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ACTHA INC. NEWS
OCT-NOV 2012
Newsletter of the ACT Herpetological Association Inc.

ACT HERPETOLOGICAL ASSOC. INC. PRESENTS ITS ANNUAL GENERAL MEETING ON TUESDAY, 26 OCT '12

WHAT'S NEW? WHAT'S HAPPENING? BE THERE AT 7.30PM SHARP & FIND OUT. YOU'LL BE IMPRESSED!!

YOUR COMMITTEE FOR 2011 - 2012

President	Dennis Dyer
Vice President	Ric Longmore
Secretary	Vacant/Angus Kennedy
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
	Peter Child
Student Representative	Angelique Harrison
	Sophie Sloane

* *Denotes Life Members*

IN THIS ISSUE

DIARY DATE

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

***Belconnen Soccer Club,* Hawker**

(cnr Belconnen Way & Springvale Drive)

UPCOMING MEETING

Tuesday, 16 October 2012

It's our **AGM** and we would like to see as many of our members as possible for a good get-together, as well as hear

David Hunter talk on mitigating the impact of the **amphibian chytrid fungus** which is devastating frog populations worldwide. Come along to your special interest group's meeting and support it whole-heartedly!

As alluded to above, this month our guest speaker is **David Hunter**. The decline of frogs around the world as a result of the amphibian chytrid fungus is considered the most devastating impact on biodiversity from a pathogen in modern times. David Hunter, in conjunction with many collaborators, has been investigating potential management options for mitigating the impact of this pathogen. Dave will provide an overview of this work, and discuss the future of many of our unique frog species like the Southern Corroboree Frog.

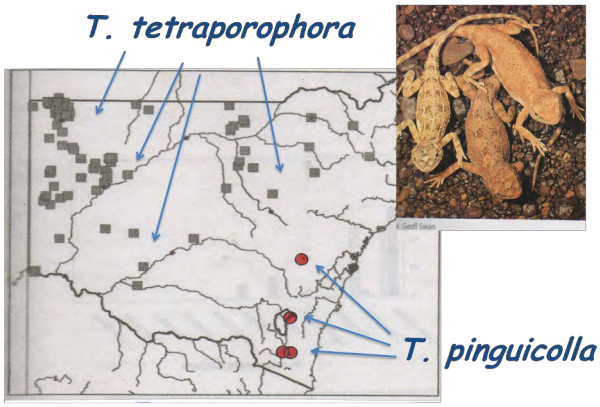
Conservation of threatened Grassland reptiles in the face of urban expansion:
Case Studies from the ACT Part 2, The Grassland Earless Dragon

Will Osborne's talk to ACTHA members at its February 2012 meeting concentrated on the conservation of the Pink-Tailed Worm-lizard, Aprasia parapulchella, and the Striped Legless Lizard, Delma impar, which included an assessment of their natural habitat (pls see June—July '12 newsletter). Will's second talk, given to members at the April 2012 meeting, concentrated on the region's endangered Grassland Earless Dragon, Tympanocryptis pinguicolla, and focussed on the dragon's general field biology and on conservation issues.

This summary by Mandy Conway, with invaluable editing by Will Osborne.

Male ***Female***

Earless dragons, shown in the image above, were first described by Mitchell in the 1920s as the sub-species *T. lineata pinguicolla*. This sub-species was elevated to a full species in a paper prepared by Warwick Smith, Paul Cooper, Will Osborne, and Steve Donnellan and in 1999. The species was rediscovered by Will on the Poplars property near Queanbeyan. The two specimens pictured were the first two individuals 'rediscovered' and sadly ended up in the Australian National Wildlife Collection at CSIRO – however it was critical that the specimens were lodged at the Museum to provide reference material that could be checked by other experts. Will, with his Parks Service colleague Kruno Kukolic embarked on a series of surveys for the species in the ACT and managed to find additional populations in the Jerrabomberra Valley and near the Canberra Airport, on Defence Land (Majura).



Known range in NSW

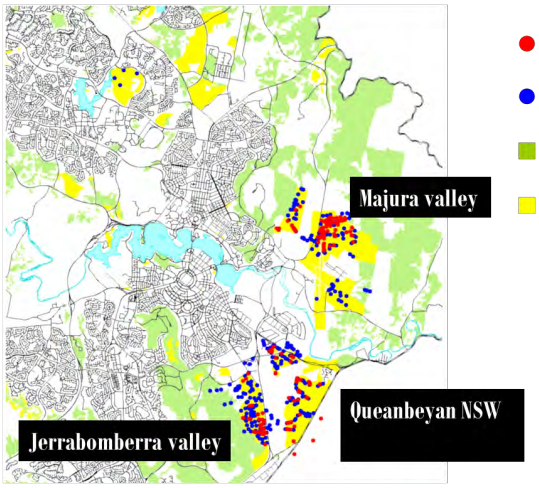
Where are these species and who is the nearest relative of the GED?

The Grassland Earless Dragon's (GED) nearest geographic relative in nearby NSW is *Tympanocryptis* (meaning hidden ear) *tetraporophora* (having four pores just behind the cloaca) as opposed to the Eastern Lined Earless Dragon which only has two pores.
T. l. pinguicolla (meaning thick neck!) is now found only in the ACT region and near Cooma, and is therefore quite a restricted species. It is thought to be extinct in Victoria, and there are also two records of the species from Bathurst, although the record is twenty years old and no more individuals have been found. Will examined one of the Bathurst specimens and has a photograph of it. No more have been seen since this time.

When Will first moved to Canberra in 1977 several herpetologists who grew up in Canberra (Jenkins, Longmore, Wombey and Young) had spoken about the existence of the Grassland Earless Dragon (GED) in Canberra. However the species had not been seen for about 30 years so Will was delighted when he came across his first specimen on the Poplars property near Queanbeyan. After flipping over a stone that had a tightly curled up dragon under it, he momentarily thought he was seeing a baby bearded dragon, but gestalt set in rapidly and in a split second he realised it must be an earless dragon. The species had been rediscovered in the ACT and a few years later was confirmed (again by Will and Peter Ormay) to still occur near Cooma. Tim McGrath (UC) previously spoke to the Association about his recent research on this species.

Current distribution and abundance in the ACT

The GED is considered to be one of the most threatened species in Australia. Endangered in the ACT and NSW, and thought to be extinct in Victoria, it is a species affected by gross range contraction and habitat loss (over 95% of the suitable grassland habitat has been lost – with the largest remaining areas being in the Monaro). The dragon has the strongest government (legislative) protection in place, however on-ground protection is very difficult to achieve.



Source: Institute of Applied Ecology, University of Canberra

Captures this summer 2012:

<10 at Jerrabomberra

<5 at Majura

The current distribution and abundance of the GED is shown in the slide above (*top*). Red dots are sites where GED were found and blue dots represent areas that were diligently surveyed by the ACT Government, and no specimens were found. All populations in the ACT have collapsed to very low numbers in the past few years – thought to be the cumulative effects of the recent drought. Wendy Dimond has described this in detail in her earlier talk to the Association.

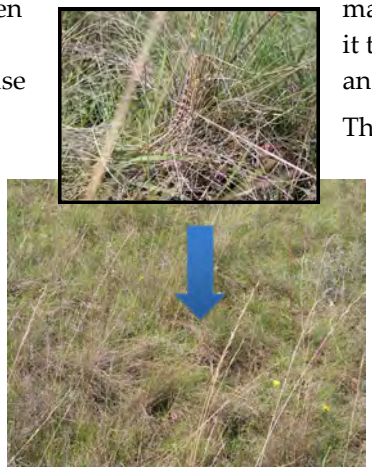
Will commented that there is only about 0.2% of the original grassland community left in Australia, with an estimated 5% left in the ACT. The fact that we still have native grasslands in the ACT that are suited to the GED is a result of a series of chance events – but particularly the fact that the paddocks were never or rarely ploughed, were not 'improved' by planting exotic pasture grasses and clovers, and were not overgrazed by livestock.. On the former 'Woden' property leased by Charles Campbell there were an estimated 1,000 GED as recently as 2006 when Wendy Dimond undertook mark -release-recapture surveys. Mr Campbell was keen to say that the paddock had never been ploughed in the 140 years his family had been there and that there had only ever been one application of superphosphate in the 1950s – this apparently was because the paddock was used for producing superfine Merino wool.

Field biology of the Grassland Earless Dragon

This dragon is incredibly cryptic, making field studies by researchers a difficult exercise not made any easier by current low population numbers, although a wild animal that initially scuttled off when approached by Will didn't seem too perturbed when quietly approached for a camera session.

The male was in good breeding condition, with bright orange colouration up on the throat and down each side to the abdomen. Will has observed a GED climb a grass tussock to the very top and sit amongst the seed-heads, where the lizards bright markings might be more visible, and then the dragon would nod its head before quickly retreating back to the ground. A signal perhaps? A good behavioural study project could potentially solve this riddle.

Hatchlings appear in mid-January. The young are so small they can curl up on a human thumb nail. By April they are sub adults and, following winter spent in a burrow, they rapidly attain adult size and breeding condition. Very few males and females appear to make it through to a second year of life: an exceptionally short life!



The habitat of the GED consists mainly of native grass species, particularly wallaby grasses, *Austrodanthonia* spp, and spear grasses, *Austrostipa*. Saffron thistle was widespread in the grasslands in 2011 and this year fleabane has taken over much of the landscape.

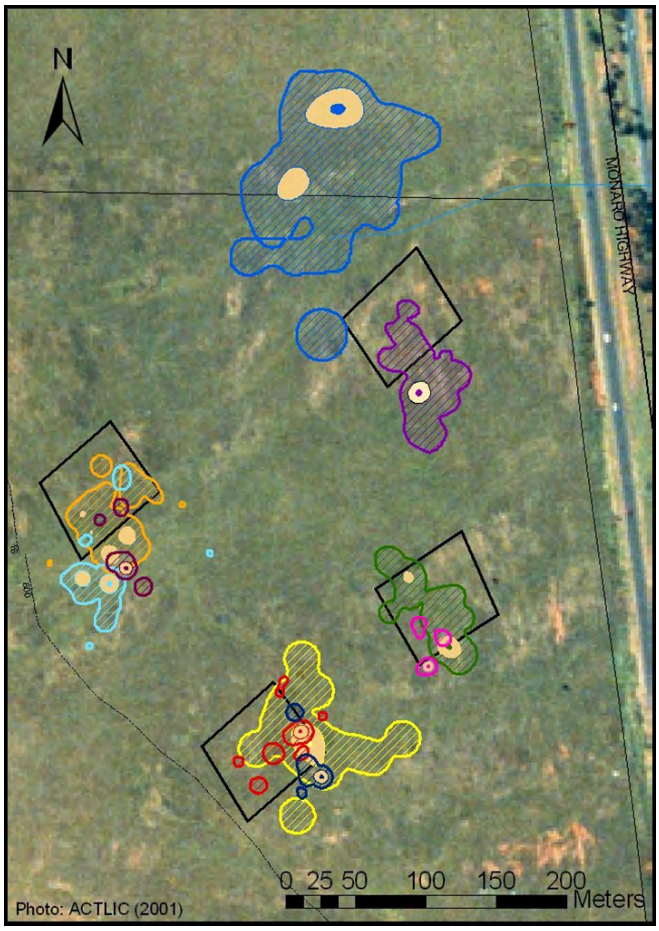
(Conservation of threatened grassland reptiles, cont'd...)

African Lovegrass is also present. Will made the point that unless grassland management personnel and weeds contractors can confidently identify and eradicate invasive weeds then the preservation of what is left of GED habitat is going to be extremely difficult. (Example: a weed sprayer targeting kangaroo grass in the Jerrabomberra Grassland reserve and thinking that it was African Love Grass is a worry...) Involvement by knowledgeable groups like Friends of Grasslands will assist Government management of threatened species habitat.

It took some time for researchers to find that the GED readily uses artificial burrows. Their somewhat weak limbs are not suited to burrowing; their long fingers with delicate looking claws are more adapted to climbing than digging.

The image above shows a tube system which enables the dragon to easily come and go. This artificial burrow was originally covered, which made checking hundreds of them tedious and time consuming. More recently the burrows have been left uncovered for ease of checking by torch light or mirror (*left*).

Adults have been found to breed only once in their very short one year life, with a clutch size of four to seven. This reduces their capacity to bounce back easily from population declines. A catastrophic event that persists for more than two summers could easily remove the entire breeding population. Maintaining any remaining specimens within their habitat is very important if the species is to persist in that area.



Tracking with fluorescent powders

A fine fluorescent powder was applied to the underside of specimens and Will and his students would return at night to search for the route the lizard followed by using a UV light to light up the powder. Crawling around on hands and knees to follow the very small flecks over a 30m area was exhausting, but it was the only way as radio transmitters were unsuitable at the time.

Results: Each individual tracked appeared to behave quite differently. Some moved through both open and more dense patches, but overall the preference seemed to be for the more open or slightly open grassland areas.

Radio tracking was undertaken in a later study by Toni Stevens and revealed that home ranges centred on one or two naturally occurring arthropod burrows (used as shelter by the lizards) and were no more than 100m across. More recently radio transmitters were attached to GED to track the lizard's movements. During the drought, when the grass tussocks were in a somewhat collapsed condition, GED moved through most parts of the study area, not spending more time in any particular part. Since the removal of livestock and fencing out of kangaroos at some sites, the grass has

become taller and denser. How is the GED coping in these thick rank grasslands? There is a great concern now that it is becoming difficult for the dragons to find burrows and that the dense grassland may in fact be affecting the ability of the lizards to find prey and to choose sites to lay their eggs. Although burrow dwelling invertebrates, e.g. Canberra's Raspy Crickets and Wolf Spiders, are common in the ACT grasslands, they very likely will have also been affected by the change in the grass structure – no cover and then too much cover.

Thus, in just a couple of seasons, the dragons have been faced with extinction due to the complete loss of tussock grass cover such as occurred at the Majura training range and now the conversion of the grasslands to too dense, rank grasslands that lack the thermal properties and open patches that the species may favour. In winter the species moves into arthropod burrows and it is not known if any individuals managed to find burrows this year. Individuals just resting underneath grass tussocks are likely to be far less protected than those 10cm below the ground surface in an arthropod borrow.

Wendy Diamond and Toni Stevens' research was invaluable in providing data on the GED's demography and movements in the middle of the drought. And this can be compared to earlier studies by students at the ANU and UC.

Diet and food availability

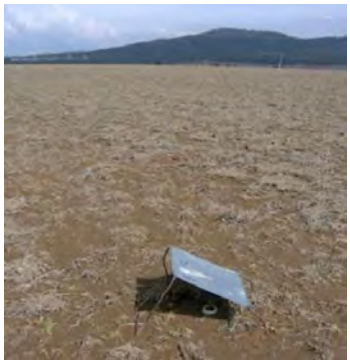
A lot of work has been done in relation to diet and food availability, unfortunately none has been published to date. It appears that GED's are sit and wait predators, although this has not been validated by a controlled behavioural study. Faecal samples placed in ethanol have been examined under the microscope (*left*). About half of the dietary organisms taken are small black ants, but spiders, beetles and insect larvae are also relished.

Why have GED populations declined?

Will doesn't believe the causes have been nailed down by research. At Majura, during the drought when the grass had been eaten back by kangaroos, Will observed that large flocks of non-territorial Magpies were always present feeding in the paddock. The reduced groundcover at this time could have increased predation. However, no direct manipulative study (magpies versus no magpies) could be undertaken to test this theory. An alternative and perhaps more likely hypothesis is that towards the end of the drought the eggs in the burrows in the soil were either getting too hot, or were desiccating. It does seem very likely though that the extreme crash in the numbers of grassland earless dragons was the result of the drought. Unfortunately there has been no sign yet of the population beginning to recover, and this may relate to the two very cool wet summers that we have just experienced.

Above: Majura FTR 1999—pre drought

Below: 2006—2007 following heavy kangaroo grazing



Hope for the future

This year it was observed that Grassland Earless Dragons successfully bred at two sites in natural temperate grassland where the grass cover was slightly more open - one site had high levels of kangaroo grazing (Queanbeyan Nature Reserve) the other site in the ACT had moderate levels of sheep grazing leading to a more-open pasture. Canberra Nature Park staff have just started an experiment with advice from Will's group at the University, to try and simulate these processes in the Jerrabomberra grassland reserves. Some sites with GED are to be grazed by livestock some sites will be allowed to be grazed at a moderate level by kangaroos and other sites will be not grazed at all. Monitoring over the next few years should start to reveal whether or not the ACT population is capable of recovery.

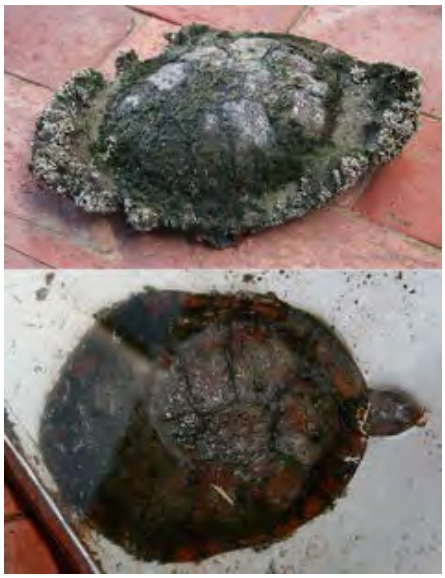
Life in the slow lane pushes turtles towards extinction

Author: Kylie Williams, PhD candidate at Charles Sturt University. Article appeared in 'The Conversation', 22 Aug '12

Eastern long-necked turtles, once common and abundant, are now greatly reduced throughout much of their range. Image: Damien Naidoo

Turtles are great evolutionary survivors. With their iconic shells and ponderously slow pace of life, they have plodded through 220 million years of natural selective pressures. In the face of forces that have ended many living lines – including dinosaurs – the overall turtle solution of being gently inoffensive yet well protected has held strong.

But now, a combination of human-induced changes has created a downward spiral so powerful that – without strategic intervention – much of the great turtle lineage will have disappeared by the close of the 21st century.



This turtle's legs were trapped inside its shell by an encrustation of tubeworms. Image: robdownunder/Flickr

Nearly half of all turtle fauna are threatened or extinct in the wild.

Australia is not immune from these global trends: six of our freshwater turtle species are listed as nationally threatened under the Environment Protection and Biodiversity Conservation Act. Recent research has also highlighted that other turtle species may soon find themselves added to the list. Around the Murray River region for example, the Eastern Long-necked Turtle has declined in abundance by 90% since the mid-1970s, and no juvenile recruitment has occurred for over a decade.

Threats to Australian freshwater turtles are numerous. But collectively their potency lies in the ability to permeate every aspect of the turtle's life history, from egg to adult. The natural history of turtles involves high but fluctuating rates of egg and juvenile mortality balanced by repeated reproductive episodes over a very long lifetime, in which threats to adult survival are low. That is, young turtles die easily, but many more are born, and once they reach adulthood they have a good chance of living a long life. Unfortunately, we have sent this selective regime awry in many places. Eggs and young are being depleted, but adult mortality is also increasing.

The wondrous shell that has been so successful at holding back nature's vicissitudes is no match for motor vehicles, and adult turtles frequently become road kill victims as they disperse throughout riverine and wetland habitats. They are also struck by boats, drowned in fishing nets and die in falls from weirs.

During the recent "millennium drought", there were reports of mass turtle mortality as historically permanent wetlands dried up: a harbinger of what may become commonplace under climate change predictions. And in the lower lakes of South Australia – where salinity rose during the drought – many turtles perished after becoming entrapped by massive growths of estuarine tubeworms on their shells.

Mortality rates in the egg stage appear to be even bleaker: over 90% of them are dug up and eaten by European foxes around the Murray River. Feral pigs fulfil a similarly devastating predatory role in more northern regions.

The unique life history traits of turtles also serve to mask the extent of threat to populations. Their longevity means that adults can persist in regions at relatively high levels for decades. But these apparently healthy populations may in fact be imperilled by chronic reproductive failure.

"Living-dead" populations composed entirely of old turtles with limited reproductive capabilities create a dangerously false illusion of prosperity. This problem is compounded by the cryptic nature of juvenile freshwater turtles – young turtles hide too well to be counted, and often scientists only know how many adults there are in a population. However, if managers wait until numbers of adult turtles are greatly reduced before initiating conservation measures, recovery will be extremely difficult or impossible.

Turtles can be killed on roads, by boats, drowned in fishing nets or in falls from weirs. Image: gautsch/Flickr

Extended inter-generation intervals also need to be taken into consideration when judging the success of conservation actions. A turtle nesting this year may have hatched some half a century ago, when conditions affecting survival were vastly different from today. And where decades of failed recruitment have occurred, even immediate and aggressive intervention will not compensate for the inevitable (though hopefully temporary) future drop in adult population numbers.

Globally, the turtle conservation crisis is probably more widespread than the well-publicised amphibian decline phenomenon. However, perhaps partly due to the long generation time of turtles, it has not yet engendered the same level of concern. Amphibians are often described as unique indicator organisms because they are so sensitive to environmental perturbations. But turtles, with their long life spans and historical resilience to dramatic environmental changes, can also tell us a lot about the health of our ecosystems.

The story of the slow but steady turtle winning the race against a fleet hare is familiar to us all. But a contemporary – sadly real – version of this fable would see the turtle in a race against a tide of anthropogenic change. In this setting, their slow pace presents a major hindrance to winning the race.

If we're to turn the tide back in favour of the turtle, we have to recognise that managing a vertebrate with a hundred-year lifespan presents some unique challenges. Conservation actions need to be proactively directed at every age class and across multiple habitats. They need to be augmented by careful long-term monitoring and research that provides a deeper understanding of turtle biology and the threats they face.

These advances can only be achieved through dedicated scientists who are able to devote much of their professional careers to ensuring the survival of one of Earth's most ancient citizens.

Virgin births seen in wild vipers

By Brian Switek, 'Nature' magazine 12 Sept 2012. This article reproduced in Scientific 'American'.

A recently examined snake brood represents the first example of wild facultative parthenogenesis in a sexually reproducing species.

It usually takes two snakes — a female and a male — to make a litter of baby copperheads. But research now shows that copperheads (*Agkistrodon contortrix*) and their venomous cousins cottonmouths (*Agkistrodon piscivorus*)

Above: Female copperhead snakes (Agkistrodon contortrix) can give birth without mating first. Image: C.Smith/P.Eskeridge/ The Royal Society

don't always require a partner to establish the next generation. These vipers are capable of virgin births.

For some vertebrates, parthenogenesis — asexual reproduction in which embryos develop without fertilization — is the norm. The New Mexico whiptail lizard (*Cnemidophorus neomexicanus*), for example, is an all-female species that reproduces without any genetic contribution from a male.

But in zoos and aquariums, zoologists have begun to document the strange phenomenon of facultative parthenogenesis: females of species that usually reproduce sexually, delivering offspring without mating. Surprise pregnancies have been documented among birds, sharks, snakes and Komodo dragons (*Varanus komodoensis*), but until now, only in captivity.

Warren Booth, a molecular ecologist at the University of Tulsa in Oklahoma, now reports the first known case of wild facultative parthenogenesis, publishing the study today in *Biology Letters*.

In work conducted while he was at North Carolina State University in Raleigh, Booth and his colleagues captured pregnant wild copperheads and cottonmouths, which gave birth in the lab. The researchers suspected that some of the snakes had reproduced without male input: in comparison with those born from sexual unions, says Booth, asexually reproduced snake litters typically have a large number of failures in development such as stillborn babies, and few viable males. When he saw that some of the snakes had delivered broods with these characteristics, "these litters were at the top of my agenda to genotype", says Booth.

Serpent sexuality

Booth examined genetic markers in the mothers and offspring to check whether the young snakes had really been born as a result of facultative parthenogenesis, or were unusual broods sired by males that were genetically similar to the mother.

"When I got the results of the DNA sequencer, I was floored," he says. The genotyping compared the genetic make-up of the offspring with the populations from which the snakes were collected; the results indicated that the chance of a male contribution was "infinitesimally small". Researchers had always believed that facultative parthenogenesis took place in the wild, Booth notes, but he and his colleagues were "stunned" at finally finding the evidence.

It is not clear how asexual reproduction evolved in normally sexual species, but the absence of a process called genomic imprinting may have had a role. In mammals, genomic imprinting causes a set of genes from one parent to dominate over the other, and this interaction requires genes from both parents to create viable offspring. Reptiles don't undergo genomic imprinting, so mating isn't required for mothers to develop their young — but it is not known why.

Nor is it known what spurred the female snakes to reproduce asexually. Booth points out that isolation from males is not the key: the snakes were collected from habitats with males, which undoubtedly were on the lookout for females. For whatever reason, the females forsook their potential mates, or rejected sperm from pairings, to deliver parthenogenic litters. Booth says that the finding removes the "prevailing dogma" that facultative parthenogenesis occurs only when females are isolated.

{*Phill Watts, an ecological geneticist at the University of Liverpool, UK, agrees that the study calculated "a convincingly low probability for male parentage". The discovery may motivate other researchers to search for further examples. "We still lack data to understand when and why facultative parthenogenesis happens in the wild," says Watts. There are almost certainly other asexually reproducing snakes, sharks and lizards out there, but the biological impetus for their wonderful births is, as yet, a mystery.*}

Snake toxins can become harmless

ANU, 20 Sept 2012, www.sciencealert.com.au/news

Research into snake venom could lead to the development of new drugs to treat conditions like cancer, diabetes and high blood pressure says an academic from The Australian National University.

Dr Gavin Huttley from The John Curtin School of Medical Research is part of the international team who discovered that the toxins that make snake and lizard venom deadly can evolve back

into completely harmless molecules, raising the possibility that they could be developed into drugs. Their findings were published in *Nature Communications* on 20 Sept 2012.

Above: Eastern Brown Snake. Image: MoMorad/iStockphoto

"Our work highlights a fascinating relationship between molecules that make up reptile venom and normal cellular proteins," Dr Huttley said. "The results strongly suggest that venom molecules have been modified for non-venom purposes in nature. This is proof-of-principle that an otherwise toxic molecule can be modified to provide benefit to an organism, supporting interest in exploring their pharmaceutical potential."

Lead author of the study Dr Nicholas Caswell from the Liverpool School of Tropical Medicine in the UK said that the results demonstrate the complex evolution of snake venom. "The venom gland of a snake appears to be a melting pot for evolving new functions for molecules, some of which are retained in venom for killing prey, while others go on to serve new functions in other tissues in the body," he said.

Dr Wolfgang Wüster from Bangor University, a co-author of the study, said the team's discovery opens the door to a new era of drug discovery. "Many snake venom toxins target the same physiological pathways that doctors would like to target to treat a variety of medical conditions," he said. "Understanding how toxins can be tamed into harmless physiological proteins may aid the development of cures from venom."

Australia's Vanishing Frogs

Earthwatch has been assisting scientist **Michael Mahony** on expeditions to collect information and monitor the health of frogs in forested areas of eastern Australia for over 20 years, specifically in the rainforests on the eastern escarpment of the Great Dividing Range, which include the World Heritage Gondwana Rainforest Reserve.

Along the east coast of Australia, nine species of frogs have totally disappeared in the past two decades. Our task is to monitor the health of populations of several species that are considered critically endangered and to keep a watch on others that we consider may be susceptible to sudden declines. At the same time, we will be collecting information on decline causes and investigating the role of climate change.

We usually run two teams a year of 12 participants who help look for frogs. The more eyes we have the more frogs we can find and the more data we can record. We have a team which is based in Coffs Harbour and it will be running an expedition on 5 - 11 November 2012. More people are urgently required to enable this expedition to go ahead.

You can read more about the expedition here:
http://www.earthwatch.org/australia/exped/mahony.html

There is a cost to join the expedition, which is $1,500 to cover food, transport, park fees and largely to contribute back towards research.

The neural implications of selection: How do brains vary among species?

Daniel Hoops, PhD Candidate, Keogh Lab, Research School of Biology, ANU, gave a presentation to ACTHA members at its August 2012 meeting on his research trip in 2011.

Introduction by Daniel Hoops: "Brain size and structure are measurable reflections of a species' adaptation to its environment, as brains are shaped by factors such as social living, seasonality, and foraging ecology. As the brain is the most energetically expensive organ, there is a trade-off between energy investments in different brain regions that reflects the different selective pressures or research focuses on A lizards (Squamata: Ag whether species with sexual selection inves regions associated wi sexual behaviours, an accompanied by a rec complexity of other b are dormant in the wi volume to conserve e investigate whether tl species that compete spring."

This summary of the tal Photographs by Angus Tobias Hayashi.

Daniel gave a brief ov presentation, highligh the brains of lizards t other in the *Ctenophor* differs in certain uniq comparing their brair fundamental questior including:

- Are sexually dimor dimorphic in brain
- Does seasonality af
- Is increased habita with changes in bra

The *Ctenophorus* grou to each other as show

They all, however, vary in certain specific ways. In some species the males are brightly coloured whilst the females are very drab. In other species the males and females are both drab in colouration.

2011 field trip to capture the first seven *Ctenophorus* species

The first capture site was at Gluepot Reserve, which is located in the semi-arid South Australian mallee near Waikerie in Riverland. The Painted Dragon, *Ctenophorus pictus*, and the Mallee Military Dragon, *Ctenophorus fordi*, were targeted.

An original capture method!

Volunteers were issued with fishing rods. A 'noose' was made at the end of the fishing line and this was carefully lowered over the head of a dragon

Mel
200

(The neural implications of selection, cont'd...)

The second capture site was a sheep property in the Adelaide Hills. The gullies here are dried creek beds covered in rocks, ideal Tawny Dragon, *Ctenophorus decresii*, habitat. Daniel pointed out that the property had fields of security cameras which were pointing at the ground. The Pygmy Blue-tongue Lizard's movements are being studied here, the only known site where they are known to exist. This special location is known as the Tiliqua Reserve. Within 30 minutes, Daniel and his crew found the Pygmy Blue-tongue, *Tiliqua adelaidensis*, Shingleback, *T. rugosa*, Eastern Blue-tongue, *T. scincoides*, and Western Blue-tongue, *T. occipitalis*, lizards living harmoniously together. eastern brown snakes were also spotted several times per day.

Daniel's team then headed north to Roxby Downs, which is situated in the Painted Desert. The Gibber Dragon, *C. gibba*, which only occurs on the flat expanse of Lake Eyre, Central Netted Dragon, *C. nuchalis*, Red-backed Dragon, *C. vadnappa*, a spectacularly coloured dragon, and the Ochre Dragon, *C. tjantjalka*, a vision of blue on red rocks, were the four species targeted.

A visit to Lake Eyre yielded no dragons. Their whereabouts in the current wet conditions was a mystery.

How might brains differ between species?

A number of each species was brought back to the ANU. The brain of each dragon was removed, very finely cut into 36 very thin slices and placed in a fluid to bind the DNA and fluoresce green under a blue light for examination purposes. The image below, showing different brain regions, is a 'slice' as seen through a microscope.

A cluster of cells is depicted as a very bright green. The area that controls a male or female's reproductive system is shown as a red patch. Daniel pointed out that if the cells in the red patch are 'scrambled' in a live specimen, using a finely inserted needle, the lizard will not reproduce, even if, for example, testosterone is given in a male, as the hormone is no longer recognised by these cells. In male animals, which compete more for reproduction purposes, these areas are larger.

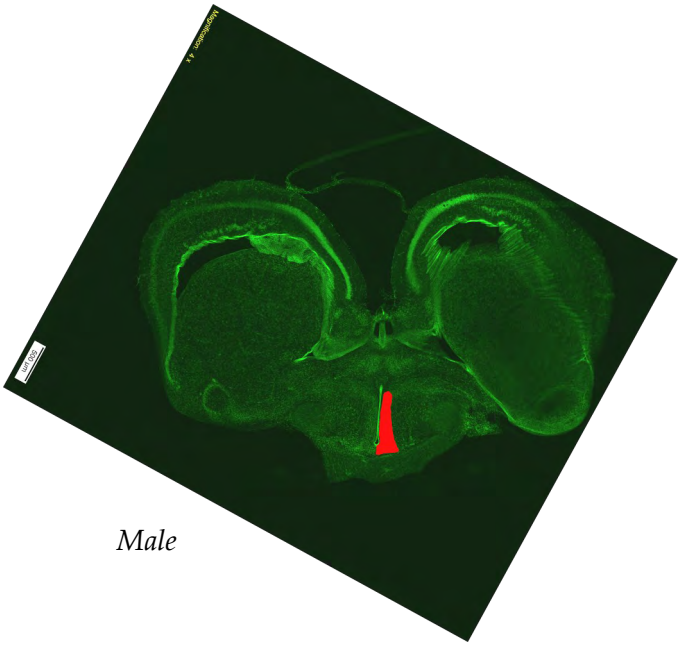
Above: Pygmy Blue-tongue Lizard

(The neural implications of selection, cont'd...)

A computer program, which is run in conjunction with a microscope, defines the size of the area eg 2,063 micrometres square. The number of neurons is manually counted.

Each area of the brain is responsible for a given function. eg detecting temperature, hunger, motivation, memory etc. A lot of areas in the brain have been given names based on where they are however little is known of what they really do. Studies such as Daniel's are helping to shed a little more light on this complex organ.

Daniel ended his presentation by thanking his colleagues and volunteers. Anyone wishing to volunteer for the field trip planned for 2012 is more than welcome to contact him via email: daniel.hoops@anu.edu.au



Male

The area in the brain which controls the reproductive system is shown as a red patch.

Female