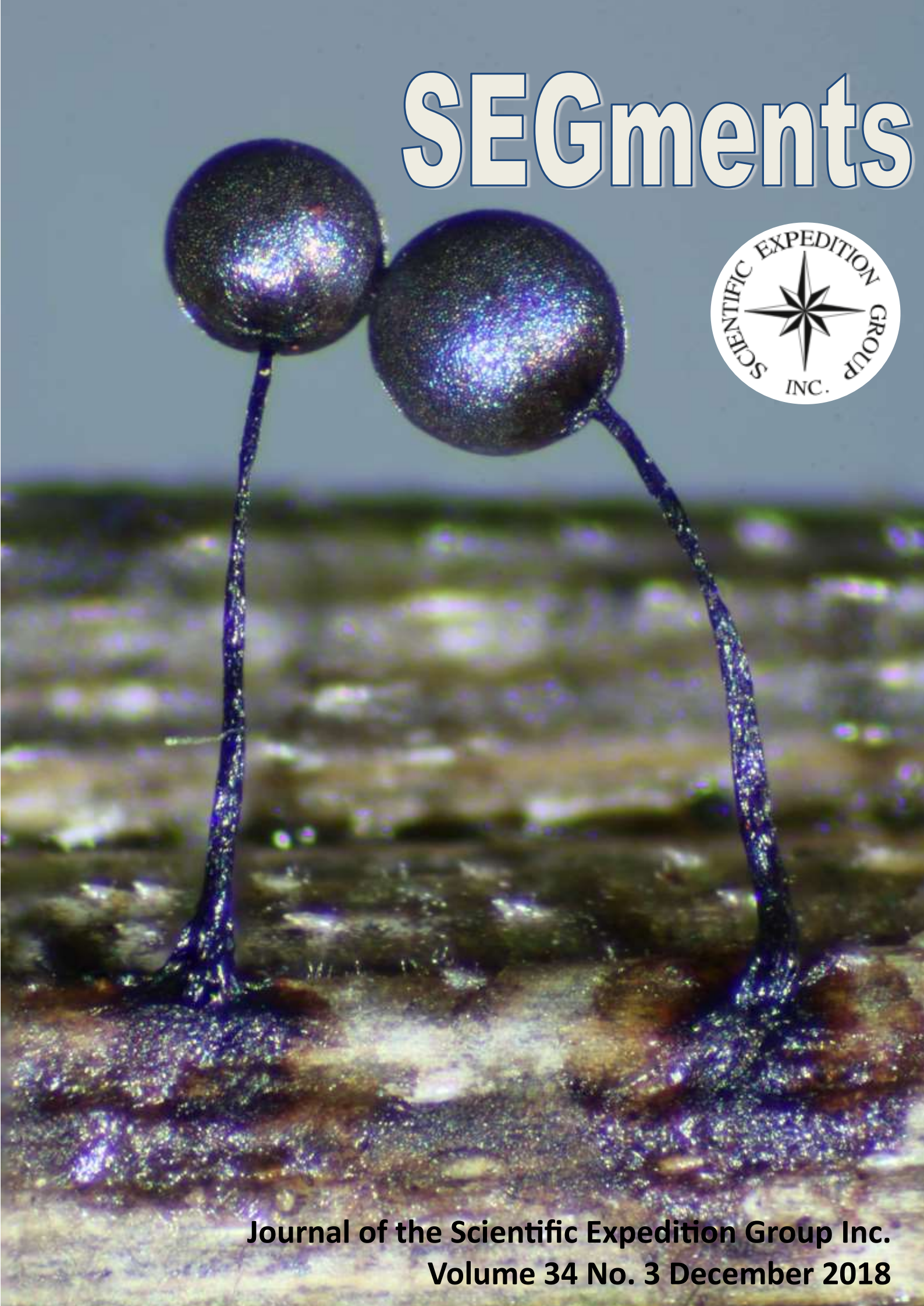

SEGments

Journal of the Scientific Expedition Group Inc.
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Cover Photo: Slime mould *Lamproderma* 'umbilicatum' sp. nov. at the sporangia (fruiting body) stage. Photograph Sarah Lloyd

Rear Cover Photos: Slime moulds, top *Trichia decipiens* and bottom, *Elaeomyxa cerifera*. Photographs Sarah LLoyd

The Scientific Expedition Group is a not-for profit organisation which began in 1984. SEG undertakes several expeditions each year to record scientific information on wildlife and the environment in many parts of South Australia.

A major expedition to conduct a biodiversity survey occurs each year over two weeks. Scientific experts lead volunteers in surveying mammals, reptiles, invertebrates, vegetation, birds and physical geography. The data collected on each survey are archived with the relevant State scientific institutions to ensure they are available to anyone interested in our State's environment.

In addition to the major expedition, a number of trips for the Vulkathunha-Gammon Ranges Scientific Project are organised annually. A long term study of rainfall on the ranges and of water flow in arid-zone creeks is undertaken. All data are supplied to the Department of Environment Water and Natural Resources and to the Bureau of Meteorology and are available for analysis.

SEG conducts four-day biodiversity surveys at eight different sites each autumn and spring in the Heritage Area of scrub on "Minnawarra" farm near Myponga. Data collected are entered into the Biological Data Base of SA. SEG also conducts annual mallee-fowl monitoring over a weekend in the Murraylands.

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Contacts:
SEG Secretary: Sarah Telfer
PO. Box 501, Unley SA 5061
Email: sarahtelfer@internode.on.net

SEG email: scientificexpeditiongroup@gmail.com

SEG website Http://www.communitywebs.org/ScientificExpeditionGroup

SEGments

Volume 34 Number 3 December 2018

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GUEST EDITORIAL

Professor Chris Daniels

Cleland Wildlife Park in 2018 –towards a new future

Cleland Wildlife Park was established in 1967. It showcased South Australian fauna and the need to protect precious and threatened South Australian environments. From its inception, Cleland Wildlife Park demonstrated nature and fauna by direct contact. You could feed, pat and meet a wide range of animals. From the 1970's this contact with wildlife expanded to include koalas. Koalas were introduced into the Mt Lofty Ranges in the early 1960's from a few individuals transported from Kangaroo Island. As the koala numbers increased a pair of enterprising residents living near to Cleland began caring for sick, injured and orphaned koalas. Bob and Eileen Robins introduced to Cleland WP not just koalas as educational and conservation icons, but also developed a special 'training' method which enabled members of the public to safely hold koalas. Koalas weigh upward of 15 kg and are large animals with sharp claws, and a propensity to bite when harassed – and then there is their famous ability to pee. However, the Robins interacted and connected with koalas from a very young age. They recognised that each animal had its own personality and therefore some are more anxious, clingy, outgoing, aggressive, friendly, submissive, happy, or people focussed – than others. By understanding each koala the Robins selected only those animals which wanted to be held, took to training with a keeper and also were happy to be held by strangers. They also never "made" an animal do something it did not want to do. Every participating animal was there because it valued the interaction, and if that situation changed the animal was immediately withdrawn. So animals are in charge, not people! Hence there are essentially no negative experiences for both visitors and koalas. The Robins developed their extensive protocol for training the koalas with 'the right stuff' which takes around 4 years to complete and their system is still in practice today. The 'Robins method' is without doubt the best connection strategy for people and animals, and the messages delivered through this experience are unbeatable. Upwards of 30% of everyone who holds koalas in this safe and personal manner are emotionally moved – sometimes to tears by the experience.

So Cleland WP became famous for koalas and the holding experience, and this experience is still the premier activity in the park. People, including famous stars of stage and screen, come from all over the world to have this special experience. However, the nature experiences have expanded to encompass many other animals – birds, wombats, reptiles and very soon butterflies! This experience of nature through a wide and expanding range of direct contact separates Cleland from almost all other zoos. The animals are generally free to roam in large paddocks or aviaries and very few are in small enclosures. This direct nature experience enables park staff to connect with visitors and so deliver educational material to highly engaged audiences. Without the opportunity to deliver high quality information and knowledge about animals and environments, experiences are little more than entertainment. It is vital that visitors, locals, children and corporate members gain insights into the nature of wildlife and the threats to its existence.

However, in the end a wonderful experience leading to an educational improvement in knowledge and attitude is still not enough to justify the existence of a Wildlife Park. We know that the wider community must become more connected to conservation messages and methods. We need to empower individuals to make a difference. Actions can be as little as providing water for backyard faunal visitors, to funding and donating to wildlife and environmental charities – or even joining an organisation like SEG to make on ground change! Active

Editorial continued on Page 16

LIFE AMONGST SLIME
SARAH LLOYD

I first learnt about slime moulds while contributing to the Fungimap project. (See "Fungi – the Hidden Kingdom" by Julia Haska in SEGments Vol. 31 No. 3 Dec 2015). I'd noticed the slime mould 'target' species: *Fuligo septica* (Image 10) ('dog's vomit slime'), *Lycogala epidendrum* and *Ceratiomyxa fruticulosa (Image 7)*, but I knew nothing about them and had no idea that there might be more species to find in the forest surrounding my home. In early 2010 after beginning a routine of daily morning walks I started to notice and photograph plasmodia (the second feeding stage of a slime mould), or their exquisitely miniscule spore-bearing fruiting bodies. I was hooked! By September that year I was closely examining logs and stumps with a hand lens and strong headlamp, essential equipment for seeing the fruiting bodies in the darkness of the shady forest—and I had started to accumulate reference books. I photographed, but did not collect, several species that were common that year (2010) including *Elaeomyxa cerifera (Rear cover, bottom photograph)*, *Physarum viride* (Image 2), *Trichia verrucosa*, *Lycogala epidendrum*, and *Badhamia utricularis* (Image 14); and two undescribed species, including one resembling the tropical *Alwisia* (formerly *Tubifera*) *bombarda*, now *A. lloydiae (Image 6*) and *Lamproderma* 'umbilicatum' (Cover photograph). It only took a year to appreciate their unpredictability: species that are common in one year will not necessarily be common the next, and many have not been seen again on the log or stump where they were first observed. Once I realised this I started to collect all mature fruiting bodies I found.

Not only did I know virtually nothing about slime moulds in 2010, I was also unaware that despite being found **wherever there is organic material**, they are believed to be the least studied of all the microorganisms. This is probably because they are unpredictable, ephemeral, invisible to the naked eye during their amoeboid stage, rarely seen at their plasmodial stage and usually overlooked at their spore-bearing stage (fruiting) because most are around 2 mm high. Their unpredictability makes it almost impossible to plan field trips to coincide with their fruiting times, and the field trips that are organised seldom exceed one or two weeks and follow-up visits are rare. Therefore, the most common method of conducting surveys is to visit a location, collect any specimens that happen to be there and collect substrate to culture in the laboratory using the moist chamber culture technique. This simply involves placing substrate (bark, litter, bryophytes etc) in Petri dishes, keeping the material moist and checking it regularly with a microscope to see if fruiting bodies have

Image 2, a slime mould, *Physarum viride*

Image 1 (at top of page) *Cribriaria cancellata*

Image 3 *Lamproderma echinulatum*

appeared. The technique is productive for a range of species, but many rarely or never appear in moist chambers.

(https://www.disjunctnaturalists.com/articles2/armchair-foraying.htm).

Myxomycetes - what are they?

The acellular or plasmodial slime moulds—also known as myxomycetes—have mystified naturalists for centuries. In 1753 when Swedish botanist, physician and zoologist Carl Linneus was devising his system of classification with two kingdoms—plant and animal—myxomycetes were thought to be fungi and fungi were thought to be plants, so they were placed in the plant kingdom. With the invention of the microscope it was clear that fungi were very different from plants so a third kingdom—fungi—was added and myxomycetes were included. When their moving feeding stage (the plasmodia) was observed they were placed in the animal kingdom, but they were moved yet again to the kingdom protista (or protoctista) when their amoeboid stage was discovered. There is now general agreement that myxomycetes are Amoebozoans but whether this is a supergroup or kingdom is a matter of debate.

Recent research suggests that the common ancestor of myxomycetes was marine and existed before plants colonised the land, and that myxomycetes possibly co-evolved with plants in terrestrial habitats. Their predatory amoebae live in soils rich in organic matter where they feed on bacteria and single-celled fungi such as yeasts. Thus, they play important ecological roles including enhancing soil fertility through nutrient recycling. Research suggests that these amoebae possibly participated in the initial enrichment of soils prior to the colonisation of land by plants although more work is needed to confirm this.

They're amoebae!

Slime moulds are often described as 'fungus-like' organisms, but apart from the fact that they both produce spores, they are nothing like fungi. Most fungal species must be described soon after being collected because their features change considerably as they dry out. In contrast, slime mould fruiting bodies are never fleshy, but are essentially a mass of spores. They (and substrate) dry within hours and retain indefinitely all features needed to describe them. Furthermore, their extremely fragile fruiting bodies are remarkably robust once they are properly mounted, a process that simply involves gluing substrate (with fruiting bodies attached) to card with folded up ends that fits snugly into a match box or similar. Fruiting bodies themselves need not be handled because the card can be manipulated with tweezers when viewing them with a microscopic.

Slime moulds at Black Sugarloaf

I am taking a completely different approach to studying slime moulds because I live in the middle of a tall wet eucalypt forest that just happens to be a perfect place to observe them. For instance, the fruiting bodies—some of which are brightly coloured and relatively easy to see when they first appear—often emerge overnight or in the morning. If I spot them during my morning walks, I can mark their location and revisit the site over hours or days (depending on the species and the weather conditions) and monitor their progress as they mature and become less conspicuous. And I can collect fruiting bodies in good condition, that is, before they are adversely affected by rain, invertebrates or fungi.

Seven years of observation at the same location on an almost daily basis has given me an inkling of their ecology, a little-known aspect of slime moulds in Tasmania. For instance, some species are common and widespread one year and rarely seen or absent the next; and it is not unusual to find a concentration of different species on a stump or small section of log, while similar logs nearby have no fruiting bodies, and these forest 'hotspots' change from year to year. The observation that several species from the same genus appear simultaneously is another interesting aspect of their behaviour. And the fact that some species never appear on the log or stump where they were first observed may indicate a longer cycle than my seven years of observation; only time will tell.

My study site encompasses several different vegetation communities, including paperbark (*Melaleuca ericifolia*) swamp forest; ferny gullies dominated by treeferns (*Dicksonia antarctica*); tall wet eucalypt forest with several different *Eucalyptus* species and blackwood (*Acacia melanoxylon*), banksia (*Banksia marginata*), lots of ground ferns, copious quantities of fallen logs in various stages of decay, and other 'coarse woody debris', i.e. fallen branches, twigs and leaf litter. In short, fantastic slime mould habitat.

The most productive area and the one I visit at least once a day is on a shaded south-facing hillside with extensive patches of fishbone waterfern (*Blechnum nudum*) that indicate very damp conditions. It has plant species—especially stringybark (*Eucalyptus obliqua*), blanketleaf (*Bedfordia salicina*) and clematis (*Clematis aristata*)— whose deeply fissured absorbent bark is particularly favoured by slime moulds; and it is surrounded by an extensive area of native forest. Furthermore, although the trees are not deciduous, the eucalypts and dogwoods (*Pomaderris apetala*) drop copious quantities of leaves during summer, and the eucalypts are constantly shedding bark and limbs and so are continually adding to the leaf litter and coarse woody debris on the forest floor.

By 2013, after a request from Dr Tom May, senior mycologist at the National Herbarium of Victoria (MEL), I started to lodge duplicates of my collections at the herbarium.

Identifying slime moulds

Apart from a handful of distinctive species, identifying slime moulds is no easy task. Some have features that are distinctive enough to place them in the correct family, order or even genus in some cases, but identifying most species requires equipment and texts. By August 2013 I had the use of a compound microscope with oil immersion lens, and field guides from the USA, Germany, France, The Netherlands and New Zealand (there are no field guides for Australia). I made a colour plate for each species with date; descriptions of habitat, substrate and fruiting bodies; notes; references; and photographs taken with cameras mounted on stereo and compound microscopes. By 2018 I had amassed over 1700 collections representing more than 120 species, an extraordinary number considering that they were all collected from within one kilometre of my home, and only 42 species had been officially recorded from Tasmania.

Some noteworthy species

In my initial ignorance I had no idea if the fruiting bodies I was collecting were common, rare or new to science. I now know that two of the frequently occurring species that I found in 2010 were new to science: *Alwisia lloydiae* (Image 6) and *Lamproderma* 'umbilicatum' (Cover photo) (currently being described). Collections made subsequently, including a *Tubifera* (Image 4)and a *Macbrideola*, are possibly also undescribed species.

Alwisia lloydiae

In 2010 I photographed a slime mould with brush-like bristles arising from the calyculus, a characteristic of the tropical species *Tubifera bombarda* (the calyculus is a small cup-like structure at the base of the spore mass). The sparse bristles in the Tasmanian collection arose from the edge rather than the bowl of the calyculus, but it otherwise fitted the description of *T. bombarda*. However, it took the experienced eye of US researcher Dr Steven Stephenson to question this determination, and it was genetic sequencing that confirmed that the species was new to science.

The discovery of the Tasmanian collection coincided with a revision of the Reticulariaceae family, and the collection of another undescribed species by Fungimap colleague Teresa van der Huel. The research involved genetic sequencing, which resulted in the revalidation of the genus *Alwisia*. The genus now includes *Alwisia bombarda*, which has reverted from *Tubifera* to its original name; and two newly described species: *A. morula,* whose type specimen was collected in Costa Rica in 1998; and *A. repens* whose type specimen was collected by Teresa in NSW in 2008.

Based on the morphology and genetics of *A. lloydiae,* research by Dr Dmitry Leontyev (2016) suggests that it is close to the ancestral stock of members of the Reticulariaceae family:

'this species occurs in the Australian continent and in Tasmania, the well known refuges of relict biota.'

***Elaeomyxa reticulospora* (Image 9)**

On 18 August 2012 I found golden baubles on a twig in a nearby Gully. Its iridescent peridium (the membrane covering the spore mass) suggested a *Lamproderma* (Greek: *lampros* shining; *derma* skin) and the key in Martin & Alexopoulos (1969) was used with immediate success — or so I thought at the time. The reticulate pattern on the spores resembled those of *L. cribrarioides.* On 3 October 2013 a similar-looking species with nodules on the capillitium (thread-like structures found within the pore mass) visible with the dissecting (stereo) microscope appeared on small eucalypt branches. The description of *L. cribrarioides* in Martin & Alexopoulos has no reference to nodules but the illustration depicts one small protuberance.

Image 4 Tubifera sp. nov (New species)

Image 5 *Arcyria denudata*

Image 6 *Alwisia lloydiae*

Image 7 *Ceratiomyxa fruticulosa*

Image 8 *Comatrichia nigra*

Image 9 *Elaeomyxa reticulospora* on gumnut

Image 10 *Fuligo septica* on dicksonia fronds

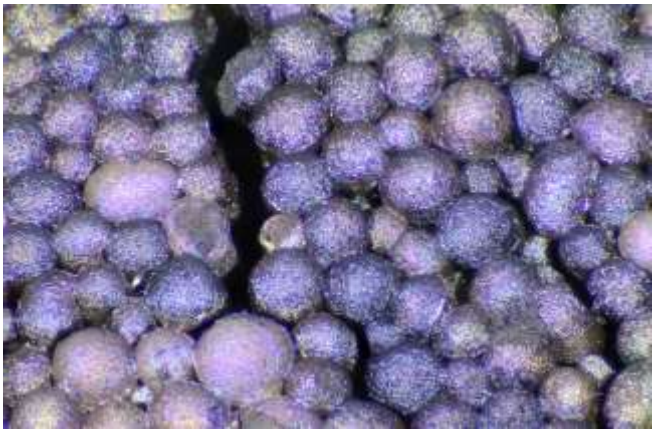

Image 11 *Paradiachea caespitosa*

Image 12 *Tubifera dudkae*

I sent a sample to Spanish researcher Dr Gabriel Moreno who sent me his co-authored paper *A Study on Lamproderma australiansis and L. reticulosporum* (2008). The mystery was solved. *L. reticulosporum* and *L. australiansis* are described as 'two apparently very rare species'. *L. reticulosporum* was first described in 1991 and is known only from the type locality: a tropical forest in western Java. *L. australiansis* was first described in 2007 and is represented by two collections from alpine habitat at Thredbo.

The authors conclude:

> 'both species occur in association with bryophytes in association with litter or bark, suggesting two muscicolous *Lamproderma* species with very different ecological requirements: *L. reticulosporum* occurring in the tropics and *L. australiansis* in an alpine snowbank habitat.'

The Black Sugarloaf collections are not muscicolous (growing with moss), and Tasmania is neither tropical nor alpine. Nevertheless, they were identified as *L. reticulosporum* by Dr Moreno, based on habitat and minute differences in morphology. The paper's authors regard the placement of the species in the genus *Lamproderma* as questionable because of the characters of the capillitium—i.e. the yellowish to orange, oily thickenings that are similar to those of *Elaeomyxa miyazakiensis*. They have transferred the two species to the genus *Elaeomyxa* until further molecular studies are undertaken.

I have collected *Elaeomyxa reticulospora (Image 9)* every year at Black Sugarloaf since my study began. In June 2016 and 2017 there were hundreds of sporangia on the accumulated leaf litter on a large eucalypt log and in 2018 more appeared in the same place and in ground litter nearby. In fact, rather than being very rare, it is the most common species I find. Furthermore, in June 2014 I collected it from a eucalypt forest 25 km south of Black Sugarloaf, and in 2017 from leaf litter 40 km to our west.

How little we know about these intriguing, beautiful and ecologically important organisms.

sarahlloyd@iprimus.com.au

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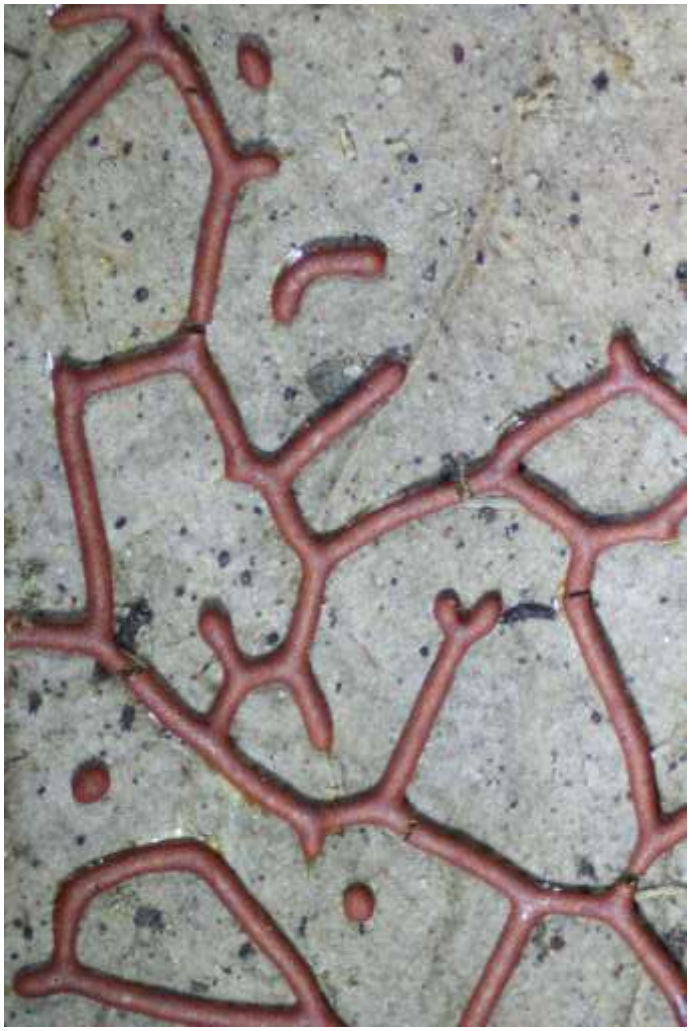

Image 13 Plasmodiocarp of *Willkommlangea reticulata* on a leaf

Image 14 *Badhamia utricularis* developing

Further reading:

Lloyd, S.J. (2018) *Where the slime mould creeps*. Second edition. Tympanocryptis Press, Birralee.

All photographs by Sarah Lloyd. Not all the images of slime moulds shown are referred to in this article.

STUDENT REPORT – IKARA-FLINDERS EXPEDITION

JOEL SCHILLER

My name is Joel Schiller. Some of you may know me from the recent Ikara Expedition. I am currently in my second year of a Bachelor in Environmental Science at the University of South Australia. One of my course coordinator's has been encouraging all the second-year students to get out and volunteer wherever they can. It is also said that these days anyone can get a degree, but it is those who show they are actively engaged with their area of study, and with experience outside of university, who have a better chance of getting a job upon completion of their degree. When I saw the Ikara-Flinders expedition advertised in the volunteer opportunities of the Biological Society of South Australia, I knew it would be the perfect opportunity to gain some experience in a location that I always love going to - the Ikara-Flinders Ranges National Park.

My top three highlights of the trip overall include: being able to create survey sites that can be used to monitor areas in the future; being in the incredible landscape; and being able to network with people who know their stuff.

Establishing **permanent** survey sites is something that I have not been involved in before. There was a lot of hard work required in the first couple of days, but in the long term, this work will certainly pay off in providing data that will hopefully improve our understanding of the environmental landscape within the park. Through setting up these sites I learnt some new techniques, in particular how to dig pitfalls and set up the mesh lines. For the Elliott traps I knew how they worked as I had used them on a camp for one of my courses earlier in the year. No wonder Trent started to call me by the name "Elliot".

In our spare time we had the opportunity to go out and see the incredible landscape that is around Wilpena Pound. We were able to go up to the top of Mount Sunderland and see the amazing view that shows the Flinders Ranges in all of its magnificence; an added advantage of going up there was that it was a four-wheel drive track. While I was up there the view just took my breath away. Being a Christian myself, I was in awe of what God has created, seeing the different colours bouncing off of the many different rock formations. Even going down Brachina Gorge and being able to see geological history laid out right in front of me was truly incredible. On the Brachina Trail, our tour guide was Garry Trethewey, who shared his wealth of knowledge with the many people in the group who came along. For me, whilst on the Trail I was reminded of the geological knowledge that I have gained at university, and I was able to put this knowledge into practice.

I learnt quite a lot from top quality people who each had particular interests in certain areas; vegetation, mammals, birds, reptiles and ants. Dr Rob Brandle, one of the SEG Science Leaders guided me in properly holding a gecko, which I have not done before, and also guided me to look a little bit closer at the distinct colours and why they are named the way they are.

As I mentioned earlier I am currently in the second year of my degree: it was not long before coming on this trip that I was beginning to think about whether I would do Honours in Environmental Science or not. It was after talking to both Cat Lynch (one of the Park Rangers), and Leah, who have both completed Honours Degrees at university, that I got more of an idea of the importance and benefits of completing Honours, and I am currently thinking about continuing to an Honour's Degree.

All in all, it was a great experience and I am sure that you will see me again.

joel.schiller1998@gmail.com

Editor's Note: The Brachina Geological Trail is described in "The Geology of South Australia" by Terry Krieg in SEGments Vol. 30 No. 4, March 2015, available on the SEG website.

MINNAWARRA BIODIVERSITY PROJECT - SPRING SURVEY 2018

Janet Furler

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Have you ever wondered what happens between the "jelly bean" stage of an Antechinus and being independent? So have I. I have now had a glimpse of the intermediate stage. Six weeks after the Spring survey, I took the veggie scraps to the worm farm, flung open the lid, ripped off the shade-cloth and saw this poor Ante mum trying to run and hide. She was so well tethered by the teats that I could catch her, and the babies kept hold when I lifted her up. (Makes my eyes water!) I held her for a couple of minutes while a friend got a camera, and only one of the seven or eight (count the tails?) babies let go. The rest were going to have lunch regardless of any disturbance. The one who let go, or possibly wasn't quite latched on due to the siblings' heads, wobbled around on my palm and squeaked. I'm sure it would have been collected up once the mum's world stopped being turned upside down, and possibly told off for running away. I'm also sure at least some of the babies will find their way into the kitchen in a month or two. Mostly it's boys who come in, and get relocated. They have returned from near the front gate, but none have come back from over the road.

The recent survey was conducted from 27th September to 1st October. Forty two people joined in, 9 of them children. For the first time in a while we had more campers than house crew, braving a couple of cold nights.

Animal numbers were down 24% on last spring's new captures of 112; possibly due to a dry spell or the full moon. We caught 85 mammals including an Echidna, 1 grey shrike thrush, 4 frogs and no skinks; a total of 90 critters. Unfortunately, no bandicoots were caught this time. Counting repeat visits on this survey, this time we had 191 catches or sightings. Forty one of 84 mammals were recaptures from previous surveys, being already micro-chipped. Added to this will be the results from the birdos, Brian and Jo Blaylock, who quietly slipped in one day - Thank you.

Two sites (1 and 4), which are swampier, had Swamp Rat (*Rattus lutreolus*) as the most common species, overtaking the Bush Rats (*R fuscipes*), and Antechinus (*A flavipes*). At the other 6 sites, Bush Rats were the most common catch, and made up half of the mammal catches.

At Science Alive! we picked up a very nice pictorial key for the 6 frogs of the Mount Lofty Ranges, produced by Natural Resources Adelaide and Mount Lofty Ranges. This poster has been laminated and included in the information folder which goes on the site rounds. Although the frogs we caught were the most common, *Crinea signifera*, it was a good introduction to the process of following a key for identification.

We are very grateful to Microchips Australia Pty Ltd which has provided us with all our microchips, readers and accessories so far. They have generously donated 200 microchips, and SEG's Minnawarra Biodiversity Survey is mentioned on their website as a wildlife application for their products.

NEXT YEAR'S SURVEY DATES

Autumn – Wednesday 24th to Sunday 28th April 2019, in the last week of school and uni holidays.

Spring – Saturday 28th September to Wednesday 2nd October 2019, in the first week of school holidays, and the last week of uni holidays.

WHAT IMPACT DO CATS HAVE ON SMALL VERTEBRATES IN IFRNP

Cat Lynch and Robert Brandle – Natural Resources, SA Arid Lands

During 2014-2016 Natural Resources, SA Arid Lands in partnership with the Foundation for Australia's Most Endangered species (FAME) reintroduced Idnya (Western Quolls) and Virlda (Brushtail Possum) to Ikara-Flinders Ranges National Park. Monitoring of released Idnya identified that of animals that died, the majority of deaths were attributable to feral cats. Monitoring during 2016 highlighted some concerns with regard to population growth and sex bias toward males; a potential result of the smaller females being removed from the population by cats. To maximize the potential for the population to expand beyond our release areas we decided to test if aerial baiting for cats would be effective in promoting the survival of the Idnya population.

Bynoe's Gecko *Heteronotia binoei*

In the first year 500 sq km across the western half of the Park was baited with Eradicat 1080 poison sausage baits designed for cat control in Western Australia. The results were spectacularly successful in removing cats that we had radio-collared (>85% reduction), and subsequent camera-based monitoring showed that this was sustained for the rest of the year. Trapping for Idnya at the end of that year also showed a slight positive response and a reduction in the male/female bias. This was despite extremely dry condition; so very encouraging.

The decision was then made to continue the trial for 3-5 years to fully evaluate the usefulness of cat baiting in assisting medium-sized mammal translocations. Because it is well known that cats mostly prey on smaller mammals, reptiles and birds, the trial provides an opportunity to test whether or not cat baiting has positive spin-offs for a range of smaller fauna species – enter the SEG expedition.

The aim of the study that SEG has helped to establish is to monitor for small vertebrate fauna response to cat baiting, by sampling a range of habitat types that are paired for baited and unbaited areas. Sites were chosen in areas not currently occupied by quolls, as they would be an extra uncontrollable variable in the proposed comparative study.

Ranges Stone Gecko *Diplodactylus furcosus*

Habitat types sampled using pitfall and Elliott trapping plus bird observation and vegetation survey were: *Triodia* hummock grassland, Lemon-scented Grass tussock grassland, Native Pine open woodland, Gum-barked Coolibah Open woodland over Rhagodia spp., Lobe-leaved Hopbush shrubland on rocky hills, Red Gum Woodland with shrub understory along drainage lines.

During September 2018 a hardy troop of SEG volunteers assisted Rob Brandle in installing 12 sites, each with 3 groups of 4 pitfall traps and 10 Elliott traps. At least 2 of the sites were "easy" digging but the crowbars were replaced with jack-hammers very quickly. All were installed in 3 and a bit days; a huge effort that is greatly appreciated - thank you.

So what did we find

A total of 91 animals (77 reptiles and 14 mammals) were captured across the 12 trapping sites. Only two mammal species were captured – the Fat-tailed Dunnart (*Sminthopsis crassicaudata*) and the introduced House Mouse (*Mus*

Tawny Dragon *Ctenophorus decresii*

musculus). Reptile diversity was much higher, with 17 different species being trapped, ranging from skinks, dragons, geckos to snakes. A further 10 species were found by searching under rocks and leaf litter. The majority of captures were of the Common Snake-eye Skink (*Morethia boulengeri*), Eastern Striped Skink (*Ctenotus spaldingi*) and the Ranges Stone Gecko (*Diplodactylus furcosus*). Other species included the Tawny Dragon (*Ctenophorus decresii*), Bynoe's Gecko (*Heteronotia binoei*), Barking Gecko (*Underwoodisaurus milii*) and the distinctive Burton's Legless Lizard (*Lialis burtonis*).

Of interest was the sighting of a Masked Rock Skink (*Liopholis margaretae*). One of the students on the SEG survey, Tamika, got a glimpse of one in a rock crevice, and noticed the distinctive cream-coloured ring around the eyes. There are scattered records for this species throughout the Flinders, but it seems not to have been recorded within this specific survey area before.

Of note were the higher number of reptile captures in baited sites (49) compared to unbaited sites (28), which suggests the baiting program may be having a positive impact on other species besides quolls. Too few mammals were captured to include in the comparison, reflecting the very dry 14 months prior to the survey. Follow-up surveys over a number of years will provide us with a long-term comparison on the abundance and diversity of small mammals and reptiles between baited and unbaited areas.

Without SEG's involvement this study would not have been started and we anticipate further involvement once conditions in the Flinders have become more productive, hopefully in 2020.

Catherine.Lynch@sa.gov.au

Robert.Brandle@sa.gov.au

Burton's Legless Lizard *Lialis burtonis*

MINNAWARRA BIODIVERSITY SURVEY DATES FOR 2019

Wednesday 24th to Sunday 28th April 2019, in the last week of school and uni holidays.

Saturday 28th September to Wednesday 2nd October 2019, in the first week of school holidays, and the last week of uni holidays.

Come for half a day, one day or several days.

Minnawarra is situated on the southern Fleurieu Peninsula

For further information and registration forms, contact:

Janet Furler on 0419 842 667 or thefurlers@gmail.com

Richard Willing on 0408 807 517 or rwilling01@gmail.com

CHAIRMAN'S REPORT 2018

BOB SHARRAD

We have had a busy time since the last AGM with a healthy amount of field work including: a small fauna survey at Morella in the upper South East in October 2017; a major expedition to the Flinders Ranges in September 2018, the Autumn and Spring Minnawarra surveys; the continuation of the Vulkathunha – Gammon Ranges Scientific Project and Malleefowl monitoring. This important field work is made possible by the work of our hard working executive and committee:

President, Richard Willing; Hon Secretary, Sarah Telfer (Sarah also organises the venue); Hon Treasurer, Graeme Oats; Administration Officer, Alun Thomas; Helen Johnson, Greg Johnston, John Love, Duncan McKenzie, Stuart Pillman, Trent Porter, and Jill Tugwell.

Helen Johnson and Alun Thomas also edit our excellent journal **SEGments**

Science Alive 3 – 5 August 2018. SEG had a display at this event and while several members helped run things, special thanks must go to Andrew Barr and Helen Johnson for designing the display and to Annette Vincent for providing her microscope, ants and expertise.

Morella. A small team carried out this follow-up to the 2013 survey. Twenty one species of reptiles and mammals were identified, and Duncan McKenzie compiled an impressive list of birds. John Love deserves special thanks for goading us to do the work and for collating the report. The undoubted highlight was finding two species of pygmy possums.

Richard being presented his well-deserved award by the Honourable Mr David Speirs, Minister for the Department for Environment and Water.

Ikara Survey – Flinders Ranges National Park 16 – 27 September 2018. After missing a year, this full scale expedition combined hard work (digging pitfalls into rocky ground) with a "soft" existence at the Oraparinna base. Few small mammals were captured, but a reasonable bird list, vegetation list and a sound return of reptiles made this a successful trip. Thankfully the pitfalls are permanent (but closed) so we don't need to dig them again. Trent Porter once again made sure we were fed and watered in fine style.

Malleefowl monitoring. Stuart Pillman is the main organiser of these events on the Bakara Conservation Park and the nearby property owned by Andrew Paschke (previously owned by Henry Short).

Vulkathunha – Gammon Ranges Scientific Project. The important monitoring continues in that remote, difficult to access region. Stalwarts like Chris Wright, John Love, Garry and Michelle Trethewey, Graham Blair and many other regulars have hiked innumerable kilometres through rugged, rocky terrain to keep the equipment functioning and the data coming in.

Minnawarra Biodiversity Survey. Richard Willing and Janet Furler have again run this long-term activity. The data are accumulating and can be used to present a picture of the nature of the local fauna and how it changes over time.

SEG's President Dr Richard Willing has been honoured for his long service in volunteering by the award of a "Premier's Certificate of Recognition for Outstanding Volunteer Service", presented to him by the Honourable Mr David Speirs, Minister for the Department for Environment and Water.

We were greatly saddened this year to lose **Henry Short**, a great supporter of SEG and other conservation groups.

COMEBACK OF THE PYGMY BLUETONGUE LIZARD

Dr Jess Clayton

Introduction

The pygmy bluetongue lizard (*Tiliqua adelaidensis*) has been the subject of an ongoing conservation management program since the early 90's. Pygmy bluetongue lizards are medium sized skinks, endemic to South Australia. The lizards rarely exceed 18cm in length and are distinctive because their tongue is pink. The species was thought to be extinct until 1992 when a specimen was discovered in the stomach contents of a dead brown snake found on the side of the road in Burra, South Australia**.** Up until this point we did not know much about the lizard's ecology and life history, however, since its rediscovery a significant amount of research has been conducted to improve our understanding of this species in an effort to improve its conservation outcome. The pygmy bluetongue lizard is listed as Endangered in South Australia and nationally.

Early searches

The lizards are only found in the mid-north of South Australia between Kapunda and Peterborough. In the early days it was not known that the lizards lived in spider burrows, and thus a lot of searching was conducted with very limited results. Once it was established that the lizards were using spider burrows as refuges, the searches proved more effective. Eventually a fibre optic inspection scope was used to inspect burrows, and this technique is still used.

Research history

Much of the research on this species has been conducted by the late Professor Michael Bull (Flinders University) in collaboration with the South Australia Museum (led by Dr Mark Hutchinson), Department for Environment and Water, Monarto Zoo and numerous other organisations. In the early years after its rediscovery, research focussed on the life history and basic ecology of the species. In this stage of the project, researchers were able to improve our understanding of the species' habitat requirements, diet, predators and social interactions. After establishing a foundation of knowledge on these characteristics, researchers were able to delve deeper, researching genetic diversity between and within lizard populations, and also started to explore how human-induced habitat changes influence the species. I joined Professor Bull's research group as a PhD candidate in 2012 to contribute to the latter of these categories, researching grazing impacts on lizards.

Population estimates

There has not been a recent attempt to estimate the population size of these lizards, and the last known figure was an estimate of ~ 5000 based on 10 populations. There are now 34 or so populations, and so an expected higher number of lizards. A captive breeding program at Monarto Zoo https://www.monartozoo.com.au/saving-the-pygmy-bluetongue / has been ongoing for some years, and has recently achieved a world-first in conservation for this species with successive years of live births (14 and 12).

Species ecology

The pygmy bluetongue lizard inhabits native grassland habitat in the Mid-North region of South Australia. They occupy abandoned spider burrows constructed by wolf and

trapdoor spiders, and will utilise these burrows as refuges, basking sites and ambush points.

For pygmy bluetongue lizards, habitat fragmentation has been a critical factor in their decline. Current populations of these lizards now only persist in farmland which is grazed by sheep, as ploughing renders an area unsuitable for their spider burrow engineers and thus the lizards. We know that these grasslands have historically been grazed by native herbivores such as kangaroos, but since European settlement sheep have also been dominant grazers in these habitats. My research aimed to investigate whether sheep grazing had any influence on the construction and persistence of spider burrows which are crucial to persistence of pygmy bluetongue lizards in these habitats.

Trapdoor spider in its burrow

Impact of sheep grazing

Sheep grazing has the potential to be beneficial and detrimental to lizard persistence. Previous studies used simulated grazing to investigate how a reduction in vegetation may influence lizard behaviour. There were mixed results, with one study finding that lizards had increased ability to capture prey in the grazed habitat compared to ungrazed, but also an increased visibility to predators. Alternatively, lizards would also have an increased ability to detect predators in grazed habitats, and due to the reduced vegetation may have less abundant prey. It also influences their basking behaviour, with lizards potentially requiring less basking in grazed habitat due to increased exposure to sunlight. Interactions between an organism and its environment are complex and as you can see, even when using a simplified version of what plays out in their natural habitat, their response to these environmental cues can be varied.

To contribute further to our understanding of grazing impacts on this species, I experimentally manipulated plots using sheep rather than simulating grazing. My study focussed on the stability of the burrows, a resource critical to the pygmy bluetongue species' survival. We know from previous research that pygmy bluetongue lizards are selective with the burrows that they inhabit, utilising deep burrows rather than shallow burrows. In my study, sheep grazing at a moderate level reduced the number of shallow spider burrows but did not appear to impact lizard-suitable burrows. In grazed plots, the number of new burrows being constructed was lower than ungrazed plots, and the number of existing burrows being destroyed was higher compared to ungrazed plots. Further, grazing also resulted in a decline of spider reproductive output (the number of spiders observed with egg sacs or offspring). This does not necessarily translate to spider recruitment but has the potential to influence burrow availability if over time it does result in fewer spiders reaching maturity. This result indicated that sheep grazing at this level is not likely to have any direct negative impacts on lizard persistence via disturbance to their burrows. Further experimentation will help us to understand the long-term impacts on spider populations.

Pigmy bluetongue lizard in a burrow

Burrow ownership

A secondary question within my study is a question that is raised regularly by people. This is whether lizards and spiders battle it out for ownership of a burrow. My research revealed that niche partitioning occurs within these grasslands, whereby lizards utilise abandoned burrows rather than stealing burrows from spiders. This is a likely scenario, as spiders design their burrows in a way that allows them to protect themselves from potential predators and burrow invaders at the surface.

Community engagement

Alongside the research, Professor Bull also fostered an emphasis on community engagement. This combination of consistent research and community engagement has been integral in the ongoing conservation of this species. There is a pygmy bluetongue community group that meet multiple times

each year to discuss ways to promote conservation of the lizards. This group has played a major role in creating awareness among landholders who may potentially have lizards on their property. Along with students from our lab, the group holds educational days for farmers to visit pygmy bluetongue populations, and learn more about them; and the group also visits community fetes and other events. The pygmy bluetongue community group is essential in conservation of the species, as group members are also often farmers within their communities. It is more powerful to hear what it is like to have an endangered species on your property from a member of the community, than from a scientist or researcher.

Long-term conservation

My research has added another piece to the puzzle within this conservation program. After over twenty years of research we have built a knowledge bank of the many ecological requirements and ecological threats of these lizards. Through ongoing research, we have been able to identify likely future threats to the species. One which may have a detrimental impact is the potential for their current range to become unsuitable under future climate predictions. Long-term conservation will very likely require us to identify suitable habitat to translocate lizards, and to identify strategies that can improve the outcome of translocations.

As such, the next phase in conservation of these lizards is to investigate the potential for translocations of the species. Research on the species is now being led by Associate Professor Mike Gardner at Flinders University. Students from the Gardner lab have been assessing some potential ecological and genetic risks of translocating populations of these lizards, and we are now also assessing how captivity influences their suitability to translocation. Results of these studies will help to ensure that when we do translocate lizards they have the best possible chance for survival in their new habitat.

Pigmy bluetongue lizard

Jess.Clayton@flinders.edu.au

Editor's Note: Jess has recently been awarded the inaugural Professor Mike Bull Research Fund for Emerging Young Nature Scientists 'medal for academic excellence'.

Pigmy bluetongue lizard grassland habitat impacted by grazing

LATIN LESSONS

Garry Trethewy

While we were on the Ikara-Flinders expedition based at Oraparinna, I started doodling a bit with the binomial names that we've given to animals and plants. Some of them can be good mnemonics to us help remember things, others not so much. But often there is an interesting story.

For a quick look at the complexities of Latin, Google "life of Brian" + "Romans go home". Luckily we don't need that depth, but it helps to know some words, without the grammar. Googling "etymology" + genus &/or species is useful. Anything carpus is to do with the fruit. Tetra anything is four of them, in Latin. And so is quad, but in Greek.

Most commonly, Greek and Latin words are used, but don't expect any consistency. The common brown snake, *Pseudonaja textilis*, has a bit of Greek; a bit of Sanskrit - naja for snake, now equated with cobra (it stands up and spreads a hood when alarmed); and a bit of Latin. So *Pseudonaja textilis* = false (Gk) cobra (Sanscrit) with a woven skin (Lat, textile, weave).

Other names will have a bit of French, a bit of Old English, a bit of German, Swahili, Inuktitut, Malayan – all sorts.

The placement of a word seems arbitrary. Cryptoblepharus = hidden eyelids. Tympanocryptus = eardrum hidden.

There are lots of names of famous people, eg stoksii, freelingii, geoffroii, duttonii, mcdonaldi, (yes, only one 'i').

Sometimes the name refers to what something looks like – *Grevillea rosmarinifolia* leaves look like rosemary. *Acacia myrtifolia* - leaves like a myrtle.

Some things seem to have been named by classicists, not by biologists. Yellow-footed rock wallaby, *Petrogale xanthopus*, Petros=rock (Gk), Gata=weasel, ferret (Gk), Xanthos=yellow (Gk), Pus=foot (Gk). Rock Sida, *Sida petrophila*, could have been named by the same person. Sida = pomegranite tree, water lilly (Lat).

Tiliqua seems to be meaningless, or if it ever had a meaning, somebody called Gray applied it to a different animal in 1825 and then forgot why. Perhaps it was inspired by the misread text on an empty bottle. So our common blue-tongue might be (hiccup) scincoides – looking like a skink, (which it is), and our sleepy lizard is (hiccup) rugosa – rough, and arguably doesn't look like a skink (which it still is).

For Melaleuca, honey-myrtle, the Mel is probably black (Gk), but could refer to honey (Lat).

A few years ago, Dr Google provided lots of links explaining the etymology of *Acacia victoriae* (elegant wattle). In flower it looked like Queen Victoria's gorgeous cream wedding gown. That made sense. Looks lovely on the outside, but on contact, is prickly and unforgiving. And while I haven't had the pleasure of seeing Queen Victoria naked (there'll be a web site somewhere), the plant, when not in flower, is the scruffiest and most untidy you'll ever see. More recently Dr Google seems to have changed his mind. It seems the type specimen was named for the (then) Victoria River, Qld, which has since been renamed, so Acacia barcoo might be more appropriate.

And the famous comedy team contributes a bit more: *Montypythonoides riverleighensis,* a large extinct python from Riversleigh, Qld.

So why do we have all these weird and often meaningless names, when common names are just as good? Well, depending where you travel, a blue-tongue can be a *Tiliqua scincoides*, a *Tiliqua rugosa*, or any other local animal with a blue tongue. A cabbage tree can be an Arecacea (palm), a cordyline, a tree fern, or a xanthorrhoea. In Victoria, manuka can be an Acacia, but in most places manuka is *Leptospermum scoparium*. Which is also called a tea-tree, but so are lots of other things.

So the reason we need the admittedly awkward and often meaningless binomial names is that they are unique, like car number plates. Meaningless, but unique. So a Peruvian ecologist and a Botswanan zoologist in Helsinki can be sure they are talking about the same thing.

But the names keep changing. Some cassias became Sennas. Some Egernias became Liopholis. A western brown snake is now 4 different species. Casuarinas became 4 species, including allocasuarina (allo = other (Gk), so other casuarina). That happens when a lot of experts get together and argue about whether the sub-types are just local variations, or actually meaningfully different. Sometimes things that looked the same under a microscope turn out to have quite different DNA. Australian acacias were found to be quite different from the African type species which were named first, so according to the rules of naming, all 900 Australian acacias should have been re-named. But after a bit of argey-bargey, the numbers won: we got to keep the name, and lots of African botanists are pretty grumpy that they had to rename the type species. Among NZ moas, there was a big species and a small species, until DNA showed them to be male & female of the same species. Many Australian native bees were similarly mislabelled.

So let's see if we can untangle and understand the names of some of the things we found at Oraparinna, and compare and contrast the elements in their meanings.

Tympanocryptis tetraporophora eardrum (Gk) hidden (Gk) four (Gk) pores (Gk)

Cryptoblepharus australis hidden (Gk) eyelid (Gk) southern (Lat)

Underwoodisaurus milii Mr Underwood's lizard (Gk) honouring Mr Milius

Pseudonaja textilis false (Gk) cobra (Sanscrit) with a woven skin (Lat, textile, weave)

Pseudonaja aspidorhyncha false (Gk) cobra (Sanscrit) shield (Gk) snout (Gk)

But note, Latin for shield is scut, giving *Notechis scutatus* (shield-like scales) for tiger snake (not seen at Oraparinna).

Suta suta stitched (Lat) stitched (Lat)

Parasuta nigriceps near, similar (Gk) (to Suta, a similar genus) black (Lat) head (Lat).

Xanthorrhoea quadrangulata yellow (Gk) flow (Gk) four-sided (Lat) (-cross section of leaves)

Petrogale xanthopus rock (Gk) weasel, ferret (Gk) yellow (Gk) feet (Gk)

Acacia tetragonophylla prickly (Lat) four-sided (Gk) leaf (Gk)

Exocarpos aphyllus outside (Gk) fruit (Gk) without (Gk) leaves (Gk)

Sida petrophila pomegranate tree, water lily (Lat) rock (Gk) lover (Gk)

And just to avoid (or perhaps cause) confusion here, phyll (Gk) refers to leaf, phil (Gk) refers to lover, phyl (Gk) refers to tribe or group.

Eremophila alternifolia desert (Gk) lover (Gk) alternating (Middle English) leaves (Lat)

Eremophila maculata desert (Gk) lover (Gk) spotted (Lat)

These both have alternate leaves and spotted flowers, so either name could apply to either species. But at least now they've got unique names.

Eremophila oppositifolia desert (Gk) lover (Gk) paired, set against (Old French) leaves (Lat)

Pittosporum angustifolium pitch (Gk) seed (Gk) narrow (Lat) leaf (Lat). Sadly, nothing to do with the lead guitarist of AC/DC.

Melaleuca glomerata honey (Lat(1)) or black (Gk(2)), white (Gk) heaped (Lat) (flowers)

(1) *M. glom*. is also called honey myrtle. (2) Named for black trunk, white branches. So two possibilities.

And note so far, we've found *Mela* =black (Gk), *nigri* = black (Lat)

Codonocarpus pyramidalis bell (Gk) fruit (Gk) pyramidal (Gk)

Casuarina pauper cassowary (Malay) (branchlets look like cassowary feathers) poor (Lat)

Macropus robustus long (Gk) feet (Gk) robust (Lat)

garrytre@bigpond.com

Editorial continued from page 1

participation by community members, at whatever level, is vital to make real change and halt the decline in species and habitat loss. So the purpose of Cleland is to provide nature experiences which enable educational outcomes concerning the natural world, which in turn lead to improved conservation practice. And this is our objective. We showcase the actions of the Department for Environment and Water and will, in future, demonstrate how partnerships with organisations like SEG deliver meaningful conservation outcomes. In addition, Cleland WP will be involved with environmental research through foundations like Nature Foundation SA, the International Koala Centre of Excellence and FAME to name a few. It is also planned to support rewilding ventures such as breeding endangered native butterflies (with the Butterfly Conservation Society of SA), and hopefully breeding for release endangered South Australian birds and reptiles.

We are really excited to be 'opening our doors' to organisations like SEG to work in the Park to understand the complex ecological relationships that exist there. In addition, SEG will be able to teach the next generations of budding biologists about biological monitoring and surveying, and so help to preserve these vital measurement techniques. We anticipate SEG members will work on a range of projects in the Park and interact with young people through, and with, organisations like the Junior Field Naturalists of SA.

This purpose is a tall order for a small park nestled into the peaks of the Mt Lofty Ranges, but we must champion the environmental cause. For a wildlife park to be relevant it must be more than a zoo and certainly not a circus. It must engage, inform and entertain, and from this base develop a citizenry committed to conservation and empowered to make change. Much of this work can only be delivered in partnership with important specialised organisations like SEG. With animal connections carefully designed and training that employs methods that only support animals to participate if they themselves want to, then the value of these experiences is immense. What a challenge – but what a future!

Chris Daniels
Director Cleland Wildlife Park

Trustee
Scientific Expedition Foundation

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APPLICATION FOR MEMBERSHIP AND MEMBERSHIP RENEWAL for 2018 —19

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