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ACTHA INC. NEWS

DEC '13 - JAN '14

*Newsletter of the
ACT Herpetological
Association Inc.*

IN THIS ISSUE

Sorting out species numbers in the toadlets

Uperoleia: Summary of a talk given in August by **Renee Catullo**, CSIRO/ANU, who is using genetics to identify members of this cryptic species, from page 2.

ACTHA fieldtrip to Dubbo Zoo: A dozen members spent a weekend in October visiting Dubbo Zoo, which included a behind the scenes reptile tour, from page 6.

Research of the Month: 'Chemosensory discrimination of social cues mediates space use in snakes', includes an interview by our writer, Gabrielle Openshaw, with Lead Author Mitchell Scott, page 9.

The Australian & International Scene:

Why cane toads give us small hope for climate change, p10.

Rare frog's range expanded, p11.

YOUR COMMITTEE FOR 2013 - 2014

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** Denotes Life Members*

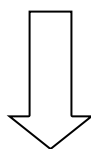
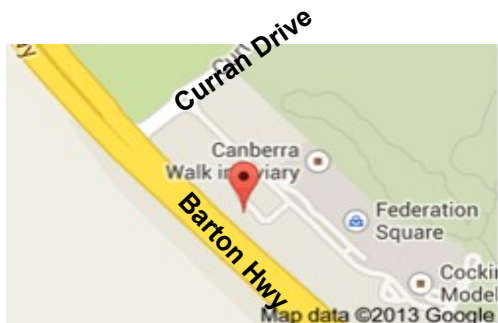
DIARY DATE

The *bi-monthly* meetings of the Association are usually held on the **third Tuesday of the month** at 7.30pm. Our usual venue is:

Belconnen Soccer Club, Hawker
(cnr Belconnen Way & Springvale Drive)

UPCOMING MEETING

NOTE – CHANGE OF VENUE



Christmas party for ACTHA members

from 6pm, Tuesday 17th December 2013

to be held at **Canberra Reptile Zoo**,
O'Hanlon Place, Gold Creek, Nicholls.

A selection of food & drink will be available for all financial members
(Margaret will have her receipt book for *last minute subscriptions, still only \$10pa*)

RSVP to mandyconwy@gmail.com by **Friday, 13 December 2013**

An exclusive 10 min film of a **turtle burying her eggs in Giralang**,
taken by local wildlife carer **Denise Kay**, will be shown!!

Snakes Alive! 2014

Mon 20 to Sun 26 January
is only 5 weeks away &
we need volunteers
during opening hours
to handle reptiles
& guide visitors.

Let's talk at the Christmas
Party!

SORTING OUT SPECIES NUMBERS IN THE TOADLETS

Uperoleia: Myobatrachidae

Renee Catullo, Postdoctoral Fellow, CSIRO Ecosystem Sciences, Visiting Fellow ANU, was our guest speaker at ACTHA's August 2013 meeting. This summary of Renee's talk is by Mandy Conway, with many thanks to Renee for writing the overall conclusion!

"This talk is a follow-up to my PhD on the Genus *Uperoleia*, which ACTHA kindly contributed towards. *Uperoleia* are known to be difficult to distinguish from each other let alone tell how many species there are. I will look at what patterns have influenced their diversification." Renee said as she started her presentation.

Current Species Definitions

The term 'Species' has many definitions, but the one most often used is the Biological Species Concept, which says that species are not actually or potentially interbreeding in nature. Most definitions are also usually based on morphology.

Some difficulties with species defined by morphology include:

- non-visual mating signals such as mating calls or pheromones;
- extreme environmental conditions selecting for a specific morphology, while other selection pressures favour changes in behaviour, communication, or chemical signals.

Cryptic Species Identification can be described as a single, wide-ranging species, as in the case of



this South American butterfly (left). Once thought to be one species, it is in fact twelve different species. They look almost identical however genetic technology has allowed the identification of reproductively isolated populations.

Prevalence of Cryptic Species

Over the past decade, cryptic species have been identified by the use of molecular genetics throughout a large range of taxonomic groups

including orchids, sea turtles, lemurs, mosquitoes, moths and moss, to name just a few examples.

Cryptic Species in Frogs

Frogs are likely to have unidentified cryptic species due to abundance of non-morphological species recognition methods:

- mate advertisement calls are important in reproductive isolation;
- low commercial value therefore less likely to be studied;
- genetic studies show immense cryptic diversity, for example an increase in species number by over 200% in Madagascar, Africa and the Amazon.

Management Implications

The Water-holding Frog, *Litoria platycephala*, is primarily located in three main areas of Australia.

Losing the species in the small area on the map at right may not be much of a worry if all three areas in fact contain the one species. However if they are different, a 'species' status provides a basis for the identification of

"Evolutionarily Significant Units" which should be managed separately. Species already considered rare may be a complex of separate species which are individually more threatened. "We could lose an entire species without even knowing about it." Renee added.



Australian Frog Diversity

As at 2009, there were 227 described frog species of which 94% are endemic to Australia. 13.7% of these are either threatened or endangered. A Government pamphlet noted that there were an estimated 1.5% of amphibian species yet to be described. Phylogeographic information is now being collected on a large scale thanks to advances in genetic science. In less than five years, five new species have been described, showing that the government's estimate of undescribed species is vastly too low.

(Sorting out species numbers, *Uperoleia* cont'd...)

The Family Myobatrachidae

The Myobatrachidae family has a long evolutionary history in Australia. Its closest relatives are in South America, which indicates that they have existed in Australia since continents were once connected.

Uperoleia, called Toadlets or Gungans in QLD, are the most diverse genus, with 27 currently

described species. Adults range in size from 17mm to 41mm SVL, many are fossorial and morphologically conservative, or, to put it bluntly, brown!

Habitat varies widely from spinifex grasslands in the sandy desert, rock covered ground in the Pilbara, floodplain areas, and along south coast rainforest edges.



Research, research!

Renee's research on 'little brown frogs' continues, specifically:

- Looking for cryptic species using genetics.
- Major taxonomic revision of the genus.
- Identifying areas of endemism for *Uperoleia*.
- Understanding how changes in climate and geology have influenced speciation, primarily in the monsoonal tropics.
- Population genetics in the Pilbara.

Tissue samples were taken from many museum specimens of frogs found throughout Australia.

Renee sequenced 800 individuals which resulted in 39 clades that may represent species (tissues were unavailable for three described species).

A vast majority of *Uperoleia*, that is, twenty-seven of the clades, are located in the monsoonal tropic areas of Australia. There are two hypotheses regarding the origin of these taxa (Bowman *et al*, 2010):

One: That they represent recent arrivals from Asia approximately 20 million years ago (mya). This hypothesis is now deemed not possible because Myobatrachid frogs are old Australo-Papuan endemics.

Two: That they comprise ancient Gondwanan relicts that persisted in refugia.

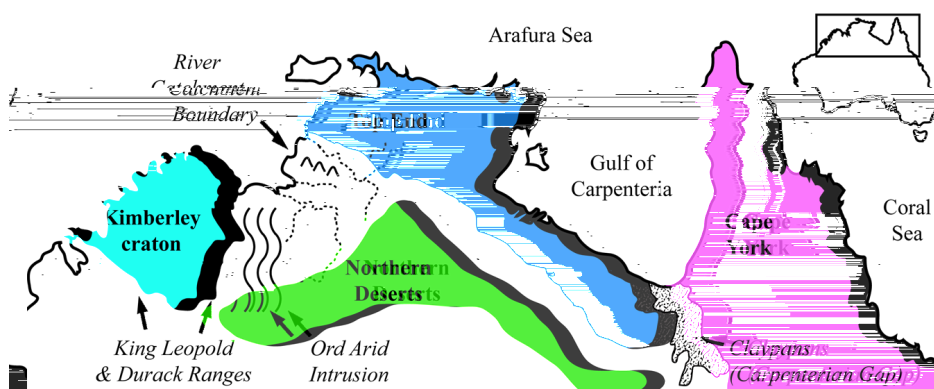
In both these hypotheses the evidence is unsupported in Agamid lizards. The data suggests that the origin of monsoonal species of Agamids dates to 11mya. Myobatrachid frogs are also much younger than hypothesis *two* suggests.

Australia was a warm and wet continent in the mid-Miocene period. As the continent became more arid, divergence between eastern mesic and monsoonal clades occurred, with a further split of monsoonal clades in the Pleistocene, 4-5mya. The expansion and contraction of Australia's arid zone over time has had a huge impact on frog diversification in recent history.

Australian Monsoonal Tropics Hypothesized Sub-Regions

There are four major Myobatrachid frog groups in Australia's north: Cape York, Top End, Northern Deserts and the Kimberley (shown in the figure below). Renee's task was to identify the relationship between frogs in these regions.

"DNA is acquired in equal proportions from a mother and father," Renee explained, "and the developmental process is a slow one. Mitochondrial DNA, however, is only received from the mother and therefore can develop through a very different evolutionary history."



(Sorting out species numbers,
Uperoleia cont'd...)

Renee sequenced nuclear DNA, which produced the results in the diagram at right. When she sequenced mitochondrial DNA a different pattern emerged. Previously commonly used markers were unable to be used in Renee's research. This was completely unexpected.

Morphology: The red line in the slide below (#) distinguishes all of the Northern Desert species from the Cape York, Top End and Kimberley species. The frogs which occur in these two groups look morphologically similar.

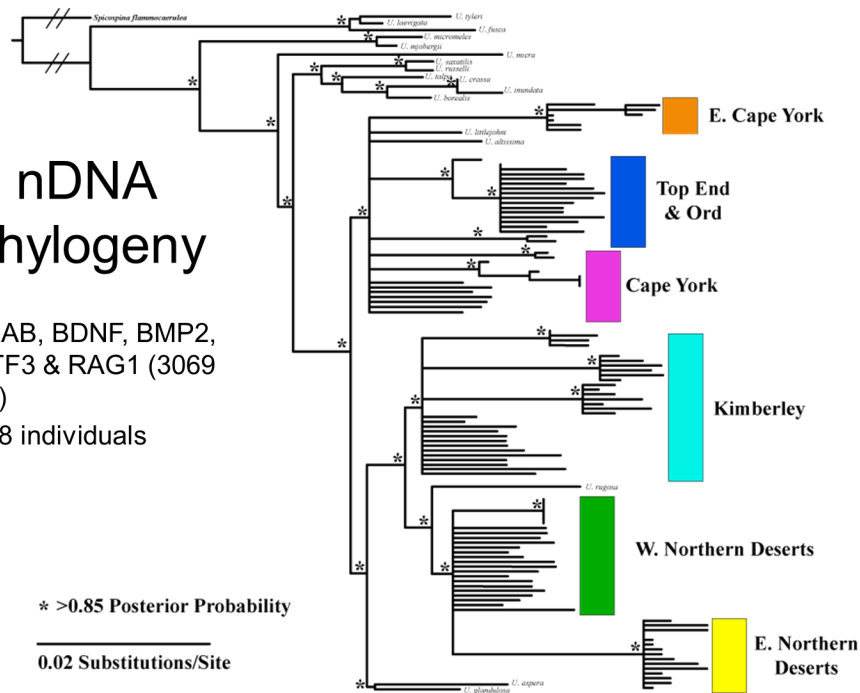
The results of acoustic analysis entirely matched the outcome of nuclear DNA research.

Mitochondrial DNA has obviously been widely spread throughout this genus through hybridization.

- A2AB, BDNF, BMP2, NTF3 & RAG1 (3069 bp)
- 128 individuals

nDNA phylogeny

* >0.85 Posterior Probability
0.02 Substitutions/Site



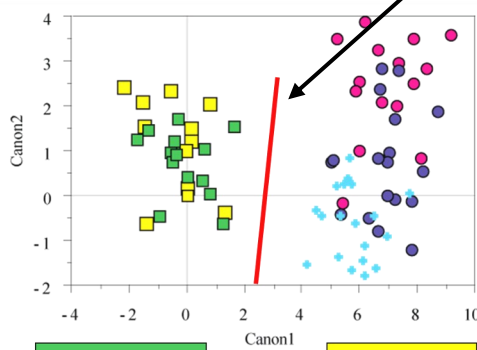
Research Summary

[NB Written by Renee Catullo]

Prior to this research, it was understood that three species of *Uperoleia* were present: *U. russelli*, *U. glandulosa*, and *U. micromeles*. Genetic analyses of samples across the arid zone showed that there were five species actually present – the three above, plus *U. talpa* and another species that was described by me as *U. saxatilis*, or the Pilbara Toadlet. While doing this work, I identified that many *Uperoleia* species have more than one call, and this may be contributing to the taxonomic uncertainty.

East coast *Uperoleia* have been especially hard to tell apart. The genetic work I have conducted found that there were very strong geographic patterns within species. This suggests that a large part of the problem is that people have been working from previous poor identifications, which continually causes confusion. My research has found that *U. fuscus* is limited to the coastal regions north of the Sydney Sandstone, *U. laevigata* lives in the Great Dividing Range, *U. tyleri* and *U. martini* live on the coastal plains to the south of Sydney, and the transition

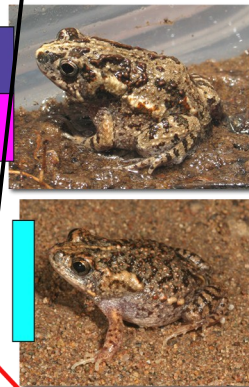
A) Morphology



U. trachyderma W



U. trachyderma E



U. lithomoda TE & CY



U. minima

Northern Monsoonal

Northern Deserts

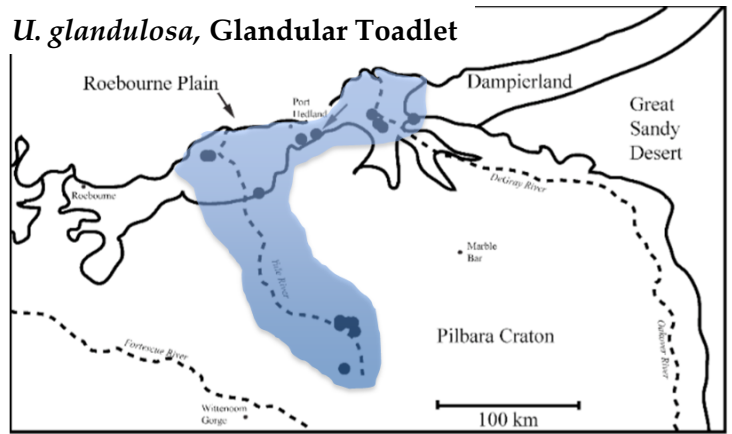
(Sorting out species numbers, *Uperoleia* cont'd...)

between the species is somewhere between Nadgee Nature Reserve and Bournda National Park.

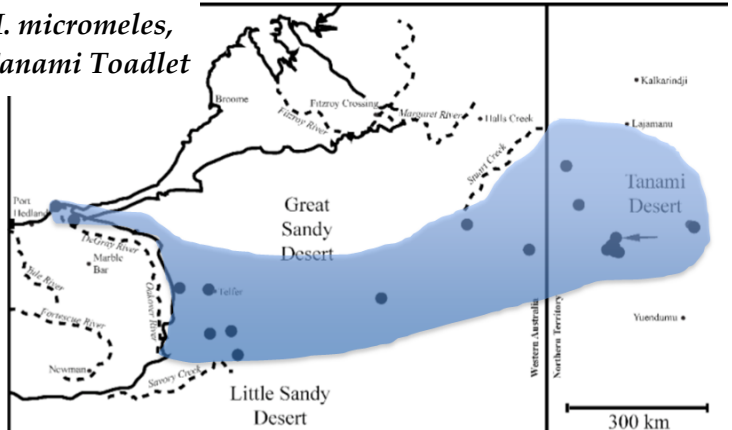
I found large areas where *U. martini* is missing from historic locations, and this species is now being listed as Critically Endangered by Victoria. *Uperoleia* species are suspected to be at risk because they utilize a very different set of habitat than other frogs. Because they are aggressive and territorial, *Uperoleia* do not congregate in large numbers around breeding ponds. Males are more finely distributed through the landscape around the breeding aggregation and defend calling sites from other males. For this reason, species like *U. martini* seem to be missing from any area where there is no longer intact native forest to the edge of the breeding aggregation, even if all other regular congeners are present at the waterbody.

If you spot them, please let me know!

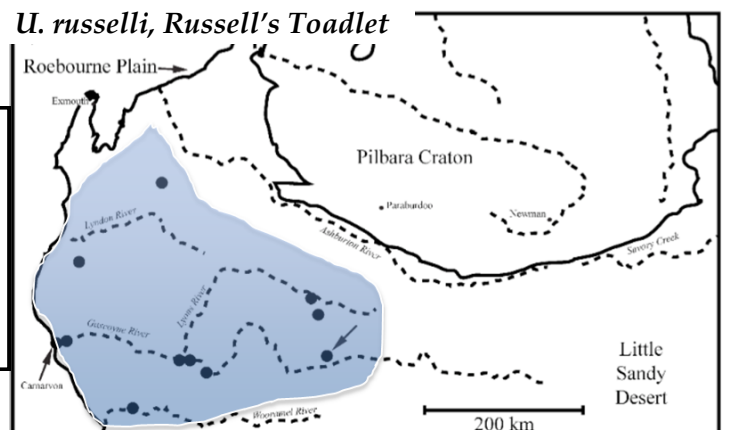
U. glandulosa, Glandular Toadlet



U. micromeles, Tanami Toadlet



U. russelli, Russell's Toadlet



U. russelli

- Massive reduction in known distribution
- Over 70% of records apply to other species
- Only reliably collected 11 times
- River & stream breeder - unusual for *Uperoleia*

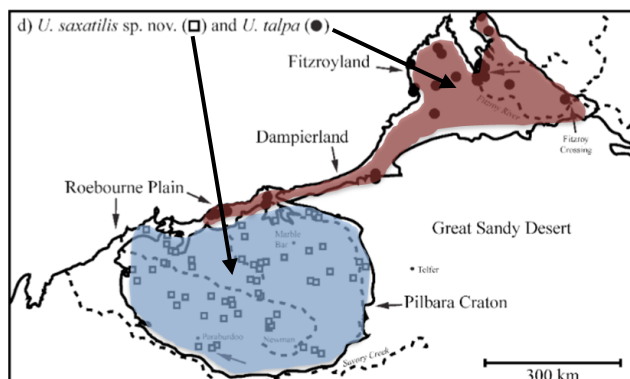
U. talpa, Mole Toadlet

- Much wider distribution than previously believed
- Not included in any environmental assessments of the Pilbara

U. saxatilis, Pilbara Toadlet

- New species that only lives in the Rocky Pilbara
- Lives in rocky gorges, no knowledge of how water flow/quality effect the species.

Previous *U. talpa*:



Catullo, R., Doughty, P., Roberts, J.D., & J.S. Keogh (2011) Molecular phylogeny and taxonomic revision of *Uperoleia* toadlets (Anura: Myobatrachidae) from the western arid zone of Australia, with a description of a new species. *Zootaxa*, 2902; 1-43.



ACTHA MEMBERS GO TO TARONGA WESTERN PLAINS ZOO, DUBBO

By Mandy Conway

ACTHA members were invited to a behind the scenes look at the reptiles which call the Taronga Western Plains Zoo home and a weekend in October '13 was pencilled in. Our group of 12 had a wonderful time, staying overnight at a local caravan park to take advantage of an entry ticket which, once purchased, was valid for two consecutive days. The Taronga Western Plains Zoo is situated on 300 ha and is an open range sanctuary which plays an important role in national and international programs for the conservation of rare and endangered species. Advertised highlights included 'behind the scenes' animal encounters and tours, and a 'Zoofari accommodation experience' which caters for school groups who stay in luxury tents.

Reptiles have been on public display in the past, however they were withdrawn when the keeper retired and are now kept in the Exhibition Centre for education purposes. This coincided with a change in focus for the Zoo towards African species, predominantly the endangered wildlife most people are familiar with.

We entered the Exhibition Centre and were given a tour by Karen, one of the Zoo Keepers who also holds reptiles in high esteem!

Most of the reptiles were happily living in modified Australian icon enclosures: lizards housed in an EH Holden and small enclosures that protruded from a large water tank and equally large wooden log. The reptiles included shingleback and blue-tongued lizards, central bearded dragons, carpet pythons, a small crocodile, as well as some British tortoises (more on that later).



The resident juvenile saltwater crocodile is fed seven crickets each day and a small pinkie mouse every second day. "Crocodiles will generally eat everything they can find in a tank so food is rationed." Karen said. "She was 35cm when she arrived and will reach 55cm in approximately 12 months." The Zoo has an arrangement where the crocodile is traded back to the supplier and a younger one is brought in to replace it. I noticed an interesting looking stocking hanging in the crocodile tank. Karen explained that the stocking contained moss which effectively draws ammonia out of the water.

We were able to see a beautifully coloured corn snake, the result of a confiscation. Karen is also a wildlife rescuer and commonly gets called out to extract snakes from houses, yards and chook pens. In the last five years she has picked up two corn snakes in the immediate area around Dubbo.

All the snakes in the centre are handled by a minimum of trained handlers to avoid stress.



*Right:
A pair of
Coastal
Carpet
Pythons*



(ACTHA goes to Dubbo Zoo, cont'd...)

NSW Parks and Conservation officers are very efficient at detecting, arresting and/or seizing invasive animals, Karen explained. The lead up to a potential seizure is quite an involved process, taking many man hours.

The Centre displays a number of customs confiscated items that appalled our group. A coat made from 16 Cheetah cub pelts, some extremely large snake skins and eggs and skulls from various illegally sourced animals.

The bearded dragon (*below*) which was held in an enclosure at the side of the room was very



animated and excitable; he moved and bobbed his head constantly. He is a captive born individual who is the most active bearded dragon the Zoo has ever had!

Karen then introduced us to another male bearded dragon which was surrendered by a mother who found it under her eight-year-old son's bed. It was being kept in a shoe box. The young boy adequately fed the dragon however didn't take its full care requirements into consideration; it did not have access to any natural light or a heat source. As such it was in very poor condition and was starting to show deformities when Karen received it. "He is the most relaxed dragon ever!" Karen said. "When we have special visitors to the Zoo he is the reptile we bring out. He's met John Cleese, Prince Edward, and quite a few other celebrities."

Weight charts are kept for all the reptiles and adjusted accordingly by the vet if the animals get too fat or are likewise too thin.

Now, back to the little tortoises. We were shown two adorable little Spur-thighed Tortoises, *Testudo graeca*, a Mediterranean species. The Zoo has had the tortoises for three



years. A lady brought them with her from overseas 38 years ago. The pair were donated to the Zoo when the elderly owner couldn't keep them anymore.

Incredibly they are only just coming into breeding age.

"Their favourite foods are mulberry leaves, hibiscus flowers, tomatoes and pumpkin. The tortoises are naturally attracted to anything red in colour." Karen said. She was also lucky enough to once see some eggs deposited and described how one half of the plastron is hinged to allow the large eggs to pass. The clutch of eight eggs was not fertile.

Margaret Ning writes...



An extra bonus following our Education Centre viewing was another offer for us to go behind the scenes, this time in the Galapagos Tortoise enclosure. We watched the regular talk and feeding of one of the giant tortoises

(they eat any greenery from grass to the leaves of trees, if the latter are cut down for them!!!), and then identified ourselves as part of the Herps' group from Canberra.



(ACTHA goes to Dubbo Zoo, cont'd...)

We were invited into the enclosure, shown a couple of additional rooms with more giants, and were then taken to a smaller self-contained enclosure a bit further away but within the same complex. First we were shown some old tortoise eggs and then their pride and joy: a 20cm long, two year old baby Galapagos Tortoise (*right*). It was a rather grand finale!

Many thanks to Dubbo Zoo for the opportunity to see their reptiles up close and personal!!



Research Article

Scott, M., Whiting, M., Webb, J. & Shine, R. (2013) **Chemosensory discrimination of social cues mediates space use in snakes, *Cryptophis nigriscens* (Elapidae).** *Animal Behaviour*, 85: 1493-1500.

Comments

When we think of snakes, most of us think of solitary individuals dotted around the landscape, which come together to mate, but otherwise have little contact. The research I have chosen this month builds on the work of recent studies to suggest snakes may be more socially mediated than previously thought. Specifically, the article examines how scent indicating the presence of other snakes impacts choice of refuge in the small-eyed snake (*Cryptophis nigriscens*).

Scott et al. (2013) found interesting sex-specific responses in their experiments. Males preferred to rest in female-scented refuges than male-scented ones, and chose refuges containing the scent of large females over small females. Females preferred refuges with the scent of conspecifics, both male and female, over scentless refuges. When given the choice of two male-scented refuges, females chose the ones containing the scent of the larger male. These results show the small-eyed snake can chemically discern the sex and body size of conspecifics, and they alter behaviour accordingly.

Interview with Lead Author: Mitchell Scott

Q: How did you become interested in snakes and their communication?

A: Throughout my undergraduate degree I did a lot of volunteering, and many projects involved surveying and identifying reptiles. These animals are interesting to me because they see the world differently to humans: they have a very good sense of smell using their tongue.

Q: What was the most exciting part of your Honours research?

A: Fieldwork is one of the best parts of research. My study species lives within rock crevices, and whilst turning over rocks looking for them you never know what you might find! It's important to remember that my species is a part of a much bigger system. I also enjoyed working on this project from conception to results.

Q: Were any findings unexpected?

A: We didn't expect to find out that males can discriminate between the body size of rival males. Because body size determines contest outcome in this species, we believe that males can use chemical cues to mediate the costs of fighting. This means smaller can avoid getting beaten up by larger males, all in the dark! These results also contribute to our changing view of snakes. Aggregations of snakes are sometimes thought to be caused solely by limited habitat, but we are now discovering that this is not the case for many species.

Q: What are you studying now?

A: I'm working as a Research Assistant in the Moritz Lab, ANU. The projects I am involved in explore the phylogeography (relationships and distributions) of different lizard species in the monsoonal tropics.



Figure 1: The distribution of *Cryptophis nigriscens* in SE Australia, from ALA records.



Figure 2: The small-eyed snake is nocturnal, small (approx. 50cm), and shiny black or slate grey, with inconspicuous eyes.



THE AUSTRALIAN & INTERNATIONAL SCENE

Why cane toads give us small hope for climate change

Author: Ric Shine, Professor in Evolutionary Biology, University of Sydney

Source: The Conversation, 30 July 2013

Cane toads are one of the Australia's most serious invasive species, killing predators such as goannas, quolls and crocodiles in the tropical north. We already know the toads are advancing from Queensland to the Kimberley. New research shows the toads may evolve to spread faster in new environments. But this may be good news for animals who have to move because of climate change.

So, how do we get from toads to climate?

Hopping to it

Most ecological theory starts with the assumption that a population of animals is stable in space: individuals and their offspring live in the same general area year after year. But, the reality is much messier: many populations are not stable. For example, invasive species expand their range as they spread.

As part of a long-term study by my University of Sydney-based "Team Bufo", Greg Brown radio-tracked invasive cane toads as they first arrived at an area near Darwin, and continued to track newly-arriving toads over the next several years. Tom Lindstrom's mathematical analysis of those radio-tracking results revealed a dramatic shift, published in the journal PNAS. The first toads that arrived near Darwin were incredibly mobile, often moving more than one kilometre within a single night – but within a couple of years that rate had more than halved. The super-speediness seen at the invasion front is probably driven by evolutionary forces that come into play only at an expanding range edge, and are not seen in stable populations. Earlier studies of the toad front had revealed these mechanisms, and the current work shows just how spectacular the acceleration can be.



That rapid decrease in mobility after the invasion front passes through means that studies on "normal" cane toads – that is, on animals from long-established populations – would underestimate the potential rate of movement. If we want to predict how quickly a species can expand its range, we need to look right at the expanding range edge.

Unfortunately, that's logistically difficult, so most of our data on animal dispersal rates come from long-established, stable populations. As a result, we may be underestimating potential rates of population spread.

Adapting to a changing world

The problem doesn't just relate to invasive species. Many species shift their ranges for other reasons. Climate change is rendering many areas unsuitable for the animals and plants that currently live there (for example, by becoming too hot or too dry). But at the same

time it is creating those conditions somewhere nearby (in an area that previously may have been too cold or too wet).

If a species caught in this situation is to survive, individuals either must rapidly

adapt to the new conditions, or move to the area that offers suitable conditions. The fast pace of climate change makes both of these options very tough to achieve, but not impossible.

Even in a species where individuals generally do not move about very much or very far, the process of expanding their range into a newly-suitable area will create an evolutionary pressure for faster and faster dispersal. The end result may be that many species will manage to shift their distributions more quickly than we would have guessed from the movement rates we can measure in existing stable populations. And perhaps that provides a glimmer of hope.

Rare frog's range expanded

Source: James Cook University Media Release, 4 October '13, Photos: Dr Conrad Hoskin

In a bold conservation move, one of Australia's rarest frogs has been given a new lease on life following the first successful frog translocation in Queensland's history.



Twenty-two years ago the Armoured Mistfrog (*Litoria lorica*) vanished from the rainforests of Far North Queensland, and was not seen again until rediscovered in 2008 on the Carbine Tablelands of the Wet Tropics World Heritage Area.

Great news but, unfortunately, five years of intensive surveys turned up just one small population in one rainforest stream.

Drs Conrad Hoskin and Robert Puschendorf of James Cook University conducted the surveys.

"No species is safe as a single population when disease or other threats could suddenly wipe out that population, and hence the entire species" Dr Hoskin said.

With translocation the only option for the critically endangered frog, Drs Hoskin and Puschendorf got together a team including representatives from the Department Of Environment and Heritage Protection, the Department of National Parks, Recreation, Sport and Racing, and the Western Yalanji Aboriginal Corporation.

"The potential gains from the translocation are very significant," Dr Hoskin said. "Moving these frogs might seem like a drastic action, and there are risks involved, but the threat to the species if left as a single population is too great.

"It is vital that we protect species from extinction and keep natural ecosystems in the Wet Tropics World Heritage Area intact.

"Having rediscovered this species we don't want to lose it a second time," he said.

On September 3 and 4 this year, 40 Armoured Mistfrogs - 20 males and 20 females - were carefully translocated to a new site about 4km upstream from the single known population. Seventeen of the translocated females carried eggs, which will hopefully be laid at the new site over coming months.

"The translocation was a great success with many of the released frogs visible the second night, sitting by a waterfall. I will visit the site again in about a month to see how they are settling in." Dr Hoskin said.

Survival and breeding success will be monitored for both source and translocated populations over the next five years to ensure that the Armoured Mistfrog is on track and thriving.

"The Wet Tropics has many unique species and a tremendous diversity of life, and we need to keep it that way," Dr Hoskin said.

The project was funded through the Australian Government's National Environmental Research Program Tropical Ecosystems Hub.



HAVE YOU RENEWED YOUR **ACTHA MEMBERSHIP?!**

THIS IS THE **LAST CHANCE** BEFORE BEING **DROPPED FROM THE SYSTEM**

Membership renewal runs from 1 July 2013 to 30 June 2014 and costs **\$10** for a single or family membership. Herpetofauna is an additional **\$12** for two issues.

OR please make your cheque out to ACTHA Inc., fill in your details below and send it to:
ACTHA Membership Officer, PO Box 160, Jamison ACT 2614.

Full Name:

Address:

State/Territory:

Postcode:

Telephone (h):

Telephone (w):

Email:

OR you could make a direct deposit to ACTHA's bank account: St George Bank, BSB 112-908, A/c 040003311
PLEASE! Don't forget to note your name so we can identify whose payment it is on our Bank Statement.

Queries? please call Margaret on 02 6241 4065 (h).



ACTHA News

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