ACTHA contact details
PO Box 160
Jamison ACT 2614
E-mail: info@actha.org.au
Website: **www.actha.org.au**

ACTHA Inc. News
Aug - Sept '15
Newsletter of the ACT Herpetological Association Inc.

AGM to be held at October '15 meeting!

ACT Herpetological Association Inc.
2015 - 2016 Membership Renewal
FINAL REMINDER

Please **renew your $10 membership this month** to ensure you remain a member & are invited to ACTHA's Christmas Party, where you can also join planning for our forthcoming ***Snakes Alive! Exhibition***
Mon 18 to Sun 24 January 2016.
Let's make it the best one ever!

Make a direct deposit into ACTHA's bank account, citing your name:

ACTHA's new bank account details are:
St George Bank, **BSB 112-908 A/c 486822880**

Or follow this link to renew:
http://www.actha.org.au/renew-membership.html

Even better, see you at the next meeting!

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

Tuesday, 18 August 2015

Tim McGrath, Threatened Species Policy, NSW Department of the Environment, has just completed his Masters by research in Applied Science at the University of Canberra. His research focused on the Grassland Earless Dragon, *Tympanocryptis pinguicolla*, in the Monaro region of NSW. Tim will be presenting his findings from four years of turning rocks in search of the dragon, including recommendations for the dragon's conservation in the Monaro region of NSW.

Your Committee for 2014 - 2015

President	Dennis Dyer
Vice President	Ric Longmore
Secretary	Vacant
Treasurer	Margaret Ning
Newsletter Editor	Mandy Conway
Webmaster	Angus Kennedy
Public Officer	**John Wombey ***
Excursion Officer	**Ric Longmore ***
Conservation Officer	Joe McAuliffe
Committee Members	Iris Carter
	Greg Flowers
	Jason Spurr
	Peter Child
	Nicole Hansen
Student Representatives	Vacant

***** *Denotes Life Members*

In this issue

Reptiles and frogs in our neighbourhood

By Geoff Robertson

At April 2015's ACTHA meeting, Aaron Clausen gave a presentation on an ACTHA & Frogwatch '**Reptile and Frog Map**'. It is part of the broader Canberra Nature Map project that is enabling individuals to photograph plants, fungi, birds, reptiles and frogs and submit reports on them. From there species may be mapped.

My comments are restricted to the 'Reptile and Frog Map'. The Map enables ACTHA to meet many long term objectives. It provides a facility for members to record our sightings in the Canberra region. In turn, the Map will build up a comprehensive picture of each species and their location. It provides an excellent conservation tool: informing the public of what species are to be found, where to find them and how to identify them, and how people may participate in their conservation. It also enables advertising of events and conversation opportunities.

To start, type in **http://reptiles.naturemapr.org** which will take you to the site where you can explore a number of options. The image below represents the opening page. Without registering or logging in, you can explore the species, for example, by hitting the 'Species' button.

Alternatively, by registering, you will able to enter your own sightings and to explore the possibilities of the Map in more detail. Reporting your sightings will enable you to build up your own map.

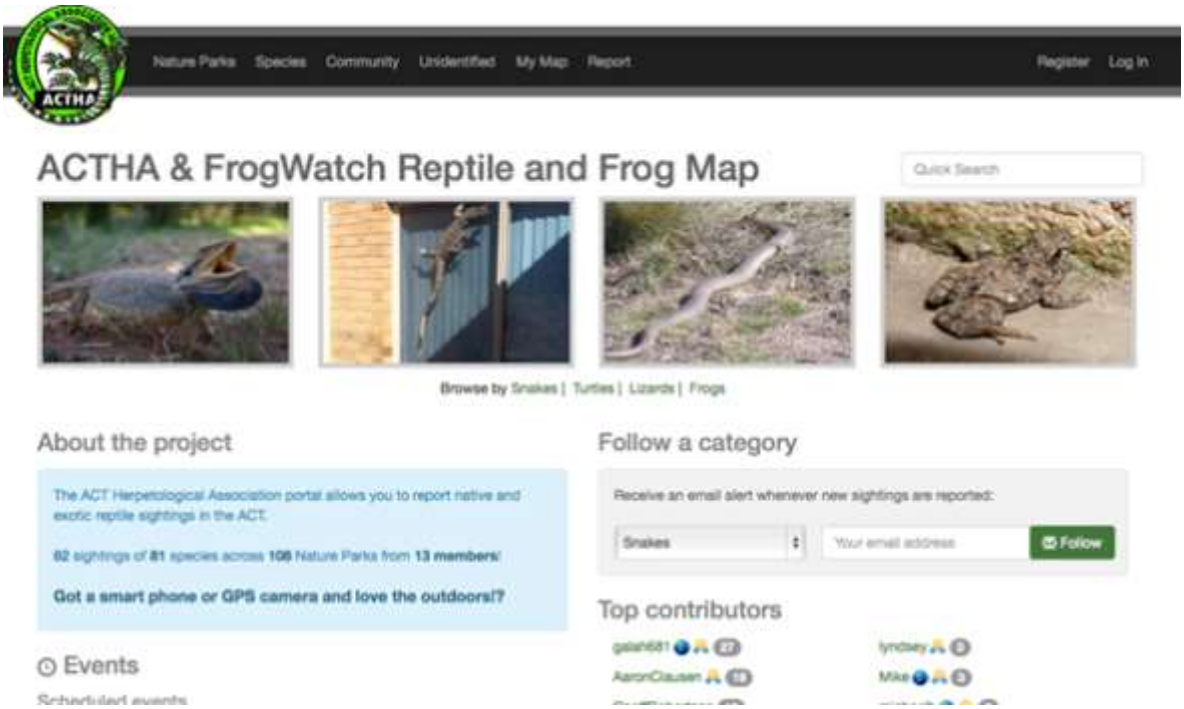
To report a sighting you click on 'Report'. The form is fairly easy to follow. If you know what the species is, or think you do, you can enter the common or scientific name. However, that is not necessary. You need to attach a photo or image which had a GSP locator imbedded in it. This will enable the sighting to be dated and to be mapped. The GPS locator exists in smart phones and many cameras but needs to be switched on. However, if your images are not GPS tagged we can get around this, but you will need to arrange that with me.

Any sighting will be confirmed by Anke Maria (our Frogwatch contact) or me (for reptile sightings). We should be able to verify most sightings easily if the images are of reasonable quality - but we have access to the more expert if required.

You can also look at maps of species. For example, at right is the map showing the distribution of sightings for Rosenberg's goanna.

Aaron has done an amazing job to bring this about. It is a very exciting development. There is a lot more that may be said about the project and about Aaron, but we can talk about that in later issues.

Please have a go and tell your friends. I am looking forwarded to Spring when we expect a flood of sightings.



Snake picnic: life

Canberra artist and ACTHA member Steven Holland was our first guest speaker at the 16 June '15 meeting. He recently completed his PhD research at the ANU School of Art bronze foundry and this presentation concentrated on a sculpture called 'Snake picnic', the focus of Steven's final project. Ed. This article predominantly contains extracts from notes provided by Steven Holland.

"Continuing the Copperhead is the title of this practice-led-research that has evolved over the past four years. It is about bronze casting and snakes and a search to find connections between them. As the research unfolded I developed four projects. These projects investigated a question;

Can the life of elapid snakes from the districts around Canberra be revealed through the material of bronze and the processes of bronze lost wax casting?

This question provided a way of working where I could gain an understanding of local snakes and try to communicate a sense of their life. The question also provided a platform from which I could explore the representation of snakes through bronze sculpture. My study used trans-disciplinary methods bridging the fields of Sculpture and Biology. It acknowledged snakes from a cultural and biological perspective, as being both symbolic and real animals. With an emphasis on the lives of snakes, one of my aims was to facilitate understanding and tolerance of elapid snakes which through fear and ignorance are often misunderstood and needlessly persecuted.

At the Hot Metal Casting Research Facility in ANU's Sculpture Workshop, run by Nick Stranks, my investigation followed an artistic hunch. It followed an intuition that some substances have metaphorical animal properties and that perhaps I could find the essence of a highly evolved reptile lying dormant in an ancient sculptural process.

Bronze lost wax casting is a copper based technology dating back 7000 years. Throughout this history there are many references to bronze Serpents and in 2012 I was able to study key examples of bronze Serpents during a research trip in India, Turkey, Greece and Israel.

***being* was the title of the first project**

It used language as a creative device to articulate the life of Eastern Brown Snakes. It aimed to do this in several ways. Firstly through making bronze Eastern Brown Snake sculptures in the shape of the letters *b* and *e;* to literally communicate a state of their existence. The second approach was to examine in detail the processes of lost wax casting to find out if the non-verbal language of foundry practices could metaphysically reveal the life of snakes. When the project was complete I had created seven pairs of bronze snake sculptures that formed the *snakey* word *be* and during the technical stages of making the sculptures I sensed the life of snakes in three ways; in casting wax and bronze into moulds, through the qualities of wax and in the atmosphere of the bronze foundry during *the pour*.

The snake letter sculptures were shown in two different installations. In 2012 they were displayed at the entrance to the *Snakes Alive!* Exhibition. This occasion provided an opportunity to share the aims of my research with herpetologists, to inform children about living alongside venomous snakes and to speak with audiences about my project. By the end of *Snakes Alive!* my installation was notable for two reactions; the sculptures attracted the attention and created great concern to birds living in the gardens and they were called "fake snakes" by many children visiting the event. These responses alerted me to the visual codes that snakes denote to humans and birds to signal danger.

Another remarkable moment happened when an Eastern Brown Snake living in the gardens was spotted several meters from the installation. The snake could be seen to respond to smells, vibrations and movements of people and animals. The subtle relationship between its light brown colour and the filtered light falling onto the leaf litter was a breathtaking spectacle. I was thrilled to have observed a free ranging

snake close to my 'fake snakes'. The installation helped me to identify issues of representation and display and acted as a locus for people to tell their stories about elapid snakes. In recounting their experiences, snakes became alive in language.

In a subsequent exhibition of *being* that spanned 2013 and 2014 I created an installation out of pages of the local newspaper as an environment for the sculptures in *Gallery 4* at the Canberra Museum and Gallery. The installation was on show over two summer months and was accompanied by several public programme events. It featured a suspended newspaper hanging made from sheets of *The Canberra Times* that were perforated with leaf shaped holes. This was designed to respond to natural and artificial light and provide a literary context for the bronze snake letters.

Red-bellied Blacksnakes were the focus of the second project

Working under the title *Moon over the Murrumbidgee* I developed a poetic and biological interpretation of Red-bellied Blacksnakes that utilized the capacity of bronze to record the snake's appearance. The project was an attempt to make an artistic connection between Red-bellied Blacksnakes, the universe, the moon, and water, and resulted in a series of six bronze sculptures.

Much time, material and energy had led to the moment of casting the snake sculptures in bronze. This day was filled with much expectation and reverence. In the atmosphere of the foundry is a sense that an ancient ritual is being enacted.

In 2013 I entered one of the Red-bellied Blacksnake's sculptures in the *Waterhouse Prize for Natural Science Art* at the South Australian Museum in Adelaide and gave a talk on the sculpture when it was later exhibited at the National Archives in Canberra. To summarize this project I realized that experiments with wax were successful in revealing how the bronze process had an affinity with the biology of local snakes. As an artwork displayed in a gallery however the sculpture's reliance on external appearance alone raised many questions about imitation of nature. In the next project I found ways to address this problem by focusing on the foundry as a context for the snake sculptures. This idea occurred to me when I was studying ancient fragments of equipment and debris excavated from archaeological bronze sites while I was on my research field trip.

In 2012 I conducted research into bronze serpent sculpture, the history of bronze, serpent symbolism and elapid snakes in India, Turkey, Greece and Israel.

Back at the ANU foundry I was able to experiment with foundry procedures and waste products as a metaphor for the hunting behaviour of the Death Adder and the defence strategies of the Tiger Snake. I explored slag scraped from the top of molten bronze, the plaster investment, old crucibles and the foundry sand pit in the works of art.

My final project was called *Snake picnic*

Underlying this was a wish to shift the context of the bronze investigation into an environment where elapid snakes live and to initiate a sculptural interaction with a snake. The still life sculpture consists of an arrangement of bronze picnic items bolted to a bronze picnic blanket. It is placed on the farm where I live in a location where I have seen several Eastern Brown Snakes. The sculpture has been here since late winter. The project is based on the supposition that in

suitable environmental conditions the thermal properties of bronze will attract snakes and a motion sensor camera can record their presence if they ventured onto the blanket. My intention is to *invite a snake to a picnic*.

The bronze objects forming *Snake picnic* were selected for a combination of associations with elapid snakes, Serpents, bronze and picnics and for their potential to accommodate a live snake into the display.

With *Snake picnic* and the motion sensor camera in place, I decided to monitor the sculpture for a trial period to coincide with the change of seasons from late winter to early summer. The camera was initially set to record any movement within its field of view, in a burst of three exposures over five seconds. It also recorded the date, time, moon phases and the ambient temperature.

While it may have been possible for me to attract passing snakes to the sculpture with various smells such as mice and snake pheromones, I decided against this. Without these smells I could test the time of day and temperature alone, to see if the sculpture could attract a snake. During the test period I mostly checked the camera once a week. The first animal that the camera recorded was a magpie. Eighteen days later a Jackie Dragon was photographed sitting on the blanket with its long tapered tail appearing from behind one of the bronze pomegranates. Following this, as the daytime temperatures started to increase and it frequently rained, the grass grew around the blanket. It grew so high that it obscured the sculpture and repeatedly triggered the camera when the wind blew. To remedy this, I cut the grass around the sculpture and adjusted the camera to record a burst of three images over one minute. In October, I began to notice a few more lizards around the area.

Then on 10 November, the motion sensor camera detected an Eastern Brown Snake as it move on and around *Snake picnic (Right: seen along RHS of bronze 'blanket'.*

The photographs first record the snake when it is well into the camera's field of view. They show the snake's size, colour and movement in addition to the date, time, waning gibbous moon phase and the temperature. The pattern on the blanket serves as a reference to measure of the snake and the direction it took. The sequence of photos also shows the pace at which the snake cruised across the sculpture and how it mainly stayed on the brown squares. It appears that the snake followed the same course across the dark chequer pattern in a continuous forward-pouring line, whilst the snake's head determined a different path off the bronze blanket. It went into the grass towards the shadow of the trees, in the direction of the nearby dam and the road.

In a detailed examination of the casting process I found a sculptural affinity with snakes and serpents through mould making, the qualities of wax and the bronze pour. I also found that by engaging with people at exhibitions of my sculptures snakes became symbolically alive through recounting stories. My final project still has the potential to reveal a live snake. The snake's ability to remain concealed however communicates a palpable presence.

Through the material of bronze my sculptures can be seen as a celebration of elapid snakes as beautifully adapted creatures that live amongst us. My research defines bronze Serpent sculpture as a broad discourse and within this field establishes the snakes from around Canberra's as a unique local inflection."

Northern Corroboree Frog breeding and release Program, Tidbinbilla ACT

Our Main Guest Speaker at the 16 June '15 meeting was Dr Murray Evans, Senior Ecologist, TAMS, who gave an update on the Northern Corroboree Frog's chances of survival.
This article written by Mandy Conway, most images provided by Murray.

Corroboree frogs, with their black and yellow stripes, are one of Australia's most distinctive and easily recognisable frogs. With a highly restricted distribution - they are found only in the higher elevation areas of the Australian Alps, including the Brindabella Ranges (ACT) and Snowy Mountains (NSW) - they occur only where there are sphagnum moss bogs, not a common feature in the landscape.

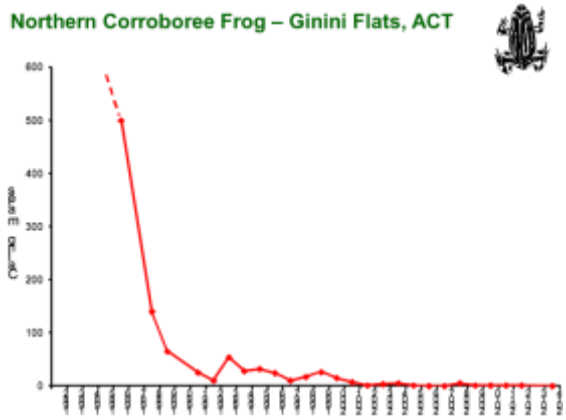
There are two species of Corroboree frog:

- the Northern Corroboree Frog, *Pseudophryne pengilleyi*. occurs in two populations made up of two subpopulations each represented by frogs that are slightly genetically different - 'evolutionary significant units'
  - within the Bogong Mountains/Fiery Range, NSW from Yarrangobilly to Buccleuch State Forest;
  - along the Brindabella Ranges ACT, occupying the area from California Flats to Mt Bimberi. This is the species we have at Tidbinbilla.
- the Southern Corroboree Frog, *Pseudophryne corroboree*, occurs in Kosciuszko National Park, at a higher elevation of between 1300 and 1760m.

Northern Corroboree frogs have been monitored in the Brindabella Ranges since the mid 1980's. Murray explained, "When I arrived back in Canberra in 2001, my colleague at the time asked me to go out and help survey for Corroboree frogs. He explained his methodology, which was to walk along in a line across bogs during the frog's breeding season (summer) whilst calling out 'Hey frog!' at pools of water. There was no way I was going to do that, I thought they were pulling my leg! In the end I thought why not, and bingo, success! We call it the shout response technique. The Corroboree frog call is a difficult one to imitate so fortunately we discovered that males would call in response to a loud noise, like a shout."

Will Osborne has been passionate about this amphibian since completing his Ph.D on the species. When he began monitoring them in 1986, following anecdotal reports of declines in numbers, he recorded their presence at just one site, Ginni Flats, ACT. At the time there was some concern that the frogs were not being seen in bogs as before. Bushwalkers in particular often saw Corroboree frogs in the moss when putting their gas stoves down. When the stove heated up the frogs could be seen walking out from beneath trying to avoid the heat. They were thought to be the most abundant vertebrates in the bog system at that time.

When Murray and his colleagues went up to the Brindabella Ranges to do the first recording of calling males they didn't have to shout 'Hey frog!'. A box was ticked if it was determined there were 500 or more calls. By 1992 (six years later) the Northern Corroboree Frog had almost disappeared from Namadgi National Park. The graph below shows data for the Ginni Flats site, though this trend mirrors the decline across all Corroboree frog sites in the Brindabellas.



Southern Corroboree frogs in NSW were undergoing similar population crashes. The reason for these crashes was a mystery, but Ozone depletion (high UV) or severe drought were initially thought to be the reasons.

The African Clawed Frog, a disease vector

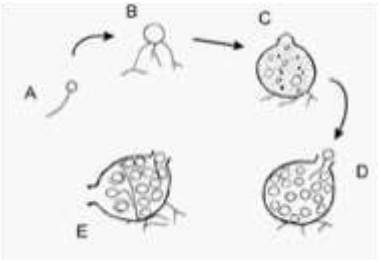
The African Clawed Frog, 12cm in length and weighing around 200g, was used as a pregnancy test kit for humans from the 1930s to the 1950s, becoming the equivalent of the 'lab rat' and exported throughout the world. They weren't just continuously exported out of Africa, the frogs would have been imported into many countries and bred there. Unfortunately, accidental contact with a research facility's native species and subsequent escapes into the wild would have enabled the chytrid fungus to spread through wild native populations, which had no immunity. No one at the time realised that the African Clawed Frog carried the fungus which could easily spread amongst other species, whilst suffering no ill effects from the pathogen itself.

Who thought of injecting an African Clawed Frog to determine pregnancy, the ACTHA audience asked?

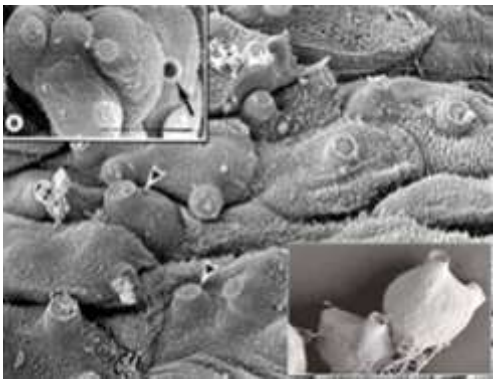
Murray explained he could see how the idea came about. People would have been experimenting with all sorts of reproductive hormones across a wide taxa of mammals; a mouse, an elephant, and every mammal in-between. So when scientists came across this theory they started to look at amphibians. By placing the same hormones into an amphibian scientists learnt that the same processes could be driven. So someone would have thought that alright, some hormones are expressed through urine so what happens if we inject female hormones that cause ovulation into a frog? would it trigger the same response? Who would have thought that a frog would become a testing unit for pregnancy!

The spread of Chytridiomycosis from this 'lab rat' was eventually identified as the cause of amphibian die-offs in Australia in 1998 and is the first emerging disease shown to cause the decline or extinction of many hundreds of species worldwide not otherwise threatened. It is alluded in a recent article that scientists and conservationists are literally running ahead of this wave of extinction and scooping up frogs, placing them into shipping containers which have been turned into breeding facilities. [*NB An article appeared in ACTHA's June-July 2015 newsletter about saving the Panama Golden Frog*]. "In a similar way, back in 2003, eggs of the Corroboree frog were gathered while nests and eggs were still to be found. The population had hit rock bottom, it was not recovering, and if we had not done that we would not have frogs now." Murray said.

Chytrid Fungus, *Batrachochytrium dendrobatidis*



Chytrid fungus starts life as a waterborne spore, which lands on skin that has keratin. The spores set down roots, which grow into a capsule that then produces thousands more of these spores. The image at right shows what it looks like on a frog's skin.



A frog's egg is free of chytrid because the keratin cells have not yet developed, hence the eggs can be brought into the laboratory chytrid free. However the tadpoles have a little keratin present in their mouth scales, and this is where the first free-swimming chytrid spores attach themselves. "And the tadpole can do alright with that, but as soon as it metamorphoses and the rest of its body turns into keratin skin, chytrid fungus just spreads all over it. A classic symptom of tadpoles which have chytrid fungus is that they all metamorphose and then three weeks later they're all dead." Murray said.

Researchers aren't completely sure how the fungus kills the frogs. The two prevailing theories are that the fungus produces lethal toxins or that its presence interferes with the exchange of oxygen and carbon dioxide through the skin.

A native species unaffected by chytrid

The frog pictured here is the Common Eastern Froglet, *Crinia signifera*, and we call it *'the Typhoid Mary of the chytrid fungus world'*.

(Northern Corroboree Frog breeding and release Program, Tidbinbilla ACT, cont'd,...)

Why is the story of Typhoid Mary relevant? Mary Mallon was a 'healthy carrier' of typhoid fever in the United States. She was employed by many families over the years as a cook, and investigations into her employment history showed that typhoid bacillus outbreaks had followed Mary from job to job. Health professionals at the time didn't know typhoid could be carried by someone that showed no symptoms at all but could infect people.

The Common Eastern Froglet carries chytrid fungus in the same way; the froglet is not affected. There are quite a few frogs that are resistant to chytrid however there is a whole suite of frogs that are not. The Common Eastern Froglet is a habitat generalist which occurs from behind the sand dunes of the East Coast of Australia, right up to the top of Kosciusko. It is one of the main vectors of this disease and removing this reservoir host is nigh impossible.

Have any studies determined why this frog survives and yet others don't? "It is a really complicated area." Murray said "They're looking into the genetics, to see why some frogs are resistant and yet others aren't. Frogs secrete something like 100 different peptides in their skin. Not only that, every frog has a whole ecosystem of bacteria and other fungi that can live with the peptides but help fight other fungi. In humans, natural gut flora does the same thing. The behaviour of the frog also plays a role. Some frogs, like green tree frogs, like to bask in the sun for short periods during the day. Chytrid fungus doesn't like warmer temperatures, which is why the first dramatic declines occurred in high altitude frog colonies, affecting the Corroboree frog and the Southern Gastric Brooding Frog, amongst others. The immune system of frogs runs slower in colder temperatures."

Establishing the breeding facility at Tidbinbilla

The frogs needed to be placed in a secure environment. In 2002 the Conservation Planning and Research unit (CPR), of the Environment and Sustainable Development Directorate, ACT Government, established a facility at Tidbinbilla Nature Reserve to house a captive 'insurance' colony of the Northern Corroboree Frog, in case the species became extinct in the wild. The facility comprises of three refrigerated shipping containers placed on concrete slabs, which enabled the frogs to be kept in the cool moist conditions found in their natural habitat.

Above: Chytrid Fungus sweeps through the world's native amphibians.

Disaster

"We got the shipping containers at the end of 2002, we were all ready to collect eggs, and then the unthinkable happened. The January 2003 bushfires came through. This was a really horrible time. I got a call back from the rangers up there, who said the bogs had survived but everything else had burnt. Then, a few days later on Sunday the 18th of January, the fire storm went through and reburnt all the burnt stuff and this time the bogs. A classic extinction scenario. We thought well that's it, we've lost the Corroboree frogs. I thought we would only be reading about them in text books." [The classic extinction scenario initially involves something like disease or fire or drought that drives species numbers down to a few isolated populations, and then a further catastrophe blips out any remaining animals.]

On average, 70 to 90% of these pristine and fragile sphagnum moss ecosystems burnt.

But some areas had survived!

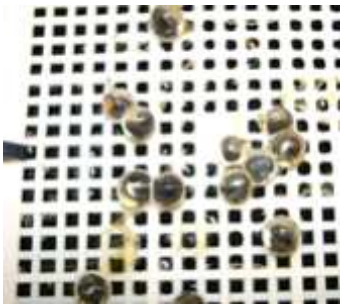
Corroboree frogs lay their eggs, around 25 per year, out of water, terrestrially, near the edge of pools. The tadpoles develop inside these eggs and then wait for the water levels to rise. Once the eggs are swamped the

tadpoles, now at an advanced stage, wriggle into the water. "What's amazing is that you open up a nest and there are these massive eggs, in a clump about the size of a golf ball. The female is much smaller, and lays about a third of her body weight in eggs as a concentrated jelly. Then, over the course of perhaps a few days, the eggs absorb water from their environment, swelling to many times their size."

"Once we were given access, we collected some 300 eggs from those few remaining nests in the Mt Ginni area, although only about 1/3 of eggs were taken to minimise further impact on a population that could hopefully continue when the sphagnum bogs recovered. These eggs established the captive population at Tidbinbilla. Each year we returned to collect more eggs until 2007, when no more nests could be found. Luckily we had that window of opportunity where we could get up there and collect enough eggs for a broad genetic base. You can't expect a species to survive from only six animals. Then came the huge job of working out how to hatch and raise them, not having done this before."

When populations of the Southern Corroboree Frog crashed, efforts were made to breed the species in zoos and other research institutions: success eluded ecologists. The first successful captive breeding of a Corroboree frog occurred at Tidbinbilla, in 2008, when those first eggs had developed into mature frogs of breeding age (at 5 years). CPR ecologists had managed to re-created the right conditions to stimulate breeding.

Above: Wild collected eggs being prepared for hatching at Tidbinbilla.



Breeding northern Corroboree frogs

The eggs are placed on floating trays, poking roughly half out of the water - they could drown if placed fully into water. Once the tadpoles hatch they wriggle down through the mesh. Murray commented that they pretty much look like the non-descript tadpole of *Crinia signifera*, which is very annoying when you are trying to find them in the field!

The tadpoles are raised in small containers (A), before being moved into terrariums, (B).

A

B

"Corroboree frogs in the wild can live for nine years." Murray said. "We still have frogs which were collected in 2003." There are currently around 1000 Corroboree frogs in the captive population. Sadly, in Namadgi National Park, there are estimated to be less than 20 individuals remaining from the original populations.

A captive-bred Northern Corroboree Frog (above). The ACT species tends to be greener, having genetic differences to its close cousin (right).

Above: Eggs bred in captivity.

The good news for Corroboree frogs is that their habitat has recovered well, unlike a lot of other critically endangered species who have lost their habitat and will probably only ever be seen in a zoo. Ginni Flats is recovering, *below & right.*

In 2011 the first captive-bred northern Corroboree frogs were released back to the wild: 200 juvenile frogs, at 1 year of age, were released to two sites. "The aim is to re-establish breeding aggregations and allow development of natural resistance to chytrid fungus – which has apparently occurred in at least 2 other Australian frog species that persisted in the wild at low numbers, but whose populations have subsequently recovered." Murray said. Around a further 200 frogs have been released each year since, with approximately 600 frogs released in 2014.

"The frogs take 4 years to reach breeding age, which is when it is possible to count calls. Whether any of the frogs released in 2011 survived to breeding age was not known until 2015, when at least 9 males were found to have survived from the original 100 males released (with 100 females). Whilst this is a small number, it is significant because we've not heard this number calling at the release sites for a decade, and they have survived 4 years in the environment with chytrid fungus. Over the next few years more released frogs will reach breeding age and hopefully will establish breeding aggregations. Whether we can re-establish frogs back in the wild will not be known for some years, but the survival of these few frogs is a significant first step in that direction."

All of the frogs in the colony and the frogs released to the wild have had their belly patterns photographed, which has enabled individual identification; belly patterns are much like a fingerprint, (*left*).

What's next?

The next major step in the captive breeding program is to explore more economical ways to produce larger numbers of frogs for release, and to breed and raise Corroboree frogs under more natural conditions. To achieve this goal, outdoor ring tanks appear to have promise and will be trialled in 2015/16. The tanks are designed to enclose Corroboree frogs in a natural habitat whilst excluding other chytrid carrying frogs.

If one of these enclosures becomes contaminated, by say a Peron's Tree Frog, then it is cleaned out, sterilised and the process is started again. Five of these ring tanks will be installed at Tidbinbilla, with mesh tops to prevent other frog species entering. Pools will be included so that eggs can be put in there to allow tadpoles to metamorphose. The one year old frogs will then be collected and dispersed into the wild.

"We've just done a ten year review of our Corroboree frog breeding program and although progress has been made, the process is long-term, perhaps another 10-20 years?. Government funding for the shipping containers can't be relied on forever and low tech and budget ways to raise the frogs must be found."

A good question was asked at the conclusion of *Murray's presentation:*

"What kind of natural predators would the Corroboree frogs have?" asked a young member. "Very few, in fact we don't know of any." Murray replied. "That is because they have toxins on their skin, which shows similarities to the toxins on the skin of poison dart frogs in South America - similar sort of family of compounds. We think that they may not be toxic but just taste bad. A friend of mine has lizards to whom he feeds flies and one day he thought he would rub the fly on the back of a Corroboree frog and see what happens. The lizard took the fly but then promptly spat it out!"

The Australian & International Scene

ACT GOVERNMENT WELCOMES $625,000 BOOST TO PROTECT NATIVE SPECIES

Media release, 16 July '15

The ACT Government has today welcomed the Federal Government's announcement to contribute almost $625,000 to help protect threatened species in the ACT.

Minister for the Environment Simon Corbell welcomed the funding, which would be used for further preservation of the Mulligans Flat Woodland Sanctuary, as well as specialised habitats for the endangered Northern Corroboree Frog.

"This contribution will support a number of ACT Government initiatives to halt the decline of threatened habitats and species," Mr Corbell said.

"The ACT is a nationally significant region for biodiversity with some of the largest and most diverse remnants of yellow box, red gum grassy woodland and natural temperate grassland in Australia. These ecosystems provide habitat for many rare and threatened species so it is extremely important we protect them.

"This contribution from the Australian Government will go a long way toward protecting the environment in the ACT. Our success depends on strong partnerships, not just between governments, but institutions such as the Woodland and Wetlands Trust who have been very active in fundraising for endangered box gum woodlands in the ACT."

Minister for Territory and Municipal Services Shane Rattenbury said that the contributions from the Australian Government would support three important environmental projects in the ACT.

"The Australian Government will contribute $600,000 to improve and expand the Mulligans Flat Woodland Sanctuary that provides a predator-free environment for threatened species including the eastern Bettong and the New Holland mouse. Expanding the sanctuary is vital in protecting these species," Mr Rattenbury said.

"This will add to the $900,000 contribution from the ACT Government from the 2015/16 budget and is another welcome boost to the Bettong Bungalow campaign launched last month to raise funds for the expansion of the Mulligans Flat Sanctuary.

"A small proportion of the funds will also be used to support the restoration of ACT natural temperate grassland sites. The ACT Government is already conducting an extensive program of work to support threatened grassland species, including the grassland earless dragon, the striped legless lizard, the golden sun moth and a number of threatened plant species."

A $20,000 contribution will also be provided to help fund northern corroboree frog enclosures. The five specialised amphibian enclosures will protect critically endangered northern corroboree frogs at Tidbinbilla Nature Reserve to help re-establish wild breeding populations.

How scientists brought an extinct frog back to life: extinction might not be forever

By Fiona Macdonald, ScienceAlert, 14 July '15

We all know by now that, sadly, a J*urassic Park*-like dinosaur restoration is pretty unlikely. But, in 2013, Australian scientists did manage to bring an extinct species of frog back to life - albeit temporarily. And now they're hoping to do so more permanently in the future, as the latest episode of the University of New South Wales' (UNSW) 'Catastrophic Science' explains.

So what's so special about the amphibian? The Gastric Brooding Frog was first discovered in the 1970s, when scientists realised it had a pretty fascinating reproductive strategy. Instead of letting its offspring develop in the water, the species swallows its fertilised eggs or newly hatched tadpoles, and turns its stomach into a uterus where they develop until they're fully formed frogs. When they're ready to leave the womb, the gastric brooding frog will projectile vomit its offspring out into the world. Yep, projectile vomits.

As gross as that sounds, the strategy got scientists pretty excited about all the incredible things they could learn from the species, such as new fertility strategies and treatments for stomach conditions such as ulcers.

But by the early 1980s, the gastric brooding frog was driven to extinction by an introduced species of fungus, and the work was lost. Now an international team involving UNSW scientists is hoping to reverse that.

How exactly do you bring an animal back from the dead? As the video explains, it involves a process known as somatic cell nuclear transfer, which is where the DNA-containing nucleus of a cell is extracted from frozen remains of an extinct species, and then inserted into an egg cell from a living frog that's had its own DNA removed.

This newly fertilised cell then starts to develop into a tadpole of the extinct species. It's the same process that scientists used to clone Dolly the sheep, although it's a little harder with an extinct animal, because you're using an egg from a different species. As a result, the team so far has only been able to keep a gastric brooding frog embryo alive for three days. But they're getting closer than ever to bringing it back for good.

Climate change is turning male dragon lizards into females

By Claudia Doman, University of Canberra, Science News, 4 July '15

Above: Distinguished Professor Arthur Georges and Dr Clare Holleley hold two bearded dragons inside their lab at UC's Institute of Applied Ecology. Credit: Michelle McAulay

A climate-induced change of male dragons into females occurring in the wild has been confirmed for the first time, according to University of Canberra research recently published on the cover of international journal *Nature*.

The researchers, who have long studied Australia's bearded dragon lizards, have been able to show that a reptile's sex determination process can switch rapidly from one determined by chromosomes to one determined by temperature.

Lead author Dr Clare Holleley, a postdoctoral research fellow at the University of Canberra's Institute for Applied Ecology, explained: "We had previously been able to demonstrate in the lab that when exposed to extreme temperatures, genetically male dragons turned into females."

"Now we have shown that these sex reversed individuals are fertile and that this is a natural occurring phenomenon."

Using field data from 131 adult lizards and controlled breeding experiments, Dr Holleley and colleagues conducted molecular analyses which showed that some warmer lizards had male chromosomes but were actually female.

"By breeding the sex reversed females with normal males, we could establish new breeding lines in which temperature alone determined sex. In doing so, we discovered that these lizards could trigger a rapid transition from a genetically-dependent system to a temperature-dependent system," she said.

"We also found that sex-reversed mothers -- females who are genetic males -- laid more eggs than normal mothers," Dr Holleley said. "So in a way, one could actually argue that dad lizards make better mums."

University of Canberra Distinguished Professor Arthur Georges, senior author of the paper, also highlighted the importance that these discoveries have in the broader context of sex determination evolution.

"The mechanisms that determine sex have a profound impact on the evolution and persistence of all sexually reproducing species," Professor Georges said.

"The more we learn about them, the better-equipped we'll be to predict evolutionary responses to climate change and the impact this can have on biodiversity globally."

Boa constrictor found in Vic building,

7 News, 19 May '15

Authorities are investigating how a boa constrictor has ended up in a disused building in Melbourne

The Boa, more than two metres long, is believed to have been dumped in the Seaford building before she was picked up by a snake catcher.

The Department of Environment, Land, Water and Planning, will humanely euthanase the Boa, to prevent disease, after an investigation into how the snake got there.

"Boa constrictors are native to central and South America and large penalties apply in Victoria to anyone breeding, trading or keeping illegal non -native species", DELWP spokesman Glenn Sharp said. "Boa constrictors are among the top five high risk invasive animals commonly found in the State. They carry a virus called Inclusion Body Disease which is fatal to native Australian pythons."

Little Whip Snake, *Suta flagellum*, seen during a planned burn

at Turallo Nature Reserve near Bungendore, in the Southern Tablelands. On 24 June 2015, Rainer Rehwinkel (below) was looking at the results of a planned burn in a grassland reserve and saw the little snake. There is an interesting story here about grassland management by burning and threatened fauna. This is one of a very few sites that little whip snakes exist.

Last minute entry!

What's the difference between poisonous and venomous animals?

By Helen Thompson, Smithsonian.com, 6 August 2015

Left: Corythomantis greeingi frogs carry potent venom in their pouts. Image: Carlos Jared.

The first known venomous frogs, discovered in Brazil, raise some basic questions about toxic biology.

Amid an arid forest of cacti, *Corythomantis greeningi* frogs look pretty harmless. In contrast to the bright cautionary colours of poison dart frogs, these tree frogs sport drab brown and green hues. So when Carlos Jared of Brazil's Butantan Institute ventured out to collect and study them, he didn't think they posed much of a threat—until he felt pain in his palm.

"It took me a long time to realize that the pain had a relationship with the intense and careless collection of these animals hitting the palm of my hands," recalls Jared. The biologist fell prey to a totally unique defense mechanism: the helmet-headed frogs use spikes along their lips to inject potent chemicals, giving aggressors a mix between a head butt and a toxic smooch. After careful study, Jared and his team found that *C. greeningi* and a related species of hylid frog, *Aparasphenodon brunoi,* are the only venomous frogs known to science.

"This is very, very cool. Unprecedented would actually be an understatement," says Bryan Fry, a molecular biologist at the University of Queensland who was not affiliated with the study. But if we already knew frogs could be poisonous, why is this discovery such a big deal? The answer lies in the often-misunderstood difference between poison and venom.

Some people use the words interchangeably because once in the body, the chemicals do similar damage, attacking the heart, brain or other vital targets. But the terms do mean very different things. Traditionally, **venomous creatures** bite, sting or stab you to do their damage, while you have bite or touch poisonous critters to feel their effects. That means venomous organisms need a way in, like fangs or teeth. All octopuses are venomous, along with some squid, plenty of snakes, spiders, scorpions, and a few lizards Some fish, including lionfish, use spines to sting attackers with venom. The Brazilian frogs aren't even the only venomous amphibians. When attacked, Iberian ribbed newts push out their own ribs so that spikes on the ends jab a predator with toxin.

Poisonous organisms take a more passive approach, often lining the skin or other surfaces with toxic chemicals.

(What's the difference between poisonous and venomous animals? cont'd,...)

Poisons can either be brewed from scratch inside the animal or acquired through diet. Cane toads naturally secrete poison they make in glands behind their ears. Meanwhile, poison dart frogs generate a highly poisonous alkaloid skin coating they derive from munching on ants. Mama frogs pass the chemical on to tadpoles via egg sacs, so if you take a young poison dart frog out of its natural habitat, it will actually lose toxicity.

Having to digest unsavoury foods to survive may be what drove some organisms to evolve poisons, which are primarily used to defend against predators. "If this provided some protection against predation, you can see how this could favour the evolution of systems to actually concentrate the toxins in the skin rather than dispose of them," explains Kyle Summers, an evolutionary biologist at East Carolina University.

By contrast, venoms evolved for defense, offense—or both. Some organisms even use venom in mating. The male platypus shoots his toxin out of tiny, prickly foot barbs to paralyze rival suitors.

In the case of the venomous frogs, both species were discovered in the 1800s, but they had hopped under the radar until now because no one had previously taken an in-depth look at their biology.

"Even the most recent book on Brazilian frogs lists them as nontoxic," says study co-author Edmund Brodie, a biologist at Utah State University. So after Jared's incident in the field, he wanted to figure out what kind of toxic wizardry might be at play. The researchers carefully collected wild *C. greeningi* and *A. brunoi* for lab tests. They found that both frogs secrete a sticky white concoction of compounds that contains some of the same characteristics as venom.

The team then saw that glands supply the toxin to spikes in the frogs' skin. When the frogs flex their helmet heads up and down or side-to-side, the spikes jab the skin of unsuspecting predators (or scientists) like biological syringes, injecting small doses of the toxin into the bloodstream, Jared and his colleagues report today in *Current Biology*. Modern hylid frogs have no known predators. However, somewhere down the line it must have given them an advantage over something trying to eat them. Alternatively, like the male platypus, the frogs could be using their venom to take out mating competition.

Because the toxins get delivered in different ways, venoms tend to be larger compounds that must be injected to break through skin, while poisons are usually smaller chemicals that can be absorbed. So is one type of toxin fundamentally more potent than the other?

Golden poison arrow frogs can kill a human with as little as two micrograms of their alkaloid skin goo. Meanwhile, a single drop of inland taipan snake venom can kill 100 people. Compared to the Brazilian pitviper, *C. greeningi* is two times as lethal and *A. brunoi* is 25 times as lethal. Roughly one gram of *A. brunoi*'s venom could kill 300,000 mice or 80 humans. That said, the hylid frogs probably produce and deliver their venom in much smaller doses.

"The toxicity of both poisons and venoms varies dramatically across species in nature," says Summers, so it's impossible to say that one type of chemical weapon is fundamentally more dangerous. The main takeaway is that both venom and poison can kill you in truly horrifying and painful ways. Field biologists, beware.

ACTHA 2015 - 2016 Membership Renewal - FINAL REMINDER

Membership renewal runs from 1 July 2015 to 30 June 2016 and costs **$10** for a single or family membership.

'Herpetofauna' is an additional **$12.**

Payment at our August meeting would be appreciated.

OR Please use the forms on our website **www.actha.org.au** to renew:

http://www.actha.org.au/renew-membership.html

OR you could make a direct Deposit to ACTHA's bank account:

St George Bank, BSB 112-908, A/c 486822880 *(**Note - new account number**)*

(*PLEASE! Don't forget to note your name so we can identify whose payment it is on our Bank Statement.)*

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ACTHA News
PO Box 160
Jamison ACT 2614