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ACTHA INC. NEWS AUG - SEPT 2013

*Newsletter of the
 ACT Herpetological
 Association Inc.*

YOUR COMMITTEE FOR 2012 - 2013

President	Dennis Dyer
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Committee Members	Iris Carter
	Greg Flowers
	Peter Child
Student Representatives	Angelique Harrison
	Sophie Sloane
	<i>* Denotes Life Members</i>

*** UNIDENTIFIED EFT MEMBERSHIP PAYMENTS ***

Our Treasurer has received several ACTHA membership payments (we presume) with limited or **no reference details**. To avoid confusion and prevent our dear Treasurer from going awol, could everyone please remember to include a **full SURNAME etc.**

We wouldn't want you to drop off our membership list and not receive this Newsletter or meeting details.

(Paid and not sure? Please contact Margaret at margaretning1@gmail.com quoting any payment reference numbers.)



IN THIS ISSUE

Komodo National Park adventure:..

ACTHA member Angus Kennedy presents yet more of his amazing photography as he describes his latest trip abroad, pages 2 & 3.

Genomics of the bearded dragon

Dr Arthur Georges, UC, took his audience through the basic science of DNA at ACTHA's meeting in June '13, from page 4.

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Globalisation helps spread chytrid: page 8.

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DIARY DATE

The *bi-monthly* meetings of the Association are 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, 20 AUGUST 2013

This month our guest speaker is **Renee Catullo**, who will report on her ACTHA in-part sponsored PhD research at the University of Canberra: **Sorting out species numbers of the Toadlets (*Uperoleia*)**

"Despite native Australian Toadlets having the greatest number of described species in the Myobatrachid Family, their cryptic morphology, fairly unappealing demeanour and questionable distributions make them one of the hardest frogs to confidently identify. I will discuss whether you really can tell them apart, how many species there are, why molecular genetics were essential to figuring out species numbers and distributions, and then talk about the interesting Australian landscape history that created such diversity in a group of little brown frogs. I'll finish up with a few quirks that hopefully will improve their image in the eyes of herpetologists."

KOMODO NATIONAL PARK ADVENTURE

By Geoff Robertson



At our 18 June ACTHA meeting, our wandering wonder Angus Kennedy did the warm up talk with a report on his recent visit with his

girlfriend Carla to the islands of Komodo and Rinca which form part of Komodo National Park. The park includes the larger islands of Komodo, Padar and Rinca and 26 smaller ones with a total area of 1,733km² (603km² of it land).



Above: Savannah (grassy woodland) which is typical of Komodo National Park.

He and Carla travelled to Bali and from there by plane to Labuan Bajo, from which they commissioned a boat to take them to the archipelago that forms the Komodo National Park. While people visiting the islands tend to overnight on the boats, our intrepid dragon seekers decided to stay on land so that they



life among the komodos did not encourage me to want to book a trip even though the cost of such a trip was extremely reasonable.

could do some spotlighting. While Angus talked up the facilities to us, his description of cat-sized rats, blood on their bedroom wall from komodo attacks, and

Komodo dragons (*Varanus komodoensis*) are monitors, or goannas as we say here, and are the world's largest reptile. Their habitat is savannah woodland. Angus showed many photos of these tropical isles.



The dragons grow up to three metres, weigh up to 100 kg, and live for up to 30 years. They hunt in packs and there was much discussion of their hunting behaviour. Much research has focused on their saliva which contains septic pathogens which are released when komodo dragons bite their large prey in duck-in-and-out attacks. The pathogens slowly kill the prey. While Angus did not witness any attacks, he described what appeared to be a somewhat ghastly site of dragons demolishing the remains of a dolphin. He did take photos of their food; water buffalo, deer, crab-eating monkeys, and anything else that moved.

The female dragons lay their eggs in burrows cut into the side of a hill or in the abandoned nesting mounds of the orange-footed scrub-fowl (a mound builder or megapode) and females jealously guards their clutch of, on average, 20 eggs. However when they are born, the young agile dragons head for, and climb, the trees so that they do not become tucker for the adults, including their mum. Komodo dragons are also known to be parthenogenetic, that is, there are cases recorded where young dragons are hatched from unfertilised eggs.

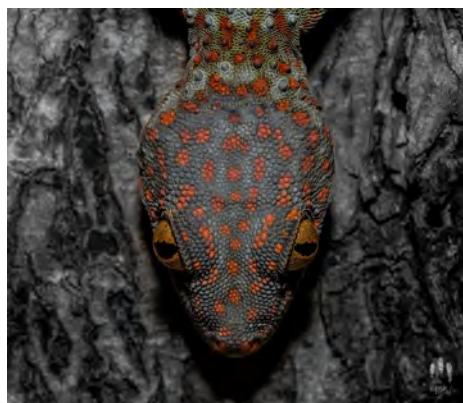
Angus said that dragons were sneak-up and attack merchants so that they are unlikely to attack if you can already see them. However, two of the rangers he talked to had been bitten,

(Komodo National Park adventure, cont'd)

but were on the mend. This occurred when one was surprised by a dragon and the other went to his assistance in one of the ranger huts.

While dragons were plentiful around them, and their numbers had improved since the national park was established, there is some concern with their conservation status, because in the park and the neighbouring island of Flores there are probably less than 5,000 dragons living in the wild.

Angus showed many photos of other reptiles he saw in the park and told fascinating stories about them, including the Tokay gecko which is



the world's second largest gecko growing up to 51 cm. Angus said that his favourite photo of the trip was a closeup of the head of one of these delightful creatures (*left*).

Their numbers are of concern, as they are poached for use in chinese herbal medicine and are sold to the pet trade, primarily in the US and Europe.

Apparently, the accommodation that used to be available on Rinca Island has been closed because it is the habitat of the infamous Russell's viper or Daboia (*below*).



This snake is wide spread throughout southern Asia including India, and is one of the species recording the most snakebite incidents and deaths.

The couple also tried to get up close and personal with the crab-eating monkeys who showed no interest in them and kept their

distance. However, they watched the monkeys from a distance, seeing some



getting up to monkey business (*above*). They were informed by the rangers that the monkeys throw rocks at the crabs to catch them for food.

Unusual for an amateur herpetologist, Angus takes an equal interest in people. There are about 4,000 people living in the park. Those he talked to were very supportive of the park, although now that the dragons are protected, the people cannot hunt within the park and now rely on fishing. While the dragons are of national and international interests, the local people had not gained much economic advantage from their presence, except for the few who had jobs as rangers. Simple things like a fence to separate the village from the dragon habitat were currently beyond their reach.



Above: Water buffalo, just one of the Komodo Dragon's food source.



Above: Trick pic of Carla stroking a dragon!



GENOMICS OF THE BEARDED DRAGON

By Geoff Robertson



At the 18 June ACTHA meeting, the main presentation was given by **Arthur Georges, Professor in Applied Ecology, University of Canberra**, who described the title of his talk as '**Genomics for dummies - a step by step introduction to the full genome sequence for the bearded dragon**'. Arthur describes himself as a dummy himself when it comes to

genomics, a field he has ventured into in his enthusiasm to study reptiles.

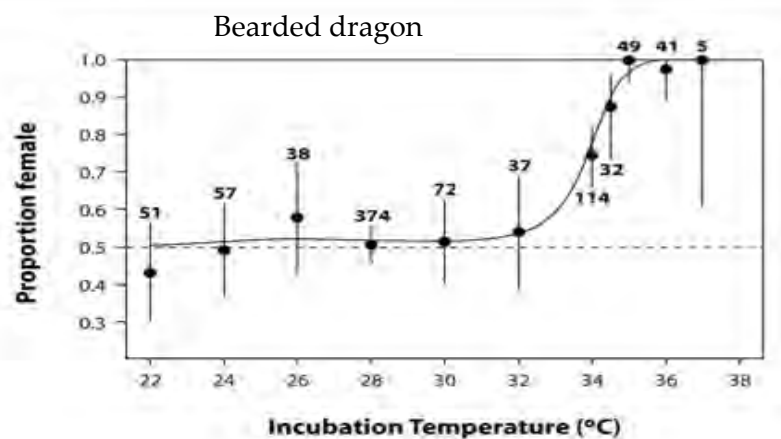
Arthur's talk covered some DNA basics, how the sex is determined in reptile offspring, the special case of sex determination of the bearded dragon, the tools that are used to get at the genetic code, the search for the sex determining gene in bearded dragons, and follow-up work now that the first Australian reptile genome, that of the bearded dragon, has been sequenced.

The crowd was ready for a challenging evening, knowing that it would not be able to follow the play if it did not focus its attention from the start. Arthur prepared the crowd for what they would experience. In his warm up he showed some deft moves as he weaved his way through his slides showing the basic science of DNA. Even if the crowd did not follow all the action, each person gained an appreciation of how the science of genetics is being played.

Arthur lined up his first goal, explaining sex determination. We know in humans and mammals that the sex gene is on the XX chromosomes for females and the XY chromosomes for males. However in many species such as birds and snakes the relevant chromosomes are the ZZ/ZW. These systems evolved separately. However, earlier in evolution, sex determination of offspring was based on incubation temperature.

In past presentations to the Association, Arthur has illustrated how the incubation temperature

is often a factor in determining the sex of reptile species. Temperature dependent sex determination (TSD) is found in pig-nosed turtles where, if the incubation temperature is 31.5 degrees or less, all offspring are male, whereas if the temperature is above 32.5 degrees, all are female. In water dragons, an incubation temperature of about 25 to 32 degrees results in male offspring, whereas lower or higher incubation temperatures result in female offspring. This is known as 'phenotypic plasticity' where an organism can change its phenotype (its observable characteristics) due to, or as an adaption to, its environment. Arthur described other research into phenotypic variation, often using twins brought up in different environments.



Bearded dragons were somewhat more complex when it came to sex determination, and indeed may represent a special case. They seem to display both TSD and genetic sex determination. As the graph above shows, at less than 32 degrees offspring are about half male and half female. This changes as the incubation temperature rises; all offspring above 35 degrees are female. That is at lower temperatures genetics plays a part, but this is replaced by phenotypical response at higher temperatures.

Arthur and his team have compiled data on known sex determination behaviour in reptiles which are found in the second slide. It shows that birds and snakes clearly have a ZW determination, but among the other orders and families, there are many patterns.

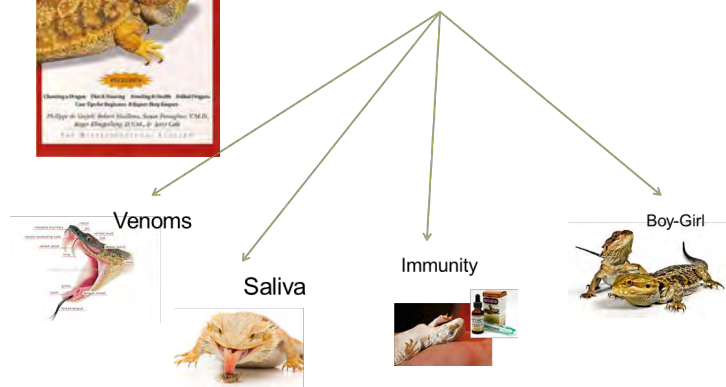
(Genomics of the bearded dragon, cont'd)

The next question was to discover what were the sex genes in bearded dragons. To do this Arthur explained the various methods used to isolate the sex genes. He first described the creation and use of bacterial artificial chromosome (BAC) libraries and then the method of comparative chromosome hybridization, which I shall not try to repeat here.

Use of these methods requires first dyeing the male DNA red and the female DNA green, and then painting them onto chromosome preparations in combination. An area that remains green only, or red only, shows where the chromosomes vary between male and female. As the only chromosomes known to vary are the sex chromosomes, this enables the researcher to determine which chromosomes contain the sex selecting gene. This clearly shows up in XX/XY and ZZ/ZW systems. A bright green spot shows that the dragon has a ZZ/ZW system, and it involves a microchromosome.



Reading the DNA Book of Dragons

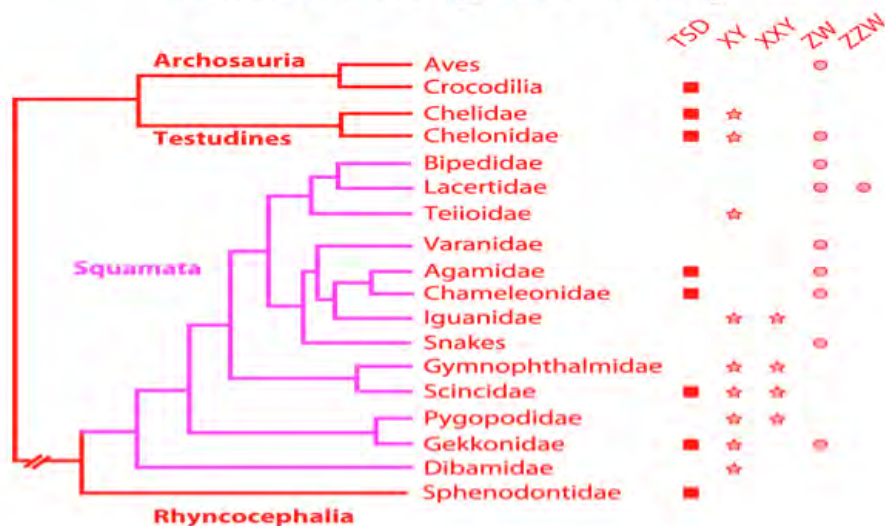


Other work has eliminated all known sex genes as residing on these sex chromosomes, which suggests an entirely novel gene will be the sex determining gene in reptiles. Perplexed but undaunted, the search continues.

All this work is predicated on the sequencing of the bearded dragon genome. Arthur showed the sequence for the dragon, that is, the genetic code passed across the top of his slide show.

This is somewhat meaningless unless one has an understanding of how to read it. Hence the next project is unraveling the code, like opening a book which explains the work that has been done. Here Arthur's team have been negotiating with other researchers throughout the world to explain the work that has been done on bearded dragon DNA sequencing. The "open book" which will be the full genome sequence of the dragon will cover sex determination but also other topics such as the genetics of development and use of venom, saliva assisted food mastication, immunity, and limb length. While these topics may seem somewhat esoteric, each will provide valuable insights into science and may provide many breakthroughs.

Astonishing Diversity



For those not familiar with the scientific names, Archosauria includes the birds (Aves) and crocodiles (Crocodylia), the Testudines (turtles, tortoises and terrapins), Squamata (monitors or goannas (Varanidae), dragons (Agamidae), snakes, skinks (Scincidae), legless lizards (Pygopodidae) and geckos (Gekkonidae)) and Rhynchocephalia (tuatara). It shows that crocodiles have TSD system; birds, monitors and snakes have ZW systems; and many others reptiles have a mix of systems. Dragons so far demonstrate a mix of TSD and XY systems. However bearded dragons seem to have a mix of TSD and some yet unknown genetic system.

(Genomics of the bearded dragon, cont'd)

Arthur explained his own odyssey into the world of genomics and his travels to the Beijing Genome Institute (BGI) located in Shenzhen where the genome of each species is being sequenced. This has been an amazing experience and shows the disproportionate effort being put in by China and other countries into genetic research. Nevertheless Australia has an important role to play because of its specialist knowledge of Australian fauna.

Arthur also commented on the cost of sequencing a genome, down from \$95 million per genome in 2001 to a mere \$5,000 now.

The last slide (at right) shows a world first: a bearded dragon sitting on a hard disk containing his own DNA sequence.

Arthur's team includes an impressive team of staff, post-doctoral researchers, and students within the Institute of Applied Ecology with links to Harvard, ANU and University of NSW. As indicated it has also entered into a partnership with BGI.

ACTHA considers itself privileged to have members and supporters of the like of Professor Arthur Georges who has gathered an impressive group of researchers and students at the Institute. Arthur also gives generously of his time to numerous committees and activities that encourage research and conservation of fauna, particularly reptiles and amphibians.



MEDAL OF THE ORDER OF AUSTRALIA 2013

Mr Richard Craig LONGMORE

**'For Service to herpetology, particularly
the study of snakes and lizards.'**

Ric was recently presented with his medal by the Honourable Quentin Bryce AC CVO, Governor-General of Australia.

Congratulations once again Ric!

Lizard numbers slither forward

By Mark Sawa

THOSE who think too much attention is dedicated to cute and fluffy or large endangered animals at the expense of their less cuddly or captivating colleagues should keep in mind the trials and tribulations of the legless lizard population in Canberra.

Over the past six years *The Chronicle* and *The Canberra Times* have combined to deliver more than 50 stories about legless lizards in the Territory.

The rare lizards have survived development, abundant kangaroo numbers and bushfires to emerge as a

species that has attracted significant attention. Last week it was announced that one of the largest populations of striped legless lizards ever recorded has been found at Gungahlin.

A recent survey found significant numbers of the reptile in three Gungahlin grassland reserves. In terms of habitat size and number the reserves are among the top five habitats in Australia, with lizard numbers estimated between 2000 and 3000.

In the 1990s the ACT government decided to move the Gungahlin town centre away from key habitat and reserved over five square kilometres of grassland to protect the legless lizard.

Minister for the Environment and Sustainable Development Simon Corbell said it was gratifying that nearly 20 years on, the Crace, Mulanggari and Gungahlin reserves each support thousands of lizards.

"This report highlights the ACT government's commitment to strategic land management, conservation and planning foresight," Mr Corbell said.

He said it was one of the largest and highest density populations ever recorded.

The striped legless lizard is snake-like in appearance and grows to 30 centimetres in length. They are usually

pale grey-brown on top and whitish underneath. The lizards can be distinguished from small snakes by having a visible ear opening.

Conservation officer Michael Mulvaney said about 99 per cent of the lizard's habitat had been wiped out.

"It's a species that the ACT is a stronghold for so it's good that we are not going to be the reason why a species becomes extinct," Dr Mulvaney said.

"It's a beautiful little creature and it's amazing to see it move."

There are four kinds of legless lizard in the ACT.



A record number of striped legless lizards have been found.

THE AUSTRALIAN & INTERNATIONAL SCENE

Toad Busters rewarded with increased goanna numbers

Lucie Bell, NT Country Hour, ABC Rural,
Mon 17 June 2013

We are all familiar with the devastating effect cane toads have on native wildlife, but goannas are among those worst hit with many young reptiles unable to resist eating the poisonous toadlets.

The Darwin group Reptile Watch holds regular toad busts and reptile musters as part of the "Reversing Reptile Decline" project.

Coordinator Graeme Sawyer says the good news is, the group is finding its work eliminating toads has led to some encouraging results.



Above: Graeme Sawyer is the coordinator of Reptile Watch and Frog Watch in Darwin.

"We've taken out between 100 to 200,000 tadpoles across the course of the wet season. It's those little toadlets that are really damaging to our reptile populations, especially small goannas and frill necks," he said.

Graeme's team of volunteers has 11 traps which they bait and set in the Dripstone Cliffs area regularly.

"So far we've micro-chipped 34 goannas and I don't think you'd find that many goannas in Kakadu now," Mr Sawyer said.



Left: Graeme holding goanna 'Number 68'.

"Mustering goannas is real tough work. We've been getting quite good success with the traps we've got but we're also looking for nesting sites and burrows."

Fellow volunteer David Rhind has just returned from the Kimberly where teams are working to excavate goanna nests.

"They actually found nests for the first time last year, they seem to have quite complex nesting systems," he said.

Complex is the right word. The team in the Kimberly has found nesting tunnels dug in a corkscrew shape up to 3.8m underground, making goannas the deepest nesting reptiles in the world.

Graeme Sawyer believes as long as young toad numbers are kept under control, there's a good chance goanna numbers will continue to improve.

"The really big outcome from these projects is that it looks like toad management can make a real difference to goanna populations," he said.

Ancient frog fungus spread by globalisation

Anna Salleh, ABC Science, Tues 7 May 2013

The fungus suspected of killing off many of the world's frogs is from an ancient strain that has just recently escaped its niche thanks to globalisation, suggests new research.

The new genetic analysis of chytrid fungus is published today in the *Proceedings of the National Academy of Sciences*.

"It's an older strain that has spread into new areas," says Australian team member Dr Lee Berger, of James Cook University in Townsville.

"The most likely reason for the spread is trade."

Ever since frogs started going extinct in Australia and South America in the 1980s, scientists have been trying to work out the cause.

In 1998, Berger was the first to identify chytrid fungus in the bodies of many dead frogs as part of her PhD under Professor Rick Speare.

Berger says a 2011 genetic analysis subsequently suggested that the global pandemic strain of chytrid fungus had only

evolved in the 1970s, through hybridisation of a number of different strains: a timeline that fitted with the decline of frogs in the 1980s.

But now, Berger and colleagues have come up with findings that complicate this picture by showing the pandemic strain actually evolved thousands of years ago.

Family tree

The researchers analysed the genome of 49 samples of chytrid fungus from around the world to draw up a family tree, which gave them clues the origins of the pandemic strain.

"This paper says that that global pandemic strain has been around a long time before the frog declines occurred," says Berger.

She says the ancestor for the pandemic strain arose at least 1000 years ago and maybe even as early 26,000 years ago.

"A new strain has not evolved," says Berger. "It's just that globalisation has allowed the fungus to escape from its niche and spread."

Berger says more genetic work is needed to clarify exactly where the strain came from but some possible sources include Africa and Asia.

The fungus is known to have been in these areas a long time and frogs there seem to be immune to it, she says.

Can of worms

Professor Hamish McCallum, a chytrid expert from Griffith University, says the fungus is threatening more species than any other vertebrate pathogen.

He welcomes the new research, but says it raises more questions than it answers.

"It is an interesting piece of work but it literally opens up a can of worms," says McCallum.

He says the research shows that the pandemic strain has much greater diversity than previously thought.

"Even if one is looking at a particular strain that has been obtained from one source, its virulence varies substantially between frog species," says McCallum, who says it's important to understand why this is the case.

"The critical thing to understand in all of this is that virulence of a pathogen is not an intrinsic property of the pathogen itself. It's a property of the interaction between the pathogen and its host in a particular environment."



Above: The tiny Corroboree frog is at high risk from chytrid fungus. Image: Laura Grogan

McCallum says it appears that the pathogenic strains of chytrid across the world have come from separate introductions from the same source, rather than from a single introduction.

"It's hideously complicated and that's one of the real problems in trying to manage this thing," he says.

This complexity is played out in Australia. Berger says while some Australian populations of frogs are living successfully with chytrid fungus, others, like the corroboree frog around Mount Kosciuszko, are suffering badly.

"There are less than 30 left in wild," says Berger. "There are a lot in captivity but after release they die from chytrid."

Biologist maps the family tree of all known snake and lizard groups

Sciencedaily 8 May 2013

A George Washington University biologist and a team of researchers have created the first large-scale evolutionary family tree for every snake and lizard around the globe.

The findings were recently published in the journal *BMC Evolutionary Biology*. Alex Pyron, the Robert F. Griggs Assistant Professor of Biology in GW's Columbian College of Arts and Sciences, along with researchers from the City University of New York and Arizona State University, detail the cataloging of 4,161 species of snakes and lizards, or squamates.

"Squamates include all lizards and snakes found throughout the globe, including around 9,500 species on every continent except Antarctica, and found in most oceans," said Dr. Pyron. "This is everything from cobras to garter snakes to tiny geckos to the Komodo Dragon to the Gila Monster. They range from tiny threadsnakes that can curl up on a dime to 10 feet monitor lizards and 30 foot pythons. They eat everything from ants to wildebeest."

The evolutionary family tree, or phylogeny, includes all families and subfamilies and most genus and species groups, said Dr. Pyron. While there are gaps on some branches of the tree, the structure of the tree goes a long way toward fully mapping every genus and species group.

"It's like building an incomplete family tree for your family, but with half of the 'children' sampled. You're in it, but not your brother, one of your cousins is, but not another. However, because it's so complete, we know where the missing relatives go because there's no longer as much mystery as to how the missing species, or cousins, are related, with a few notable exceptions for some remaining species.

"This is also a community effort. We sequenced hundreds of these species ourselves but took thousands more from public databases, building on the work of others."

Understanding how various snakes and lizards are connected to each other fills a major gap in knowledge, said Dr. Pyron, because before this, there were no single reference for how all lizards and snakes were related or what their classification was.

"A phylogeny and taxonomy is fundamental for all fields of biology that use lizards and snakes, to understand how to classify the species being



*Above: Hump Snout Lizard, *Lyriocephalus scutatus*
Image: George Washington University*

studied, to interpret biological patterns in terms of relatedness, and even at a more basic level, to count how many species are in an area, for example, for conservation management purposes."

This project has been in the works since 2008 with the last five years being the most intense. It was funded by the National Science Foundation Postdoctoral Research Fellowship in Biological Informatics.

The researchers used DNA sequencing technology to genotype, or identify, the DNA of thousands of lizards and snakes.

"We have laid down the structure of squamate relationships and yet this is still the beginning," said Dr. Pyron. "As hundreds of new species are described every year from around the globe, this estimate of the squamate tree of life shows us what we do know, and more importantly, what we don't know, and will hopefully spur even more research on the amazing diversity of lizards and snakes."



ACTHA HAS MAIL!

Compiled by Mandy Conway, Editor

ACT & Region Frogwatch Winter 2013 Newsletter

Includes the following information on Frogwatch's funding situation.

"The last few months have been a mammoth task of grant application writing to secure the survival of one of the best community science programs ever - the ACT & Region Frogwatch Program.

"After a lot of blood, sweat and tears (so to speak) we are hopeful that Frogwatch will continue to receive funding through the Caring For Our Country Initiative. The Natural Resource Management Council has put forward its recommendations to the Commonwealth to fund the Frogwatch Program for another 18 months, after which we would rely on corporate funding for survival."

Contact: Anke Maria Hoefer

Phone: (02) 6278 3309

Email: frogwatch@ginninderralandcare.org.au

Web: www.ginninderralandcare.org.au

Herp information request via ACTHA website

From Jenny, June 2013

"I saw a small (approx 30cm in length) Red-bellied Black Snake loosely curled in the grass today when out walking on a property at Mount Fairy. I was surprised to see a snake at this time of the year, not that it was reactive. I thought I would let you know as you may be able to provide some information regarding the active presence of snakes of this species or others at this time of the year in this region. Part of my reason for asking is that I frequently walk my dog through the paddocks here and I am concerned for her if she saw the snake before me.

I look forward to any information you may be able to provide."

ACTHA experts reply

Seeing a snake this time of year is very unusual and I tend to think that this is a combination of cold and wet weather. The recent rains would not be helping.

My guess is this one was probably flushed out by local flooding, forcing the snake to bask. The cold conditions will keep them largely inactive and if they are out it won't be far from their overwintering site.

To my knowledge there has not been a recorded human fatality from a Red-bellied Black Snake. Their toxicity in dogs is certainly not as dangerous as browns but a bite from any venomous land snake should always be treated as potentially dangerous.

A friend of mine has trained his Australian kelpies to be afraid of snakes. Dogs will often try to catch and kill them, risking a bite, and training will help them to recognise them as a danger. Keeping to open, scarcely vegetated areas is probably the safest thing you can do.

Also...

While snakes are generally less active in the winter time in SE Australia, nevertheless if it is a sunny day they are quite likely to take advantage of the situation and sun themselves just like the rest of us do. Although we think of reptiles hibernating in the winter, we sometimes confuse this behaviour with what might happen, say in north America or Europe where for some time they may be under a layer of snow.

Here in Australia there are very few locations where true hibernation occurs away from the alpine regions. So although it is not as common to see snakes out at this time of the year, it is possible. They would not normally be actively hunting or feeding and probably not far from their refuge and if the air temperature is low, they could be a bit sluggish as well. So in short your observation is unusual but not impossible.

They are most active in the spring/early summer when the males are looking for females. After that they move about far less than at that time. The exception here are Eastern Brown Snakes who are active hunters and move about the country side looking for mice and lizards more than the other large venomous snakes in this region.





ACTHA SUCCESSFUL GRANT APPLICATIONS FOR 2013

ACTHA is delighted to announce that five grant applications have been approved this year. The recipients are:

The Southern ACT Catchment Group for ACT Wildlife: Develop husbandry guidelines for wildlife caring and conduct educational school visits. The Group will be invited to provide a display at *Snakes Alive!* 2014.

Bruno de Oliveira Ferronato, University of Canberra: Assistance in the cost of studying *Chelodina longicollis* in challenging environments.

Damien Esquerre, ANU: Assistance with the cost of scanning the heads of Australo-Papuan pythons for his research of this genus.

Gabrielle Openshaw, ANU: Costs associated with scanning ten Varanidae lizard heads to assist Gabrielle's research into the evolution of monitor lizard head shape.

Marta Vidal-Garcia, ANU: For purchase of a force plate, which will allow Marta to accurately assess the kinematics of all phases of the jumping cycle of Australo-Papuan frogs.

All recipients have been requested to publish or make available detailed results to the general public and these given at a talk to the Association on the conclusion of the project.



LOW FLYING DRAGONS NEED YOUR HELP!

An excellent brochure that illustrates what is possible for farmers to achieve in the way of protecting environments to support **Grassland Earless Dragons** has been included with this Newsletter. The brochure, organised by **Tim McGrath**, describes the species' biology, conservation status, distribution and conservation efforts.

Project Dragon is a collaborative effort by ACTHA, Friends of Grasslands (FOG), Kosciuszko to Coast partnership, NSW Office of Environment and Heritage and the University of Canberra's Institute for Applied Ecology.

The Bombala Times recently ran an article on this project, which can be found at <http://www.bombalatimes.com.au/story/1625933/hunting-dragons/?cs=531>



ACTHA News
PO Box 160
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