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SOUTHWESTERN FROGS – FROM ANCIENT PAST TO UNCERTAIN FUTURE

by Ken Aplin

A most unfrog-like frog

THE early colonists at the Swan River Colony sent a great many interesting biological specimens back to England for study. But few were quite as peculiar as what came to be known as *Myobatrachus gouldii*, the turtle frog. This short-limbed, fat-bodied frog has dry, rubbery skin and a rounded head with a permanent, enigmatic smile. Only a century later did scientists uncover the mystery behind the smile – rather than laying its eggs in water for tadpoles to hatch, the eggs are placed in a breeding chamber deep below ground where they hatch after several months, as fully formed little turtle froglets. All in all, a most unfrog-like frog!

The enigmatic smile of the turtle frog. (Sincere apologies to Leonardo!)

A frog fauna all of its own

The turtle frog may be the most peculiar of the southwestern frogs, but is certainly not the only one of scientific or conservation interest – far from it! As a matter of fact, every single southwestern frog species is endemic to this region – meaning that they occur nowhere else in Australia.

Several southwestern frogs have close relatives in Eastern Australia, for example the vociferous motorbike frog, *Litoria moorei*, which is a close relative of the threatened green and gold bell frog, *Litoria aurea*, recently made famous by its occurrence at the Homebush Sydney Olympic site. These species probably separated from a common stock across southern Australia only as recently as 1-2 million years ago.

Other southwestern frogs, including the turtle frog and its relative the sandhill frog, *Arenophryne rotunda*, are without close relatives in other parts of Australia. The ancestor of these species was most likely cut off from the rest of Australia by the first phase of drying out of inland Australia, perhaps as much as 10-15 million years ago.

A year-round cycle of breeding

The yearly cycle of frog activity in the southwest is determined largely by the pattern of rainfall. For many species, the year begins with the first heavy autumn rains. Around Perth, thousands of male moaning frogs, *Heleioporus eyrei*, can be seen at this time moving towards the seasonal wetlands, where they will toil to excavate breeding burrows in the still-dry soil. The males' incessant, mournful wail, issued from the mouth of the burrow, is evidently appealing enough to females of the species, as many will enter burrows to lay their egg mass. A month or so later, as the water level rises in response to increasingly regular rains, hundreds of thousands of moaning frog tadpoles are flushed into the swamps and streams to begin the next phase of their danger-stricken existence. Most will be eaten by water birds, turtles and other aquatic predators – very few survive to enter the next generation.

The colder months of winter trigger breeding activity in various other species including the tiny brown froglet, *Crinia pseudinsignifera*, and Glauert's or clicking froglet, *Crinia glauerti*, which occur in huge numbers wherever the ground becomes waterlogged. In the Darling Range, Lea's frog, *Geocrinia leai*, climbs low shrubs and reeds to lay its eggs suspended in jelly, from which tadpoles will later fall like raindrops into the stream below.

Late winter and spring bring a suite of new sounds to our busy southwestern wetlands. The explosive 'bonk' of individual male banjo frogs, *Limnodynastes dorsalis*, can be heard up to a km from the calling site – a very effective long-distance advertisement! In contrast, the harsh grating call of the male slender tree frog, *Litoria adelaidensis*, is usually lost to our ears, at least within the deafening screech that emerges from densely populated reed beds.

Last to begin their reproductive run around Perth are the motorbike frogs, which continue to call and lay their eggs right through the summer months. Many tadpoles of this species perish as shallow pools dry up completely – but with 3000 eggs per clutch, they can afford to lose a few!

Elsewhere in the southwest, late spring and early summer see the breeding of various forest frogs including the threatened white- and yellow-bellied frogs, *Geocrinia alba* and *G. vitellina*, and the recently-discovered sunset frog, *Spicospina flammocaerulea*. Unlike most of our other southwestern frogs, these forest dwellers are highly sedentary,

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probably living out their entire lives within a single swamp or along a single section of stream.

A multitude of threats – and an uncertain future

Frogs are declining worldwide and the southwest is no exception. Here, as in many other parts of the world, frogs face a multitude of threats including land clearance, environmental pollution and disease.

Land clearance has been the single largest cause of frog decline in southwest WA, Over the last 50 years, vast areas of natural vegetation have been cleared for agricultural, pastoral and suburban use. In the metropolitan area, this process continues today, with many of the smaller remnant bushlands and seasonal wetlands still falling prey to new housing or commercial developments. The fact that many local frogs spend a good part of each year foraging away from wetlands has not been widely appreciated.

Long-term residents around many of our larger metropolitan wetlands have noted a major reduction in the frog chorus today as compared with 20 or even 10 years ago. This decline in frog numbers in protected breeding sites is worrying, and may be due to increased domestic use of garden products such as herbicides, pesticides and soil-improvement products such as wetting agents. Laboratory tests on local frogs have shown that some of these products can be harmful to frogs and tadpoles, but the impact on wild populations remains unstudied.

Until recently, frogs living in our major conservation areas such as National Parks and Nature Reserves seemed to be protected against all of these 'human-made' problems. However, late in 1998 we learned of a new peril facing southwestern frogs – the arrival in WA of the deadly amphibian fungal disease.

The amphibian chytrid fungus was only recently identified as a significant cause of frog decline and extinction in both Australia and Central America. Evidence gathered so far suggests that it is an exotic disease, probably originating from a third country, and that it was first introduced into southeastern Queensland about 10-15 years ago. From there it appears to have spread both north and south, resulting in the decline and/or extinction of many species of frogs. Some species appear to be more susceptible to the disease than others, but it is likely that all species can catch and transmit the fungus. The fungus is probably passed by direct animal contact and by contact with infested water. The fungal spore is not resistant to drying and so cannot be dispersed by wind.

In WA, the fungus has so far been identified at various localities around Perth, and at widely scattered towns in the southern forests. As yet, we do not know whether these represent spot outbreaks or chance sampling points in a broadly distributed epidemic. Similarly, we do not yet know how many of our local species will be especially vulnerable to the disease. A great deal of research is yet needed to find answers to these and other vital questions.

Litoria moorei

What can we do to help?

Everyone can help protect and conserve frogs. The first step is to learn more about your local frogs – learn their names, learn to recognise their calls, and learn something about their feeding and breeding habits. The next step – and this often seems to grow naturally from a little knowledge – is to start thinking about ways in which we can make our own living environment more 'frog-friendly'.

In the metropolitan area, the key to building a 'frog-friendly' world lies in our own backyards. Frogs can be encouraged to repopulate large areas of the suburban environment by making only a few small changes in the way we design and manage our gardens:

- allow leaf litter to build up under trees and shrubs to help retain moisture and to encourage invertebrate life (= frog food)
- try to use the minimal amount of chemical sprays and additives
- add rock or logs to garden beds to provide shelter from predators and the summer heat
- think about installing a small garden pond where frogs might be able to breed.

In country areas, landholders should be encouraged and assisted to protect small natural wetlands such as seepages and areas of seasonally waterlogged soil, preferably with small patches of adjoining dense vegetation where frogs can forage and shelter outside of the breeding season. As a general principle, a patchwork of small remnant wetlands and bushlands are probably more effective in the long term for frog conservation, compared with a few large wetland reserves.

But is all of this futile in the face of the fungal threat? I think not.

Useful lessons can be taken from our own history. As a species, humans have suffered and survived

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innumerable epidemics of infectious disease, most notable several outbreaks of that most devastating of all diseases, the Black Death or Plague. In general, these epidemics have had their greatest impact in major cities and towns, where on-going transmission of diseases is guaranteed. Far fewer deaths have occurred in rural areas, where human population is widely dispersed and personal contact less frequent. In these latter cases, an infectious disease will often just pass by, or else burn itself out with only just a few casualties.

Extending this model to frogs, I believe that the fungus will probably have its greatest impact in large breeding populations, such as those found around the major wetland reserves. Less impact may be observed in areas that contain large numbers of sheltering and breeding sites, some of which may well remain free of infection or else recover soon after a wave of infection.

Summary

Frogs of the southwest have survived in a changing world for millions of years. Since European settlement, they have undergone large scale declines, caused mainly by land clearance and urban growth. With the recent introduction of the deadly amphibian fungus to WA, southwestern frogs may be facing their greatest challenge yet.

Community action is needed to help frogs overcome this new threat. All we may need to do is to make some small changes to how we live.

Ken Aplin is Curator of Amphibians at the WA Museum. He also coordinates the 'Frogwatch' programme. If you would like to know more, including obtaining a tape to identify frogs by their calls, contact him on 08 9427 2700.