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ACTHA Inc. News
Oct - Nov '18
Newsletter of the ACT Herpetological Association Inc.

Annual General Meeting

Notice is hereby given of the 2018 AGM of the **ACT Herpetological Association Inc**. to be held at the Belconnen Soccer Club, Cnr Belconnen Way & Springvale Dr, Hawker, in conjunction with our meeting on **Tuesday, 16 October 2018**, at 7.30pm.

Agenda

Minutes of the AGM held 17 Oct 2017, President's Report, Treasurer's Report.

Nominations are called for President, Vice-President, Secretary, Treasurer, Newsletter Editor, Webmaster, Public Officer, Excursion Officer, Conservation Officer and supporting Committee members. Nominations may be sent to ACTHA by email to **info@actha.org.au** or post to our **NEW PO Box 440 Jamison ACT 2614.**

Nominations will be accepted at the meeting.

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ACTHA Meeting held Tues, 21 August '18: Reptiles galore! several members brought some of their special pets along to this meeting, page 4.

Global and local impacts of chytrid fungus on amphibians, Ben Scheele, ANU College of Science, was our Guest Speaker for our 19 June meeting where he gave a presentation on developments in the chytrid fungus battle, page 6.

A turtle treat at Jerrabomberra Wetlands, uncovering the next generation of baby turtles, page 9.

The Australian & International Scene

The weird, wonderful and worrying world of sea snakes, page 10.

How American scientists are planning to thwart a salamander apocalypse, page 12.

British man dies after bite from sea snake off Australia's north coast, page 15.

Event: Bush Blitz at ANBG, see page 16 for all the details.

Membership renewals now over due, see page 17 to maintain your membership.

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, 16 October 2018

Annual General Meeting

Want to get more involved with ACTHA? Do you have some ideas for excursions and field trips for our membership? Are you breathlessly waiting to contribute your ideas for our next Snakes Alive! Exhibition in January 2019?? Then please come along and offer your help and ideas! We need fresh and enthusiastic Committee members, who meet just before our bi-monthly meetings, which is not onerous. (NB Student reps eagerly sought.)

Our Guest Speaker:

Damien Esquerré, ANU, will be giving a slide show presentation of his trip to Sri Lanka. Those of you who were present at Damien's last presentation will recall his amazing photography of all creatures great and small. This is a meeting not to miss!

Your Committee for 2017 - 2018

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

** Denotes Life Members*

ACTHA Grants made in 2018

Each year the Association makes grants to assist students, researchers and members of the public who are involved in activities that advance the interests of herpetofauna. The funding for these is derived from the earnings made at our *Snakes Alive!* display. The Association is pleased to advise those and their activities who have received a grant in 2018.

1. **Anke Maria Hoefer** Frogwatch for $1500

Name of Project / Activity

How to create a frog friendly habitat

Purpose of Project / Activity

Running 2 workshops on "how to create a frog-friendly habitat". Workshops will preferably take place in the fast-growing areas of Gungahlin and the Molonglo Valley (Coombs and Wright).

Participants will learn how to establish and maintain frog-friendly gardens and how to create a frog-pond on their property.

Each workshop will be based on a power-point presentation about the why, where and how of frog habitat. Important tools and equipment for the establishing of frog habitat, including ponds, will be presented and explained. Examples of successful pond building projects will be shown. Fact sheets, plant lists and a "how to" brochure will be handed out to all participants.

2. **Sarah Whiteley** University of Canberra for $1500

Name of Project / Activity

Effect of temperature on the epigenetic underpinnings of temperature dependent sex determination in two Australian dragon lizards *Pogona vitticeps* and *Amphibolurus muricatus*

Purpose of Project / Activity

Incubation temperature influences the sex of the developing embryo in many reptile species. This is known as temperature dependent sex determination (TSD). Ever since TSD was first described nearly five decades ago, scientists have sought the mechanism by which temperature is translated to a genetic signal that determines sex, yet it remains elusive. Advances in the study of epigenetics (changes in DNA regulation mediated by environmental factors, such as temperature) has allowed for the identification of an ideal candidate for the epigenetic control of TSD. Research has shown that a change in developmental epigenetic regulation known as intron retention in two genes (JARID2 and JMJD3) is associated with TSD in three species.

The aim is to demonstrate that IR is an essential epigenetic regulator of temperature dependent sex determination in two native Australian lizards: the Central Bearded Dragon, *Pogona vitticeps,* and the Jacky Dragon, *Amphibolurus muricatus*.

3. **Carlos Joaquin Pavon Vazquez** Australian National University for $1500

Name of Project / Activity

Resolving the taxonomy of two Australian monitor lizards

Purpose of Project / Activity

Resolve the taxonomy of two widespread and polytypic monitor lizards, *Varanus acanthurus* and *V. tristis*, using genomic data and morphology.

4. **Kristoffer Wild** University of Canberra for $1500.

Name of Project / Activity

Identifying and understanding the specific behaviours of a common lizard and the role these behaviours play in shaping sex-reversal

Purpose of Project / Activity

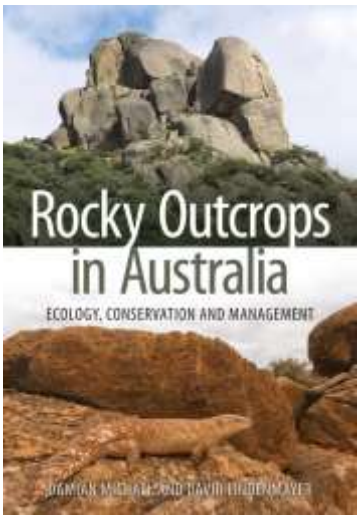
The broad purposes of the project are to understand the role behaviour plays in reproductive transitions between genetic and temperature-dependent sex determination under natural conditions. This will be accomplished in two parts that relate to understanding the differences in activity and behaviours among male, female, and sex-reversed lizards. Firstly, we plan to quantify and categorize specific behaviours of *Pogona vitticeps* with accelerometers under laboratory settings. In the lab we will quantify forging, mating, running, and aggressive behaviours with the use of an accelerometer and a video camera. Videos of specific behaviours will be analysed and matched to the x/y/z data from the accelerometer.

The second part of the study will use the same accelerometers to then see how specific behaviours, that were quantified in the lab, vary by sex under natural settings in the field. This behaviour data will complement a current radio telemetry project tracking movement patterns of male, female, and sex-reversed males.

2 good books have been made available to ACTHA members at a heavily discounted price

Rocky Outcrops in Australia: Ecology, Conservation and Management

Damian Michael,
David Lindenmayer



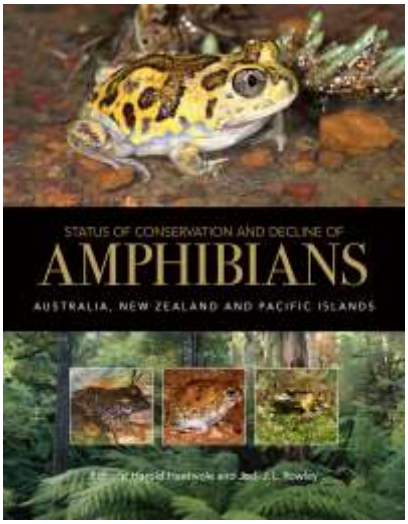
Rocky outcrops are landscape features with disproportionately high biodiversity values relative to their size. They support specialised plants and animals, and a wide variety of endemic species. To Indigenous Australians, they are sacred places and provide valuable resources. Despite their ecological and cultural importance, many rocky outcrops and associated biota are threatened by agricultural and recreational activities, forestry and mining operations, invasive weeds, altered fire regimes and climate change.

Rocky Outcrops in Australia: Ecology, Conservation and Management contains chapters on why this habitat is important, the animals that live and depend on these formations, key threatening processes and how rocky outcrops can be managed to improve biodiversity conservation in agricultural landscapes, state forests and protected areas. This book will be an important reference for landholders, Landcare groups, naturalists interested in Australian wildlife and natural resource managers.

Paperback | Feb 2018 | CSIRO Publishing | 9781486307906 | 184pp | 245x170mm |RRP AUD$49.95 | **Cost Price $29.97**

Status of Conservation and Decline of Amphibians: Australia, New Zealand, and Pacific Islands

Edited by Harold Heatwole,
Jodi J. L. Rowley



Amphibians are among the most threatened groups of animals on earth. In part due to their highly permeable skin, amphibians are highly sensitive to environmental changes and pollution and provide an early-warning system of deteriorating environmental conditions. The more we learn about the impact of environmental changes on amphibians, the better we as humans will be able to arrest their demise, and our own.

Status of Conservation and Decline of Amphibians brings together the current knowledge on the status of the unique frogs of Australia, New Zealand, and the Pacific. Although geographically proximate, each region presents unique challenges and opportunities in amphibian research and conservation. This book contributes to an understanding of the current conservation status of the amphibians of each region, aims to stimulate research into halting amphibian declines, and provides a better foundation for making conservation decisions. It is an invaluable reference for environmental and governmental agencies, researchers, policy -makers involved with biodiversity conservation, and the interested public.

Hardback | Jun 2018 | CSIRO Publishing | 9781486308385 | 248pp | 270x210mm |RRP AUD$160.00 | **Cost Price $96.00**

Please contact Margaret to register your interest for either publication:

margaretning1@gmail.com **or** 0427 788 304

Once your order is confirmed payment will need to be made into ACTHA's bank account:

ACTHA BSB 112-908, A/c 486822880
[*quoting your name as reference*.]

[NB. A $10 bulk delivery fee will apply if we do not meet the $150 total minimum order.]

ACTHA meeting held Tuesday, 21 August 2018

Reptiles galore!

This summary by Dennis Dyer and Margaret Ning

At this meeting our members got to see some wonderful reptiles owned by their fellow enthusiasts. We spent the whole evening talking, handling and admiring the reptiles who came along courtesy of their owners.

First up was **Skott**, *above*, who talked about the **3 Antaresia species** he brought along to the meeting: Stimson's, Children's and Spotted Pythons. He highlighted where each reptile was acquired from as well as aspects of their demeanour and husbandry.

A six year old adult along with a couple of very young examples where admired by his ACTHA audience before they started asking their questions. Most related to how he managed the day to day care of a large collection of pet reptiles. Keeping accurate daily records, as left, was the key.

Next in line was **Iris** with her **Children's Python, Clyde**, *right.*

Clyde failed to thrive in the first 3 years of his life; he ate very little with his former owner. It took Iris over a year to encourage him to eat properly. Iris succeeded in maintaining a new feeding regime, only to take a step backwards the year Clyde was shown and housed at a *Snakes Alive!* event. He just couldn't cope being in what was perhaps a stressful situation for him. Visitors to 'his permanent residence' are well received however, and he loves to meet and greet people in short stints.

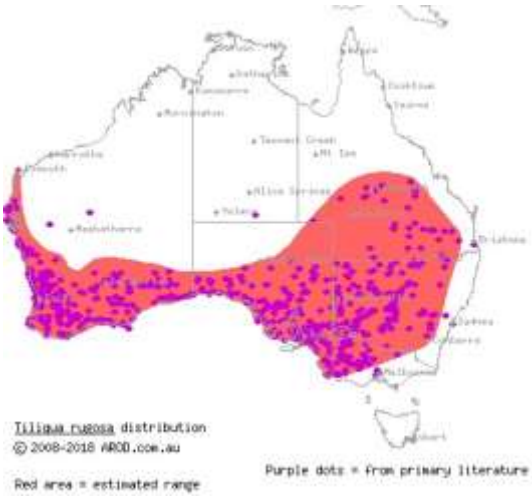
Our relatively new member **Allie** followed on with her special pets: **two subspecies of shingleback skinks**: *Tiliqua rugosa rugosa* from the Goldfield-Esperance region in Western Australia and *Tiliqua rugosa asper* from South Australia. Allie has written the following to provide members with more information about her pet species.

'An introduction on the description and distribution of *Tiliqua rugosa*, the Shingleback Lizard'

By Allie Bryan, Tiliqua keeper and enthusiast

At the most recent ACTHA meeting, I was given the opportunity to discuss the different subspecies of *Tiliqua rugosa*, one of the more unique blue-tongues.

Tiliqua rugosa were first documented by zoologist John Edward Gray in 1825. Shinglebacks, as they are more commonly referred to, are found throughout Australia and are known by different common names, some of which include the names bobtail and sleepy lizard.



(Reptiles galore, cont'd,...)

There are four subspecies of shingleback:

- Eastern Shingleback, *T.r. Asper*.
- Shark Bay Shingleback *T.r. Palarra*
- Rottnest Island Shingleback, *T.r. Konowi*
- Bobtail or Western Shingleback, *T.r. Rugosa*

Shinglebacks are found in parts of Queensland and around most southern parts of Australia, aside from the east coast. *Rugosa* is not found in the Northern Territory or Tasmania, as they are highly susceptible to the cold and humidity. Three of the subspecies are found only in Western Australia.

T. konowi, or Rottnest Island shinglebacks, are a protected subspecies and not allowed to be kept in captivity. They are speckled green and black in colouring and are only found on Rottnest Island. The animals are protected on the island, however, can found bred in captivity outside of Australia due to illegal export.

The second unique subspecies to WA is *T.r. palarra* or Shark Bay Shingleback. Shark Bay is an isolated area in WA, located approximately 800km north of Perth. In appearance, *T.r. palarra* has a dark brown base colour with cream patches. *Palarra* appear to have a narrowing pointed nose and tail. Like *T.r. konowi, T.r. palarra* is not kept or bred in captivity within Australia.

The third and most common shingleback in WA is *Tiliqua rugosa rugosa*. There are three main localities: Hills, coastals and goldfields. These animals have tough, bumpy scales but are very smooth to the touch. Hills and coastals come in shades of pale grey to black and browns to cream, and commonly have yellow to orange colouring to their heads. Although coastals and hills are different forms of *rugosa*, sometimes their appearance is equally varied and interchangeable. Goldfields, however, are more distinct in their colouring. Goldfield shinglebacks are found throughout the Goldfields-Esperance region of WA. Their colouring ranges from pale yellow orange to a deep red with prominent thick black stripes- some have a diamond pattern variation and are almost completely black. Of all the shinglebacks, Goldfields are the most vibrant and striking in colour. Goldfields are desert animals and have adapted to blend in with their environment which brings out that rich colouring from the golden red sands of the Western Australian outback.

The last and most commonly recognised subspecies of shingleback is the Eastern Shingleback, *T.r. asper*. Their colours range from black to brown and speckled yellow. *Asper* means rough and is a great way to describe the rough texture of their scales. *Aspers* are found in QLD, NSW, SA and south-eastern WA. The darker shinglebacks absorb more heat and are more tolerant of cooler areas, which is why most shinglebacks in southern NSW to VIC have evolved that way.

In my experience, shinglebacks are solitary animals but do mate for life and in captivity are capable of living with and form bonds with other shinglebacks. Shinglebacks are placid in nature but will sometimes express a warning with a tongue display to scare potential predators if feeling threatened or at times expressed in males during mating season. All *rugosa* subspecies have a thick tail akin to their heads to confuse predators, that's just another example of what makes these blue-tongues so unique.

It has been a pleasure to talk about one of my favourite reptiles and some of the lesser known variations of *Tiliqua rugosa*.

Global and local impacts of chytrid fungus on amphibians

ACTHA meeting held
Tuesday, 19 June 2018

Our Guest Speaker in June

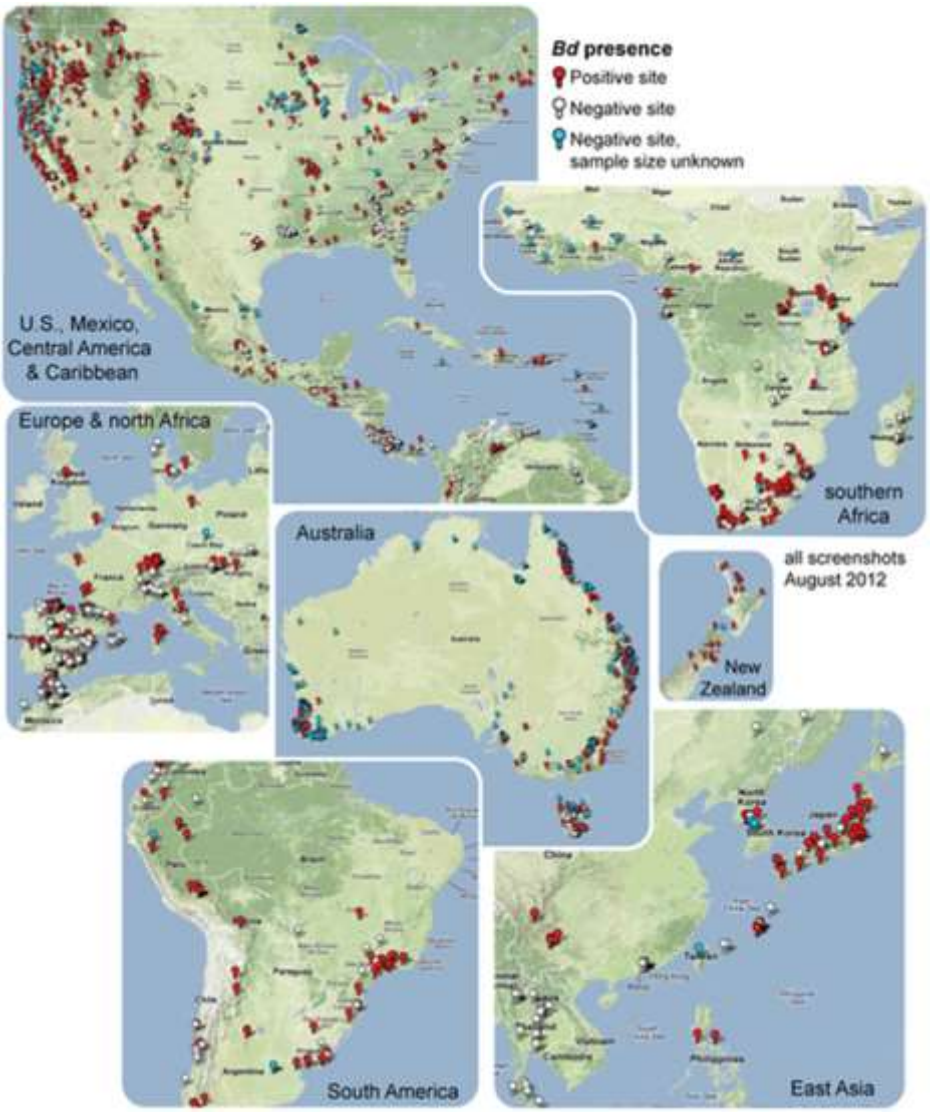
Ben Scheele, ANU, *gave a talk which focussed on current research efforts to understand whether environmental conditions and the presence and abundance of reservoir hosts influences the ability of Northern Corroboree Frog populations to persist in the wild at sites where chytrid fungus is present.*
The following article and images were kindly supplied by Ben.

Frogs are in trouble. A third of all frog species are threatened with extinction. The usual culprits of habitat loss and climate change are at work, but another more insidious threat looms. A devastating disease called chytridiomycosis has been wiping out frogs, often from pristine habitats. The disease is caused by a fungus – amphibian chytrid fungus (pronounced kit-tyrid). The fungus disrupts the skin function of infected frogs leading to cardiac arrest (heart attack).

The numbers are sobering. Since the identification of chytrid by Australian researchers in 1998, the pathogen has been documented in over 500 amphibian species, and is now found on all continents (except Antarctica). Fortunately, the pathogen is not universally deadly with some species demonstrating high resistance (though this produces some problems of its own as I'll explain later).

However, many species are highly susceptible and the pathogen has been identified as the primary driver of decline for over 200 species of frog! Consider that for a moment. Enormous effort is put into saving vertebrate species from extinction and when, for example, a microbat, the Christmas Island pipistrelle, went extinct in 2009 there was an enormous outcry. Chytrid is threatening over 200 vertebrate species with extinction.

It's believed that 113 of these species are likely already extinct.



Olson et al. 2012, Mapping the Global Emergence of Batrachochytrium dendrobatidis, the Amphibian Chytrid Fungus. PloS One

Chytrid in Australia

Although the origin of chytrid remains uncertain, recent evidence suggests the pathogen may have originated from Brazil and has since been distributed around the globe unwittingly by humans.

The earliest record of chytrid in Australia is from a frog specimen in a museum collected in 1978, in south-eastern Queensland. From a potential introduction point of Brisbane, chytrid appears to have spread rapidly both north and south, reaching far north Queensland in the mid-1990s and Tasmania by 2004.

The cooler, wetter conditions of the Great Dividing Range have proved highly suitable for the pathogen and its impacts have been severe along the entire east coast of Australia. While chytrid is now present throughout eastern Australia, luckily, it doesn't

tolerate the hot, dry conditions found in many inland regions.

Over the past three years we have focused on the long-term impacts of chytrid on frogs of the Australian High Country – a region that is home to several frog species found nowhere else in the world. In the mid-1980s mysterious frog declines were reported from the region and, with the benefit of hindsight and retrospective museum sampling, we can now be confident that these declines were caused by the initial emergence of chytrid. In conjunction with Threatened Species Manager David Hunter from the NSW Office of Environment and Heritage we have examined population trends of susceptible species and the ongoing threat posed by chytrid three decades after its emergence.

Broadly speaking, impacted frog species can be classified into three groups: declining, stable and recovering.

Moving towards extinction

Let's get the bad news out of the way first. Worryingly, some species are in a continued state of decline, being pushed closer and closer to extinction every day. These declining species include some of our most iconic fauna, the corroboree frogs.

The northern corroboree frog was once highly abundant in Kosciuszko and Namadgi National Parks. In the 1980s, populations were decimated by chytrid, with dramatic declines and many local extinctions. Seemingly overnight, chytrid almost turned the lights off on the northern corroboree frog; this in highly protected habitat. However, as with many other chytrid-affected species, a handful of remnant populations survived.

Unfortunately for the northern corroboree frog, the common eastern froglet – a highly resistant species – also remains abundant at these sites. In ongoing research, we have shown that the common eastern froglet acts as a reservoir host – a species that carries infection, but is rarely killed by disease. The presence of a reservoir host amplifies the impact of the disease in corroboree frog populations and drives ongoing declines. Although the prognosis for the corroboree species is alarming, understanding the mechanism controlling chytrid dynamics is facilitating the development of innovative management strategies.

Hanging in there

While it is clear that some species are in an ongoing state of decline, for other species, such as the endangered alpine tree frog, the situation appears a little better. The alpine tree frog experienced a similar pattern of decline to the corroboree frogs. Remnant populations of alpine tree frogs, however, now appear relatively stable despite the continued presence of chytrid. Studying these populations, we have found that their persistence is facilitated by high juvenile frog recruitment (Scheele et al, 2015).

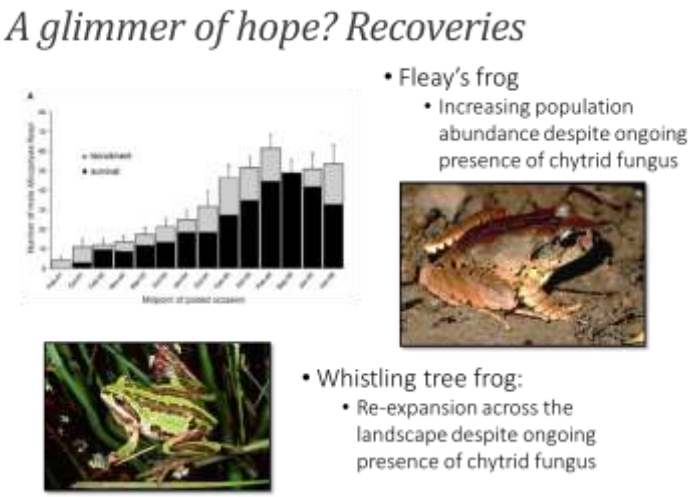
During the breeding season, the prevalence of chytrid can exceed 90% in adults, resulting in very low survival between years. Crucially though, the pathogen is rare in tadpoles and juvenile frogs. This allows the next generation to disperse into woodland habitat free of the disease. Because chytrid is an aquatic pathogen, individuals have low risk of becoming infected in terrestrial environments. However, when individuals reach sexual maturity they re-turn to wetlands to breed and subsequently become infected. Luckily, adults are able to breed prior to succumbing to the disease.

Bouncing back

Although the impact of chytrid has been horrendous, it's not all bad news. In the foothills of the Snowy Mountains, the whistling tree frog, a close relative of the alpine tree frog, is bouncing back (Scheele et al. 2014a).

Surveys in the 1970s found that whistling tree frogs were ubiquitous on the NSW southern tablelands; if there was a pond or farm dam, they were just there. Like so many other species, whistling tree frog populations crashed in the 1980s and the species was considered rare in the Canberra region by the early 1990s.

When we commenced our surveys in 2011, we found that the species was present in many areas where it was absent two decades earlier. Ongoing surveys in 2012 and 2013 demonstrated that, year by year, the species is re-expanding into habitat occupied decades ago. Whilst more work remains to be done on the mechanism facilitating recovery (chytrid prevalence remains high and appears to drive high adult mortality), we found that sites that retained frogs during the cycle of population decline and recovery had high quality habitat.



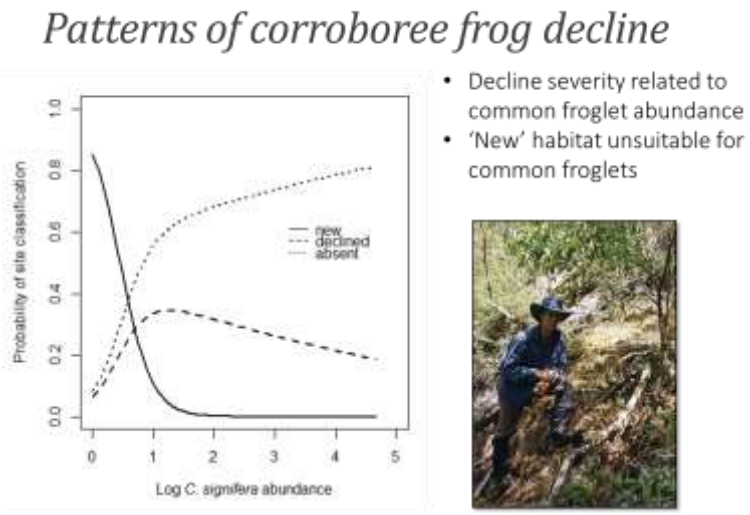
This highlights the potential for habitat to buffer species from novel shocks.

A framework for innovative intervention

In Australia, some frog species are in an ongoing state of decline due to chytridiomycosis. Without conservation interventions, the number of Australian species driven to extinction by chytridiomycosis will almost certainly rise. While preserving habitat is crucial, it is not enough on its own to mitigate the effects chytrid fungus on many species. Appropriate and complementary direct action is also required.

Building on our field research and a review of the international literature, we developed a framework to help guide the management of chytrid-threatened species (Scheele et al. 2014b). Within our framework, we identified two broad management approaches: 1. reducing chytrid fungus in the environment or on amphibians and 2. increasing the capacity of populations to persist despite increased mortality from disease.

At a national level, a whole raft of measures ranging from investigating frog capacity for



evolved resistance to assisted translocation into environments with low disease suitability are needed to combat chytrid fungus.

Responding to the chytrid threat has appeared extremely daunting over the last 15 years. However, our research indicates we are now at a turning point, with the potential to make real progress in the management of this terrible disease.

A turtle treat at Jerrabomberra Wetlands

By Margaret Ning, 8 October 2018

My granddaughters recently had a very special experience at Jerrabomberra Wetlands. They were part of a group that helped to uncover and then excavate three turtle nests at the wetlands. The eggs had been laid on a rainy night in October a year ago, had hatched in February this year, and the babies had remained in the nest, under the soil, normally expecting to emerge on another rainy moment in October/ November this year.

The problem is that foxes are so prevalent at the wetland that they lie in wait for the females to finish laying the eggs and then dig them up and consume them. To prevent this, volunteers venture out on the rainy October nights, observe the females laying their eggs, and once she has finished, a one foot square mesh is immediately laid over the freshly buried nest, pegged down, and left. These nests then require human intervention at the 'emerging' stage.

The first step in the turtle release process involved the dedicated turtle watchers removing the 'plug' that the mother turtle had sealed the nest with. The volunteers' gentle digging continued until the baby turtles were uncovered. Further digging proceeded until they reached the bottom of the nest where the empty egg shells were revealed. A total of thirty babies were removed from the three nests. All were put into shallow water in a bucket in preparation for their release.

The next stage was the release of the turtles into part of the wetlands, which was quite a trek away. All the babies were gently and safely released into a quiet corner of JW, a reasonable distance away from the pelicans, cormorants and other predators that suddenly seemed to abound!

Next on the program was some volunteer work also down by the wetland, where some grasses and shrubs had been planted some time back, and were crying out for a drink. Volunteers used buckets to move the water from the water cube to all the new plantings.

A bonus for the kids' curious eyes was a birding scope trained on a threatened bird species, Latham's Snipe, at the edge of the wetland.

The weird, wonderful and worrying world of sea snakes

By Jo Khan for Off Track, ABC News, 23 August 2018

http://www.abc.net.au/news/science/2018-08-23/sea-snakes-and-their-wonderful-world/10077300?

Above: You might have heard rumours and myths about sea snakes, but scientists want you to know they are often misunderstood. Image Matt Curnock.

Close your eyes and take the plunge. Imagine, diving into the ocean and coming face to face with the beady eyes and flicking tongue of a sea snake.

That's just another day at work for PhD student Blanche D'Anastasi from James Cook University.

"I must have swum with thousands of snakes by now," she says.

"They zoom right up to me and I think they're checking if I'm going to try and eat them."

Australia's sea snakes are curious creatures, often wriggling out of their coral hidey-holes to say hello to unusual visitors.

"They will come and have a little look, and then go about their business," Ms D'Anastasi says.

For a long time, sea snakes have slipped through the cracks of ocean — and reptile — conservation.

Now, scientists like Ms D'Anastasi are trying to understand why the marine reptile is mysteriously disappearing from some of our reefs.

Vanishing act

Hundreds of kilometres from the northern coast of Western Australia, lies an idyllic underwater wilderness.

Expeditions to Ashmore reef in the 60s and 70s revealed the area was home to more sea snakes — in species and in numbers — than anywhere else in the world.

A veritable hotspot of sea snake biodiversity, with over 10 different species all cohabitating on the same remote patch of protected coral reef.

Then, they were gone.

"In 2012 there were no snakes left. We thought we'd lost a couple of species that they'd gone extinct," Ms D'Anastasi says.

There was a glimmer of hope when two of the "extinct" species showed up on the Western Australian coast.

But no-one knew what caused them to disappear in the first place.

"We still don't," says Kate Sanders, an evolutionary biologist at Adelaide University.

"It could be to do with changing predator dynamics or disease," says Dr Sanders, who has been studying Australia's sea snakes for the past 10 years.

"We can rule out coral bleaching because we know that nearby bleached reefs maintained sea snake populations."

Evolutionary marvels

The sudden decline of sea snakes at Ashmore Reef indicates the reptiles are vulnerable.

And scientists are concerned this decline may be happening on other reefs.

"We don't know enough about existing populations of sea snakes to be able to detect declines in other locations," Dr Sanders says.

"So similar declines might be happening outside of Ashmore reef, but we won't know."

When scientists began studying sea snakes in earnest, they soon realised there was a deep trove of evolutionary and ecological secrets to untangle.

For a start they are incredibly diverse, Dr Sanders says.

"[Some snakes] feed on burrowing eels, on fish eggs. Some species only dive to a few metres, while others dive past 100 metres. And some are [found on] blue water reefs, while others in inshore turbid environments," she explains.

Above: The olive sea snake is one of the most common around Australia's coasts. Image: Jon Mills.

They also evolved quickly from their land-based cousins.

Roughly 10 million years ago, some of Australia's most venomous terrestrial snakes started to transition toward a semi-aquatic, and eventually fully-aquatic lifestyle.

The tapered tail of the land-based snakes transitioned to a flattened, paddle-like tail allowing sea snakes to efficiently propel themselves through the water.

And while sea snakes retained the single body-length-long lung of their terrestrial counterparts, they also evolved the ability to supplement their oxygen intake through their skin so they could breathe when underwater.

But there are traits they still have in common with their land relatives.

"They do have big, fixed front fangs, a flip-top head like a python, and they are really venomous," Ms D'Anastasi says.

So there goes a myth that they have little fangs and can't open their mouths very wide.

But if you leave the snakes alone, they aren't aggressive, she says.

Snakes and sensibility

The fast-paced evolution of sea snakes can also tell us a lot about how other reptiles evolved, says Jenna Crowe-Riddell who is a PhD student studying sensory evolution at the University of Adelaide.

"They are a great system for studying a comparative approach of evolution, including their sensory systems," Ms Crowe-Riddell says.

All lizards and snakes have little bumps in varying sizes and numbers on their scales, called sensilla.

"They are in highest numbers on the head — some snakes can have up to 6,000 of these little organs — and they help them move through the world in a tactile way.

"They're for sensing their immediate environment," Ms Crowe-Riddell says.

However, it could be a different story for sea snakes.

"When you're underwater there is potentially this new sense where anything in the water will generate a ripple or vibrations that can get carried through the medium," she says.

Sea snakes are the perfect study organisms to understand the evolution of sensory mechanisms. Image: Blanche D'Anastasi.

When Ms D'Anastasi heard about this discovery it "rocked her world" because the sea snakes she encountered appeared to pick up her presence from very far away.

"Turns out you cannot sneak up on a sea snake," she says.

Local conservation key

Scientists also need to know where sea snakes live, if they are going to try to protect them and prevent further declines.

Ms D'Anastasi has spent a lot of time hanging off the back of boats looking for sea snakes to take a scale sample from for DNA analysis to find out whether different populations of sea snakes are related.

"I looked at the DNA of Shark Bay sea snakes, and found that they don't move far to breed.

"It means that if you're doing a good job in your local management area, you're doing the best job possible to protect those sea snakes," she said.

Analysing the DNA of many different populations of sea snakes showed that they don't overlap at all, and have very distinct genetic fingerprints.

"Once they're gone, they're gone for a really long time, if not for good," Ms D'Anastasi says.

"We have to do well at a local scale so we don't lose them population by population."

Sea snake champions

A lot of people dislike snakes, and many people aren't overly fond of the ocean, making sea snakes enemy number one for many — despite the fact they very rarely interact negatively with humans.

Scientists like Ms Crowe-Riddell are trying to give their image a makeover, and help people understand their complexities.

But another reason they have previously slipped through the cracks is that even scientists aren't sure who should be studying sea snakes.

"Sea snakes often get ignored by herpetologists because they're in the ocean and too hard to get to," Ms Crowe-Riddell says.

"Or if you're a marine biologist, you see them in the ocean but you might think 'oh that's a reptile' and ignore them as well.

"So they kind of sit in this weird space and haven't been as well studied."

And, she says, learning about sea snakes has implications for more than herpetologists or marine biologists.

"If you want to know how animals change in response to major shifts in their environment, sea snakes are a really good group to study those big questions," Ms Crowe-Riddell says.

Luckily for sea snakes, they now have a passionate team of scientists working hard to understand and protect them.

How American scientists are planning to thwart a salamander apocalypse

By Benji Jones, smithsonian.com, 1 August 2018.

https://www.smithsonianmag.com/science-nature/how-american-scientists-are-planning-thwart-salamander-apocalypse-180969809/

Yet another fungus threatens to decimate amphibians in North America, but this time, scientists stand ready.

They didn't see it coming.

By the time scientists discovered the first outbreak of chytridiomycosis, a disease caused by a fungus called *Bd*, it was too late; worldwide, the pathogen had already begun tanking populations of some 200 species of frogs that have gone extinct since the 1970s.

That was then. Now, another closely-related fungus called *Bsal* threatens to release a new wave of chytridiomycosis on amphibians—and this time, salamanders are the target. Though *Bsal* remains isolated in Asia and Northern Europe, researchers say it's only a matter of time before it reaches the United States, home to the world's highest salamander diversity.

But when the new pathogen strikes, scientists won't be caught off guard.

With the devastating impacts of *Bd* still fresh in their minds, they've mounted a defense against *Bsal*—a volunteer-led task force, comprised of researchers from academia, government and nonprofits, that's been preparing for the pathogen's arrival for years.

"We're preparing ourselves enough so we can pounce on it when it's detected—and maybe actually contain it," says Priya Nanjappa, a program manager at theAssociation of Fish and Wildlife Agencies, who's a core part of the response effort. "The potential for impact is immense."

Whether their efforts will be enough to prevent another amphibian epidemic in the U.S., however, hinges on how quickly they can detect an initial outbreak. And even if they are prepared, Nanjappa says, "it's definitely going to be an experiment when it gets here."

A perfect pathogen

The emerging pathogen *Bsal* is like something out of the Ridley Scott movie *Alien*. Like its

Right: When Bsal first arrived in the Netherlands, the pathogen wiped out 96 percent of the resident population of fire salamanders in a few years. Image: Wikimedia Commons.

relative *Bd,* spores ejected into the environment latch onto the skin of a host—in this case, at least a few dozen species of salamanders, research suggests—and then begin to consume the amphibian's skin to build root-like masses and "mother cells," which fire off even more spores. The salamander dies in as little as a week as a result, but not before the fungus multiplies and seeks out additional hosts.

Above: A fire salamander covered in Bsal ulcerations.
Image: F. Pasmans via Wikimedia Commons.

The potential impact of *Bsal* was evident when it first arrived in the Netherlands, likely through the pet trade from Asia where it's believed to be native. There, the pathogen wiped out 96 percent of the resident population of fire salamanders in a few years. And it's since been discovered in wild populations of other species like the alpine newt in neighbouring countries.

The pathogen now appears to be spreading—both in the wild and through the pet trade, experts say.

"We've seen several instances of it moving through the pet trade in Europe," says Katie Richgels, chief of the Applied Wildlife Health Research Branch of the National Wildlife Health Center. "The pet trade is by far the biggest reason why we're moving amphibians around."

As a precautionary measure, the U.S. Fish and Wildlife Service placed an import ban on 201 salamander species thought to be potential vectors of the disease in 2016. These species were listed as "injurious" to wildlife under the Lacey Act—rarely used to thwart wildlife diseases—restricting their importation and interstate movement.

But even a ban won't be enough to block *Bsal*'s arrive, says Stefano Canessa, a research fellow at Ghent University in Belgium, who's been involved in mitigating the pathogen's impact in Europe. It will find a way here, he says, if not through trade, then through an agriculture stow-away or the mud on the bottom of a hiker's boot.

"Due to the size of the trade and the numbers we're playing with, introduction is basically a certainty," he says. "It will come in if it's not already there."

Scientists in the U.S. are worried.

In many ways, *Bsal* is a perfect pathogen, they say. It's not only highly virulent—its effects are severe and swift—but it can also persist in the environment for days without a host. It can even be carried on the feet of wading birds, research shows, which could further aid its spread.

There's another reason why *Bsal* is so nasty: While the pathogen may be lethal to at least 60 species of salamanders in the U.S., scientists believe that other species—like the midwife toad and the alpine newt—can carry *Bsal* yet remain asymptomatic. In other words, they serve as "reservoirs" for the disease.

"They don't get sick, but they're spreading it to those that are susceptible," Richgels says. "In the disease world, that's really hard to manage."

But scientists in the U.S. do have an advantage that offers a glimmer of hope: time and experience.

Preventing a pandemic

When *Bd* was first described in 1999, it was already at work for nearly two decades, scientists say, lethally infecting frogs in a similar way to how *Bsal* infects salamanders; the two fungi are in the same genus, *Batrachochytrium,* and they both produce the disease chytridiomycosis. At the time, researchers knew little about the disease's pathology and how to prevent it from spreading.

That's what makes the emergence of *Bsal* so unique. Scientists in the U.S. not only have time ahead of its arrival to prepare, but they also have a general idea of what to expect.

"We have a huge toolkit now," says Jake Kerby, a biologist at the University of South Dakota who's been working on *Bd* for a decade. And it includes "the ability to very quickly assess the presence of these diseases."

"That's a huge advantage," he adds.

In 2015, a group of scientists, government officials and other researchers seized the opportunity. Motivated in part by fear—many having witnessed the impacts of *Bd* and other wildlife diseases like white-nose syndrome—they formed the country's greatest defense against another chytridiomycosis epidemic: The National Bsal Task Force.

Sure, it's not as sexy as the Avengers, but for the country's salamanders, which play a critical role in any environment, from transporting nutrients between habitats to feeding other species, they are indeed superheroes.

Their goal is simple: Prevent *Bsal* from spreading among salamander populations in the U.S.

Central to that mission is a 30-page emergency response plan, published in June. It reads something like a guidebook for a zombie outbreak: "Individual quarantine for all potentially exposed animals until causative agent is determined," reads one step. "Restricted public access to the exposed area (s)."

"The response plan has an exhaustive list of scenarios," says Reid Harris, co-lead of the task force, from discovering a confirmed case of *Bsal* in the wild to hearing about a sick salamander in captivity. Now that the plan is drafted, the next step is helping state wildlife agencies understand and be ready to implement the plan, he says.

The plan isn't designed to stop the pathogen altogether, Nanjappa says. Rather, it's meant to minimize the pathogen's reach and, in doing so, buy the task force time to come up with treatment or a cure.

"Right now we don't have an answer to *Bsal*, but that doesn't mean we won't," Richgels says. "If we find it early there are things we can do to slow the spread, which gives us time to find answers—treatments, cures and whether there's some way to treat the environment."

Indeed, there are still massive gaps in research, Kerby says. Scientists need to better understand which species of salamanders in the U.S. are susceptible to *Bsal*—and to what extent. Without knowing which kinds of salamanders are most vulnerable to the disease (and which are already at risk from other pressures like habitat loss), he says, it's difficult to efficiently allocate resources.

Above: Midwife toads, known for carrying their eggs on their back, can carry Bsal without showing symptoms of the disease. Image: Buiten-Beeld/Alamy.

Kerby and other researchers are also scrambling to find ways to rid the pathogen permanently. While they've already learned that the right combination of temperature and antifungal agents could treat individual salamanders—in part, thanks to previous work on *Bd*—a treated salamander could simply walk back into the environment and contract the disease again.

But there's a new line of research that's showing promise: "probiotics."

Not all species of salamanders are susceptible to chytridiomycosis, research has shown, and scientists believe that natural immunity is linked to beneficial bacteria found on amphibians' skin. In other words, some salamanders may have a microbial army, of sorts, ready to fight off *Bsal* as it starts to invade. If researchers can identify what the soldiers look like—what kind of bacteria they are, that is—they might be able to create a "probiotic bath" for salamanders.

But they're still far from a cure. Until one's developed, scientists are on high alert for sick or dead salamanders, especially in the Appalachian Mountains and Pacific Northwest, where their diversity is greatest.

"Any suspicious-appearing amphibians should be investigated," the plan says. It goes on to describe symptomatic animals as "sick or lethargic individuals, those with black circular or oblong lesions, or inability to right themselves."

Scientists still worry they won't discover the disease right away, even with state wildlife agencies on the ready, armed with a response plan. The area over which *Bsal* could invade is vast and the resources for surveillance are limited, they say.

That's why it's so important that everyone, including the general public, assist in the hunt, Canessa says. "There are lots of people out there like hikers that could report *Bsal*," he says. "To harness that potential is our best bet."

To that end, Partners in Amphibian and Reptile Conservation, a network of nonprofits, federal agencies and other institutions dedicated to the conservation of herpetofauna, launched an email-based disease alert system last summer. They encourage everyone to report signs of *Bsal.*

"We want reports of apparently sick, dying or dead animals with disease signs," Dede Olson, an ecologist with the U.S. Forest Service, said in a press release. "It would help if the greater community of nature enthusiasts and recreationists would report their observations of disease events, as these can be cryptic and go unnoticed."

A few recent reports have been unnerving, Nanjappa says, including one about salamanders with lesions on their skin. But tests revealed all of them to be false alarms—still, there's no sign of *Bsal* in the United States.

"As far as far as we know, nothing has come back with a *Bsal* positive," she says. "That's great news, absolutely." But, from here, it's a question of when—not if—the disease will arrive.

British man dies after bite from sea snake off Australia's north coast

Man, 23 and reportedly a backpacker, bitten when pulling up net on fishing boat

Agence France-Presse, Friday 5 October 2018

A young British man has died after being bitten by a sea snake while working aboard a fishing trawler off Australia's northern coast.

The 23-year-old was bitten as he pulled up a net around noon on Thursday, when the vessel was about 70 nautical miles south of Groote Eylandt, an island in the Gulf of Carpentaria, Northern Territory police said.

Deaths from sea snakes are rare despite their deadly venom.

St John Ambulance operations manager Craig Garraway told the Northern Territory News paramedics went out to the trawler "but unfortunately by the time they got out there he had passed away".

The boat eventually docked at the small township of Borroloola where the man, reportedly a backpacker, was declared dead.

Police said the British embassy was notified of his death and a postmortem examination would be conducted.

Some 30 of the 70 known species of sea snake – marine reptiles found in tropical waters – are found in Australia.

Sea snakes are venomous but considered to be non-aggressive and rarely attack unless provoked.

The Marine Education Society of Australasia said most sea snake bites occur on trawlers, although only a small proportion are fatal to humans as it is rare for much venom to be injected.

It said there were no deaths previously recorded from bites in Australian waters.

Bush Blitz at the Australian National Botanic Gardens (ANBG)

DATE	**Sunday 2 December 2018**
TIMING	**10am–3pm**
PURPOSE	To hold a fun educational event that raises awareness of taxonomy, Bush Blitz, and the Australian National Botanic Gardens.
TARGET AUDIENCE	General public – all ages, local residents and visitors to Canberra
KEY MESSAGES	• Taxonomy is the science of naming and sorting plants and animals; only 1 in 4 plants and animals have scientific names; identifying species is key to saving them. • Bush Blitz is an Australian species discovery partnership between the Australian Government, BHP and Earthwatch Australia. • The ANBG conducts research on plant taxonomy, and conserves and educates people about biodiversity.
ACTIVITIES	• Bush Blitz scientists will lead collecting trips in the Gardens. A 'field lab' will be set up in the Crosbie Morrison Building and visitors will be able to interact with scientists throughout the event. Scientists will prepare specimens and showcase what they have collected during the first few days of the Bush Blitz. • Hands-on activities, that encourage people to be more aware of biodiversity and to learn how to identify species, will be provided by a wide range of government and community groups e.g. water bug ID, seed collecting, bird ID, insect art workshops, demonstrations of Canberra Nature Map…
WHAT YOU GET OUT OF IT	• An opportunity to showcase what you do, to encourage people to learn more about taxonomy/biodiversity, and to network with like-minded people.
WHAT WE ASK FROM YOU	• Bring your enthusiasm for nature/taxonomy/biodiversity and share it with everyone. • Keep your space tidy, clean up any mess/take away any waste that you create. Minimise waste paper by distributing information electronically wherever possible e.g. display a copy of your promotional material and encourage people to take a photo of it.
PROMOTION	• Bush Blitz will promote the event and provide details at bushblitz.org.au. Please help us by promoting the event to your members/staff/volunteers.
CONTACT DETAILS	Event coordinator – Paula Banks 6250 9476

Toad vs toad: outwitting the cane toad with ingenious biology

When the cane toad invasion advanced through Northern Australia and threatened the snakes Rick Shine was studying, he was forced to switch his scientific attention to toads.

Quickly understanding the futility of trying to eradicate the cane toad, Rick devised a radical solution.

His idea, met with huge scepticism, was to influence biology by training native animals to prefer a smaller, less-toxic toad.

Rick's had a lifelong fascination for reptiles, stemming from a boyhood love of snakes. He's conducted studies into snakes all over the world, and is recognised as a leading herpetologist.

Rick's research and teaching have seen him awarded with many honours and prestigious positions, including multiple Eureka Prizes. In 2016, he won the Prime Minister's Prize for Science.

A 50 minute interview by ABC Radio with Dr Shine can be found at the following web address http://www.abc.net.au/radio/programs/conversations/rick-shine/10283694

Christmas party for ACTHA members

from 6pm, on a Friday
mid December 2018

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

Details next Newsletter

RENEWALS - While recently preparing ACTHA's end-of-year accounts for the auditor I saw how many people were wonderfully prompt with their renewals last August 2017, so I am hoping that your response will be equally good this year.

Unless you joined ACTHA in the last half of this membership year (2017-18) your renewal for 2018-19 is now due. Why not bring your renewal along to the meeting, and say hello and enjoy the Sri Lankan travelogue?
[*Please note that only financial members are able to vote in Committee elections.*]

Cheers, Margaret
ACTHA Treasurer

ACTHA 2018 - 2019 Membership Renewal Now Due

$20 family/individual m'ship
$10 university student m'ship
[**$15** 'Herpetofauna']

Membership year runs from 1 July 2018 to 30 June 2019. Payment can be made at our next meeting,

OR, preferably, a direct debit to:

ACTHA BSB 112-908, A/c 486822880

OR by cheque to **NEW** PO Box
ACTHA, **PO BOX 440**, Jamison Centre, ACT 2614.

Most importantly, please don't forget to note your name so we can identify you on the bank statement.

Queries: margaretning1@gmail.com **OR** 0427 788 304