especially in the male). The underside is black with white markings. It has bright red/orange colours in the groin and the back edge of the hind legs. There is a pair of enlarged teeth in the lower jaw (which are not normally seen).

Males call from the edge of ponds hidden below overhanging vegetation or rocks in rainforest pools. The eggs are laid in a floating foam nest, which the parents anchor amongst vegetation, or in a flooded cavity between or under rocks or in a flooded depression.

### The White-Lipped Frog, *Litoria infrafrenata*

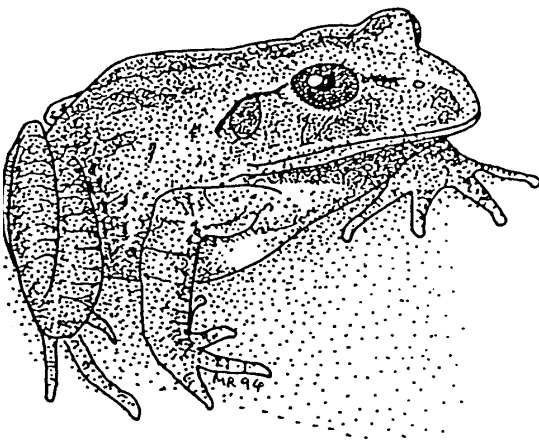
This is one of Australia's largest native frogs, at 13cm or more. It is green to brown, with large toe pads and a white lower lip stripe. It is a tree frog, from the Cape York Peninsula in North Queensland. It sometimes arrives in Sydney in boxes of bananas or other fruit. Although it is a rainforest frog, it also inhabits sheds and houses near rainforest.

### The Barred Frogs

(The frogs of the genus *Mixophyes*)

Barred Frogs are large, strong, muscular frogs between 80 and 115 mm with bars on the hind legs and webbed feet.

The Barred Frogs live in rainforests, wet sclerophyll, and Antarctic Beech forests. They eat insects and small frogs. The males call from leaf litter along the banks or streams and creeks and also of still water. Eggs are laid on the banks and are swept into the water with rain. There are five species in this genus, but unfortunately very little is known about the life history of these frogs. This is of particular concern, as most populations of these species are in decline.



*The Great Barred Frog*

### Mt. Glorious Torrent Frog, *Taudactylus diurnus*

This frog is also called the Southern Dayfrog. It is small (20- 30 mm), and grey-brown and the tips of its fingers are a T-shape.

It lives in warm temperate rainforest and used to be very abundant, but it is now extremely rare, possibly extinct. It occurs only from rainforest at Mt. Glorious at Kondalilla and in the Conondale Range, in S.E. Queensland.

The Mt. Glorious Torrent Frog lives next to fast-flowing rainforest mountain streams. It can cling tightly to rocks in the water torrent. Its call is very quiet and quite difficult to hear over the water noise.

### School project suggestions

Hip-pocket Frog:

1. Investigate animals in which the male of the species looks after the offspring - e.g. The Hip-pocket Frog, emu, sea-horse.
2. Compare the "normal" frog life cycle (with an aquatic tadpole phase) to the life cycle of a Hip-pocket Frog.
3. Describe the changes taking place when a tadpole turns into a frog (metamorphosis).
4. Draw a diagram or picture of a male Hip-pocket Frog and his tadpoles.

Gastric Brooding Frog:

1. Study and report on declining frog populations.
2. Study and describe the extent of parental care in frogs.
3. Extension work: *Rheobatrachus vitellinus* (Northern Gastric Brooding Frog).
4. Compare different frog life cycles in Australian Frogs, e.g. *Litoria infrafrenata*, (White-lipped Frog), *Kyarranus*, *Assa darlingtoni* (Hip-pocket Frog), *Rheobatrachus silus* (Gastric Brooding Frog).
5. Adaptations to living in an aquatic environment as seen in the Gastric Brooding Frog.

Tusked Frog:

1. Discussion of aggression in frogs. Warning: To date there is no evidence that the Tusked Frog uses its teeth in combat.
2. Using a frog identification sound tape, compare the advertisement call of the Tusked Frog to that of the Striped Marsh Frog.

General project suggestions:

1. Make recordings of frog call in rainforest areas. This has to be done at night and preferably after or during rain. Take temperature measurements, describe exactly the habitat, describe the behaviour of any frogs seen (torches!). Send the tape for identification and data recording to the FATS Group, PO Box 296 Rockdale NSW 2216.
2. Prepare a questionnaire on frogs and ask people you know in your area. This can have various contents depending on the age of the children. Younger children may only want to ask about people's attitudes to frogs or if they can tell any stories about frogs. Older children want to ask people about why they think frogs are declining in numbers.
3. Compare the life cycles of various Australian frog genera - e.g. a tree frog (*Litoria*), the Hip Pocket Frog, the Gastric-brooding Frog, *Kyarranus* and *Mixophyes* (the Barred Frogs).
4. Declining frog populations. Possible causes, and what we can do to stop the decline.
5. Parental care in frogs.
6. Illustrate Aboriginal legends involving frogs. See General References below.
7. Describe the differences between tree frogs and ground frogs.

8. Describe a rainforest frog from each of the following Australian Frog families: the tree frogs (Hylids), the narrow mouthed frogs (Microhylids) and the southern frogs (Myobatrachids).
9. Investigate Fletcher's Frog (Sandpaper Frog) *Lechriodus fletcheri* and the cannibalistic behaviour of its tadpoles.
10. Describe the distribution of the *Cophixalus* and *Sphenophryne* genera in Australia and present information on their breeding biology.

### Further reading

#### Hip-pocket Frog:

- Ehmann, H. and Swan, G. *Reproduction and Development in the Marsupial Frog, Assa darlingtoni (Leptodactylidae, Anura)* in *Biology of Australasian Frogs and Reptiles*. ed. by Grigg, G., Shine, R., and Ehmann, H. Royal Zoological Society of N.S.W.; 1985;
- Ingram, G.J., Anstis, M. and Courben, C.J. *Observations in the Australian Leptodactylid Frog Assa darlingtoni*. Herpetologica 31: pp 425 -429, 1975.
- Mahony, M. *Frogs. Bizarre Breeders*. Australian Natural History, Winter 1989, Vol. 23.no.1. Australian Museum.

#### Gastric Brooding Frog:

- Tyler, M.J. and Davies, M. *The Gastric Brooding Frog in Biology of Australasian Frogs and Reptiles* ed. by Grigg, G., Shine, R. and Ehmann, H. Royal Zoological Society of N.S.W. 1985 pp. 469- 470.
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- Tyler, M.J. *There's a Frog in my Throat (Stomach)* Collins, Sydney, 1985.

#### Tusked Frog:

- Shine, R. *Sexual Selection and Sexual Dimorphism in the Amphibia*. Copeia 1979 (2), pp. 297 -306.

#### General references:

- *Australian Crocodiles, Turtles, Tortoises and Frogs* Aust. Wildlife Series, Bay Bks. Sydney. 1981.
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- Duellmann, W E. and Trueb L. *The Biology of Amphibians* McGraw-Hill Inc. 1986
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- Stodart, E. *Frogs*. Octopus Books Vic. Aust Junior Field Guides, 1989.
- Timaepatua, M.A. *Quork Quork, the Green Frog in Aboriginal Legend of Australian Aboriginal Children*. Rigby. ANU Press, Canberra 1977.
- Tyler, M. J. *Encyclopedia of Australian Animals. Frogs* The National Photographic Index of Australian Wildlife. Angus and Robertson 1992
- Robinson, M. A. *Field Guide to the Frogs of Australia. From Pt. Augusta to Fraser Island including Tasmania*. Australian Museum/Reed Publication 1993.

### Further information from the FATS Group:

- Postal address: P.O. Box 296, Rockdale NSW 2216.
- *FrogFacts* information sheets:
  - FF1 Keeping Green Tree Frogs
  - FF2 Keeping Frogs in Your Garden
  - FF3 Establishing Frog Habitats on Your Property
  - FF5 Green and Golden Bell Frogs
  - FF6 Collecting, Raising and Releasing Tadpoles
  - FF7 Frogs of the Sydney Region
  - FF8 Frog Hygiene for Captive Frogs
  - FF9 Frogs as Bio-Indicators
  - FF10 Water Quality for Frog and Other Nature Ponds
- Other *FrogFacts* are planned. When requesting *FrogFacts*, please send a small donation for photocopying and postage.
- Meetings: Every first Friday of every even month, 7 pm for a 7:30 start, at Newington Armoury, Bldg. 22, northern end of Jamieson St., Homebush Bay. Parking at boom gate.
- Web site (with links to other frog groups): [www.fats.org.au](http://www.fats.org.au)
- Frogwatch Helpline: 0419 249 728.
- *FrogCall* - Bimonthly newsletters of the FATS Group

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