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**ACTHA Inc. News**
**Aug - Sept '16**
*Newsletter of the ACT Herpetological Association Inc.*

**ACTHA 2016 - 2017 Membership Renewal Now Due, final reminder now $20 for individuals or a family**

***Please see back page.***

*It was discussed at a recent Committee Meeting that due to rising costs ACTHA's Annual Membership Fee will increase to $20 per year for an individual or family membership. This is the first increase for over 15 years.*

## 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 |
| Student Representatives | Vacant |

* *Denotes Life Members*

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**Annual General Meeting**

Notice is hereby given of the 2016 Annual General Meeting of the **ACT Herpetological Association Inc**. to be held at the Belconnen Soccer Club, in conjunction with our meeting on Tuesday, 18 October 2016, at 7.30pm.

***Pls see back page for further information.***

## 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, 16 August 2016

**Reconnecting fragmented agricultural landscapes: how does land management influence connectivity for herpetofauna.**

Nicole Hansen, PhD Candidate, ANU, is our guest speaker this month. Her research is part of a collaborative project between the Australian National University, Central Tablelands and Central West Local Land Services (LLS) and the Lake Cowal Foundation, to improve the effectiveness of revegetation sites created by the LLS's corridor projects. Her project, supported by the Biodiversity Fund, has matrix (non-habitat, modified area) ecology as a central theme, with a focus on how species, particularly herpetofauna, respond to habitat fragmentation in agricultural landscapes.

## A travelogue: field trip to Sarawak, Malaysia

*Ian Brennan, ANU, was our guest speaker at the 19 April '16 ACTHA meeting.*
*This summary by Mandy Conway, all images not otherwise credited are by fellow travellers Ben Karin and Jackie Childers.*

"In June 2015 I had the opportunity to join a friend and do some field work in Sarawak, on the island of Borneo in Malaysia. I found an amazing diversity of reptiles and amphibians as well as some other cool and strange animals," Ian said at the beginning of his presentation.

*Above: The island of Borneo, within the Indonesian archipelago, is made up of three separate nations.*

Borneo is one of the largest islands in the world and is incredible! There are around 110 different lizard species comprising many skinks, geckos, a few goannas and a number of dragons.

"My friend Indraneil, who works at the University of Malaysia at Sarawak, sent us into the field with some of his students who were helpfully able to speak traditional languages. Some students were working on very small primates, Tarsiers, which could be readily found within the campus. These little animals have enormous eyes and toe pads similar to that of frogs. They also have vicious sharp little teeth, which I personally experienced during a photo session!

*Image: wan_hong, Encyclopedia of Life*

"The **Draco** genus, or gliding dragons, *right*, could also be found amongst the trees. These reptiles are capable of spreading their ribs out (patagial ribs), stretching the skin, which then allows them to glide between trees to escape predators. Some species are rather plain in colour but others are incredibly coloured, blue and/or spotted. The males also have an impressive dewlap which they flick out to impress the ladies and scare off other males. They range in sizes from 5cm to 15cm snout to vent.

"On the first day that we arrived Indraneil showed us two **Earless Monitor Lizards**, *Lanthanotus borneensis*, *right*, that his students had caught. It is the only species in a small family, a sister group to the goanna genus, which has been isolated evolutionary wise for a very long time. It is a long and thin reptile that has tiny eyes, is partially aquatic, and can be found in fast moving streams feeding on worms and other soft bodied invertebrates.

*Image: Chien C. Lee, Wild Borneo Photography*

"The best way to get around Sarawak is by boat," Ian advised. "Outside of the cities the roads are generally unsealed and can be very rough. Rainfall constantly washes out roads as well. Travelling by plane in Borneo is also a time and cost effective way to do so. In the three weeks we were there we took six or seven flights. A 30 minute flight from Kuching to Gunung Mulu National Park on Sarawak's east coast was only about $60." Ian said.

### Gunung Mulu National Park

Gunung Mulu National Park contains a string of broken cave systems. It would have been just one long ridge at one time but because it is made of limestone it has been separated in several spots by rivers, which result in big gorges, pinnacles and cave systems where the rivers have eroded into the limestone.

*(A travelogue: field trip to Sarawak, Malaysia, cont'd,...)*

Because of the rough landscape the primary mode of travel is by river, in very long canoes.

"This Borneo endemic pit viper, *Trimeresurus subannulatus*, [the Bornean Keeled Pit Viper used to be considered part of the Wagler's Pit Viper species, but was made its own species in 2007] shows a male. They are sexually dimorphic so the females are large and the males are about half their size. While we were taking photos of it, an awesome south-east Asian lizard showed up, a green crested lizard, *Bronchocela cristatella,* Sometimes referred to as chameleons, they turn very quickly from a very bright green to a dark brown colour, and they do this within 10 to 15 seconds of being grabbed." Ian said. "They are usually only found at night by torchlight, out along branches."

"One of the really iconic animals we were hoping to see were the large leaf mimicking frogs belonging to *Megophrys*, which was not difficult. A large frog, they frequently call out during rain in large numbers and can be easily found at night with a torch because they have very good red eye shine.

"We stayed for a couple of nights at Camp Five and asked the locals if they had seen *Cyrtodactylus* geckos. The answer was yes, one of the good places to look for them was by the old bridge. Just climb up at night and you'll find them amongst the old spans. My friend Ben was pretty confident he had seen eye shine at the top of the bridge and, being a rock climber, was quite happy to go up and have a look. He didn't come down with a *Cyrtodactylus*, but instead a gliding gecko. They have fantastic webs between their toes and a long wide tail like a rudder. They have extra scales on the sides of their body that spread out when they jump. They're perhaps not as good as the Draco in their gliding but do have more control in their flight by being able to slow down using their tail.

"We also came across well camouflaged vine snakes which were bright green and whip thin. Even holding them near the tail, they were still able to stand straight out like a stick. They have a broad but elegant head with small eyes. The groove in front of the eyes allows them to not only focus outwards but also forwards: being predators in trees this gives them greater depth of focus. They have interesting colouring between their scales which become visible when they puff out due to impending danger."

There is a repeated action of gliding in a number of different reptile groups in Borneo: lizards, frogs and even in snakes. The steep rise of the landscape which includes 60+ metre trees has meant that as life moved up into the trees the reptiles were forced to do so too. Not all snakes are found in trees however, there are some water snakes. With so much rain in Borneo, there are many streams which feed freely into the rivers. This provides a banquet of amphibians for the snakes to feed on.

"This is an interesting little snake, *Calamaria sp.*, that comes out at night, wandering across trails among the leaf litter. When you're out at night looking up into the canopy for frogs, snakes and lizards, you often get covered in bity ants. That helped at this moment when I was looking up and getting stung by heaps of ants and this tiny little snake was at my feet. When we brought it back to the University, we asked our friend to help us identify it. The response was a rather vague "ah, I haven't seen that one before, it's probably a new thing." Great! still don't know what it is, but it is really pretty. Quite short, tiny little eyes and very adept at moving through the leaf litter."

This **image is of Melinau Gorge,** with spectacular limestone sides.

"Leaving Gunung Mulu National Park, we took a five hour boat ride with two guides back towards the coast. From here we travelled through Brunei to the most eastern edge of Sarawak to do some more sampling.

"The majority of our sampling was for *Tropidophorus* skinks; a good analogue for them here in Australia would be *Eulamprus,* which also live along waterways. Sitting on rocks in the middle of the stream they dive in at any sign of danger. Catching them took a lot of patience, and often involved triangulating. The males of this species have a long red flush beneath their chin."

On the top of Ian's 'wish to see' list was the **Malaysian Cat Gecko,** *Aeluroscalabotes felinus, below*, "In general, when we think of geckos we think of toe pads and eyes being licked.

However the cat gecko is part of a family that have eyelids and lack toe pads. They have small claws within a small retractable skin cover and have prehensile tails. We found them on sapling trees sitting on a stem with their heads facing down, patiently waiting for a prey item to come past." Ian commented that an individual would be on a sapling when they walked past on night A, still be there on their way home, in the same spot on night B and even on night C. "One thing we didn't expect to find was the extent of the diversity in cat geckos. They are supposed to be the same species all the way up through southeast Asia, however even though they look alike we found some much smaller individuals which lacked the colouring of others. They were definitely adults so there obviously needs to be more work done on this group."

The next stage saw Ian and his friends fly up to the Indonesian border to Ba'kelalan to capture reptiles from a high altitude. Having befriended the head mistress of the local school on the flight there was fortunate because she arranged billeting with a local family for them. "Her brother-in-law was a great asset out in the field too!"

"One of the skinks we were looking for had a blue and black throat when located on the eastern edge of Sarawak. This changed to a bright red colour on the western edge near Kuching. One of my friend Ben's projects was to investigate where the colour switches over from one to the other and why within a single species. After much sampling between the two areas we found an intergrade zone where the bluish colour fades out and turns into a greyish colour before turning to red some 50km from there. More work needs to be done.

"The bronze-back snakes, of which there are several species, are beautiful and similar in a way to the tree snakes found in northern Australia, although more variable in pattern."

Approaching the highlands in the mountain range that runs between Indonesian and Malaysian Borneo are rivers which have now become a chocolate colour, primarily due to logging sediment. Ian stepped out of the canoe onto what appeared to be solid ground, whereupon his leg disappeared into a metre of mud.

Making a base near the hot springs Ian started his search for the *Crytodactylus* gecko, which are known for their bent toes. There are 200 species within the genus all over the world with the majority living in south-east Asia; there are currently seven recognised species in Borneo. Some can also be found in India as well as in the Cape York region of far North Queensland.

*Cyrtodactylus, above,* in Borneo can be divided into three main groups:

*Cyrtodactylus malayanus*, **Malayan Bent-toed Gecko** - these are big, yellow and brown banded geckos that live on the large tree trunks of fig trees that soar high into the canopy.

*C. cavernicolus* - this group contains much smaller species, who are also banded. They mainly inhabit limestone caves. "Even though the geckos all looked similar we found that each cave housed an individual species."

*C. pubisulcus* - this third group is a medium-sized gecko, with quite blotchy colouring on its back. This is also a group that is likely to be a number of species instead of a single species.

The **Borneo Splash Frog** or Green-spotted Rock Frog, *Staurois tuberilinguis, above,* lives along the banks of clear, small rocky streams, perching on rocks. They have large toe pads to help them stick to rocks in fairly turbulent streams. Even the tadpoles have strong mouths which cling to rocks. They don't call because their call would be drowned out, so instead they make eye contact with another male across the water before elaborately hand waving their displeasure. Ian's rather comical descriptive end to this scenario "... if the frog gets angry enough it will jump off the rock, swim towards the other, and proceed to beat the crap out of the other guy..."!

"So, we've had gliding dragons, gliding geckos and now gliding frogs!"

Ian showed us many stunning images of the frogs he came across and probably one of the most spectacular was of a gliding frog from the Genus ***Rhacophorus***. When threatened or in search of prey they will leap from a branch and splay their four webbed feet. The membranes between their toes and loose skin flaps on their sides catch the air as they fall, helping them to glide to a nearby tree branch. They also have oversized toe pads which helps them to both land softly and stick to tree trunks.

*Malabar Gliding Frog*
*Image: Caesar Sengupta on Fivehundredpx*

Arriving back in Kuching, the group took several small day trips for general exploration. These trips meant seeing a different assemblage of creatures: things like giant and very colourful scorpions, the very small and long-legged Bornean bearded pigs, and some pretty amazing caterpillars and butterflies.

Ian finished his presentation by saying that everyone should visit this beautiful place called Borneo if they ever get the opportunity. ACTHA field trip anyone?!

# Is it snake? Is it a worm? NO it's a Caecilian!

## A tale of the overlooked amphibian

*This summary by Mandy Conway.*

A small but fascinated group of members braved the cold for our June '16 meeting to hear Dr Emma Sherratt talk about this amazing amphibian and our little group made it possible to chat throughout the presentation, a thoroughly enjoyable evening!

When Emma did a zoology degree with the intention of studying snakes, something she has always loved, her future looked set. However a placement in 2004 with the Natural History Museum in London changed this ambition to the study of caecilians. Emma is currently a Postdoctoral Scientist at the Keogh Lab, Evolutionary Biology & Ecology of Reptiles and Amphibians, ANU.

*Image: David J. Gower*

### Introduction

Caecilians have been recognised since Carl Linnaeus described the species in 1758. All modern caecilians and their closest fossil relatives are grouped as a clade, Apoda, within the larger group Gymnophiona, which actually means 'naked snakes'. The name caecilian derives from the Latin word *caecus*, meaning 'blind', referring to the small or sometimes non-existent eyes.

Caecilians completely lack limbs, making the smaller species resemble worms while the larger species resemble snakes. Their eyes are small and covered by skin, hence vision is limited to dark-light perception, and their anatomy is highly adapted for a burrowing lifestyle. They possess a pair of tentacles located between their eyes and nostrils, which are probably used for a second olfactory capability. Often, the left lung is much smaller than the right one, an adaptation to body shape that is also found in snakes.

ACTHA members were asked to identify the caecilian in a slide, no easy task. It was depicted with other animals which included a blind snake, a legless lizard, an eel and an earthworm. The annulation, or body rings, of caecilians makes them appear similar to many other reptiles.

"Caecilians, in your hands, don't feel like a snake. They are quite strong but they don't have that coiling ability, it's much more like an eel."

Caecilians, of which there are 10 families, and 35 genera with 205 species, represent one of three orders of modern amphibians; the others being frogs and toads, and newts and salamanders. Emma argues that the current estimate of numbers is underestimated because caecilians are cryptic, not rare per se. With more recent efforts, 4 new species were described in the past year alone.

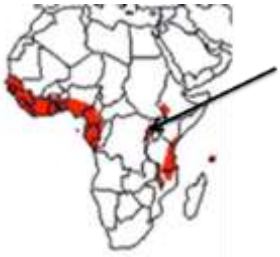
### Caecilian fieldwork

"Taking a hoe or spade into the forest, we turned over rotten logs under palms, tore through anthills and waded through marches and swamps. It's a lot of hard work and not always very rewarding. In a 3 week field trip to French Guiana we found just 2 animals." Emma added that although digging through the landscape can be destructive, no evidence of this could be seen a year down the track on a revisit.

"Several methods can be used to capture caecilians:

- nets or yabby traps baited with prawns are used to catch the South American aquatic species;
- pit fall traps can be used in less water-logged areas;
- a study in Tanzania showed us that some species are only found by digging;
- others can be found on the surface, especially at night when it's raining, when they are out searching for worms."

*Above: Boulengerula fischeri, the white tip shown on the animal in this slide is the tail.*



### The curious case of *Boulengerula fischeri*

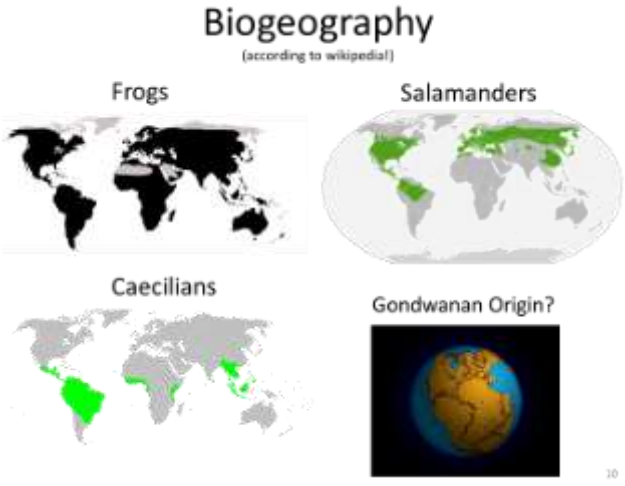
"In 1987, 1 species of caecilian was found and described in Rwanda. It wasn't seen again until it was rediscovered in 2006. The researchers at this time had asked the locals to look for earthworms for them. When they got back to the car they discovered the earthworms had been left on the bonnet. With no locals in sight the researchers carried the bundle back to base, although unfortunately they were rather dried up. On closer examination, one of them looked different; mistakenly picked up because it looked just like an earthworm. But it was a caecilian, only 5mm in diameter and very long. We now know that they live in the soil on agricultural land, particularly banana plantations."

### Ecology

"What do we know about caecilian habitat choice? From all the field work to date we can make some generalisations. There is some evidence of micro-habitat partitioning, where some species are deep burrowers and others spend substantial time above ground.

"Some caecilians are fully aquatic, which we know because they are only found in water and they have morphological features common to aquatic species - the anal fin for example." Emma said. These species need to come up for air and Emma described how she got bored watching one for 10 minutes, waiting for it to come up and breathe. "Then there are some that are found very close to water, in waterlogged soil, sometimes seen moving through streams. Even aquatic ones burrow. They can spend a comfortable amount of time in water."

"Caecilians seem to be from a very old lineage, of Gondwanan origin when the large land mass split apart some 250 million years ago. We don't know if this species is found within central Africa, mainly because we are not allowed to undertake fieldwork in the Congo. They are found across South America, which is their stronghold, and up into Mexico. Fascinatingly, they are not found in Madagascar, a potentially ideal environment, and yet they are found in India and all through Southeast Asia."




*Above: According to Wikipedia, these maps give some indication of where these animals can be found: predominantly throughout the southern hemisphere.*

### Distribution

The disjunct African distribution involves three different genera, with species in the east and west. The timings of genera splits are quite similar and suggest they are due to a common geographical event. However it must be noted that the country separating these two distinct populations is the Congo and, as highlighted before, it is not the easiest place to undertake research.

The seemingly more widespread distribution of caecilians in Central and South America is partly due to an overactive map drawer. While many species there may also originate from geographical speciation, comparatively little research has been done on caecilian biogeography to substantiate this.

The distribution of caecilians in Southeast Asia is due to a migration of caecilians out of India when the subcontinent collided with Eurasia around 65 MYA. Two genera are found from China down to the Wallace line, and their distribution on the different islands can be explained by the changing sea levels in Southeast Asia.

*(The Caecilian, an overlooked amphibian, cont'd,...)*

Caecilians are found on other islands, including the Thai island of Koh Tao, as well as Sri Lanka.

The Seychelles, an archipelago of 115 islands in the Indian Ocean off East Africa, is home to a radiation of caecilians, closely related to a genus in India. They are there as a result of the Seychelles being left behind by India as the subcontinent moved away from Africa. They can be found on multiple islands.

Finally, there is one species on the Sao Tome island of West Africa. It is most closely related to species known from Kenya. Researchers believe that caecilians were washed out there by freshwater currents from floods on the mainland.

The group with the most primitive of the species are the Rhinatrematidae, which are found in South America. They have true tails, at about 1 cm long.

*Above: Ichthyophis kohtaoensis. Image: henk.wallays / flickrhivemind*

Emma's favourite group are the Ichthyophiidae. Endearingly, they have a little white mark that makes them look like they have a French moustache; it's found in East India and Southeast Asia.

Scolecomorphidae is completely blind, in that it doesn't have proper eyes. These are most often caught in pitfall traps in Tanzania, Africa.

"Chikilidae - very recently a group of us described a new family of caecilians which highlight very well the story of ancient diversification. A specimen was found 100 years ago and identified as Gegeneophis. It lay for 100 years unstudied. Then a few years ago our Indian collaborators did a huge survey of Northeast India. They found several new species of Ichthyophiidae, but perhaps more importantly the specimen found of *Gegeneophis fulleri* was genotyped and CT scanned by myself and found to be a very distinct lineage - a new family more related to a family in Africa than other Indian caecilians. Found in Northeast India, an extraordinary cryptic diversity. There are now four distinct families of caecilians all unrelated to each other."

Herpelidae - these are very dedicated burrowers with a worm like body and no eyes at all; only found in Africa, with dedicated digging!

Typhlonectidae are an aquatic species, found in South America as are the Caecilidae, to which they are closely related.

Caeciliidae - found in South and Central America, they are known to live in very soggy soil.

Indotyphlidae is possibly the most geographically spread group, found in the Seychelles, Africa and India.

Siphonopidae - maybe one of the most striking of the caecilians, which David Attenborough highlighted in his TV program 'Life in cold blood'. They have bright coloured banding and are found across South America.

Dermophiidae, found in Central and South America and Africa, are the 'boring' brown ones, but interesting due to their life cycle and reproductive mode.

## Biology

Caecilians have five key morphological features: they are limbless, have an elongated body, have annuli or 'rings' around the body, a reduced or absent tail and the anus is situated at the end of the body.

*Image: Farah Ahmed*

"Size and shape variation in caecilians is very diverse. We have short and fat, long and thin, very small and very large. They also come in a large range of colours."

*Image: John Measey*

All caecilians have a unique paired appendage on the snout, behind the nostrils - the tentacle (*shown above*). This curious feature was likely present in the ancestor of all caecilians for chemosensory purposes - tasting and smelling the atmosphere - and while all caecilians have a tentacle, not all have visible eyes.

*Image: Emma Sherratt*

"Note the backward facing teeth tucked well beneath the snout in the image above, so that the nose protrudes forwards to enable burrowing. The whole back of the skull, where the muscles to close the jaw are located, are hidden under bone. Perhaps this makes a more compact skull for burrowing through the soil. Interestingly, after clinical trials, there is no difference in burrowing abilities between species."

*Danté Fenolio / Science Source*

"There are differences in teeth across species, in terms of tiny peg like teeth or really long vicious looking teeth. They have two rows of teeth on the top and sometimes two rows on the bottom and yes it hurts when they bite!"

"Caecilian skulls are completely different to amphibians - completely solid to effectively move in the soil. The frog has quite obvious eye openings, the

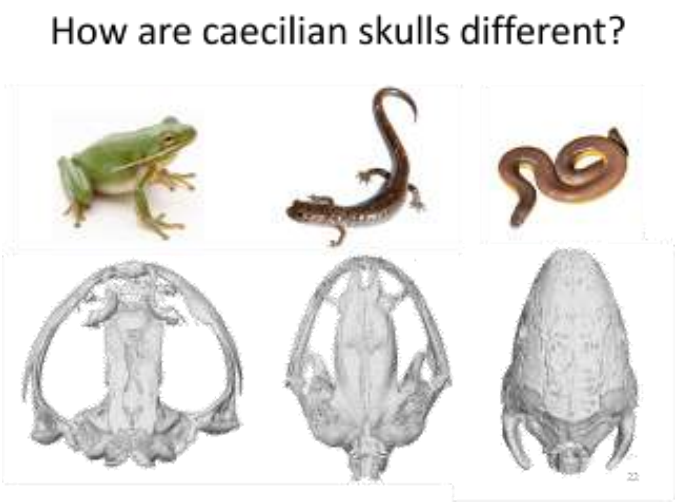



*Image: Hillary Maddin & Emma Sherratt*

salamander has a more robust skull, whereas the caecilian skull obviously looks more adept at burrowing."

The diversity of skulls in caecilians is what drove Emma into studying this aspect. This did lead to some key observations, in that characteristics that were thought to do with deep burrowing adaptations don't always evolve together.

### Reproduction & life history

Just like frogs, caecilians have a diverse reproductive and life history. Firstly, they copulate like reptiles. The cloaca of males can be everted through the vent to serve as an intromittant organ, or phallus, used in copulation to effect direct sperm transfer. Internal fertilisation then occurs.

Some species lay eggs, with a free-living aquatic larval stage similar to a tadpole, which then metamorphosis into an adult. Some larvae are born with enormous external gills which are shed almost immediately.

Others lay eggs and metamorphosis occurs within the eggs, before emerging as mini adults. They are also born with a vestigial gill structure that will fall off about 1 day after birth.

Viviparous species give birth to already developed young. The foetus is fed inside the mother with cells lining the oviduct, which the young eat with special scraping teeth.

"Viva parity has evolved at least four times in caecilian history. It's almost as if these traits have been scattered within the family tree, and we are now trying to understand why there is such a diverse reproductive range within this species. Because we have so many independent instances of certain interesting traits it is like a natural experiment; we can understand how evolution actually works by studying these animals." Emma said.

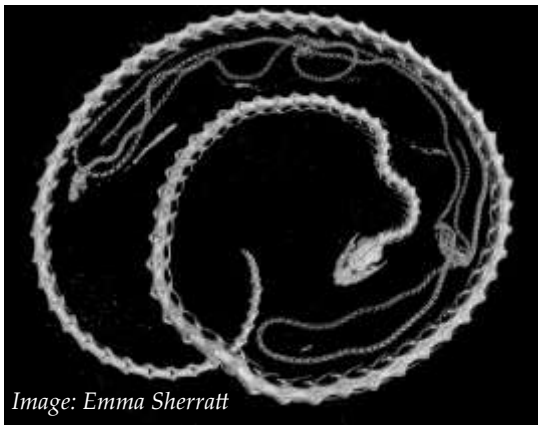


Image: Emma Sherratt

The slide above shows an x-ray image of Potomotyphlus, an aquatic caecilian with her young inside her. "This was a very fat museum specimen. We did expect that she was a gravid female however we didn't expect she would have almost fully developed little caecilians."

### Independent evolution of skin feeding in caecilians

"An exciting finding, which occurred about six years ago, was the discovery that the babies of egg laying species were eating their mothers skin as a form of nutrition when first born: the skin becomes high in fat and other nutrients. This trait is found amongst different groups in Africa and South America. We don't know how common this is, but we have found it in four species to date."

### Predators versus prey

Snakes, birds and armies of ants are known to prey on caecilians. In turn, caecilians eat borrowing snakes, worms, termites and ants. They are the predators of the soil system. Aquatic species will eat fish and small aquatic invertebrates. Sadly we lack specific information on diet for the majority of species.

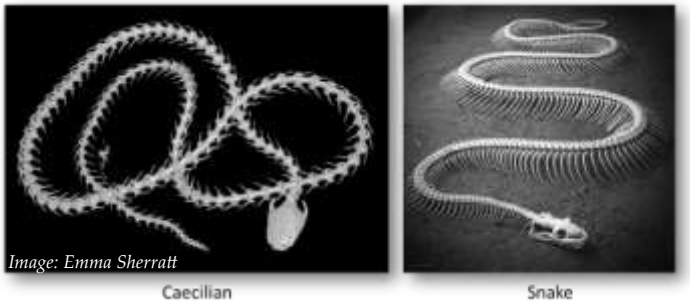
"In a recent development, we now know that caecilians have adopted a new muscle from under their neck that allows them to have a much more powerful jaw than other creatures living under the soil. By having this mechanism, whereby the lower jaw bends upwards to close the mouth with three muscles (unlike our two), catching and holding onto prey becomes much more efficient. They are relatively lazy feeders, virtually waiting for something to hit them in the face rather than actively seeking anything out."

Interestingly, through the use of x-ray markers, caecilians in fact do the death roll under the soil when they grab hold of their prey, tearing off chunks (of say a worm) in the process.

### Caecilian locomotion

Caecilians don't have ribs like a snake, instead having little stubby ribs covered by a healthy layer






of fat. They don't have the usual vertebral ball and socket joint either, instead dislocation prevention is achieved by ligaments.

"Moving like earthworms under the ground they extend their body out and then coil up their vertebral body, basically stretching outwards. In tight spaces they move like no other limbless species, other than a worm. They have a completely different muscle cross section compared to a frog or salamander, having extra muscles stretching in different directions."

### An exciting time for caecilian research: rediscovery of the largest lungless Tetrapod: *Atretochoana eiselti*

"We thought this species was extinct but it was rediscovered a couple of years ago and it is the most fascinating of the caecilians. It is the only lungless caecilian, and largest lungless animal alive. The Tetrapod is basically an animal without a backbone that isn't a fish. This is a large, heavy bodied animal that was only known from two specimens in the world, with a question mark from Brazil as its known habitat. No one knew where the specimens had actually been found.

*Image: Natural History Museum, London*

"In 2011, in Brazilian Amazonia, they built a dam and consequently flooded a whole section of forest with a new river system, and these caecilians popped up.

"Now that we have found them in large numbers we can undertake so much research. They have no lungs, very wrinkly skin, which they likely breathe through. They also have a very unusual head. Their lower jaw connects well beyond the back of the head, which results in an enormous mouth. Their eyes are almost non-existent, as are their tentacles."

# The Australian & International Scene

## Woman finds red-bellied black snake hiding in pocket of recliner chair

*By Alasdair McDonald, The Canberra Times, 30 June 2016 [Edited, MC]*

A woman had a rude awakening while relaxing at home on a property just outside Bega, in south-eastern NSW.

Joyce Parbery was relaxing in her recliner chair when she reached into a side pocket to search for her glasses.

*Image: Bega District News*

"I jumped up and couldn't speak," she said.

Mrs Parbery's husband Herb checked the chair pocket and discovered a red-bellied black snake curled up inside.

"It took over an hour to get it out, we had to drag the chair outside, put it upside down and cut the chair open so it could escape," she said.

Mr Parbery successfully released the snake unharmed, but the unexpected visitor left his wife a little shaken.

## Massive python found in Mission Beach bedroom

*By Nancy Notzon and staff, ABC News, 22 June 2016*

*Above: The carpet python was discovered at 4.30am. Image: Facebook, Trina Hibberd*

**A woman awoke to find a 40kg, five-metre python stretching from the lounge room to her bedroom while staying with her friend in far north Queensland.**

It is believed the python, nicknamed Monty, has been living in the walls and ceiling of Trina Hibberd's Mission Beach house, south of Cairns, for more than a decade.

But on what was a cold Monday morning, before dawn, a hungry Monty ventured out.

It slithered along the verandah, knocking a shoe off, then up the lounge room wall, flicking the light switch on, and then into a bedroom, where it knocked over a lamp.

*Above: Mr Goodwin released the python into a nearby sewage plant. Image: David Goodwin.*

Ms Hibberd's friend Julie Birrell woke up, raising the alarm.

"All hell broke loose," Ms Hibberd said.

The women filmed the beast sprawled across the home, stretching across the lounge room wall and into the bedroom.

They trapped it in the room and called the snake catcher at 4:30am.

While this was a rude awakening, it was not the first time the reptile had made an appearance.

Ms Hibberd said she first saw it 15 years ago, when it poked its head into the bathroom when she was having a shower.

"We knew the snake was there but I had never seen it inside, not that I know of," she said. "I've never seen it in its full length."

Monty was still in the bedroom when snake catcher Dave Goodwin arrived.

"We walked into the bedroom and it was hanging from the curtain drapes down to the bedside table — and that was only a third of him," he said.

"We locked ourselves in the bedroom and grabbed him around the neck. He coiled around my arm but we managed to put him a container."

*Above: A photo recently taken by the Hibberds of Monty. Image supplied.*

It is the second biggest snake Mr Goodwin has seen in his career.

Monty was released into a local water treatment plant, which backs onto native bushland.

## Scales, feathers and hair have a common ancestor

*By Nicholas St Fleur, The New York Times, 24 June 2016*

Reptiles have scales. Birds have feathers. Mammals have hair. How did they get them?

For a long time scientists thought the spikes, plumage and fur characteristic of these groups originated independently of each other. But a study recently published suggests that they all

*Above: This picture shows, from bottom to top, a normal bearded dragon, a dragon with one copy of the mutated EDA gene and a naked bearded dragon with two copies of the mutated EDA gene. Image: Michel C. Milinkovitch.*

evolved from a common ancestor some 320 million years ago.

This ancient reptilian creature — which gave rise to dinosaurs, birds and mammals — is thought to have been covered in scale-like structures. What that creature looked like is not exactly known, but the scales on its skin developed from structures called placodes — tiny bumps of thick tissue found on the surface of developing embryos.

Scientists had previously found placodes on the embryos of birds and mammals, where they develop into feathers and hairs, but had never found the spots on a reptilian embryo before. The apparent lack of placodes in present-day reptiles fuelled controversy about how these features first formed.

"People were fighting about the fact that reptiles either lost it, or birds and mammals independently developed them," said Dr Michel C. Milinkovitch, an evolutionary developmental biologist from the University of Geneva in Switzerland and an author of the new paper. "Now we are lucky enough to put this debate to rest, because we found the placodes in all reptiles: snakes, lizards and crocodiles."

In their paper, published in the journal 'Science Advances', Dr. Milinkovitch and his team report the first findings of the anatomical structures in Nile crocodiles, bearded dragon lizards and corn snakes. They concluded that birds, mammals and reptiles all inherited their placodes from the same ancient reptilian ancestor.

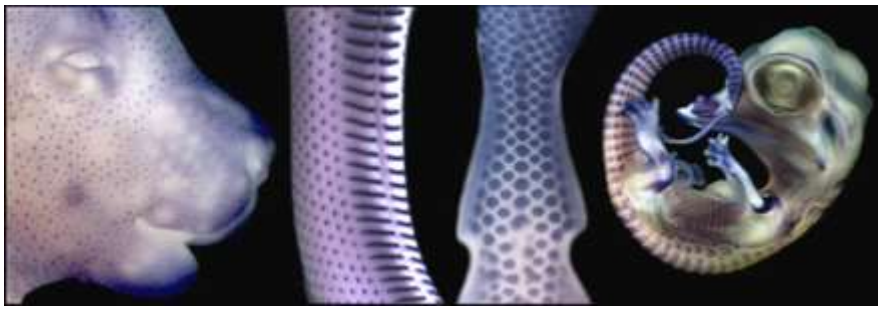
**Why did no one find placodes in reptiles before?**

According to Dr. Milinkovitch it's because the structures are extremely difficult to spot in developing reptiles, whereas placodes in avian and mammalian embryos last long enough that they are easy to see. Reptilian placodes exist for a brief period of about 12 hours and pop up on different locations depending on the species.

"If you don't look at the right place at the right time you don't see any," he said. "If you look too early you see nothing, if you look too late it's already a scale."

Dr. Milinkovitch and his team did not originally set out to find placodes in reptiles; rather they were investigating why certain bearded dragons are born without scales. By analysing the genomes of the naked bearded dragons they narrowed down the culprit to a mutation in a single gene, called EDA, which is also known to disrupt placode development in birds and mammals. In humans, EDA gene mutations can lead to Hypohidrotic ectodermal dysplasia, which causes people to develop abnormal teeth, nails and sweat glands.

"We were like 'Whoa! That's the same gene,'" said Dr. Milinkovitch. "There must be a link here because this guy doesn't have scales, and in birds and mammals when that gene is mutated they don't have hair or feathers."



*Above: The dark spots stained blue are placodes, which develop into scales, feathers and hair. The animals from left to right are a mouse, snake, chicken and crocodile. Image: Nicholas Di-Poi, Michel C. Milinkovitch and Athanasia Tzika.*

The clue got the team thinking that maybe reptiles need placodes to make scales and led them to search the microanatomy of reptilian embryos.

"When we investigated normal snakes, normal crocodiles and normal lizards we found placodes everywhere," Dr. Milinkovitch said.

Their findings unite birds, mammals and reptiles as descendants from the same lineage of ancient reptilian creatures that first developed placodes.

### Bearded dragons change colour on different body parts for social signals and temperature regulation

*ScienceDaily, story source University of Melbourne, 8 June 2016*

*Above: Photographs of the same bearded dragon at 15°C (left) and 40°C (right). Credit: Kathleen Smith, University of Melbourne.*

New research shows that bearded dragons are able to partition colour change to specific body parts, depending on whether they are responding to temperature or communicating with other lizards.

The study revealed that colour change in the neck area was only linked to social interactions with other bearded dragons, but by changing their backs to a darker colour in cool weather, the lizards were predicted to save approximately 85 hours of basking time during the energy-intensive breeding season.

Ms Kathleen (Katie) Smith led the research project, as part of her Masters of Philosophy at the University of Melbourne.

Twelve wild-caught bearded dragons (*Pogona vitticeps*) were observed at different temperatures and during social interactions in the breeding season in northern Victoria, Australia.

"While many lizards use colour change for camouflage, communication and regulating body temperature, we wanted to understand how an animal might accommodate all of these different functions at once," Ms Smith said.

"The ideal internal body temperature for a bearded dragon lizard is 35°C. In order to maintain this temperature, a bearded dragon can change its back to a light yellow colour when it is hot to a dark brown colour when it is cool." Ms Smith added.

"Interestingly, the chest and beard do not change colour in response to temperature, but change dramatically from cream to jet black during social interactions, accompanied by head-bobs and push-ups.

"Our results suggest that a bearded dragon lizard can balance all of its colour change requirements by only changing colour on the back for regulating temperature (which appears to be beneficial as it is exposed to the sun), and only changing the beard/chest colour for social communication (which is the region displayed to other lizards).

'The lizards also changed to dark colours very quickly, indicating that this may be an important adaptation for rapidly warming body temperatures."

The team predicted that the dark colour change would allow more of the sun's energy to enter the lizard's body and warm it, so they studied the absorption and reflectivity of the bearded dragon's skin.

The bearded dragons were photographed during exposure to temperatures of 15 or 40°C, and the levels of light reflected from the lizard's skin were recorded to collect the energy-rich wavelengths in the UV-visible and near infrared range (700-2600nm).

The spectrum of light was analysed by a script written by Professor John Endler from Deakin University, and then incorporated into a computer program that modelled lizard behaviour at different temperatures.

"By changing to a darker colour in cooler temperatures, the bearded dragons reflected much less light than the paler coloured lizards, at 8% and 23% reflectivity respectively." Prof Endler said.

"The darker lizards would heat up to their active state an average 22 minutes earlier, thereby allowing them to also move away from predators sooner.

"Our modelling predicted that the lizards with a darker colour only on their backs could save approximately 85 hours of basking time needed to reach active body temperatures during the breeding season."

Ms Smith said that the next steps in the research were to look at temperature-dependent colour change in the wild and how these lizards might change colour when faced with conflicting requirements (camouflage, communication, and thermoregulation).

The work is published in the journal *Proceedings of the Royal Society B* and was conducted by Ms Kathleen Smith, Dr Devi Stuart-Fox, Assoc Professor Michael Kearney and Dr Viviana Cadena (School of Biosciences, University of Melbourne), Professor John Endler (Deakin University) and Professor Warren Porter (University of Wisconsin).

### Sea snakes have extra sense for water living

*ScienceDaily, source University of Adelaide, 8 June 2016*

*Above: The head of a Beaded Sea Snake (Hydrophis schistosus) and a close up of a single scale on head. Each scale has many 'scale sensilla' that protrude from its surface, these small organs may allow aquatic snakes to 'feel' their environment. Scale bar, 3mm. Image: Jenna Crowe-Riddell.*

The move from life on land to life in the sea has led to the evolution of a new sense for sea snakes, a University of Adelaide-led study suggests.

The international team, led by researchers in the University's School of Biological Sciences, studied tiny and poorly understood structures on the heads of snakes called 'scale sensilla'. The research has been published in the Royal Society journal *Open Biology*.

"Land snakes and many lizards have small raised structures on the scales on their heads -- called scale sensilla -- that they use to sense objects by direct touch," says lead author Jenna Crowe-Riddell, University of Adelaide PhD student.

"We found that the scale sensilla of sea snakes were much more dome-shaped than the sensilla of land snakes, with the organs protruded further from the animals' scales, potentially making them more likely to be able to sense vibrations from all directions. We also found that scale sensilla on some of the fully aquatic snakes covered a much higher proportion of the scales' surface.

"We believe sea snakes use these organs to sense objects at a distance by 'feeling' movements in the water. This hydrodynamic sense is not an option for land animals. In water, a new way of sensing the environment becomes possible."

Sea snakes evolved from land-living snakes, taking to life in the sea between 9 and 20 million years ago. They spend the majority of their lives at sea: hunting fish, swimming and diving using a paddle-shaped tail, and coming up to the water's surface to breathe air. Although they can also see, little is known about the underwater sensory perception of the snakes.

"Every movement of a fin or flipper generates vibrations underwater, like when you drop a stone into a pond and the surrounding ripples spread to every corner of the pond," says Ms Crowe-Riddell.

The researchers, including from the University of Witwatersrand in South Africa and from the University of Western Australia, looked at 19 species of snakes, including fully-aquatic, semi-aquatic and land species, and measured the coverage of sensilla over single scales on their heads.

They used DNA sequencing to reconstruct the evolutionary relationships between the snakes; and used microscope imaging and specially developed software to automatically detect the small organs from silicone casts of snake heads. They also examined the shape of the sensilla using scanning electron microscopy.

"What we now need to do," says lead scientist Dr Kate Sanders, "is to investigate the physiology of these scale sensilla and demonstrate exactly what they can sense. If they are hydrodynamic tactile sense organs, as we suspect, then by comparing them to the

scale sensilla of closely related land-snakes we can start to understand how evolution has changed these organs from direct-touch sensors to distance vibration-sensors that work underwater."

The researchers believe being able to sense vibrations underwater would mean potential impacts on sea snake populations from man-derived disturbances such as motor boats and seismic surveys.

### Super-female bearded dragons 'more male than males'

*By Marc Llewellyn, ABC Science, 8 June 2016*

*Above: These central bearded dragons are challenging when it comes to their gender identity. Image: Arthur Georges.*

When is a female a female? And when is a male a male? These are the questions that scientists continue to ponder after the latest research on an Australian lizard that reverses its sex when exposed to high incubation temperatures.

The study shows the Central Bearded Dragon (*Pogona vitticeps*) are born with male chromosomes, but can lay eggs. They also have other strange characteristics.

Not only, as found previously, do they behave like super females, laying more eggs than standard females, but they are also bolder and more active than males.

"This could give them an advantage in the arid and semi-arid areas of Australia they inhabit," said Professor Rick Shine of the University of Sydney, who led the research, published today in the Royal Society journal Proceedings B.

The study follows previous research by some of the same scientists that compared the *genetic* sex of 131 Central Bearded Dragons, determined by blood samples taken from the tails, and their *actual* sex, as determined by their size, behaviour and gonads.

Male bearded dragons usually have two Z chromosomes and females usually have a Z and a W chromosome.

Eleven of the dragons studied previously were sex-reversed females, in other words, females with ZZ chromosomes. These looked more like males than females.

Back in the laboratory the researchers found that at lower incubation temperatures these ZZ females produced males, and at high temperatures they produced ZZ females.

Like their mothers, these baby ZZ females also had the potential to lay more eggs than standard females.

Without the production of standard ZW females, these super females could rapidly dominate the population.

The sex determination process in the dragons had changed from one governed by chromosomes to one governed by temperature, the researchers said.

"In the latest study I suggested we should find out what this actually meant in terms of behaviour," Professor Shine said.

"To do this my colleague Hong Li, a visiting scholar from China, got to work on standardised observational tests."

Dr Li studied 115 juvenile and hatchling dragons from eggs incubated at various temperatures.

He found that, when it came to activity and boldness, the 20 super female lizards in the group behaved in an even more male-like way than standard males.

Each lizard was housed in a cage with a container to shelter in and tested to see how active they were, and how quickly they emerged from their shelters (a standard sign of boldness).

"We found that sex-reversed females were much more active than both males and standard females, especially when they were presented with an unfamiliar object," Professor Shine said.

"In the boldness test, the sex-reversed females emerged much quicker from their shelters than the others as well.

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

Professor Shine and his team also found the super females had higher body temperatures than standard females - temperatures more similar to that of males.

"A bearded dragon can have male sex chromosomes but be a functioning female. Yet it can be more male-like in the way it looks, in its temperature and in its behaviour. They are more male-like than the actual males.

"Because super female dragons lay more eggs and because standard females can be bred out of the population, then why aren't all central bearded dragons either males or super females?

"It's a phenomenon that happens at quite high temperatures - we don't know the exact temperature in the nest," Professor Shine said.

"Maybe being bold can be good in some situations. They could get more food. Sometimes it might mean they become easier prey. Either way, it's a strange animal indeed."

### Multiplying death adders

*By Tim Low, Australian Geographic, 31 May 2016*

*Above: The so-called common death adder (Acanthophis antarticus) is far from common. Photographed here at Springbrook, Queensland in April 1979. Image: John Wombey, CSIRO.*

Most Australians probably think there is just one species of death adder, *the* death adder – *Acanthophis antarcticus*. That was the verdict in the 1970s, but experts currently recognise at least seven, including one named in 1985 after Prime Minister Bob Hawke (*A. hawkei*). Current thinking is that more species await naming.

Across Australia death adders vary in colours, markings, thickness, scalation and habitat, but carving them up into species is difficult because they vary a lot within populations, and because different forms don't always have obvious boundaries.

*Above: Death adders from northern Australia were once thought to belong to a single species but there are now thought to be at least four. Image: Captmondo/Wikimedia.*

Not helping are different notions about what constitutes a species. The species concept is meant to, but doesn't always, correspond to something important in the wild. The question of how many death adders there are might not have a correct answer, since it depends on the definition of species used and how it is applied in borderline situations.

In Western Australia the Pilbara Death Adder (*A. wellsi*) and Desert Death Adder (*A. pyrrhus*) interbreed where their ranges meet. The many hybrids show that the snakes are mating freely rather than sorting themselves into two species. Despite this, biologists are entitled to recognise two species because the hybrids are confined to a limited contact zone. An alternative approach, popular in the past, but not today, would be to count them as one species made up of two subspecies.

Elsewhere in Australia thorough DNA sampling will be the key to deciding how many species are finally accepted, though there is no guarantee a consensus will be reached. Some of the species that were named in recent decades are not considered valid today, although that could change in future.

Although it happens rarely, death adders, with their 'lazy' sit-and-wait approach to life, are the snakes most likely to be stood upon. Instead of seeking food, a death adder hides in leaf litter or sand and wiggles its tail like a worm when a mouse or other prey chances along. Limited mobility promotes regional variation, feeding doubts about how many species to believe in.

**Boa constrictors, venomous snakes among 30 reptiles seized from Baldivis, WA, home**

*By Laura Gartry, ABC News Western Australia, 5 July 2016*

Police have seized 30 reptiles, including two endangered boa constrictors, from a property in Perth's south as part of a joint investigation with wildlife authorities and the Australian Border Force.

Officers alleged a 32-year-old Baldivis man was keeping the pythons as pets without a licence.

Police said 14 different native species were found, including the dangerously venomous and potentially lethal king brown snake, tiger snake and dugite.

Other species included the specially protected rough scaled python, a large scrub python believed to be from north Queensland, and an eastern water dragon lizard.

Investigators also found 10 exotic reptiles from overseas including two endangered boa constrictors, two corn snakes, a ball python, and four Burmese pythons.

Mr Swan said the reptiles were kept in enclosures and did not appear to be malnourished. However, authorities had been forced to euthanase them for bio-security reasons.

*Above: This ball python was one of the exotic reptiles seized, and at Right, other reptiles seized.*
*Images supplied: WA Department of Parks and Wildlife.*

"Parasites were found on the reptiles, known as reptile mites, which can help spread disease from exotic animals to the native populations," he said.

*"The risk to the wild was too great for these animals to remain alive given exotic animals from overseas pose a significant disease risk. Given they were intermingled with our native species, the decision was made."*

Mr Swan said the exotic reptiles were likely sent in the post from Asia.

"The way the animals have come into Western Australia is not clear, but the typical way things come in is through the post or they get carried in on someone's body under the clothes on the plane," he said.

The accused is due to appear in court next month charged with 14 counts of keeping fauna in captivity without an appropriate licence and wilfully misleading a wildlife officer,

It is not known if the man was planning to sell the reptiles. Authorities are considering a range of further charges.

## Annual General Meeting

Notice is hereby given of the 2016 Annual General Meeting of the **ACT Herpetological Association Inc**. to be held at the Belconnen Soccer Club, in conjunction with our meeting on Tuesday, 18 October 2016, at 7.30pm.

***All members welcome!***

Agenda

Present, Apologies, Minutes of the Previous Annual General Meeting, President's Report, Treasurer's Report, Election of Office Bearers, Other Business.

Nominations are therefore called for the following positions: President, Vice-President, Secretary, Treasurer, Public Officer and Committee members. Nominations may be emailed to mandycnwy@gmail.com or posted to PO Box 160 Jamison ACT 2614. If no nominations have been received for a position prior to the AGM, nominations will be accepted from the floor of the Meeting.

## ACTHA 2016 - 2017 Membership Renewal Now Due

## Membership now costs $20 for individuals/family

Membership year runs from 1 July 2016 to 30 June 2017. 'Herpetofauna' is an additional **$15** per annum**.**

Payment at our next meeting would be appreciated.

OR a direct Deposit to:

**ACTHA, BSB 112-908, A/c 486822880**

OR a cheque made out to ACTHA at PO Box 160, Jamison Centre, ACT 2614

***PLEASE!*** *Don't forget to either* ***note your name*** *or* ***fill in the form*** *so we can identify whose payment it is on our Bank Statement.. There are currently a number of* ***anonymous $$ entries*** *so could you advise Margaret if you have recently made a payment.*

Queries? please email margaretning1@gmail.com

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