

# THE AUSTRALIAN SOCIETY OF HERPETOLOGISTS INCORPORATED



**NEWSLETTER 54**

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**THE AUSTRALIAN SOCIETY OF HERPETOLOGISTS  
INCORPORATED**

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Please direct all membership enquiries to the Treasurer, Joanna Sumner. Membership forms can be filled out at the ASH web site. Newsletter feedback can be given to Deb Bower. All other enquiries should be directed to the Secretary, Eridani Mulder.

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**ASH contingent of the 9th World Congress of Herpetology in Dunedin, New Zealand January 2020**

## Letter from the editor

I begin the 2020 newsletter by acknowledging the sad passing of a veteran in herpetology – our very own Professor Mike Tyler. I won't forget Mike's passion and vibrancy when he joined ASH recently in Barmera. I know Mike has left behind many friends who knew him dearly and we pay our respects to his family and loved ones in these sad times. A huge thanks to Dale Roberts for his dedication to Mike on the next page.

The newsletter this year was prompted, in part, by the need to postpone the 2021 ASH conference in Bachelor, NT. Despite the best of planning by future ASH president Graeme Gillespie, the uncertainty around travel restrictions in the next twelve months means that we cannot realistically commit to venues and organise travel in the near future. We will be holding the Annual General Meeting electronically, to which I'm sure most of us are now accustomed, and there will be another ASH student grant round "soon".

Fortunately there was a monumental ASH contingent at the World Congress of Herpetology in January this year, so many of us got our fix of Glenn's tights. The Kiwi's certainly put on a great show with delicious conference cuisine, a great venue, and some fond memories shooting the scat in the local pubs. I particularly enjoyed watching the plenary talks with women in herpetology just lighting up the stage including our own Jodi Rowley and Nicki Mitchell (with not so womanly but just as brilliant representation by Geoff While). We voted on the next meeting to be held in Kuching, Malaysia in August 2024. Can I get a hellbender yes!

With recent global mayhem, it has become common practice for me to seek the optimistic flipside in our current affairs. I think for that means conferences that will now be held virtually (e.g. Turtle Survival Alliance, ASSAB, Statistical Ecology), allowing a more global network of attendees.

I know a lot of herpetological research has been disrupted from the events of drought, fire and now the coronavirus but I hope this newsletter sparks a little joy with updates of the recent achievements and movements of ASH members. Thank you to all who contributed. For the Star War's nerds out there, look out for a punny paper title that will make you smile and for the rest of you, enjoy the pics and news of our fantastic community, whom I dearly treasure.

Back leg's first,  
Deb Bower



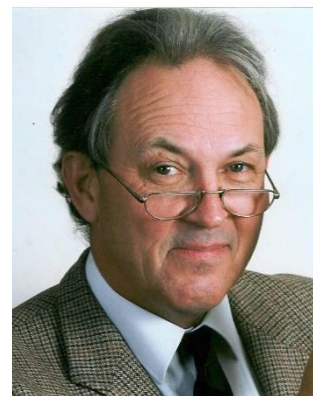
## Michael J Tyler (1937 – March 26, 2020)

By J Dale Roberts

I first met Mike in the early 1970's: I was a Ph D student in Zoology at the University of Adelaide, Mike, then, was the "lab manager" in the Dept of Physiology and Pharmacology - not an academic position. Not sure how we first met but we both worked with frogs. Despite me working on acoustics and hybrid zones and Mike at that time heavily involved in systematics and taxonomy we hit it off and Saturday mornings I spent with Mike at the South Australian Museum.

He "allocated" me projects: *Crinia riparia* lacked an eardrum- let's plot its distribution relative to *Crinia signifera*. Multiple frogs later and some field work to fill in some distribution gaps, we published a short note in the South Australian

Naturalist in 1973 showing the two species had abutting distributions in the mid-north of South Australia - my first publication. Mike encouraged me to sort out the taxonomy and distribution of Neobatrachus species in South Australia, *N. pictus* and *N. sudelli* with Neobatrachus becoming a lifelong interest for me. The same pattern emerged with *Arenophryne rotunda* at Shark Bay: a trip with Mike and Marg Davies to Shark Bay in 1978 when we did our first frog tracking exercise. The paper was drafted in the airport departure lounge before Mike flew back to Adelaide!



Tyler made several major contributions to global frog systematics and frog biology. A 203 page monograph from 1968 on the "Papuan hylid frogs of the genus Hyla", his demonstration that Rheobatrachus is a "gastric brooder", his analysis of the form of submandibular muscular showed that Australian hylid frogs were a monophyletic lineage distinct from other global hylid lineages, and, its corollary – burrowing frogs in the genus "Cyclorana" were also hylids! First suggested in a publication in 1971 this work lead to the resurrection of Litoria as a genus for Australian tree frogs. His work with fossil frogs – based largely on the structure of the ilium. His determination to explore Kimberley frog faunas and the consequent documentation of incredible diversity in the genus Uperoleia (e.g. a 1981 monograph with Marg Davies and Angus Martin). An enormous number of publications on skin secretions in anurans: the standout for me the development of material from Notaden species as a very effective biological glue used in repairing bone fractures.

Tyler was instrumental, along with many others, in alerting Australia and the world to global frog declines. He authored (with others) a review for the Australian Federal Government, "The Action Plan for Australian Frogs", in 1997 that assessed the conservation status of all Australian frog species built with input from just about anyone working on Australian frogs at that time. Mike helped galvanize frog researchers across the planet into taking frog declines as a serious issue – a major outcome of the first "World Congress of Herpetology".

Mike moved from "lab manager" to an academic position in the Department of Zoology at the University of Adelaide in 1975 where he remained until his retirement (in name only), and continued in an honorary research position until 2020.

As well as a strong publication record in mainstream scientific journals (several hundred publications), Mike authored or co-authored field guides to both "all of Australia" and "state based", SA, NT and WA frogs, most recently the second edition of a "Field Guide to Australian Frogs" – illustrated and co-authored by Frank Knight published by CSIRO in 2020. Mike also authored several "popular" books on Australian frogs – biology, origins, natural history and the bizarre – the gastric brooding frog, Rheobatrachus.

Along with his academic career Mike fostered community interests in natural history particularly with junior naturalist groups in Adelaide. He also ran a "profit for charity" (the Redcross) bookshop based on second hand books. I had several suggestions of books that I "had to have" (and now do) in my library: gems that had turned up in his second hand book "collection" – always for a reasonable (possibly inflated) price.

A friend and research colleague throughout my career: and after his retirement and mine – every trip to Adelaide included Belair, coffee at the Sheoak Café, and always new ideas about frogs, different perspectives on old issues, or, peculiarities that Mike had noticed that I should follow up on! A great career, a lifelong colleague in science, and, some shared, tough, experiences in life where we supported each other. Thanks.

## Australian Capital Territory

### Team Pogona and friends

#### Institute for Applied ecology, University of Canberra

Research focus currently on exploring the mechanisms of sex determination in reptiles using our ZZ/ZW with sex reversal model (Pogona), our XX/XY model (Bassiana), our TSD model (Amphibolurus). Still working on turtles, particularly species delimitation and phylogeography, but dabbling in wildlife forensics.

Cao, R., Somaweera, R., Brittain, K., Fitzsimmons, N., Georges, A. and Gongora, J. 2020. Genetic structure and diversity of Australian freshwater crocodiles (*Crocodylus johnstoni*) from the Kimberley, Western Australia. *Conservation Genetics*, <https://doi.org/10.1007/s10592-020-01259-5>

Capraro, A., O'Meally, D., Waters, S.A, Patel, H.R., Georges, A., and Waters, P.D. 2020. The role of microRNAs in regulating neuroprotection in the brain of hibernating central bearded dragons, in press.

Castelli, M., Whiteley, S., Georges, A. and Holleley, C.E. 2020. Cellular calcium and redox regulation: The mediator of vertebrate environmental sex determination? *Biological Reviews*, doi: 10.1111/brv.12582.

Chessman, B.C., McGilvray, G., Rumming, S., Jones, H.A., Petrov, K., Fielder, D.P., Spencer, R-J and Georges, A. 2020. On a razor's edge: status and prospects of the critically endangered Bellinger River snapping turtle, *Myuchelys georgesii* *Aquatic Conservation* 30:586-600.

Cornejo-Páramo P, Dissanayake DS, Lira-Noriega A, Martínez-Pacheco ML, Acosta A, Ramírez-Suástegui C, Méndez-de-la-Cruz FR, Székely T, Urrutia AO, Georges A, Cortez D. 2020. Viviparous reptile regarded to have temperature-dependent sex determination has >100 million year old XY chromosomes. *Genome Biology and Evolution*, in press.

Doucette, L., Duncan, R.P., Osborne, W.S., Evans, M., Georges, A., Gruber, B. and Sarre, S.D. 2020. Warming reduces activity time and increases vulnerability to climate change in a temperate lizard submitted

Georges, A., Doody, J.S., Young, J. and Beggs, K. 2020. Reptiles with TSD: How the physical and the physiological can combine to overcome climate change. Submitted.

Jones, M.E.H., Pistevos, J.C.A., Cooper, N.H., Lappin, A.K., Georges, A., Hutchinson, M.N. and Holleley, C.E. 2020. Reproductive phenotype predicts adult bite-force performance in sex-reversed dragons. *Journal of Experimental Zoology A* 333:252-263.

Rovatsos, M., Gamble, A., Nielsen, S., Georges, A., Ezaz, T. and Kratochvil, L. 2020. Do male and female heterogamety really differ in expression regulation? Lack of global dosage balance in pygopodid geckos. *Philosophical Transactions of the Royal Society, Series B*, in review.

Schwanz, L.E., Georges, A., Holleley, C.E. and Sarre, S.D. 2020. Climate change, sex reversal and lability of sex determining mechanisms *Journal of Evolutionary Biology* 33:270-281.

Shea, G., Thomson, S. and Georges, A. 2020. The identity of *Chelodina oblonga* Gray 1841 (Chelonia: Chelidae) reassessed. *Zootaxa*, in review.

Stanford, C. et al. 2020. Turtles in Trouble: Overexploitation and habitat loss are driving the world's turtles and tortoises toward extinction. *Current Biology*, in press.



Bower, D., Lips, K.R., Amepou, Y., Richards, S., Dahl, C., Nagombi, E., Supima, M., Dabek, L., Alford, R., Schwarzkopf, L., Ziembicki, M., Noro, J.N., Hamidy, Gillespie, G.R., A., Berger, L., Eisemberg, C., Li, Y., Lui, X., Jennings, C.K., Tjaturadi, B., Peters, A., Krockenberger, A.K., Nason, D., Kusriani, M.D., Webb, R.J., Skerratt, L.F., Banks, C., Mack, A.L., Georges, A., Clulow, S. 2019. Island of Opportunity: Can New Guinea protect amphibians from a globally emerging pathogen? *Frontiers in Ecology and the Environment* 17:348-354

Capraro, A., O'Meally, D., Waters, S.A., Patel, H.R., Georges, A. and Waters, P.D. 2019. Waking the sleeping dragon: transcriptional profiling of a hibernating reptile. *BMC Genomics* 20:460.

Kehlmaier, C., Zhang, X., Georges, A., Campbell, P.D., Thomson, S. and Fritz, U. 2019. Mitogenomics of historical type specimens of Australasian turtles: clarification of taxonomic confusion and old mitochondrial introgression. *Scientific Reports* 9:5841.

Matsubara, K., O'Meally, D., Sarre, S.D., Georges, A., Matsuda, Y., Graves, J.A.M., Srikulnath, K., Ezaz, T. 2019. ZW sex chromosomes in Australian dragon lizards (Agamidae) originated from a combination of duplication and translocation in the nucleolar organizing region. *Genes* 10:861 [pdf]

van Dyke, J.U., Spencer, R-J., Thompson, M.B., Chessman, B., Howard, K. and Georges, A. 2019. Conservation implications of turtle declines in Australia's Murray River system. *Scientific Reports* 9:1998.



## The Keogh Lab

### The Australian National University

Departed but not forgotten:

Marta Vidal Garcia (recent Postdoc) Marta is now at the University of Calgary working in the Hallgrímsson Lab on lots of different morphometrics projects.

The current lab:

Scott Keogh: I can't seem to escape from a life of admin duties. After serving as Head of the Division of Ecology and Evolution for eight years, and looking forward to stepping back from that position, I've been sucked in to a one-year term as Interim Director of the Research School of Biology after a failed international search for a new boss. It's way less fun than herpetology. I am still managing to find a bit of time for research albeit mostly in the form of cheerleading the great people I am lucky enough to have in my lab. We are working our way through huge phylogenomic scale projects on the major Australian herp clades and I'm very happy to report that we already

have four papers from this work in *Systematic Biology* (goannas, pythons, the world's major amphibian clades and the world's major squamate reptile clades) and another about to come out in *PlosGenetics* (*Neobatrachus*). And lots more to come.

Mitzy Pepper (Postdoc): I am still a postdoc in the Keogh lab, and enjoying every minute of it. The past year I have been wrapping up some long term projects, including the African *Platysaurus* work, a revision of *Hemiergis*, along with a review on the geohistory and biogeography of the arid zone, trying to make the geological literature accessible for biologists. I am very excited to report that Scott and I just won an ABRIS grant to keep me around for another 2.5 years from January 2021, working on the love of my scientific life, arid zone geckos. I had an awesome time catching up with herp buddies from all over the world at the World Congress - the Crew of ASH'ers was fantastic. Currently I am enjoying working non-stop from home 3 days a week on science, and otherwise looking after an 18mo, 3.5yo and just turned 5yo. Thank goodness we have what seems to be an endless supply of *Hemiergis* to chase in the backyard!

Ian Brennan (Postdoc): After submitting my thesis in early 2019 and graduating at the end of the year, I've kept up the Keogh lab tradition and stuck around for a postdoc. Given the flood of high-quality data in the lab, someone needs to sit behind a computer and be overwhelmed by it all. I spent the end of my PhD and most of 2019 working on the phylogenetics of monitor lizards. After presenting this project a few too many times, it's finally in press in *Systematic Biology*. This work suggests that the amazing diversity of Australian goannas has been driven by interspecific competition resulting in character displacement, and more broadly explains why Australia is such a great place to study these kinds of questions. Now that Scott's paying me the big bucks, I'm wading through phylogenomic data for many of Australia's reptile and amphibian radiations. This mostly means doing the behind the scenes work so that our all-star collaborators (like Damien, Carlos, Mitzy, Conrad, and Steve Donnellan among others) can run with amazing projects on Australia's snakes, lizards, and frogs. In the meantime, I'm always testing out and working on new macroevolutionary methods. Make sure to reach out if you need a seminar speaker, I love to chat about all this work, and in the worst-case you'll get a pretty presentation to watch!

Damien Esquerré (Postdoc). After finishing my PhD with Scott last year, I have been hired as a postdoc until next year. I have been busy publishing the remaining chapters of my PhD on the evolution of pythons and *Liolaemus* lizards of South America. My latest paper, in *Systematic Biology*, uses a huge genomic and morphometric dataset on the pythons of the world and resolves their phylogeny and finds how they have accelerated their morphological evolution upon arriving to Australia. Recently I have undertaken more projects on phylogeography, which are challenging for someone used to working above the species level, but I'm finding the fun in it and helping redefine the species boundaries and systematics of some of the iconic python groups. I have also been busy working as a wildlife photography instructor and tour leader taking participants to places like Borneo and Costa Rica.

Carlos Pavon (PhD Student). I am now a third year PhD student in the Keogh Lab. I am mainly interested in how to integrate molecular, morphological, and geographic data to understand evolutionary and biogeographic patterns. For my PhD, I am using this integrative approach to look at the evolution of a remarkable group of lizards: goannas (*Varanidae*). I am currently trying to figure out what evolutionary and ecological processes are responsible for the phenotypic and phylogenetic diversity exhibited by the World's varanids and on the role that ontogenetic lability has had in shaping this diversity. At a finer scale, I am close to publishing a study revealing ancient hybridization in the clade containing the Komodo dragon and its close relatives, and I am also using genomic and phenotypic data to look into the phylogeography and systematics of some varanid species complexes. In addition I am involved in research projects focused on the systematics, biogeography, and evolution of Neotropical herps, co-authoring a triad of papers on these topics

recently. I was interviewed by Rolling Up Science, which you can read about here:  
<https://rollingupscience.wixsite.com/rollingupscience/post/water-treatment-research-experiment>

Putter Tiatragul (PhD Student). I am a new PhD student in the group (since July 2019) from Thailand. My thesis will focus on the (often-forgotten) Australian blind snake genus *Anilius*. Before travel restrictions, I visited the South Australian Museum and the Western Australian Museum to collect some morphological data along with some tissues. The goal for the project is to infer a phylogeny using genomic data and use comparative methods to test hypotheses about the evolution of this charismatic group! Prior to this, I studied nesting behaviour of anoles in Miami (USA) at Auburn University with Dan Warner.

Bank Paphatmethin (Masters Student). I am a new Masters student from Thailand who is interested in invertebrate systematics and taxonomy. I have been a Keogh Lab member since late January 2020 and is co-supervised by Dr. Andreas Zwick from the Australian National Insect Collection, CSIRO Black Mountain. Currently I am using an integrative taxonomic approach, including phylogenomics and morphological data, to revise and test the monophyly of the Australian moth genus *Symphyta* (Lepidoptera: Lasiocampidae). Before coming to Australia and joining the Keogh Lab, I worked on the systematics of freshwater bivalves (Bivalvia: Unionidae) in Thailand based on morphology and genetics. I was also a part of the Animal Systematics and Molecular Ecology Laboratory at Mahidol University in Thailand where I learned the fundamental taxonomy and population genetics of freshwater leeches, jellyfishes, snails, sea cucumbers, pileated gibbons and slow lorises.

Keogh Lab Published or in press for 2019/20:

Brennan, IG, AR Lemmon, EM Lemmon, DM Portik, V Weijola, L Welton, SC Donnellan, JS Keogh. 2020. Phylogenomics of monitor lizards and the role of competition in dictating body size disparity. *Systematic Biology*, in press.

Novikova\*, PY, IG Brennan\*, W Booker, M Mahony, P Doughty, AR Lemmon, EM Lemmon, JD Roberts, L Yant, Y Van de Peer, JS Keogh, SC Donnellan. 2020. Polyploidy breaks speciation barriers in Australian burrowing frogs *Neobatrachus*. *PLOS Genetics*, in press. \*Equal first authors

Hime, PM, AR Lemmon, EM Moriarty Lemmon, E Scott-Prendini, JM Brown, RC Thomson, JD Kratovil, BP Noonan, RA Pyron, PLV Peloso, ML Kortyna, JS Keogh, SC Donnellan, RL Mueller, CJ Raxworthy, K Kunte, R Santiago, S Das, N Gaitonde, DM Green, J Labisko, J Che, DW Weisrock. 2020. Phylogenomics uncovers ancient gene tree discordance in the amphibian tree of life. *Systematic Biology*, in press.

Esquerré, D, SC Donnellan, IG Brennan, AR Lemmon, EM Lemmon, H Zaher, F Grazziotin, JS Keogh. 2020. Phylogenomics, biogeography and morphometrics reveal rapid phenotypic evolution in pythons after crossing Wallace's line. *Systematic Biology*, in press.

Burbrink, FT, FG Grazziotin, RA Pyron, D Cundall, SC Donnellan, F Irish, JS Keogh, F Kraus, RW Murphy, B Noonan, S Ruane, CJ Raxworthy, AR Lemmon, EC Moriarty Lemmon, H Zaher. 2020. Interrogating genomic-scale data for Squamata (lizards, snakes, and amphisbaenians) shows no support for key traditional morphological relationships. *Systematic Biology*, early view online.

Tiatragul S, Hall JM, & Warner DA. 2020. Nestled in the city heat: urban nesting behavior enhances embryo development of an invasive lizard. *Journal of Urban Ecology*. juaa001

Esquerré D, Ramirez-Álvarez, CJ Pavón-Vázquez, J Troncoso-Palacios, CF Garza-n, JS Keogh, AD Leaché. 2019. Speciation across mountains: phylogenomics, species delimitation and taxonomy of the *Liolaemus leopardinus* clade (Squamata, Liolaemidae). *Molecular Phylogenetics and Evolution*, 139: 106524.

- O'Brien, D, JS Keogh, AJ Silla, PG Byrne. 2019. Females prefer to mate with more related males in wild red-backed toadlet (*Pseudophryne coriacea*). *Behavioural Ecology* 30:928-937.
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## New South Wales

### Taronga Herpetofauna Division

#### Taronga Conservation Society Australia

Throughout 2019 and early 2020, the focus within the Herpetofauna Division of Taronga Zoo has been on maintaining and managing threatened species insurance colonies and undertaking a range of translocations. In addition to the existing programs below, new insurance populations have been established at the zoo over the summer for the northern populations of *Litoria booroolongensis* and the Fiery Range populations of the *Pseudophryne pengilleyi* due to severe drought and bushfires respectively. Michael McFadden continues to supervise the department and oversee the conservation programs, whilst also undertaking a PhD part-time in the Byrne lab at University of Wollongong.

Continued breeding success for *Pseudophryne corroboree* and *P. pengilleyi* has enabled further translocations from the zoo's insurance colonies in partnership with NSW DPIE, NPWS and Zoos Victoria. For *P. corroboree*, this has focused on translocating eggs to wild and enclosed sites in Kosciuszko National Park and establishing released frogs in disease-free enclosures. For *P. pengilleyi*, efforts have been focused on establishing best practice protocols for translocating frogs and establishing artificial pools for released eggs to boost recruitment. Additionally, further breeding success with *Litoria castanea* in the last year, has permitted the experimental translocations of over 1000 frogs to the wild.

The insurance population for *Myuchelys georgesii* has been productive over the last year at the zoo. Six of the zoo's seven mature female turtles have produced clutches this season, with the hatchlings being reared in quarantine facilities. Ten juvenile turtles approaching two years of age were released from the zoo to the Bellinger River in November 2019, each with radio-transmitters attached. Close monitoring of these turtles will be undertaken by DPIE. This follows the initial translocation of ten zoo-bred turtles in November 2018. With less than 200 turtles left in the wild, the insurance colony will be utilised to boost existing wild population numbers.

Last but not least, translocations have been initiated on the Cocos Islands with *Cryptoblepharus egeriae*. The blue-tailed skinks were last seen in the wild on Christmas Island almost a decade ago. They disappeared largely due to predation by invasive species, including the Asian wolf snake and giant centipede. Two successful insurance populations were established for this species and *Lepidodactylus listeri*, located on Christmas Island, managed by Parks Australia, and at Taronga Zoo. In September 2019, in partnership with Parks Australia and UWA, 150 individuals from each colony were released onto Pulu Blan in the Cocos Islands. In March 2020, a further 150 from each colony were released onto a second neighboring island.

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## Shine Lab

### Macquarie University

Rick Shine and an assorted bunch of postdocs (Greg Brown, Matt Greenlees, Georgia Ward-Fear), together with the ever-faithful Melanie Elphick (senior research assistant), are now working out of Macquarie Uni rather than Sydney Uni.

Rick works three days a week at Macquarie, and is loving it (although a bit less so now that we are all in social isolation). But until the COVID bug closed us down, the level of scientific discussion (and fun) at Macquarie was amazing. And very conducive to work. Rick managed to get more than 50 papers accepted in 2019. Admittedly, quite a few of these were from his backlog ... but still ...

Rick went on lots of overseas trips in 2019 (a good decision, in retrospect) – the US herp meetings in Utah, a trip to Sri Lanka, talks in Finland and some ceremonial stuff (induction into the American Academy of Arts and Sciences) in Massachusetts. The World Congress of Herpetology in New Zealand in January, and sea snake fieldwork in New Caledonia in February. A trip to the Northern Territory for research and teaching in March... and then it all came to a screeching halt as the world went into lockdown.

Rick sends his thanks to Tracy Langkilde and Dan Warner and Melanie Elphick for arranging the symposium in Rick's honour at the WCH, and thanks also to everyone who gave talks (especially family members) and those who attended.

Melanie Elphick transferred to Macquarie University with Rick in November 2019 in a new role as Senior Research Coordinator. The transition to MQ was more complex and took much longer than anyone imagined. It took Mel 3 months to decommission the old lab at USYD and many more months after that clearing out offices and storerooms. Amazing how much "stuff" a research group can accumulate over 40 years of residence in the same lab space. Thankfully the move is nearly complete, all the institutional transition admin and paperwork has eased off and Mel can get back to her favourite job of formatting and copyediting manuscripts. In January 2020 Mel attended the World Congress of Herpetology in Dunedin and gave her first talk in 25 years at the Shine Symposium. Mel would rather just get things done behind the scenes, and hopes it will be another 25 years before she has to get up in front of an audience again!

Research-wise, the Northern Territory program spearheaded by Greg Brown is still going strong (coevolution of cane toads and their lungworms, plus about 100 minor projects) because it is all based at the Research Station at Middle Point (now rebadged for Macquarie Uni). But things are tougher for fieldwork in the Kimberley (Georgia's project) and northern NSW (Matt's project). A lot was achieved before COVID lockdown, but the future is unclear.

So like everyone else, we are social-distancing and writing up papers from accumulated data. Rick is finally attacking his longterm sea snake data set (17 successive years of mark-recapture work). Plus, of course, lots of stuff on cane toads.

Lachlan Pettit is close to finishing his PhD on longterm impacts of cane toads on varanids. Lincoln Macgregor is conducting an eDNA study on the toad front in northern NSW. Rick is collaborating with Anthony Waddle (University of Melbourne), Simon Clulow and Fleur Ponton (Macquarie) on a project looking into chytrid resistance in Green and Golden Bell frogs.

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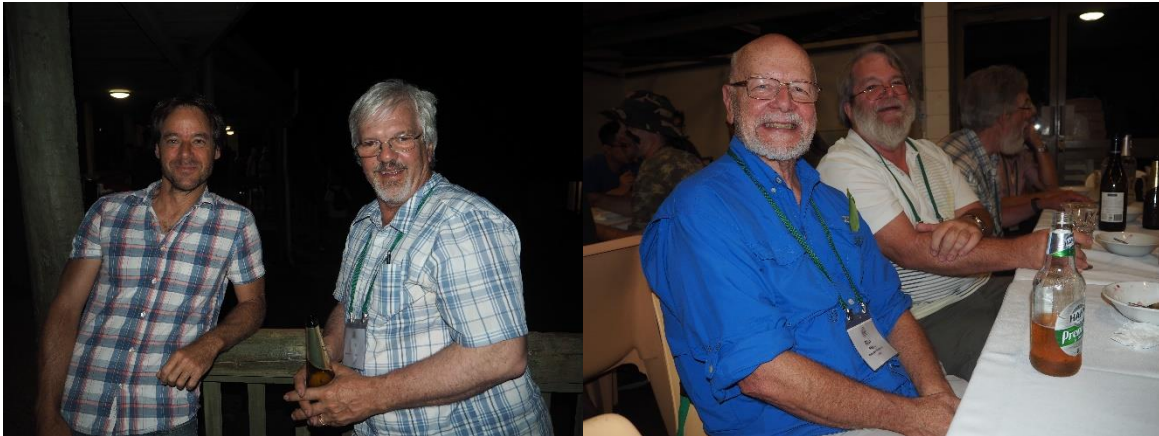
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## Whittington/Thompson Lab

### University of Sydney

The lab is continuing its research on the evolution of viviparity and other aspects of the physiology of reproduction under the guidance of Camilla Whittington, while Mike Thompson is enjoying life on his farm in South Australia and continues to co-supervise students via Skype and email. Camilla received a 2020-2021 Sydney Research Accelerator (SOAR) fellowship to start a new program of fish pregnancy research to complement the existing reptile viviparity research in the group. From South Australia, Mike has focussed locally on turtle research. He liaises with various community groups and government agencies, together with Ricky Spencer (WSU) and James (Van) Van Dyke (La Trobe), which led to a “Turtle Summit”, run by the South Australian Department of Environment and Water to advance conservation and recovery of turtles in the River Murray. Unfortunately, Mike’s involvement was somewhat curtailed last turtle nesting season because of health issues (kidney transplant) and then, like everyone else, COVID-19. The Turtle Summit was a great success and, fortunately, fell between the kidney issues and the COVID-19 lock down.

Claudia Santori has handed in her PhD thesis, supervised by Mike, Camilla, Ricky Spencer and James (Van) Van Dyke. She has been very successful in attracting small grants to support her PhD project on turtles in the River Murray. Claudia presented at the International Congress for Conservation Biology (ICCB 2019) in Kuala Lumpur, Malaysia in 2019, as well as the World Congress of Herpetology (WCH9) in Dunedin. Camilla and Jacque also enjoyed the WCH, although Mike was unfortunately unable to make it this year.

Mel Laird (PhD 2018) is now at the University of Otago, continuing her marsupial focus, but turned her attention to skinks in her electron microscopy analysis of *Saiphos equalis* eggshells, when we described the first known case of eggs plus live birth in a single vertebrate litter. Mel led an article for The Conversation about this work, which generated a lot of interest (<https://theconversation.com/the-first-known-case-of-eggs-plus-live-birth-from-one-pregnancy-in-a-tiny-lizard-113460>). We are continuing work with this species, perhaps a contender for the title of ‘weirdest lizard in the world’(?) due to its bimodal reproduction and possible facultative oviparity. We recently published an analysis of the uterine transcriptome of this species that supports the idea that egg-laying *S. equalis* are transitional between “true” egg laying, and live birth (<https://theconversation.com/this-lizard-lays-eggs-and-gives-live-birth-we-think-its-undergoing-a-major-evolutionary-transition-133630>). This work was led by Charles Foster (postdoc), who is now a veteran lizard catcher after fieldwork in Tasmania and NSW. Charles has been busy analysing a huge amount of placental transcriptome data from a range of skinks as part of an ARC-funded project with Camilla, Mike and Van studying vertebrate placental function. Stephanie Liang started

honours in the lab this year, after volunteering with us for several years and proving her worth during lizard catching and tank cleaning. Stephanie originally came to us with a passion for birds, but skinks (specifically her study species, *S. equalis*) have stolen her heart! Deirdre Merry (continuing PhD, University of Tasmania; primary supervisor Geoff While) continues to study the mechanisms underlying parturition in Egernia group skinks and spends several weeks at a time at USyd carrying out her molecular work. Jessica Dudley joined us as a postdoc this year and is working on projects mostly focused on seahorse reproduction. Several other students in the lab are studying non-herps, but addressing similar questions about the evolution of viviparity, including Sadeq Khan (sea star viviparity, PhD 2020), Alice Buddle (shark viviparity, continuing PhD), Zoe Skalkos (seahorse pregnancy, Hons 2019), and Vertina Teh (seahorse pregnancy, continuing Hons). The very glittery Jacquie Herbert keeps lab operations running smoothly and continues to impart her vast store of lizard-catching wisdom to each new member of the lab.

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## Macquarie University

Simon Clulow has moved into the final year of his MQ Fellowship at Macquarie University studying crows and toads with Martin Whiting. While that brings some uncertainty for the future, he remains hopeful that his career is not done just yet, with the MQ frog lab having seen a sharp increase in the numbers of frogs and students being housed.

James Madden is studying frog and tadpole cognition for his Masters (in collaboration with Martin), Jayden Maloney will be studying spatial learning and cognition in magnificent tree frogs (also with Martin) and Anthony Waddle has joined us from University of Melbourne for part of his PhD on chytrid studies in bell frogs (in collaboration with Rick Shine). Grant Webster continues his PhD on the ecology of Mahony's toadlet (in collaboration with Deb Bower at UNE) and aims to survey more than 200 new sites for the frog despite COVID-19 travel restrictions.

Further afield, Simon and Sean Doody are continuing their studies on large lizards and the cane toad invasion in northern Australia with Stephanie Deering starting her Masters on rapid learning in crows in response to toads and Kari Soennichsen joining the lab from Germany in the second half of the year to study spatial and nesting ecology of perentie in central Australia.

Further afield still, Simon and Sean plan to continue reproductive studies of lizards in Florida and Simon and Deb Bower will continue their studies on frog biodiversity and conservation in New Guinea. Simon will also be heading over to Bolivia and Sand Diego (when COVID restrictions lift) to attempt to use assisted reproduction to help rescue frogs on the brink of extinction. Back in Newcastle, Dean Lenga continues his studies of green and golden bell frog ecology on Kooragang Island and Rose Upton and Lachlan Campbell continue their PhDs developing assisted reproductive technologies for frog (Rose) and reptile (Lachlan) conservation and are both due to submit in 2020. Simon is also pleased to report two student completions at the end of 2019 with Angela Simms completing her Masters on Sulawesi turtle ecology in Indonesia (and scoring a subsequent PhD scholarship at LaTrobe) and John Gould completing his PhD on the reproductive ecology of the sandpaper frog.

#### Books

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#### Book Chapters

Clulow, J., Upton, R., Trudeau, V. & Clulow, S. (2019). Amphibian Assisted Reproductive Technologies – Moving from Technology to Application. In: Holt, W., Brown, J. & Comizzoli P. (eds) *Reproductive Science in Animal Conservation – Progress and Prospects*. Springer: New York. Pp. 413-463.

#### Refereed Journal Articles

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Burstal, J., Clulow, S., Colyvas, K., Kark, S. & Griffin, A (In Press). Radiotracking invasive spread: Are common mynas more active and exploratory on the invasion front? *Biological Invasions*. <https://doi.org/10.1007/s10530-020-02269-7>

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Conservation': an ominous projection for native wildlife and biodiversity. *Biological Conservation*, 241: 108365

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## Conservation Biology Research Group

### University of Newcastle

The past year has been a rollercoaster for CBRG, just as I am sure it has been for many others. Over the summer, we had several of our frog survey sites burn in the megafires. Some of these sites were locations that had been surveyed for several years and where we have good baseline data to explore the impacts of fire on population abundance, genetics and disease. Other sites were newly established and resulted in the loss of a substantial amount of sound recorders and temperature loggers. Needless to say, the focus of these projects will now incorporate a fire element.

National park closures and now COVID19 travel restrictions have prevented us from traveling to our burnt study sites, but apart from that, other projects are going full steam ahead. Green and golden bell frog surveys on Kooragang Island were set to wrap up at the start of April, but late season breeding events have seen our team continue fieldwork to track juvenile dispersal and chytrid levels (following strict hygiene protocols, of course!). Other members of our team are focusing on analysing sound data, genetic and habitat modelling, and of course, writing! The other large project we have underway is an exhibition titled 'Biomes', where we aim to engage the public with the wonders of biodiversity and encourage community involvement in conservation actions. This will be a month-long exhibition held at the Newcastle Museum toward the end of the year watch this space!

Despite the doom and gloom occurring in the world, we have multiple achievements to share. Highlights for our team include: the publication of several articles discussing concerns we have over the topics of "compassionate conservation" and rewilding, and two articles focusing on techniques and benefits of cryopreservation for biobanking; three of us presented at the inaugural Women Researching and Talking Herpetology conference in Sydney in September; we welcomed a handful of new RHD students, including three new honours students and two masters students studying various amphibian conservation topics. Additionally, we congratulated John Gould on submitting his PhD thesis, Samantha Wallace for passing confirmation, and Alex Callen on receiving an excellence in teaching award. Another high that we managed to fit in between the megafires and mega-world-virus-shutdown, was the 9th World Congress of Herpetology conference in Dunedin, New Zealand. Nine of us made it over the ditch to present at this wonderful event.

Andrea S Griffin, Alexandra Callen, Kaya Lee Klop-Toker, Robert J Scanlon, Matt W Hayward (In Press). Compassionate conservation clashes with conservation biology: Should empathy, compassion and deontological moral principles drive conservation practice? *Frontiers in Psychology*, section Comparative Psychology



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## Australian Museum Herpetology

### Australian Museum Herpetology & UNSW Sydney

<https://australianmuseum.net.au/learn/collections/natural-science/herpetology/>

The focus of the Australian Museum/UNSW Sydney lab remains amphibian and reptile conservation biology in Australia, SE Asia and the Pacific. In 2019/20, we have spent a fair bit of time in the field, especially in the New England and Central Tablelands of NSW, having resumed our search for the Peppered Tree Frog (*Litoria piperata*) and ramped up our work in understanding the distribution of and threats facing the newly rediscovered population of Booroolong Frogs (*Litoria booroolongensis*) on the New England Tablelands and at other sites. In 2019, Chris participated in collaborative amphibian research in northern Vietnam, continuing our more than decade-long amphibian research and conservation work in SE Asia. Jodi and Tim were also extremely lucky to be invited to join collaborative frog research led by the Kwaio community in Malaita, the Solomon Islands.

The biggest project in the AM Herpetology team remains FrogID ([frogid.net.au](http://frogid.net.au)), which has now put over 180,000 records of 197 species of frogs on the map since launching in November 2017. Identifying frogs from their calls is our new superpower! We're working hard not only to identify these frogs but also to put these calls to work in helping understand frogs and inform their conservation. We've put the first year of data online and available for download, plus published four papers on FrogID- with many more on the way! FrogID also won a Eureka Prize! Please keep submitting calls - and keeping them in mind for helping your projects.

There was a strong AM team at the World Congress of Herpetology in Dunedin in January, with Tim awarded the prize for best student talk on frogs with his Honours research "'Surveying frogs from the bellies of their parasites"' and Jodi presenting a keynote on "'Adventures in amphibian conservation: from scientific expeditions to citizen science"'. Jordann presented her Honours research "'Bad neighbours? Amphibian chytrid fungus infection dynamics in three frog species of Sydney"' and Brittany presented her Honours research "'High variability in Red Tree Frog advertisement calls may act as buffer to anthropogenic disturbance"'. In addition, previous FrogID Validator Kathy Potter presented "Examining Spotted Marsh Frog *Limnodynastes tasmaniensis* call races using large-scale citizen science data" and Research Associates Glenn Shea, Frank Lemckert and Renee Catullo presented research on "The tenses of existence of the skink *Eugongylus rufescens* (Shaw, 1802) (Scincidae)", "Life on the edge - Green and Golden Bell Frogs in a coastal lake" and "The undescribed frog diversity of the Australian Monsoonal Tropics".

Jodi Rowley (Curator, AM & UNSW Sydney) is focused on the scientific outcomes of FrogID, frog systematics and taxonomy (with a focus on Australia, Vietnam, and more recently the Solomon Islands), drivers of amphibian declines, and otherwise gathering information to inform conservation management. Her joint position with the Centre for Ecosystem Science at UNSW has helped expand the team and scope of research, particularly in collaboration with Corey Callaghan.

Dane Trembath (Collections Technical Officer, AM) took on the role of Herpetological Technical Officer in late 2019. He is currently hard at work emptying freezers, re-organising the freshwater turtle collection, accessioning the amazing Marion Anstis Tadpole Collection, listening to FrogID calls and sneaking in some herpetological research!

Tim Cutajar (Research Assistant, AM) recently completed the test stage of his project to increase detectability of rare frog species through iDNA (invertebrate-derived DNA) surveys. Having successfully detected elusive frogs by sequencing DNA from midges' bloodmeals, he and Jodi are continuing research to further develop the technique. When not focused on flies' rear ends, Tim is working with Jodi on understanding the frogs of the New England Tablelands including the

population of Booroolong frogs they recently rediscovered, continuing the IUCN Red List update for Southeast Asian amphibians, identifying FrogID calls, making use of these abundant FrogID data to make sense of some geographically confusing small green frogs and helping the broader team out with DNA sequencing and mapping. Oh, and there's always a new Southeast Asian frog to help describe!

Chris Portway (Research Assistant, AM) has been working on Australian frog taxonomic revisions in collaboration with Jodi, Renee and others and has been conducting qPCR in the AM lab to quantify amphibian chytrid infection in Australian frogs, including and historical specimens from the AM's collection. He's also very involved in FrogID and has listened to his share of frog calls!

Adam Woods (FrogID Science Communicator and Project Coordinator, AM) has been busy keeping FrogID going, including sending newsletters and coordinating a huge team of people to keep improving the project.

Harry Leung (Research Assistant, AM) is working with Tim on continuing the update of the IUCN Amphibian Red List for mainland Southeast Asian amphibian species. He is also involved in searching for the Green-thighed Frog (*Litoria brevipalmata*), led by Chris at Ourimbah, with current efforts focused on analyzing data from automatic recordings. He is also listening to and identifying frog calls submitted to FrogID.

Jordann Crawford-Ash (Research Assistant & FrogID Validator, AM) completed her honours project (UNSW Sydney & AM) which focused on the dynamics of amphibian chytrid fungus infection in three frog species in Sydney and has two papers brewing from this project. She is still busy validating FrogID calls, and along with Chris and other lab members she is currently investigating the presence of the amphibian chytrid fungus in our museum collections through swabbing historical specimens.

Chi Phan (Research Assistant & FrogID Validator, AM) is working with Tim on updating the IUCN Amphibian Red List for mainland Southeast Asian amphibian species and has just started on research projects examining the trade in Southeast Asian amphibians. She is also listening to and identifying frog calls submitted to FrogID.

Brittany Mitchell (AM & UNSW Sydney) has now finished her Honours project, where she was using FrogID citizen science data to examine how frogs are responding acoustically to anthropogenic disturbance. She found that Red Tree Frogs (*Litoria rubella*) do not appear to change their advertisement calls in response to urbanisation, however they do have highly variable calls which may act as a buffer to disturbance. The paper has been published in the Journal of Urban Ecology and she is hoping to start her PhD soon. In the meantime, Brittany is happily listening to and validating frog calls for the FrogID project.

Andrew Trevor-Jones (FrogID Validator, AM) has been busy identifying frogs calls on FrogID recordings, especially from Queensland.

Duong Le (PhD Student, AM & University of Science, Vietnam National University-HCMC) has just successfully defended her PhD examining the impact of habitat modification on a forest-dependent frog community in Vietnam!

Gracie Liu (PhD Student, AM & UNSW Sydney and FrogID Validator) is researching how frogs respond to habitat modification and has been out surveying Booroolong frogs in the Central Tablelands. She is also part of the FrogID validation team. When she isn't identifying calls, she can usually be found analysing and writing up data (collected from FrogID!) for her PhD.

Maureen Thompson (PhD Student, AM & UNSW Sydney and FrogID Validator) received a UNSW University International Postgraduate Award (UIPA) to move from the U.S. and join the lab in spring

of 2019. For her research, Maureen is using the FrogID dataset to look at environmental factors most closely related to frog calling across the continent and seeking to better understand motivations of citizen scientists and optimize data collection. She is also learning to recognize (and form opinions on) the frog calls of NSW!

Sophie Collins (PhD Student, UNE & AM) is now back to resurveying frog populations on the New England Tablelands of NSW as part of her PhD (Stuart Cairns), after a brief drought-induced hiatus.

Liam Bolitho (PhD Student, SCU & AM) is now finished chasing *Philoria* in the mountains as part of a PhD project at SCU (David Newell) and now writing furiously.

Savannah Weaver (Undergraduate student, UNSW Sydney & AM) spent some time with the team this year investigating frog call diversity using the FrogID dataset and is now working with us remotely, with a manuscript near completion!

Ana MarÃ-a Olave Velandia (Volunteer Researcher, AM) recently joined the team after moving from Colombia, and is working closely with Tim, lending her wealth of experience in all things molecular.

Vic Patterson (Volunteer Researcher & FrogID Validator, AM) has validated an awful lot of North Queensland frog calls submitted to FrogID and is currently undertaking a research project on the poorly known *Uperoleia* species of north Queensland.

Harold Cogger (John Evans Memorial Fellow) is writing up 50 years of monitoring of a western NSW population of the mallee dragon (previously *Ctenophorus fordi*, now *Ctenophorus spinodomus*) and earlier work done on the comparative growth patterns of two terrestrial/arboreal lacertilians (*Intellagama lesueurii* and *Brachylophus vitiensis*) and a lacertilian analogue (*Sphenodon punctatus*). His snake identification app is also ready for download!

Glenn Shea (Research Associate) spent much of 2019 helping out others with projects, including the global catalogue of reptile type specimens, a list of the recognised skink species of the world for the IUCN Skink Specialist Group, and the ASH species lists, which interrelated in a variety of ways, as well as the follow-up work from the IUCN Australian workshops. In July, he participated in the IUCN Wallacean reptiles workshop in Singapore, and in October/November, he spent a month visiting American institutions (CAS, MVZ, BYU, UF, USNM, AMNH, MCZ) in search of more scales to count. As a result of issues identified during the preparation of the reptile type catalogue and other related studies, he has most actively been working on a variety of nomenclatural papers, several of which have recently appeared and others of which are in review. With COVID curtailing museum visits in Australia and overseas for 2020, he is still waiting to visit the last four unseen collections (SAM, KU, LSUMZ, MSNG, a total of 125 specimens) to complete examination all of the world's 1600 *Eugongylus* specimens, but in the meantime is writing up several papers on new typhlopids, new *Eulamprus*, a new *Emoia*, and a number of new *Sphenomorphus* (with various combination of coauthors), as well as new, resurrected and redefined genera of sphenomorphin skinks. In 2020, he is supervising Hannah Steel, a University of Sydney DVM student doing her Year 3 research project on geographic variation in morphology of the small *Glaphyromorphus* species (*crassicaudus*, *pumilus*, *darwiniensis* and *arnhemicus*), which have been variously treated as species and subspecies in a confusing variety of different combinations, with the aim of defining morphological and geographic boundaries.

Ross Sadlier (Senior Fellow) with colleagues had the results of several research projects published this year. Publication of work on the Kaputar Skink has finally brought formal recognition to one of NSW's most range restricted vertebrate species, and a formal threatened species nomination for the species was prepared and submitted. Publication of the description of the Eastern Mallee dragon now recognizes populations formerly included under *Ctenophorus fordi* from southeast Australia as a new species, *Ctenophorus spinodomus*, restricted mallee *Triodia* habitat. Work continues with

Steve Donnellan on resolving the complex of taxa within *Egernia cunninghami*, which continues to be more complex than ever anticipated. An investigation of the history and identity of historical specimens of the Saw-shelled Turtle '*Elseya latisternum*' in the British Museum with Ian Smales resolved the identity of the true type of the species, a major step forward in a review of the systematics of this species. Work on New Caledonian lizards is now focused on a revision of the 2000 'The Herpetofauna of New Caledonia' with Aaron Bauer. Ongoing systematic and biology projects saw the publication of the descriptions of two new species of skink from the region, both endemics to small islands off New Caledonia. Ross sits on the NSW OEH SoS advisory group and collaborates with the western district OEH in conservation assessments of reptile and amphibians.

Stephen Mahony (Research Associate) has converted from a staff member to a Research Associate and is working on various reptile research projects with us (although we suspect he greatly misses listening to all those frog calls!).

Frank Lemckert (Research Associate) doesn't have much time for frog research but has written draft survey guidelines for frogs for the NSW Biodiversity Assessment Method (BAM) and been accredited to write expert reports for six species under the NSW BAM. In between writing and reviewing reports he has managed to get out and do some survey work for Green and Golden Bell Frogs at Kooragang Island (providing some very useful information on the efficiency of frog fences when faced with hordes of determined juvenile GGBFs), and completed surveys on the NSW Central Coast for both the Wallum Froglet and Mahony's Toadlet to guide day to day management of these species by local councils.

Marion Anstis (Research Associate) is collaborating with the lab on frog systematics and taxonomy and in the search for the Peppered Tree Frog (*Litoria piperata*). As soon as the situation allows, she will begin tackling the unidentified tadpoles in the AM collection!

Gerry Swan (Research Associate) is currently using the self-isolation time to work on the 6th edition of the Complete Guide with Steve Wilson. Until all this happened, he was doing work out at Mutawintji NP to find out if the endangered population of *Liopholis whitii* was still extant or had gone extinct. It is still hanging on, only just, despite drought, heat and goats. Pulled together the data on the Barkly pipeline results and had it published.

Renee Catullo (Research Associate) is primarily collaborating with the Jodi and Chris on big round frogs (Platyplectrum) and pointy brown frogs (Rocket frogs).

Phil Spark (Research Associate) is collaborating with the lab on a few projects on NSW frogs and reptiles, particularly Booroolong Frogs.

Josie Stokes (Research Associate) is collaborating with us on FrogID.

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## Laboratory of Applied Zoology and Ecological Restoration

### University of New England

Deb Bower accepted a continuing position as a Lecturer in Zoology and Ecology in the School of Environmental and Rural Science. The lab has grown to include a party of herp students (surely that is the appropriate collective noun?) that bring a diversity and vibrancy to her life.

Jigme Wangyal most recently joined us from Bhutan, although only through the internet, since COVID19 has restricted his physical immigration. Jigme is studying the herpetofauna of the Kingdom of Bhutan, a little known fauna sandwiched between China and India. He has been collecting data for many years so he's tracking well and that lovely Paul Oliver has joined the team to help with systematics and all things mountainous.

Grant Webster's PhD focuses on a flashy frog that was only described in 2016 by his most fabulous supervisor Simon Clulow. It has since been listed as endangered nationally. Grant will use a combination of ecological and genetic techniques to test the applicability of current methods for determining occupancy of threatened frogs and to assess specific threats to Mahony's toadlet.

Razzaq Sarker and Annette Deppe are both MSc students in part of a joint project with the Commonwealth Water Office and Darren Ryder looking at the effects of environmental flows in the Gwydir and Warrago. Joanne Ocock and Amelia Walcott have been providing data and expertise on all things frogs and flows as Razzaq has been analysing their five year data set on frog monitoring. Annette tracked freshwater turtles at a large waterhole in the Gwydir Wetlands as it dried up and then refilled, quantifying mortality and behaviour of different turtle species in response to drought.

Lou Streeting upgraded her MSc to a PhD recently and continues her hard work studying the conservation biology of the endangered Bell's turtle in the local New England Tablelands, a project led very capably by Local Land Services Officer (and herper) Martin Dillon. Lou has raised and head started a variety of clutches, obtained hours of video of nesting turtles, and been working with sniffer dogs to protect nests in the wild. The local community has gotten involved and many school kids have helped to release turtles. It might be the most adorable thing that's ever happened.

Kyia Eveleigh's PhD is on plasticity in the spotted marsh frog. He is looking to see how climate change will influence their development and different defence behaviours among populations.

Trish Flores is studying rats and their effect on blue-tailed skinks on Cocos Islands for her MSc.

Melissa Hampton-Smith is looking at the impacts of blast fishing in Tanzania (mostly on people).

Kimberly Reynolds is also studying people and how we might change their perceptions around herpetofauna. Roan Dunstone is out in the New England region looking at the acoustics of threatened frogs.

Don McKnight made a guest entry as a postdoc for 10 months but has returned to the VertEco lab with Lin to study acoustics. We had a thoroughly enjoyable trip to Noonbah with Angus Emmott to capture turtles marked by Arty Georges' team some 17 years prior.

<https://www.abc.net.au/news/2019-12-24/desert-turtle-thriving-in-outback/11818880>

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## Northern Territory

### Christian Animal Physiological Ecology Lab

#### Charles Darwin University

Gecko physiology and population genetics (ARC Discovery with Craig Moritz, ANU). Continuing studies of skin microbiota on amphibians and reptiles.

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## Queensland

### Venom Evolution Lab

#### The University of Queensland

We secured a \$2M LIEF grant for 2021 to create an integrated, multi-nodal bio-layer interferometry facility with leading-edge technology and robot-enabled experiments. This will allow us to make substantial inroads into snake venom prey-specific targeting, evolution, and resistance. We also filmed an episode with ABC Catalyst called 'Venom', which should air around Jan 2021. Jordan Debono, Daniel Dashevsky, and Christina Zdenek received their PhDs. Our lab is currently made up of 1 head, 1 post-doc, 4 PhD candidates, 2 incoming PhDs in limbo (from overseas unable to start yet), 1 visiting PhD student from Brazil, 1 visiting Masters student from Italy, and 1 Honours student.

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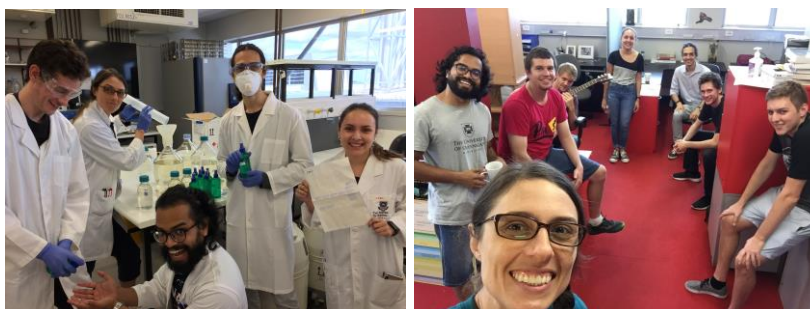
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## **VertEcology Lab**

### **James Cook University**

Lin's VertEco lab has been busy and diverse as ever. Despite a lab that now includes students working on the impacts of feral cats in the wet tropics, breeding ecology of chital deer, digging behaviours in rufous bettongs, thermal physiology in ants, and the conservation of black-throated finches (!!), Lin thankfully still has some herpetologists in her lab to keep her sane. Students have been busy collecting data across Australia and in remote stretches of the world including the Galapagos islands and central American rivers in Belize. Lin presented three talks at the World Congress of Herpetology in New Zealand, on using ecoacoustics to examine toad calling, on controlling toads with traps, and on sticky toes in geckos, and has been actively helping build the Australian Acoustic Observatory, deploying acoustic recorders to assess biodiversity of vocal species across the country. Lin is happy to introduce the lab's newest graduate, Dr Don McKnight, who gained a cum laude for his thesis on the recovery of frog populations from frog disease. We expect Jendrian Riedel to follow soon, as he has handed in and his thesis on the Morphology of Gecko Skin is being marked. In addition, a new student Rishab Pillai, has started his PhD on gecko toes. Despite COVID-19 restrictions, the lab has continued to thrive working-from-home and powering through data analyses and writing up papers!

Ross Alford is enjoying his retirement, but still helping Lin's lab with thinking about science, and analysing data through regular visits to the lab lunch.

Eric Nordberg is finishing up as a postdoc in the lab, where he has stayed busy mentoring students in the lab and conducting research on a variety of topics including predation risks on sea turtle nests, the impacts of feral animal fences on freshwater turtles, boldness and activity in house geckos, the effects of leaky dam structures on the rehydration of grazing landscapes, and nocturnal basking behaviours in freshwater turtles.

Slade Allen-Ankins started a postdoc with the lab midway through 2019 and has been working on developing automated methods for detecting frog calls in long-term recordings, as well as conducting research on the acoustic niche hypothesis in frog communities. He has also been involved with deploying acoustic sensors around the Townsville area as part of setting up the Australian Acoustic Observatory which will collect audio from all around the country over the next 5 years. Along with other members of the lab, he attended the "Ecoacoustics For Conservation Workshop" at QUT in February 2020. Most importantly, he helped Ebony help baby Jude come into the world earlier this year!

Hiro Komine was a visiting postdoc from Tokyo University of Agriculture and Technology and conducted two projects on potential impacts of urbanization on cane toads while at JCU. One looked at the impact of artificial light on food intake of toads, and the other tested morphological differences between urban and rural area toads. Toads in urban areas seem to have small poison glands!

Don McKnight finished his PhD at James Cook University in December 2019. He presented his research at the World Congress of Herpetology (2020), Joint Meeting of Ichthyologists and Herpetologists (2019), and Turtle Survival Alliance (2019). He joined Deborah Bower at the University of New England to study Cooper Creek Turtles as a post-doc, and he is currently in Belize studying Central American River Turtles. He spends more time complaining about Donald Trump and recent Star Wars movies on Facebook than he does doing science, which is remarkable when you see how much science he does!

Jendrian Riedel has been busy this last year finishing his thesis and publishing his thesis chapters. His research focused mainly on gecko ecology, gecko toe-pad morphology, and hydrophobicity of gecko skin. In between he presented results on these topics at the 2nd gecko specialist meeting (Gekkota Mundi II) in Tel Aviv, Israel, and at the World Congress of Herpetology in Dunedin, New Zealand.

Jaimie Hopkins has continued to collect data for her PhD project, but has looked up from the vocalisations of frogs, toads and geckos she has studied so far, and recorded the coos of native peaceful doves exposed to invasive spotted dove coos, to determine whether peaceful doves alter vocalisations in response to the noise. She is currently writing up her thesis.

Sheryn Brodie continues her PhD using acoustic data to study the chorusing patterns of savanna frogs. Her first paper describing cane toad calling phenology was recently published, and she has been dipping her toes into the machine learning pond to find an efficient method to analyse 33,000 hours of audio to study the chorusing of native frog populations.

Kyana Pike has spent the last year heavily involved in data collection for her PhD on the interaction between giant Galapagos tortoises and agriculture. Now back from the field she is mostly working on the analysis of her second chapter investigating the influence of infrastructure such as fences and roads on tortoise movement and space use.

Rishab Pillai has (finally!) commenced his PhD furthering his research on the ecological morphology of Diplodactylinae geckos across Australia. He has spent the last year working on a range of projects within the lab while writing up and collecting data to set up his PhD.

Wytamma Wirth is in the final stages of writing his PhD thesis. Wytamma's thesis has focused on ranaviral infection in Australian freshwater turtles. During his PhD, Wytamma has determine how many epidemiological relevant factors such as inoculation route, viral dose, environmental temperature, and length infection influence ranaviral disease in our turtles.

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- BJ Muller, RM Andrews, L Schwarzkopf, DA Pike. 2020. Social context alters retreat- and nest-site selection in a globally invasive gecko, *Hemidactylus frenatus*. *Biological Journal of the Linnean Society* 129 (2), 388-397
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- K Indraswari, DS Bower, D Tucker, L Schwarzkopf, M Towsey, P Roe. 2020. Assessing the value of acoustic indices to distinguish species and quantify activity: A case study using frogs *Freshwater Biology* 65 (1), 142-152
- W Wirth, L Schwarzkopf, LF Skerratt, A Tzamouzaki, E Ariel. 2019. Dose-dependent morbidity of freshwater turtle hatchlings, *Emydura macquarii krefftii*, inoculated with Ranavirus isolate (Bohle iridovirus, Iridoviridae). *Journal of General Virology* 100 (10), 1431-1441
- GP Brown, L Schwarzkopf, RA Alford, D Bower, R Shine. 2019. Spinal arthritis in invasive cane toads is linked to rate of dispersal as well as to latitude. *Scientific reports* 9 (1), 1-4
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## Conrad Hoskin Lab

### James Cook University

The lab has been cruising along with a whole bunch of herp projects. Stephen Zozaya submitted his PhD, had no changes, and was conferred cum laude. He also published a great paper on gecko pheromones in *The American Naturalist*. Congrats on a stellar effort Dr Zozaya. Diego Ortiz is nearing submission of his PhD on *Osteocephalus* frog diversity across the Amazon basin. Conrad joined Diego on his final fieldtrip in Ecuador, where they frogged alongside giant otters, pink dolphins, a green anaconda (exciting), and a puma (super exciting). Steve Ryan is powering away on his project on toads in upland rainforest; currently wrangling complex data. Halvard Midtun is early in the piece in his MPhil on parasite interactions and impacts between Asian house geckos and native geckos. So far, it has involved a ridiculous number of field surveys. Lorenzo Bertola has started his MPhil project on speciation genomics in the *Litoria serrata/L. myola* system, after doing a run of projects in the lab over recent years (*Phyllurus* geckos, *Litoria* linkage map). Scott Macor finished his Honours project on *Oedura* pheromones and is now enviro consulting. Conrad also continues with projects on discovery, taxonomy and conservation of Qld herps, evolution and ecology of microhylid frogs, and quolls (a spotted, furry herp).

Meyer, E.A., Hines, H.B., Clarke, J.M. & Hoskin, C.J. (2020). An update on the status of wet forest stream-dwelling frogs of the Eungella region. *Proceedings of the Royal Society of Queensland*, 125, 97-115.

Hoskin, C.J. (2019) Description of three new velvet geckos (Diplodactylidae: *Oedura*) from inland eastern Australia. *Zootaxa*, 4683, 242-270.

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Cocciardi, J.M., Hoskin, C.J., Morris, W., Warburton, R., Edwards, L. & Higgie, M. (2019) Adjustable temperature array for characterizing ecological and evolutionary effects on thermal physiology. *Methods in Ecology & Evolution*, 10, 1339-1346.

Hoskin, C.J., Bertola, L.V. & Higgie, M. (2019) A new species of *Phyllurus* leaf-tailed gecko (Lacertilia: Carphodactylidae) from The Pinnacles, north-east Australia. *Zootaxa*, 4576, 127-139."





## South Australia

**James Menzies**

**University of Adelaide**

The musculoskeletal system and natural history of *Barygenys maculata* (Anura, Microhylidae) a burrowing frog of New Guinea. Royal Society of South Australia (in press, April 2020).



## Tasmania

**Behavioural and Evolutionary Ecology Research Group**

**University of Tasmania**

The BEER group is in full isolation mode following a busy Spring, Summer and Autumn working on a range of different research projects both in Tasmanian and elsewhere. We have an active website which contains plenty of extended updates on the group and our research to date ([www.beergrouputas.wordpress.com](http://www.beergrouputas.wordpress.com)). But for those of you who would prefer the brief version...

Erik Wapstra continues to build the snow skink system with his students on a range of questions from climate effects and climate change modelling, telomere and life history dynamics, sex allocation and sex determination. Erik, along with Chris Burrige (UTAS), Tariq Ezaz (University of Canberra) and Oleg Simakov (University of Vienna) were recently awarded an ARC Discovery

Project grant to examine the molecular mechanisms underpinning the intraspecific variation in sex determining mechanisms observed within the snow skinks. This project builds substantially on Erik's long-term snow skink project, which moved into its 21st season this year. While international travel may have been curtailed this season, Erik also continues to collaborate closely with Mats Olsson on their Sand Lizard project in Sweden.

Geoff While continues his work into the origins and evolution of complex sociality using the *Egernia* group. Geoff, in collaboration with Martin Whiting PhD (Macquarie), Tobias Uller (Lund) and Charlie Cornwallis (Lund), have a range of projects running related to their ARC Discovery Project focused on the role that social plasticity plays in mediating the early origins of family life. As part of project, Geoff's natural population of *Liopholis whitii* population moved into its 16th season of sampling and has begun to uncover interesting insights into the long-term social dynamics of the *Liopholis*. Geoff spent much of last year at the University of Lund, working on various projects related to the wall lizard system with Tobias and Natalie Feiner. The publication of the wall lizard genome last year has opened a range of new questions that Geoff, Tobias and Natalie can pursue. Plans were put on hold this year as corona virus curtailed Geoff's annual Mediterranean sojourn but he looks forward to getting back to Europe in the near future. Geoff recently began an exciting new project, in collaboration with Camilla Whittington (University of Sydney), James van Dyke (Latrobe) and Martin, to utilize the unique asynchronous birth of the *Egernia* lizards to understand how females control the timing of birth. They were recently awarded Hermon Slade Foundation grant to pursue this research.

The BEER Group has been fortunate enough to have two excellent post-docs join the ranks over the past 12 months. First, Kirsty MacLeod joined the group via a Marie Curie Fellowship. Kirsty's project utilized the *Liopholis* system to examine how the post-natal social environment mediates the outcome of maternal stress effects. Kirsty managed to escape back home to Scotland before the lockdown commenced but powered through a heap of work over the summer with some exciting results. Second, Jen Moss joined the group on an Endeavor leadership Fellowship. Jen's project, in collaboration with BEER Group Honours student Zach Borthwick, examined how the thermal environment mediates social complexity by influencing levels of multiple paternity and within group relatedness. Zach and Jen are currently wrapping up the final bits of analysis and we hope to get these results out as soon as possible.

The BEER group has one important PhD completion in the last 12 months with Tom Botterill-James submitting his PhD thesis. Tom's PhD explored the causes and consequences of conflict and cooperation between family members during the early evolution of family life. Tom tackled this question by integrating a variety of experimental and analytical techniques (manipulative experiments, meta-analyses, comparative analyses) across a wide range of model systems, from Burying Beetles, to *Egernia* lizards and birds. This involved some great collaborations with close friends of the BEER group Dan Noble (ANU) and Per Smiseth (University of Edinburgh). Tom is currently on a three-year post-doctoral fellowship with Barry Brook and the DEEP group.

Lu Fitzpatrick, Peta Hill and Mara Ruiz Minano will hopefully be joining Tom in the Doctors lounge soon. Lu is finalizing her work using Erik's long-term data set as well as some neat experimental approaches to examine telomere dynamics and senescence in the *N. ocellatus*. Peta is finalizing her PhD project, working with Erik, Chris and Tariq, utilizing both field, experimental and molecular techniques to uncover the molecular mechanisms underlying sex determination in *N. ocellatus*. Mara returned to UTAS from Sweden/Italy to write up her PhD. Mara's PhD is focused on understanding the role that climate plays in mediating the introgressive spread of the Tuscan phenotype/genotype that we see in the Wall Lizards. All three promise to produce excellent theses and we look forward to celebrating with them soon.

In addition to the BEER group mainstays, we have added several new members to the group. Alix Bouffet-Halle joined us as a PhD student all the way from France. Alix's PhD is examining how offspring sex mediates various aspects of family life within the Liopholis, making the use of sex specific markers recently developed in Lund. Deirdre Merry joined the group after completing an excellent honours. Deirdre is examining the physiological, neuro-morphological and molecular mechanisms underlying birthing asynchrony in the Liopholis (in collaboration with Camilla). Victoria Russel joined the group on a PhD scholarship related to Geoff and Martins DP. Victoria's project examines the role that social plasticity plays in mediating the origins of social complexity in the Egernia. Her work involves a lot of large-scale experimental work utilizing the wonderful facilities that Martin has at Macquarie. Yorick Lambreghts joined us all the way from Belgium. Yorick's PhD, in collaboration with Martin and Camilla, will examine the co-evolutionary dynamics between viviparity, social evolution and kin recognition. Finally, Alex Hansson joined us from Sweden. Alex's PhD is split between UTAS and the University of Gothenburg. Perhaps unsurprisingly, Alex is examining what mediates telomere dynamics in both the snow skink and sand lizard systems. Alex recently returned to Sweden after a busy summer running the snow skink field program.

The Comparative Endocrinology and Ecophysiology Group is the other area of herpetological research at UTAS. Ashley Edwards continues her work on examining key components of the reproductive physiology of the blue tongue lizard, *Tiliqua nigrolutea*, and has also had an increase in focus on teaching and learning directives at the university level.

Yang, W., Feiner, N., Laakkonen, H., Sacchi, R., Zuffi, M. A. L., Scali, S., While, G. M. and Uller, T. (In press) Spatial variation in gene flow across a hybrid zone reveals causes of asymmetric introgression and reproductive isolation in wall lizards. *Evolution*.

Kreger, K. M., Shaban, B., Wapstra, E. and Burridge, C. P. (In press) Phylogeographic parallelism: Concordant patterns in closely related species illuminate underlying mechanisms in the historically glaciated Tasmanian landscape. *Journal of Biogeography*.

Drummond, E. M., Senior, A. F., Hamilton, K., Gardner, M. G., While, G. M. and Chapple, D. G. (In press) Temporal variation in thermal plasticity in a free-ranging subalpine lizard. *Journal of Thermal Biology*.

Feiner, N., Munch, K. L., Jackson, I. S. C. and Uller, T. (In press) Enhanced locomotor performance on familiar surfaces is uncoupled from morphological plasticity in Anolis lizards. *Journal of Experimental Zoology*.

Thompson, S. A., Pearson, S. K., While, G. M., Chapple, D. G., and Gardner, M. G. (In press) Scat on the doorstep: refuge choice in a group-living lizard is influenced by the presence of scat piles. *Austral Ecology*.

Atkins, Z.S., Amor, M.D., Clemann, N., Chapple, D.G., While, G.M., Gardner, M.G., Haines, M. L., Harrison, K.A., Schroder, M. and Robert, K.A. (2020) Allopatric divergence drives the genetic structuring of an endangered alpine endemic lizard with a sky island distribution. *Animal Conservation*. 23: 104-118.

Axelsson, J., Wapstra, E., Miller, E., Rollins, N. and Olsson, M. (2020) Contrasting seasonal patterns of telomere dynamics in response to environmental conditions in the ectothermic sand lizard, *Lacerta agilis*. *Scientific Reports*. 10: 182.

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- G.R., Greenlees, M.J., Hobson, R., Hoskin, C.J., How, R., Hutchinson, M.N., Lloyd, R., McDonald, P., Melville, J., Michael, D.R., Moritz, C., Oliver, P.M., Peterson, G., Robertson, P., Sanderson, C., Somaweera, R., Teale, R., Valentine, L., Vanderduys, E., Venz, M., Wapstra, E., Wilson, S. & Chapple, D.G. (2019) Geographic and taxonomic patterns of extinction risk in Australian squamates. *Biological Conservation*. 238: 108203.
- Fitzpatrick, L. J., Olsson, M., Parsley, L. M., Pauliny, A., Pinfold, T. L., Pirtle, T., While, G. M. and Wapstra, E. (2019) Temperature and telomeres: thermal treatment influences telomere dynamics through a complex interplay of cellular processes in a cold-climate skink. *Oecologia*. 191:767-776.
- Deakin, J. E., Potter, S., O'Neill, R., Ruiz-Herrera, A., Cioffi, M. B., Eldridge, M. D. B., Fukui, K., Marshall Graves, J. A., Griffin, D., Grutzner, F., Kratochvil, L., Miura, I., Rovatsos, M., Srikulnath, K., Wapstra, E., Ezaz, T. (2019) Chromosomics: Bridging the Gap between Genomes and Chromosomes. *Genes*. 10:627.
- While, G.M. and Wapstra, E. (2019) Developmental Biology: Embryonic movement influences sex determination in a turtle. *Current Biology*. 29: R883-R886.
- Fitzpatrick, L., Olsson, M., Parsley, L. M., Pauliny, A., Pirtle, T., While, G. M. and Wapstra, E. (2019) Tail loss and telomeres; consequences of large-scale tissue regeneration in a terrestrial ectotherm. *Biology Letters*. 15: 20190151.
- While, G. M. (2019) Why is ectothermic parental care so cold? a comment on Beekman et al. *Behavioral Ecology*. 30: 594-595.
- Uller, T., Laakkonnenn, H., Michaelides, S., While, G. M., Coulon, A. and Aubret, F. (2019). Genetic differentiation predicts body size divergence between island and mainland populations of common wall lizards. *Biological Journal of the Linnean Society*. 127: 771-786.
- Munch K.L., Wapstra E., Thomas S., Fisher M. and Sinn D. L. (2019) What are we measuring? Novices agree amongst themselves (but not always with experts) in their assessment of dog behaviour. *Ethology*. 125: 203-211.
- Edwards, A.M., Cameron, E.Z., Wapstra, E. and McEvoy, J. (2019) Maternal effects obscure condition-dependent sex allocation in changing environments. *Royal Society Open Science*. 6: 181885.
- Senior, A.F., Atkins, Z.S., Clemann, N., Gardner, M. G., Schroder, M., While, G.M., Wong, B.B.M and Chapple, D. G. (2019) Variation in thermal biology of three closely related lizard species across an elevation gradient. *Biological Journal of the Linnean Society*. 127: 278-291.
- Andrade, P., Pinho, C., Pérez i de Lanuza, G., Afonso, S., Brejcha, J., Rubin, C-J., Wallerman, O., Pereira, P., Sabatino, S., Bellati, A., Pellitteri-Rosa, D., Bosakova, Z., Bunikis, I., Carretero, M. A., Feiner, N., Marsik, P., Paupério, F., Salvi, D., Soler, L., While, G. M., Uller, T., Font, E., Andersson, L. and Carneiro, M. (2019) Regulatory changes in pterin and carotenoid genes underlie balanced color polymorphisms in the wall lizard. *Proceedings of the National Academy of Sciences, USA*. 116: 5633-5642.
- Bererhi, B., Wapstra, E., Schwartz, T. and Olsson, M. (2019) Inconsistent inbreeding effects during lizard ontogeny. *Conservation Genetics*. 20: 865-874.
- Olsson, M., Schwartz, T., Wapstra, E. and Shine, R. (2019) How accurately do behavioural observations predict reproductive success in free-ranging lizards. *Biology Letters*. 15: 20190030.
- Yuni, L.P.E.K, Jones, S. M. and Wapstra, E. (2019) Thermal biology of the spotted snow skink, *Niveoscincus ocellatus*, along an altitudinal gradient. *Australian Journal of Zoology*. 66: 235-246.

While, G. M. (2019) Book Review: *Eco-Evolutionary Dynamics* by Andrew Hendry. *Austral Ecology*. 44: 355.

Botterill-James, T., Munch, K.L., Halliwell, B., Chapple, D.G., Gardner, M.G., Wapstra, E. and While, G.M. (2019) Low food availability during gestation enhances offspring post-natal growth, but reduces survival, in a viviparous lizard. *Oecologia*. 189: 611-620.

While, G.M., Gardner, M.G., Chapple, D.G. and Whiting, M. J. (2019) Stable social grouping in Lizards. In A. Russell and V. Bells (eds), *Behaviour of Lizards: Evolutionary and Mechanistic Perspectives*. CRC Press, New Hampshire, U.S.A, pp 321-343.

Colchero, F., Jones, O. R., Conde, D. A., Hodgson, D., Zajitschek, F., Schmidt, B. R., Malo, A. F., Alberts, S. C., Becker, P. H., Bouwhuis, S., Bronikowski, A. M., De Vleeschouwer, K. M., Delahay, R., Dummermuth, S., Fexrnández-Duque, E., Flatt, T., Frisenvænge, J., Hesselsøe, M., Larson, S., Lemaître, J-F., McDonald, J., Miller, D. A. W., O'Donnell, C., Packer, C., Raboy, B. E., Reading, C. J., Wapstra, E., Weimerskirch, H., While, G.M., Baudisch, A., Coulson, T. and Gaillard, J-M. (2019) The diversity of population responses to environmental change. *Ecology Letters*. 22: 342-353."



## Victoria

### Robert Lab - Reproductive ecology & Conservation biology

#### La Trobe University

Herpetological focused research in 2019-20 was largely completed by the now Dr Zak Atkins with two more chapters of his thesis published. In 2020 we have a new PhD candidate in Angela Simms working on turtle head-starting for conservation (primary supervision by James Van Dyke) and 2 new honours students (mid-year start) in Candice Sexton working on little whip snakes and Kushini Kularatne working on immunocompetence handicap hypothesis.

Atkins, Z.A., Clemann, N., Chapple, D.G., Edwards, A.M., Sinsch, U., Hantzschmann, A.M., Schroder, M., Scroggie, M.P., Robert, K.A. (2020) Demographic and life history variation in two sky-island populations of an endangered alpine lizard. *Journal of Zoology*. DOI:10.1111/jzo.12728

Atkins, Z.A., Amor, M.D., Clemann, N., Chapple, D.G., While, G.M., Gardner, M.G., Haines, M.L., Harrisson, K.A., Schroder, M., Robert, K.A. (2019) Allopatric divergence drives the genetic structuring of an endangered alpine endemic lizard with a sky-island distribution. *Animal Conservation*



**Ray Draper**

**Central Highlands Environmental Consultancy**

Mapping chytrid fungus in western Victoria.



**La Trobe Wildlife Sanctuary**

**La Trobe University**

La Trobe University's Wildlife Sanctuary hosted a workshop on advances in amphibian survey and monitoring on 7 September last year. Techniques that have been developed or advanced in the past couple of decades were demonstrated, including eDNA sampling, call site visualisation in the field using 'Firefly', remote acoustic recording using Song Meters and AudioMoths, mark-recapture using Visible Implant Elastomer and Alphanumeric tags, radio telemetry using miniaturised transmitters, baited tadpole trapping with glow sticks, and the latest hygiene procedures. Tom Burns (Deakin University), Brendan Casey (RMIT University), David De Angelis (La Trobe University), Josh Griffiths (CESAR), Claire Keely (Museums Victoria), and Reid Tingley (Monash University) presented.

Up until 13 March, the Sanctuary continued quarterly frog surveys of its wetlands as part of its citizen science program. Third year Statistics Major Kevin Newman used acoustic data collected over the preceding five years to complete occupancy modelling for his Vacation Research Scholarship with the Australian Mathematical Sciences Institute.

During the COVID-19 situation, Dave is keeping busy surveying for the state-threatened Brown Toadlet (*Pseudophryne bibronii*) with local council and community groups in his role as a private ecological consultant.

De Angelis, D. and Cleeland, C. (2019) Observations of recruitment failure and success in relation to rainfall for an isolated population of the Southern Toadlet *Pseudophryne semimarmorata*. *The Victorian Naturalist* 136: 112-116.



## Macroecology Research Group

### Monash University

Reid established the Macroecology Research Group at Monash in January 2019. We use field studies, laboratory experiments, and statistical modelling to study how environmental change influences the dual processes of invasion and extinction at macroecological scales. And of course, most of our work focuses on Australian amphibians and reptiles. Our group currently consists of five PhD candidates, two Hons students, and a number of casual researchers and volunteers. Central to our team is our frog aficionado and Lab Manager, Maddie Sanders. Maddie looks after our large *Litoria ewingii* colony, which forms the basis of our long-term common garden experiments on amphibian life history.

We are still expanding and always looking for exciting new collaborations - please get in touch if you share our research interests!

Chapple DG, Tingley R, Mitchell NJ, Macdonald SL, Keogh JS, Shea GM, Bowles P, Cox NA, Woinarski JCZ (2019) *The Action Plan for Australian Lizards and Snakes 2017*. CSIRO Publishing.

Pili A, Tingley R, Sy E, Diesmos ML, Diesmos A (In press) Niche shifts and environmental non-equilibrium undermine the usefulness of ecological niche models for invasion risk assessments. *Scientific Reports*.

Enriquez-Urzelai U, Tingley R, Kearney MR, Sacco M, Palacio AS, Tejudo M, Nieceza AG (In press) The roles of acclimation and behavior in buffering climate change impacts along elevational gradients. *Journal of Animal Ecology*.

Smart AS, Tingley R, Phillips BL Estimating the benefit of quarantine: eradicating invasive cane toads from islands. *bioRxiv* (preprint).

McCull-Gausden EF, Weeks AR, Tingley R (In press) A field ecologist's guide to environmental DNA sampling in freshwater environments. *Australian Zoologist*.

Visintin C, Briscoe N, Woolley S, Lentini P, Tingley R, Wintle B, Golding N (2020). steps: software for spatially- and temporally-explicit population simulations. *Methods in Ecology and Evolution*, 11, 596-603.

Tingley R, +51 others, Chapple DG (2019) Geographic and taxonomic patterns of extinction risk in Australian squamates. *Biological Conservation*, 238, 108203.

Gregg E, Tingley R, Phillips B (2019) The on-ground feasibility of a waterless barrier to stop the spread of invasive cane toads in Western Australia. *Conservation Science and Practice*, 1, e74.

Enriquez-Urzelai U, Kearney MR, Niecieza AG, Tingley R (2019) Integrating mechanistic and correlative niche models to unravel range-limiting processes in a temperate amphibian. *Global Change Biology*, 25, 2633-2647.

Wilkinson DP, Golding N, Guillera-Aroita G, Tingley R, McCarthy MA (2019) A comparison of joint species distribution models for presence-absence data. *Methods in Ecology and Evolution*, 10, 198-211.

Tingley R, Greenlees MJ, Oertel S, van Rooyen AR, Weeks AR (2019) Environmental DNA sampling as a surveillance tool for cane toad *Rhinella marina* introductions on offshore islands. *Biological Invasions*, 21, 1-6."



## Animal Behaviour Group

### La Trobe University

#### The Animal Behaviour Group at La Trobe Uni (by members and alumni)

Jose Ramos recently finished an ARC funded postdoc at LTU focused on the motion signalling strategies of Australian agamid lizards - including filming for the first time the communicative displays for a number of species. His descriptions of these signals are forthcoming.

Xue ("Snow") Bian completed her PhD thesis during 2019 and was awarded the Nancy Millis Medal for a thesis of exceptional merit. Snow's projected used sophisticated 3D animation tools to explore motion signals in lizards. She has one chapter left to publish and will commence a postdoc at LTU (once she is allowed to return to Australia) extending her animation work to Chinese *Phrynocephalus* lizards

Estefania Boada Viteri has recently completed her 3rd and final season studying *Microlophus* lizards of Ecuador. This work included two seasons on the Galapagos Islands that had her studying



six species on six different islands. She began her project working on two species on mainland Ecuador. Estefania was generously supported by a Harvard Travellers Grant and the Rufford Foundation.

Bhagya Herath has been investigating the signalling strategies of *Litoria fallax*. Her fieldwork has included comparisons across their geographic range and in different environmental contexts. In the most recent season, Bhagya has been conducting playback experiments to investigate both the acoustic and visual components of their signalling repertoire. Throughout her work, Bhagya has benefited from the contribution of a variety of frog enthusiasts in QLD, NSW and VIC. We are also particularly indebted to Dave De Angelis for his help and expertise.

Jon Salisbury has now all but completed his fieldwork on dorsal patterns of *Amphibolurus muricatus*. Using up-to-date photographic tools he has quantified variation across the range including individuals from different habitat types and from the different genetic clades. Jon has also been quantifying the ontogenetic changes in patterns.

Ben Wilson completed Honours in 2019 studying population differences in ecology and behaviour of *Ctenophorus fionni*. His work provided further evidence that these populations differ in multiple ways, adding data to already established colour differences between populations.

The group is pleased to be welcoming a new member to the group - Estefany Guerra. Estefany will join us from Ecuador as soon as she is allowed to travel to Australia. Her project is still being developed but will be in the broad area of thermal biology of Agamid lizards.

Recent alumnus, Andrea Narvaez, is now based in Ecuador at the University of Guayquil and writing up her work on Ecuadorian Anolis in-between a very heavy teaching load.

Richard Peters still manages to get out into the field when he can - but is currently experiencing the 'joys' of online teaching.

For more info, blogs, images go to:

[www.peterslab.info](http://www.peterslab.info)

Recent herp flavoured papers from the ABG:

Salisbury J, Peters RA (2019). Non-random perch selection by cryptic lizards, *Amphibolurus muricatus*. *Behavioral Ecology and Sociobiology*, 73:115

Bian X, Chandler T, Pinilla A, Peters RA (2019). Now you see me, now you don't: Environmental conditions, signaler behavior, receiver response thresholds interact to determine the efficacy of a movement-based animal signal. *Frontiers in Ecology and Evolution*, 7, 130.



## Frogs Victoria

Frogs Victoria, the new-ish networking hub for researchers, conservationists, enthusiasts and the frog curious has become incorporated and held its first official AGM. The inaugural official committee was elected and all offices were unopposed (Nick Clemann was in the field). Murray Littlejohn remains Patron, and membership continues to swell like a gravid toad.

Lynette Plenderleith was re-elected as President. Despite her continued attempts to sidestep into a career in the film and television industry, she cannot forgo her addiction to frogs and is also currently running 'The Frogs Are Calling You' citizen science project.

Nick Clemann continues as Vice President. He leads the Threatened Fauna Program at the Arthur Rylah Institute for Environmental Research, is an honorary Research Associate at Museums Victoria, and a member of several National Recovery Teams for threatened frogs in south-eastern Australia. He is currently pre-occupied with the impacts on herps of recent bushfires and feral species.

Colin McHenry drew the shortest straw of all and became Secretary for his Frogs Vic committee debut. Colin is currently paid to count Green and Golden Bell Frogs and teach anatomy to med students at University of Newcastle, when he's not surfing.

David De Angelis joins the Frogs Vic committee as Treasurer. Dave has a wealth of committee experience and frog knowledge. In his spare time, Dave is an environmental consultant and educator and manages to spend a bit of time in the field.

Steph Versteegan is a Frogs Vic committee Ordinary Member, but is anything but ordinary. Her career in captive breeding of frogs and endangered species research has led her to her current position as a keeper at Melbourne Museum.

Matt Clancy is a research assistant at the University of Melbourne and an Ordinary Member of the Frogs Vic committee. Matt is an amazing wildlife photographer when he's not busy writing publications from his honours research.

Teisha Sloane-Lay stepped down as Frogs Vic founding Secretary and takes the role of Events Coordinator, organising speakers and venues for talks. She is currently working for the Victorian Department of Environment, Land, Water and Planning as a Wildlife Management Project Officer within the Environmental Compliance Unit. Fieldwork gets her much needed time away from home-schooling!

Frogs Victoria hopes to return to its programme of talks after a COVID-19 induced hiatus. The committee also has plans to increase its range of activities and impact. Its first year has seen great warmth and support from speakers, members and attendees. The community of frog-lovers in Victoria hopes to keep the pubs in business for a while to come.



## Western Australia

### Mitchell Lab

#### The University of Western Australia

The Mitchell lab at UWA continues its focus on pressing conservation issues for a wide range of herps, but with a few lab members working on mammals. New recruits include Ryan Ellis who has (finally) committed to an honours project on frogs, and not his vastly preferred blind snakes. Ryan will be investigating the taxonomic status of a putative new species of *Pseudophryne* from the Mid-west of Western Australia, identified during genomic work by former honours student Deanne Cummins. Morphological assessment of existing specimens is underway and field work aiming to collect additional specimens will hopefully kick off in the winter months, pending COVID-19 travel restrictions. On a related COVID-19 note, new MSc Research student Kristen Schubert is stranded on the Cocos Keeling Islands without a volunteer to assist with her research on assisted colonisation trials for imperilled reptiles from Christmas Island. Kristen has worked round the clock in what looks like a tropical paradise to collect a huge dataset on skinks, plants, ants, rats and birds to try to understand their interactions, and has adopted a cat for company.

Bethany Nordstrom hailing from Halifax, Canada, joined the lab in January 2020, and is developing her PhD project on the Critically Endangered western swamp tortoise, investigating the role of diet in assisted colonisation decisions, and with a strong focus on various applications of environmental DNA sequencing. She follows on the coattails of honours student Siobhan Paget who analysed some fiendishly complex biotag data collected during a second assisted colonisation trial for swamp tortoises, to learn more about how juveniles trade-off foraging and thermoregulatory behaviours when they are put somewhere quite cold. JP Emery has finished his PhD fieldwork quantifying reintroduction success for Blue-tailed skinks and Lister's gecko (both Extinct in the Wild) onto Christmas Island. H's seen mixed results: the blue-tailed skink population is now flourishing (on the second attempt) in a large predator-managed enclosure, whereas the Lister's gecko population has declined but still persists 15 months post release. JP is now writing up his PhD and dabbling in consulting via helicopter, undertaking fauna surveys in the goldfields and the Pilbara.

Emily Hoffmann is also getting to the pointy end of her PhD research on Critically Endangered white-bellied frogs and is busy writing papers and looking forward to a submission haircut (JP and Emily have kept true to their “hair-pact” and haven’t cut their hair since starting in 2017). Emily has gathered strong evidence that population declines of two *Geocrinia* species are linked to drying conditions in the region.

Malindi Gammon has completed the second field season of her PhD on flatback sea turtles. She has been working with sea turtle researchers from the WA Department of Biodiversity Conservation and Attractions to understand the vulnerability of nesting sites in the north-west shelf to rising sea levels and warming beaches. The phrase “looking for a needle in a haystack” has taken on a new meaning for Malindi who is now well acquainted with the perils of digging up old nests in dry sand in the hope of relocating an iButton.

Tabitha Rudin Bitterli, Jessica Stubbs and Malcolm Soh have all completed their PhD’s on assisted gene flow in frogs, foraging ecology of green turtles and deforestation of tropical montane forests respectively, and Tabitha has topped off this milestone with another, recently welcoming baby Emilia. Having returned from a postdoc in the Wyneken lab in Florida, Blair Bentley rejoined the Mitchell lab to test the effectiveness of protein expression in sea turtle blood for determining the sex of hatchlings, and to continue his work on gene expression regulation in heat stressed embryos (flatbacks, greens and loggerheads). He is waiting impatiently for the pandemic to end to return to more tropical conditions and explore how kinship in green turtles impacts climate change resilience, working in Lisa Komoroske’s lab at the University of Massachusetts.

Lab associate Ruchira Somaweera continues his long-term projects on the impact of invasive species (weeds and cane toads) on the freshwater crocodiles of the Kimberley, while also studying the sea snakes and invasive Asian house geckos in the remote Ashmore Reef in the Timor Sea. His reptile conservation and education related work in Sri Lanka and Indonesia are continuing. Nicki has had a busy couple of years involving a lot of work-related travel to places beginning with C (Croatia, Costa Rica, Coral Bay, Christmas Island and Canberra) and is now enjoying staying put for a while. Highlights included mulling over the complexities of resurrecting the collapsing Eastern Pacific leatherback stock with the IUCN Conservation Translocation Specialist Group at a Costa Rican Ecoresort replete with free-ranging macaws. This led to the recruitment of MSc student Anna Ortega from the U. Michigan who will be undertaking PVA modelling and structured decision making to arrive at an answer.

Nicki won a national (AAUT) teaching citation in 2020 and has been reappointed to the Commonwealth Threatened Species Scientific Committee, who are dealing with (among other things, including the impacts of the 2019-20 bushfires) plenty of listing nominations for amphibians and squamates, the latter resulting from the recent publication of an action plan for Australian Lizards and Snakes. Otherwise, Nicki is enjoying having Ben Phillips (now of Covid-19-app fame) in Perth for his sabbatical, and is trying to wrap up an embarrassingly-long study of turtle frogs.

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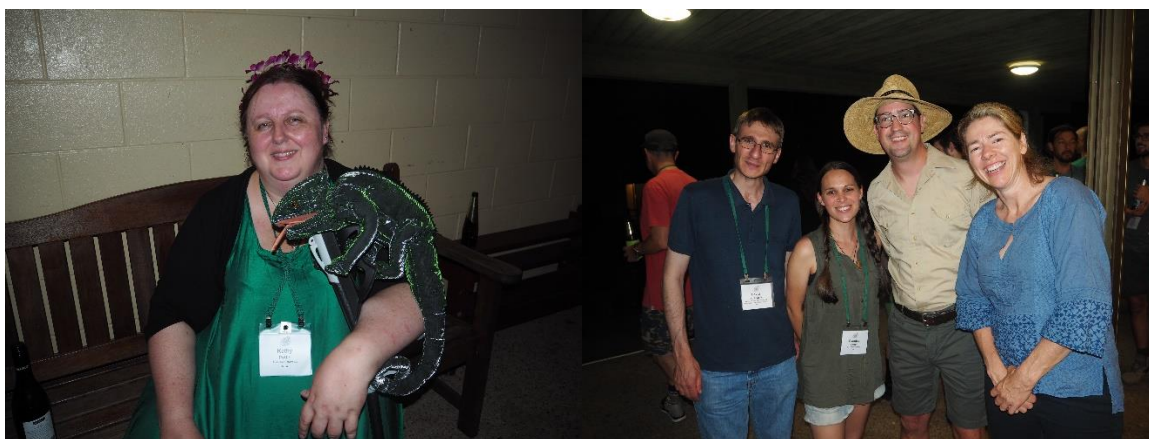
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### **Western Australian Museum**

The WAM team has largely focussed on Gehyra papers (led by Paul Doughty) and the type catalogues (led by Ryan Ellis), in addition to dragons, skinks, snakes and participating in the occasional “mega-collab”-style paper that now seem to be trending (e.g. Rosauer et al. 2019; Uetz et al. 2019). Collaborations with ANU herpos remain especially strong. Work continues on numerous taxonomy projects and publications for various species and complexes across the state and beyond. Expect more skinks, geckos and – of course – blindsnakes sometime in the future.

Ryan started an Honours with Nicki Mitchell at UWA in 2019 investigating the systematics of *Pseudophryne* from the Mid-west of WA (see under UWA). So far, he has managed to stay reasonably sane while trying to fit studying in with full-time environmental consulting work.

Field trips in the past four years include the North West Cape (twice), Pilbara (multiple visits), Barrow Island, the Shark Bay region (en route to northern sites) and BushBlitz trips to the Bradshaw region in the western Top End and the SA side of the GVD. Ryan’s work continues to take him to various places far and wide across the state catching animals, but surveys mostly the Pilbara.

The herp team launched Gekkota Mundi, the world’s first academic gecko conference, in Fremantle in 2017, and Gekkota Mundi II was hosted in 2019 in Tel Aviv by Shai Meiri which Paul attended.

We welcome Research Associate Renee Catullo who is joining UWA this year, and new collection manager Jenelle Ritchie who replaces Rebecca Bray who departed to the Auckland Museum last year.

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