



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

ACTHA Inc. News

Apr - May '16

*Newsletter of the
ACT Herpetological
Association Inc.*



Above: "Loggerhead turtles are already fighting an uphill battle since roughly one in 2,500 to 7,000 sea turtles make it to adulthood." Article on page 11.

In this issue

Urban hazards for turtles, abstract from Bruno Ferronato's recently published paper, page 2.

RBBS spotted by member of public, page 2.

Herpetofauna on CNM; what are we learning?

A summary of Geoff Robertson's talk to members at the Feb '16 meeting starts on page 3.

Burrowing into ACTHA's past: 1990, page 7.

The Australian & International Scene:

The lizard and the grassland: a scaly tale, page 8.

Pygmy blue-tongue lizards, once thought extinct, bred in SA's Monarto Zoo, page 8.

Mystery of how snakes lost their legs solved by reptile fossil, page 9.

When snakes bite: Newcastle to host venom and antivenom research centre, page 10.

Sex and sea turtles: New study reveals impact of climate change, sea level rise, page 11.

ACTHA trip to Gosford, we'll be visiting the Australian Reptile Park and a Reptile Expo, details on back page.

Your Committee for 2015 - 2016

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	Mandy Conway
Conservation Officer	Joe McAuliffe
Committee Members	Jason Spurr Iris Carter Greg Flowers Peter Child Nicole Hansen
Student Representatives	Vacant

** 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

Tuesday, 19 April 2016

Ian Brennan, from the ANU, will be giving members a Sarawak/Malaysian travelogue presentation.

"Due to its tropical climate and recent connection to southeast Asia, the island of Borneo is an incredible hotbed of herpetofaunal diversity. I'm going to present images from a series of reptile surveys I undertook in Sarawak, Malaysia, on the northwest side of Borneo in 2015. I'll aim to keep the topic light, and highlight some of the particularly bizarre reptiles and amphibians we found in Sarawak, as well as some basic conservation implications and fun stories. Sarawak, and Borneo as a whole, is a surprisingly understudied region, which likely holds an immense amount of undescribed diversity."

Urban hazards: spatial ecology and survivorship of a turtle in an expanding suburban environment

Bruno O. Ferronato, John H. Roe, Arthur Georges

The following is an excerpt from the above recently published paper. Please contact Margaret Ning at margaretning1@gmail.com if you would like a full copy of the paper.

Abstract

Urbanization poses a threat to long-lived vertebrates, particularly from road mortalities that can threaten population persistence. We studied movements, behavior and survivorship in a semi-aquatic turtle, *Chelodina longicollis*, during a La Niña period of above average rainfall (wet period) from 2012 to 2013. Our goals were to compare female turtles in a suburban environment to those in an adjacent nature reserve, and to interpret our results relative to a previous study in the same system during an El Niño period of drought from 2006 to 2007. During the wet period, turtles from suburban and nature reserve environments exhibited largely similar movements and use of space, and turtles did not aestivate terrestrially despite prolonged periods of aestivation during the 2006–2007 drought. Additionally, turtles from suburbs had reduced annual survivorship (0.67) compared to turtles in the nature reserve (1.00) during the wet period, which contrasts with previous estimates during drought, when survivorship did not differ between environments. Such a reduction in survivorship for suburban turtles resulted largely from vehicular collisions and may be a consequence of rapid increases in human population (79 %) and traffic volume (76 %) over the eight-year study period. Our study demonstrates that turtle behavior and survivorship can be variable in space and time, and that both urban development and climatic conditions can interact and change relatively quickly to influence important aspects of turtle behavior and population biology.



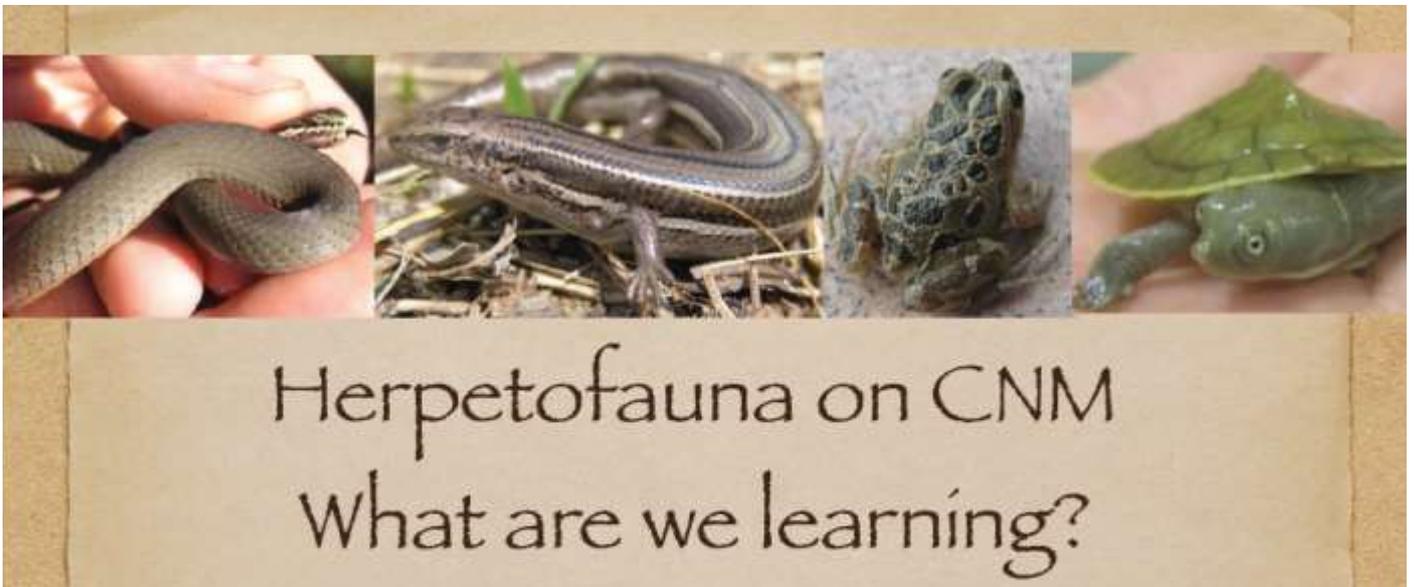
Spotted!

Sent in by **Roger Farrow**, mid March '16:

"I think this 2m+ snake seen crossing track in Royal National Park is a Red-bellied Black Snake without the red belly. Can you confirm?" [*Belly appears grey in colour version, Ed.*]



ACTHA expert: Most likely to be a RBB Snake, the red belly can be very faded on an older individual. It can be difficult to ID without actually examining it in the hand. The glossy appearance is more sunlight reflecting than actual typical red bellied gloss but it may be close to sloughing, very hard to tell from this image.



This was the title of the presentation given by Geoff Robertson at our meeting on 16 Feb 2016 and he has kindly written the following for our Newsletter.

Canberra Nature Map (CNM) was commenced by Michael Mulvaney and Aaron Clausen. It allows someone with a camera who sights a plant, fungi, bird, reptile, frog or butterfly to take a photo and submit it to CNM where it becomes a record, provided the photo has the time and location imbedded in it; although photos without the imbedded time and location may also be uploaded. The power of the CNM is that it provides wonderful information on species, shows fantastic photos, and maps the distribution of species. All records are verified by 'experts'.

The CNM commenced as a way to capture records of rare plants. An early finding was that it demonstrated that populations of rare plants were more plentiful than previously known. CNM proved very popular and all native plants, fungi and some weeds were added. Geoff Robertson lobbied for reptiles to be added; that was agreed and frogs were also added.

Last year ACTHA successfully applied for a grant to help the expansion of CNM to add reptiles, birds and butterflies, and to extend the system from a purely web-based system to also include iPhone and Android Apps. This year, on the first day of *Snakes Alive!*, Canberra Region Reptiles and the two apps were launched. The event also boosted the numbers of attendees at, and media coverage of, *Snakes Alive!*

This presentation on reptiles illustrates how CNM is contributing to ACTHA's aims to encourage greater understanding, study, conservation and recovery of reptiles in our region. Our support for CNM is paying very worthwhile dividends.

Structure of CNM

Reptiles and frogs are one of the elements of the CNM; others include plants, butterflies, fungi, etc. In turn, reptiles and frogs are broken down into snakes, dragons, geckos, monitors, turtles, legless lizards, skinks and frogs. For each category and subcategory there are broad descriptions and in turn for each species there are descriptions, photos, records and distribution maps.

Historical ACT Government records (known as ACT Atlas) have been added to the database and John Wombey and Will Osborne have agreed to add their records. This makes for a rich dataset.



(Herpetofauna on CNM, cont'd,...)

Species descriptions provide information about the species and related species, information on whether the species is rare or common, its distribution and field identification and photography tips. The aim is to assist interested people to know what species they are photographing and how best to identify and photograph it. The information about species or groups of species will greatly facilitate research, as for each species there are records and maps of their distribution. This information can and should be used in conjunction with the records on the Atlas of Living Australia (ALA), although these do not have photos with each record. In addition, there is information about locations, e.g. Canberra Nature Park and Reserves, Canberra suburbs and towns, and locations in NSW and Victoria.

As with any records there are issues around quality of data, validation, research limitations and other qualifications, some of which may become apparent presently.

Some findings so far

Snakes

In the Canberra region there are twelve elapids, one blind snake and one python. On CNM there are photos and descriptions for all those species. To achieve this I have had to include some 'notional records', records based on an actual ALA record. Brown snakes are the most frequently sighted and black snakes and copperheads less so; copperheads are confined to higher altitudes. Recently there have been some white-lipped snakes and little whip-snakes reported, as well as the first sighting of a bandi-bandi in Canberra.

Dragons

There are six dragon species in the region. The water, bearded and Jacky dragons are frequently reported on CNM. Excitingly, there have been recent sightings of mountain and nobbi dragons. There are limited records on grassland earless dragons; the Canberra Atlas records of grassland earless dragons have not been added to CNM as yet.

The next slide (*top right*) shows examples of Jacky, mountain and knobbi dragons. These are hard to tell apart. Mouth colour is definitive, yellow for Jacky and pink for nobbi, but these critters often don't show the insides of their



mouths when being photographed and so we may need to look for other features. Spines at the base of the tail provide a definitive characteristic for mountain dragons. Colour is a guide: Jacky is always grey, but nobbis may have a brown colouring and mountain dragons may turn orange in the breeding season. Behaviour also differs; mountain dragons remain on the ground in the leaf litter and like to burrow, and Jackys, also known as tree dragons, climb trees and onto higher rocks. Lastly, location: mountain dragons are restricted to high altitude, nobbis have scattered populations along the Murrumbidgee and Jackys are widespread.

Turtles, geckos & monitors

There are two from each group in the Canberra region. Many Eastern long-neck turtles and marble geckos are reported on CNM. There have been no recent sightings of stone geckos or Murray turtles in and around Canberra (although there are historical records for the Murray turtle). There are recent sightings of Rosenberg's monitor in and around the ACT, and a lace monitor at Murrumbateman.

Legless lizards

There are five species located in the region. There are many records of Pink-tailed Worm Lizard and striped legless lizards due to the frequent surveys of these species. Olive and Burton's legless lizard are also being reported.

There is only one historical recording (an ALA record) of a scaly-foot in the ACT. As an aside, currently the ACT government is monitoring the release of over one hundred striped legless lizards at Scottsdale, near Bredbo in NSW.



Egernia skinks

In CNM we have distinguished between three groups (clads) of skinks: *Egernia*, *Eugongylus* and *Sphenomorphus*.

Within *Egernia* there are eleven local species which may be described as blue-tongues and shinglebacks (*Tiliqua*), she-oak skinks (*Cyclodomorphus*), rock & tree skinks (*Egernia*) White's, Guthega & tan-back skinks (*Liopholis*).

Fairly common are eastern and blotched blue-tongues, skinglebacks, Cunningham's and White's skinks. There have been recent ACT sightings of the tan-backed skink and black rock-skink. Others remain elusive.



The slide above shows examples of the *Egernia* skinks.

Eugongylus skinks

There are eight species of *Eugongylus* skinks including three striped - and copper-tail skinks (*Ctenotus*), four water-skinks (*Eulamprus*), and one three-toed skink (*Hemiergus*). All are relatively common, apart from the oriental striped-skink and the alpine water skink. The *Ctenotus* species are easily distinguished once one knows what to look for. Three-toed skinks with their shiny scales, reduced limbs, longish body

and yellow belly are also easily identified.



Water skinks are, however, difficult to distinguish between. There are four species; mountain (*E. tympanum*), yellow-bellied (*E. heatwoolie*), Eastern (*E. quoyii*) and Kosciuszko (*E. kosciuszko*). They may be distinguished by location, back and head markings, some being yellowish rather than whitish. The subtle ways to tell them apart were explained during the presentation.

Sphenomorphus skinks

There are fourteen *Sphenomorphus* skink species in the region, including *Acritoscincus* (2 species), *Carlia* (1), *Lampropholis* (2), *Mentia* (1), *Morethia* (1), *Niveoscincus* (1), *Nannoscincus* (1), *Pseudemoia* (4) and *Saproscincus* (1).

The two species of *Acritoscincus* are three-lined (*A. duperreyi*) and red-throated (*A. platynotum*) skinks. Both may have a red flush, a characteristic that turns up in many *Sphenomorphus* skinks. However, the red flush is not always present; this is true of many of the species that have a tendency to show red. The two species of *Acritoscincus* are quite distinctive and easily recognised when one is familiar with them. Both species are relatively common at higher altitudes.

Lampropholis is probably the most common skink genus in the eastern states and includes the common garden skink (*L. guichenoti*) and delicate skink (*L. delicata*). The garden skink is characterised by blue flecks on its back and often a central stripe down its back. The delicate skink may be a mono colour or almost colourless. However the delicate skink is highly variable and some specimens may be difficult to distinguish from the common garden skink. The two species overlap, although they may prefer slightly different habitats.

Pseudemoia includes four fairly common and somewhat unlike species that occur at higher altitudes. The woodland tussock-skink (*P. entrecasteauxii*) is a variable species, sometimes referred as a species complex. It sometimes has a red stripe. The other three are readily distinguished. The grassland tussock-skink (*P. pagenstecheri*) has a lateral red stripe, the glossy grass-skink (*P. rawlinsoni*) is glossy and prefers limited habitats, and Spencer's skink (*P. spenceri*) has a distinctive pattern.

Two small skinks that look superficially similar are Grey's skink (*Menetia greyii*), which has four front digits, and Boulenger's skink (*Morethia boulengeri*) which has a copper coloured tail. Both appear to be common ACT species, although in recent times few Grey's skinks have been reported.

The remaining *Sphenomorphus* species include skinks that are not common in Canberra (image below): Weasel skink (*Saproscincus mustelinus*) is a long thin skink, with distinctive scales and a copper tail; MacCoy's skink (*Nannoscincus maccoyi*), has reduced limbs and is similar to the three-toed skink but has five fingers and toes; Coventry skink (*Niveoscincus coventryi*) is a variable species with subtle distinguishing characteristics and prefers forest habitat; while Southern rainbow-skink (*Carlia tetradactyla*) is a solid animal with a red side.



Lessons so far

CNM is giving fresh impetus to the study of local reptiles. There is a crop of new amateur herpetologists emerging.

CNM is bringing together, in one place, old and new records and creating a powerful data base that can readily enable researchers access to current and historical records.

We are seeing what many herpetologists have already known, that there is great variability between and within species. We are also getting insights into what is relatively plentiful and what is rare.

Focus of future study

There are two questions that I consider need attention; first, are apparently plentiful species declining? and second, what species need attention?

Some species are more commonly reported than others. Hence we might conclude that some species have healthy populations. However I think the contrary is true. I can recall many places that small skinks used to be plentiful, even as recently as twenty years ago, but this is no longer true. We need to pay attention to issues such as:

- The use of indigenous (local native) and non-indigenous vegetation. The former is more likely to provide food for invertebrates which are the beginning of the food chain;
- The use of insecticides, which may also reduce reptile food supplies;
- The impact of over predation by cats and dogs, and larger native birds;
- The impact of development when large areas of top soil are removed;
- How we might restore reptile-friendly habitat and create micro areas where reptiles are safe from predation;
- How to encourage research that can provide data on what is occurring with reptile populations and what steps might best lead to their recovery.

Many species need immediate attention. These include all those species listed as threatened. However, many more also need attention such as oriental striped-skink, alpine she-oak skink, alpine water-skink, Snowy Mountains skink, montane skink and mountain dragon.

Rare sightings in ACT

CNM is building up records of species. It is showing that some species are what we may regard as rare sightings in the ACT. Some of these include:

- Death adder (one historic record - Stromlo 2012)
- Diamond python (historical record - ALA)
- Common tiger snake (21 historical records)
- Bandy-bandy (1 record)
- Lace monitor (2 records in 1990s)
- Macquarie turtle (one record in each of 1994 and 2012)
- Eastern stone gecko (last record 1998)
- Common scaly-foot (1971)
- Oriental striped-skink (*C. orientalis*) (few since 1998)
- Grassland tussock-skink (*P. pagenstecheri*) (none since 1993)
- Glossy grass-skink (*P. rawlinsoni*) (3 historical records)
- Tree skink (*E. striolata*) (one record 1998)
- Alpine water-skink (*E. kosciuskoi*) (5 records)
- Tan-backed skink (*L. montana*) (2 records)



Burrowing into ACTHA's past

By Mandy Conway

Some of the more interesting inclusions in ACTHA's newsletters during 1990 follow. Remember, a full list of inclusions, from surveys to research to newspaper articles, are listed in the document *'Index to ACTHA Newsletters'* which can be found on our Website under the 'Newsletter' tab. Each newsletter is also currently being scanned and will appear on our Website in due course.

Feb 1990

- 'The Natural History of the Gippsland Water Dragon', Peter Harlow, advertised speaker for Mtg
- *- 'Hello frog! ACTHA excursion to Mt Ginini Flats area to look for Corroboree Frog, led by Will Osborne', article by Jenny Morrison

March 1990

- Frog Workshop at the ANU: 'Australia's disappearing frogs', Mike Tyler advertised speaker for Mtg
- *- 'The Corroboree Frog: A high mountain specialist', notes based on an article for Australian Natural History magazine, by Will Osborne
- 'There's a frog in my throat/stomach' by Michael Tyler, book review by David Carter
- 'Australian Frogs by Michael Tyler', book review by Will Osborne

April 1990

- 'The Fierce Snake: *Parademansia microlepidota* or *Oxyuranus microlepidota*? John Wombey, advertised speaker for Mtg
- 'Exciting new locality record for the ACT: James Fitzgerald finds the Nobby Dragon near the lower Molonglo sewerage works'
- Great response to the Frog Workshop with 176 people attending, Mike Tyler, guest speaker

May 1990

- 'Australian Fossil Fishes and the Origins of the Amphibia', Dr Richard Barwick, advertised speaker for Mtg
- Two goanna species in the ACT region: ACT P&CS want dead animals and photos of live ones
- *- ACTHA excursions to view proposed freeway routes through Gungahlin, and a Brindabella search for Corroboree Frogs

June 1990

- Turtle Safari in the NT, May '90, Arthur Georges
- ACTHA Committee meet with ACT P&CS to discuss how best to work together to further the cause of reptiles and amphibians in the ACT

- *- '*Aprasia parapulchella* range extension, one found on Burra Road', and 'Good sized *Drysdalia rhodogaster*', both articles by Jo Vandermark

July 1990

- 'Atlas of ACT Reptiles', Mark Lintermans and Liz Dovey will instruct ACTHA members on how to formally record field notebooks so that they can contribute to official records
- 'Chappel Island Tiger Snakes', Ross Bennett, advertised speaker for July Mtg, newspaper article and some notes included
- 'Frogs spell danger for earth' newspaper article on a trend biologists say appears linked to the planet's deteriorating environment

Aug 1990

- 'Reptiles of the Rainforest', Jeanette Covacevich, Senior Curator (Vertebrates) QLD Museum, advertised speaker for Mtg
- *- ACTHA field trip: 'Survey of Pink-tailed Legless Lizard on Mt Taylor' on Sun 12 Aug '90, will be led by Will Osborne
- 'Characterizing Banjo Frog Burrows', by Don Driscoll, 3rd year research project at Melb Uni Burra Survey Project: initial call for ACTHA members to conduct a herp survey of a 500 acre property at Burra over a period of 2 years. Article includes all the survey details, Di Weaver and Will Osborne

Sept 1990

- 'Great mysteries of the north: Does the Northern Long-neck Turtle lay its eggs underwater?' Rod Kennett, advertised speaker for Mtg
- ACTHA Burra Survey Project attended by 25 members, Sun 2 Sept '90

Oct 1990

- 'Notes on the identification of lizards occurring in the Burra district of NSW', by John Wombey
- 'Massive mortality of Long-necked Turtles *Chelodina longicollis*, at Lake Mokoan NE Vic', Feb '90, a census in Aug revealed 341 live and emaciated, and 300 dead

Nov 1990

- 'Frogs in the ACT region', Will Osborne's presentation at the Oct '90 Mtg

Dec 1990

- 'Field Guide to the Snakes and Lizards of NSW', Gerry Swan, advertised speaker to talk about his book and local herps
- ACTHA excursion to research site near Coppin's Crossing to find Cunninghams tagged twenty years ago, Dr Richard Barwick, Sun 9 Dec '09.

* *Of particular interest.*



The Australian & International Scene

The Lizard and the Grassland: A Scaly Tale

By Kate Graham, District Ecologist, Natural Resources Adelaide & Mount Lofty Ranges. (Reprinted, with permission, from *Small Talk*, Autumn 2014)

The native grasslands that are important as grazing systems and as natural plant communities in their own right, are also of vital importance to South Australia's very own species of blue-tongue lizard. Most of us know the common blue-tongue as a welcome visitor to our gardens, where it helps out by eating pests such as slugs, snails and caterpillars. We are probably also familiar with another lizard in the blue-tongue family, the Sleepy (or Stumpy Tail) Lizard.

But do you know the Pygmy Blue-tongue Lizard, the smallest member of that family?

It's found in only in a small part of South Australia from Kapunda to the Hummocks on Yorke Peninsula and north to Peterborough. Growing to a maximum of 20cm, it resembles a miniature version of the common blue-tongue, which occurs in all mainland states. And its tongue is not the blue of its relative - it's pink. Before 1992, this lizard had not been seen for over 30 years and was thought to be extinct. That year, someone who was taking part in a biological survey cut open a dead Brown Snake near Burra, in SA, and recognized its latest meal as the elusive Pygmy Blue-tongue Lizard. In the ensuing excitement, many reptile enthusiasts searched the surrounding area to try to find a live specimen. Very little was known about its preferred habitat, which made finding a live animal difficult. Eventually, they were found living below ground in spider burrows.

The next challenge was to find out how widely they occurred. The SA Museum had old collections from Burra, Gawler and as far south as Marion in Adelaide - in fact, the lizard's scientific name is *Tiliqua adelaidensis*. Highly sensitive to movement, a Pygmy Blue-tongue Lizard quickly backs down its burrow and disappears well before a casual walker could observe it. So, using a tiny camera on the end of a flexible cable, researchers searched spider burrows for the lizards. They began to build up

a picture of the lizards' distribution. The lizards themselves don't dig the burrows; wolf and trapdoor spiders do. It is likely that the Pygmy Blue-tongue Lizard looks for empty spider holes to move into rather than evicting sitting tenants. There are records of Pygmy Blue-tongue Lizard being killed by spiders and also instances of lizards eating the spiders. The relationship may be uneasy, but the spiders are vital to blue-tongue's survival. The preferred burrow has a width of around 2cm and a depth of up to 30cm, and is usually located at the base, or on the slopes, of grassy hills where the soil is deeper. The only indication that a burrow may be hosting a Pygmy Blue-tongue Lizard is the slightly smoothed edges where the lizard slides in and out of the entrance.

Pygmy Blue-tongue Lizards are ambush predators. They sit at their burrow opening and wait for passing prey. Their diet is made up of invertebrates like grasshoppers, ants, snails, beetles and cockroaches, as well as small amounts of plant matter. Because of their close association with unploughed grassland, their populations have declined dramatically as land is converted to cropping. Due to their limited range and specialized habitat needs, Pygmy Blue-tongue Lizard are classified nationally as Endangered. As they occur almost exclusively on private land, their continuing survival depends on the farming communities whose land supports them. The best ways to help this lizard is to look after its grassland home by maintaining a moderate grazing regime, avoiding soil disturbances like ploughing or ripping, minimizing the use of pesticides or herbicides near known populations, and supporting research and recovery projects in the region. To date, more than 30 populations are known, and the search continues.

Pygmy blue-tongue lizards, once thought extinct, bred in SA's Monarto Zoo

By Claire Campbell, ABC News 24 February 2016

Australia's pygmy blue-tongue lizards are so rare they were once believed to be extinct, but 14 of the little creatures have been born in South Australia.

(The Australian & International Scene, cont'd,...)

Monarto Zoo successfully bred the lizards in captivity in what they have hailed a conservation world first.

The babies — about 10 centimetres in length and, contrary to the name, bearing distinctive pink tongues — were born to five different females at the zoo last month.

The lizards have started exploring the burrows in their enclosure, emerging only to feed and bask in the sun.



Above: A pygmy blue-tongue lizard peeps from a hole, image Phil Ainsley.

Zoos SA conservation programs manager Phil Ainsley said the birth of 14 pygmy blue-tongue lizards would help protect the species from extinction.

"Over the last few weeks, the little lizards have become more active, venturing out of their burrows where they have been seen eating crickets," he said.

"The pygmy blue-tongue is one of the rarest reptiles in the country and we need to do everything we can to ensure the survival of this species.

"Zoos SA has been involved in the conservation of this species since its rediscovery back in 1992, so this is an amazing success story and a resounding endorsement for our purpose-built breeding facility that has only been in use for just over 18 months."

The pygmy blue-tongue had not been seen in its natural habitat for more than 30 years, but in 1992 a herpetologist found the body inside the stomach contents of a roadkill snake he was examining.

Nowadays, the little reptile is only found in South Australia's mid-north region between Kapunda and Peterborough.

Mystery of how snakes lost their legs solved by reptile fossil

ScienceDaily, article supplied by University of Edinburgh, 27 November 2015

Comparisons between CT scans of the fossil and modern reptiles indicate that snakes lost their legs when their ancestors evolved to live and hunt in burrows, which many snakes still do today.

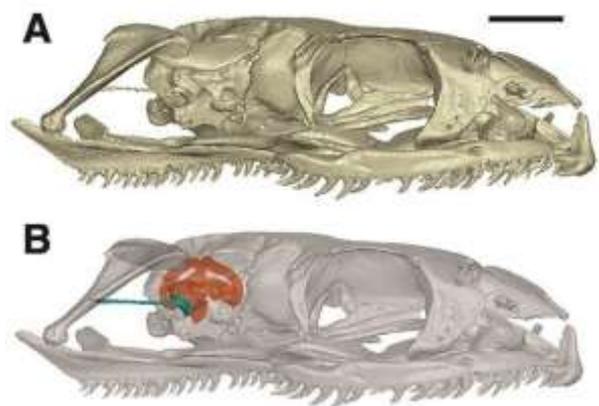
The findings show snakes did not lose their limbs in order to live in the sea, as was previously suggested.

Scientists used CT scans to examine the bony inner ear of *Dinilysia patagonica*, a 2-metre long reptile closely linked to modern snakes. These bony canals and cavities, like those in the ears of modern burrowing snakes, controlled its hearing and balance.

They built 3D virtual models to compare the inner ears of the fossils with those of modern lizards and snakes. Researchers found a distinctive structure within the inner ear of animals that actively burrow, which may help them detect prey and predators. This shape was not present in modern snakes that live in water or above ground.

Below: Modern snake skull, with inner ear shown in orange, credit Hongyu Yi.

The 90 million-year-old skull is giving researchers vital clues about how snakes evolved.



The findings help scientists fill gaps in the story of snake evolution, and confirm *Dinilysia patagonica* as the largest burrowing snake ever known. They also offer clues about a hypothetical ancestral species from which all modern snakes descended, which was likely a burrower.

(The Australian & International Scene, cont'd,...)

The study, published in *Science Advances*, was supported by the Royal Society.

Dr Hongyu Yi, of the University of Edinburgh's School of GeoSciences, who led the research, said: "How snakes lost their legs has long been a mystery to scientists, but it seems that this happened when their ancestors became adept at burrowing. The inner ears of fossils can reveal a remarkable amount of information, and are very useful when the exterior of fossils are too damaged or fragile to examine."

Mark Norell, of the American Museum of Natural History, who took part in the study, said: "This discovery would not have been possible a decade ago -- CT scanning has revolutionised how we can study ancient animals. We hope similar studies can shed light on the evolution of more species, including lizards, crocodiles and turtles."

When snakes bite: Newcastle to host venom and antivenom research centre

By Kim Arlington, Sydney Morning Herald, 14 November 2015

Monday is milking day at the Australian Reptile Park. Each week the park's head of reptiles, Billy Collett, collects venom from 100 snakes to be used in life-saving antivenoms.



Surrounded by boxes housing his deadly charges – taipans, tiger snakes, king browns – Mr Collett deftly immobilises a snake's head as it sprays venom into a vial. In 10 years of working with snakes, he has never been bitten.

The 10 most venomous snakes in the world are all found in Australia. The reptile park, at Somersby on the NSW central coast, is the chief supplier of venom used by pharmaceutical company bioCSL to make antivenoms which neutralise their effects. The company distributes



A tiger snake found in a backyard, Photo: Yanni

2500 vials of snake antivenom around the country every year.

Each snake species has unique venom. Some affects the nervous system, causing paralysis that can lead to heart failure. Other components can destroy blood cells or tissue, or cause blood clots or haemorrhaging.

Toxins in tiger snake venom consume the clotting protein so the blood cannot clot, putting victims at risk of major bleeding. To demonstrate how swiftly it affects blood, Mr Collett, the park's venom program supervisor, injected a dish of his own with fresh venom from a tiger snake. Within four minutes, it was like jelly.

Australians are most likely to encounter snakes during the summer months but leading toxicologist Geoffrey Isbister said 20 snake bites – an unusually high number – were recorded in October. On average there are 60 to 100 severe snake envenomings each year. Only one might be fatal, but in a bad year as many as five people will die from snake bites.

Billy Collett, venom program supervisor at the Australian Reptile Park, milks venom from a tiger snake, Photo Tony Walters

Improving treatments for snake bite victims will be the focus of a new centre of research excellence for venom and antivenom, to be established at the University of Newcastle. Professor Isbister will lead research at the centre, the first in Australia.

With \$2.5 million in funding from the National Health and Medical Research Council, the centre will bring together Australian and Sri Lankan experts to run clinical trials, improve understanding of antivenom dosage and investigate envenoming in high-risk countries.

Professor Isbister said they aimed to develop a bedside testing kit to ensure snake bite victims were diagnosed and given antivenom as early as possible.

"In Australia a lot of snake bites are in rural regions and those hospitals, although they have anti-venom, don't have a laboratory that can do many of the tests that we need," he said.

"[Patients] need to be getting the antivenom within three hours for it to be effective."

(The Australian & International Scene, cont'd,...)

But sometimes even rapid treatment cannot save a victim.

"People can collapse from the brown snake bite within 30 minutes ... a small number of patients die at that point," Professor Isbister said. "That's the major cause of death from snake bite in Australia."

So how to avoid being bitten? Professor Isbister advised people to wear long pants, boots or enclosed shoes when bushwalking. "In thongs and shorts, if you run into a snake, you're fair game," he said.

And never try to pick a snake up. "Seventy-five per cent of men get bitten on the hands, [compared to] 25 per cent of women ... so that tells you something about human behaviour," Professor Isbister said. "If you see a snake, the best thing is to stand completely still and then slowly walk away from it."

Sex and sea turtles: New study reveals impact of climate change, sea level rise

ScienceDaily, 15 October '15, reprinted from materials provided by Florida Atlantic University

Marine turtles deposit their eggs in underground nests where they develop unattended and without parental care. Incubation temperature varies with environmental conditions, including rainfall, sun, shade and sand type, and affects developmental rates, hatch and emergence success, and embryonic sex. Although the loggerhead turtle has been around for more than 60 million years, drought, heavy rainfalls and climatic changes are impacting hatchling sex ratios and influencing future reproduction. Because sea turtles don't have an X or Y chromosome, their sex is defined during development by the incubation environment. Warmer conditions produce females and cooler conditions produce males.

Researchers from Florida Atlantic University have just published the results of a four-year study in the journal *Endangered Species Research*, on the effects of turtle nest temperatures and sand temperatures and on hatchling sex.

"The shift in our climate is shifting turtles as well, because as the temperature of their nests change so do their reproduction patterns," said



Jeanette Wyneken, Ph.D., professor of biological sciences in FAU's Charles E. Schmidt College of Science. "The nesting beaches along Florida's coast are important, because they produce the majority of the loggerhead hatchlings entering the north-western Atlantic Ocean."

Loggerhead turtles are already fighting an uphill battle since roughly one in 2,500 to 7,000 sea turtles make it to adulthood. The typical loggerhead produces about 105 eggs per nesting season and would have to nest for more than 10 nesting seasons over the span of 20 to 30 years just to replace herself and possibly one mate. And, if enough males aren't produced because of climate changes, then this will result in a dire problem for this species.

"If climatic changes continue to force the sex ratio bias of loggerheads to even greater extremes, we are going to lose the diversity of sea turtles as well as their overall ability to reproduce effectively. Sex ratios are already strongly female biased," said Wyneken. "That's why it's critical to understand how environmental factors, specifically temperature and rainfall, influence hatchling sex ratios."

Wyneken and her team documented rainfall and sand temperature relationships as well as rainfall, nest temperatures and hatchling sex ratios at a loggerhead turtle nesting beach in Boca Raton, located in southeast Florida. Nesting season, which runs from April through October, were sampled across 2010 and 2013. The researchers used temperature dataloggers in the sand at three locations and buried them at three different depths to create temperature profiles of the sand column above the level that would directly influence eggs. The rainfall data were graphed in temporal synchrony with sand temperature for each depth.

(The Australian & International Scene, cont'd,...)

Nest temperatures were recorded throughout incubation. Rainfall data collected concurrently with sand temperatures at different depths showed that light rainfall affected only the surface sand; effects of the heaviest rainfall events tended to lower sand temperatures, however, the temperature fluctuations were very small once the moisture reached upper nest depths.

Nest temperature profiles were synchronized with rainfall data from weather services to identify relationships with hatchling sex ratios.

The sex of each turtle was verified laparoscopically to provide empirical measures of sex ratios for the nest and the nesting beach.

"The majority of hatchlings in the sampling were female, suggesting that across the four seasons most nest temperatures were not sufficiently cool to produce males," said Wyneken. "However, in the early portion of the nesting and in wet years, nest temperatures were cooler, and significantly more males hatched."



ACTHA excursion to Gosford to visit the Australian Reptile Park and a Reptile Expo Friday 20th - Sunday 22nd May 2016

Plans are well underway for this trip and the details thus far are:

Several cars are leaving Canberra on **Friday from lunchtime onwards**, heading for the **Ocean Beach Holiday Park, Gosford**. There are a number of accommodation options, from camping to cabins, which can be viewed online.

We will be visiting the **Australian Reptile Park on Saturday** and the **Reptile Expo on Sunday morning**, before heading home.

Please come along to this month's ACTHA meeting if you would like to join us.

Arrangements for the trip will be finalised at the meeting. Alternatively, you can contact Margaret Ning at margaretning1@gmail.com

[Note that those wishing to attend will need to book their own accommodation.]



ACTHA News
PO Box 160
Jamison ACT 2614