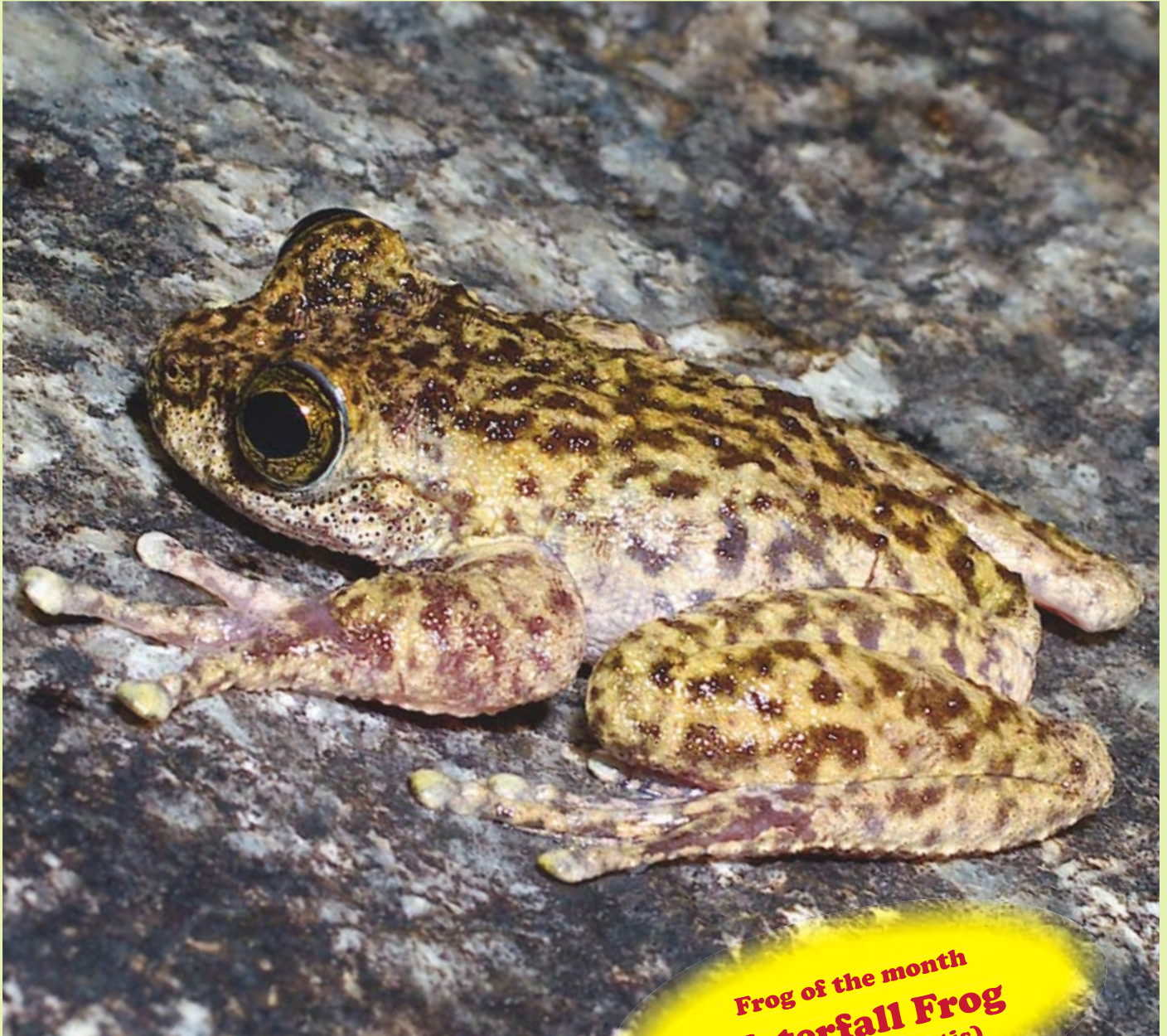




# *The Croaker*

**Newsletter of the Tablelands Frog Club**

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Frog of the month  
**Waterfall Frog**  
(*Litoria nannotis*)

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**October 2007**



# Tablelands Frog Club

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# Tablelands Frog Club

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### DISCLAIMER:

Opinions expressed in this Newsletter are not necessarily that of Tablelands Frog Club.

### PUBLIC INFORMATION:

The Croaker is the Newsletter of the Tablelands Frog Club Incorporated. This Newsletter is produced by the voluntary efforts of members. We gratefully accept all contributions, however limited space may mean that contributions are not included immediately, and all are subject to editorial discretion. The TFC newsletter is published bimonthly (i.e. February, April, June, August, October, & December). Newsletter submissions are due on the 15th of the preceding month. Please direct all contributions to The Editor c/o Tablelands Frog Club, at the addresses listed above.

TFC meetings/nights and field trips/outings are held monthly. See schedule for dates, speakers and locations. Annual membership fees are:

- \$15.00 Adults
- \$15.00 Family
- \$ 5.00 Junior/Associate

The Croaker is now available as a PDF to members that have access to email. The PDF version of The Croaker is in full colour, and contains more information than mail-out photocopied versions. Email costs less to send out, and doesn't waste paper and other resources, making it good for the Tablelands Frog Club and the environment. To take advantage of this service, contact the Tablelands Frog Club with your email details. You will need Adobe Acrobat Reader to open PDF files. The latest version of Adobe Acrobat Reader is available as a free download from:



<http://www.adobe.com/downloads/>

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## Editorial bullrush!

The October issue of *The Croaker* is jammed full of interesting amphibian articles from around the world. Many are scientific studies from a diverse range of fields, from a molecular view to an entire ecosystem study. What is also worth noting are the three new frog species discovered, one being from our local area, suggesting that there are still many undiscovered forms of wildlife to be found in the world. We have a lot to learn and can tackle this problem by sending in articles and observations. We join clubs to learn and share with others. You can even send a letter to the editor discussing your feelings or view on any amphibian related topic. The frog of the month certainly could also be expanded to include more information, anecdotes and photos. *The Croaker* is for the entire family, despite the many scientific abstracts, and we are tending to forget our future froggers, namely our children. Kids corner is seriously lacking any input. We need games, puzzles, colour ins, poetry, book reviews, and whatever else you can think of for the kids. Adults secretly like these as well. Remember, *The Croaker* is your newsletter and survives by your contribution.

My regards to all...  
Darren Green



### Front Cover

Waterfall Frog by Michael Anthony.  
See Page 5 & 6 for this story.

### Our Story

The Tablelands Frog Club was formed in January 1995 in Yungaburra by a group of people who were aware of diminishing numbers of frogs in all areas and who were keen to learn more about the species in general. From the outset guidance was available from experts in the field. Since that time public interest has been constant and the Club has grown rapidly. Frog enthusiasts have joined from as far afield as Adelaide in the south to Weipa in the north. The pooling of Club members' expertise in various related fields has helped the Club to become established and recognised within the community. Membership numbers reached 94 within the first year and are still increasing. On November 17, 1995, the Club became incorporated under the Queensland Associations Incorporation Act 1981. The Club now operates under appropriate rules.

### What can I do as a member?

The Club needs all the support and enthusiasm you can provide to help us to achieve a better understanding of these much overlooked animals. Some of the rare species are facing extinction at this very moment. We need assistance to address the many problems which threaten the livelihood of these vulnerable creatures by improving our knowledge of their habits and habitat, by enhancing their environment and by educating our children and the public at large on these issues.

**Education:** The Club offers many opportunities for you to learn about frogs and in turn to educate others.

**Research:** Grant applications are made by the Club as an incorporated body and research is led by social scientists who provide you with the opportunity to participate in this work. The Club maintains an information database on frog distribution and invites your input.

**Protection of frog environment and breeding:** The Club provides guidance and knowledge on how to protect and create friendly frog environments and how to set up a breeding programme for common species in your garden.

### Our Aims

**To study frogs:** The Club meets once a month with professional guest speakers and relevant videos. Members are encouraged to participate in general discussion and to introduce items of interest. A mobile library of scientific and general information on frogs is available at these meetings. Members recordings of frog distribution and animal husbandry are collated on a database for research purposes. The Club conducts workshops and field trips with professional guidance. The Croaker, the Club's newsletter, contains scientific information, contributions from both adult and junior members and general business matters of the Club.

**To conserve and encourage the preservation of frogs:** The Club has a Code of Conduct and abides by the Nature Conservation Act 1992, runs public awareness campaigns through the media, displays static educational material, encourages a 'Frog Friendly' environment and guides members on breeding programmes of common species in gardens and urban parks.

**To encourage children's interest in frogs:** The Club holds workshops suitable for junior members, runs a section called 'Kid's Corner' in the newsletter aimed at the younger group and conducts various competitions with appropriate educational prizes. The Club also guides children in frog breeding programmes and encourages them, under parental guidance, to participate in suitable field trips.

# From the president's lily pad

As is usual for this time of year not much has been happening with either frogs or the frog club. Although conditions have been mostly dry, the build-up has begun and there have been a few minor episodes of rain. I have heard the first frog call for the season where I live in Whitfield. As it was last year, the White-lipped Treefrog was the first (and so far only) frog to call. Unlike last year, the first call was followed by rain just two days later; last year it was quite some time between the first frog call and the first decent rain. It is interesting to note the different frogs calling, and when they call. As the wet season progresses, more and more different frogs can be heard. Some frogs call mostly before rain, some after and often the frogs you were hearing at the start of the wet are replaced by other frog species. When more



breed. Many frogs depend upon water accumulating in puddles, depressions and drains to breed, both on the coast and inland.

Please remember to send your photos of frogs in this year so that they can be identified and added to our database. Any photos you already have, please bring along to the next meeting to show other members and have the frogs identified.

Unfortunately we had no volunteers for the Frog Festival (October) or the Garden Expo (September) this year so these activities did not take place. Perhaps we can start thinking about the 2008 events. To register interest for volunteering for frog club activities or any other projects you might want to organise, please contact the committee.

<http://www.tablelandfrogclub.com>

than one species of frog is calling, they sometimes take it in turns to call, however many species may call at the one time when conditions are best. It is possible to hear up to eight species calling in one area, such as around coastal canefields, one of the best places to see and hear frogs. Sometimes it takes a while for your ear to "tune in" to the calls, especially those that are calling in the distance. What was the first frog to call around your place? The first storms of the wet season can be the best times to find frogs, when they come out of their dry season hiding spots to feed, and when there has been enough rain, to

Despite the lack of activity, the club is going well. We have a steady trickle of new memberships, mainly due to the excellence of our newsletter and website. We have an interesting program of meetings and field trips for the rest of the year and beyond to look forward to so dust off your frog call cds, cameras and field guides and get ready for the wet season!

Michael Anthony



Mike Anthony frogging (or grogging) at the Walsh River (PHOTO: Michael Cermak).

# Schedule of events...

Dates, times & localities will be confirmed in the newsletter prior to meetings and field trips.

## Meetings...

### Friday 26 October 2007 Mareeba

A members photo and ID night – bring in any of your photos, slides or digital for ID or just to show to other members. To be held at Mareeba DPI, Mitchell Room, 7.00pm.

### Friday 16th November 2007

The Wilderness Society's Cape York Presentation, featuring some great photos & important information about the importance of Cape York Peninsula. CWA Hall, Yungaburra, 7.00pm.

### January 2008 TBA Cairns

Marion Anstis on the frogs and tadpoles of Northern Australia. Not to be missed!

### February 2008 TBA

To be announced.

### March 2008 TBA

Annual General Meeting.

## Events...

### Field trips...

#### 17th November 2007

Mt Fisher (third highest peak in Queensland but start at altitude).

#### 24th November 2007

Koolmoon Creek, Misty Mountains.

#### 15th December 2007

Mt Carbine (Saturday, hopefully coincide with first major storms).

#### February 2008 TBA

Mareeba Wetlands (Saturday night, easy walking).



# TFC Members...



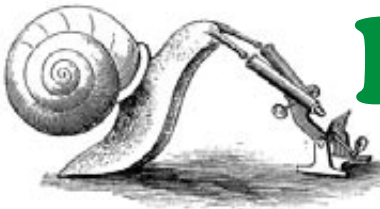
Wai Awarau  
Mandy Lindsay  
Bevan Pritchard  
Dr Stacey Gelis  
Dr Amber Gillett  
Dr Che Phillips  
Robyn King  
Dominic Chaplin  
Val Bonner  
Bonnie Arbon  
Judy Catchpole  
Keith Martin  
Cindy Harkness  
Jo Loader  
Kia Bailey  
John Booy  
Grant Turner  
Kent Jozefowski  
Clarissa Morris  
Sue Morris  
Beryl Davidson  
Inga Lorenz  
Merv Robson  
J & M Sweetzer  
Marney Fichera  
Michael & Sharon Williams  
Cheryl Lammeretz

Atherton  
Atherton  
Atherton  
Beerwah  
Beerwah  
Beerwah  
Broadbeach  
Bungalow  
Burrows Oxley  
Caboolture  
Chambers Flat  
Clifton Beach  
Edge Hill  
Glass House Mountains  
Glass House Mountains  
Gordonvale  
Innisfail  
Kallangur  
Landsborough  
Landsborough  
Malanda  
Malanda  
Malanda  
Malanda  
Mooroobool  
Newport VIC  
Peachester

Tricia Schilling  
Ian Wilesmith  
Murray Wellington  
Darren & Jo Green  
Michael Anthony  
Shaun Cook  
Maria Destro  
Eleanor Duignan  
Alan Gillanders  
Murray Powdren  
Margret Egger  
Sian Moore & Scott Radcliffe  
Neville Simpson  
Claudine Grandjean  
Chris Tsilemanis

Reesville  
Redbank Plains  
Speewah  
Trinity Beach  
Whitfield  
Whitfield  
Whitfield  
Whitfield  
Whitfield  
Yungaburra  
Yorkeys Knob  
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# In the spotlight

## Waterfall Frog (*Litoria nannotis*)

### Details...

**Family:** Hylidae

**Common name:** Waterfall Frog or Torrent Tree Frog

**Scientific name:** *Litoria nannotis*

**Description:** This frog is grey to olive-green to almost black on its back with lots of darker mottling. It has a broad, rounded snout. There is a bluish metallic sheen on the sides of the body. The belly is whitish and granular. The armpits and groin are flesh coloured. The backs of the thighs are dark brown. The skin on the back is granular or has lots of small warts. The finger and toe pads are large. The fingers are slightly webbed and the toes are fully webbed. The tympanum (tight membrane covering the entrance to the ear) is not clearly visible.

**Size:** 65 mm

**Habitat:** This frog lives in rainforests and wet sclerophyll forests near waterfalls and cascades. They are commonly seen on boulders beside or behind waterfalls.

**Call:** A short harsh growl. Males of this species have lost their vocal sac, as a mating call is hard to hear when surrounded by fast flowing water.

**Breeding:** Males have small spines on their thumbs and chests so they can cling to a female and not get swept off. Gravid females and males with spines are seen all year round.

**Eggs:** Are large and laid under stones in streams surrounded by a jelly-like mass to hold them in place.

**Tadpoles:** Are found in fast flowing sections of the stream, often attached to rocks with their suckorial mouth. These tadpoles also have muscular tails that help them swim in fast flowing water. The body colour is grey or olive-green.

**Similar species:** This frog is distinguished from other species of *Litoria* by its habitat preference, size and male spines.

### Conservation Information...

**Population size:** An estimate of the total number of adults present in the species entire range is 5001-10000 individuals. Some factors affecting population size and distribution are known, but 1 or more major factors are unknown.

**Population trend in Australia over the past 50 years:** Population formerly experienced serious declines but is presently stable or increasing.

**Knowledge of population trend in Australia:** Nation-wide monitoring, but not with statistical sensitivity.

**Population concentration:** Majority concentrates at more than 25 locations. (e.g. the number of sites in which individuals group together either seasonally, such as breeding sites, or they may occupy discrete habitat patches within the broader landscape, such as discrete water bodies or drainage units.)

**Ongoing management activities in Australia:** Management mostly related to enforcement of conservation laws.

**Reproductive potential for recovery:** The average number of eggs deposited per adult female per year is 51-200 eggs/female/year. Minimum age at which females are known or suspected to first reproduce is 2-3 years.

**Range size in Australia:** The size of the geographic area over which the taxon is distributed: 101-1000 km.

**Distribution trend:** Area occupied has declined by 25-74%. (This is an estimate of change in the portion of the total range that is occupied or utilised; it may not equal the change in total range.)

**Knowledge of distribution in Australia:** Distribution is well known and occurrence can be accurately predicted throughout the range.

Photo by Darren Green.



### Source...

Frogs Australia Network.

**For more information of the October 2007 frog of the month, the Waterfall Frog, turn to page 6.**

Photo by Michael Anthony.



**Frogs Australia**   
NETWORK  
<http://frogsaustralia.net.au/>

**December "in the spotlight" focuses on the Australian Lacelid (*Nyctimystes dayi*) send us a story about this frog!**



# In the spotlight

## Waterfall Frog (*Litoria nannotis*)

This spectacular frog, also known as the Torrent Frog or Torrent Tree Frog is, as its names suggest, an inhabitant of fast flowing waterfalls and cascades. It is endemic to the Wet Tropics, occurring along rocky streams in rainforest and surrounding areas. Once found at very high altitudes (up to 1250 metres) Waterfall Frogs have suffered declines from the infection of the chytrid fungus at high altitude, where cooler temperatures favour the fungus (for more information about chytrid fungus go to <http://fdrproject.org/pages/disease/CHYrecog.htm>) It is now rarely found above about 450 metres although can be occasionally found up to 900 metres.

Both the adult frog and the tadpole are superbly adapted to this environment. Adult Waterfall Frogs are robust frogs with strong arms and legs, and large toe pads for getting around on the wet slippery surfaces that they inhabit. They have large eyes for excellent night vision amongst the dark crevices and dense spray around waterfalls and cascades. Their hands are half-webbed and feet fully webbed for swimming in the fast-flowing and often tumultuous waters into which they may jump from great heights to escape a predator. Their dorsal pattern is similar to that of the surface of the granite rocks that is the predominant rock type along Wet Tropics rainforest streams. Waterfall Frogs are capable of being submerged for long periods of time. It has been postulated that they may be able to "breathe" underwater taking in oxygen through their skin. More often, Waterfall Frogs disappear behind the waterfall, into rock crevices.

Females grow to a maximum of about 70mm and males to about 50mm. Male Waterfall Frogs have very strong arms (male tree frogs in general have more robust arms than females), large nuptial pads and chest spines. The purpose of these structures is to hold on to the female during amplexus (mating position). As anyone who has held a Waterfall Frog can attest, these animals are very slippery and strong, easily escaping a human grasp let alone a little 50mm male frog!

Male Waterfall Frogs call from the tops of waterfalls or other perches around the edges of the waterfall including tree roots, logs and rock ledges. Their call has been variously described as a "short harsh growl"; "loud crescendo of low-pitched sonorous "crows"; "a repeated crawl, crawl, crawl" or "a gentle, popping growl-like sound".

It was believed that Waterfall Frogs did not call and lacked a vocal sac but this has since proven to be untrue. It is simply that the noise of rushing water drowns out the voice of the frog in many cases. It is a conundrum that many species of stream dwelling frogs have very quiet calls in a loud environment (although it is logical that frogs are able to hear the calls of its own species much better than we could) while frogs of the open forest may have very loud calls that can be heard for long distances. The reason for this could be that stream dwelling frogs tend to stay close to their preferred habitats i.e. males and females are closer together. Females tend to stay close by the waterfalls, however males may be found at greater distances from the water, especially during periods of heavy rain when the creeks have been flooding.

Female Waterfall Frogs appear to bear eggs over a large part of the year thus may breed a number of times. The un-pigmented eggs are laid in a gelatinous mass under rocks in streams.

The tadpoles are also highly adapted to an existence in fast flowing streams, with a flattened body to decrease the surface area exposed to the force of the water, a muscular tail for swimming and suctorial mouthparts which enable the tadpole to attach itself to rocks in fast flowing sections of stream, where it grazes on algae. The tadpoles may also be found in the larger, slower flowing rock holes along a stream. Disturbance in the water, for instance people swimming and splashing in the water may bring the tadpoles from the deeper water up to the edges, and may prove to be a threatening

process to the survival of this species, especially close to larger human populations. Tadpoles are quite large, growing to approximately 50mm in total length. The adult pattern may be discernable on larger specimens.

Young frogs may be found along streams some distance from waterfalls, it is unknown whether this is because the froglets disperse after metamorphosis or as a result of tadpoles swimming or being washed downstream. During the height of the rainy season, adult frogs may be also found away from water, in the surrounding rainforest. This may be to escape flooding episodes along streams, or because flooding has washed away the invertebrates on which they feed.

Waterfall frogs are classed as Endangered.

AUTHOR: Michael Anthony.

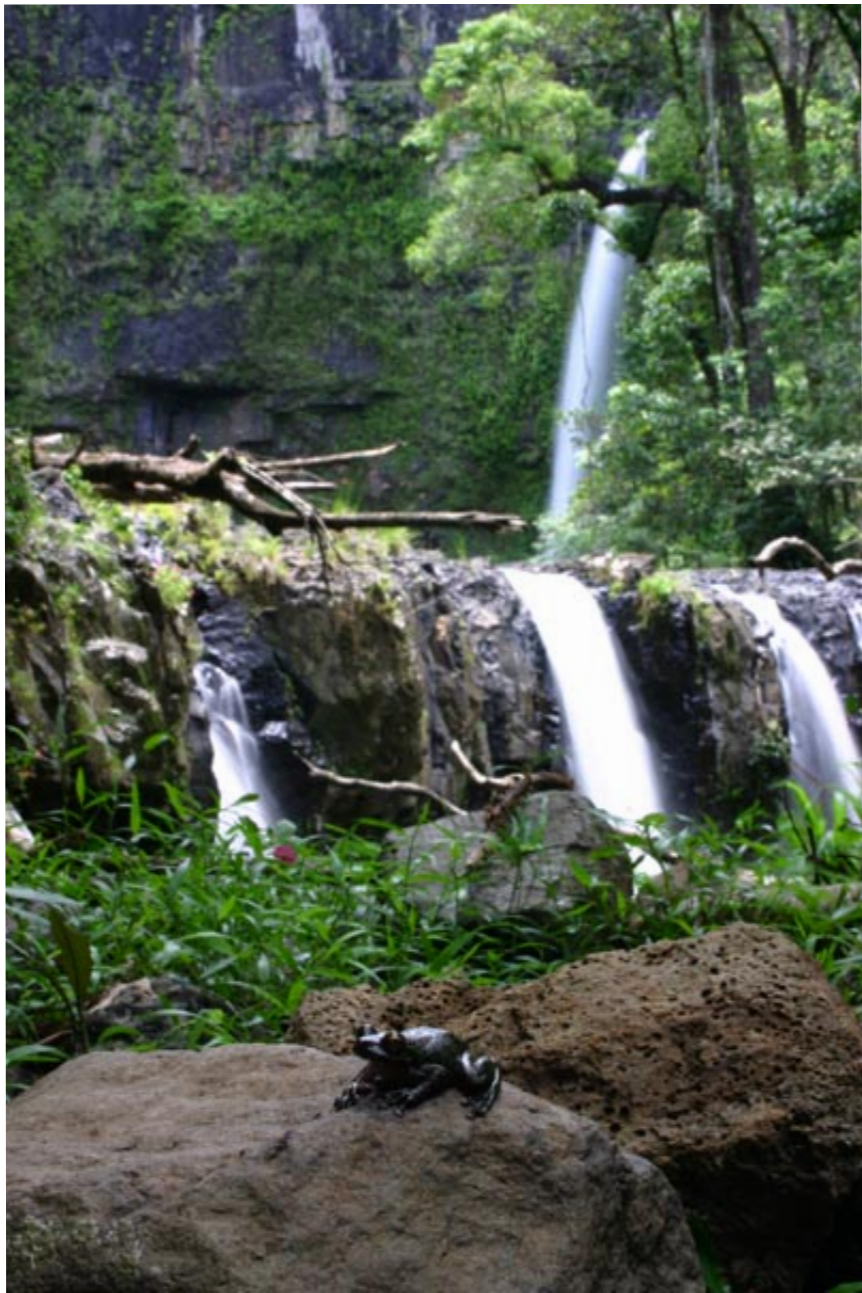


PHOTO: Waterfall frog at Nandroya Falls (Photo by Darren Green).



# Amphibian news...

## The invisible frog

Live See-Through Frogs Jump Developed, No Need for Dissection. TOKYO (AFP). Japanese researchers have succeeded in producing see-through frogs, letting them observe organs, blood vessels and eggs under the skin without performing dissections. 'You can see through the skin how organs grow, how cancer starts and develops,' said the lead researcher Masayuki Sumida, professor at the Institute for Amphibian Biology of state-run Hiroshima University. 'You can watch organs of the same frog over its entire life as you don't have to dissect it. The researcher can also observe how toxins affect bones, livers and other organs at lower costs,' he told AFP.

Dissections have become increasingly controversial in much of the world, particularly in schools where animal rights activists have pressed for humane alternatives such as using computer simulations. Sumida said his team, which announced the research last week at an academic conference, had created the first transparent four-legged creature, although some small fish are also see-through.

The researchers produced the creature from rare mutants of the Japanese brown frog, or *Rena japonica*, whose backs are usually ochre or brown. Two kinds of recessive genes have been known to cause the frog to be pale. Sumida's team crossed two frogs with recessive genes through artificial insemination and the offspring looked normal due to the presence of more powerful genes. But crossing the offspring led to a frog whose skin is transparent from the tadpole stage.

'You can see dramatic changes of organs when tadpoles mutate into frogs,' said Sumida, whose team is seeking a patent. Such frogs could theoretically exist in the wild but it is 'virtually impossible' they would naturally inherit so many recessive genes, Sumida said. The transparent frogs can also reproduce, with their offspring inheriting their parents' traits, but their grandchildren die shortly after birth. 'As they have two sets of recessive genes, something wrong must kick in and kill them,' Sumida said.

While the researchers relied on artificial insemination, they said that genetic engineering could also produce transparent and even illuminating frogs. Sumida said researchers could also inject into the transparent frogs an illuminating protein attached to a gene, which would light up the gene once it manifests; for example, showing at what stage cancer starts. Sumida said it would be unrealistic to apply the same method to mammals such as mice as their skin structure is different. SOURCE: <http://www.herpdigest.org> 27 September 2007

## Farms Fuel Frog Deformities

LiveScience study 24 September 2007. Frog-deforming infections caused by tiny parasites are increasing because of North American farms' nutrient-rich watershed, a new study shows. The excess nitrogen and phosphorus found in farm runoff causes more algae to grow, which increases snail populations that host microscopic parasites called trematodes, said Pieter Johnson, a water scientist at the University of Colorado in Boulder. 'This is the first study to show that nutrient enrichment drives the abundance of these parasites, increasing levels of amphibian infection and subsequent malformations,' said Johnson.

Johnson noted that he and his colleagues' work, which is detailed in the September 24 issue of the Proceedings of the National Academy of Sciences, could also explain 'a wide array of diseases potentially linked to nutrient pollution.' Frog species also are vanishing from Earth in the past few decades for reasons that are difficult to tease apart, including habitat loss, global warming and emerging diseases such as one caused by chytrid fungus. Nutrient pollution and limb malformations also contribute, Johnson said.

A worldwide study of more than 6,000 species of amphibians recently concluded that 32 percent were threatened and 43 percent were declining in population. Deformed frogs first gained international attention in the mid-1990s, when a group of schoolchildren discovered a pond where more than half of the leopard frogs had missing or extra limbs, Johnson said. Since then, widespread reports of deformed amphibians have led to speculation that the abnormalities were being caused by pesticides, increased ultraviolet radiation or parasitic infection.

Parasite infection is now recognized as a major cause of such deformities, but the environmental factors responsible for increases in parasite abundance have largely remained a mystery. 'What we found is that nitrogen and phosphorus pollution from agriculture, cattle grazing and domestic runoff have the potential to significantly promote parasitic infection and deformities in frogs,' Johnson said. The trematode life cycle involves three host species. The tiny parasites form cysts in the developing limbs of tadpoles, causing missing limbs, extra limbs and other malformations, Johnson said. Aside from this stage and an infectious one in snails and the cyst stage in frogs, predators complete the trematode life cycle by eating infected frogs and spreading the parasite back into the ecosystem.

To discover the link between farms and the trematode infections, Johnson and his team built 36 artificial ponds similar to farm stock tanks, where frogs and salamanders often breed and deposit their eggs. The researchers then stocked each tank with snails and green frog tadpoles and, in addition to adding nutrients, they dropped in parasite eggs. In ponds with added nutrients, Johnson said, the total mass of snails was 50 percent greater and parasite egg production was eight times as great. The infection rate in frogs rose between two to five times in those tanks, he added. 'We were able to watch nutrient pollution move through the life cycle of the parasite as it cascaded through the food web,' he said. 'Since most human diseases involve multiple hosts, understanding how increased nutrient pollution affects freshwater and marine food webs to influence disease is an emerging frontier in ecological research.' SOURCE: <http://www.herpdigest.org>

## Hybrid salamanders thrive, contradicting expectations.

Davis, California – 9/27/07, Based on study. A new UC Davis study not only has important findings for the future of California tiger salamanders, but also contradicts prevailing scientific thought about what happens when animal species interbreed. The salamander experts studied the survival rates and genetic makeup of three types of salamanders: native California tiger salamanders (*Ambystoma californiense*), which are protected under the U.S. Endangered Species Act; barred tiger salamanders that were introduced in California from Texas in the 1950s (*Ambystoma tigrinum mavortium*); and the hybrid offspring born when the two species mated.

They found that more of the hybrid young survived in the wild than did young of the native or the introduced species; quite a surprise, since animal hybrids are usually less fit than their parents ('hybrid vigor' is largely limited to plant crosses). That raises difficult questions for managing endangered native salamander populations, Shaffer said. Some conservationists might say that hybrids are an acceptable change, since they are favored by natural selection, and 'improve' the original species. Others might consider hybrids to be genetically impure and regard them as threats to the native salamanders, their competitors and their prey.

The study, by former UC Davis doctoral student Benjamin Fitzpatrick (now on the faculty of University of Tennessee, Knoxville) and professor Bradley Shaffer, was published recently in the Proceedings of the National Academy of Sciences' online edition. Such questions will arise more frequently, Shaffer said, as humans both create new opportunities for hybridization with introduced species, and improve the genetic analyses that detect them. The study, titled 'Hybrid vigor between native and introduced salamanders raises new challenges for conservation,' was funded by the U.S. Environmental Protection Agency (EPA), National Science Foundation (NSF), U.S. Department of Agriculture, CALFED Bay-Delta Program, and UC Davis Agricultural Experiment Station. SOURCE: <http://www.herpdigest.org>

## Note from the Editor

The Croaker is your Newsletter. If you have any feedback, comments or additions, please forward them to the TFC (see page 2 for address). If you have anything interesting, perhaps good or sad news, then perhaps we could all learn from it. Don't let anything be forgotten, send it in for others to read. Remember, we all have different knowledge and experiences, let's share it so that we all may benefit.



# Amphibian news...

## Pollution drives frog deformities

Science Daily — High levels of nutrients used in farming and ranching activities fuel parasite infections that have caused highly publicized frog deformities in ponds and lakes across North America, according to a new study led by the University of Colorado at Boulder. The study showed increased levels of nitrogen and phosphorus cause sharp hikes in the abundance and reproduction of a snail species that hosts microscopic parasites known as trematodes, said Assistant Professor Pieter Johnson of CU-Boulder's ecology and evolutionary biology department. The nutrients stimulate algae growth, increasing snail populations and the number of infectious parasites released by snails into ponds and lakes. The parasites subsequently form cysts in the developing limbs of tadpoles causing missing limbs, extra limbs and other severe malformations, Johnson said.

"This is the first study to show that nutrient enrichment drives the abundance of these parasites, increasing levels of amphibian infection and subsequent malformations," said Johnson. "The research has implications for both worldwide amphibian declines and for a wide array of diseases potentially linked to nutrient pollution, including cholera, malaria, West Nile virus and diseases affecting coral reefs." Deformed frogs first gained international attention in the mid-1990s when a group of Minnesota schoolchildren discovered a pond where more than half of the leopard frogs had missing or extra limbs, he said. Since then, reports of deformed amphibians have become widespread in the United States, leading to speculation they were being caused by factors like pesticides, increased ultraviolet radiation or parasitic infection.

While parasite infection is now recognized as a major cause of such deformities, the environmental factors responsible for increases in parasite abundance had largely remained a mystery until the study was undertaken, Johnson said. "One of our main goals was to understand how parasites are going to respond to land-use changes and ecosystem alterations," he said. "What we found is that nitrogen and phosphorus pollution from agriculture, cattle grazing and domestic runoff have the potential to significantly promote parasitic infection and deformities in frogs." The trematode has a complex life cycle that involves three host species, he said. In addition to the infectious stage in snails and the cyst stage in frogs, the parasites rely on predators including wading birds to complete their life cycle by consuming infected frogs and spreading the parasite back into the ecosystem through defecation.

The research team built 36 artificial ponds in central Wisconsin similar to farm stock tanks -- a common breeding site of frogs and salamanders -- and stocked each with selected numbers of snails and tadpoles of the green frog. In addition to adding nutrients, the researchers took



A study led by CU-Boulder shows high levels of nutrients used in farming and ranching activity can trigger frog deformities in North American ponds and lakes. (Credit: Image courtesy of University of Colorado, Boulder).

on the role of birds in the trematode life cycle by adding parasite eggs to the tanks, then measuring the subsequent ecological responses. In ponds with added nutrients, snail biomass increased by 50 percent and the snails increased parasite egg production by up to eight-fold, he said. The infection rate in frogs rose by two- to five-times in those tanks, Johnson said. As few as 12 trematode larvae, known as cercariae, can kill or deform a single tadpole by burrowing into their limb regions and disrupting normal leg development, he said. A single infected snail can produce more than 1,000 cercariae in one night. Frogs that become deformed rarely survive long in the wild, he said. "We were able to watch nutrient pollution move through the life cycle of the parasite as it cascaded through the food web," he said. "Since most human diseases involve multiple hosts, understanding how increased nutrient pollution affects freshwater and marine food webs to influence disease is an emerging frontier in ecological research."

A recent study of more than 6,000 species of amphibians worldwide

concluded that 32 percent were threatened and 43 percent were declining in population. While the causes range from habitat loss to emerging disease, the researchers are now exploring how nutrient pollution and limb malformations contribute to the pattern, Johnson said. Johnson is the lead author of a study on the subject published online the week of Sept. 24 in the Proceedings of the National Academy of Sciences. Co-authors include Jonathan Chase from Washington University, Katherine Dosch, Richard Hartson, Daniel Sutherland and Stephen Carpenter from the University of Wisconsin, Jackson Gross from the Southern California Coastal Water Research Project and Don Larson from University of Alaska. The National Science Foundation funded the work. SOURCE: Science Daily 25 September 2007

## Decline or extinction?

Amphibian declines and extinctions are critical concerns of biologists around the world. The estimated current rate of amphibian extinction is known, but how it compares to the background amphibian extinction rate from the fossil record has not been well studied. I compared current amphibian extinction rates with their reported background extinction rates using standard and fuzzy arithmetic. These calculations suggest that the current extinction rate of amphibians could be 211 times the background amphibian extinction rate. If current estimates of amphibian species in imminent danger of extinction are included

in these calculations, then the current amphibian extinction rate may range from 25,039 to 45,474 times the background extinction rate for amphibians. It is difficult to explain this unprecedented and accelerating rate of extinction as a natural phenomenon. The paper is available through the author (email: malcolm.mccallum@herpconbio.org). SOURCE: McCallum, Malcolm (2007) Amphibian Decline or Extinction? Current Declines Dwarf Background Extinction Rate, Journal of Herpetology 41(3):483-491.

## Jump starting your backyard

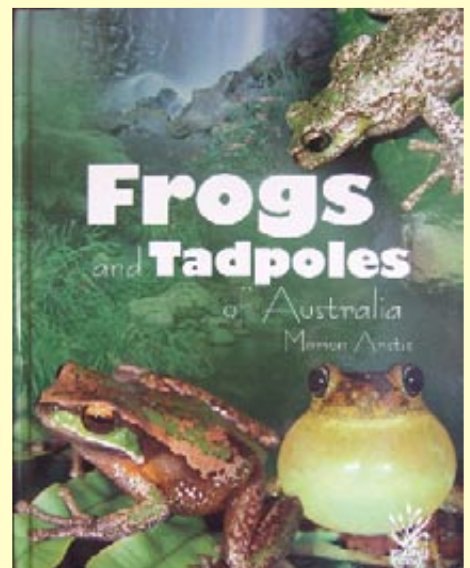
Do you want some good ideas for encouraging frogs in your backyard? The October to December issue of Australia Geographic is for you. The magazine contains an article by Ken Eastwood titled "jump start: encouraging frogs to visit and breed in your backyard isn't as hard as you think."

## Frogs & Tadpoles of Australia

From Marion Anstis, the author of Tadpoles of South-eastern Australia, comes this new book, one of the New Holland Young Reed series on Australian wildlife.

Frogs & Tadpoles of Australia takes us into the private world of frogs and tadpoles and how they live and breed in many different habitats across Australia.

Hard cover, 48 pages in full colour design enough to wet anyone's appetite, and there are even activities to do at the end! Attractively priced at \$19.95



it is available from the author (email: frogpole@tpg.com.au), or can be ordered through bookshops (ISBN: 9781921073076).







# Amphibian news...

## Kuranda tree frog discovered

A new species of tree frog has been discovered in the Kuranda region, but the problem is it's critically endangered. A researcher has stumbled upon a new frog named 'Litoria myola' also known as the Kuranda tree frog. The Frog is seeming to be related to the 'green eyed frog.' The researcher fears that residential areas are closing in on the frogs natural habitat. There will be an action plan soon to save this newly found species. SOURCE: [http://pages.matmice.com/home/nat\\_froghop/](http://pages.matmice.com/home/nat_froghop/)

## New species of frog discovered: India

Science Daily — The India's smallest land vertebrate, a 10mm frog, has been discovered from the Western Ghats of Kerala by Delhi University Systematics Biologist, S D Biju and his colleagues. Indian land vertebrates (all animals with backbone except fishes), comprises of 2,400 species including 218 frog species. S D Biju and his colleagues discovered the tiny night frog living under leaf litter and among the roots of ferns in the humid rainforest of the Western Ghats of Kerala, a mountainous region in the western portion of India. Biju gave a new name for the frog, *Nyctibatrachus minimus*. With adult males of barely 10 mm in length, *Nyctibatrachus minimus* is the smallest of all known Indian land vertebrates and compete with miniature frogs in other parts of the world, including Cuba, the Amazon and Borneo. This frog can be found during nighttime (hence the common name of the genus- Nightfrog) and also can be heard (mating calls) from under the leaf litter during monsoon months, the ideal time for reproduction. Biju has been working in the Western Ghats to find new species of frogs over the past several years, and his findings include the purple frog (*Nasikabatrachus*) and the first canopy frog (*Philautus nerostagona*) from India. The discovery was published recently in the Journal Current Science. SOURCE: Science Daily 3 October 2007.



This tiny Indian frog sitting on an Indian 5 rupee coin is the smallest India frog. (Credit: Image courtesy of University of Delhi).

## Zoos & aquariums respond to frog extinctions

Science Daily — Amphibians are facing great threats. About one third of the 6000 frog, toad, salamander and newt species are threatened with extinction, more than 120 species have likely become extinct since 1980, and 435 species have declined into a category of greater threat during that time. In October 2005, WAZA, The World Zoo and Aquarium Association, therefore adopted a strong resolution calling on all zoos and aquariums to respond to the global extinction crisis facing the world's frogs and other amphibians. This is part of a wider approach led by IUCN - The World Conservation Union, which encompasses also conservation measures in the field. Many factors behind the extinction of frogs are still not well understood. However, it is known today that, in some parts of the world, there is a fungus causing the quick extinction of every amphibian species throughout the range. Experts are convinced that, in many cases, the only solution is to conserve them in zoos and aquariums with the hope that the species can be reintroduced to the wild at a later stage. This will require a massive coordinated effort, but it is a key solution in addressing the global amphibian extinction crisis. With a view to galvanising coordinated action by zoos and aquariums,

experts of the Conservation Breeding Specialist Group of the World Conservation Union, representatives of the World Association of Zoos and Aquariums and other stakeholders met from February 12 to 15 at El Valle, Panama, discussing how a global action plan should be implemented. They recommended criteria for prioritizing species and best practices for breeding facilities, and determined the capacity for rapid response. The meeting envisioned a WAZA coordinated effort with multiple partners that offers a de-centralized approach with multiple breeding facilities. There was a presumption in favour of the breeding taking place in the range countries of the species concerned. However, the value of backup facilities outside the species' range was recognized. The balance between the size of facility, economics and vulnerability will be determined. The meeting acknowledged that this ex-situ effort is a 'stop-gap' measure, and called to Governments, the Amphibian Specialist Group of the World Conservation Union and other stakeholders to strive for a rapid response to help address the amphibian extinction crisis. SOURCE: Science Daily 8 March 2007.

## New golden frog discovered: Colombia

Science Daily — A new poisonous frog was recently discovered in a remote mountainous region in Colombia by a team of young scientists supported by the Conservation Leadership Programme (CLP). The new frog, which is almost two centimetres in length, was given the name the "golden frog of Supatá." Originally, the young scientists thought the frog was similar to several other common species in the area. However, after scientific analysis of the frog's characteristics, and review of their findings by experts at Conservation International, it was determined that the golden frog of Supatá is unique and only found within a 20 hectare area in Colombia's Cundinamarca region. Colombia is one of the world's richest countries in amphibian diversity, with more than 583 species. Unfortunately, since this frog is a recent discovery, and endemic to only the Cundinamarca region, little is known about it. So far, scientists say that the golden frog of Supatá belongs to a group of "dart frogs" that are known to be highly venomous. In the coming months, the young scientists hope to have more information about the frog. "The importance of this project is not just the discovery of the new frog," said Oswaldo Cortes, team leader and one of the winners of the 2007 Conservation Leadership Programme awards. "But, most importantly, what this new discovery shows is how little we still know about our planet, and the many species that haven't yet been discovered. This is why it is so important to work with local communities and educate them about the need for conservation." In addition to Oswaldo Cortes, the team of scientist includes Erika Salazar, Giovanni Chaves, Jose Gil, and Ximena Villagran, students, who attend La Universidad Distrital, and Francisco Jose de Caldas and Luiz Alberto Rueda of the University of the Andes (La Universidad de los Andes). SOURCE: Science Daily 29 August 2007.

The new frog, which is almost two centimetres in length, was given the name the "golden frog of Supatá." (Credit: Conservation Leadership Programme).





# Amphibian news...

## Frog + frying pan = better antibiotic

Science Daily — What do you get when you cross a frog with a frying pan? Possibly a solution to the problem of drug-resistant bugs, research suggests. By creating “Teflon” versions of natural antibiotics found in frog skin, a research team led by biological chemist E. Neil Marsh of the University of Michigan has made the potential drugs better at thwarting bacterial defenses, an improvement that could enhance their effectiveness. Marsh and collaborators work with compounds called antimicrobial peptides (AMPs), which are produced by virtually all animals, from insects to frogs to humans. AMPs are the immune system’s early line of defense, battling microbes at the first places they try to penetrate: skin, mucous membranes and other surfaces. They’re copiously produced in injured or infected frog skin, for instance, and the linings of the human respiratory and gastrointestinal tracts also crank out the short proteins in response to invading pathogens. In addition to fighting bacteria, AMPs attack viruses, fungi and even cancer cells, so drugs designed to mimic them could have widespread medical applications.



Scientists have been interested in exploiting these natural antibiotics since their discovery in the 1980s, but they haven’t been able to overcome some limitations. In particular, AMPs are easily broken down by protein-degrading enzymes (proteases) that are secreted by bacteria and are also naturally present in the body. Increasing the concentration of AMPs in an effort to get around that problem can cause toxic side effects, such as the destruction of red blood cells—those critical carriers of oxygen in the bloodstream. That seems to happen because sticky parts of the AMP molecule interact with the cell membrane in a harmful way. Marsh had the idea of replacing sticky portions of the peptides with nonstick analogs. His inspiration came from the kitchen as much as the chemistry lab: nonstick cookware is coated with fluorinated polymers, plastic-like compounds composed of chains of carbon atoms completely surrounded by fluorine atoms. The fluorine not only makes Teflon slippery, it also makes the coating inert to almost every known chemical. When Marsh and co-workers swapped sticky parts of their AMP molecule with nonstick, fluorinated versions, the molecules became much more resistant to proteases. “The difference was quite striking,” said Marsh, a U-M professor of chemistry. “When we treated them with purified proteases, the nonfluorinated AMPs were all degraded within 30 minutes. Under the same conditions, the fluorinated AMP was completely intact after 10 hours. We think that should make them more effective, as they’ll stay around longer in the body. “We also showed that they seem to be at least as good at killing bacteria as their nonfluorinated counterparts, and for some bacteria they’re actually significantly better.”

Next, the researchers plan experiments to learn whether Teflon AMPs are also less toxic than their stickier equivalents. If they are, and if further studies continue to point to their promise, eventually producing large

quantities of fluorinated AMPs for clinical trials should be quite feasible, Marsh said. Though the research now has obvious practical applications, it started as an exploration in basic science. “We were just interested in translating useful properties of man-made materials

into biological molecules,” Marsh said. “But fairly immediately we saw the potential for applying our fundamental science to a very important clinical problem, which is the way that more and more bacteria are becoming resistant to more and more conventional antibiotics.” Marsh

recently presented this research at the 234th national meeting of the American Chemical Society in Boston.

The researchers have funding from the American Heart Association and the National Science Foundation.

SOURCE: Science Daily 21 August 2007.

## Frog molecule could provide drug treatment for brain tumors

Science Daily — A synthetic version of a molecule found in the egg cells of the Northern Leopard frog (*Rana pipiens*) could provide the world with the first drug treatment for brain tumours. Known as Amphinase, the molecule recognises the sugary coating found on a tumour cell and binds to its surface before invading the cell and inactivating the RNA it contains, causing the tumour to die. In new research published in the *Journal of Molecular Biology*, scientists from the University of Bath (UK) and Alfacell Corporation (USA) describe the first complete analysis of the structural and chemical properties of the molecule. Although it could potentially be used as a treatment for many forms of cancer, Amphinase offers greatest hope in the treatment of brain tumours, for which complex surgery and chemotherapy are the only current treatments. “This is a very exciting molecule,” said Professor Ravi Acharya, from the Department of Biology & Biochemistry at the University of Bath. “It is rather like Mother Nature’s very own magic bullet for recognising and destroying cancer cells. “It is highly specific at hunting and destroying tumour cells, is easily synthesised in the laboratory and offers great hope as a therapeutic treatment of the future.”

Amphinase is a version of a ribonuclease enzyme that has been isolated from the oocytes (egg cells) of the Northern Leopard frog. Ribonucleases

are a common type of enzyme found in all organisms. They are responsible for tidying up free-floating strands of RNA cells by latching on to the molecule and cutting it into smaller sections. In areas of the cell where the RNA is needed for essential functions, ribonucleases are prevented from working by inhibitor molecules. But because Amphinase is an amphibian ribonuclease, it can evade the mammalian inhibitor molecules to attack the cancer cells. As a treatment, it is most likely to be injected into the area where it is needed. It will have no effect



on other cells because it is only capable of recognising and binding to the sugar coating of tumour cells. “Amphinase is in the very early stages of development, so it is likely to be several years and many trials before it could be developed into a treatment for patients,” said Professor Acharya and his colleagues Drs Umesh Singh and Daniel Holloway. “Having said that, the early data is promising and through this study we have provided the kind of information needed if approval for use is requested in the future.”

Amphinase is the second anti-tumour ribonuclease to be isolated by Alfacell Corporation from *Rana pipiens* oocytes. The other, ONCONASE(R) (ranpirinase), is currently in late-stage clinical trials as a treatment for unresectable malignant mesothelioma, a rare and fatal form of lung cancer, and in Phase I/II clinical trials in non-small cell lung cancer and other solid tumours. “We are pleased with the superb work performed by Professor Acharya and his talented team at the University of Bath,” commented Kuslima Shogen, Alfacell’s chairman and chief executive officer. “Their work is critical to the continued development and understanding of our family of novel ribonuclease based therapeutics with the potential to help patients suffering from cancer and other dismal diseases.” The company is now working on pre-clinical trials of Amphinase with a view to beginning clinical trials in the future.

SOURCE: Science Daily 26 June 2007.

ABOVE PHOTO: Northern leopard frog. (Credit: David Cappaert, Michigan State University (Bugwood.org)).

Antimicrobial peptides are copiously produced in injured or infected frog skin, for instance. (Credit: iStockphoto/Robert Dant).





# Toad news...

## Giant cane toad found

A CANE toad the size of a small dog has been caught by a pest eradication group in the Northern Territory. FrogWatch, a group culling the introduced menace across the Northern Territory, has found a toad measuring 20cm in length and weighing 860gm. Volunteers discovered the whopping hopper and 38 smaller toads at Lee Point in the city's northern suburbs. FrogWatch's Graeme Sawyer said the monster toad was the size of a small dog. "The only bigger cane toad I've seen is in a specimen bottle in a museum in Brisbane," he said. "I reckon I've probably seen 50,000-60,000 cane toads in the last 12 months and there is nothing even remotely close to this thing." Mr Sawyer said he was surprised by the toad's sex. "The biggest toads are usually females, but this one is a rampant male," he said. "He is huge; I would hate to meet his big sister." The highly publicised big female caught in the city recently was little over 15 centimetres, this monster is another five centimetres long and one-third heavier." A number of toad busts have been organised by FrogWatch to minimise the pest's spread during the wet season.

SOURCE: The Daily Telegraph 27 March 2007.

Available: <http://www.news.com.au/dailytelegraph>

## Queenslanders turn on their own

A north Queensland council has been labelled irresponsible by the RSPCA for encouraging people to hit cane toads with golf clubs. Townsville City Council produced several hundred beer stubby holders carrying slogans promoting local activities including "cane toad golf", as part of a recently launched advertising campaign. The \$270,000 campaign is designed to showcase "all the great things about Townsville and the people who live here", a council spokeswoman said today. Other slogans on the beer coolers include "cold beer on a hot summer's day" and "bagging a barra" (barramundi).

RSPCA Queensland spokesman Michael Beatty said the merchandise encourages animal cruelty. "We just think it's sending the wrong message, particularly to young people," Mr Beatty told AAP. "We just don't want to encourage anyone to go hitting any animal, even if it is a cane toad, with a golf club, a baseball bat, a cricket bat or any other form of blunt instrument."

Not only is clubbing toads inhumane, Mr Beatty said, it is also an ineffective way of eradicating the pests. "Nine times out of 10 the toad gets up and hops away," he said. "We're not being wowsers about it, it's just irresponsible."

Townsville mayor Tony Mooney said the council will look at removing the cane toad golf stubby holders from the campaign if offence is taken. "This is a campaign that promotes the good things about Townsville and our residents," he said. "I certainly don't want to see anything that might offend people and steps will be taken to sort it out." The slogans were always intended to be humorous, Cr Mooney said. "Let's not get too politically correct," he said.

AUTHOR: Drew Cratchley. SOURCE: Daily Telegraph 07 June 2007.

## How to kill a cane toad

WHAT do you do if you see a cane toad? Here's some handy advice for dealing with this dreaded Qld critter. Freezing has been suggested as the most humane form of killing cane toads. When put into a freezer, a cane toad will become dormant as a reaction to the cold. And don't worry, they won't make Alfie Langer-like comebacks when you take them out to make room for ice cream. The NSW National Parks and Wildlife Service recently warned Sydneysiders to be on the lookout for cane toads after one was discovered at Quakers Hill. The cane toad can be identified by its size (up to 15 centimetres long), warty appearance, a large gland behind the ear and pointed, bony ridges between the nose and eyes. A bit like Russ Hinze, really. More information to help tell frog from toad can be found at <http://www.nationalparks.nsw.gov.au>.

Earlier this month Sydney scientists said that they believed they may have

found a chink in the armour of one of Australia's biggest environmental pests. Sydney University's John Llewelyn and Crystal Kelehear are part of a group known as Team Bufo, named after the cane toad, Bufo marinus. The team has identified a parasitic worm that attacks the



toad's lungs, stunting their growth and, in most, cases killing them. Perhaps they should nickname the worm Willie Mason. "It's a pretty exciting set of results", team leader Professor Rick Shine said. "They kill a large number of the small toads that we infected." According to Professor Shine, if toads in Northern Territory and northern NSW were infected by the parasite, it may be possible to slow their advance quite dramatically.

It's also important to check for cane toad eggs. They are black and laid in water in long necklaces. The necklaces are clear jelly - a bit like the defence of the Maroons' backline. Most frogs lay their eggs

as a mass of foam or clumps of jelly in water or land nests, or in holes in moist areas. An individual cane toad can attach up to 35,000 eggs to water plants or debris in slow-moving or still water. Cane toad tadpoles are very dark, their tails are short compared with their body size and they gather in pub beer gardens. When native tadpoles hatch, they feed on decaying plant material and gradually develop legs before changing into frogs. SOURCE: Daily Telegraph 15 May 2007.

## Arthritis may slow cane toads

CANE toads in the Northern Territory are developing severe arthritis resulting in gross malformation of their spines. The invading pests, which have steadily been marching west, may now be slowed down due to the affliction. The discovery points to a weakened immune system which may leave them vulnerable to parasites, Fairfax reports. Since being introduced to Queensland in the 1930s, cane toads have spread across northern Australia. Rick Shine from the University of Sydney said nature had designed the toads to spend their lives "sitting around the swamp, eating a few flies" but many travelling toads had developed much longer legs than other toads. Professor Shine said swapping an effective immune system for mobility led to a strong chance that the immune system would struggle to keep up.

SOURCE: The Australian 16 October 2007.

Available <http://www.theaustralian.news.com.au>

## Beer bounty for cane toads

TOM Hedley, Australia's biggest private hotel owner and one of Queensland's richest men, has thrown his support behind plans to introduce a beer-for-a-bag-of-toads bounty. KEN Ritchie never thought he'd see the day a cane toad would be worth its weight in beer, let alone two. "Hell, I'll give them two beers," said Mr Hedley, who also owns and drinks at his favourite watering hole the Red Beret. Latest estimates are that there are between 100 and 200 million cane toads in Australia, which means at the standard Queensland 'pot' glass size of 285mls, it would take 57 million litres of free beer to wipe out pest - at two toads a bag. But Mr Hedley thinks it will be money well spent. "As far as I am concerned they're pests and a nuisance to society," said Mr Hedley. "If offering a beer for a bag of toads is one way to wipe them out once and for all then I am all for it," he said. The RSPCA welcomed the multi-millionaire's backing, saying the proposal could be modeled on a similar beer-for-a-toad bounty run in the Northern Territory. "How it worked in Darwin is they brought in the toads to the RSPCA to be humanely euthanised and they were then issued a voucher to get a beer - with a daily limit on the number of beers," said RSPCA spokesman Michael Beatty. "It could be more than a gimmick. It could seriously help reduce the toad population, especially around suburbia," he said.

AUTHOR: Peter Michael. SOURCE: The Australian 26 February 2007.

Available <http://www.theaustralian.news.com.au>





# Amphibian research...

## The Efficacy of Small-Scale Conservation Efforts, as Assessed on Australian Golf Courses

Habitat remnants on urban green-space areas (i.e. parks, gardens and golf courses) sometimes provide refuge to urban-avoiding wildlife, leading some to suggest these areas may play a role in wildlife conservation if they are appropriately designed and managed. The high densities observed on some green-space areas may however be attributed to external influences. Localised efforts to enhance the habitat value of urban green-space areas may therefore have little more than a cosmetic effect. This study investigated environmental factors influencing bird, reptile, mammal and amphibian diversity on Australian golf courses to assess the efficacy of small-scale conservation efforts. Abundance and species richness did not simply reflect local habitat qualities but were instead, partly determined by the nature of the surrounding landscape (i.e. the area of adjacent built land, native vegetation and the number of connecting streams). Vertebrate abundance and species richness were however, also associated with on-site habitat characteristics, increasing with the area of native vegetation (all vertebrates), foliage height diversity and native grass cover (birds), tree density, native grass cover and the number of hollows (mammals), woody debris, patch width and canopy cover (reptiles), waterbody heterogeneity and aquatic vegetation complexity (frogs). Localised conservation efforts on small land types can benefit urban-avoiding wildlife. Urban green-space areas can provide refuge to urban-avoiding vertebrates provided combined efforts are made at patch (management), local (design) and landscape (planning) scales.

SOURCE: Hodgkinson, S., Hero, J.M. & Warnken, J. (2007) The Efficacy of Small-Scale Conservation Efforts, as Assessed on Australian Golf Courses, *Biological Conservation* 136:576-586. Available at <http://www.sciencedirect.com>

## Biodiversity Management Approaches for Stream-Riparian Areas: Perspectives for Pacific Northwest Headwater Forests, Microclimates, & Amphibians

Stream-riparian areas represent a nexus of biodiversity, with disproportionate numbers of species tied to and interacting within this key habitat. New research in Pacific Northwest headwater forests, especially the characterization of microclimates and amphibian distributions, is expanding our perspective of riparian zones, and suggests the need for alternative designs to manage stream-riparian zones and their adjacent uplands. High biodiversity in riparian areas can be attributed to cool moist conditions, high productivity and complex habitat. All 47 northwestern amphibian species have stream-riparian associations, with a third being obligate forms to general stream-riparian areas, and a quarter with life histories reliant on headwater landscapes in particular. Recent recognition that stream-breeding amphibians can disperse hundreds of meters into uplands implies that connectivity among neighboring drainages may be important to their population structures and dynamics. Microclimate studies substantiate a "stream effect" of cool moist conditions permeating upslope into warmer, drier forests. The authors review forest management approaches relative to headwater riparian areas in the U.S. Pacific Northwest, and we propose scenarios designed to retain all habitats used by amphibians with complex life histories. These include a mix of riparian and upslope management approaches to address the breeding, foraging, overwintering, and dispersal functions of these animals. They speculate that the stream microclimate effect can partly counterbalance edge effects imposed by upslope forest disturbances, hence appropriately sized and managed riparian buffers can protect suitable microclimates at streams and within riparian forests. The authors propose one approach that focuses habitat conservation in headwater areas – where present management allows extensive logging – on sensitive target species, such as tailed frogs and torrent salamanders that often occur patchily. Assuming both high patchiness and some concordance among the distribution of sensitive species, protecting areas with higher abundances of these animals could justify less protection of currently unoccupied or low-density habitats, where more intensive forest management for timber production could occur. Also, they outline an approach that protects juxtaposed headwater patches, retaining connectivity among sub-drainages using a 6th-field

watershed spatial scale for assuring well-distributed protected areas across forested landscapes. However, research is needed to test this approach and to determine whether it is sufficient to buffer downstream water quality and habitat from impacts of headwater management. Offering too-sparse protection everywhere is likely insufficient to conserve headwater habitats and biodiversity, while our alternative targeted protection of selected headwaters does not bind the entire forest landscape into a biodiversity reserve.

SOURCE: Olson, D.H., Anderson, P.D., Frissell, C.A., Welsh, H.H.Jr. & Bradford, D.F. (2007) Biodiversity Management Approaches for Stream-Riparian Areas: Perspectives for Pacific Northwest Headwater Forests, Microclimates, & Amphibians, *Forest Ecology & Management* (in press). Available from <http://sciencedirect.com>

## The Conservation Value of Suburban Golf Courses in a Rapidly Urbanising Region of Australia

The conservation value of suburban golf courses was assessed in southeast Queensland, Australia, by investigating their capacity to support urban-threatened birds, mammals, reptiles and frogs. Terrestrial vertebrate assemblages were compared between golf courses and nearby eucalypt fragments and with suburban bird assemblages. Biotic diversity varied among golf courses. While some had conservation value (supporting high densities of regionally threatened vertebrates), most failed to realise that potential, supporting only common urban-adapted species. Golf courses were generally a better refuge for threatened birds and mammals than for threatened reptiles and amphibians. Reasons for the relative absence of threatened herpetofauna are currently unclear but could be attributed to increased sensitivity to isolation, exposure to herbicides or greater disruption of ground-level habitats. While species-specific studies are required to identify the ecological role played by habitats on golf courses and the potential for long-term viability, the results confirm that suburban golf courses can have local conservation value for threatened vertebrates. Given their ubiquity, golf courses present a significant opportunity for urban wildlife conservation. Thus while the golf industry is making genuine attempts to improve its environmental management standards, it is important to ensure those efforts target the needs of regionally threatened species. Legislation may be required to ensure ecological criteria are incorporated in new golf developments. Ongoing research is investigating the effect that golf course design and management practices have on the local diversity of threatened vertebrates.

SOURCE: Hodgkinson, S.C., Hero, J.M. & Warnken, J. (2007) The Conservation Value of Suburban Golf Courses in a Rapidly Urbanising Region of Australia, *Landscape & Urban Planning* 79:323-337. Available at <http://www.sciencedirect.com>

## Control of Breathing in Anuran Amphibians

The primary role of the respiratory system is to ensure adequate tissue oxygenation, eliminate carbon dioxide and help to regulate acid-base status. To maintain this homeostasis, amphibians possess an array of receptors located at peripheral and central chemoreceptive sites that sense respiration-related variables in both internal and external environments. As in mammals, input from these receptors is integrated at central rhythmogenic and pattern-forming elements in the medulla in a manner that meets the demands determined by the environment within the constraints of the behavior and breathing pattern of the animal. Also as in mammals, while outputs from areas in the midbrain may modulate respiration directly, they do not play a significant role in the production of the normal respiratory rhythm. However, despite these similarities, the breathing patterns of the two classes are different: mammals maintain homeostasis of arterial blood gases through rhythmic and continuous breathing, whereas amphibians display an intermittent pattern of aerial respiration. While the latter is also often rhythmic, it allows a degree of fluctuation in key respiratory variables that has led some to suggest that control is not as tight in these animals. In this review the authors focus specifically on recent advances in studies of the control of ventilation in anuran amphibians. This is the group of amphibians that has attracted the most recent attention from respiratory physiologists.

SOURCE: Gargaglioni, L.H. & Milsom W.K. (2007) Control of Breathing in Anuran Amphibians, *Comparative Biochemistry & Physiology, Part A* 147:665-684. Available from <http://www.sciencedirect.com>

## Frogs at You-Tube

For a good laugh click on the internet link below....  
<http://www.youtube.com/watch?v=f3mXaATLeRM>



# Amphibian research...

## The Relationship Between Environmental Conditions & Activity of the Giant Barred Frog (*Mixophyes iteratus*) on the Coomera River, South-East Queensland

Determining the population density of ectotherms is often confounded by individual activity levels, which are highly dependent on ambient climatic conditions. In this study Koch and Hero used radio-telemetry and streamside surveys to examine the influence of local climatic conditions on individual activity levels (detectability) and streamside density of a population of endangered giant barred frog (*Mixophyes iteratus*) along the Coomera river in south-east Queensland. Temperature was the most important climatic variable influencing the behaviour and hence detectability of *M. iteratus*. The results indicated that males bury under the leaf litter during cold conditions (<18°C) so fewer were detected during surveys. Although females were also found to bury under the leaf litter in cold weather, no significant relationship between exposure and streamside density was detected. This is likely to be due to the lower number of females detected during surveys. The streamside density of juveniles was significantly related to temperature and rainfall, but little of the variance in the data was explained by climatic conditions, despite greater numbers of juveniles being found than adults. These results indicate that, for increased efficiency, surveys of *Mixophyes iteratus* should be undertaken when temperatures exceed 18°C.

SOURCE: Koch, A.J. & Hero, J.M. (2007) The Relationship Between Environmental Conditions & Activity of the Giant Barred Frog (*Mixophyes iteratus*) on the Coomera River, South-East Queensland, *Australian Journal of Zoology* 55:89-95. Available at <http://www.publish.csiro.au/journals/ajz>

## Amphibian Biodiversity Recovery in a Large-Scale Ecosystem Restoration

Amphibians are important components of ecosystem function and processes; however, many populations have declined due to habitat loss, fragmentation and degradation. The authors studied the effect of wetlands ecosystem restoration on amphibian population recovery at Kankakee Sands in northwest Indiana, USA. They also tested predictions about colonization in relation to proximity to existing nature preserves and species characteristics. Prior to restoration activities (1998), the amphibian community at Kankakee Sands consisted of fourteen populations of seven species at seven breeding sites. By 2001, this community increased to 60 populations at 26 sites; however, species richness had not increased. By 2002 the community increased to 143 populations of eight species at 38 sites, and by 2003 there were 172 populations of ten species at 44 sites. Abundance index values increased 15-fold from 1998-2003. These increases best fit the exponential growth model. Although survival through metamorphosis was substantial during wetter than average years (2002 and 2003), during other years restored wetlands dried before larvae of most species transformed. Amphibian colonization was greatest near a nature preserve with the greatest amphibian diversity. The earliest colonists included fossorial species and those species whose habitat includes wet and mesic sand prairie. However, the fossorial Tiger Salamander (*Ambystoma tigrinum*) was the last species to colonize Kankakee Sands.

SOURCE: Brodman, R., Parrish, M., Kraus, H. & Cortwright, S. (2007) Amphibian Biodiversity Recovery in a Large-Scale Ecosystem Restoration, *Herpetological Conservation & Biology* 1(2): 101-108.

## Human Land Use & Patterns of Parasitism in Tropical Amphibian Hosts

Landscape alterations by humans can change patterns of parasite transmission. Depending on the type alteration and the life histories of parasites and hosts, parasitism may increase or decrease. To investigate whether parasitism in tropical amphibians was associated with land use change, Valerie McKenzie studied three species of amphibians, *Rana vaillanti*, *Eleutherodactylus fitzingeri*, and *Smilisca puma* from the Province of Heredia, Costa Rica, in the Atlantic lowlands. Frogs were collected and examined for parasites during the rainy seasons of 2001-2003 from sites in forest or clear-cut cattle pastures. The abundances of five species of parasites and parasite species richness of *R. vaillanti* were significantly higher in pasture habitat. A single parasite species shared by *E. fitzingeri* and *S. puma* showed a trend of increased abundance in pasture habitats. Overall, the abundances of six parasite species (three trematodes, an intestinal nematode, an encysted nematode, and a filarial

nematode) were higher in pastures, while two species (trematodes) were higher in forest. This study suggests that land use activities in tropical regions affects the abundance and richness of amphibian parasites. Converting forest to pasture may impact the abundance of amphibian parasites because subsequent water quality changes (e.g. eutrophication, higher pH) often enhance habitat and resources for intermediate hosts (e.g. snails, mosquitoes) involved in parasite life cycles. Aquatic amphibians (e.g. *R. vaillanti*) may be particularly prone to experiencing increases in parasitism in agricultural habitats due to the positive relationship between many aquatic intermediate hosts and water quality changes associated with agricultural land use.

SOURCE: McKenzie, V.J. (2007) Human Land Use & Patterns of Parasitism in Tropical Amphibian Hosts, *Biological Conservation* 137:102-116. Available at <http://www.sciencedirect.com>

## Diagnostic Assays & Sampling Protocols for the Detection of *Batrachochytrium dendrobatidis*

*Batrachochytrium dendrobatidis* is a fungus belonging to the Phylum Chytridiomycota, Class Chytridiomycetes, Order Chytridiales, and is the highly infectious aetiological agent responsible for a potentially fatal disease, chytridiomycosis, which is currently decimating many of the world's amphibian populations. The fungus infects 2 amphibian orders (Anura and Caudata), 14 families and at least 200 species and is responsible for at least 1 species extinction. Whilst the origin of the agent and routes of transmission are being debated, it has been recognised that successful management of the disease will require effective sampling regimes and detection assays. The authors have developed a range of unique sampling protocols together with diagnostic assays for the detection of *B. dendrobatidis* in both living and deceased tadpoles and adults. Here, they formally present our data and discuss them in respect to assay sensitivity, specificity, repeatability and reproducibility. The authors suggest that compliance with the recommended protocols will avoid the generation of spurious results, thereby providing the international scientific and regulatory community with a set of validated procedures which will assist in the successful management of chytridiomycosis in the future.

SOURCE: Hyatt, A.D., Boyle, D.G., Olsen, V., Boyle, D.B., Berger, L., Obendorf, D., Dalton, A., Kriger, K., Hero, M., Hines, H., Phillott, R., Campbell, R., Marantelli, G., Gleason, F. & Colling, A. (2007) Diagnostic Assays & Sampling Protocols for the Detection of *Batrachochytrium dendrobatidis*, *Diseases of Aquatic Organisms* 73:175-192.

## Seasonal Patterns of Activity & Community Structure in an Amphibian Assemblage at a Pond Network with Variable Hydrology

The authors studied community structure and seasonal activity patterns in a system of four ponds with seasonally-variable hydrology at a Mediterranean area in central Italy. Using a set of field methods to assess species presence and relative frequency of observation. The network of ponds was inhabited by six species of amphibians, two salamanders and four frogs. The breeding phenology of the six species did not vary remarkably among ponds, but there were significant differences among species in use of ponds. Factorial analysis of pond similarity drawn from percentage composition of the amphibian fauna, revealed that each of the four ponds was treatable as independent units, with no influence of relative inter-pond distance. PCA analysis allowed us to spatially arrange the amphibian species into three main groups: two were monospecific groups (i.e., *Triturus vulgaris* and *Bufo bufo*) and the third consisted of those species that selected not only the largest-deepest ponds, but also the ephemeral ones (i.e., *Triturus carnifex*, *Hyla intermedia*, the green frogs and *Rana dalmatina*). The results suggest that the inter-pond differences in riparian vegetation, water depth, aquatic vegetation structure/abundance, and soil composition may produce differences among pond ecological characteristics (i.e., water turbidity and temperature, shelter availability, abundance of oviposition micro-sites), which may in turn influence different patterns of use by amphibians. This is thought to be the first study emphasizing the potential role of heterochrony in the maintenance of a high species richness in Mediterranean amphibian communities. Preservation of freshwater vertebrate biodiversity requires management and protection not only of the main ponds and water bodies but also the temporary and ephemeral shallow ponds.

SOURCE: Vignolia, L., Bologna, M.A. & Luiselli, L. (2007) Seasonal Patterns of Activity & Community Structure in an Amphibian Assemblage at a Pond Network with Variable Hydrology, *Acta Oecologica* 31:185-192.

# Observations...

## From the Ernst family

Hi everyone

We are frog crazy people from Mareeba, who just wanted to share some amazing information with you. This year was a very special year for us with our first major laying and hatching of frog eggs in our frog ponds in January with the start of the storms. We have guppies in our ponds and they were very happy to snack on the eggs (we were told they would not eat the tadpoles, but they do like the eggs) so the kids and I moved as many of the eggs as we could to a separate pond just for the tadpoles.



As you can see from the first photo attached we had 100s and 100s. Unfortunately not all of them made it to adulthood but a good many did and we hope to see them back next year or the year after to lay more eggs. Now the point of my letter is to show you our late developer (photo 2), this guy is approx seven months old and still waiting for his front legs. We had him in outside pond but as the weather got colder we moved him into a tank inside and he seem very happy to just swimming about. His front legs are there but have not yet popped out - I'm hoping he waits until the temp goes up as I'm not sure how he will take the cold.

Frog friends

Kattina, Barry, Jessyk & Emily Ernst



## From Michael Anthony

The Common Nursery frog (*Cophixalus ornatus*) with two clutches of eggs at Innisfail.



## Cape York action

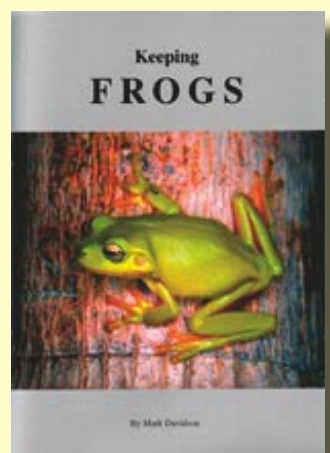
Take Action and Help Make Cape York World Heritage. Please help us make our target of sending 1000 messages to the decision makers who can progress world heritage for Cape York Peninsula. Send your message today and email others. Thank you for your support. For more information log onto [https://www.wilderness.org.au/cyberactivist/cyberactions/07\\_07\\_capeyork\\_cyberaction.php](https://www.wilderness.org.au/cyberactivist/cyberactions/07_07_capeyork_cyberaction.php)

Di Horsburgh  
Community Campaigner  
The Wilderness Society (Qld)  
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Ph 40 416666 / F: 40 416677



## Keeping Frogs

This book is a must have aid for anyone interested in the captive care of Australian frogs. Keeping Frogs is an easy to follow guide for everyone from beginner to long-term amphibian enthusiasts. It helps guide the reader through those tricky stages of tadpole development and morphing. Contents include biology, basic rules, indoor & outdoor enclosures, substrates, water quality, lighting, heating, humidity, feeding & supplements, breeding, raising tadpoles, metamorphosis, health & disease, common questions & answers, and some vital reminders. It covers many of the most commonly kept species such as the Green Tree Frog (*Litoria caerulea*), White-lipped Frog (*Litoria infrafrenata*), Red-eyed Tree Frog (*Litoria chloris*), Blue Mountains Tree Frog (*Litoria citropa*), Peron's Tree Frog (*Litoria peronii*), Dainty Tree Frog (*Litoria gracilienta*), Green & Golden Bell Frog (*Litoria aurea*), Dwarf Tree Frog (*Litoria fallax*), Southern Brown Tree Frog (*Litoria ewingii*), Growling Grass Frog (*Litoria reniformis*), Spotted Marsh Frog (*Limnodynastes tasmaniensis*), Striped Marsh Frog (*Limnodynastes peronii*), Painted Burrowing Frog (*Neobatrachus sudelli*), and Great Barred Frogs (*Mixophyes* species). Full colour, 40 pages, 25 photos. AVAILABLE: <http://www.reptilepublications.com.au>

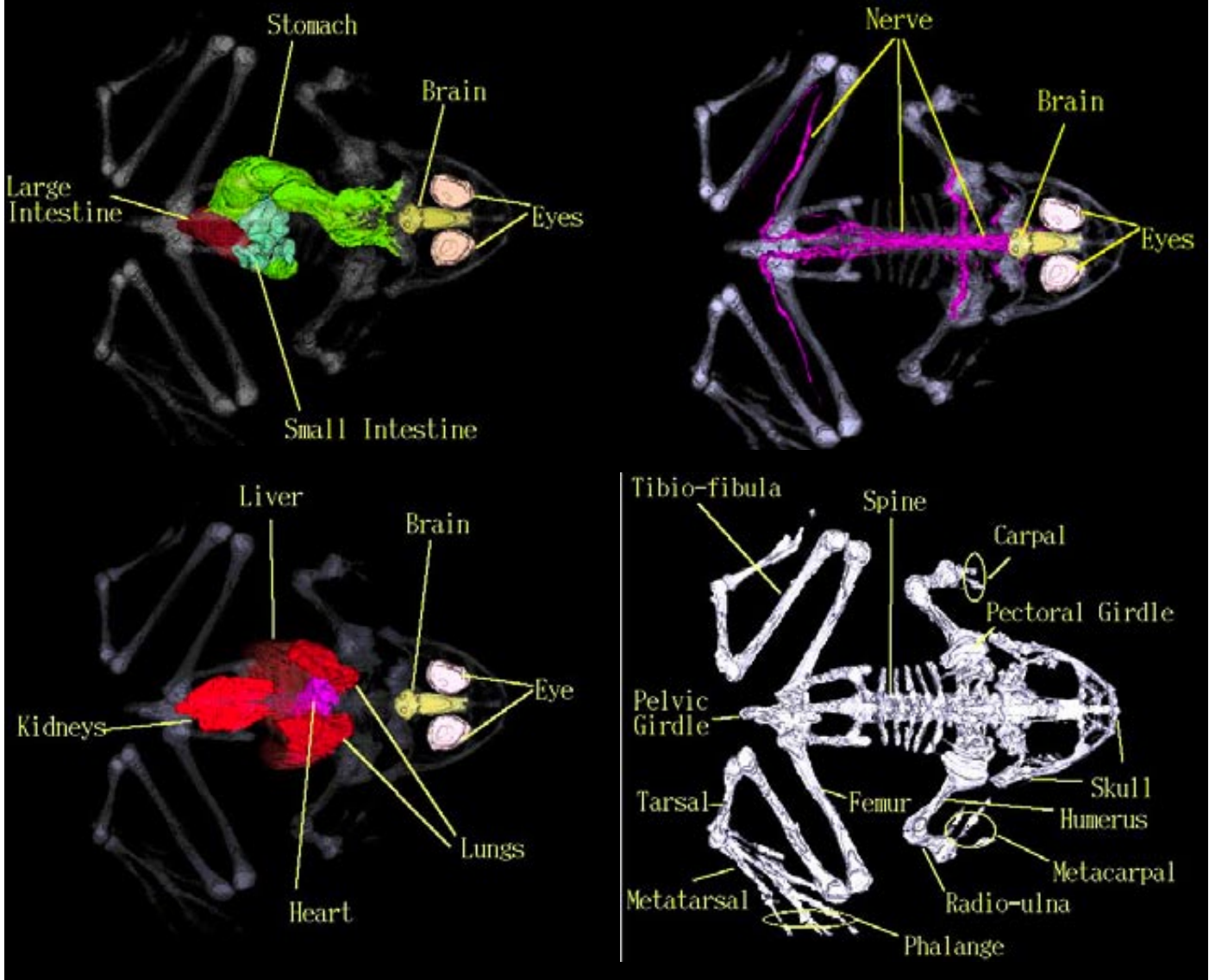




# Kids corner..

Know your frogs from the inside out!

## X-ray vision



## Skulls & bones



Giant salamanda skull



Brazilian horned frog skull



Goliath frog skull



Goliath frog skeleton



<http://www.skullsunlimited.com>



# Pond croakings

Like most fields of scientific endeavour, herpetology (the study of reptiles and amphibians) involves a certain amount of jargon. In this section I will attempt to explain the terms they use. I will provide other definitions as required in forthcoming newsletters. Over time you will be able to build up a dictionary of common terms.

**ARBOREAL**

Tree dwelling.

**BILLABONG**

A branch or effluent of a river, forming backwater or stagnant pool.

**CRYPTOZOIC**

Living in hidden or darkened places such as under rocks, logs and bark.

**ECOLOGY**

Relationship between the herp and their environment.

**EXFOLIATIONS**

Split sheets or slabs of rocks usually caused by weathering.

**FOSSORIAL**

Adapted for digging or burrowing into the ground.

**LITTORAL**

Relates to the shoreline.

**MESIC**

Living in, or adapted to, moist, temperate conditions.

**MONTANE**

Associated with mountains or highlands.

**OX BOW LAKE**

A lake formed when the circular meander of a river is isolated by the river cutting a new channel, with subsequent silting.

**PELAGIC**

Ocean inhabiting.

**SAVANNAH**

Tropical or subtropical grasslands with scattered trees and shrubs.

**SAXICOLINE**

Living amongst rocks.

**SCLEROPHYLL**

Relating to vegetation with hard, drought resistant leaves, as typified by most eucalyptus trees.

**SPHAGNUM**

Peat or bog mosses which form thick, dense and extensive water saturated mats in many alpine and cool highland areas of high rainfall.

**TERRESTRIAL**

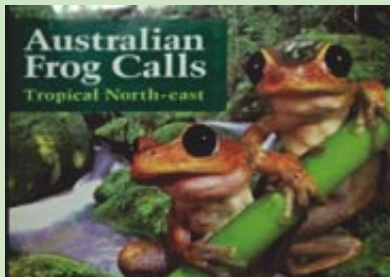
Occurs or is active on the ground.

**XERIC**

Living in, or adapted to arid conditions.



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Polo shirts \$10.00 each





# Tablelands Frog Club

Mail Bag 71

YUNGABURRA QLD 4879

## Application for Membership

\$15.00 Adult membership       **Membership type**       \$15.00 Family membership       \$5.00 Junior/Associate

Surname(s): \_\_\_\_\_ Given name(s): \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_ P/Code

Postal: \_\_\_\_\_

\_\_\_\_\_ P/Code

Phone (h) \_\_\_\_\_ (w) \_\_\_\_\_ (m) \_\_\_\_\_

E-mail Address (for newsletters and updates) \_\_\_\_\_

Occupation: \_\_\_\_\_

The Tablelands Frog Club Incorporated is incorporated under the Associations Incorporation Act.

### TFC OFFICE USE ONLY

Membership paid: \$ \_\_\_\_\_ Paid by:  Cash,  Money Order,  Cheque

Receipt number: # \_\_\_\_\_ Date issued: \_\_\_\_/\_\_\_\_/\_\_\_\_

Membership number: # \_\_\_\_\_ Date entered: \_\_\_\_/\_\_\_\_/\_\_\_\_



### Tablelands Frog Club

Mail Bag 71

YUNGABURRA QLD 4879

### MEMBERSHIP TAX RECEIPT

Membership paid: \$ \_\_\_\_\_ Paid by:  Cash,  Money Order,  Cheque

Receipt number: # \_\_\_\_\_ Date issued: \_\_\_\_/\_\_\_\_/\_\_\_\_

Membership number: # \_\_\_\_\_ Signed: \_\_\_\_\_

Please Post Membership Application to: Mail Bag 71, Yungaburra QLD 4872



# *The Croaker*

**Newsletter of Tablelands Frog Club**  
**October 2007**

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