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Large breeding aggregations of the small frogs *Geocrinina otwaysensis* (Hoser, 2020) and *Geocrinia victoriana* (Boulenger, 1888).

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ABSTRACT

Large breeding aggregations of small frogs of both *Geocrinina otwaysensis* (Hoser, 2020) and *Geocrinia victoriana* (Boulenger, 1888) were observed in Victoria in March 2023.

These observations are detailed herein.

This paper also details further differences between the two taxa including by way of comparative photos of each species that were not published with the original description of *G. otwaysensis* in Hoser (2020).

Keywords: Biology; Amphibia; ecology; frog; Australia; Victoria; Mount Sabine; Park Orchards; Melbourne; *Geocrinia*; *victoriana*; *otwaysensis*.

INTRODUCTION

The frogs of the genus *Geocrinia* Blake, 1973 (as defined by Hoser 2020) are of considerable scientific interest because they lay eggs on land, with tadpoles that live in water.

It is generally believed that the eggs are inundated with rains at which point the free living tadpoles are washed into the nearby (adjacent) pond, dam or waterhole. Alternatively, the oviposition sites become inundated and the tadpoles simply live in the same place.

The species *G. otwaysensis* (Hoser, 2020) originally described as a subspecies, but effectively elevated to species status by Hoser (2022) is similar to, but readily distinguishable from *Geocrinia victoriana*.

Inadvertently omitted from the original description was the fact that *Geocrinia otwaysensis* is most readily separated from its nearest related species *G. victoriana* by colouration in the groin, or lack of it in terms of distinctive black bordering around the red, yellow or orange marbling seen in the other species, *G. victoriana* as well as the also related *G. laevis* (Günther, 1864).

It is best to see the groin colouration in these species in the comparative images posted in this paper or online at:

<http://www.snakeman.com.au/Recently-discovered-spectacular-species-of-frog-found-in-massive-numbers-at-Mount-Sabine.htm>

Geocrinia otwaysensis is also separated from both other nearest related species by call.

In the pulse mode, *Geocrinia otwaysensis* usually calls at 5-6 pulses per 2 seconds, versus 8-9 in *Geocrinia victoriana*.

Examples of both species calls can also be downloaded from:

<http://www.snakeman.com.au/Recently-discovered-spectacular-species-of-frog-found-in-massive-numbers-at-Mount-Sabine.htm>

G. otwaysensis has tadpoles of different appearance to those of *G. victoriana* as well.

Suffice to say that the two species are in fact consistently quite

different!

This is even before one looks at general colouration, although this is a variable trait and even within a single population and so for that reason is hard to quantify, either by age or gender.

GEOCRINIA OTWAYSSENSIS AT MOUNT SABINE, VICTORIA

In the early hours of 18 March 2023, I drove off the Forrest to Apollo Bay Road to sleep for a few hours at Mount Sabine, before continuing to the Apollo Bay Agricultural Show, where I was scheduled to do a live reptiles display.

Where I pulled over to sleep at about 2 AM, I heard what were obviously *Geocrinia* calls but was too tired to bother investigating.

In the morning I saw a nearby small pond (probably man made) in an area of cleared forest and decided to investigate it. There were a small number of *Geocrinia* calling.

On the edge of the pond was a single log and this was lifted. Underneath was a total of 9 adult *G. otwaysensis* that were visible, as well as six already laid egg masses. Because there was smaller bits of twigs and grass under the log and to the sides, it is quite likely more frogs may have also been adjacent and not seen.

Of the nine frogs, 8 were males and only one was a female.

After some photos were taken, I left this area.

About 500 metres to the south-west was a small shallow dam, surrounded by dense matted grass, the water being about 5 metres square and the noise generated by calling *G. otwaysensis* was deafening and indicative of many dozens of frogs hiding amongst the grass at the bottom of the depression. A second depression of similar size had a lesser number of calling *G. otwaysensis*.

It was assumed that the frogs were hiding amongst the grass at the bottom of the depression.

There had also been some rain the previous week, being the first



Swamp at Mount Sabine, Victoria, Australia showing log on far side. Underneath that were numerous *Geocrinia otwaysensis*. Below: A male *G. otwaysensis*. All photos by Raymond Hoser.





Geocrinia otwaysensis (Hoser, 2020) males. From Mt. Sabine, Vic., Australia.



Hoser 2023 - Australasian Journal of Herpetology 63:3-16.



Geocrinia otwaysensis (Hoser, 2020) both sexes. From Mt. Sabine, Vic., Australia.



Hoser 2023 - Australasian Journal of Herpetology 63:3-16.



Top: Log where 9 *G. otwaysensis* were found. Bottom: Second site of massive calling aggregation.



Hoser 2023 - Australasian Journal of Herpetology 63:3-16.



Geocrinia otwaysensis (Hoser, 2020) both sexes. From Mt. Sabine, Vic., Australia.
Bottom Pic is with eggs.



Hoser 2023 - Australasian Journal of Herpetology 63:3-16.

major autumn rains of the season, but not in large quantity.

Upon return to the pond with the log (referred to above) late the same day, I saw a male and female in amplexus among eggs and the other males seen in the morning still present.

These were of course under the log. In that situation it seemed that the males had occupied the underside of the log as a breeding site, being the only "hard cover" in the area and in preference to anywhere else around the pond.

Noting the number of males underneath the log and only one female (the same one on both occasions that day), it seemed that the males occupied the area more-or less continually, while the females would merely attend, mate and leave again.

GEOCRINIA VICTORIANA AT PARK ORCHARDS, VICTORIA.

See photos on following pages.

Notable is that in the week preceding 18 March 2023, while there was rain in the Otway Ranges (including Mt. Sabine), this rain did not get to Melbourne, about 2 hours drive to the north-east.

However, there were small amounts of rain over the following fortnight.

On 27 March 2023 a drive around the suburb of Park Orchards, including the outer edges of the suburb, revealed a number of calling male *G. victoriana* at several locations around inside 100 Acres Reserve, including around most man-made dams and ponds in the reserve. Some individuals were also heard calling from ditches and gullies in other parts of the reserve indicating some mobility of specimens in this relatively small nature reserve.

No *G. victoriana* were heard calling from anywhere else in and around Park Orchards, even though sweeps were done of likely spots by day and night in the fortnight following 27 March 2023.

Significantly in every case, specimens were only calling from low-lying areas of dense matted grass that were obviously prone to inundation, or alternatively by dams and ponds with edges of matted grass.

Where a dam or swamp only had matted grass in one section, that was from where the frogs were calling. Other parts of the edge of the dam would have no calling frogs of this or any other kind at the time (although in passing I noted that in May 2023, three other species were found calling from the same ponds or swamps).

One of these sites where *G. victoriana* was calling on 27 March 2023, was a dam in the 100 acres reserve about 100 metres north of the corner of Arundel Road and Dalry Avenue. On the north-east corner of the dam was a slightly elevated area of tight matted grass from where the frogs were calling.

This grassed area was basically dry and about 3 cm above the level of the adjacent dam water surface.

An area of less than 1 metres square was cleared to reveal 12 *G. victoriana* indicating a sizeable breeding aggregation. All but one were males.

They were photographed and the grass placed back as was.

Also relevant is that no laid eggs were found in the matted grass area, implying that these *G. victoriana* were breeding significantly later than their Otway Ranges counterparts.

Significantly a small shallow dam about 150 metres to the west of this dam, consisting mainly of matted grass had a massive number of calling males, but the nature of the vegetation did not lend itself to being able to locate any frogs. In terms of the site with the matted grass at the dam, where I had found the 12 *G. victoriana*, heavy rains resulted in the entire section being inundated and covered with about 10 cm of water three weeks later, which remained at roughly the same level of inundation into at least mid June 2023. This of course directly connected to the immediately adjacent dam, of which it now formed part.

Obviously the relevant *G. victoriana* caught on 27 March 2023 must have moved to another location/s, and no attempt was made to determine of this was in the same immediate area or elsewhere.

However the observation reported in Hoser (2023) implies that specimens move away from the swamps they breed at in the months outside the breeding season.

On 28 March 2023, I was called to catch a Copperhead snake at Toolangi (between Yarra Glen and Yea), in the evening.

One *G. victoriana* was heard calling from a depression at the rear of the property.

DISCUSSION

Observations at the above referred to locations indicated that both *G. otwaysensis* and *G. victoriana* called both by day and night, although this calling peaked in the early hours of the night. Both *G. otwaysensis* and *G. victoriana* have similar breeding habits and preferences. Differences in observed timings of breeding seasons may well have more to do with rainfall events, rather than any other strict rules, but at this stage my view is largely conjecture.

When breeding, males of both species have a demonstrated preference for hiding beneath tightly matted grass that either sits in a depression prone to flooding, or similar on the edge of a dam or swamp.

That high densities of frogs can hide within relatively small areas indicates an abundance of these species not previously envisioned.

Had I not specifically looked for the frogs by moving the vegetation and looking closely when doing so (due to the small size of the froglets), none would have been seen or found from a casual viewing of the site. This is mentioned because it showed how easy it is for large numbers of small frogs to avoid detection by people not carefully looking for them.

The large populations observed in 2023 of both species indicates that they have either recovered from any Chytrid related population drops in recent decades or may otherwise have some kind of resistance to the pathogen.

In any event, noting that both aggregations observed were in areas heavily altered by human activity, it seems that neither species is rare or threatened, or likely to become so.

In fact, quite the contrary.

With the creation of man-made dams across the rural landscape, extant ranges and distributions of each species is likely to increase. In the case of the current area of absence of *Geocrinia* north of the Otway Ranges, that may one day come to be populated by one or other species.

REFERENCES CITED

- Blake, A. J. D. 1973. Taxonomy and relationships of Myobatrachine frogs (Leptodactylidae): a numerical approach. *Australian Journal of Zoology* 21:119-149.
- Boulenger, G. A. 1888. Descriptions of two new Australian frogs. *Annals and Magazine of Natural History, Series 6*, 2:142-143.
- Hoser, R. T. 2020. 3 new tribes, 3 new subtribes, 5 new genera, 3 new subgenera, 39 new species and 11 new subspecies of mainly small ground-dwelling frogs from Australia. *Australasian Journal of Herpetology* 50-51:1-128.
- Hoser, R. T. 2022. Hiding in plain sight. A previously unrecognized biogeographical barrier in Australia formed by an event of biblical proportions. Five new species of skink lizard from south-west Victoria, three more closely related species from New South Wales and another from South Australia. *Australasian Journal of Herpetology* 56:3-21.
- Hoser, R. T. 2023. Litter, plastic sheets and rubbish. It's not necessarily an eco-disaster for all species! *Australasian Journal of Herpetology* 61:3-4.
- Ride, W. D. L. (ed.) *et al.* (on behalf of the International Commission on Zoological Nomenclature) 1999. *International code of Zoological Nomenclature*. The Natural History Museum - Cromwell Road, London SW7 5BD, UK.

CONFLICTS OF INTEREST - None



Low-lying grassy areas subject of seasonal inundation at 100 Acres Reserve, Park Orchards, Victoria, which had large numbers of calling *G. victoriana*. The swamp in the lower image had hundreds of calling males on 27 March 2023.



Hoser 2023 - Australasian Journal of Herpetology 63:3-16.



Swamp / dam at 100 Acres Reserve, Park Orchards, where 12 *G. victoriana* were found under less than 1 square metre of matted grass (bottom left), like the one depicted on the bottom right.



Hoser 2023 - Australasian Journal of Herpetology 63:3-16.



Geocrinia victoriana, all from Park Orchards, Victoria. Most easily separated from *G. otwaysensis* by the obvious presence of bright red, orange or yellow marbling, bordered by black on the hidden inner surfaces of the hind limbs. This trait is absent in *G. otwaysensis* (in contrast to both *G. victoriana* and the similar *G. laevis*).



Hoser 2023 - Australasian Journal of Herpetology 63:3-16.



Geocrinia victoriana, all from Park Orchards, Victoria. Most easily separated from *G. otwaysensis* by the obvious presence of bright red, orange or yellow marbling, bordered by black on the hidden inner surfaces of the hind limbs. This trait is absent in *G. otwaysensis* (in contrast to both *G. victoriana* and the similar *G. laevis*).





Geocrinia victoriana, both from Park Orchards, Victoria. Most easily separated from *G. otwaysensis* by the obvious presence of bright red, orange or yellow marbling, bordered by black on the hidden inner surfaces of the hind limbs. This trait is absent in *G. otwaysensis* (in contrast to both *G. victoriana* and the similar *G. laevis*). All photographs in this paper, by Raymond Hoser, taken *in situ*.



Hoser 2023 - Australasian Journal of Herpetology 63:3-16.



Inundated dam/swamp/grass at 100 Acres Park Orchards.
Photo taken on 10 June 2023

Hoser 2023 - Australasian Journal of Herpetology 63:3-16.



Geocrinia victoriana from 100 Acres in Park Orchards, Victoria, Australia.

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**A Bluetongue lizard *Tiliqua scincoides* (White, 1790)
chased out of hibernation by parasitic mites.**

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ABSTRACT

Detailed is an incident on 11 June 2023, in which a large adult Eastern Bluetongue Lizard *Tiliqua scincoides* (White, 1790) was found to have emerged from hibernation.

Circumstantial evidence suggested that it was a severe mite infestation that forced the lizard to flee where it was hibernating at a time of year that such would not normally occur.

Keywords: Biology; Reptilia; ecology; lizard; Australia; Victoria; Melbourne, Cragieburn; *Tiliqua*; *scincoides*; mites; *Ophionyssus natricis*; parasites; hibernation; brumation.

INTRODUCTION

In southern parts of Australia, including Melbourne, Victoria, the majority of reptiles go into a proper "hibernation" in the colder months of winter (June-August).

In this period, most reptiles remain under cover and do not emerge for any reason, including for example to sunbake on a sunny and relatively warm day.

It is only when there is sustained run of warm sunny days in late August (rarely), or more often September/October that the majority of reptiles emerge from their winter hideouts.

This is especially the case for larger reptiles such as snakes over 75 cm long and adult Bluetongued Skinks (genus *Tiliqua* Gray, 1825).

The hibernation process in reptiles is sometimes called "Brumation" and people spend a huge amount of time arguing what is the correct term and when, but this is not an important feature of this paper.

Hibernation implies no activity in winter, whereas brumation implies some movement.

Is shuttling slowly from one side of the underneath of a rock to another defined as brumation or something to be ignored? At what stage does it become treatable as activity?

Is this "activity", if and when the snake or lizard eats?

In terms of the larger reptiles, being snakes over 75 cm long and adult Bluetongued Skinks, these stop feeding over winter in Melbourne and as a rule do not emerge over winter months.

While emergence and activity is not unheard of, it is not the normal situation.

As the Melbourne 24/7 snake catcher I know that call outs for large snakes and large lizards in the winter months invariably have one or other of the following factors at play.

- 1/ The reptile has been "dug up" or otherwise disturbed from its winter hiding spot,
- 2/ The reptile is sick, or has something wrong literally forcing it from a normal winter hiding spot.

Included in this latter group are female Tiger Snakes that may have given birth late in the previous autumn and sometimes do not have enough body fat to survive to the following spring at the time hibernation usually commences.

They may be seen basking and attempting to feed in the cooler months to literally get through.

Sick or otherwise unwell reptiles emerging from hibernation are

sufficiently common as to be seen by myself as the Melbourne 24/7 snake catcher every year.

THE BLUETONGUED LIZARD

On Sunday 11 June 2023 at 11.30 AM I received a call to catch a "snake" at 20 Caspian Drive, Cragieburn, Victoria. Upon arrival, at 12.15 PM, I saw a large adult male Bluetongued Lizard walking along a wall in a front yard of a property.

The lizard was immediately noticed to have numerous raised scales and a severe parasitic mite *Ophionyssus natricis* (Gervais, 1844) infestation.

In captivity, snakes and lizards go to extreme lengths to get rid of their mite infestations. They will pace their cage in the hope the mites fall off and disappear. Alternatively they may jump into a water bowl to try to drown the mites off. The reptiles will also try to "scratch" off the mites.

Wild reptiles generally do not get major mite infestations because a mite that falls off a reptile is unlikely to ever have the chance to jump back onto it. It is not like a cage situation where the reptile simply cannot get away.

Hibernation changes this situation somewhat in that an infested lizard is effectively torpid and cannot easily up and leave when mites are climbing on and off to suck blood.

In the case of the above-mentioned lizard, the morning in question was sunny and while cool (about 15 Deg. C), the lack of wind and mainly blue skies, meant that the lizard was able to emerge and warm up quickly. This enabled it to flee where it had been, including all the mites that were obviously at the same place in the immediately adjacent substrate.

So while it was mid-winter, the lizard was able to flee the mites hanging around it's hibernacula in order to find a new place to see out the remainder of winter.

Because of the percentage of mites remaining on the lizard when it fled, the act of fleeing the previous resting place, did not completely get rid of the debilitating mite infestation.

However it may well have made the difference between not surviving winter had it remained in the one place and probably surviving in a new location and with a lesser mite burden.

In any event, it seems that in this case, the relatively unusual mid-winter activity of the Bluetongue lizard was brought about by the parasitic mite infestation.

Parasitic mites are thought to be an exotic pathogen in the Melbourne

herpetofauna.

They are ubiquitous among Bluetongued Lizards as well as a lot of larger snakes, this being the case across most suburbs in and around Melbourne, Victoria, including for example, the western suburbs, north-east and the Mornington Peninsula (Hoser and Valentic 1996).

In the two and a half decades since that publication, mites have become even more ubiquitous on wild reptiles in and around Melbourne, Victoria.

As a Snake Catcher, I know that mites will fall of most adult snakes or lizards caught, that are then sprayed for mites with a commercial mite killing spray (e.g. "Top of descent" or "Mac Mite").

As already mentioned, most mite infestations of wild reptiles do not appear to be anywhere near as debilitating and devastating as compared to the captive infestations.

In captivity, mite infestations explode exponentially unless aggressively treated and stopped.

Captive mite infestations seem to be only "curable" via chemical means alone and extreme vigilance on the part of the keeper.

Chemical means include, sprays or similar chemical controls (e.g. Dichlorvos-based pest strips), and also the drug Ivermectin (of Covid-19 treatment fame), as a form of inoculation for vulnerable (to mite) reptiles.

Mites appear to be gaining resistance to treatments for captive reptiles over

recent decades and it is now often desirable to use multiple means to combat mite infestations or potential infestations, such as both oral administration of Ivermectin in combination with spraying of affected cages.

While it is illegal in

most places in Australia to trap Bluetongue Lizards for pets, it is self-evident that a lot of what passes through the pet trade is in fact wild caught.

It goes without saying that any wild-caught lizards should be preemptively treated for mites and other internal parasites (cestodes, nematodes, flukes, etc) at time of acquisition.

REFERENCES CITED

Gervais, P. 1844. *Histoire Naturelle des Insectes*. Aptères. Paris, France: Roret.

Gray, J. E. 1825. A synopsis of the genera of reptiles and Amphibia, with a description of some new species. *Annals of Philosophy*, 10:193-217.

Hoser, R. T. and Valentic, R. 1996. Notes on a field trip to the lower Mornington Peninsula with comments on the wider significance of some observations. *Monitor: Journal of the Victorian Herpetological Society Incorporated* 8(1):24-34.

White, J. 1790. Journal of a voyage to new South Wales, with sixty-five plates of non descript animals, birds, lizards, serpents,

curious cones of trees and other natural productions. Debrett, London, UK:229 pp.

CONFLICTS OF INTEREST
None.

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ABSTRACT

For the first time ever, cross genus combat in male elapid snakes is documented.

On 4 November 2022, I, Snakeman, Raymond Hoser witnessed and filmed a male Red-bellied Black Snake *Pseudechis porphyriacus* (Shaw, 1794) and a male Eastern Brown Snake *Pseudonaja textilis* (Duméril, Bibron and Duméril, 1854) engaged in male combat as usually seen between males of the same species when fighting for a mate.

A detailed account of the event is given.

A video of the combat has been posted at:

https://youtu.be/c7ad_y9H3lc

Keywords: Snakes; elapidae; Pseudonaja; textilis; Pseudechis; porphyriacus; Brown Snake; Eastern; Red-bellied black snake; male combat; cross genus; combat; venomoid snakes; devenomized snakes.

INTRODUCTION

Male combat in Australian elapid snakes is well known (Hoser 1989) and has been documented in Red-bellied Black Snakes *Pseudechis porphyriacus* (Shaw, 1794) (Worrell 1963a) and Eastern Brown Snakes *Pseudonaja textilis* (Duméril, Bibron and Duméril, 1854) (Hoser 1989).

In the 1990's I filmed a male Blue-bellied Black Snake *Panacedechis guttatus* (De Vis, 1905) in combat with a male Collett's Snake *Panacedechis colletti* (Boulenger, 1902). At the time the video was quite a sensation as it was the first ever documented case of different species engaging in male combat.

These closely related species have even been hybridised in captivity, with a photo of one such specimen published in *Australasian Journal of Herpetology*. Details of the relevant breedings are in Hoser (2007).

Hoser (2007) also noted that for those two species "Tests on the mitochondrial DNA (cytochrome B) of the two taxa, indicate a recent separation of the taxa (3% separation)."

That gives a divergence between the two species as just 1.5 MYA.

On 4 November 2022, I had the good fortune to observe an unprovoked male combat between two willing male snakes of different genera, being

an adult male Red-bellied Black Snake *Pseudechis porphyriacus* (Shaw, 1794) and an adult male Eastern Brown Snake *Pseudonaja textilis* (Duméril, Bibron and Duméril, 1854).

Their divergence is measured in the tens of millions of years.

This means they are not even closely related!

The purpose of this paper is to document this event and add it to the permanent scientific record.

MATERIALS AND METHODS

On the date in question, 4 November 2022, I was working with Daniel Mannix of the Victorian Dog Training Academy at



a farming property at Garfield, Victoria, where we were doing Snake Avoidance Training for dogs.

Snake Avoidance is an Australian registered trademark (TM No. 1869367), owned by myself.

The snakes used in this Snake Avoidance training are of the exact species the dogs are likely to encounter in Victoria as to train dogs to avoid other unrelated species (e.g. pythons, as is done by trademark infringing imitators) has been shown to be a waste of time, in that it does not work in getting dogs to avoid the relevant species.

Even dogs trained to avoid Tiger Snakes *Notechis scutatus* (Peters, 1861) as a rule do not avoid Eastern Brown Snakes *Pseudonaja textilis* (Duméril, Bibron and Duméril, 1854) until trained to avoid those exact snakes.

While the training is complex and involves dealing with numerous factors, it can be explained in overly simple terms to lay persons thus:

1/ A surgically de venomized deadly snake (see Hoser 2004a-b, 2005) is placed on the ground and a dog then walks up to it to investigate or attack it.

2/ At the correct time, a "shock collar" is used to deliver a mild electric shock to the dog. The zapping is done by the licensed dog trainer as he knows the exact time to do so as well as shock intensity and duration. Preferred is when the dog is literally on top of the snake and sniffing it, so that it gets all relevant information and the electric shock is only associated with the snake and nothing else, as may be the case if the dog is zapped when not close to the snake.

3/ There is no association between owner, trainer or snake handler with the snake, or at least so far as the dog can tell and so the dog associates the zapping and electric shock with the snake, nothing else and so learns to avoid the snake, thinking it is the cause.

4/ Because different species of snakes smell different to one another, a dog generally only avoids snakes of the exact kind it is trained to avoid and not others as their scent is unfamiliar to them and they do not associate them with the training. This is why we use all kinds of Victorian deadly snakes (de venomized ones) in our snake avoidance training of all dogs.

5/ For this reason, training a dog using correct techniques to avoid non-venomous snake will not as a rule help them avoid the venomous species.

6/ We know the preceding because over recent years we have dealt with copycats using non-venomous snakes in their trademark infringing snake avoidance training. Many of their clients pets are dying from snake bites, because they did not avoid venomous snakes after their training and as of end 2022, all dogs previously trained by these imitators, that have been checked by us have not avoided a Tiger Snake or Brown Snake when placed on the ground. This is well over 50 such dogs.

By contrast the overwhelming majority of dogs properly trained to avoid venomous snakes do so more than a year later when checked.

In Snake Avoidance Training, the use of de venomized snakes (which I alone in Australia have the expertise to have) is essential to the training and also ensures no risk to dogs at time of training, as would otherwise be the case if normal highly venomous snakes were used.

In terms of the Snake Avoidance Training, only one snake is usually placed on the ground at a time.

This is because most dogs find them easily enough and furthermore there is the issue of watching the snakes out of sight of the dog being trained and making sure the snake/s do not escape.

Relatively unusually, on 4 November 2022, a dog was having trouble finding the snakes on the ground, because as sometimes happens, it was too engrossed in its owner to be concerned about looking out for snakes.

To combat this problem and to be able to train the dog, an adult

male Red-bellied Black Snake *Pseudechis porphyriacus* (Shaw, 1794) and an adult male Eastern Brown Snake *Pseudonaja textilis* (Duméril, Bibron and Duméril, 1854) were both placed near one another on a driveway in an open area of the relevant property so that it'd be almost impossible for a passing dog not to notice one or other, or both snakes sitting there, as it was led down the driveway.

Again I note that the dog was not at risk from the venomous snakes as all were surgically de venomized (venomoid) as detailed by Hoser (2004a-b, 2005).

These snakes are essential for Snake Avoidance training and trademark infringing imitators using non-venomous snakes in imitation snake avoidance training, as a rule will fail to train dogs to avoid the venomous species as already outlined.

RESULTS

On 4 November 2022, the snakes were taken out of plastic carry boxes and were relatively cool at the time.

This was deliberate as the snakes being cool do not run away immediately, as would be the case if already warm.

As soon as the snakes were placed on the ground, they immediately flattened out to absorb the warm rays of the sun. The air temperature at the time was well below 20 Degrees Celsius but the sun was shining.

Within sixty seconds the male Red Bellied Black Snake (Black Snake), crawled towards the nearby Eastern Brown Snake (Brown Snake) and began to mount and combat with it.

This is done by mounting the other snake and then using its head and neck, trying to force the other snake down and to the ground, while the other snake either submits or responds in kind. In this case, the Brown Snake responded in kind. The snakes were broken up and placed further apart on the same driveway before Daniel (the dog trainer), the dog owner and their dog approached the snakes as a group. The relevant dog did notice the snakes and avoided them, in line with earlier training, but before I was able to pick them up from the driveway both snakes had crawled towards one another and again commenced male combat. I filmed this altercation.

The relevant snakes were long term captives, both of whom had been surgically de venomized (see Hoser 2004a-b, 2005 for details) more than a decade prior. Both have mated and bred with their own kind in the intervening years (Hoser 2006b).

At the time of the above detailed combat event, each snake had been taken from a cage on their own and placed in a transport box on their own before being driven to the relevant location, about an hour's drive from our facility. Neither snake had in the recent past (months) been in contact with any females of any species or even close to any (other than in the same room at our facility, where they are generally housed, one per cage).

All the snakes used in the training were transported individually in boxes and all snakes used that day (and most others that we do use for Snake Avoidance training) happened to be all males. Of relevance is that the date in question, 4 November 2022 was in the spring mating season and both relevant snakes had been savagely cooled over the previous winter.

As anyone who keeps snakes in indoor set-ups can attest, exposure to the uv and infra red rays of the sun on a cool spring day really does fire up snakes in many ways and so in terms of provoking any potential male combat between the two relevant snakes, all factors were working in favour of such occurring.

Males of the relevant species at our facility do as a rule yield semen if forced to ejaculate in November (Hoser 2008).

It may be trite to note that I could probably recreate this sort of behaviour between other fighting species and genera, e.g. to include Taipans (*Oxyuranus* Kinghorn, 1923 spp.), who have a similar (seasonal) spring mating cycle to the preceding genera, along with the preceding genera involved in this documented case and using surgically de venomized snakes.

I note that in Australia, I alone have de venomized snakes and therefore I alone could initiate this activity without serious risk to

the relevant snakes if I chose to do so.

That is, none of the snakes could possibly die of envenomation in event of a bite.

However the logical question would be, "what is the point?"

Would such cross-genus male combat occur between wild specimens of the same species (Black and Brown)?

I can only speculate, but I would be loathe to say "never".

The more likely answer is that it may occur, but probably very rarely.

More commonly one would probably find one eating the other and this I have seen in both Blacks and Browns eating one another, even when of similar size.

I note however that although when of the same size Brown Snakes normally dictate to the Black Snakes where to go (Hoser 2006a), in terms of who is more likely to eat the other, it definitely goes in favour of the Blacks. The same dichotomy occurs with respect of Tiger Snakes and the relatively closely related to them) Copperheads (*Austrelaps* Worrell, 1963 spp.) (Hoser 2006a).

DISCUSSION

Cross genus matings and combat in snakes is not unknown.

Obviously in captive snakes, combat is not uncommon.

Underlying all this is the fact that most of the time, snakes do not like other snakes and as a rule, prefer to be on their own. In the wild, the less dominant one can flee the dominant one, whether of the same species or another.

It is a well-known fact that in captivity, snakes put together often fight and/or kill one another and so most snake keepers as a rule keep one per cage.

Causes of this combat may include social hierarchies as per Hoser (2006a), or commonly one snake mistaking another for a food item.

No doubt this sort of thing would occur in the wild as well, albeit less often.

In terms of matings, artificial insemination as detailed by Hoser (2008) has opened up opportunities to cross breed snakes in ways never previously dreamt of.

Separate to that, many species of pythons have been hybridized in recent years. The earliest such documented instance were the examples detailed in Hoser (1989) involving a captive Jungle Carpet Python *Morelia cheynei* Wells and Wellington, 1984 successfully mating and breeding with a Water Python *Simalia fuscus* (Peters, 1873) and also a Scrub Python *Australiasis kinghorni* (Stull, 1933).

Photos of the adult young were published in Hoser (1989). (Note: *Simalia* Gray, 1849) has the Water Python as the type species, NOT the Scrub Python as commonly reported on the internet. See Cogger *et al.* (1983) for an explanation with the relevant details, which by default means the taxonomy of Wells and Wellington 1984 and 1985 is in fact correct. The name *Simalia* has been unlawfully promoted by the notorious Wolfgang Wüster and his gang of thieves in recent years as a means of usurping the correct ICZN name for the Scrub Pythons, *Australiasis* Wells and Wellington, 1984 (see Ride *et al.* 1999). The actions of Wüster *et al.* have been in breach of the Australian Copyright Act 1968, Moral Rights Provisions, the relevant parts being within Sections 36, 115, 189-190, 193-195, in particular Sections 195AI (2) and 195AJ (a-b) and 195AQ(2).

More recently and even more significant than the preceding, was the world's first ever case of a Queensland Black-headed Python (male) *Aspidites melanocephalus* Krefft, 1864, mating with a South-east Queensland Carpet Python (female) *Morelia macdowelli* Wells and Wellington, 1984, the cross breeding being by accident. Those eggs were laid on 21 November 2017 (no mating date known or observed).

This breeding was first documented by Hoser (2022).

Based on the young, the father was identified as the Queensland Black-headed Python (originally bred by Neil Sonnemann of

Murungie, Victoria) and the two snakes had occupied a box together when transported to and from reptile shows in the previous 2 years on numerous undocumented occasions. These eggs hatched and young emerged on 30 Jan 2018. 12 of 13 eggs hatched, all this lot being incubated as a single egg mass, as laid, and all young hatched in good health. The non hatching egg was at the centre of the base of the mass and is believed to have died in incubation due to its position in the mass, but the exact reason for non-hatching is not known. That egg was a shrunken and hard mass with no evidence of development when inspected at time of the other eggs hatching. 9 of the 12 snakes ended up surviving to adulthood.

Two died suddenly in their first year at several months of age.

A third snake was stolen at a reptile display on 9 December 2018. It was recovered by the Victoria police in a planned armed raid on the thief, Matthew Christopher Gatt of 12 Domain Drive, Hillside, Victoria, complete with parasitic snake mites 3 weeks later on 31 December 2018. The snake died of mite-borne viral disease shortly thereafter. Matthew Gatt was charged and convicted and fined 8 thousand dollars on 21 March of 2019 (Hoser 2019). Up to 23 March 2022, nine of that litter remained alive and well. Some of those snakes at various ages are depicted (as of 1 January 2023) online at: <https://www.flickr.com/photos/thereptileman/48781145103/> and <https://www.flickr.com/photos/thereptileman/48781160003/> and <https://www.flickr.com/photos/thereptileman/48736752052/> and <https://www.flickr.com/photos/thereptileman/48781549921/> and <https://www.flickr.com/photos/thereptileman/48781479611/>

On 23 March 2022 a large female died from a large inoperable tumour, meaning that as of end 2022 just eight of the original twelve hatchlings born four years earlier remained alive.

All were males bar one runt female that was physically similar to the two others that died suddenly in the first year.

This situation effectively prevented any future breedings of this lineage of snakes, especially as the male Black-headed Python that mated the female South-east Queensland Carpet Python also died in 2022.

As of the time of publishing this paper, all eight remaining snakes hatched on 30 Jan 2018 appeared to be in perfect health.

As mentioned already, I again note that "Snake Avoidance" is an Australian registered trademark (TM No. 1869367). I have owned the trademark for many years. Unauthorised use for the purposes of training dogs in Australia, or for dissemination of information, including promotions and advertising, is expressly forbidden. This includes for any deceptively similar variants such as "Snake avoidance Victoria" or "Canine Snake Avoidance".

CONCLUSIONS

While the primary purpose of this paper has been to report on the world's first ever cross genus male combat in dangerously venomous elapid snakes, or for that matter any kind of elapid snake, it is also worth mentioning that this resulting observation was only possible with the use of surgically de venomized snakes.

It would not have been allowed to potentially happen with two captive snakes that could potentially envenomate and kill one another.

The circumstances leading to this world first observation only happened in the shadow of the relevant snakes being surgically de venomized and used in dog snake avoidance training at the time.

These "venomoid" snakes as they are known, have had numerous beneficial applications both for people and the snakes themselves as detailed by Hoser (2004a-b, 2005), including the scientific findings reported in Hoser (2006a and 2007) as well as other papers not cited here.

But significantly, by far the best outcome of the development of surgically de venomized snakes has been the parallel development of Snake Avoidance training for dogs.

This has saved the lives of hundreds of the thousands of dogs

we have trained (the majority would not have died of snakebite, so it is not as if the training was a waste of time, but rather that not all dogs trained to avoid venomous snakes actually ever encounter any).

Also the training has saved the lives of many hundreds of venomous snakes as the dogs that would otherwise have attacked and killed them, have instead run away from them as we had trained them.

Hence the positive wildlife conservation implications of the venomoid snakes should not be ignored.

In fact the positive wildlife conservation implications of venomoid snakes should be utilized further to protect threatened and vulnerable species of snake from dog attacks as required, if and when such attacks are possible or likely.

REFERENCES CITED

- Boulenger, G. A. 1902. Description of a new snake of the genus *Pseudechis* from Queensland. *Ann. Mag. Nat Hist.* (7)10:494-495.
- Cogger, H. G., Cameron, E. E. and Cogger, H. M. 1983. *Zoological Catalogue of Australia (1) Amphibia and Reptilia*, Australian Government Publishing Service, Canberra, ACT, Australia:319 pp.
- De Vis, C. W. 1905. A new genus of lizard. *Annals of the Queensland Museum* (Brisbane) 6:46-52.
- Duméril, A. M. C., Bibron, G. and Duméril, A. H. A., 1854. *Erpétologie générale ou histoire naturelle complète des reptiles. Tome septième. Deuxième partie, comprenant l'histoire des serpents venimeux*. Paris, Librairie Encyclopédique de Roret: i-xii+781-1536.
- Gray, J. E. 1849. *Catalogue of the specimens of snakes in the collection of the British Museum*. Edward Newman, London, UK. i-xv+125 pp.
- Hoser, R. T. 1989. *Australian Reptiles and Frogs*. Pierson and Co., Sydney, NSW, Australia:238 pp.
- Hoser, R. T. 2004a. Surgical Removal of Venom Glands in Australian Elapid Snakes: The creation of venomoids. *The Herptile* 29(1):36-52
- Hoser, R. T. 2004b. Venomoid Snakes Silicone snakes cause sensation in Australia and elsewhere. *Hard Evidence* 4(6):25-29.
- Hoser, R. T. 2005. Surgically enhanced venomous snakes. Venom glands out, silicone implants in! The creation of perfect exhibition snakes in the post HIH era. *Crocodylian: Journal of the Victorian Association of Amateur Herpetologists Incorporated* 5(1)(May 2005):17-28,5(2)(August 2005):17-28 (and Covers),5(3)(November 2005):30-36.
- Hoser, R. T. 2006a. Pecking orders in large venomous Snakes from South-east Australia ... ecological and distributional Implications. *Litteratura Serpentina* (Journal of the European Snake Society), 26(2):142-156.
- Hoser, R. T. 2006b. Successful keeping and breeding of Eastern Brown Snakes (*Pseudonaja textilis*) including an assessment of previously documented failures and reasons for them. *Crocodylian - Journal of the Victorian Association of Amateur Herpetologists Incorporated* 6(2):16-28.
- Hoser, 2007. The first ever reported cross-genus matings in Australian elapid snakes (Serpentes: Elapidae). *Crocodylian: Journal of the Victorian Association of Amateur Herpetologists Incorporated* 7(3):21-24.
- Hoser, R. T. 2008. A technique for artificial insemination in squamates. *Bulletin of the Chicago Herpetological Society* 43(1):1-9.
- Hoser, R. T. 2019 11 new species, 4 new subspecies and a subgenus of Australian Dragon Lizard in the genus *Tympanocryptis* Peters, 1863, with a warning on the conservation status and long-term survival prospects of some newly named taxa. *Australasian Journal of Herpetology* 39:23-52.
- Hoser, R. T. 2022. Incubation and hatching of juvenile Marbled Gecko *Christinus marmoratus* (Gray, 1845). *Australasian Journal of Herpetology* 56:55-56.
- Kinghorn, J. R. 1923. A new genus of elapine snake from north Australia. *Records of the Australian Museum* 14(1):42-45.
- Krefft, G. 1864. Description of *Aspidiotes melanocephalus*, a new snake from Port Denison. *Proc. Zool. Soc. London* 1864:20-22.
- Peters, W. C. H. 1861. *Eine zweite Übersicht (vergl. Monatsberichte 1859 p. 269) der von Hrn. F. Jagor auf Malacca, Java, Borneo und den Philippinen gesammelten und dem Kgl. zoologischen Museum übersandten Schlangen*. Monatsber. königl. Akad. Wiss. Berlin. 1861 (Juli): 683-691 (1862 on title page).
- Peters, W. C. H. 1873. Über eine neue Schildkrötenart, *Cinosternon effeldtii* und einige andere neue oder weniger bekannte Amphibien. *Monatsber. königl. Akad. Wiss. Berlin*. 1873 (October):603-618.
- Ride, W. D. L. (ed.) et al. (on behalf of the International Commission on Zoological Nomenclature) 1999. *International code of Zoological Nomenclature*. The Natural History Museum - Cromwell Road, London SW7 5BD, UK (also commonly cited as "The Rules", "Zoological Rules" or "ICZN 1999").
- Shaw, G. 1794. *The Zoology of New Holland*. London, UK:33 pp.
- Stull, O. G. 1933. Two new subspecies of the family Boidae. *Occasional Papers of the Museum of Zoology University of Michigan* (267):1-4.
- Wells, R. W. and Wellington, C. R. 1984. A synopsis of the class Reptilia in Australia. *Australian Journal of Herpetology* 1(3-4):73-129.
- Wells, R. W. and Wellington, C. R. 1985. A classification of the Amphibia and Reptilia of Australia. *Australian Journal of Herpetology Supplementary Series* 1:1-61.
- Worrell, E. 1963a. *Reptiles of Australia*. Angus and Robertson, Sydney, Australia:207 pp.
- Worrell, E. 1963b. A new elapine generic name. *Australian Reptile Park Records* 1:1-7

CONFLICTS OF INTEREST

None.



Hoser 2023 - Australasian Journal of Herpetology 63:19-22.

Six new snakes from southern Australia (Squamata: Serpentes: Elapidae).

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ABSTRACT

In the face of accelerating human population growth in southern Australia, brought about mainly because of the “Big Australia Policy” of successive Federal Governments (Saunders 2019, Zaczek 2019), and their massive tax-payer funded immigration programs (Karp 2023), habitat destruction in southern Australia is an ever increasing problem.

This underpins the urgency in cataloguing the biodiversity here in order to locate and identify taxa before they run the risk of extinction.

To that end, this paper formally names as subspecies, six snakes from southern Australia, significantly divergent from the nominate forms.

They are identified on the basis of morphological divergences, distributional disjuncture and in some cases earlier molecular studies have identified the relevant taxa as sufficiently divergent to warrant formal recognition.

These are:

1/ The eastern population of the Western Australian endemic, the Square-nosed Snake *Rhinoplocephalus bicolor* Müller, 1885, (type locality “Australia”, but quite evidently of the western form), herein named as *Rhinoplocephalus bicolor rodneyscanesi* subsp. nov. (being found from Israelite Bay, through Esperance to Bremer Bay in Western Australia),

2/ The similarly distributed Eastern population of the Western Australian endemic, the Western Crowned Snake *Elapognathus (Hawkeswoodelapidus) coronatus* (Schlegel, 1837), (with a type locality of King George’s Sound, Western Australia), herein named as *Elapognathus coronatus staszewskii* subsp. nov.,

3/ The divergent, light coloured Stirling Range population of *R. bicolor* is formally named as *R. bicolor bulliardi* subsp. nov.,

4/ The main southern Victorian population of the Eastern Small-eyed Snake *Cryptophis nigrescens* Günther, 1862, (with a type locality of near Sydney, New South Wales), herein formally named as *Cryptophis nigrescens minor* subsp. nov.,

5/ A divergent lineage of White-lipped Snake *Drysdalia coronoides* (Günther, 1858), (with a type locality of Tasmania from far south in Tasmania, named as *Drysdalia coronoides divergans* subsp. nov. and

6/ Another divergent lineage of White-lipped Snake *Drysdalia coronoides* (Günther, 1858) this one being from mainland Australia named as *Drysdalia coronoides absconditus* subsp. nov..

Keywords: Taxonomy; nomenclature, reptile; snake; elapid; Square-nosed Snake; Crowned snake; Small-eyed Snake; White-lipped Snake; *Rhinoplocephalus*; *bicolor*; *Elapognathus*; *coronatus*; *Cryptophis*; *nigrescens*; *Drysdalia*; *coronoides*; Australia; Western Australia; Tasmania; New South Wales; South Australia; Victoria; new subspecies; *rodneyscanesi*; *bulliardi*; *staszewskii*; *minor*; *divergans*; *absconditus*.

INTRODUCTION

In 2023, the newly elected Federal Labor Government of Australia firmly committed itself to the continued acceleration of human population growth as part of a human and military build up against the perceived geopolitical threat of Communist China. In fact, as part of the Federal Government policy of bringing more and more people to overpopulate Australia, the estimated

intake of people is 300,000, mainly breeding age people in 2023 alone! (Karp 2023).

In the face of accelerating human population growth in southern Australia, brought about mainly because of the “Big Australia Policy” of successive Federal Governments, and their massive tax-payer funded immigration programs (see for example Saunders 2019 or Zaczek 2019), habitat destruction in southern

Australia is an ever increasing problem (see also Hoser 1989 and 1991a).

This underpins the urgency in cataloguing the biodiversity here in Australia in order to locate and identify taxa before they run the risk of extinction.

To that end, I have been a leader among Australian herpetologists and zoologists in the last 30 years, seeking to locate, identify and catalogue any overlooked vertebrates from within Australia, ensuring they are correctly named within the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

While it seems that most living Australian snake species and subspecies have already been formally named and/or if a given taxon is not widely recognized, there is a name available for it, there remain some exceptions, including six that have seemed obvious to me for some years.

Within this latter category are the eastern population of the Square-nosed Snake *Rhinoplocephalus bicolor* Müller, 1885, (type locality "Australia", but quite evidently of the western form), herein named as *Rhinoplocephalus bicolor rodneyscanesi subsp. nov.* (found from Israelite Bay, through Esperance to Bremer Bay in Western Australia) as well as another divergent population from the Stirling Range, which in many ways is similar to the eastern form, but found proximally to the western form, albeit an isolated range to the north.

Each are significantly morphologically divergent to the nominate form and much of their available habitat has already been reduced to monoculture agriculture in the relevant parts of their ranges.

I had intended formally naming these taxa for some years, but awaited either a molecular basis for doing so, further specimens to be made available, or both.

Unfortunately neither appear to forthcoming, save for a limited number of specimens of the eastern and western forms and the Stirling Range animal that I have managed to inspect in recent years.

With the only relevant issue being whether these divergent forms are different species, or just subspecies, I have decided to take a conservative approach and name them as a subspecies.

While conservation should not dictate taxonomy, I do note that by identifying these forms as separate taxa, governments can and should be able to manage them as entities separate from the better-known western population (nominate form).

Hence the formal naming of the eastern population as *Rhinoplocephalus bicolor rodneyscanesi subsp. nov.* and the Stirling Range population as *Rhinoplocephalus bicolor bulliardi subsp. nov.*

A near identical situation exists for the eastern population of the Western Crowned Snake *Elapognathus (Hawkeswoodelapidus) coronatus* (Schlegel, 1837), (with a type locality of King George's Sound, Western Australia), herein named as *Elapognathus (Hawkeswoodelapidus) coronatus staszewskii subsp. nov.*

Hawkeswoodelapidus Hoser, 2013 is the subgenus for the species.

A similar scenario also exists with respect of the Eastern Small-eyed Snake *Cryptophis nigrescens* Günther, 1862, (with a type locality of near Sydney, New South Wales).

Since arriving in Melbourne, Victoria at end 1985, I have noted substantial differences between putative *C. nigrescens* from around the east of Melbourne, versus those from around Sydney in New South Wales.

However, based on published distribution maps, the populations of putative *C. nigrescens* appeared to be continuous from Sydney to Melbourne, through the relevant parts of south-east Australia, along the coast and ranges between the two major cities.

Because of the preceding situation, I had assumed that differences were probably clinal and so could not justify recognition of the central-southern Victorian specimens at any

new taxonomic level.

In support of the preceding contention is the absence of any *Cryptophis* from the Otway Ranges, south-west of Melbourne, which in terms of hill-dwelling eastern Victorian taxa has only been cut off from these ranges in recent geological times (estimated at 3-5 MYA), (see Hoser 2020, 2022a, 2022b, 2022c).

Note also that species complexes within *Abbasaurum* Hoser, 2022 and *Limnodynastes* Fitzinger, 1843, managed to get to the Otway Ranges from eastern Victoria before the volcanic plains barriers formed in the 3-5 MYA period, which further implies that *Cryptophis* is a relatively recent immigrant into southern Victoria from further north and most certainly arrived here after 5 MYA, which broadly matches the situation of the skink genus *Allengreerus* Hoser, 2009, which also made it to central Victoria (viz. *A. jackyhoserae* (Hoser, 2012)), but did not make it to the Otway Ranges (see Hoser 2009b, 2012a, 2020, 2022a-c).

If one looks at the evidence of Hoser (2009c and 2013c), it appears in the most outlandish scenario, that the population of north-east Victoria by *Cryptophis* may in fact be measured in just tens of thousands of years, rather than millions, again negating any likelihood they are a different species from those further north, but in terms of small reptile species, of which *C. nigrescens* is, the scenarios outlined in Hoser (2020, 2022a-c) are more likely, supporting the idea of species-level divergence of the putative Victorian *C. nigrescens*.

In recent years, in particular from 2010 to 2023, I have been able to see large numbers of specimens of putative *C. nigrescens* from near Melbourne and north-east Victoria, previously not collected by myself or colleagues and also been able to see females produce young on a number of occasions, with invariably just 1-2 (rarely 3) being produced at a time, which is significantly lower than the 4-5 average I got from specimens north, south and west of Sydney in the nearby sandstone plateaux or similarly on the NSW south coast to at least as far south as Bega.

That alone implies taxonomic divergence.

In terms of distribution, it also appears that the populations from the hills and ranges immediately west, north, east and south-east of Melbourne, including flat areas on the Mornington Peninsula, and extending across most of south-east Victoria, east of the main Great Dividing Range, are disjunct from those found in most of New South Wales (along the coast and ranges), implying potential for taxonomic divergence.

The south-central Victorian snakes are similar to those further east in Victoria, but consistently smaller than those from the south coast of New South Wales, which are effectively similar to those from the NSW South Coast and nearby ranges, including Sydney, the Blue Mountains and immediately north and west of these places.

Noting recent divisions of putative *Allengreerus delicata* (De Vis, 1888) by Hoser (2009b, 2012b and 2022b), including at least three species being found within the State boundaries of Victoria, including one (*A. jackyhoserae* (Hoser, 2012)) from the central and eastern parts, south of and on the Great Dividing Range, sneaking into north-east Victoria, for which genetic validation was available, putative *Cryptophis nigrescens* from the same general range as that taxon and apparently divergent from the nominate Sydney form, warranted further investigation in the same way Queensland specimens had been examined and dealt with by Hoser (2012b).

As a result, these snakes were flagged as a potentially unnamed taxon, at least as a new subspecies.

In terms of the two species *Rhinoplocephalus bicolor* Müller, 1885 and *Elapognathus coronatus* (Schlegel, 1837), they have repeatedly been flagged as a putative taxa in which there may be one or more potentially hidden or cryptic species.

See also Hoser (2013b).

For example Cogger (2014) wrote of "Genus *Rhinoplocephalus Müller, 1885*", the following:

"a genus containing a single species found in the south-west of Western Australia".

Pyron *et al.* (2013) in their supermatrix showed each of *R. bicolor*, *E. coronatus* and *C. nigrescens* occupying long single stems, implying a strong likelihood of other species or subspecies within each clade as shown.

In terms of biogeographic barriers at play with respect of the two putative snake taxa within south-west Western Australia, a number of other species of reptiles and frogs have been shown to be composite across the same barrier/s, that is in an area slightly west of Esperance, Western Australia and/or confined to the Stirling Range.

Most notable of these included the recent formal division of *Contundo napoleonis* (Gray, 1839) into two species. The newly named *C. rosswellingtoni* Hoser, 2018, is the taxon found from Esperance and east, with *C. napoleonis* (Gray, 1839) being found along the coast west of Hopetoun and as far north as Green Head, Western Australia. That division was made on the basis of a molecular study showing divergence of the populations and consistent morphological differences (Hoser 2018 and sources cited therein).

Distribution maps and specimen data from Australian museums, as well as photographic evidence on "inaturalist.org" also shows population breaks for the relevant putative snake species across the same biogeographical barrier, implying taxonomic divergence.

Also notable was the division of the previously monotypic genus *Metacrinia* Parker, 1940, with the type species *Pseudophryne nicholsi* Harrison, 1927, known only from south-west Western Australia, into three species by Hoser (2020), each being morphologically and genetically divergent, each species being at least 2.6 2 MYA divergent from the other nearest relatives (based on earlier studies) and including an isolated Stirling Range taxon (*Metacrinia bettyswilae* Hoser, 2020).

In terms of the populations of *Cryptophis nigrescens* in south-east Australia, there are no useful molecular studies, although most other species complexes of small reptiles in south east Australia do in fact have different species in Sydney and Melbourne, including species within the *Allengreerus delicata* (De Vis, 1888) complex (see above) and *Lampropholis guichenoti* (Duméril and Bibron, 1839) species complexes (Hoser 2022b).

Based on Hoser (2022b), relying in turn on multiple earlier studies, including molecular ones, both putative species, which were until recently being treated as monotypic, turned out to be four species for *Lampropholis guichenoti* (Duméril and Bibron, 1839), one previously not named and nineteen within *Allengreerus delicata* (De Vis, 1888), 14 of which were previously not named, meaning that 15 species were formally named in that paper for the first time!

As already stated, no members of the *A. delicata* complex ever made it to the Otways in south-west Victoria (being unable to cross the basalt plains formed in the past 3-5 MYA) and like for *C. nigrescens*, are believed to have arrived in Victoria from further north in recent geological times, postdating the most significant volcanic events in central and western Victoria.

Finally, Dubey *et al.* (2010) published a study of the phylogeny of the genus *Drysdalia*, also referred to by Hoser (2013b).

The three recognized species in that southern Australian genus are the White-lipped Snake *Drysdalia coronoides* (Günther, 1858), being the type species for the genus, The Masters Snake *Drysdalia mastersi* (Krefft, 1866) and the Rose-bellied Snake *Drysdalia (Staszewskius) rhodogaster* (Jan and Sordelli, 1873)

In terms of the species, *D. mastersi*, and relying in part on the data from Dubey *et al.* (2010), the species was divided into three subspecies (including the nominate form), each with a divergence of about 500K years from one another.

The authors only provided a single sample for putative *D. (Staszewskius) rhodogaster* even though there are two distinctive populations, being one found mainly in the Blue Mountains, west

of Sydney, and another on the NSW South Coast. While the exact provenance of the holotype is unknown, there are available names for both forms, being, "*Hoplocephalus collaris* Macleay, 1887" for the south coast form, with a type locality of Bega, New South Wales, and "*Pseudelaps minutus* Fry, 1915", for the Blue Mountains form, with a type locality of Colo Vale, New South Wales.

Staszewskius Hoser, 2013 is the subgenus for *D. rhodogaster*.

For *D. coronoides*, the picture was somewhat more complicated.

This species, with a type locality of "Tasmania" being found throughout Tasmania, Victoria, eastern New South Wales and south-east South Australia, comprised three quite divergent lineages, with apparently little or no admixture, even though specimens were found proximal to one another.

They diverged from one another over 1 MYA, but the authors made no taxonomic changes as a result of their findings.

This in part was due to the need to ascertain the exact provenance or form of the holotype material from Tasmania and also to quantify the differences between the lineages if this were possible.

Neither were attempted by Dubey *et al.* (2010), or for that matter anyone else in the ensuing years.

To resolve the matter, I set out to determine if it was possible to identify the three putative forms morphologically and then to confirm which of the three forms was the type material for *D. coronoides*.

Assuming both were possible, the next step would be to formally identify and name each lineage, which is in fact what has happened.

The type form for *D. coronoides* is that from most parts of Tasmania, with a population from the far south, being unnamed. That is herein formally named as *Drysdalia coronoides divergens* subsp. nov..

Interestingly on mainland Australia where two morphologically similar lineages occur, I was able to identify and separate each.

The one which is of the Tasmanian type form is obviously already named, but the other is formally named herein as *Drysdalia coronoides absconditus* subsp. nov..

Notable is that all appear to be evolving separately as different species, even when in contact with one another, as in no evidence of cross-breeding or introgression.

In spite of this, I have conservatively identified each as subspecies, rather than as full species.

MATERIALS AND METHODS

In the absence of any detailed molecular studies on relevant populations of each of three putative snake species, namely, *Rhinoplocephalus bicolor* Müller, 1885, *Elapognathus coronatus* (Schlegel, 1837) and *Cryptophis nigrescens* Günther, 1862, no funds or government hand outs available to me to commence one and no one else in Australia or elsewhere with any stated interest in these snakes, it was decided to inspect specimens of each species from all areas they are known to occur to see if there were any consistent identifiable differences between given populations and if so, whether these alone warranted taxonomic recognition of any populations at either species or subspecies level.

Relevant literature on each putative species was also examined to confirm if there were any available synonyms for any potential new taxa (none were) and also to see if any other relevant information could be gathered in order to make a better taxonomic determination with respect to populations of each species.

Included in the inspections were live specimens, photos with good locality data and museum specimens.

Literature relevant to the taxonomic and nomenclatural decisions with respect of *Rhinoplocephalus bicolor* Müller, 1885 included Bush and Maryan (2006), Christensen (1972), Cogger (2014), Cogger *et al.* (1983), Fitzinger (1843), Hoser (2018, 2020),

Hutchinson (1990), Keogh *et al.* (1998), Müller (1885), Pyron *et al.* (2013), Wallach *et al.* (2014), Wells and Wellington (1984, 1985), Wilson and Knowles (1988), Wilson and Swan (2017) and sources cited therein.

Literature relevant to the taxonomic and nomenclatural decisions with respect of *Elapognathus coronatus* (Schlegel, 1837) included Bush and Maryan (2006), Christensen (1972), Cogger (2014), Cogger *et al.* (1983), Coventry and Rawlinson (1980), Dubey *et al.* (2010), Duméril and Bibron (1839), Fitzinger (1843), Fleay (1952), Gray (1841), Gray and Neill (1845), Guibé and Roux-Estève (1972), Hallermann (2020), Hoser (2018, 2020), Hutchinson (1990), Keogh *et al.* (1998, 2000), Kinghorn (1924), Pyron *et al.* (2013), Ride *et al.* (1999), Schlegel (1837), Shine (1981, 1994), Wallach *et al.* (2014), Wells and Wellington (1984, 1985), Wilson and Knowles (1988), Wilson and Swan (2017) and sources cited therein.

Literature relevant to the taxonomic and nomenclatural decisions with respect of *Cryptophis nigrescens* (Günther, 1862) included Bridge (1979), Cogger (2014), Cogger *et al.* (1983), Coventry and Rawlinson (1980), Fearn (2000), Günther (1862a-b), Hoser (1980, 1989, 1990, 1991b, 2012c, 2013c, 2018, 2019a, 2019b, 2020, 2022a-c), Hutchinson (1979), Macleay (1885), Murphy (1994), Pyron *et al.* (2013), Ride *et al.* (1999), Shine (1994), Stapley *et al.* (2005), Swan *et al.* (2017), Turner (2018), Wallach *et al.* (2014), Wells and Wellington (1984, 1985), Wilson and Swan (2017), Worrell (1961) and sources cited therein.

In terms of *Drysdalia coronoides*, Dubey *et al.* (2010) laid out which populations needed to be inspected and over the ten years post-dating that paper, I have been able to inspect hundreds of specimens including in Museums, in captivity, in the wild and via photographs with good locality data.

This has enabled me to determine consistent differences between the three forms identified in Dubey *et al.* (2010).

Literature relevant to the taxonomic and nomenclatural decisions with respect of *Drysdalia coronoides* Günther, 1858 included Cogger (2014), Cogger *et al.* (1983), Coventry and Rawlinson (1980), De Vis (1905), Dubey *et al.* (2010), Gomard (2015), Günther (1858), Hoser (1989, 1990, 1991b, 2009b, 2009c, 2012b-c, 2013b-c, 2018, 2019a, 2019b, 2020, 2022a-c), Hutchinson (1979, 1990), Jan and Sordelli (1873), Kinghorn (1924, 1926), McCoy (1878), Pyron *et al.* (2013), Ride *et al.* (1989), Shine (1981), Swan *et al.* (2017), Wallach *et al.* (2014), Wells and Wellington (1984, 1985), Wilson and Swan (2017) and sources cited therein.

RESULTS

Consistent differences between eastern and western populations of *Rhinoplocephalus bicolor* Müller, 1885 and *Elapognathus coronatus* (Schlegel, 1837) were identified and as a result, in each case the eastern forms are formally named below as new subspecies.

The Stirling Range population *R. bicolor* of was also found to be sufficiently divergent to warrant taxonomic recognition as well.

In terms of *Cryptophis nigrescens* Günther, 1862, the specimens from near Melbourne, Victoria were sufficiently divergent from the Sydney animals to warrant formal naming as a new subspecies, being *Cryptophis nigrescens minor subsp. nov.*. This divergence included size, shape, colouration and reproductive biology, combined with apparently allopatric distribution.

I was able to identify consistent differences between the three forms of *Drysdalia coronoides* Günther, 1858 as identified by Dubey *et al.* (2010) and hence the two forms for which there are no available names are formally named, like the others mentioned above, in accordance with the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

INFORMATION RELEVANT TO THE FORMAL DESCRIPTIONS THAT FOLLOW

There is no conflict of interest in terms of this paper or the conclusions arrived at herein.

Several people including anonymous peer reviewers who revised

the manuscript prior to publication are also thanked as a relevant staff at museums who made specimens and records available in line with international obligations.

In terms of the following formal descriptions, spelling should not be altered in any way for any purpose unless expressly and exclusively called for by the rules governing Zoological Nomenclature as administered by the International Commission of Zoological Nomenclature.

Material downloaded from the internet and cited anywhere in this paper was downloaded and checked most recently as of 18 April 2023, unless otherwise stated and were accurate in terms of the context cited herein as of that date.

Unless otherwise stated explicitly, colour descriptions apply to living adult male specimens of generally good health and not under any form of stress by means such as excessive cool, heat, dehydration or abnormal skin reaction to chemical or other input.

While numerous texts and references were consulted prior to publication of this paper, the criteria used to separate the relevant species has already been spelt out and/or is done so within each formal description and does not rely on material within publications not explicitly cited herein.

Delays in recognition of these subspecies could jeopardise the long-term survival of the taxa as outlined by Hoser (2019a, 2019b) and sources cited therein.

Therefore attempts by taxonomic vandals like the Wolfgang Wüster gang via Kaiser (2012a, 2012b, 2013, 2014a, 2014b) and Kaiser *et al.* (2013) (as frequently amended) to unlawfully suppress the recognition of these taxa on the basis they have a personal dislike for the person who formally named it should be resisted (Dubois *et al.* 2019).

Claims by the Wüster gang against this paper and the descriptions herein will no doubt be no different to those the gang have made previously, all of which were discredited long ago as outlined by Dubois *et al.* (2019), Hawkeswood (2021), Hoser, (2007, 2009a, 2012a, 2012b, 2013, 2015a-f, 2019a, 2019b), ICZN (1991, 2001, 2012, 2021) and sources cited therein.

Some material within descriptions is repeated to ensure each fully complies with the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

RHINOPECEPHALUS BICOLOR RODNEYSANESI SUBSP. NOV.

LSIDDurn:lsid:zoobank.org:act:B0497E4F-23BB-492D-85CE-DC13D1A4A157

Holotype: A preserved specimen at the Western Australian Museum, Perth, Western Australia, Australia, specimen number R89479 collected from Yokinup Bay, Western Australia, Australia, Latitude -33.866667 S., Longitude 123.033333 E.

This government-owned facility allows access to its holdings.

Paratype: A preserved specimen at the Western Australian Museum, Perth, Western Australia, Australia, specimen number R151714, collected from Mason Bay, Western Australia, Australia, Latitude -33.95 S., Longitude 120.45 E.

Diagnosis: The subspecies *Rhinoplocephalus bicolor rodneysanensi subsp. nov.* is the eastern population of the western Australian endemic species *Rhinoplocephalus bicolor* Müller, 1885. *Rhinoplocephalus bicolor rodneysanensi subsp. nov.* occurs along the coast from Israelite Bay in the east, through Esperance to Bremer Bay in the west. Specimens found from Mount Many Peaks in the east, west along the coast and nearby hinterland to Broke Inlet, are of the nominate form *R. bicolor bicolor*.

R. bicolor bulliardii subsp. nov. appears to be restricted to the Stirling Range, southwest Australia.

The three relevant subspecies are separated from one another by the following three suites of characters:

Nominate *R. bicolor* has a lead-grey upper surface of the head, which extends down the sides to the level of the bottom of the eye. The upper labials are all or mainly a deep yellow colour (the very top of each beginning to turn grey). The lead grey colour

of the head extends along the dorsum and includes the upper flanks. In turn, the lower flanks are a deep yellow, like the venter, but with a strong orange tinge on the flanks.

There is no obvious yellow line down the mid-dorsal line. The dorsal scales are of even colouration and not obviously etched.

R. bicolor rodneyscanesi subsp. nov. is a light brown colour on the upper surface of the dorsum, rather than grey or greyish, with a faint yellow-orange line running along the midline of the dorsum, being one scale wide. The upper part of the head and nape, behind the eyes is blackish, but the snout is light brown. Sides of the head and upper labials are a faded brown, very light yellow or cream in colour, but not a deep yellow. Lower flanks and venter are light yellow, with an orange tinge on the lower flanks.

The anterior of each scale on the dorsum is semi-distinct darker and gradually fades as one moves down the scale in a posterior direction.

R. bicolor bulliardi subsp. nov. is in many ways intermediate in form between the other two subspecies.

However it is separated from both as follows:

It has a dark grey upper surface of the head behind the eyes and anteriorly has a blue-grey snout. Upper labials are cream. The dorsum is brown, but with a strong blue-grey overlay. There is a very faded orange stripe running down the mid-dorsal line, being one scale wide.

The anterior edge of each dorsal scale is thinly etched dark purple-brown but each scale is otherwise of even colour.

Lower flanks and venter are light yellow with a strong orange hue on the lower flanks, especially anteriorly.

R. bicolor, treated as monotypic for the genus *Rhinoplocephalus* Müller, 1885, including the subspecies formally named here, are separated from all other Australian elapids by the following unique suite of characters: tail not paddle shaped or ending in a spine; head and dorsum are more or less uniformly coloured above, though sometimes with a thin line down the midline of the dorsum; nasal contacts the preocular; smooth scales with 15 mid-body rows; frontal longer than broad; more than one and a half times as broad as the supraocular; supranasals present; internasals absent; anal single; 25-40 all single subcaudals; 135-165 ventrals; no suboculars; two to five small, solid maxillary teeth follow the fang; labials are uniform in colour and lack bars; belly lacks transverse bars and is creamish, yellow or orange in colour; no keeling of ventral scales; smallish eyes, (modified from Cogger, 2014).

R. bicolor of the type form is depicted in life in Cogger (2014) on page 929 and online at:

<https://www.inaturalist.org/observations/119158305>

and

<https://www.inaturalist.org/observations/149950272>

and

<https://www.inaturalist.org/observations/112344420>

and

<https://www.inaturalist.org/observations/112343754>

A specimen of *R. bicolor rodneyscanesi* subsp. nov. in life from Lort River, Western Australia, photographed by Brian Bush of Western Australia can be found online at:

<http://members.iinet.net.au/~bush/bicolor.html>

R. bicolor bulliardi subsp. nov. in life is depicted online at:

<https://www.inaturalist.org/observations/91497711>

(six images) or at:

https://calphotos.berkeley.edu/cgi/img_query?enlarge=0000+0000+0407+1884

Distribution: As stated above.

Etymology: *R. bicolor rodneyscanesi* subsp. nov. is named in honour of Rodney Nathan Scanes, currently of Ramornie, New South Wales, Australia in recognition of his many services for herpetology, ornithology, herpetoculture and aviculture in Australia spanning some decades.

RHINOPECEPHALUS BICOLOR BULLIARDI SUBSP. NOV.
LSIDurn:lsid:zoobank.org:act:91A474FA-4742-4FBC-B709-83B64C9B57E2

Holotype: A live specimen depicted in the four images posted at: <https://www.inaturalist.org/observations/91497711>

being an adult male specimen (one snake only) collected from the Stirling Range National Park, Western Australia, Australia.

Diagnosis: The subspecies *R. bicolor bulliardi* subsp. nov. appears to be restricted to the Stirling Range, southwest Australia, being proximally distributed to the western Australian endemic species *Rhinoplocephalus bicolor* Müller, 1885, (of the type form) found generally south and west of there in south-west Australia.

Rhinoplocephalus bicolor rodneyscanesi subsp. nov. is the eastern population of *Rhinoplocephalus bicolor* Müller, 1885.

Rhinoplocephalus bicolor rodneyscanesi subsp. nov. occurs along the coast from Israelite Bay in the east, through Esperance to Bremer Bay in the west. Specimens found from Mount Many Peaks in the east, west along the coast and nearby hinterland to Broke Inlet, are of the nominate form *R. bicolor bicolor*.

The three relevant subspecies are separated from one another by the following three suites of characters:

Nominate *R. bicolor* has a lead-grey upper surface of the head, which extends down the sides to the level of the bottom of the eye. The upper labials are all or mainly a deep yellow colour (the very top of each beginning to turn grey). The lead grey colour of the head extends along the dorsum and includes the upper flanks. In turn, the lower flanks are a deep yellow, like the venter, but with a strong orange tinge on the flanks.

There is no obvious yellow line down the mid-dorsal line. The dorsal scales are of even colouration and not obviously etched.

R. bicolor rodneyscanesi subsp. nov. is a light brown colour on the upper surface of the dorsum, rather than grey or greyish, with a faint yellow-orange line running along the midline of the dorsum, being one scale wide. The upper part of the head and nape, behind the eyes is blackish, but the snout is light brown. Sides of the head and upper labials are a faded brown, very light yellow or cream in colour, but not a deep yellow. Lower flanks and venter are light yellow, with an orange tinge on the lower flanks.

The anterior of each scale on the dorsum is semi-distinct darker and gradually fades as one moves down the scale in a posterior direction.

R. bicolor bulliardi subsp. nov. is in many ways intermediate in form between the other two subspecies.

However it is separated from both as follows:

It has a dark grey upper surface of the head behind the eyes and anteriorly has a blue-grey snout. Upper labials are cream. The dorsum is brown, but with a strong blue-grey overlay. There is a very faded orange stripe running down the mid-dorsal line, being one scale wide.

The anterior edge of each dorsal scale is thinly etched dark purple-brown but each scale is otherwise of even colour.

Lower flanks and venter are light yellow with a strong orange hue on the lower flanks, especially anteriorly.

R. bicolor, treated as monotypic for the genus *Rhinoplocephalus* Müller, 1885, including the subspecies formally named here, are separated from all other Australian elapids by the following unique suite of characters: tail not paddle shaped or ending in a spine; head and dorsum are more or less uniformly coloured above, though sometimes with a thin line down the midline of the dorsum; nasal contacts the preocular; smooth scales with 15 mid-body rows; frontal longer than broad; more than one and a half times as broad as the supraocular; supranasals present; internasals absent; anal single; 25-40 all single subcaudals; 135-165 ventrals; no suboculars; two to five small, solid maxillary teeth follow the fang; labials are uniform in colour and lack bars; belly lacks transverse bars and is creamish, yellow or orange in colour; no keeling of ventral scales; smallish eyes, (modified from

Cogger, 2014).

R. bicolor of the type form is depicted in life in Cogger (2014) on page 929 and online at:

<https://www.inaturalist.org/observations/119158305>

and

<https://www.inaturalist.org/observations/149950272>

and

<https://www.inaturalist.org/observations/112344420>

and

<https://www.inaturalist.org/observations/112343754>

A specimen of *R. bicolor rodneyscanesi subsp. nov.* in life from Lort River, Western Australia, photographed by Brian Bush of Western Australia can be found online at:

<http://members.iinet.net.au/~bush/bicolor.html>

R. bicolor bulliardi subsp. nov. in life is depicted online at:

<https://www.inaturalist.org/observations/91497711>

(six images)

or at:

https://calphotos.berkeley.edu/cgi/img_query?enlarge=0000+0000+0407+1884

Distribution: Apparently confined to the Stirling Ranges, Western Australia.

Etymology: *R. bicolor bulliardi subsp. nov.* is named in honour of Kaj-erik Bulliard of Esperance, Western Australia, previously of Perth, Western Australia, and before that, of Sydney, NSW, Australia in recognition of a contribution to herpetology in Australia spanning some decades.

ELAPOGNATHUS CORONATUS STASZEWSKII SUBSP. NOV.

LSIDurn:lsid:zoobank.org:act:DC2457D0-505A-496D-8CDC-FD02422A8BCC6

Holotype: A preserved specimen at the Western Australian Museum, Perth, Western Australia, Australia, specimen number R97561 collected from Gulch island, Recherche Archipelago, Western Australia, Australia, Latitude -34.033333 S., Longitude 123.233333 E.

This facility allows access to its holdings.

Paratypes: Two preserved specimens at the Western Australian Museum, Perth, Western Australia, Australia, specimen number R97562-R97563 collected from Gulch island, Recherche Archipelago, Western Australia, Australia, Latitude -34.033333 S., Longitude 123.233333 E.

Diagnosis: *Elapognathus coronatus staszewskii subsp. nov.* is readily separated from the nominate form of *Elapognathus coronatus* by the fact that the dark nape marking is significantly wider at the midline of the neck, versus not so in *E. coronatus*. This means that it is 4 scales wide at the widest point in *E. coronatus staszewskii subsp. nov.*, versus 2-3 in the nominate form of *E. coronatus*.

The top of the head in *E. coronatus staszewskii subsp. nov.* is a dark greenish-grey versus lead-grey to grey in *E. coronatus*.

Both subspecies of *E. coronatus* are separated from the other species within *Elapognathus* Boulenger, 1896, namely *E. minor* (Günther, 1863) by having a distinct black band across the nape, continuous or more-or-less continuous with a narrow black stripe that extends around the sides of the head, through each eye and around the snout and 1-4 solid maxillary teeth behind the fang, versus none in *E. minor* and 130-160 ventrals, versus 115-130 in *E. minor*.

In *E. minor* the head and neck are more or less uniformly coloured when viewed from above, although in younger specimens a faded nape, most prominent on the lateral surfaces may be visible.

The snakes in the genus *Elapognathus* Boulenger, 1896 are separated from all other Australian elapids by the following unique suite of characters: no paddle on the tail, no spine at the end of the tail, all scales smooth, with 15 mid body rows, frontal shield longer than broad; suboculars absent; internasals present; 115-160 ventrals; 35-65 single subcaudals; single anal;

subcaudals single; no bar markings or keels on the ventrals (Modified from Cogger, 2014).

Type *E. coronatus coronatus* is depicted in life online at:

<https://www.inaturalist.org/observations/91928994>

and

<https://www.inaturalist.org/observations/120476753>

and

<https://www.inaturalist.org/observations/151820898>

E. coronatus staszewskii subsp. nov. is depicted in life online at: <https://www.inaturalist.org/observations/144918599>

and

<https://www.inaturalist.org/observations/68396590>

Distribution: *Elapognathus coronatus staszewskii subsp. nov.* is found from Cobinup Lake in the west, along the coastal strip, including near shore islands to Israelite Bay in the east.

Nominate *E. coronatus coronatus* is found from Hopetoun in the east, west along the coastal strip, including near shore islands to through south-west Australia and then north along the coast to near Perth, Western Australia.

Etymology: *E. coronatus staszewskii subsp. nov.* is named in honour of well-known snake keeper and breeder, Alex Staszewski of Blacktown, New South Wales, Australia in recognition of his contributions to herpetology in Australia spanning some decades. He has had success breeding large numbers of Taipans and Death Adders.

CRYPTOPHIS NIGRESCENS MINOR SUBSP. NOV.

LSIDurn:lsid:zoobank.org:act:B92ACF0B-1437-4F71-B587-7E3F8B3A6C96

Holotype: A preserved specimen at the National Museum of Victoria, Melbourne, Victoria, Australia, specimen number D56366 collected from Christmas Hills / Kinglake, Victoria, Australia.

This government-owned facility allows access to its holdings.

Paratype: A preserved specimen at the National Museum of Victoria, Melbourne, Victoria, Australia, specimen number D73200 collected from Kinglake National Park, Victoria, Australia, Latitude -37.57 S., Longitude 145.33 E.

Diagnosis: *Cryptophis nigrescens minor subsp. nov.* is separated from nominate *C. nigrescens* Günther, 1862, (with a type locality of near Sydney, New South Wales), *Cryptophis assimilis* (Macleay, 1885), from north Queensland and *Cryptophis edwardsi* Hoser, 2012, from south-east Queensland, by its smaller adult size, being never more than 55 cm, versus sometimes more than 60 cm for the other three species, no red or pink on the belly of juveniles, or if so, only light or faint, versus strong pink or orange on the belly of juveniles of the other three above-named taxa and a small litter size, 3 or less, versus (usually) 4 or more in the other three species.

Adult *C. nigrescens minor subsp. nov.* have a white belly, rarely with any hint of pink, which while seen in type *C. nigrescens*, is less frequent, with most *C. nigrescens* having at least some element of pink on the belly or margins. *C. edwardsi* is characterised by a strongly orange venter. *C. assimilis* is similar in most respects to *C. nigrescens*.

C. nigrescens minor subsp. nov. is also separated from the other three above-named taxa by having a relatively smaller head and in large adults lacks the bulbosity of the venom glands, showing at the back of the upper surface of the head from beneath the scales.

Cryptophis nigrescens, *C. assimilis*, *C. edwardsi* and *C. nigrescens minor subsp. nov.* are separated from all other Australian elapid snakes by the following unique suite of characters: tail not paddle shaped or ending in a spine; head and dorsum are uniformly grey or black above, with the head often a shiny grey or black; nasal contacts the preocular; smooth scales with 15 mid-body rows; frontal longer than broad; more than one and a half times as broad as the supraocular; supranasals present; internasals present; anal single; 30-45 all single

subcaudals; 165-210 ventrals; no suboculars; two to five small, solid maxillary teeth follow the fang; labials are uniform in colour and lack bars; belly lacks transverse bars; no keeling of ventral scales; small beady eyes, the diameter of each eye is usually less than the distance of the eye from the margin of the upper lip (modified from Cogger, 2014).

C. nigrescens is depicted in life in Cogger (2014) on page 875 top left.

C. assimilis is depicted in life in Hoser (1989) on page 152 at top left.

An image of *C. edwardsi* in life can be found in Wilson and Swan (2017) on page 543 (middle), or online at:

<https://www.flickr.com/photos/90956804@N04/15570443387/>
and

<https://www.flickr.com/photos/126002448@N02/15121139430/>
and

<https://reptile-database.reptarium.cz/species?genus=Cryptophis&species=nigrescens>

(snake from Bellthorpe, Queensland, photographed by Scott Eipper) where in this case it has been deliberately mislabelled by controller and owner of the domain, Peter Uetz as *C. nigrescens*, as part of their ego-driven fraud in pretending that anything named by Raymond Hoser, Ross Wellington, Richard Wells or any Russian author does not exist (see Uetz, 2022 and 2023).

(Note Peter Uetz has deleted the original material stating his censorship of the relevant material following howls of protest from the herpetological community, including his own cohort (Various authors 2022), but numerous people took and kept screen shots, page source texts and print outs of the relevant material as part of the permanent historical record. He has also uploaded altered material on the same url's to deceive people into believing that he has not censored anything or intended doing so, both claims or inferences of which are untrue).

C. nigrescens minor subsp. nov. in life can be found in images online at:

<https://www.flickr.com/photos/126237772@N07/49918516812/>
and

<https://www.flickr.com/photos/128497936@N03/51292085180/>

Distribution: *C. nigrescens minor subsp. nov.* appears to be restricted to central southern Victoria, being mainly the hilly country surrounding Melbourne, including the Kinglake Ranges, Dandenongs and Mornington Peninsula and extending south-east and east to the region of the NSW, Victorian border.

The type form of *C. nigrescens* appears to occupy coastal New South Wales from the far south coast, northwards. The exact distribution of *C. nigrescens minor subsp. nov.* has been confused somewhat by the inadvertent translocation of specimens by way of people moving them from one place to another, but appears to reflect that of *Allengreerus jackyhoserae* Hoser, 2012 in being all or mainly Victorian.

Etymology: The name “*minor*” reflects the fact that this is the smallest subspecies of *Cryptophis nigrescens* and is also smaller in adult size than the other two species in the genus.

DYSDALIA CORONOIDES DIVERGANS SUBSP. NOV.

LSIDurn:lsid:zoobank.org:act:0F24ADC6-9D4D-45DC-B055-DE192E868566

Holotype: A preserved specimen at the Vertebrate Collection in the Tasmanian Museum and Art Gallery, Hobart, Tasmania, Australia, specimen number C873 collected from Pigsty Ponds, southern Tasmania, Latitude -43.488627 S., Longitude 146.731059 E. This facility allows access to its holdings.

Diagnosis: The three subspecies of white-lipped snake are readily separated from one another by the three following unique suites of characters:

1/ Nominate *Drysdalia coronoides* (Günther, 1858), (with a type locality of Tasmania, occupying most of Tasmania, except for the very far south, as well as occurring in cooler parts of south-east South Australia, Victoria, the Australian Capital Territory and New South Wales, is identified and defined as having a well-defined

thick whitish bar running from the nostril, under the eye, running 12-13 scales along from the nostril, with a general absence of colour or peppering on the white. The upper surfaces of the head and snout in particular either lack peppering, or if present it is indistinct, although close inspection will reveal some peppering between the eye and nostril on either side of the snout.

2/ *Drysdalia coronoides divergens subsp. nov.* known only from around Pigsty Ponds, southern Tasmania is similar in most respects to nominate *Drysdalia coronoides* but differs in having dark purple-brown markings (blotched) across the centre of each white scale (the upper labials), which is not seen in either of the other subspecies. There is absolutely no peppering on the top of the head or between the eyes, but there are some obvious dark spots anteriorly.

3/ *Drysdalia coronoides absconditus subsp. nov.* from scattered locations between south-east South Australia, through Victoria to north-east, New South Wales is readily separated from the preceding two taxa by the fact that the whitish bar running from the nostril, under the eye is thinner than in the other two taxa (particularly nominate *D. coronoides*) invariably broken by at least one dark intrusion under the eye, as well as extensive whitening on the upper surfaces and side surfaces of the snout, which is in turn extensively peppered. The whitish bar running from the nostril, under the eye, only goes 8-10 scales along from the nostril.

Drysdalia coronoides is readily separated from the other two species in the genus *Drysdalia* Worrell, 1961 by the absence of an obvious pale band across the nape.

All species within the genus *Drysdalia* Worrell, 1961 are separated from other Australian elapid snakes by being small, slender smooth-scaled snakes with 15 mid-body rows, an absence of noticeably enlarged lower lateral scales, no terminal spine at the end of the tail; tail not paddle shaped; no transverse black bars on the belly; ventrals are not keeled or notched; frontal much longer than broad, being usually less than 1.5 times as wide as the supraocular; single anal; 35-70 single subcaudals; 120-160 ventrals; internasals present; suboculars absent; 3-5 small, solid maxillary teeth following the fang (modified from Cogger, 2014).

The nominate form of *Drysdalia coronoides* is depicted in life online at:

<https://www.flickr.com/photos/ryanfrancis/49637441087/>
and

<https://www.flickr.com/photos/tindo2/4649930592/>
and

<https://www.naturepl.com/stock-photo-white-lipped-snake-drysdalia-coronoides-male-a-small-diurnal-venomous-image01214213.html>

Drysdalia coronoides divergens subsp. nov. is depicted in life online at:

<https://www.inaturalist.org/observations/156335699>

Drysdalia coronoides absconditus subsp. nov. is depicted in life online at:

<https://www.inaturalist.org/observations/106508355>

and

<https://www.inaturalist.org/observations/34113598>

Distribution: *Drysdalia coronoides divergens subsp. nov.* is presently known only from around Pigsty Ponds, southern Tasmania and likely not to occur far from this site. This is not the only endemic Tasmanian species or subspecies with a distribution restricted to the far south of the state.

Litotesincus wellsii Hoser, 2016 is also found in the far south-west of Tasmania, being known only from the vicinity of New Harbour and Melaleuca.

Etymology: The subspecies name “*divergans*” represents the fact that this taxon is divergent from the nominal form. The spelling of this name should not be changed.

DYSDALIA CORONOIDES ABSCONDITUS SUBSP. NOV.

LSIDurn:lsid:zoobank.org:act:14CC60CD-754E-42F5-8155-B4A1FE4BCE43

Holotype: A preserved specimen at the Australian Museum, Sydney, New South Wales, Australia, specimen number R.153789 collected from Racecourse Swamp on the Racecourse Trail, Werrikimbe National Park, New South Wales, Australia, Latitude -31.12693 S., Longitude 152.27971 E.

As of 2022, this government-owned facility allows access to its holdings pursuant to international treaties (but under the management of Ms. Kim McKay (she / her), this facility does not comply with the provisions of the GIPA Act of NSW, NSW Copyright Act 1968 or the *International Code of Zoological Nomenclature*).

Paratype: A preserved specimen at the Australian Museum, Sydney, New South Wales, Australia, specimen number R.139109 collected from 300m West of Midslope Site on the Werrikimbe Trail, Werrikimbe National Park, New South Wales, Australia, Latitude -31.19194 S., Longitude 152.16444 E.

Diagnosis: The three subspecies of white-lipped snake are readily separated from one another by the three following unique suites of characters:

1/ Nominate *Drysdalia coronoides* (Günther, 1858), (with a type locality of Tasmania, occupying most of Tasmania, except for the very far south, as well as occurring in cooler parts of south-east South Australia, Victoria, the Australian Capital Territory and New South Wales, is identified and defined as having a well-defined thick whitish bar running from the nostril, under the eye, running 12-13 scales along from the nostril, with a general absence of colour or peppering on the white. The upper surfaces of the head and snout in particular either lack peppering, or if present it is indistinct, although close inspection will reveal some peppering between the eye and nostril on either side of the snout.

2/ *Drysdalia coronoides divergens subsp. nov.* known only from around Pigsty Ponds, southern Tasmania is similar in most respects to nominate *Drysdalia coronoides* but differs in having dark purple-brown markings (bloched) across the centre of each white scale (the upper labials), which is not seen in either of the other subspecies. There is absolutely no peppering on the top of the head or between the eyes, but there are some obvious dark spots anteriorly.

3/ *Drysdalia coronoides absconditus subsp. nov.* from scattered locations between south-east South Australia, through Victoria to north-east, New South Wales is readily separated from the preceding two taxa by the fact that the whitish bar running from the nostril, under the eye is thinner than in the other two taxa (particularly nominate *D. coronoides*) invariably broken by at least one dark intrusion under the eye, as well as extensive whitening on the upper surfaces and side surfaces of the snout, which is in turn extensively peppered. The whitish bar running from the nostril, under the eye, only goes 8-10 scales along from the nostril.

Drysdalia coronoides is readily separated from the other two species in the genus *Drysdalia* Worrell, 1961 by the absence of an obvious pale band across the nape.

All species within the genus *Drysdalia* Worrell, 1961 are separated from other Australian elapid snakes by being small, slender smooth-scaled snakes with 15 mid-body rows, an absence of noticeably enlarged lower lateral scales, no terminal spine at the end of the tail; tail not paddle shaped; no transverse black bars on the belly; ventrals are not keeled or notched; frontal much longer than broad, being usually less than 1.5 times as wide as the supraocular; single anal; 35-70 single subcaudals; 120-160 ventrals; internasals present; suboculars absent; 3-5 small, solid maxillary teeth following the fang (modified from Cogger, 2014).

Distribution: *Drysdalia coronoides absconditus subsp. nov.* is presently known from mainland Australia in an area stretching from south-east South Australia, through Victoria, to northern New South Wales, in cooler parts of the coast and ranges within

this region.

Populations of nominate *Drysdalia coronoides* within this same range appear to occur in separate areas (and is by far the more widespread of the two, for example being the only form known from southern New South Wales), are often separated by zones of unsuitable habitat or lower elevation, where warm climate species of snakes predominate instead. Notwithstanding the preceding, there is no evidence at this stage, suggesting habitat displacement by one subspecies over another, although the apparently mutually exclusive distributions of each subspecies implies this fact.

Etymology: The subspecies name "*absconditus*" represents the fact that this taxon was hidden or absconded from science by being confused with the nominal form for over 160 years. The spelling of this name should not be changed.

CONSERVATION THREATS TO THE PRECEDING TAXA

There are no known significant immediate conservation threats to these newly named subspecies, although the best part of the habitat for these taxa have been effectively erased or degraded by intensive human activities in the form of urbanisation or land-clearing for agriculture.

Unforeseen threats may include direct human activities (e.g. yet more land clearing for homes or farming activities), as well as potential threats caused by changed vegetation regimes, introduced pests and potential pathogens, including those introduced via the legal importation of foreign reptiles and amphibians by government-owned zoos and other government backed commercial enterprises.

Denial of the existence of the relevant taxa *sensu* Wüster *et al.* as outlined by Hoser (2019a, 2019b), could ultimately cause extinction of these taxa in the same way it caused one or more earlier extinctions as documented by Hoser (2019a, 2019b).

The conservation of these species will also be hampered by the issues raised in Hoser (1989, 1991a, 1993, 1996 and 2007).

Translocation of specimens should be discouraged and captives should only be released into the wild if part of a carefully planned wildlife management program.

In case it has not been made clear, there is a likelihood that molecular studies in the future may necessitate the elevation of one or more of the just described subspecies taxa to full species status.

REFERENCES CITED

- Bridge, G. 1979. The small-eyed snake (*Cryptophis nigrescens*). *Victorian Herpetological Society Newsletter* 13:17-18.
- Bush, B. and Maryan, B. 2006. *Snakes and Snake-like Reptiles of Southern Western Australia*. Snakes Harmful and Harmless, Stoneville, Perth, Western Australia, Australia:40 pp.
- Christensen, P. 1972. New Record of Mueller's Snake, *Rhinoplocephalus bicolor*. *Western Australian Naturalist* 12(4):88-89.
- Cogger, H. G. 2014. *Reptiles and Amphibians of Australia* (Seventh Edition). CSIRO Publishing, Collingwood, Victoria, Australia:1033 pp.
- Cogger, H. G., Cameron, E. E. and Cogger, H. M. 1983. *Zoological Catalogue of Australia (1) Amphibia and Reptilia*, Australian Government Publishing Service, Canberra, ACT, Australia:319 pp.
- Coventry, A. J. and Rawlinson, P. A. 1980. Taxonomic revision of the elapid snake genus *Drysdalia* Worrell, 1961. *Memoirs of the National Museum of Victoria* 41:65-78.
- De Vis, C. W. 1905. A new genus of lizard. *Annals of the Queensland Museum* (Brisbane, Australia) 6:46-52.
- Dubey, S., Scott Keogh, J. and Shine, R. 2010. Pliopleistocene diversification and connectivity between mainland and Tasmanian populations of Australian snakes (*Drysdalia*, Elapidae, Serpentes). *Molecular Phylogenetics and Evolution* 56(3):1119-1125.
- Dubois, A., Bauer, A. M., Ceriaco, L. M. P., Dusoulier, F., Fretey,

- T., Lobl, I., Lorvelec, O., Ohler, A., Stopiglia, R. and Aesch, E. 2019. The Linz Zocode project: a set of new proposals regarding the terminology, the Principles and Rules of zoological nomenclature. First report of activities (2014-2019). *Bionomina* (online), 17:1-111.
- Duméril, A. M. C. and G. Bibron. 1839. *Erpétologie Générale ou Histoire Naturelle Complète des Reptiles*. Vol. 5. Roret/Fain et Thunot, Paris, 871 pp.
- Fearn, S. 2000. Record of an extreme leucistic *Rhinoplocephalus nigrescens* (Serpentes: Elapidae). *Herpetofauna* (Sydney, Australia) 30(2):55.
- Fitzinger, L. J. F. J. 1843. *Systema Reptilium. Fasciculus Primus*. Wien: Braumüller et Seidel.
- Fleay, D. 1952. The crowned or coronated snake. *Victorian Naturalist* 68:146-150.
- Gomard, G. 2015. Tigerottern: eine Einladung zum Kennenlernen der Reptilien Tasmaniens. *Terraria-Elaphe* 2015(4):44-51.
- Gray, J. E. 1838. Catalogue of the slender-tongued saurians, with descriptions of many new genera and species. Part 1. *Ann. Mag. Nat. Hist.* (1)1:274-283.
- Gray, J. E. 1841. A catalogue of the species of reptiles and Amphibia hitherto described as inhabiting Australia, with a description of some new species from Western Australia. Appendix E, pp. 422-449. In: G. Grey, *Journals of Two Expeditions of Discovery in Northwest. T. and W. Boone*, London. Vol. 2: 422-449 + plates.
- Gray, J. E. and Neill, J. 1845. Catalogue of reptiles and fish found at King George's Sound. Appendix in: Eyre, E. J. *Journals of Expeditions of Discovery into Central Australia and Overland from Adelaide to King George's Sound in the Years 1840-1*. London: T. and W. Boone 1:412-418.
- Guibé, J. and Roux-Estève, R. 1972. Les types de Schlegel (Ophidiens) présents dans les collections du Muséum National d'Histoire Naturelle de Paris. *Zoologische Mededelingen* 47:129-134.
- Günther, A. 1858. *Catalogue of Colubrine snakes of the British Museum*. London, I-XVI+1-281.
- Günther, A. 1862a. On new species of snakes in the collection of the British Museum. *Annals and Magazine of Natural History* (3)9:52-67.
- Günther, A. 1862b. On new species of snakes in the collection of the British Museum. *Annals and Magazine of Natural History* (3)9:124-132.
- Hallermann, J. 2020. An annotated list of reptiles and amphibians from the 1905 Hamburg expedition to southwest Australia deposited in the Zoological Museum Hamburg. *Evolutionary Systematics* 4:61-70.
- Harrison, L. 1927. Notes on some Western Australian Frogs, with descriptions of new species. *Records of the Australian Museum* 15:277-287.
- Hawkeswood, T. J. 2021. Time to end taxonomic vandalism by Wolfgang Wuster *et al.*: The Snakeman, Raymond Hoser's publications are validly published and his names available according to the ICZN: Objective investigation finds Hoser's taxonomic works as scientific best practice and in every relevant case identifies valid entities. *Calodema* 860:1-51.
- Hoser, R. T. 1980. Further records of aggregations of various species of Australian snakes. *Herpetofauna* (Sydney, Australia) 12(1):16-22.
- Hoser, R. T. 1989. *Australian Reptiles and Frogs*. Pierson and Co., Sydney, NSW, Australia:238 pp.
- Hoser, R. T. 1990. Melbourne's snakes. *Litteratura Serpentina* 10(2):82-92, 10(3):122-145.
- Hoser, R. T. 1991a. *Endangered Animals of Australia*. Pierson and Co., Sydney, NSW, Australia:240 pp.
- Hoser, R. T. 1991b. Sydney's Snakes. *Litteratura Serpentina* 11, 3-6:56-67, 78-87, 101-113, 125-130.
- Hoser, R. T. 1993. *Smuggled: The Underground Trade in Australia's Wildlife*. Apollo Books, Moss Vale, NSW, Australia:160 pp.
- Hoser, R. T. 1996. *Smuggled-2: Wildlife Trafficking, Crime and Corruption in Australia*. Kotabi Publishing, Doncaster, Victoria, Australia:280 pp.
- Hoser, R. T. 2007. Wells and Wellington - It's time to bury the hatchet. *Calodema* Supplementary Paper 1:1-9.
- Hoser, R. T. 2009a. Creationism and contrived science: A review of recent python systematics papers and the resolution of issues of taxonomy and nomenclature. *Australasian Journal of Herpetology* 2:1-34. (3 February).
- Hoser, R. T. 2009b. A new genus and a new species of skink from Victoria. *Australasian Journal of Herpetology* 3:1-6.
- Hoser, R. T. 2009c. How Fast Can You Crawl? Mobility and the Distribution of Snakes in Southeast Australia. *Bulletin of the Chicago Herpetological Society* 44(6):87-95.
- Hoser, R. T. 2012a. Exposing a fraud! *Afronaja* Wallach, Wüster and Broadley 2009, is a junior synonym of *Spracklandus* Hoser 2009! *Australasian Journal of Herpetology* 9 (3 April 2012):1-64.
- Hoser, R. T. 2012b. A New Genus and new species and new subspecies of skink from Victoria (Squamata:Scincidae). *Australasian Journal of Herpetology* 12: 63-64.
- Hoser, R. T. 2012c. Some new small-eyed snakes from Australia and New Guinea (Serpentes:Elapidae). *Australasian Journal of Herpetology* 13:3-7.
- Hoser, R. T. 2012c. Robust taxonomy and nomenclature based on good science escapes harsh fact-based criticism, but remains unable to escape an attack of lies and deception. *Australasian Journal of Herpetology* 14:37-64.
- Hoser, R. T. 2013a. The science of herpetology is built on evidence, ethics, quality publications and strict compliance with the rules of nomenclature. *Australasian Journal of Herpetology* 18:2-79.
- Hoser, R. T. 2013b. Revisiting the Australian "White-lipped Snakes" of the genus *Drysdalia* Worrell, 1961, (*sensu lato*) including two new subgenera and two new subspecies (Serpentes: Elapidae). *Australasian Journal of Herpetology* 20:47-51.
- Hoser, R. T. 2013c. How fast can they crawl? Distribution of snakes in Melbourne, Victoria, Australia. *Australasian Journal of Herpetology* 20:52-63.
- Hoser, R. T. 2015a. Dealing with the "truth haters" ... a summary! Introduction to Issues 25 and 26 of *Australasian Journal of Herpetology*. Including "A timeline of relevant key publishing and other events relevant to Wolfgang Wüster and his gang of thieves." and a "Synonyms list". *Australasian Journal of Herpetology* 25:3-13.
- Hoser, R. T. 2015b. The Wüster gang and their proposed "Taxon Filter": How they are knowingly publishing false information, recklessly engaging in taxonomic vandalism and directly attacking the rules and stability of zoological nomenclature. *Australasian Journal of Herpetology* 25:14-38.
- Hoser, R. T. 2015c. Best Practices in herpetology: Hinrich Kaiser's claims are unsubstantiated. *Australasian Journal of Herpetology* 25:39-64.
- Hoser, R. T. 2015d. PRINO (Peer reviewed in name only) journals: When quality control in scientific publications fails. *Australasian Journal of Herpetology* 26:3-64.
- Hoser, R. T. 2015e. Rhodin *et al.* 2015, Yet more lies, misrepresentations and falsehoods by a band of thieves intent on stealing credit for the scientific works of others. *Australasian Journal of Herpetology* 27:3-36.
- Hoser, R. T. 2015f. Comments on *Spracklandus* Hoser, 2009 (Reptilia, Serpentes, ELAPIDAE): request for confirmation of the availability of the generic name and for the nomenclatural validation of the journal in which it was published (Case 3601; see *BZN* 70: 234-237; comments *BZN* 71:30-38, 133-135). *Australasian Journal of Herpetology* 27:37-54.

- Hoser, R. T. 2018. New Australian lizard taxa within the greater *Egernia* Gray, 1838 genus group of lizards and the division of *Egernia sensu lato* into 13 separate genera. *Australasian Journal of Herpetology* 36:49-64.
- Hoser, R. T. 2019a. 11 new species, 4 new subspecies and a subgenus of Australian Dragon Lizard in the genus *Tympanocryptis* Peters, 1863, with a warning on the conservation status and long-term survival prospects of some newly named taxa. *Australasian Journal of Herpetology* 39:23-52.
- Hoser, R. T. 2019b. Richard Shine *et al.* (1987), Hinrich Kaiser *et al.* (2013), Jane Melville *et al.* (2018 and 2019): Australian Agamids and how rule breakers, liars, thieves, taxonomic vandals and law breaking copyright infringers are causing reptile species to become extinct. *Australasian Journal of Herpetology* 39:53-63.
- Hoser, R. T. 2020. 3 new tribes, 3 new subtribes, 5 new genera, 3 new subgenera, 39 new species and 11 new subspecies of mainly small ground-dwelling frogs from Australia. *Australasian Journal of Herpetology* 50-51:1-128.
- Hoser, R. T. 2022a. Hiding in plain sight. A previously unrecognized biogeographical barrier in Australia formed by an event of biblical proportions. Five new species of skink lizard from south-west Victoria, three more closely related species from New South Wales and another from South Australia. *Australasian Journal of Herpetology* 56:3-21.
- Hoser, R. T. 2022b. The inevitable split up of the common Australian skink lizard *Allengreuerus delicata* AKA *Lampropholis delicata* into resurrected and new species (Reptilia: Squamata: Scincidae). *Australasian Journal of Herpetology* 57:28-52.
- Hoser, R. T. 2022c. Greater diversity of skink species in south-east Australia than previously realized: *Carinascincus* Wells and Wellington, 1985 *sensu lato* is further divided. *Australasian Journal of Herpetology* 59:48-64.
- Hutchinson, M. N. 1979. The reptiles of Kinglake National Park. *Victorian Naturalist* 96:124-134.
- Hutchinson, M. N. 1990. The generic classification of the Australian terrestrial elapid snakes. *Memoirs of the Queensland Museum* 29(3):397-405.
- International Commission of Zoological Nomenclature (ICZN) 1991. Decision of the commission. Three works by Richard W. Wells and C. Ross Wellington: proposed suppression for nomenclatural purposes. *Bulletin of Zoological Nomenclature* 48(4):337-338.
- International Commission of Zoological Nomenclature (ICZN) 2001. Opinion 1970. *Bulletin of Zoological Nomenclature* 58(1):74, (30 March 2001).
- International Commission of Zoological Nomenclature (ICZN) 2012. Amendment of Articles 8, 9, 10, 21 and 78 of the *International Code of Zoological Nomenclature* to expand and refine methods of publication. *Zootaxa* (PRINO) (Online) 3450:1-7.
- International Commission of Zoological Nomenclature (ICZN) 2021. Opinion 2468 (Case 3601) - *Spracklandus* Hoser, 2009 (Reptilia, Serpentes, Elapidae) and *Australasian Journal of Herpetology* issues 1-24: confirmation of availability declined; Appendix A (Code of Ethics): not adopted as a formal criterion for ruling on Cases. *Bulletin of Zoological Nomenclature* 78 (30 April 2021):42-45.
- Jan, G. and Sordelli, F. 1873. *Iconographie Générale des Ophidiens*. Atlas 1860-1881. Milan: Jan and Sordelli, 50 livr.
- Kaiser, H. 2012a. SPAM email sent out to numerous recipients on 5 June 2012.
- Kaiser, H. 2012b. Point of view. Hate article sent as attachment with SPAM email sent out on 5 June 2012.
- Kaiser, H. 2013. The Taxon Filter, a novel mechanism designed to facilitate the relationship between taxonomy and nomenclature, vis-à-vis the utility of the Code's Article 81 (the Commission's plenary power). *Bulletin of Zoological Nomenclature* 70(4) December 2013:293-302.
- Kaiser, H. 2014a. Comments on *Spracklandus* Hoser, 2009 (Reptilia, Serpentes, ELAPIDAE): request for confirmation of the availability of the generic name and for the nomenclatural validation of the journal in which it was published. *Bulletin of Zoological Nomenclature*, 71(1):30-35.
- Kaiser, H. 2014b. Best Practices in Herpetological Taxonomy: Errata and Addenda. *Herpetological Review*, 45(2):257-268.
- Kaiser, H., Crother, B. L., Kelly, C. M. R., Luiselli, L., O'Shea, M., Ota, H., Passos, P., Schleip, W. D. and Wüster, W. 2013. Best practices: In the 21st Century, Taxonomic Decisions in Herpetology are Acceptable Only When supported by a body of Evidence and Published via Peer-Review. *Herpetological Review* 44(1):8-23.
- Karp, P. 2023. Australia on track for 2023 migration boom as arrivals dwarf Treasury forecasts, ex-official says, *The Guardian, Australia*, 13 January 2023, posted online at: <https://www.theguardian.com/australia-news/2023/jan/13/australia-on-track-for-2023-migration-boom-as-arrivals-dwarf-treasury-forecasts-ex-official-says>
- Keogh, J. S., Shine, R. and Donnellan, S. 1998. Phylogenetic Relationships of Terrestrial Australo-Papuan Elapid Snakes (Subfamily Hydrophiinae) Based on Cytochrome b and 16S rRNA Sequences. *Molecular Phylogenetics and Evolution* 10(1):67-81.
- Keogh, J. S., Scott, I. A. and Scanlon, J. D. 2000. Molecular phylogeny of viviparous Australian elapid snakes: affinities of *Echiopsis atriceps* (Storr, 1980) and *Drysdalia coronata* (Schlegel 1837) with description of a new genus. *Journal of Zoology* 252:317-326.
- Kinghorn, J. R. 1924. Reptiles and batrachians from south and south-west Australia. *Records of the Australian Museum* 14(3):163-183.
- Kinghorn, J. R. 1926. Note on *Pseudelaps minutus* Fry. *Records of the Australian Museum* 15(1):65.
- Macleay, W. 1885. On some Reptilia lately received from the Herbert River District, Queensland. *Proceedings of the Linnaean Society of New South Wales* 10:64-68.
- McCoy, F. 1878. *Hoplocephalus coronoides* (Günther.) The white-lipped snake. *Prodromus of the Zoology of Victoria* 2:7-9.
- Müller, F. 1885. Vierter Nachtrag zum Katalog der herpetologischen Sammlung des Basler Museums. *Verhandlungen der Naturforschenden Gesellschaft in Basel* 7:668-717.
- Murphy, M. J. 1994. Reptiles and amphibians of Seven Mile Beach National park, NSW. *Herpetofauna* (Sydney, Australia) 24(2):24-30.
- Shine, R. 1981. Venomous snakes in cold climates: ecology of the Australian genus *Drysdalia* (Serpentes : Elapidae). *Copeia* 1981(1):14-25.
- Shine, R. 1994. Sexual size dimorphism in snakes revisited. *Copeia* 1994(2):326-346.
- Parker, H. W. 1940. The Australasian frogs of the family Leptodactylidae. *Novitates Zoologicae*. Tring 42:1-106.
- Pyron, R. A., Burbrink, F. T. and Weins, J. J. 2013. A phylogeny and revised classification of Squamata, including 4161 species of lizards and snakes. Published online at: <http://www.biomedcentral.com/1471-2148/13/93:54> pp.
- Ride, W. D. L. (ed.) *et al.* (on behalf of the International Commission on Zoological Nomenclature) 1999. *International code of Zoological Nomenclature*. The Natural History Museum - Cromwell Road, London SW7 5BD, UK (also commonly cited as "The Rules", "Zoological Rules" or "ICZN 1999"). pp.
- Saunders, S. 2019. Morrison and Shorten's Big Australia: The overpopulation problem. News article published 17 April 2019 and downloaded from <https://independentaustralia.net/politics/politics-display/morrison-and-shortens-big-australia-the-overpopulation-problem,12584>

Schlegel, H. 1837. *Essai sur la physionomie des serpens. Partie Descriptive*. La Haye (J. Kips, J. HZ. et W. P. van Stockum), 606 S.+xvi.

Shine, R. 1981. Venomous snakes in cold climates: ecology of the Australian genus *Drysdalia* (Serpentes : Elapidae). *Copeia* 1981(1):14-25.

Shine, R. 1994. Sexual size dimorphism in snakes revisited. *Copeia* 1994(2):326-346.

Stapley, J., Hayes, C. M., Webb, J. K. and Scott Keogh, J. 2005. Novel microsatellite loci identified from the Australian eastern small-eyed snake (Elapidae: *Rhinocephalus nigrescens*) and cross species amplification in the related genus *Suta*. *Molecular Ecology Notes* 5:54-56.

Swan, G., Sadlier, R. and Shea, G. 2017. *A field guide to reptiles of New South Wales*. Reed New Holland, Chatswood, NSW, Australia:328 pp.

Turner, G. S. 2018. *Cryptophis nigrescens* (Eastern Small-eyed Snake) Diet. *Herpetological Review* 49(2):339.

Uetz, P. 2022. New Reptile Database release, <http://www.reptile-database.org/dbinfo/> 14 March.

Copied online at: <http://www.reptileparties.com.au/Uetz-banning-Russians-14-March-2022-1.pdf>

Uetz, P. 2023. Email to Ross Wellington dated Thu, Apr 20, 2023 at 11:08.

Copied online at: <http://www.reptileparties.com.au/Uetz-still-banning-Russians-2023-1.pdf>

Various authors 2022. Post by Peter Uetz on Facebook on 14 March 2023 and followed by comments of others, dated 15 March 2022.

Copied online at: <http://www.reptileparties.com.au/Uetz-Reptile-Database-ban-of-Russians-via-Facebook-18-3-2022-1.pdf>

Wallach, V., Williams, K. L. and Boundy, J. 2014. *Snakes of the World: A Catalogue of Living and Extinct Species*. Taylor and Francis, CRC Press, UK:1237 pp.

Wells, R. W. and Wellington, C. R. 1984. A synopsis of the Class Reptilia in Australia. *Australian Journal of Herpetology* 1 (3-4):73-129.

Wells, R. W. and Wellington, C. R. 1985. A classification of the Amphibia and Reptilia of Australia. *Australian Journal of Herpetology, Supplementary Series*, (1):1-61.

Wilson, S. K. and Knowles, D. G. 1988. *Australia's Reptiles: A Photographic Reference to the Terrestrial Reptiles of Australia*. Cornstalk Publishing, Pymble, NSW, Australia:447 pp.

Wilson, S. and Swan, G. 2017. *A complete guide to reptiles of Australia*, (Fifth edition), New Holland, Chatswood, New South Wales, Australia:647 pp.

Worrell, E. 1961. Herpetological Name Changes. *Western Australian Naturalist* 8:18-27.

Zacsek, Z. 2019. Former PM Kevin Rudd says Australia should drastically increase its population to 50 MILLION to make sure nation can defend itself in the face of threats from China. *Daily Mail* (Australia) (27 November), published online at: <https://www.dailymail.co.uk/news/article-7729689/Kevin-Rudd-says-Australia-increase-population-50-MILLION-defend-China.html>

CONFLICTS OF INTEREST

None.

Drysdalia coronoides absconditus subsp. nov. from the Macedon Ranges, Victoria.



A new subspecies of Western Bluetongue *Tiliqua occipitalis* (Peters, 1863) from south-west Australia.

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ABSTRACT

An ongoing audit of the Australian herpetofauna has shown consistent morphological differences within populations of the iconic Australian species, the Western Bluetongue *Tiliqua occipitalis* (Peters, 1863). Those from south-west Western Australia, from about Kalbarri in the north, along the coastal strip south through Perth and South-west, Western Australia, including across the Nullarbor to Yalata in South Australia are morphologically distinct from the nominate form found elsewhere in the range of the species. Identified herein as the new subspecies *Tiliqua occipitalis bulliardi* subsp. nov., it is most easily separated from the nominate form in that it has four dark black bands on the tail and three wide dark bands on the mid-body, versus three dark black bands on the tail and two wide dark bands on the mid-body in the nominate form.

Keywords: Taxonomy; nomenclature, reptile; skink; bluetongue; Australia; Western Australia, South Australia; *Tiliqua*; *occipitalis*; *Cyclodus*; *fasciatus*; new subspecies; *bulliardi*.

INTRODUCTION

With the assistance of numerous herpetologists and naturalists, I have been conducting a detailed Australia-wide audit of the herpetofauna with a view to identifying and naming hitherto unnamed forms.

This has been to ensure that a proper baseline taxonomy and related infrastructure is in place to guide conservation in the future as the challenges of an overpopulated (by humans) Australia manifest.

Already at least one species of lizard has been extirpated due to rapid urbanisation (see Hoser 2019a, 2019b) and others appear to be similarly threatened.

In the case of the Victorian agamid lizard *Tympanocryptis lineata pinguicollis* Mitchell, 1948, the taxon was ultimately shown by Wells and Wellington (1983 and 1985) to warrant full species recognition (as *Tympanocryptis pinguicollis* (Mitchell, 1948)), a position maintained by Hoser (2007).

In spite of this scientific finding, the government business "Zoos Victoria" and organiser's of the online databases they use (e.g. Australian Faunal Directory at <https://biodiversity.org.au/afd/home>), hijacked by Wolfgang Wuster and his notorious gang of thieves (see Dubois *et al.* (2019), Hoser, (2007, 2009a, 2012a, 2012b, 2013, 2015a-f, 2019a, 2019b), ICZN (1991, 2001, 2012, 2021) and sources cited therein), pretended that *T. pinguicollis* did not in fact exist, as in it was merely a population of another putatively widespread and common species *T. lineata* Peters, 1863.

That taxon (*T. pinguicollis*) is now extinct.

To pre-empt this happening again with respect of other Australian lizard species, the urgency of identifying and naming all Australian species and subspecies of reptile has increased.

This is particularly so, noting the Federal Government policy of bringing more and more people to overpopulate Australia, the estimated intake of people being 300,000 in 2023 alone! (Karp 2023).

Backed up with an enhanced "baby bonus" and "infant payment", which as of 2023 stands at AUD \$2380.42 per baby born (see <https://www.servicesaustralia.gov.au/how-much-newborn-upfront-payment-and-newborn-supplement-you-can-get?context=22186>), which encourages breeding age women to have more kids, the long term prognosis for many Australian reptiles, including putatively common ones, is not good.

People need places to live and this includes what may well be good reptile habitat!

Although the widely distributed Bluetongue Lizards (genus *Tiliqua* Gray, 1825) have been heavily scrutinized by herpetologists over the last 200 years, it appears that no one has audited putative *Tiliqua occipitalis* (Peters, 1863), originally placed in the genus *Cyclodus* Wagler, 1828 (a subjective synonym of *Tiliqua* Gray, 1825, type species *Lacerta scincoides* White, 1790), since Cogger *et al.* (1983) recognized the species and also placed *Cyclodus fasciatus* Lütken, 1863 into synonymy with it.

Inspection of specimens from across the known range of the putative species *T. occipitalis* including Western New South Wales and Victoria, across South Australia and including the southern half of Western Australia, by myself over a period spanning more than 5 decades showed significant regional variation.

This was noted in spite of the other issues of ontogenetic changes which may obscure the observation of variation, especially when individuals are observed across a number of years and samples are limited to opportunistic observations.

MATERIALS AND METHODS

To overcome the issues outlined above, a systematic approach was taken to ascertaining if there was in fact regional variation in the putative species and if the variation conformed to species or subspecies level divergence.

Specimens were scrutinized opportunistically at State Museums and more importantly live specimens and photos were observed and archived into a database that ultimately included over 200 individual specimens from almost the entire range of the putative species.

In conjunction with the above, relevant literature was scrutinized to see if there were previously named forms that may potentially conform to any unnamed variants.

There was nothing in the literature flagging potential species or subspecies within putative *T. occipitalis*, other than the type form, believed to occur throughout the known range, but major texts were consulted in any event.

Key publications relevant to the taxonomic and nomenclatural conclusions herein were the following:

Bush (1981), Cogger (2014), Cogger *et al.* (1983), Glauert (1960), Gray (1838), Günther (1872), Hoser (1989, 2007, 2009a, 2009b, 2016, 2022), Lütken (1863), Peters (1863), Storr (1963, 1968), Swan *et al.* (2022), Wilson and Swan (2017), Wells and Wellington (1984, 1985) and sources cited therein, although ultimately, the final taxonomic decision relevant to this paper was based solely on comparative inspection of live specimens from across the known range of putative *T. occipitalis*.

RESULTS

Two main population groups within putative *T. occipitalis* were identified.

These were the type form from 4.5 km west of Gawler, South Australia (just north of Adelaide), being found throughout most of the range of the species. This type form included *Cyclodius fasciatus* Lütken, 1863, holotype at the Universitetets Zoologiske Museum, Copenhagen, Denmark, specimen number UZM R47563 self-evidently collected from the same general area within eastern South Australia or just across the State Border.

That was correctly synonymised by Cogger *et al.* (1983).

A second quite distinctive form was identified from south-west Australia.

It occurs in the region bounded by Kalbarri in the north, along the coastal strip south through Perth and South-west, Western Australia, including across the Nullarbor to Yalata in South Australia.

It is most easily separated from the nominate form in that it has four dark black bands on the tail and three wide dark bands on the mid-body, versus three dark black bands on the tail and two wide dark bands on the mid-body.

This distribution does broadly correspond to species level distributions in other reptile species pairs, including:

- 1/ *Nephrurus stellatus* Storr, 1968, west of the Nullarbor and *Nephrurus coreyrentoni* Hoser, 2016 east of it.
- 2/ *Pseudonaja affinis* Günther, 1872 west of the Nullarbor and *Pseudonaja charlespiersoni* (Hoser, 2012) east of it.
- 3/ *Acritoscincus trilineatus* (Gray, 1838) west of the Nullarbor and *Acritoscincus davidmerceicai* Hoser, 2022 east of it.

In the case of the three preceding pairs, there is molecular evidence cited in the later descriptions that validated the species-level designations.

In the case of the south-western population of putative *T. occipitalis*, besides the absence of molecular evidence of divergence (one way or other), there is a distributional issue as well. The divergent population appears to extend east across the southern edge of the Nullarbor Plain, the biogeographical barrier for the other species pairs. Also putative *T. occipitalis* appears to extend across Western Australia to the north of where the south-western form occurs, in effect encircling it to the north.

Because of this absence of molecular data and the somewhat

unusual distribution of the two forms, the hitherto unnamed form is herein described in accordance with the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999) as a new subspecies *Tiliqua occipitalis bulliardi* subsp. nov..

INFORMATION RELEVANT TO THE FORMAL DESCRIPTION THAT FOLLOWS

There is no conflict of interest in terms of this paper or the conclusions arrived at herein.

Several people including anonymous peer reviewers who revised the manuscript prior to publication are also thanked as a relevant staff at museums who made specimens and records available in line with international obligations.

In terms of the following formal description, spelling should not be altered in any way for any purpose unless expressly and exclusively called for by the rules governing Zoological Nomenclature as administered by the International Commission of Zoological Nomenclature.

Material downloaded from the internet and cited anywhere in this paper was downloaded and checked most recently as of 15 January 2023, unless otherwise stated and were accurate in terms of the context cited herein as of that date.

Unless otherwise stated explicitly, colour descriptions apply to living adult specimens of generally good health and not under any form of stress by means such as excessive cool, heat, dehydration or abnormal skin reaction to chemical or other input.

While numerous texts and references were consulted prior to publication of this paper, the criteria used to separate the relevant species has already been spelt out and/or is done so within each formal description and does not rely on material within publications not explicitly cited herein.

Delays in recognition of this subspecies could jeopardise the long-term survival of this taxon as outlined by Hoser (2019a, 2019b) and sources cited therein.

Therefore attempts by taxonomic vandals like the Wolfgang Wüster gang via Kaiser (2012a, 2012b, 2013, 2014a, 2014b) and Kaiser *et al.* (2013) (as frequently amended) to unlawfully suppress the recognition of this taxon on the basis they have a personal dislike for the person who formally named it should be resisted (Dubois *et al.* 2019).

Claims by the Wüster gang against this paper and the descriptions herein will no doubt be no different to those the gang have made previously, all of which were discredited long ago as outlined by Dubois *et al.* (2019), Hoser, (2007, 2009a, 2012a, 2012b, 2013, 2015a-f, 2019a, 2019b), ICZN (1991, 2001, 2012, 2021) and sources cited therein.

TILIQUA OCCIPITALIS BULLIARDI SUBSP. NOV.

LSIDurn:lsid:zoobank.org:act:5DD7FD02-FA52-436A-998F-B90F7DD797F9

Holotype: A preserved specimen at the Western Australian Museum, Perth, Western Australia, specimen number R42529, collected 1 mile west of Frenchman Peak, Cape Le Grand National Park, Western Australia, Australia, Latitude -33.966667 S., Longitude 122.15 E.

This government-owned facility allows access to its holdings.

Paratype: A preserved specimen at the South Australian Museum, Adelaide, South Australia, specimen number R22942, collected from Pink Lake, Esperance, Western Australia, Australia, Latitude -33.85 S., Longitude 121.83 E.

Diagnosis: *Tiliqua occipitalis bulliardi* subsp. nov. is readily separated from nominate *Tiliqua occipitalis* (Peters, 1863) by having four dark black bands on the tail and three (sometimes four) wide dark bands on the mid-body, versus three dark black bands on the tail and two wide dark bands on the mid-body in the nominate form.

Nominate *Tiliqua occipitalis* (Peters, 1863) in life is depicted in Hoser (1989) on page 11 (top), Swan *et al.* (2022) on page 217 at top.

Tiliqua occipitalis bulliardi subsp. nov. in life is depicted in Storr, Smith and Johnstone (1981) in plate 20 (bottom left), Bush

(1981), page 24 in Fig. 32 and Wilson and Swan (2017) on page 401, bottom.

The diagnosis of Glauert (1960) for *T. occipitalis* is in fact of this subspecies, *T. occipitalis bulliardii* subsp. nov..

It read as follows:

"This larger member of the genus, which may attain a length of 18 in., is the most strongly marked species owing to the sharp contrast between the pale brown body colour and the bone brown crossbands on the body and tail. There are 38 to 42 rows of scales round the middle of the body, all smooth and shining. Behind the parietals there are 3 or 4 series of enlarged scales, some of them much longer than wide, to which the lizard probably owes its specific name. The scales on the nape by contrast are much reduced in size and markedly wider than long. In due course these are succeeded by larger transverse scales slightly obliquely placed and increasing in size somewhat towards and on the tail. The limbs are short, not meeting when adpressed; the fore limb is as long as the head and about 3 times in the distance between the axilla and the groin. The tail is short, tapering and pointed, much shorter than the head and body, with four dark cross bands and a dark tip. A dark stripe along the side of the head, from the eye to over the ear, is very pronounced on all specimens examined."

Cogger (2014) at page 689 provides a composite diagnosis of both subspecies. On the same page at the bottom, he has a colour image of the nominate form of *Tiliqua occipitalis* (Peters, 1863).

There are large numbers of images of both subspecies online in photo sharing websites such as www.flickr.com and www.inaturalist.org. They can be found under the relevant search terms, such as "Western Bluetongue" or "Tiliqua occipitalis".

There is a strong likelihood that DNA analysis will necessitate the elevation of this taxon, *T. occipitalis bulliardii* subsp. nov. to full species status.

Distribution: *Tiliqua occipitalis bulliardii* subsp. nov. occurs in the region bounded by Kalbarri in the north, along the coastal strip south through Perth and South-west, Western Australia, including across the Nullarbor to Yalata in South Australia. It appears to be bounded in the north and east by nominate *Tiliqua occipitalis* (Peters, 1863), which is otherwise found in arid and semi-arid parts of Australia from western Australia in the west, east to western New South Wales and nearby north-west Victoria.

Etymology: *Tiliqua occipitalis bulliardii* subsp. nov. is named in honour of Kaj-erik Bulliard of Esperance, Western Australia, previously of Perth, Western Australia, and before that, of Sydney, NSW, Australia in recognition of a contribution to herpetology in Australia spanning some decades.

CONSERVATION THREATS TO *T. OCCIPITALIS BULLIARDII* SUBSP. NOV.

There are no known significant immediate conservation threats to this subspecies, although the best part of the habitat for this taxon has been effectively erased by the creation of endless expanses of wheat-growing monoculture.

As already mentioned, if the Australian government persists with its "Big Australia Policy", (see for example Saunders 2019 or Zaczek 2019), that being a long-term aim to increase the human population in Australia to over 100 million people by year 2150 (from the present 26 million as of 2022/3), all sorts of unforeseen threats to the survival of this lizard taxon may emerge.

Due to unforeseen potential threats I recommend further research on the relevant subspecies and including means to identify likely threats.

These may include direct human activities (e.g. land clearing for homes or farming activities), as well as potential threats caused by changed vegetation regimes, introduced pests and potential pathogens, including those introduced via the legal importation of foreign reptiles and amphibians by government-owned zoos and other government backed commercial enterprises.

Denial of the existence of the relevant taxon *sensu* Wüster et

al. as outlined by Hoser (2019a, 2019b), could ultimately cause extinction of this taxon in the same way it caused one or more earlier extinctions as documented by Hoser (2019a, 2019b).

REFERENCES CITED

- Bush, B. 1981. *Reptiles of the Kalgoorlie-Esperance Region*. Brian Bush, Perth, Western Australia:46 pp.
- Cogger, H. G. 2014. *Reptiles and Amphibians of Australia* (Seventh Edition). CSIRO Publishing, Collingwood, Victoria, Australia:1033 pp.
- Cogger, H. G., Cameron, E. E. and Cogger, H. M. 1983. *Zoological Catalogue of Australia (1) Amphibia and Reptilia*, Australian Government Publishing Service, Canberra, ACT, Australia:319 pp.
- Dubois, A., Bauer, A. M., Ceriaco, L. M. P., Dusoulier, F., Fretey, T., Lobl, I., Lorvelec, O., Ohler, A., Stopiglia, R. and Aesch, E. 2019. The Linz Zoo code project: a set of new proposals regarding the terminology, the Principles and Rules of zoological nomenclature. First report of activities (2014-2019). *Bionomina* (online), 17:1-111.
- Glauert, L. 1960. Herpetological miscellanea. XII. The family Scincidae in Western Australia. Pt. 1. The genera *Tiliqua*, *Trachysaurus* and *Egernia*. *Western Australian Naturalist* 7(3):67-77.
- Gray, J. E. 1838. Catalogue of the slender-tongued saurians, with descriptions of many new genera and species. Part 1. *Ann. Mag. Nat. Hist.* (1)1:274-283.
- Günther, A. 1872. Seventh account of new species of snakes in the collection of the British Museum. *Ann. Mag. Nat. Hist.* (4)9:13-37.
- Hoser, R. T. 1989. *Australian Reptiles and Frogs*. Pierson and Co., Sydney, NSW, Australia:238 pp.
- Hoser, R. T. 2007. Wells and Wellington - It's time to bury the hatchet. *Calodema* Supplementary Paper 1:1-9.
- Hoser, R. T. 2009a. Creationism and contrived science: A review of recent python systematics papers and the resolution of issues of taxonomy and nomenclature. *Australasian Journal of Herpetology* 2:1-34. (3 February).
- Hoser, R. 2009b. Eight new taxa in the genera *Pseudonaja* Gunther 1858, *Oxyuranus* Kinghorn 1923, and *Panacedechis* Wells and Wellington 1985 (Serpentes:Elapidae). *Australasian Journal of Herpetology* 4:1-27.
- Hoser, R. T. 2012a. Exposing a fraud! *Afronaja* Wallach, Wüster and Broadley 2009, is a junior synonym of *Spracklandus* Hoser 2009! *Australasian Journal of Herpetology* 9 (3 April 2012):1-64.
- Hoser, R. T. 2012b. Robust taxonomy and nomenclature based on good science escapes harsh fact-based criticism, but remains unable to escape an attack of lies and deception. *Australasian Journal of Herpetology* 14:37-64.
- Hoser, R. T. 2013. The science of herpetology is built on evidence, ethics, quality publications and strict compliance with the rules of nomenclature. *Australasian Journal of Herpetology* 18:2-79.
- Hoser, R. T. 2015a. Dealing with the "truth haters" ... a summary! Introduction to Issues 25 and 26 of *Australasian Journal of Herpetology*. Including "A timeline of relevant key publishing and other events relevant to Wolfgang Wüster and his gang of thieves." and a "Synonyms list". *Australasian Journal of Herpetology* 25:3-13.
- Hoser, R. T. 2015b. The Wüster gang and their proposed "Taxon Filter": How they are knowingly publishing false information, recklessly engaging in taxonomic vandalism and directly attacking the rules and stability of zoological nomenclature. *Australasian Journal of Herpetology* 25:14-38.
- Hoser, R. T. 2015c. Best Practices in herpetology: Hinrich Kaiser's claims are unsubstantiated. *Australasian Journal of Herpetology* 25:39-64.
- Hoser, R. T. 2015d. PRINO (Peer reviewed in name only) journals: When quality control in scientific publications fails.

Australasian Journal of Herpetology 26:3-64.

Hoser, R. T. 2015e. Rhodin *et al.* 2015, Yet more lies, misrepresentations and falsehoods by a band of thieves intent on stealing credit for the scientific works of others. *Australasian Journal of Herpetology* 27:3-36.

Hoser, R. T. 2015f. Comments on *Spracklandus* Hoser, 2009 (Reptilia, Serpentes, ELAPIDAE): request for confirmation of the availability of the generic name and for the nomenclatural validation of the journal in which it was published (Case 3601; see *BZN* 70: 234-237; comments *BZN* 71:30-38, 133-135). *Australasian Journal of Herpetology* 27:37-54.

Hoser, R. T. 2016. Carphodactylidae reviewed: Four new genera, four new subgenera, nine new species and four new subspecies within the Australian gecko family (Squamata: Sauria). *Australasian Journal of Herpetology* 32:3-25.

Hoser, R. T. 2019a. 11 new species, 4 new subspecies and a subgenus of Australian Dragon Lizard in the genus *Tympanocryptis* Peters, 1863, with a warning on the conservation status and long-term survival prospects of some newly named taxa. *Australasian Journal of Herpetology* 39:23-52.

Hoser, R. T. 2019b. Richard Shine *et al.* (1987), Hinrich Kaiser *et al.* (2013), Jane Melville *et al.* (2018 and 2019): Australian Agamids and how rule breakers, liars, thieves, taxonomic vandals and law breaking copyright infringers are causing reptile species to become extinct. *Australasian Journal of Herpetology* 39:53-63.

Hoser, R. T. 2022. A revision of the taxonomy of the Australian skinks in the genus *Acritoscincus* Wells and Wellington, 1985 (AKA *Bassiana* Hutchinson *et al.* 1990), resulting in the formal division into three subgenera and the recognition and descriptions of new species. *Australasian Journal of Herpetology* 56:22-43.

International Commission of Zoological Nomenclature (ICZN) 1991. Decision of the commission. Three works by Richard W. Wells and C. Ross Wellington: proposed suppression for nomenclatural purposes. *Bulletin of Zoological Nomenclature* 48(4):337-338.

International Commission of Zoological Nomenclature (ICZN) 2001. Opinion 1970. *Bulletin of Zoological Nomenclature* 58(1):74, (30 March 2001).

International Commission of Zoological Nomenclature (ICZN) 2012. Amendment of Articles 8, 9, 10, 21 and 78 of the *International Code of Zoological Nomenclature* to expand and refine methods of publication. *Zootaxa* (PRINO) (Online) 3450:1-7.

International Commission of Zoological Nomenclature (ICZN) 2021. Opinion 2468 (Case 3601) - *Spracklandus* Hoser, 2009 (Reptilia, Serpentes, Elapidae) and *Australasian Journal of Herpetology* issues 1-24: confirmation of availability declined; Appendix A (Code of Ethics): not adopted as a formal criterion for ruling on Cases. *Bulletin of Zoological Nomenclature* 78 (30 April 2021):42-45.

Kaiser, H. 2012a. SPAM email sent out to numerous recipients on 5 June 2012.

Kaiser, H. 2012b. Point of view. Hate article sent as attachment with SPAM email sent out on 5 June 2012.

Kaiser, H. 2013. The Taxon Filter, a novel mechanism designed to facilitate the relationship between taxonomy and nomenclature, vis-à-vis the utility of the Code's Article 81 (the Commission's plenary power). *Bulletin of Zoological Nomenclature* 70(4) December 2013:293-302.

Kaiser, H. 2014a. Comments on *Spracklandus* Hoser, 2009 (Reptilia, Serpentes, ELAPIDAE): request for confirmation of the availability of the generic name and for the nomenclatural validation of the journal in which it was published. *Bulletin of Zoological Nomenclature*, 71(1):30-35.

Kaiser, H. 2014b. Best Practices in Herpetological Taxonomy: Errata and Addenda. *Herpetological Review*, 45(2):257-268.

Kaiser, H., Crother, B. L., Kelly, C. M. R., Luiselli, L., O'Shea, M., Ota, H., Passos, P., Schleip, W. D. and Wüster, W. 2013. Best practices: In the 21st Century, Taxonomic Decisions in Herpetology are Acceptable Only When supported by a body of Evidence and Published via Peer-Review. *Herpetological Review* 44(1):8-23.

Karp, P. 2023. Australia on track for 2023 migration boom as arrivals dwarf Treasury forecasts, ex-official says, *The Guardian, Australia*, 13 January 2023, posted online at: <https://www.theguardian.com/australia-news/2023/jan/13/australia-on-track-for-2023-migration-boom-as-arrivals-dwarf-treasury-forecasts-ex-official-says>

Lütken, C. 1863. Nogle nye krybdyr og padder. *Videnskabelige Meddelelser fra den Naturhistoriske Forening i Kjøbenhavn* (20-22): 292-311.

Mitchell, F. J. 1948. A revision of the lacertilian genus *Tympanocryptis*. *Records of the South Australian Museum* 9:57-86.

Peters, W. C. H. 1863. Eine Übersicht der von Hr. Richard Schomburgk an das zoologische Museum eingesandten Amphibien, aus Buchsfelde bei Adelaide in Südaustralien. *Monatsberichte der Königlichen Preussische Akademie des Wissenschaften zu Berlin* 1863 (April):228-236.

Ride, W. D. L. (ed.) *et al.* (on behalf of the International Commission on Zoological Nomenclature) 1999. *International code of Zoological Nomenclature*. The Natural History Museum - Cromwell Road, London SW7 5BD, UK (also commonly cited as "The Rules", "Zoological Rules" or "ICZN 1999").

Saunders, S. 2019. Morrison and Shorten's Big Australia: The overpopulation problem. News article published 17 April 2019 and downloaded from

<https://independentaustralia.net/politics/politics-display/morrison-and-shortens-big-australia-the-overpopulation-problem,12584>

Storr, G. M. 1963. The gekkonid genus *Nephruroides* in Western Australia, including a new species and three new subspecies. *Journal of the Royal Society of Western Australia*, 46:85-90.

Storr, G. M. 1968. *Nephruroides stellatus*, A new knob-tailed gecko from southern Australia. *West. Australian Naturalist* 10:180-182.

Storr, G. M., Smith, L. A. and Johnstone, R. E. 1981. Lizards of Western Australia. 1. Skinks. University of Western Australia Press, with the Western Australian Museum, Perth, Western Australia, Australia:200 pp.

Swan, G., Sadler, R. and Shea, G. 2022. *A field guide to Reptiles of New South Wales*. Reed New Holland Publishers, Wahroonga, NSW, Australia:336 pp.

Wells, R. W. and Wellington, C. R. 1984. A synopsis of the class Reptilia in Australia. *Australian Journal of Herpetology*, 1(3-4):73-129.

Wells, R. W. and Wellington, C. R. 1985. A classification of the Amphibia and Reptilia of Australia. *Australian Journal of Herpetology, Supplementary Series*, (1):1-61.

Wilson, S. and Swan, G. 2017. *A complete guide to Reptiles of Australia*. Reed New Holland Publishers, Chatswood, NSW, Australia:647 pp.

Zaczek, Z. 2019. Former PM Kevin Rudd says Australia should drastically increase its population to 50 MILLION to make sure nation can defend itself in the face of threats from China. *Daily Mail* (Australia) (27 November), published online at: <https://www.dailymail.co.uk/news/article-7729689/Kevin-Rudd-says-Australia-increase-population-50-MILLION-defend-China.html>

CONFLICTS OF INTEREST - NONE

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Four new species of *Crinia* Tschudi, 1838, subgenus *Ranidella* Girard, 1853 from south-east, Australia.

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ABSTRACT

Following on from extensive herpetological fieldwork across south-east Australia over many decades, putative *Crinia signifera* Girard, 1853 from parts of south-east Australia were seen to be morphologically divergent from other populations of the same putative species.

This has also been confirmed by the genetic evidence of Symula *et al.* (2008) and Williams (2015) showing divergences of populations in the millions of years.

Names are available for three obviously divergent species in the complex, being the type form of *C. signifera* from most parts of eastern New South Wales, *C. varius* (Peters, 1863) from South Australia in the general region of Adelaide and *C. englishi* (Parker, 1940) from Tasmania, while four other obvious species, with divergences estimated at more than 5 MYA from their nearest relatives remain unnamed.

This paper relies on morphological and molecular evidence to formally name the four new species in the putative *C. signifera* complex.

These are *C. roypailsei* *sp. nov.* from north-east Victoria, being (an estimated) more than 8 MYA divergent from its nearest relative, *C. aagh* *sp. nov.* from south-west Victoria, being more than 5 MYA divergent from its nearest relative, *C. lynnepailsei* *sp. nov.* known from the area between Wagga Wagga and Albury in New South Wales and *C. fiacummingae* *sp. nov.* from Melbourne, nearby areas to the north and west to Hamilton in Victoria. Two divergent subspecies are also formally named for the first time.

All relevant taxa are clearly at risk of extinction or dilution from putative *C. signifera* translocated from other parts of Victoria, South Australia, New South Wales or Tasmania in the course of routine activity by humans and research into this risk should be funded as a matter of urgency.

Keywords: Taxonomy; Amphibia; nomenclature; Frog; Australia; Victoria; Bairnsdale; Cann River; *Crinia*; *Ranidella*; *signifera*; *englishi*; *varius*; *halmaturina*; new species; *roypailsei*; *aagh*; *lynnepailsae*; *fiacummingae*; new subspecies; *aberrans*; *kroombitensis*.

INTRODUCTION

In recent years, as a result of an audit of most of Australia's frogs, I, Raymond Hoser published descriptions of dozens of new frog genera and species, including in the papers of Hoser (2016, 2019a, 2020a-f).

These papers effectively audited all Australasian frogs except for the microhylids; that group being subject of an ongoing audit.

A very small number of candidate species were not formally named at the time the preceding papers were published, pending inspection of further specimens.

One of these taxa was putative *Crinia signifera* Girard, 1853.

Initially, I was most interested in those from north-east Victoria in the region between Bairnsdale in the south-west and Cann River in the East which had previously been seen to be morphologically divergent from other populations of the same

putative species.

I was fortunate enough to be able to examine further specimens on 20 January 2022 and again on 5 November 2022, both dates coinciding with Snakebusters Hands on Reptiles displays conducted in the relevant areas on the same days, which I did.

Combined with a review of the relevant literature, including for example Cogger *et al.* (1983), Hoser (2020f) and sources cited therein as well as Symula *et al.* (2008) and Williams (2015), I was able to confirm the following three important facts.

1/ The population was sufficiently genetically divergent from all other putative *C. signifera* to warrant recognition as a full species.

2/ There were no available synonym names for the relevant population of frogs.

3/ I was able to consistently separate the relevant frogs from

other putative *C. signifera* on the basis of morphological divergence.

On the basis of the preceding, I have decided to formally name this taxon as a new species, *Crinia (Ranidella) roypailsei* sp. nov. being more than 8 MYA divergent from its nearest relative as the critically important first step for the long-term conservation of this until now overlooked taxon.

In the course of examination of specimens from other parts of Victoria and nearby parts of New South Wales and South Australia, including northern New South Wales, and also Tasmania, in effect encompassing specimens from virtually the entire known range of the putative species, I found that there were regional variations between other populations of putative *C. signifera* also warranting species level recognition.

These were inspected in detail to ascertain whether or not any warranted naming as species or subspecies and in the final analysis I found that three more of these did.

One is formally named as *C. signifera aagh* and occurs in far south-west Victoria and nearby south-east South Australia, but not including the Adelaide Hills area or Kangaroo Island, those populations being assigned to the subspecies *C. signifera varius* Peters, 1863.

C. lynnepailsei sp. nov. is known from the area between Wagga Wagga and Albury in New South Wales and *C. fiacummingae* sp. nov. is from Melbourne, Victoria, nearby areas to the north and west, extending to Hamilton, in western Victoria. The latter three newly named species and the other two named species resurrected from synonymy (*C. varius* and *C. englishi*) all diverged from their next nearest relatives more than 5 MYA based on the findings of Symula *et al.* (2008).

MATERIALS AND METHODS

Live specimens of putative *C. signifera* from all parts of their range (wetter parts of NSW, Victoria, South Australia and Tasmania) were inspected, with an initial focus on differences between the relevant populations and the specimens from the area between Bairnsdale in the west and Cann River in the east, both places being in coastal east Victoria.

Photos of specimens with good location data from all parts of the range of putative *C. signifera* were also inspected and reviewed. A review of relevant literature was undertaken, to confirm prior genetic studies implying the said population (between Bairnsdale in the west and Cann River in the east) was in fact a different and divergent allopatric population and species.

This review included to check synonyms lists and recent literature to confirm that the relevant population had been given taxonomic recognition of any form, in which case the available name could be used.

Literature relevant to the nomenclatural and taxonomic decisions that formed the basis of this paper, the formal recognition of the species of *Crinia* from between Bairnsdale in the west and Cann River in the east (being for the first time ever) included, Anstis (2013), Barker *et al.* (1995), Clulow and Swan (2018), Clyne (1969), Cogger (2014), Cogger *et al.* (1983), Condon (1941), Dubois *et al.* (2019), Eipper and Rowland (2018), Girard (1853), Hero *et al.* (1991), Hoser, (1989, 2016, 2019a, 2020a-f), ICZN (2012), Lütken (1864), Parker (1940), Peters (1863), Pyron and Weins (2021), Ride *et al.* (1999), Roberts and Maxon (1986), Schäuble *et al.* (2000), Schäuble and Moritz (2001), Steindachner (1867), Symula *et al.* (2008), Tschudi (1838), Vanderduys (2012), Wells and Wellington (1985), Williams (2015) and sources cited therein.

The review also included subspecies-level classification in terms of regional populations and checking whether synonym names could be applied to any given populations.

RESULTS

That the relevant population of *C. signifera* from north-east Victoria (north-east of Wilson's Promontory and including Bairnsdale, north-east to roughly the NSW/Victorian border) warranted species-level recognition was obvious.

What was uncertain was what factor or factors caused the relevant population to separate from other putative *C. signifera* populations and to remain so for so long.

It is however noted that north-east Victoria is a zone of endemism in frogs and that the new species named within this paper is not the only one apparently confined to this region.

See for example *Philocryphus hoserae* Hoser, 2019 (Hoser, 2019a) or *Mixophyes (Quasimixophyes) hoserae jackyae* Hoser, 2020 (Hoser 2020f), as defined in the relevant formal descriptions, with both the preceding species-level taxa confirmed as morphologically and genetically divergent from other nearest related populations further north.

See also Hoser (2020e) in relation to another frog taxon and in terms of reptiles in Victoria and the divergences between similar species, see Hoser (2022a, 2022c) and sources cited therein.

Note that in terms of *Philocryphus hoserae* Hoser, 2019, the same species was unlawfully given a junior synonym name of *Heleioporus australiacus flavopunctatus* in 2021 by Mahony *et al.* (2021) who merely bootlegged the earlier Hoser material (and without proper attribution).

This act of egregious taxonomic vandalism was in breach of the *International Code of Zoological Nomenclature*, Article 23, Principle of Priority (Ride *et al.* 1999).

They did this invoking the so called "Kaiser *et al.* (2013)" edict allowing ICZN scientific names to be overwritten at whim, especially if the publishing author is not a member of your own "cohort". It is not ICZN supported or allowed (ICZN 2021) and is illegal under copyright laws including for example by being in breach of the Australian Copyright Act 1968, Moral Rights Provisions, the relevant parts being within Sections 36, 115, 189-190, 193-195, in particular Sections 195AI (2) and 195AJ (a-b) and 195AQ(2)).

The ICZN made a scathing ruling against Kaiser *et al.* (2013) and their later incarnation of that manifesto, known as "Rhodin *et al.* 2015" in 2021 (ICZN 2021).

Hence the name *Heleioporus australiacus flavopunctatus* in 2021 should not be used for the relevant taxon in any way, shape or form, other than as being listed as a junior synonym of either *Philocryphus hoserae* Hoser, 2019 or within the genus *Heleioporus* Gray, 1841 as a synonym of *Heleioporus hoserae*.

In terms of habitats and habits of the relevant newly named species, *Crinia roypailsei* sp. nov., they are best described as being "as for the genus" in that they breed in semi-permanent and permanent water, with a preference for dams and soaks near billabongs, roadsides and the like.

Interestingly, this habitat choice probably means their numbers have sharply increased in the last 200 years in line with the European settlement of Australia.

It may also mean that populations of this species and putative *C. signifera* may expand and merge, with specimens either competing or hybridising at some stage in the future, if not already.

In terms of other populations of putative *C. signifera* from across the known range of the species, there were several main morphological groupings, for which three or four previously coined names were available.

Firstly was the population from New South Wales generally, being found in all the coast, nearby highlands and slopes, including the ACT, but excluding the south-western slopes and plains near Wagga Wagga, and nearby north Victoria. The name *C. signifera* is available for these frogs at both species and subspecies-level.

Specimens from north of Coffs Harbour were sufficiently divergent both morphologically and by divergence (estimated at over 3 MYA) to be treated as a subspecies and so are formally named for this first time in this paper as *C. signifera aberrans* subsp. nov.

That taxon is believed to extend along the south Queensland coast and hinterland to about Bundaberg in the North.

The isolated population from Kroombit Tops, being about 150 km in a straight line north-west of Bundaberg, in Queensland is morphologically and geographically divergent and so is also herein formally named as a new subspecies, *C. signifera kroombitensis* subsp. nov..

Another main group is from the Adelaide Hills, nearby areas and Kangaroo Island, for which the name *Crinia varius* (Peters, 1863), type locality from Loos, 4.5 km west of Gawler, South Australia is available.

Crinia halmaturina (Condon, 1941), type locality of Kangaroo Island is a junior synonym of *C. varius*, although with a divergence of about 4 MYA from the mainland animals according to Symula *et al.* (2008), Kangaroo Island specimens are worthy of subspecies-level recognition and are treated as such herein. There are thus properly known as *Crinia varius halmaturina* (Condon, 1941).

Another group, closely related to and morphologically similar to the preceding group are those from Tasmania, for which the name *Crinia englishi* (Parker, 1840), (syntypes from northern Tasmania) is available. This taxon appeared to have diverged from the other species about 5 MYA according to Symula *et al.* (2008).

Another group, divergent from those groups listed immediately above, and more so from the type subspecies of *C. signifera* is found in far south-west Victoria and nearby south-east South Australia and has no available name, so is formally named for the first time as *C. aagh* sp. nov..

Specimens from the region between Wagga Wagga and Albury and including other parts of the Murray catchment in northern Victoria further west are morphologically similar to *C. aagh* sp. nov. but sufficiently divergent (over 5 MYA according to Symula *et al.* 2008) to warrant being treated as a separate species and so are formally named as *C. lynnepailsae* sp. nov..

Specimens from Melbourne and nearby areas to the north, at least as far north as Seymour and extending across through Ballarat and Hamilton in the west are formally described as a new species *Crinia fiacummingae* sp. nov..

In case it has been overlooked, all the newly named species were found by Symula *et al.* (2008) to have diverged from one another (next nearest relatives) at least 5 MYA.

The preceding taxonomy also conforms to the more recent molecular results of Williams (2015).

I note in passing that Symula *et al.* (2008) wrote in their summing up:

“High levels of genetic divergence were recovered among samples of *C. signifera* (Table 3). Several pairwise comparisons in this 16S rRNA dataset are above 5%, suggesting three cryptic species might be recognized. However, studies of reproductive isolation suggest that *C. signifera* represents

a single species. Experimental crosses have been performed among populations from clades B and C (Moore, 1954; Straughan and Main, 1966; Main, 1968). All crosses resulted in normal development and therefore suggest no post-zygotic isolation exists among them.” This argument against splitting the putative taxon *C. signifera* is ridiculous in the extreme.

If that were the case, species as divergent as the Queensland Black Headed Python *Aspidites melanocephalus* (Krefft, 1864) and the coastal Queensland Carpet Python *Morelia macdowelli* Wells and Wellington, 1984, (Brisbane form) would be treated as one and the same on the basis that in a captive situation they cross breed with healthy young and no obvious “post-zygotic isolation” (as detailed in summary form by Hoser (2022b)).

Same applies with other cross genus breedings of pythons as detailed by Hoser (1989). Two divergent subspecies are also formally named herein.

INFORMATION RELEVANT TO THE FORMAL DESCRIPTIONS THAT FOLLOWS

There is no conflict of interest in terms of this paper or the conclusions arrived at herein.

Several people including anonymous peer reviewers who revised the manuscript prior to publication are also thanked as a relevant staff at museums who made specimens and records available in line with international obligations.

In terms of the following formal descriptions, spelling should not be altered in any way for any purpose unless expressly and exclusively called for by the rules governing Zoological Nomenclature, being the *International Code of Zoological Nomenclature* as administered by the International Commission on Zoological Nomenclature.

The spelling of the species as *Crinia roypailsei* sp. nov. is intentional, as Roy Pails, the person whom this species is named in honour of, is often referred to as “Pailse”.

In terms of the subspecies *C. aagh* sp. nov. the spelling is also intentional and should not be changed.

Same applies for the other names formally proposed herein.

Material downloaded from the internet and cited anywhere in this paper was downloaded and checked most recently as of 6 December 2022, unless otherwise stated and were accurate in terms of the context cited herein as of that date.

Unless otherwise stated explicitly, colour descriptions apply to living adult specimens of generally good health and not under any form of stress by means such as excessive cool, heat, dehydration or abnormal skin reaction to chemical or other input.

While numerous texts and references were consulted prior to publication of this paper, the criteria used to separate the relevant species has already been spelt out and/or is done so within each formal description and does not rely on material within publications not explicitly cited herein.

Each newly named species is readily and consistently separable from their nearest congener and that which until now it has been previously treated as.

Delays in recognition of these species and subspecies could jeopardise the long-term survival of these taxa as outlined by Hoser (2019a, 2019b) and sources cited therein.

This is especially with respect of these newly named taxa as they are at risk of hybridisation with translocated individuals of putative *C. signifera* from elsewhere, which regularly get transported by people in pot plants and the like, overlooked due to their tiny size and cryptic colours.

Therefore attempts by taxonomic vandals like the Wolfgang Wüster gang via Kaiser (2012a, 2012b, 2013, 2014a, 2014b) and Kaiser *et al.* (2013) (as frequently amended) to unlawfully suppress the recognition of these taxa on the basis they have a personal dislike for the person who formally named it should be resisted (Dubois *et al.* 2019).

Claims by the Wüster gang against this paper and the descriptions herein will no doubt be no different to those the gang have made previously, all of which were discredited long ago as outlined by Cogger (2014), Cotton (2014), Dubois *et al.* (2019), Hawkeswood (2021), Hoser, (2007, 2009, 2012a, 2012b, 2013a, 2015a-f, 2019a, 2019b), ICZN (1991, 2001, 2021), Wellington (2015) and sources cited therein.

CRINIA (RANIDELLA) ROYPAILSEI SP. NOV.

LSIDurn:lsid:zoobank.org:act:F6907726-8CF8-4999-BEC8-60FCE71655DB

Holotype: A preserved specimen at the National Museum of Victoria, Melbourne, Victoria, Australia, specimen number D68313 collected from 15 km east of Lakes Entrance, Victoria, Australia, Latitude -37.806 S., Longitude 148.056 E. This government-owned facility allows access to its holdings.

Paratypes: Six preserved specimens at the National Museum of Victoria, Melbourne, Victoria, Australia, specimen numbers D68314-D68317 with same collection data as the holotype and D51166- D51167 collected from 4 km south of Nowa Nowa on Rules Road, in Victoria, Australia, Latitude -37.77 S., Longitude 148.1 E.

Diagnosis: *Crinia roypailsei* sp. nov. is readily separated from all other putative *C. signifera* Girard, 1853 from Victoria (west

of east Gippsland) and those north of the Victorian/NSW border (being the most proximal populations) and other frogs referred to this species (*sensu* Anstis 2013 or Cogger 2014) by the following suite of characters:

Two well-defined and highly raised carbuncles or ridges running parallel down either side of the midline of the back. These are continuous and pronounced in adult females and broken in adult males.

These same ridges are either absent or reduced in comparison to this species in all other known putative *C. signifera* populations.

Crinia roypailsei sp. nov. invariably has some sort of well-defined dark bar or marking running from the eye down to the upper lip. This is wholly absent in *C. fiacummingae sp. nov.* from west Gippsland and further west in Victoria, where it appears as a reduced and faded triangle, slightly anterior to the eye and rarely meeting it. The same marking is usually absent in *C. signifera* from New South Wales, or if present, is either faded or reduced, often to spots or flecks.

Crinia roypailsei sp. nov. has few if any markings on the upper surfaces of the forelimbs, which is in line with west Victorian *C. fiacummingae sp. nov.* populations, but in contrast to NSW *C. signifera* populations which have significant blotches, bars or markings on the upper surfaces of the forelimbs.

Raised skin on the upper surfaces of *Crinia roypailsei sp. nov.* is mainly in the form of carbuncles, versus mainly tubercle-like in most others in the *C. signifera* complex (or more tubercle like than carbuncles in the others in the *C. signifera* complex).

The venter of adult female *Crinia roypailsei sp. nov.* is usually brownish yellow anteriorly, fading as one goes posterior, to become whitish before the hind limbs, the undersides of which are mainly pinkish-red. It is also granular in the form of large granules. Toes are generally lighter and sometimes orangeish red at the tips.

Crinia roypailsei sp. nov. is depicted in life online at: <https://www.flickr.com/photos/27026445@N06/31681631243/> and <https://www.inaturalist.org/observations/137493439> and <https://www.inaturalist.org/observations/10305308> and <https://www.inaturalist.org/observations/2442377> and

<https://www.inaturalist.org/observations/57196566>

C. signifera of the type form from New South Wales is depicted in Hoser (1989) on page 23, Anstis (2013) pages 576 (right) to 579 and Cogger 2014 on page 83, or online at: <https://www.inaturalist.org/observations/55013920>

All species within the *Crinia signifera* Girard, 1853 species group, including those formally named for the first time in this paper, and those otherwise resurrected from synonymy with that species in this paper, are separated from all other species in the genus *Crinia* Tschudi, 1838, by the following unique suite of characters:

Obviously granular belly in adults; adults have more-or-less dermal fringes on the toes; no pink or red on the hind side of the thighs; no median white line on the throat; throat of breeding male is dark with white pectoral spots; belly of female is boldly blotched with black and white; palm is tubercular; vomerine teeth absent (derived from Cogger, 2014).

Cogger (2014) on page 71, also provides a key that separates species of *Crinia* from other Myobatrachid frog species.

According to Symula *et al.* (2008) *Crinia roypailsei sp. nov.* diverged from its nearest relatives more than 8 MYA.

Distribution: To date *Crinia roypailsei sp. nov.* is only known from the region between Bairnsdale and Cann River, on and near the coast of eastern Victoria, Australia (a range encompassing not much more than 100 km in a straight line), but based on distribution records for putative *C. signifera*, specimens as far

south-west as Woodside, Victoria are probably best referred to the species *C. roypailsei sp. nov.* Morphologically, the specimens from Genoa/Mallacoota and the Victorian side of the NSW border are also most like *C. roypailsei sp. nov.* and are also referred to this species.

C. roypailsei sp. nov. is unlikely to occur much beyond this zone, with typical *C. signifera* found both just north of this area at Eden in New South Wales (about 20 km to the north) and in the suburbs of Melbourne's east (e.g. Lilydale) one finds *C. fiacummingae sp. nov.*

Etymology: The species *Crinia roypailsei sp. nov.* is named in honour of well-known Victorian herpetologist, Roy Pails, of Ballarat, Victoria, (aged 68 in 2023) in recognition of a lifetime's work with reptiles and threatened species of native mammals.

His creation of numerous fenced fauna reserves to breed threatened and endangered species of native mammals was hugely successful.

In 2021 he got a pile of favourable media publicity and accolades for his good conservation work.

The Victorian Wildlife department did not like this as it detracted from their own dysfunctional "Zoos Victoria" business trying to monopolize cash donations from members of the public and trading to capitalize on the public's adoration for saving wildlife. Therefore they decided to unilaterally cancel the license Pails operated under.

Pails joined a long line of other victims who's successful wildlife conservation business was shut down at gunpoint by the Victorian government, including people like Fritz Maaten and Andy Stephens (Monbulk Animal Kingdom) or Vicki Lowing (Crocs n Critters), improperly destroyed in a similar way.

CRINIA (RANIDELLA) AAGH SP. NOV.

LSIDDurn:lsid:zoobank.org:act:FFE8DEC0-E2FA-4779-B642-F005722400BF

Holotype: A preserved specimen at the National Museum of Victoria, Melbourne, Victoria, Australia, specimen number: D14714 collected from Kentbruck Heath, Johnstone Creek, on the Portland to Nelson Road, Victoria, Australia, Latitude -38.17 S., Longitude 141.42 E.

This government-owned facility allows access to its holdings.

Paratypes: Three preserved specimens at the National Museum of Victoria, Melbourne, Victoria, Australia, specimen numbers: D14715-D14717 collected from Kentbruck Heath, Johnstone Creek, on the Portland to Nelson Road, Victoria, Australia, Latitude -38.17 S., Longitude 141.42 E.

Diagnosis: The species *Crinia (Ranidella) aagh sp. nov.* is readily separated from all other species within the *C. (Ranidella) signifera* Girard, 1853 complex by the following unique suite of characters:

Adult females have a distinctive dark diamond shape on the head, slightly longer than wider, being more than one dark colour, surrounded by lighter beige pigment or at least a lighter outline. On the back on either side of the beige mid-dorsum and darker greyish-brown-etching are long carbuncles that turn into short ones and then tubercles as one moves in a posterior direction down the body. The flanks have a series of light brown, then dark brown then beige stripes from top to bottom, the lighter one merging with the lighter venter, which is mainly immaculate white and with limited dark markings on the belly, which are of the form of dark blackish tubercles, immediately surrounded in part with light brown.

The dark side stripe is somewhat irregular in outline as is the case in all members of the *C. signifera* complex excluding *C. roypailsei sp. nov.* in which it is mainly straight save for the narrow anterior part.

Adult males *C. aagh sp. nov.* have a well defined but irregular pattern of dark greyish-brown on a beige background, with flushes of orange or red, heavily marked forelimbs, banded hind limbs, a venter as for the females, but usually with more darker pigmentation and spots. There is a dark coloured, backward

facing triangle on the head with the base between the eyes. There is no diamond-shape as seen in the females. At the anterior of the eye is a brown triangle with the base starting at the upper lip. The body is covered with large but scattered tubercles, the only obvious carbuncles being small and on the dorsum of the body roughly above the axilla of the forelimbs. These are large and of similar size on the upper surfaces of the hind limbs, in contrast to being small in size on the upper surfaces of the hind limbs in females. There are tubercles on the upper surfaces of the large toes in males, but not in females. No other species in the *C. signifera* complex have the exact suites of characters as just described.

Crinia aagh sp. nov. is depicted in life online at:

<https://www.inaturalist.org/observations/104630719>

and

<https://www.inaturalist.org/observations/5069095>

and

<https://www.inaturalist.org/observations/94190389>

C. signifera of the type form from New South Wales is depicted in Hoser (1989) on page 23, Anstis (2013) pages 576 (right) to 579 and Cogger 2014 on page 83, or online at:

<https://www.inaturalist.org/observations/55013920>

All species within the *Crinia signifera* Girard, 1853 species group, including those formally named for the first time in this paper, and those otherwise resurrected from synonymy with that species in this paper, are separated from all other species in the genus *Crinia* Tschudi, 1838, by the following unique suite of characters:

Obviously granular belly in adults; adults have more-or-less dermal fringes on the toes; no pink or red on the hind side of the thighs; no median white line on the throat; throat of breeding male is dark with white pectoral spots; belly of female is boldly blotched with black and white; palm is tubercular; vomerine teeth absent (derived from Cogger, 2014).

Cogger (2014) on page 71, also provides a key that separates species of *Crinia* from other Myobatrachid frog species.

According to Symula *et al.* (2008) *Crinia aagh* sp. nov. diverged from its nearest relatives more than 5 MYA, the closest related species being *C. lynnepailsae* sp. nov..

Distribution: *C. aagh* sp. nov. is found in far south-west Victoria and nearby south-east South Australia. Specimens from the region between Wagga Wagga and Albury and including other parts of the Murray catchment in northern Victoria further west are morphologically similar to *C. aagh* sp. nov. and are of the species *C. lynnepailsae* sp. nov..

Etymology: The species name "*aagh*" reflects the sound many people exclaim when they see one of these frogs underneath material lifted up.

CRINIA (RANIDELLA) LYNNEPAILSÆ SP. NOV.

LSIDDurn:lsid:zoobank.org:act:E12F8A60-55AB-4A20-88D8-A0F25D41AE15

Holotype: A preserved specimen at the Australian Museum, Sydney, New South Wales, Australia, specimen number R.90455 collected from the Dora Dora State Forest, South east of Holbrook, New South Wales, Australia, Latitude -35.916 S., Longitude 147.416 E. This government-owned facility allows access to its holdings.

Paratypes: 1/ Six preserved specimens at the Australian Museum, Sydney, New South Wales, Australia, specimen numbers R.90456- R.90461 all collected from the Dora Dora State Forest, South east of Holbrook, New South Wales, Australia, Latitude -35.916 S., Longitude 147.416 E.

2/ Two preserved specimens at the National Museum of Victoria, Melbourne, Victoria, Australia, specimen number D26311 collected from 3.2 km west of Wagga Wagga, New South Wales, Australia, Latitude -35.12 S., Longitude 147.37 E and specimen number D21877 collected from Woomargama, New South Wales, Australia, Latitude -35.83 S., Longitude 147.25 E.

Diagnosis: The species *Crinia (Ranidealla) lynnepailsae* sp.

nov. is readily separated from all other species within the *C. (Ranidella) signifera* Girard, 1853 complex by the following unique suite of characters:

It is similar in most respects to *C. aagh* sp. nov., which it would otherwise be identified as, but differs from that species in the following attributes. In the female, the distinctive dark diamond on the head is broken so that the posterior part is a triangle with the base between the eyes and there is an anterior blotch of irregular shape in front of this. Between these is an area of yellow or beige.

The darker lines running down either side of the mid dorsum are etched on the outer edge with white or light yellow. In *C. signifera*, these lines are not etched dark or light on the outer edge.

On the back on either side of the mid-dorsum and elsewhere the skin is relatively smooth but similar to *C. aagh* sp. nov. in that there are the defined carbuncle ridges on either side of the mid-dorsal line (although this is slightly less pronounced in this species) with scattered small tubercles present on the upper surfaces of the body and limbs, but these are also scattered.

Adult males are quite different in that they have a generally indistinct dorsal pattern, being often greenish, greyish or brown in overall colour, rather than having the distinctive dark and light markings on the upper surfaces as seen in *C. aagh* sp. nov.. There are two rows of moderately large tubercles running down either side of the dorsum of the back, with smaller scattered tubercles on the rest of the body, in particular the upper flank and the boundary between flank and dorsum.

Above the axilla of the forelimb the tubercles are larger and blunted in shape, but not in the form of carbuncles. There are no tubercles on the upper surfaces of the toes.

There are no obvious flushes of orange or red on the dorsum or flanks, although a few specimens have a dull rust coloured hue on the border between flank and dorsum, this sometimes coinciding with a series of tubercles, a fold or low carbuncles.

In neither sex is there any obvious line running from the eye to the jawline.

C. lynnepailsae sp. nov. from far southern New South Wales is depicted in life online at:

<https://www.inaturalist.org/observations/136090160>

and

<https://www.inaturalist.org/observations/98176566>

and

<https://www.inaturalist.org/observations/93439993>

C. signifera of the type form from New South Wales is depicted in Hoser (1989) on page 23, Anstis (2013) pages 576 (right) to 579 and Cogger 2014 on page 83, or online at:

<https://www.inaturalist.org/observations/55013920>

All species within the *Crinia signifera* Girard, 1853 species group, including those formally named for the first time in this paper, and those otherwise resurrected from synonymy with that species in this paper, are separated from all other species in the genus *Crinia* Tschudi, 1838, by the following unique suite of characters:

Obviously granular belly in adults; adults have more-or-less dermal fringes on the toes; no pink or red on the hind side of the thighs; no median white line on the throat; throat of breeding male is dark with white pectoral spots; belly of female is boldly blotched with black and white; palm is tubercular; vomerine teeth absent (derived from Cogger, 2014).

Cogger (2014) on page 71, also provides a key that separates species of *Crinia* from other Myobatrachid frog species.

According to Symula *et al.* (2008) *Crinia lynnepailsae* sp. nov. diverged from its nearest relatives more than 5 MYA, the closest related species being *C. aagh* sp. nov..

Distribution: *Crinia lynnepailsae* sp. nov. is known only from a limited area between Wagga Wagga and Albury, New South Wales, but is presumed to occur further west along the Murray basin.

Etymology: The species *Crinia lynnepailsae* sp. nov. is named in honour of Lynne Pails, the long suffering wife of well-known Victorian herpetologist, Roy Pails, of Ballarat, Victoria, (aged 68 in 2023) in recognition of her putting up with Roy and his lifetime's work with reptiles and threatened species of native mammals and all the agonies that entails. Thankfully, like Roy Pails, she has a great sense of humour, which is essential in that she has had to endure regular illegal armed raids by corrupt government-employed wildlife officers, usually in company with heavily armed and violent Victorian police officers, for more than 4 decades.

CRINIA (RANIDELLA) FIACUMMINGAE SP. NOV.

LSIDurn:lsid:zoobank.org:act:7B6BC96D-C161-4BAD-A28D-0E993C5AE0AF

Holotype: A preserved specimen at the National Museum of Victoria, Melbourne, Victoria, Australia, specimen number D22380 collected from the Mount Disappointment area, 1.6 km south of Wallan East, Victoria, Australia, Latitude -37.42 S., Longitude 145.00 E. This government-owned facility allows access to its holdings.

Paratypes: Four preserved specimens at the National Museum of Victoria, Melbourne, Victoria, Australia, being 1/ Specimen number D22554 collected from 2.4 km east of Wallan, Victoria, Latitude -37.42 S., Longitude 145.00 E, and 2/ Specimen numbers D72778, D72779, D72780 all collected from the La Trobe University Nature Reserve, Bundoora, Victoria, Australia, Latitude -37.7183 S., Longitude 145.053 E.

Diagnosis: The species *Crinia (Ranidealla) fiacummingae* sp. nov. is readily separated from all other species within the *C. (Ranidella) signifera* Girard, 1853 complex by the following unique suite of characters:

In females, the outer edges of the dark lines on either side of the mid dorsum are etched with dark grey to black, these being in the form of joined fine dots or peppering. In *C. signifera*, these lines are not etched dark or light on the outer edge, while in *C. lynnepailsae* sp. nov. the darker lines running down either side of the mid dorsum are etched on the outer edge with white or light yellow.

Dark lines are generally peppered black on the edges and lighter within, as are markings on the upper limbs. Slightly anterior to the eye is a semi-distinct triangle running up from the lower jaw that either meets, or nearly meets the front of the eye. The dark band on the upper flank is so heavily peppered light as to make it only semi-distinct. Tubercles are generally small and scattered as is any carbuncles associated with the anterior outer dark stripes on either side of the mid-dorsal line.

In males, the dorsal colour ranges from light grey to greenish grey or brown, usually with two pairs of irregularly shaped dark brownish-grey blotches on either side of the mid dorsum. These are usually associated with a concentration of tubercles or tiny carbuncles. Upper surfaces of the limbs and the dorsum and flanks have numerous closely spaced small unblunted tubercles. Upper surfaces of hind limbs have well defined markings in the form of bands or elongated spots.

Crinia fiacummingae sp. nov. in life is depicted online at:

<https://www.inaturalist.org/observations/19349545>

and

<https://www.inaturalist.org/observations/90629130>

and

<https://www.inaturalist.org/observations/110820279>

C. signifera of the type form from New South Wales is depicted in Hoser (1989) on page 23, Anstis (2013) pages 576 (right) to 579 and Cogger 2014 on page 83, or online at:

<https://www.inaturalist.org/observations/55013920>

All species within the *Crinia signifera* Girard, 1853 species group, including those formally named for the first time in this paper, and those otherwise resurrected from synonymy with that species in this paper, are separated from all other species in the genus *Crinia* Tschudi, 1838, by the following unique suite of characters:

Obviously granular belly in adults; adults have more-or-less dermal fringes on the toes; no pink or red on the hind side of the thighs; no median white line on the throat; throat of breeding male is dark with white pectoral spots; belly of female is boldly blotched with black and white; palm is tubercular; vomerine teeth absent (derived from Cogger, 2014).

Cogger (2014) on page 71, also provides a key that separates species of *Crinia* from other Myobatrachid frog species.

According to Symula *et al.* (2008) *Crinia fiacummingae* sp. nov. diverged from its nearest relatives more than 5 MYA, the closest related species being *C. varius* (Peters, 1863).

Distribution: *Crinia fiacummingae* sp. nov. is found around Melbourne, Victoria and environs, including north to at least Seymour and extending across though Ballarat and Hamilton in the west.

Etymology: *C. fiacummingae* sp. nov. is named in honour of one of the best investigative journalists in Australian history, Fia Cumming, originally of Chatswood, New South Wales and in more recent decades of Lyons in the ACT, Australia.

In the 1993, she played a pivotal role in exposing corruption in the NSW National Parks and Wildlife Service (NPWS/NSW) and getting the ban on the book, *Smuggled: The Underground Trade in Australia's Wildlife* (Hoser, 1993) lifted.

This she did in her role as a journalist at Rupert Murdoch's News Corporation.

Not surprisingly, pressure was brought to bear and she was sacked by the company.

She sued through her union and got a payout.

Smuggled: The Underground Trade in Australia's Wildlife went on to become a best seller and as a result of the content of the book and the media it generated, draconian wildlife laws were re-written in every state of Australia.

Had the ban on the book not been lifted, private ownership of any kind of wildlife would remain outlawed across Australia as it was for the previous 2 decades.

Wildlife departments in Australia remain endemically corrupt and laws governing wildlife are far from perfect. However the Nazi style reign of terror meted out on wildlife lovers from the 1970's to the 1990's by militaristic wildlife officers is now a thing of the past.

Illegal armed raids continue, but nothing compared to the scale in decades past.

For most Australians keeping a pet snake or a wallaby is now a simple process and they do not live in fear of an armed raid or jail for doing so.

Without Fia Cumming, this would not be the case.

For further detail see Hoser (1996).

I also note that News Corporation have also been running an undeclared war against myself since 1993, regularly publishing false and defamatory fake news stories about me and sabotaging our wildlife display business by backlinking to trademark infringing thieves as a means to exact further damage against me.

News Corporation staff have also actively petitioned police and wildlife departments to mount illegal raids on our family on the basis of false claims they have made to them.

CRINIA (RANIDELLA) SIGNIFERA ABERRANS SUBSP. NOV.

LSIDurn:lsid:zoobank.org:act:F67A7EA5-95C8-4E4F-8941-D80E5CD9E51E

Holotype: A preserved specimen at the Australian Museum, Sydney, New South Wales, Australia, specimen number R.165451, collected from the Wooli Road, 100 metres east of the Skinners Road intersection, Pillar Valley, New South Wales, Australia, Latitude -29.7786 S., Longitude 153.15861 E. This government-owned facility allows access to its holdings.

Paratypes: Three preserved specimens at the Australian Museum, Sydney, New South Wales, Australia, specimen numbers R.165453, R.165535 and R.165537 all collected

from the Wooli Road, 100 metres east of the Skinners Road intersection, Pillar Valley, New South Wales, Australia, Latitude -29.7786 S., Longitude 153.15861 E.

Diagnosis: The species *Crinia (Ranidealla) signifera* Girard, 1853 is readily separated from all other species and subspecies within the *C. (Ranidella) signifera* Girard, 1853 complex by the following unique suite of characters:

Dark markings or stripes on the dorsum are invariably a combination of black and brown, black and yellow or all three colours. This is typically with light centres or reversed or one dark colour, with spotting or blotches of the other in the markings, (separate from the lighter areas between, that are typically light brown, grey or beige). Tubercles on the dorsum, when present are small to medium and more-or less triangular and pointed in shape. They are usually widely scattered and in a more-or-less random pattern on the upper surfaces. On the upper snout, there are distinct (usually) or sometimes semi-distinct markings that are dark brown to black on the upper lip generally below the eye, but not meeting it. These are bordered by white or yellow, with the areas above this, anterior to the eye and above it (at the top of the head) a grey or brown colour, but darker than the etching of the darker labial markings. Venter is usually heavily peppered black (in a pattern of some sort) on a white or whitish background. Darker markings on the upper flanks in males is semi-distinct or in the form of broken darker markings in the configuration of an upper lateral stripe. In females it is usually a dark line without breaks, but the dark line has obvious lighter flecks or blotches within it (that are a darker colour than the areas outside the line).

Markings on the upper surfaces of the limbs are either absent or at best only semi-distinct. The upper surface of the proximal parts of the forelimbs is very light or with an obvious light flush (usually beige or yellowish), this feature being more prominent in *C. signifera* than in the other species in the complex, although in *C. lypailsae* sp. nov. there is an obvious brown section of the upper areas of the proximal forelimb that contrasts with the dark grey or dark brown distal part of the limb.

The subspecies *Crinia (Ranidealla) signifera aberrans* subsp. nov. is readily separated from the nominate form of *C. signifera* as defined above and *C. signifera kroombitensis* subsp. nov. as defined below, by the following characters: Males have well defined ridges of carbuncles on the upper surface of the dorsum, these running on both sides of the midline in a wavy manner and the scattered tubercles on the dorsum are of moderate density. The whitish tubercles on the belly also make it up the lower flanks.

On the female, the dark line of the upper flank extends and merges with the white of the lower parts of the flank, with white tubercles also being visible on the far lower parts of the lower flank.

In both sexes there are no obvious markings below the eye or on the upper lip, this general area being of the same general colour of the dorsum and with a limited amount of whitish peppering.

C. signifera of the type form from New South Wales is depicted in life in Hoser (1989) on page 23, Anstis (2013) pages 576 (right) to 579 and Cogger 2014 on page 83 and online at: <https://www.inaturalist.org/observations/55013920>

Crinia (Ranidealla) signifera aberrans subsp. nov. is depicted in life online at:

<https://www.inaturalist.org/observations/68265254>

C. signifera kroombitensis subsp. nov. is depicted in life online at: <https://dl.id.au/1/set.php?s=14&p=35>

All species within the *Crinia signifera* Girard, 1853 species group, including those formally named for the first time in this paper, and those otherwise resurrected from synonymy with that species in this paper, are separated from all other species in the genus *Crinia* Tschudi, 1838, by the following unique suite of characters: Obviously granular belly in adults; adults have more-or-less dermal fringes on the toes; no pink or red on the hind side of

the thighs; no median white line on the throat; throat of breeding male is dark with white pectoral spots; belly of female is boldly blotched with black and white; palm is tubercular; vomerine teeth absent (derived from Cogger, 2014).

Cogger (2014) on page 71, also provides a key that separates species of *Crinia* from other Myobatrachid frog species.

According to Symula *et al.* (2008) *Crinia signifera aberrans* subsp. nov. diverged from its nearest relative, the type form of *C. signifera* s more than 3 MYA.

Distribution: *C. signifera aberrans* subsp. nov. occur from about Coffs Harbour on the New South Wales north coast, along the coastal strip, to at least the Queensland/New South Wales border in the north and presumably nearby parts of south-east Queensland, where the distribution appears to be continuous to about Bundaberg in the north.

Further west in the New England region and south from about Port Macquarie the type form of *C. signifera* occurs.

The population isolated to Kroombit Tops, further north in Queensland (near the central Queensland coast) is of a morphologically divergent subspecies confined to that general area.

Etymology: The subspecies *C. signifera aberrans* subsp. nov. is named in reflection in that it is an aberrant form of the species *C. signifera* and the name derives exactly from that.

CRINIA (RANIDELLA) SIGNIFERA KROOMBITENSIS SUBSP. NOV.

LSIDurn:lsid:zoobank.org:act:F23C26FC-3C47-43B5-873C-1848D11BAB06

Holotype: A preserved specimen at the Queensland Museum, Brisbane, Queensland, Australia, specimen number J54865 collected from "Scientific Area 48" at Kroombit Tops, Queensland, Australia, Latitude -24.366667 S., Longitude 151.033333 E.

This government-owned facility allows access to its holdings.

Paratypes: All are preserved specimens at the Queensland Museum, Brisbane, Queensland, Australia, specimen numbers J54866 and J54867 collected from "Scientific Area 48" at Kroombit Tops, Queensland, Australia, Latitude -24.366667 S., Longitude 151.033333 E and specimen number J45558 collected from the Forestry Barracks at Kroombit Tops Queensland, Australia, Latitude -24.366667 S., Longitude 151.016667 E.

Diagnosis: The species *Crinia (Ranidealla) signifera* Girard, 1853 is readily separated from all other species and subspecies within the *C. (Ranidella) signifera* Girard, 1853 complex by the following unique suite of characters:

Dark markings or stripes on the dorsum are invariably a combination of black and brown, black and yellow or all three colours. This is typically with light centres or reversed or one dark colour, with spotting or blotches of the other in the markings, (separate from the lighter areas between, that are typically light brown, grey or beige).

Tubercles on the dorsum, when present are small to medium and more-or less triangular and pointed in shape. They are usually widely scattered and in a more-or-less random pattern on the upper surfaces. On the upper snout, there are distinct (usually) or sometimes semi-distinct markings that are dark brown to black on the upper lip generally below the eye, but not meeting it. These are bordered by white or yellow, with the areas above this, anterior to the eye and above it (at the top of the head) a grey or brown colour, but darker than the etching of the darker labial markings.

Venter is usually heavily peppered black (in a pattern of some sort) on a white or whitish background. Darker markings on the upper flanks in males is semi-distinct or in the form of broken darker markings in the configuration of an upper lateral stripe. In females it is usually a dark line without breaks, but the dark line has obvious lighter flecks or blotches within it (that are a darker colour than the areas outside the line).

Markings on the upper surfaces of the limbs are either absent or at best only semi-distinct. The upper surface of the proximal

parts of the forelimbs is very light or with an obvious light flush (usually beige or yellowish), this feature being more prominent in *C. signifera* than in the other species in the complex, although in *C. lynpailsae* sp. nov. there is an obvious brown section of the upper areas of the proximal forelimb that contrasts with the dark grey or dark brown distal part of the limb.

The morphologically divergent subspecies *C. signifera kroombitensis* subsp. nov. is separated from the nominate form of *C. signifera* as defined above, *C. signifera aberrans* subsp. nov. as defined above, and all other species in the *C. signifera* species complex, by the following characters:

In males, the dorsum is a distinctive random pattern of dark brownish-black blotches on a medium brown to dark beige background.

Overlaying all of this is a moderately dense assemblage of large, blunt and rounded tubercles, reddish-brown in colour, many of which are either elongated or otherwise joined to one another, but not forming any obvious carbuncles.

These are only present in the preceding form on the upper surface of the dorsum and the area between the eye and the axilla of the forelimb.

Anterior to the eyes are about 8-10 smaller light brown tubercles

Both males and females have an obvious thick dark stripe running from the upper lip to the bottom of the eye.

Females have two distinctive ridges formed by extended carbuncles, running down either side of the mid dorsum, being more-or-less continuous on the anterior half of the back and then being broken posteriorly.

The lines on the upper body and upper flanks are somewhat irregular and not very distinct, or well defined.

Venter in both sexes is white with black markings.

C. signifera of the type form from New South Wales is depicted in life in Hoser (1989) on page 23, Anstis (2013) pages 576 (right) to 579 and Cogger 2014 on page 83 and online at: <https://www.inaturalist.org/observations/55013920>

Crinia (Ranidealla) signifera aberrans subsp. nov. is depicted in life online at:

<https://www.inaturalist.org/observations/68265254>

C. signifera kroombitensis subsp. nov. is depicted in life online at: <https://dl.id.au/1/set.php?s=14&p=35>

The taxon described herein as *C. signifera kroombitensis* subsp. nov. is very morphologically divergent and based on this and the geographical isolation of the population, I would normally have no hesitation in treating it as a full species.

However in the absence of confirming molecular data, I have instead formally named it as a subspecies.

If and when molecular divergence of this population from type *C. signifera* is ascertained, a decision can be made as to whether or not it should be elevated to be a full species.

All species within the *Crinia signifera* Girard, 1853 species group, including those formally named for the first time in this paper, and those otherwise resurrected from synonymy with that species in this paper, are separated from all other species in the genus *Crinia* Tschudi, 1838, by the following unique suite of characters: Obviously granular belly in adults; adults have more-or-less dermal fringes on the toes; no pink or red on the hind side of the thighs; no median white line on the throat; throat of breeding male is dark with white pectoral spots; belly of female is boldly blotched with black and white; palm is tubercular; vomerine teeth absent (derived from Cogger, 2014).

Cogger (2014) on page 71, also provides a key that separates species of *Crinia* from other Myobatrachid frog species.

Distribution: The subspecies *C. signifera kroombitensis* subsp. nov. is apparently confined to the Kroombit Tops area of central coastal Queensland, Australia.

Etymology: The subspecies *C. signifera kroombitensis* subsp. nov. is named in reflection of the fact that it is a taxon confined to the area of Kroombit Tops, Queensland.

CONSERVATION THREATS TO THE RELEVANT SPECIES

There are no known significant immediate conservation threats to any species within the genus *Crinia sensu lato* as discussed within this paper, save for the ongoing risk of translocation by people moving gardening materials around Australia and inadvertently taking the frogs with them.

This brings risk of out competition or hybridisation to one or other of the affected species.

To deal with this issue with respect of species within the genus *Crinia*, it is important that the government fund properly conducted scientific studies into the potential problem.

However, if the Australian government persists with its "Big Australia Policy", (see for example Saunders 2019 or Zaczek 2019), that being a long-term aim to increase the human population in Australia to over 100 million people by year 2150 (from the present 26 million as of 2022), all sorts of unforeseen threats to the survival of these species may emerge.

Due to unforeseen potential threats I recommend further research on all aspects of the relevant species and including means to identify likely threats.

These may include direct human activities (e.g. land clearing for homes or farming activities), as well as potential threats caused by changed vegetation regimes, introduced pests and potential pathogens, including those introduced via the legal importation of foreign reptiles and amphibians by government-owned zoos and other government backed commercial enterprises.

Denial of the existence of the relevant taxa *sensu* Wüster *et al.* as outlined by Hoser (2019b, 2019c), could ultimately cause extinction of some of these frog taxa in the same way it caused one or more earlier extinctions as documented by Hoser (2019b, 2019c).

REFERENCES CITED

- Anstis, M. 2013. *Tadpoles and frogs of Australia*. Reed / New Holland, Sydney, Australia:829 pp.
- Barker, J., Grigg, G. C. and Tyler, M. J. 1995. *A Field Guide to Australian Frogs*. Surrey Beatty and Sons, Chipping Norton, NSW, Australia:407 pp.
- Clulow, S. and Swan, M. 2018. *A complete guide to Frogs of Australia*, Australian Geographic, Sydney, NSW, Australia:336 pp.
- Clyne, D. 1969. *Australian Frogs*. Lansdowne Press, Melbourne, Victoria, Australia:112 pp.
- Cogger, H. G. 2014. *Reptiles and Amphibians of Australia* (Seventh Edition). CSIRO Publishing, Collingwood, Victoria, Australia:1033 pp.
- Cogger, H. G., Cameron, E. E. and Cogger, H. M. 1983. *Zoological Catalogue of Australia (1) Amphibia and Reptilia*, Australian Government Publishing Service, Canberra, ACT, Australia:319 pp.
- Condon, H. T. 1941. Further records of lizards and frogs from Kangaroo Island. *Records of the South Australian Museum* 7:111-114.
- Cotton, T. 2014. Comments on *Spracklandus* Hoser, 2009 (Reptilia, Serpentes, ELAPIDAE): request for confirmation of the availability of the generic name and for the nomenclatural validation of the journal in which it was published (Case 3601; see *BZN* 70: 234-237, 71: 30-38; 133-135). *Bulletin of Zoological Nomenclature* 71(3) September 2014:181-182.
- Dubois, A., Bauer, A. M., Ceriaco, L. M. P., Dusoulier, F., Fretey, T., Lobl, I., Lorvelec, O., Ohler, A., Stopiglia, R. and Aesch, E. 2019. The Linz Zoocode project: a set of new proposals regarding the terminology, the Principles and Rules of zoological nomenclature. First report of activities (2014-2019). *Bionomina* (online), 17:1-111.
- Eipper, S. and Rowland, P. 2018. *A Naturalist's Guide to the Frogs of Australia*. John Beaufoy Publishing, Oxford, UK:176 pp.
- Girard, C. 1853. Descriptions of new species of reptiles, collected by the U.S. Exploring Expedition,

- under the command of Capt. Charles Wilkes, U.S.N. Second part: including the species of batrachians, exotic to North America. *Proceedings of the Academy of Natural Sciences of Philadelphia* 6:420-424.
- Gray, J. E. 1841. A catalogue of the species of Reptiles and Amphibia hitherto described as inhabiting Australia, with a description of some new species from Western Australia. Appendix E. pp. 422-449 in Grey, G. (ed.). *Journals of Two Expeditions of Discovery in North-west and Western Australia During the Years 1837, 38, and 39, Under the Authority of Her Majesty's Government. Describing many newly discovered, important, and fertile districts, with observations on the moral and physical condition of the aboriginal inhabitants, &c. &c.* London: T. & W. Boone Vol. 2 vii 482 pp. [Date published Nov. 1841] [447].
- Hawkeswood, T. J. 2021. Time to end taxonomic vandalism by Wolfgang Wüster *et al.*: The Snakeman, Raymond Hoser's publications are validly published and his names available according to the ICZN: Objective investigation finds Hoser's taxonomic works as scientific best practice and in every relevant case identifies valid entities. *Calodema*, 860:1-59.
- Hero, J., Littlejohn, M. and Marantelli, G. 1991. *Frogwatch field guide to Victorian Frogs*, Department of Frequent Name Changes, Victoria Parade, East Melbourne, Victoria, Australia:108 pp.
- Hoser, R. T. 1989. *Australian Reptiles and Frogs*. Pierson and Co., Sydney, NSW, Australia:238 pp.
- Hoser, R. T. 1993. *Smuggled:The Underground Trade in Australia's Wildlife*. Apollo Books, Moss Vale, NSW, Australia:160 pp.
- Hoser, R. T. 1996. *Smuggled-2: Wildlife trafficking, crime and corruption in Australia*. Kotabi Publishing, Doncaster, Victoria, Australia:280 pp.
- Hoser, R. T. 2007. Wells and Wellington - It's time to bury the hatchet. *Calodema* Supplementary Paper 1:1-9.
- Hoser, R. T. 2009. Creationism and contrived science: A review of recent python systematics papers and the resolution of issues of taxonomy and nomenclature. *Australasian Journal of Herpetology* 2:1-34. (3 February).
- Hoser, R. T. 2012a. Exposing a fraud! *Afronaja* Wallach, Wüster and Broadley 2009, is a junior synonym of *Spracklandus* Hoser 2009! *Australasian Journal of Herpetology* 9 (3 April 2012):1-64.
- Hoser, R. T. 2012b. Robust taxonomy and nomenclature based on good science escapes harsh fact-based criticism, but remains unable to escape an attack of lies and deception. *Australasian Journal of Herpetology* 14:37-64.
- Hoser, R. T. 2013a. The science of herpetology is built on evidence, ethics, quality publications and strict compliance with the rules of nomenclature. *Australasian Journal of Herpetology* 18:2-79.
- Hoser, R. T. 2013b. Monitor Lizards reclassified with some common sense (Squamata: Sauria: Varanidae). *Australasian Journal of Herpetology* 21: 41-58.
- Hoser, R. T. 2015a. Dealing with the "truth haters" ... a summary! Introduction to Issues 25 and 26 of *Australasian Journal of Herpetology*. Including "A timeline of relevant key publishing and other events relevant to Wolfgang Wüster and his gang of thieves." and a "Synonyms list". *Australasian Journal of Herpetology* 25:3-13.
- Hoser, R. T. 2015b. The Wüster gang and their proposed "Taxon Filter": How they are knowingly publishing false information, recklessly engaging in taxonomic vandalism and directly attacking the rules and stability of zoological nomenclature. *Australasian Journal of Herpetology* 25:14-38.
- Hoser, R. T. 2015c. Best Practices in herpetology: Hinrich Kaiser's claims are unsubstantiated. *Australasian Journal of Herpetology* 25:39-64.
- Hoser, R. T. 2015d. PRINO (Peer reviewed in name only) journals: When quality control in scientific publications fails. *Australasian Journal of Herpetology* 26:3-64.
- Hoser, R. T. 2015e. Rhodin *et al.* 2015, Yet more lies, misrepresentations and falsehoods by a band of thieves intent on stealing credit for the scientific works of others. *Australasian Journal of Herpetology* 27:3-36.
- Hoser, R. T. 2015f. Comments on *Spracklandus* Hoser, 2009 (Reptilia, Serpentes, ELAPIDAE): request for confirmation of the availability of the generic name and for the nomenclatural validation of the journal in which it was published (Case 3601; see *BZN* 70: 234-237; comments *BZN* 71:30-38, 133-135). *Australasian Journal of Herpetology* 27:37-54.
- Hoser, R. T. 2016. New frogs of the genus *Mixophyes* Günther, 1864 from Eastern Queensland, and New South Wales, Australia (Anura:Myobatrachidae). *Australasian Journal of Herpetology* 33:60-64.
- Hoser, R. T. 2019a. A new species of *Philocryphus* Fletcher, 1894 (Amphibia: Myobatrachidae) from north-east Victoria and south-east New South Wales. *Australasian Journal of Herpetology* 39:6-8.
- Hoser, R. T. 2019b. 11 new species, 4 new subspecies and a subgenus of Australian Dragon Lizard in the genus *Tympanocryptis* Peters, 1863, with a warning on the conservation status and long-term survival prospects of some newly named taxa. *Australasian Journal of Herpetology* 39:23-52.
- Hoser, R. T. 2019c. Richard Shine *et al.* (1987), Hinrich Kaiser *et al.* (2013), Jane Melville *et al.* (2018 and 2019): Australian Agamids and how rule breakers, liars, thieves, taxonomic vandals and law breaking copyright infringers are causing reptile species to become extinct. *Australasian Journal of Herpetology* 39:53-63.
- Hoser, R. T. 2020a. Three new species of frog in the genus *Limnodynastes* Fitzinger, 1843 from east Australia, two new *Platyplectron* Peters, 1863 species from east Australia and three new species of *Ranaster* Macleay, 1878 from north Australia. *Australasian Journal of Herpetology* 43:3-14.
- Hoser, R. T. 2020b. The inevitable reassessment of the Australasian frog genera *Mixophyes* Günther, 1864 and *Taudactylus* Straughan and Lee, 1966, resulting in the formal descriptions of two new families, new subfamilies and tribes, three new genera, 2 new subgenera, 1 new species and 2 new subspecies. *Australasian Journal of Herpetology* 43:15-26.
- Hoser, R. T. 2020c. For the first time ever! An overdue review and reclassification of the Australasian Tree Frogs (Amphibia: Anura: Pelodyadidae), including formal descriptions of 12 tribes, 11 subtribes, 34 genera, 26 subgenera, 62 species and 12 subspecies new to science. *Australasian Journal of Herpetology* 44-46:1-192.
- Hoser, R. T. 2020d. Four new species of frog in the genus *Assa* from eastern Australia. *Australasian Journal of Herpetology* 47:57-63.
- Hoser, R. T. 2020e. A new species of Tree Frog in the genus *Shireenhosierhylea* Hoser, 2020 from north Queensland, Australia. *Australasian Journal of Herpetology* 49:7-8.
- Hoser, R. T. 2020f. 3 new tribes, 3 new subtribes, 5 new genera, 3 new subgenera, 39 new species and 11 new subspecies of mainly small ground-dwelling frogs from Australia. *Australasian Journal of Herpetology* 50-51:1-128.
- Hoser, R. T. 2022a. Hiding in plain sight. A previously unrecognized biogeographical barrier in Australia formed by an event of biblical proportions. Five new species of skink lizard from south-west Victoria, three more closely related species from New South Wales and another from South Australia. *Australasian Journal of Herpetology* 56:3-21.
- Hoser, R. T. 2022b. Incubation and hatching of juvenile Marbled Gecko *Christinus marmoratus* (Gray, 1845). *Australasian Journal of Herpetology* 56:55-56.
- Hoser, R. T. 2022c. Greater diversity of skink species in south-east Australia than previously realized: *Carinascincus* Wells and Wellington, 1985 *sensu lato* is further divided. *Australasian*

Journal of Herpetology 59:48-64.

International Commission on Zoological Nomenclature (ICZN) 1991. Decision of the commission. Three works by Richard W. Wells and C. Ross Wellington: proposed suppression for nomenclatural purposes. *Bulletin of Zoological Nomenclature* 48(4):337-338.

International Commission on Zoological Nomenclature (ICZN) 2001. Opinion 1970. *Bulletin of Zoological Nomenclature* 58(1):74, (30 March 2001).

International Commission on Zoological Nomenclature (ICZN) 2012. Amendment of Articles 8, 9, 10, 21 and 78 of the International Code of Zoological Nomenclature to expand and refine methods of publication. *Zootaxa* (PRINO) (Online) 3450:1-7.

International Commission on Zoological Nomenclature (ICZN) 2021. Opinion 2468 (Case 3601) - *Spracklandus* Hoser, 2009 (Reptilia, Serpentes, Elapidae) and *Australasian Journal of Herpetology* issues 1-24: confirmation of availability declined; Appendix A (Code of Ethics): not adopted as a formal criterion for ruling on Cases. *Bulletin of Zoological Nomenclature* 78 (30 April 2021):42-45.

Kaiser, H. 2012a. SPAM email sent out to numerous recipients on 5 June 2012.

Kaiser, H. 2012b. Point of view. Hate article sent as attachment with SPAM email sent out on 5 June 2012.

Kaiser, H. 2013. The Taxon Filter, a novel mechanism designed to facilitate the relationship between taxonomy and nomenclature, vis-à-vis the utility of the Code's Article 81 (the Commission's plenary power). *Bulletin of Zoological Nomenclature* 70(4) December 2013:293-302.

Kaiser, H. 2014a. Comments on *Spracklandus* Hoser, 2009 (Reptilia, Serpentes, ELAPIDAE): request for confirmation of the availability of the generic name and for the nomenclatural validation of the journal in which it was published. *Bulletin of Zoological Nomenclature*, 71(1):30-35.

Kaiser H. 2014b. Best Practices in Herpetological Taxonomy: Errata and Addenda. *Herpetological Review*, 45(2):257-268.

Kaiser, H., Crother, B. L., Kelly, C. M. R., Luiselli, L., O'Shea, M., Ota, H., Passos, P., Schleip, W. D. and Wüster, W. 2013. Best practices: In the 21st Century, Taxonomic Decisions in Herpetology are Acceptable Only When supported by a body of Evidence and Published via Peer-Review. *Herpetological Review* 44(1):8-23.

Krefft, G. 1864. Description of *Aspidiotes melanocephalus*, a new snake from Port Denison. *Proceedings of the Zoological Society of London* 1864:20-22.

Lütken, C. F. 1864 "1863". Nogle ny Krybyr og Padder. *Videnskabelige Meddelelser fra Dansk Naturhistorisk Forening i Kjøbenhavn*, (2)4:292-311.

Mahony, M. J., Penman, T., Bertozzi, T., Lemckert, F. L., Bilney, R. and Donnellan, S. C. 2021. Taxonomic revision of south-eastern Australian giant burrowing frogs (Anura: Limnodynastidae: *Heleioporus* Gray). *Zootaxa* (PRINO) (online) 5016(4):451-489.

Parker, H. W. 1940. The Australian frogs of the family Leptodactylidae. *Novit. Zool.* 42:1-106.

Peters, W. C. H. 1863. Eine Übersicht der von Hrn. Richard Schomburgk an das zoologische Museum eingesandten Amphibien, aus Buchsfelde bei Adelaide in Südastralien. *Monatsberichte der Königlichen Preussische Akademie des Wissenschaften zu Berlin* 1863:228-236.

Pyron, A. and Wiens, J. J. 2011 A large-scale phylogeny of Amphibia with over 2,800 species, and a revised classification of extant frogs, salamanders, and caecilians. *Molecular Phylogenetics and Evolution* 61:543-583.

Ride, W. D. L. (ed.) et al. (on behalf of the International Commission on Zoological Nomenclature) 1999. *International code of Zoological Nomenclature*. The Natural History Museum -

Cromwell Road, London SW7 5BD, UK (also commonly cited as "The Rules", "Zoological Rules" or "ICZN 1999").

Roberts, J. D. and Maxson, L. R. 1986. Phylogenetic-Relationships in the Genus *Limnodynastes* (Anura, Myobatrachidae) - a Molecular Perspective. *Australian Journal of Zoology*, 34(4):561-573.

Schäuble, C. S., Moritz, C. and Slade, R. W. 2000. A Molecular Phylogeny for the Frog Genus *Limnodynastes* (Anura: Myobatrachidae). *Molecular Phylogenetics and Evolution*, 16(3):379-391.

Schäuble, C. S. and Moritz, C. 2001. Comparative phylogeography of two open forest frogs from eastern Australia. *Biological Journal of the Linnean Society* 74:157-170.

Steindachner, F. 1867. *Reise der österreichischen Fregatte Novara um die Erde in den Jahren 1857, 1858, 1859 unter den Befehlen des Commodore B. von Wüllerstorff-Urbair. Pt. 9, Bd. 1, Abt. 4, Zoologischer Theil. Amphibien*. Wien: K. K. Hof- und Staatsdruckerei.

Symula, R., Keogh, J. S. and Cannatella, D. C. 2008. Ancient phylogeographic divergence in southeastern Australia among populations of the widespread common froglet, *Crinia signifera*. *Molecular Phylogenetics and Evolution* 47:569-580.

Tschudi, J. J. von. 1838. *Classification der Batrachier mit Berücksichtigung der fossilen Thiere dieser Abtheilung der Reptilien*. Neuchâtel: Petitpierre.

Saunders, S. 2019. Morrison and Shorten's Big Australia: The overpopulation problem. News article published 17 April 2019 and downloaded from

<https://independentaustralia.net/politics/politics-display/morrison-and-shortens-big-australia-the-overpopulation-problem,12584>

Vanderduys, E. 2012. *Field guide to the frogs of Queensland*. CSIRO, Collingwood, Victoria, Australia:192 pp.

Wellington, C. R. 2015. Comment on the proposed confirmation of the availability of the generic name *Spracklandus* Hoser, 2009 (Reptilia, Serpentes, ELAPIDAE) and for the nomenclatural validation of the journal in which it was published (Case 3601; see *BZN* 70: 234-237; 71: 30-38, 133-135, 181-182, 252-253; 72: 61-78). *Bulletin of Zoological Nomenclature* 72(3) September 2015:222-226.

Wells, R. W. and Wellington, C. R. 1984. A synopsis of the class Reptilia in Australia. *Australian Journal of Herpetology* 1(3-4):73-129.

Wells, R. W. and Wellington, C. R. 1985. A classification of the Amphibia and Reptilia of Australia. *Australian Journal of Herpetology Supplementary Series* 1:1-61.

Williams, R. S. 2015. Phylogeography of the Australian Common Froglet, *Crinia Signifera*. Honours Thesis: University of Mississippi, USA:30 pp.

Zaczek, Z. 2019. Former PM Kevin Rudd says Australia should drastically increase its population to 50 MILLION to make sure nation can defend itself in the face of threats from China. *Daily Mail* (Australia) (27 November), published online at: <https://www.dailymail.co.uk/news/article-7729689/Kevin-Rudd-says-Australia-increase-population-50-MILLION-defend-China.html>

CONFLICTS OF INTEREST

None.

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**A further three new species of frog in the genus
Limnodynastes Fitzinger, 1843 from north Queensland, Australia.**

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ABSTRACT

The Australasian frog genus *Limnodynastes* Fitzinger, 1843 *sensu* Hoser, 2020 is further divided with new species formally named for the first time in accordance with the rules set out in the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

These are previously unnamed species in both the *Limnodynastes peronii* (Duméril and Bibron, 1841) species group (1 new species) and the *L. tasmaniensis* Günther, 1858 species group (2 new species), each being found in relatively small regions in (mainly) north-east Queensland, Australia.

Besides being easily diagnosed morphologically, each of the new taxa has species level divergence from their nearest living relatives based on previous molecular studies.

Limnodynastes maxhoseri sp. nov. previously treated as a population of either *L. peronii* or *L. lineatus* De Vis, 1884 (*sensu* Hoser, 2020) occurs north of the Burdekin Gap in the wet tropics region of far north Queensland.

L. enidconnorsae sp. nov. previously treated as a population of *L. tasmaniensis* or *L. affinis* (*sensu* Hoser, 2020) is confined to a small area in the vicinity of Proserpine, north Queensland, including wetlands immediately south, but not including specimens from north of the Burdekin River or from Mackay and south of Mackay.

L. nathanscanesi sp. nov. previously treated as a population of *L. tasmaniensis* or *L. affinis* (*sensu* Hoser, 2020) occurs in most parts of coastal Queensland south from Mackay to just north of the NSW and Queensland border.

Keywords: Taxonomy; Amphibia; nomenclature; Frog; Australia; Proserpine; Mackay, Wet tropics; Queensland; *Limnodynastes*; *peronii*; *alexanteneri*; *cameronganti*; *lineatus*; *tasmaniensis*; *affinis*; *shanscarffi*; new species; *maxhoseri*; *enidconnorsae*; *nathanscanesi*.

INTRODUCTION

The Australasian frogs of the genus *Limnodynastes* Fitzinger, 1843, as recognized by most publishing herpetologists in year 2020 (*sensu* Cogger 2014) were comprehensively reviewed by Hoser (2020), resulting in new genus and species level arrangements of taxa.

That paper placed relevant taxa into three genera, all names being previously available, resurrected various species using available names and also formally named for the first time eight new species and a subspecies, based on morphological and molecular divergences.

The final arrangement in that paper was as follows:

Genus *Limnodynastes* Fitzinger, 1843.

Limnodynastes peronii (Duméril and Bibron, 1841) (type species); *L. affinis* Günther, 1863; *L. alexanteneri* Hoser, 2020; *L.*

cameronganti Hoser, 2020; *L. depressus* Tyler, 1976; *L. fletcheri* Boulenger, 1888; *L. lineatus* De Vis, 1884, *L. shanscarffi* Hoser, 2020 and *L. tasmaniensis* Günther, 1858.

Genus *Platyplectron* (Peters, 1863).

Platyplectron dumerilii (Peters, 1863) (type species); *P. dorsalis* (Gray, 1841); *P. gerrymarantellii* Hoser, 2020; *P. grayi* (Steindachner, 1867); *P. insularis* (Parker, 1940); *P. interioris* (Fry, 1913); *P. terraereginae* (Fry, 1915) and *P. timjamesi* Hoser, 2020.

Genus *Ranaster* Macleay, 1877.

Ranaster convexiusculus Macleay, 1877 (type species); *R. henrywajswelneri* Hoser, 2020; *R. lignarius* (Tyler, Martin and Davis, 1979) (including subspecies *R. lignarius divergens* Hoser, 2020); *R. snakemansboggensis* Hoser, 2020; *R. salmini* (Steindachner, 1867) and *R.*

scottyjamesi Hoser, 2020.

The species *P. interioris* (Fry, 1913) was only tentatively recognized on the basis it appeared to be morphologically distinct and reproductively isolated from the others, even though it had been shown by Schäuble *et al.* (2000) to be genetically similar to the type form of *P. dumerilii*.

Type *Limnodynastes peronii* (Duméril and Bibron, 1841) are from Sydney, New South Wales (NSW), Australia and regarded as generally restricted to the NSW Coast.

Other morphologically and genetically divergent, recognized species within the complex are *L. lineatus* De Vis, 1884 occurring along most of the Queensland coast and nearby ranges, south of the Burdekin River, *L. alexanteneri* Hoser, 2020 from the eastern suburbs of Melbourne, east to about the Latrobe Valley in eastern Victoria and *L. cameronganti* Hoser, 2020 from the Otway ranges and west to south-east South Australia and also including King Island (Tasmania) and north-west Tasmania.

Hoser (2020) treated all specimens from coastal Queensland as *L. lineatus*, but inspection of a larger number of further specimens within the species complex, including those north of the Burdekin Gap, Queensland, showed those specimens to be morphologically divergent and worthy of consideration as a potentially unnamed species, initiating further investigations in this regard.

The fact to be ascertained was whether or not the far north Queensland population was sufficiently divergent to be recognized taxonomically, if so at what level and if worthy of taxonomic recognition, to formally name it.

In terms of the *L. tasmaniensis* Günther, 1858 species group, Hoser (2020) recognized each of *L. tasmaniensis*, with a type locality of southern Australia, *L. affinis* with a type locality of the Clarence River in northern New South Wales and *L. shanescarffi* from Ravenshoe, North Queensland and generally occupying the wet tropics of far north Queensland, north of the Burdekin Gap.

That classification was called into question after revisiting the molecular data of Schäuble and Moritz (2001) and required the critical re-examination of hundreds of specimens from all parts of the range of putative *L. tasmaniensis*.

Contrary to the position of Hoser (2020), Schäuble and Moritz (2001) identified four species-level divergent groups within putative *L. tasmaniensis*.

L. shanescarffi and *L. tasmaniensis* as conceived by Hoser (2020) appeared valid, but *L. affinis* as defined and effectively re-described by Hoser (2020) appeared to be a composite of up to three species and Schäuble and Moritz (2001) put that taxon closest to the nominate form of *L. tasmaniensis* as opposed to any other potential species.

Hoser (2020) mistakenly thought that *L. affinis* (if valid) was a Queensland taxon, extending south to include northern New South Wales, whereas it was in fact a NSW taxon, extending to far south Queensland on the coast only and possibly further north west of the Great Dividing Range.

The Hoser (2020) account of *L. affinis* was based on coastal Queensland animals and not specimens from the type locality in New South Wales.

Rather than adopt the Wolfgang Wüster strategy of defending the indefensible (see for example, Hoser 2007, 2009, 2012a, 2012b, 2013a, 2015a-f, 2019a, 2019b or ICZN 1991, 2001, 2012, 2021 and sources cited therein), I decided to critically analyse my taxonomy of 2020 with respect of the *L. tasmaniensis* species group and if need be, to junk any cherished theories I may have had, including a past diagnosis of *L. affinis* that appeared to be simply in error.

MATERIALS AND METHODS

Molecular studies including that of Roberts and Maxon (1986), Schäuble *et al.* (2000), Schäuble and Moritz (2001) or more recently Pyron and Wiens (2011) p. 563, were revisited and support the three-way split of the genus *Limnodynastes sensu* Cogger (2014) into three well-defined and divergent species

groups based on timelines of divergence as seen on page 565 of Roberts and Maxon (1986), and as done by Hoser (2020).

Hence no change was required to the genus-level taxonomy of Hoser (2020).

Noting the molecular results of Schäuble and Moritz (2001) with respect of both putative *Limnodynastes peronii* and *L. tasmaniensis*, identifying different species groups (or as sometimes put “divergent lineages”), as mentioned in the introduction, hundreds of specimens of each species group were inspected from all parts of the known ranges of each and/or reinspected.

As for Hoser (2020), specimens of all relevant species (named and until now unnamed) were examined both live in the wild and via museum collections and their records, including all State and Territory Museums on mainland Australia. Furthermore photos and data with accurate locality data was also assessed, as was all relevant previously published scientific literature and the so-called grey literature in the form of popular mass-market books, internet sites, blogs, photo-sharing sites and the like.

Key publications relevant to the taxonomic and nomenclatural conclusions herein were the following:

Anstis (2013), Boulenger (1888), Clulow and Swan (2018), Clyne (1969), Cogger (2014), Cogger *et al.* (1983), De Vis (1884), Dubois *et al.* (2019), Duméril and Bibron (1841), Eipper and Rowland (2018), Fitzinger (1843), Fry (1913, 1915), Gray (1831, 1841), Günther (1858, 1863), Hero *et al.* (1991), Hoser (1989, 2022a-b), Macleay (1887), Parker (1940), Peters (1863), Ride *et al.* (1999), Roberts and Maxon (1986), Schäuble *et al.* (2000), Schäuble and Moritz (2001), Steindachner (1867), Tyler (1976), Tyler *et al.* (1979), Vanderduys (2012), Wells and Wellington (1985) and sources cited therein.

Since Hoser (2020) was published, I have been fortunate in having been able to examine further large numbers of specimens of the relevant species groups from all parts of their known ranges, including from southern Victoria, Tasmania, coastal New South Wales and numerous parts of the Queensland coast, including the regions south and north of the Burdekin Gap, north-east Queensland as well as north and south of the border ranges in southern Queensland and northern New South Wales.

RESULTS

These were inferred in both the abstract and introduction and self evident in the descriptions that follow.

The final results of this further audit of the *Limnodynastes peronii* and *L. tasmaniensis* species groups confirmed an arrangement of species effectively in line with the results of Schäuble and Moritz (2001).

This meant that for the *Limnodynastes peronii* complex, there were five valid species, being the four recognized by Hoser (2020) as well as another unnamed form from north of the Burdekin Gap in the wet tropics of far north Queensland.

This result necessitated a redefinition of *L. lineatus* with a type locality of Mackay, north Queensland, which is herein included within the formal description of *L. maxhoseri*.

Both taxa are morphologically similar and can be separated from the other species in the complex as one (as effectively done by Hoser 2020), before relying on diagnostic features to separate the two from one another as done in this paper.

While numerous other diagnostic differences were identified in the taxa *L. alexanteneri* and *L. cameronganti* following close examination of numerous other specimens, the original descriptions of each were perfectly adequate and stood up to further scrutiny.

The two species were also separated and defined by the most obvious character traits.

Further biogeographic evidence in support of the molecular and morphological evidence underpinning the descriptions of both those species (*L. alexanteneri* and *L. cameronganti*) can be found in the later papers of Hoser (2022a) and Hoser (2022b), including the sources cited therein.

In terms of the *L. tasmaniensis* group, Hoser (2020) clearly got parts of the final analysis wrong and this needed to be corrected in this paper as a matter of urgency.

I note that I identified the mistakes myself and have chosen to identify them as the correct ethical and scientific thing to do. Had someone else pointed out the errors to me, the result herein would be identical and I would also be thanking that person for a critical analysis of an earlier work.

Fortunately, the species, *L. shanescarffi* as conceived and described by Hoser (2020) is valid and the description does not inherently need any modification.

However *L. affinis* as defined by Hoser (2020) was clearly in error and needed to be redone.

This more recent assessment upon revisiting the results of Schäuble and Moritz (2001), effectively places *L. affinis* with a type locality of the Clarence River in New South Wales, Australia as a synonym of the better known *L. tasmaniensis*.

Putative *L. affinis* from far southern Queensland and nearby northern New South Wales is divergent from type *L. tasmaniensis* from further south, but in my opinion at best only as a subspecies.

Hence in this paper, I formally synonymise *L. affinis* with *L. tasmaniensis*, without attempting to define any subspecies or differences between the two.

Two apparently unnamed and divergent lineages of putative *L. tasmaniensis* from Queensland, south of the Burdekin Gap were inspected to see if they could be separated from the remaining two recognized forms (*L. tasmaniensis* and *L. shanescarffi*).

This was possible and on the basis of molecular and morphological divergence these apparently allopatric forms have been formally named as new species herein.

These are *L. enidconnorsae* sp. nov. from the immediate vicinity of Proserpine, Queensland and *L. nathanscanesi* sp. nov. from Mackay, south to near the NSW and Queensland border.

Hoser (2020) had mistakenly treated these taxa (principally that from Mackay, Qld and south) as *L. affinis* in error in the misguided belief that specimens from the Clarence River in northern New South Wales were of this form.

This was not the case.

The type for *L. affinis* is from the Clarence River in northern New South Wales and as already inferred, is most similar morphologically and by way of divergence to the type form of *L. tasmaniensis*.

INFORMATION RELEVANT TO THE FORMAL DESCRIPTIONS THAT FOLLOW

There is no conflict of interest in terms of this paper or the conclusions arrived at herein.

Several people including anonymous peer reviewers who revised the manuscript prior to publication are also thanked as a relevant staff at museums who made specimens and records available in line with international obligations.

In terms of the following formal descriptions, spellings should not be altered in any way for any purpose unless expressly and exclusively called for by the rules governing Zoological Nomenclature as administered by the International Commission of Zoological Nomenclature.

In the unlikely event two newly named taxa are deemed conspecific by a first reviser, then the name to be used and retained is that which first appears in this paper by way of page priority and as listed in the abstract keywords.

Some material in descriptions for taxa may be repeated for other taxa in this paper and this is necessary to ensure each fully complies with the provisions of the *International Code of Zoological Nomenclature* (Fourth edition) (Ride *et al.* 1999) as amended online since.

Material downloaded from the internet and cited anywhere in this paper was downloaded and checked most recently as of 6 December 2022, unless otherwise stated and were accurate in terms of the context cited herein as of that date.

Unless otherwise stated explicitly, colour descriptions apply to living adult specimens of generally good health and not under any form of stress by means such as excessive cool, heat, dehydration or abnormal skin reaction to chemical or other input.

While numerous texts and references were consulted prior to publication of this paper, the criteria used to separate the relevant species has already been spelt out and/or is done so within each formal description and does not rely on material within publications not explicitly cited herein.

Each newly named species is readily and consistently separable from their nearest congener and that which until now it has been previously treated as.

Delays in recognition of these species could jeopardise the long-term survival of these taxa as outlined by Hoser (2019a, 2019b) and sources cited therein.

Therefore attempts by taxonomic vandals like the Wolfgang Wüster gang via Kaiser (2012a, 2012b, 2013, 2014a, 2014b) and Kaiser *et al.* (2013) (as frequently amended) to unlawfully suppress the recognition of these taxa on the basis they have a personal dislike for the person who formally named it should be resisted (Dubois *et al.* 2019).

Claims by the Wüster gang against this paper and the descriptions herein will no doubt be no different to those the gang have made previously, all of which were discredited long ago as outlined by Dubois *et al.* (2019), Hoser, (2007, 2009, 2012a, 2012b, 2013a, 2015a-f, 2019a, 2019b) and sources cited therein.

LIMNODYNASTES MAXHOSERI SP. NOV.

LSIDDurn:lsid:zoobank.org:act:8CA9AD99-263B-4EB3-BC3E-3B8999DB42C8

Holotype: A preserved specimen at the Australian Museum, Sydney, New South Wales, Australia, specimen number R.111904 collected from Kouri Creek, north-west shore of Lake Tinaroo, Queensland, Australia, Latitude -17.166 S., Longitude 145.55 E.

This NSW Government-owned facility allows access to its holdings.

Paratypes: 1/ A preserved specimen at the Queensland Museum, Brisbane, Queensland, Australia, specimen number J60404 collected from Lake Euramoo, Queensland, Australia, Latitude -17.15 S., Longitude 145.62 E.

2/ A preserved specimen at the Queensland Museum, Brisbane, Queensland, Australia, specimen number J61550 collected from the Danbulla Scientific Reserve, via Tinaroo, Queensland, Australia, Latitude -17.2 S., Longitude 145.67 E.

3/ A preserved specimen at the Queensland Museum, Brisbane, Queensland, Australia, specimen number J60396 collected from Severin, Boar Pocket Road, near Tinaroo Dam, Queensland, Australia, Latitude -17.183 S., Longitude 145.667 E.

Diagnosis: Until the publication of Hoser (2020), all of *Limnodynastes peronii* (Duméril and Bibron, 1841), *L. alexanteneri* Hoser, 2020; *L. cameronganti* Hoser, 2020 and *L. lineatus* De Vis, 1884 had been generally recognized by publishing herpetologists as simply *L. peronii* (*sensu* Cogger *et al.* 1983).

Notwithstanding this, molecular data as published 2 decades back, by Schäuble *et al.* (2000) and Schäuble and Moritz (2001) indicated at least five species being within the species complex and the same five forms are readily diagnosable and separable from one another on morphological features. They are also distributionally disjunct, evolving separately and self-evidently warrant species-level recognition.

All five species (including the newly named *L. maxhoseri* sp. nov.) are separated from all other *Limnodynastes* (*sensu lato*) species (including all species within the genera *Platyplectron* Peters, 1863 and *Ranaster* Macleay, 1877) by the following unique combination of characters: There is no skin flap or papillae in the anterior corner of the eye; the inner metatarsal tubercle is small to moderate and not shovel-shaped; the metacarpal of the inner finger is much longer than that of the

second finger; the toes are free and the snout is pointed and prominent.

Colouration is variable, but invariably brown or grey-brown above with a series of somewhat irregular dark-brown stripes or spots running anterior to posterior and dark irregular spots or mottling on the flanks. Dark dorsal markings may have lighter centres and there is sometimes a vertebral stripe which may be distinct, indistinct and of similar or different colour to other parts of the dorsum. There is a dark band along the snout, continuous behind the eye and running through the tympanum to the base of the forelimb. The band is usually bordered below by a white or yellow glandular fold.

All five species are characterised by two thick and usually irregular blackish stripes running down the spine, from between the eyes to the lower back or pelvic girdle, the stripes being separated by a lighter mid-dorsal line which may be thin or thick, and of variable colour, but invariably lighter in colour than the separated black stripes. Beyond these stripes, the dorsal surface is lighter, before there is another thick and irregular-shaped marking in the form of a stripe on the top of either flank. The flanks themselves are generally light in colouration with scattered bits of dark pigment, peppering or spots.

The limbs have scattered dark spots and irregular cross-bands, which may merge to form irregular stripes along the limb. The venter is generally whitish and often flecked with brown or grey. There is no tibial gland.

Nominate *L. peronii* is of the form seen around Sydney, New South Wales and nearby coastal areas of New South Wales and far north-east Victoria. It is depicted in Hoser (1989) on page 27 (bottom two images) and Cogger (2014) on page 50 (top right). It is separated from the other four species, namely *L. alexanteneri*, *L. cameronganti*, *L. lineatus* and *L. maxhoseri sp. nov.* by the following unique suite of characters: Flesh in the groin and armpits is either white or with only a slight yellowish tinge. Specimens with orange on the back, do not have this pigment bounded by black on the upper flank stripes as seen in *Ranaster salmini* Steindachner, 1867 (a putative species which Hoser (2020) showed was in fact two, being a coastal and an inland form which are morphologically and genetically diagnosable, the coastal species being formally named as *Ranaster snakemansbogensis* Hoser, 2020). The mid and upper flanks of this species (*L. peronii*) are characterised by having small to medium blackish spots of irregular shape. Limbs are mainly light with scattered irregular spots or blotches of small to medium size; exceptional to this is a series of 3-5 medium sized dark spots on the upper surface of the folded rear leg.

L. peronii is also characterised and separated from all of *L. alexanteneri*, *L. cameronganti*, *L. lineatus* and *L. maxhoseri sp. nov.* by having 2-6 scattered dark spots of irregular shape on each of the middle and lower flanks.

L. lineatus De Vis, 1884 from coastal Queensland, south of the Burdekin Gap and *L. maxhoseri sp. nov.* from the wet tropics of far north Queensland, north of the Burdekin Gap are both similar in most respects to *L. peronii* but both are most readily separated from that species by having well-defined light areas within the dark stripe area on the upper flanks, and heavy yellow pigment in the groin and back of the upper hind limbs. The dark mid-dorsal stripes run to the pelvic girdle, versus not that far in *L. peronii*.

Adult male *L. maxhoseri sp. nov.* is separated from all other species in the *L. peronii* species complex by having small but obvious raised whitish tubercles or carbuncles running along the dorsal midline of the upper forearm.

L. lineatus and *L. maxhoseri sp. nov.* are separated from all of *L. alexanteneri*, *L. cameronganti* and *L. peronii* by having a well defined row of 5 to 9 large dark spots along each of the lower flanks. *L. lineatus* also has spots and/or peppering merged to form lines running longitudinally down each of the fore and hind limbs, while these spots are reduced to be scattered in *L. maxhoseri sp. nov.*

L. maxhoseri sp. nov. is separated from *L. lineatus* by having a

mid-dorsal light stripe that is thin and often reduced in intensity, versus moderately thick and well defined in *L. lineatus*.

In *L. lineatus* the mid-dorsal stripe is obviously whitish and of different colour to the brown zones or stripes on the flanks of the dorsum, versus often barely different in colour in the mid-stripe and flank light zones in *L. maxhoseri sp. nov.*, the mid-dorsal stripe often being greyish or brown, instead of whitish or yellow (as seen in *L. lineatus*).

In adult *L. lineatus* the darker markings on the dorsum are usually a dark chocolate brown, versus dark greenish-grey or greenish-brown in *L. maxhoseri sp. nov.*

Below the eye, the dark area on the upper lip is reduced to be a large spot in *L. maxhoseri sp. nov.*, versus as a bar extending along the upper lip in *L. lineatus*. In both species the relevant marking is bounded by light white or cream.

L. alexanteneri from Melbourne are nearby parts of West Gippsland, including the Latrobe Valley are separated from *L. peronii*, *L. lineatus*, *L. maxhoseri sp. nov.* and *L. cameronganti* by having unpigmented versus pigmented eggs.

L. alexanteneri is separated from the other four species *L. peronii*, *L. cameronganti*, *L. lineatus* and *L. maxhoseri sp. nov.* by the black to dark brown stripe area of the upper flank being noticeably wider and more prominent at the anterior end of the body, than posterior, versus of more-or-less even thickness or prominence along the entire flank in the other three species.

L. alexanteneri is also separated from all of *L. peronii*, *L. cameronganti*, *L. lineatus* and *L. maxhoseri sp. nov.* by having no dark pigment on the middle or lower flanks save for a single large spot on the upper flank just posterior to the forelimb.

L. cameronganti from south-west Victoria and nearby parts of south-east South Australia near the coast, as well as King Island nearby parts of north-west Tasmania (see for example the phylogeny of Schauble and Moritz 2001) is separated from the other four species *L. alexanteneri*, *L. peronii*, *L. lineatus* and *L. maxhoseri sp. nov.* by having an extremely well-defined pattern of longitudinal stripes running down the body, including a well-defined dark stripe along each of the upper flanks and a well-defined large dark blotch forming a stripe on each of the lower flanks, this not being seen in any of the other species.

L. cameronganti also has a consistently strong and well-defined beige to yellow mid-dorsal stripe running to the rear of the body, being well bounded by the adjoining black stripes, which are also thin and well-defined. The yellow or white mid-dorsal stripe in this species is also thicker than either of the blackish stripes that bound it on the body, which is in stark contrast to the other four species, where the reverse is the case. There is a well-defined dark stripe along the upper surface of the anterior part of each hind limb, but not on the forelimbs (in contrast to *L. lineatus* and *L. maxhoseri sp. nov.*).

Photos of *L. peronii* in life (as defined in this paper) can be found in Hoser (1989) at page 27 (two bottom images) and Cogger (2014) at pages 50 and 51 (right and left respectively), Anstis (2013) on page 410 (two top images) and online at:

<https://www.flickr.com/photos/14807473@N08/3558432634/>

Photos of *L. maxhoseri sp. nov.* in life can be seen in Anstis (2013) on page 410 at bottom right and Vanderduys (2012) on page 88 at bottom left, or also can be found online at:

<https://www.inaturalist.org/observations/62880727>

and

<https://www.inaturalist.org/observations/103627802>

and

<https://www.inaturalist.org/observations/106789627>

Photos of *L. lineatus* in life can be found online at:

<https://www.flickr.com/photos/113096834@N02/12051078886/>

and

<https://www.flickr.com/photos/smacdonald/395057571/in/album-72157594543840677/>

Photos of *L. alexanteneri* Hoser, 2020 in life can be found in

Hero *et al.* (1991) on page 72 and online at:

<https://www.flickr.com/photos/reptileshow/52593636543/>
and

<https://www.flickr.com/photos/craigboase/14068509511/>
and

<https://www.flickr.com/photos/gondwanareptileproduction/28732302793/>
and

<https://www.flickr.com/photos/160417453@N04/39688090763/>
Photos of *L. cameronganti* Hoser, 2020 in life can be found online at:

<https://www.flickr.com/photos/reptileshow/52592636612/>
and

<https://www.flickr.com/photos/goldcoastsnakeman/52155007343/>
and

<https://www.frogwatchsa.com.au/species/view/21>

A comparative photo of both *L. cameronganti* Hoser, 2020 and *L. alexanteriori* Hoser, 2020 in life can be found online at:

<https://www.flickr.com/photos/reptileshow/52593627058/>

Distribution: *L. maxhoseri* sp. nov. is found in the wet tropics region of far north Queensland, generally from north of Townsville to Daintree, with a centre of distribution around the Atherton Tablelands region.

Etymology: Named in honour of Max Hoser of Campbelltown, New South Wales, Australia for various contributions to herpetology in the 1960's and 1970's.

LIMNODYNASTES ENIDCONNORSAE SP. NOV.

LSIDDurn:lsid:zoobank.org:act:2A912D03-2BC4-444A-BE03-8578C346C003

Holotype: A preserved male specimen at the Queensland Museum, Brisbane, Queensland, Australia, specimen number J75770 collected from Goorganga Plain, on the Bruce Highway, near Proserpine, Queensland, Australia, Latitude -20.466667 S., Longitude 148.583333 E.

This government-owned facility allows access to its holdings.

Paratypes: 1/ A preserved female specimen at the Queensland Museum, Brisbane, Queensland, Australia, specimen number J75771 collected from Goorganga Plain, on the Bruce Highway, near Proserpine, Queensland, Australia, Latitude -20.466667 S., Longitude 148.583333 E.

2/ A preserved female specimen at the Queensland Museum, Brisbane, Queensland, Australia, specimen number J87627 collected from Deadman Creek, Proserpine, Queensland, Australia, Latitude -20.505 S., Longitude 148.556111 E.

3/ A preserved female specimen at the Queensland Museum, Brisbane, Queensland, Australia, specimen number J87654 collected from Thompson Creek, Proserpine, Queensland, Australia, Latitude -20.511111 S., Longitude 148.565 E.

Diagnosis: Until 2020, *Limnodynastes shanesearffi* Hoser, 2020 from the wet tropics region of far north Queensland, had been treated as a northern population of the widespread species *Limnodynastes tasmaniensis* Günther, 1858.

Both would key out as the same species in Cogger (2014).

The same applies for the two species formally named in this paper in the same species complex, being, *L. enidconnorsae* sp. nov. and *L. nathanscanesi* sp. nov..

L. enidconnorsae sp. nov. is confined to a small area in the vicinity of Bowen to Proserpine, north Queensland, Australia, while *L. nathanscanesi* sp. nov. is restricted to a region along the coast of Queensland, generally bound by Mackay in the north and Brisbane in the south.

L. tasmaniensis, including *L. affinis* Günther, 1863, (type locality of Clarence River, NSW) herein synonymised with that taxon, is found throughout inland Queensland, including the far south coast of the State, as well as all or most of New South Wales, Victoria and Tasmania as well as most parts of eastern South Australia.

While all four species are variable in colour, *L. shanesearffi*

Hoser, 2020, *L. enidconnorsae* sp. nov. and *L. nathanscanesi* sp. nov. are all readily separated from *L. tasmaniensis* by having a dorsal colouration incorporating a dominance of dark-greenish-blackish or dark-brownish-blackish spots and blotches (versus obviously green in *L. tasmaniensis*).

L. shanesearffi is further separated from the other three species by having the dark occupying more than 70% of the upper surface, versus less than 70% in the other three species, as well as an obvious purple tinge on the lower flanks and inner thighs, versus greenish-grey in *L. enidconnorsae* sp. nov., brownish in *L. nathanscanesi* sp. nov. and yellow in *L. tasmaniensis*.

L. shanesearffi has a dark blotch beneath and slightly anterior to the eye of size nearly as large as the eye, versus extremely small, irregularly shaped and barely noticeable in *L. enidconnorsae* sp. nov., small and elongate in shape in *L. nathanscanesi* sp. nov., or small in size and generally ovoid in shape in *L. tasmaniensis*.

Male *L. shanesearffi* also have obvious orange-red spotting or peppering on the upper body and limbs, which is also present to a lesser extent in most females, this being separate from any vertebral stripe that may or may not be present.

L. shanesearffi, *L. enidconnorsae* sp. nov. and *L. nathanscanesi* sp. nov. are all readily separated from *L. tasmaniensis* by the fact that they have a well defined white or yellowish-white stripe running beneath the eye and the ear to the front leg. This is either absent or ill-defined, or not a bold white to creamy-white in *L. tasmaniensis*.

The colour of the lighter background (between the blotches) on the dorsum is different in adults of each of the preceding species and aids in separating all four of them.

In *L. shanesearffi* and *L. tasmaniensis* the colour is beige in both species, although there is a distinctive yellow tinge in the latter species (not seen in *L. shanesearffi*). For *L. enidconnorsae* sp. nov. the colour is a light, washed out green, while in *L. nathanscanesi* sp. nov. it is brownish, ranging from reddish-brown to greyish-brown.

The preceding character states identified in each of the relevant four species, means that all four species as defined herein, can be readily separated from one another.

An image of *L. shanesearffi* (including specimens of both sexes) in life, can be found in Vanderduys (2012) on page 90 at bottom.

The same species is depicted online at:

<https://www.inaturalist.org/observations/104935104>

L. enidconnorsae sp. nov. in life is depicted online at:

<https://www.inaturalist.org/observations/141233655>

L. nathanscanesi sp. nov. in life is depicted online at:

<https://www.inaturalist.org/observations/111977878>

and

<https://www.inaturalist.org/observations/139598550>

L. tasmaniensis in life (as defined in this paper) is depicted in Hoser (1989) on page 28 (at top), Hero *et al.* (1991) on page 70, Cogger (2014) on page 52 (all photos), Clulow and Swan (2018) on page 158 top, or Anstis (2013) on pages 415-417 (all images).

Distribution: *L. enidconnorsae* sp. nov. appears to be restricted to the Proserpine area of far north Queensland, excluding areas north of the Burdekin River and Mackay and areas south of Mackay. There is a disjunction in known distributions of *L. shanesearffi* north of the Burdekin River, and *L. nathanscanesi* sp. nov. found generally from Mackay and south of Mackay along the coastal strip.

Neither *L. shanesearffi* or *L. enidconnorsae* sp. nov. are known from the region between Bowen and Ayr, a distance of over 100 km by road.

Neither *L. enidconnorsae* sp. nov. or *L. nathanscanesi* sp. nov. are known from the area between Bloomsbury in the north and Kuttatubul in the south, being a distance of about 50 km by road.

L. nathanscanesi sp. nov. is restricted to a region along the coast of Queensland, generally bound by Mackay in the north and

Brisbane in the south.

L. shanescarffi sp. nov. appears to be restricted to north-east Queensland in the wet tropics region, generally north of the Burdekin River Gap (Ayr/Home Hill).

L. tasmaniensis, including *L. affinis* Günther, 1863, (type locality of Clarence River, NSW) herein synonymised with that taxon is found throughout inland Queensland, including the far south coast of the State, as well as all or most of New South Wales, Victoria and Tasmania as well as most parts of eastern South Australia.

Etymology: Named in honour of Enid Connors (AKA Noddy), wife of the late Neville Connors (died 6 January 2014), both being globally recognized aviculturalists and owner of the Casuarina Parrot Gardens, Meyers Road, Ramornie, near Grafton, New South Wales, Australia, in recognition of her lifetime of services to aviculture and wildlife conservation generally.

As of 2022 her Facebook page can be viewed at: <https://www.facebook.com/glossyblackcockatoo/>

An obituary to Neville Connors can be found online at:

<https://watchbird-ojs-tamu.tdl.org/watchbird/index.php/watchbird/article/view/3652>

LIMNODYNASTES NATHANSCANESI SP. NOV.

LSIDDurn:lsid:zoobank.org:act:59467325-E1F8-442C-BCAE-3D9200FF6ED0

Holotype: A preserved specimen at the Queensland Museum, Brisbane, Queensland, Australia, specimen number J52293 collected from Olsens Caverns (near Rockhampton, Queensland, Australia), Latitude -23.166667 S., Longitude 150.466667 E.

This government-owned facility allows access to its holdings.

Paratypes: Five preserved specimens held at the Australian National Wildlife Collection, owned by the Commonwealth Scientific and Industrial Research Organisation (CSIRO), a government department, in Canberra, ACT, Australia and all collected from locations within the Shoalwater Bay Army Training Reserve, north of Rockhampton in Queensland, Australia, being specimen numbers A01818, A01835, A01836, A01837 and A01847.

Diagnosis: Until 2020, *Limnodynastes shanescarffi* Hoser, 2020 from the wet tropics region of far north Queensland, had been treated as a northern population of the widespread species *Limnodynastes tasmaniensis* Günther, 1858.

Both would key out as the same species in Cogger (2014).

The same applies for the two species formally named in this paper in the same species complex, being, *L. enidconnorsae* sp. nov. and *L. nathanscanesi* sp. nov..

L. enidconnorsae sp. nov. is confined to a small area in the vicinity of Bowen to Proserpine, north Queensland, Australia, while *L. nathanscanesi* sp. nov. is restricted to a region along the coast of Queensland, generally bound by Mackay in the north and Brisbane in the south.

L. tasmaniensis, including *L. affinis* Günther, 1863, (type locality of Clarence River, NSW) herein synonymised with that taxon is found throughout inland Queensland, including the far south coast of the State, as well as all or most of New South Wales, Victoria and Tasmania as well as most parts of eastern South Australia.

While all four species are variable in colour, *L. shanescarffi* Hoser, 2020, *L. enidconnorsae* sp. nov. and *L. nathanscanesi* sp. nov. are all readily separated from *L. tasmaniensis* by having a dorsal colouration incorporating a dominance of dark-greenish-blackish or dark-brownish-blackish spots and blotches (versus obviously green in *L. tasmaniensis*).

L. shanescarffi is further separated from the other three species by having the dark occupying more than 70% of the upper surface, versus less than 70% in the other three species, as well as an obvious purple tinge on the lower flanks and inner thighs, versus greenish-grey in *L. enidconnorsae* sp. nov., brownish in *L. nathanscanesi* sp. nov. and yellow in *L. tasmaniensis*.

L. shanescarffi has a dark blotch beneath and slightly anterior to the eye of size nearly as large as the eye, versus extremely small, irregularly shaped and barely noticeable in *L. enidconnorsae* sp. nov., small and elongate in shape in *L. nathanscanesi* sp. nov., or small in size and generally ovoid in shape in *L. tasmaniensis*.

Male *L. shanescarffi* also have obvious orange-red spotting or peppering on the upper body and limbs, which is also present to a lesser extent in most females, this being separate from any vertebral stripe that may or may not be present.

L. shanescarffi, *L. enidconnorsae* sp. nov. and *L. nathanscanesi* sp. nov. are all readily separated from *L. tasmaniensis* by the fact that they have a well defined white or yellowish-white stripe running beneath the eye and the ear to the front leg. This is either absent or ill-defined, or not a bold white to creamy-white in *L. tasmaniensis*.

The colour of the lighter background (between the blotches) on the dorsum is different in adults of each of the preceding species and aids in separating all four of them.

In *L. shanescarffi* and *L. tasmaniensis* the colour is beige in both species, although there is a distinctive yellow tinge in the latter species (not seen in *L. shanescarffi*). For *L. enidconnorsae* sp. nov. the colour is a light, washed out green, while in *L. nathanscanesi* sp. nov. it is brownish, ranging from reddish-brown to greyish-brown.

The preceding character states identified in each of the relevant four species, means that all four species as defined herein, can be readily separated from one another.

An image of *L. shanescarffi* (including specimens of both sexes) in life, can be found in Vanderduys (2012) on page 90 bottom.

The same species is depicted online at:

<https://www.inaturalist.org/observations/104935104>

L. enidconnorsae sp. nov. in life is depicted online at:

<https://www.inaturalist.org/observations/141233655>

L. nathanscanesi sp. nov. in life is depicted online at:

<https://www.inaturalist.org/observations/111977878>

and

<https://www.inaturalist.org/observations/139598550>

L. tasmaniensis in life (as defined in this paper) is depicted in Hoser (1989) on page 28 (top), Hero *et al.* (1991) on page 70, Clulow and Swan (2018) on page 158 top, Cogger (2014) on page 52 (all photos), or Anstis (2013) on pages 415-417 (all images).

Distribution: *L. enidconnorsae* sp. nov. appears to be restricted to the Proserpine area of far north Queensland, excluding areas north of the Burdekin River and south of Mackay. There is a disjunction in known distributions of *L. shanescarffi* north of the Burdekin River, and *L. nathanscanesi* sp. nov. found generally south of Mackay along the coastal strip.

Neither *L. shanescarffi* or *L. enidconnorsae* sp. nov. are known from the region between Bowen and Ayr, a distance of over 100 km by road.

Neither *L. enidconnorsae* sp. nov. or *L. nathanscanesi* sp. nov. are known from the area between Bloomsbury in the north and Kuttabul in the south, being a distance of about 50 km by road.

L. nathanscanesi sp. nov. is restricted to a region along the coast of Queensland, generally bound by Mackay in the north and Brisbane in the south.

L. shanescarffi sp. nov. appears to be restricted to north-east Queensland in the wet tropics region, generally north of the Burdekin River Gap (Ayr/Home Hill).

L. tasmaniensis, including *L. affinis* Günther, 1863, (type locality of Clarence River, NSW) herein synonymised with that taxon is found throughout inland Queensland, including the far south coast of the State, as well as all or most of New South Wales, Victoria and Tasmania as well as most parts of eastern South Australia.

Etymology: Named in honour of Nathan Scanes, now (as of

2022) of Ramornie, near Grafton, New South Wales, Australia, in recognition of his lifetime of services to herpetology, aviculture and wildlife conservation generally, as well as correcting acts of taxonomic vandalism by the Wolfgang Wüster gang of thieves online.

CONSERVATION THREATS TO THE RELEVANT SPECIES

There are no known significant immediate conservation threats to any species discussed within this paper.

However, if the Australian government persists with its "Big Australia Policy", (see for example Saunders 2019 or Zaczek 2019), that being a long-term aim to increase the human population in Australia to over 100 million people by year 2150 (from the present 26 million as of 2022), all sorts of unforeseen threats to the survival of these species may emerge.

Due to unforeseen potential threats I recommend further research on the relevant species and including means to identify likely threats.

These may include direct human activities (e.g. land clearing for homes or farming activities), as well as potential threats caused by changed vegetation regimes, introduced pests and potential pathogens, including those introduced via the legal importation of foreign reptiles and amphibians by government-owned zoos and other government backed commercial enterprises.

Denial of the existence of the relevant taxa *sensu* Wüster *et al.* as outlined by Hoser (2019a, 2019b), could ultimately cause extinction of some of these frog taxa in the same way it caused one or more earlier extinctions as documented by Hoser (2019a, 2019b).

REFERENCES CITED

- Anstis, M. 2013. *Tadpoles and frogs of Australia*. Reed / New Holland, Sydney, Australia:829 pp.
- Boulenger, G. A. 1888. Descriptions of two new Australian frogs. *Annals and magazine of natural history* 6(2):142-143.
- Clulow, S. and Swan, M. 2018. A complete guide to Frogs of Australia, Australian Geographic, Sydney, NSW, Australia:336 pp.
- Clyne, D. 1969. *Australian Frogs*. Lansdowne Press, Melbourne, Victoria, Australia:112 pp.
- Cogger, H. G. 2014. *Reptiles and Amphibians of Australia* (Seventh Edition). CSIRO Publishing, Collingwood, Victoria, Australia:1033 pp.
- Cogger, H. G., Cameron, E. E. and Cogger, H. M. 1983. *Zoological Catalogue of Australia (1) Amphibia and Reptilia*, Australian Government Publishing Service, Canberra, ACT, Australia:319 pp.
- De Vis, C. W. 1884. On some new batrachians from Queensland. *Proceedings of the Linnaean Society of New South Wales* 9:65-68.
- Dubois, A., Bauer, A. M., Ceriaco, L. M. P., Dusoulier, F., Fretey, T., Lobl, I., Lorvelec, O., Ohler, A., Stopiglia, R. and Aescht, E. 2019. The Linz Zocode project: a set of new proposals regarding the terminology, the Principles and Rules of zoological nomenclature. First report of activities (2014-2019). *Bionomina* (online), 17:1-111.
- Duméril, A. M. C. and Bibron, G. 1841. *Erpétologie Générale ou Histoire Naturelle Complète des Reptiles*. Vol. 8, Paris: Librairie Roret: 792 pp.
- Eipper, S. and Rowland, P. 2018. *A Naturalist's Guide to the Frogs of Australia*. John Beaufoy Publishing, Oxford, UK:176 pp.
- Fitzinger, L. J. F. J. 1843. *Systema Reptilium. Fasciculus Primus*. Wien: Braumüller et Seidel.
- Fry, D. B. 1913. On a new *Varanus* and a frog from the Burnett River, Queensland, and a revision of the variations in *Limnodynastes dorsalis* Gray. *Records of the Australian Museum*, 10:17-34.
- Fry, D. B. 1915. Herpetological Notes. *Proceedings of the Royal Society of Queensland*. 27:60-95.
- Gray, J. E. 1831. A synopsis of the species of Class Reptilia. In: Griffith, E and Pidgeon, E. *The animal kingdom arranged in conformity with its organisation by the Baron Cuvier with additional descriptions of all the species hither named, and of many before noticed* [V Whittaker, Treacher and Co., London: 481+110 pp. [1830].
- Gray, J. E. 1841. Descriptions of some new species and four new genera of reptiles from Western Australia, discovered by John Gould, Esq. *Annals and magazine of natural history* 7: 86-91.
- Günther, A. 1858. *Catalogue of the Batrachia Sallenata in the Collection of the British Museum*, London. British Museum, UK:xvi+160 pp.
- Günther, A. 1863. On new species of batrachians from Australia. *Ann. Mag. Nat. Hist.* 3(11):26-28.
- Hero, J., Littlejohn, M. and Marantelli, G. 1991. *Frogwatch field guide to Victorian Frogs*, Department of Frequent Name Changes, Victoria Parade, East Melbourne, Victoria, Australia:108 pp.
- Hoser, R. T. 1989. *Australian Reptiles and Frogs*. Pierson and Co., Sydney, NSW, Australia:238 pp.
- Hoser, R. T. 2007. Wells and Wellington - It's time to bury the hatchet. *Calodema* Supplementary Paper 1:1-9.
- Hoser, R. T. 2009. Creationism and contrived science: A review of recent python systematics papers and the resolution of issues of taxonomy and nomenclature. *Australasian Journal of Herpetology* 2:1-34. (3 February).
- Hoser, R. T. 2012a. Exposing a fraud! *Afronaja* Wallach, Wüster and Broadley 2009, is a junior synonym of *Spracklandus* Hoser 2009! *Australasian Journal of Herpetology* 9 (3 April 2012):1-64.
- Hoser, R. T. 2012b. Robust taxonomy and nomenclature based on good science escapes harsh fact-based criticism, but remains unable to escape an attack of lies and deception. *Australasian Journal of Herpetology* 14:37-64.
- Hoser, R. T. 2013a. The science of herpetology is built on evidence, ethics, quality publications and strict compliance with the rules of nomenclature. *Australasian Journal of Herpetology* 18:2-79.
- Hoser, R. T. 2013b. Monitor Lizards reclassified with some common sense (Squamata: Sauria: Varanidae). *Australasian Journal of Herpetology* 21: 41-58.
- Hoser, R. T. 2015a. Dealing with the "truth haters" ... a summary! Introduction to Issues 25 and 26 of *Australasian Journal of Herpetology*. Including "A timeline of relevant key publishing and other events relevant to Wolfgang Wüster and his gang of thieves." and a "Synonyms list". *Australasian Journal of Herpetology* 25:3-13.
- Hoser, R. T. 2015b. The Wüster gang and their proposed "Taxon Filter": How they are knowingly publishing false information, recklessly engaging in taxonomic vandalism and directly attacking the rules and stability of zoological nomenclature. *Australasian Journal of Herpetology* 25:14-38.
- Hoser, R. T. 2015c. Best Practices in herpetology: Hinrich Kaiser's claims are unsubstantiated. *Australasian Journal of Herpetology* 25:39-64.
- Hoser, R. T. 2015d. PRINO (Peer reviewed in name only) journals: When quality control in scientific publications fails. *Australasian Journal of Herpetology* 26:3-64.
- Hoser, R. T. 2015e. Rhodin *et al.* 2015, Yet more lies, misrepresentations and falsehoods by a band of thieves intent on stealing credit for the scientific works of others. *Australasian Journal of Herpetology* 27:3-36.
- Hoser, R. T. 2015f. Comments on *Spracklandus* Hoser, 2009 (Reptilia, Serpentes, ELAPIDAE): request for confirmation of the availability of the generic name and for the nomenclatural validation of the journal in which it was published (Case 3601; see *BZN* 70: 234-237; comments *BZN* 71:30-38, 133-135). *Australasian Journal of Herpetology* 27:37-54.
- Hoser, R. T. 2019a. 11 new species, 4 new subspecies and a subgenus of Australian Dragon Lizard in the genus

Tympanocryptis Peters, 1863, with a warning on the conservation status and long-term survival prospects of some newly named taxa. *Australasian Journal of Herpetology* 39:23-52.

Hoser, R. T. 2019b. Richard Shine *et al.* (1987), Hinrich Kaiser *et al.* (2013), Jane Melville *et al.* (2018 and 2019): Australian Agamids and how rule breakers, liars, thieves, taxonomic vandals and law breaking copyright infringers are causing reptile species to become extinct. *Australasian Journal of Herpetology* 39:53-63.

Hoser, R. T. 2020. Three new species of frog in the genus *Limnodynastes* Fitzinger, 1843 from east Australia, two new *Platyplectron* Peters, 1863 species from east Australia and three new species of *Ranaster* Macleay, 1878 from north Australia. *Australasian Journal of Herpetology* 43:3-14.

Hoser, R. T. 2022a. Hiding in plain sight. A previously unrecognized biogeographical barrier in Australia formed by an event of biblical proportions. Five new species of skink lizard from south-west Victoria, three more closely related species from New South Wales and another from South Australia. *Australasian Journal of Herpetology* 56:3-21.

Hoser, R. T. 2022b. Greater diversity of skink species in south-east Australia than previously realized: *Carinascincus* Wells and Wellington, 1985 *sensu lato* is further divided. *Australasian Journal of Herpetology* 59:48-64.

International Commission of Zoological Nomenclature (ICZN) 1991. Decision of the commission. Three works by Richard W. Wells and C. Ross Wellington: proposed suppression for nomenclatural purposes. *Bulletin of Zoological Nomenclature* 48(4):337-338.

International Commission of Zoological Nomenclature (ICZN) 2001. Opinion 1970. *Bulletin of Zoological Nomenclature* 58(1):74, (30 March 2001).

International Commission of Zoological Nomenclature (ICZN) 2012. Amendment of Articles 8, 9, 10, 21 and 78 of the International Code of Zoological Nomenclature to expand and refine methods of publication. *Zootaxa* (PRINO) (Online) 3450:1-7.

International Commission of Zoological Nomenclature (ICZN) 2021. Opinion 2468 (Case 3601) - *Spracklandus* Hoser, 2009 (Reptilia, Serpentes, Elapidae) and *Australasian Journal of Herpetology* issues 1-24: confirmation of availability declined; Appendix A (Code of Ethics): not adopted as a formal criterion for ruling on Cases. *Bulletin of Zoological Nomenclature* 78 (30 April 2021):42-45.

Kaiser, H. 2012a. SPAM email sent out to numerous recipients on 5 June 2012.

Kaiser, H. 2012b. Point of view. Hate article sent as attachment with SPAM email sent out on 5 June 2012.

Kaiser, H. 2013. The Taxon Filter, a novel mechanism designed to facilitate the relationship between taxonomy and nomenclature, vis-à-vis the utility of the Code's Article 81 (the Commission's plenary power). *Bulletin of Zoological Nomenclature* 70(4) December 2013:293-302.

Kaiser, H. 2014a. Comments on *Spracklandus* Hoser, 2009 (Reptilia, Serpentes, ELAPIDAE): request for confirmation of the availability of the generic name and for the nomenclatural validation of the journal in which it was published. *Bulletin of Zoological Nomenclature*, 71(1):30-35.

Kaiser H. 2014b. Best Practices in Herpetological Taxonomy: Errata and Addenda. *Herpetological Review*, 45(2):257-268.

Kaiser, H., Crother, B. L., Kelly, C. M. R., Luiselli, L., O'Shea, M., Ota, H., Passos, P., Schleip, W. D. and Wüster, W. 2013. Best practices: In the 21st Century, Taxonomic Decisions in Herpetology are Acceptable Only When supported by a body of Evidence and Published via Peer-Review. *Herpetological Review* 44(1):8-23.

Macleay, W. 1877. The batrachians of the Chevert Expedition. *Proceedings of the Linnean Society of New South Wales* 2:135-138.

Parker, H. W. 1940. The Australian frogs of the family Leptodactylidae. *Novitates Zoologicae* 42:1-106.

Peters, W. C. H. 1863. Fernere Mittheilungen über neue Batrachier. *Monatsberichte der Königlichen Preussische Akademie des Wissenschaften zu Berlin* 1863: 445-470.

Ride, W. D. L. (ed.) *et al.* (on behalf of the International Commission on Zoological Nomenclature) 1999. *International code of Zoological Nomenclature*. The Natural History Museum - Cromwell Road, London SW7 5BD, UK (also commonly cited as "The Rules", "Zoological Rules" or "ICZN 1999").

Roberts, J. D. and Maxson, L. R. 1986. Phylogenetic-Relationships in the Genus *Limnodynastes* (Anura, Myobatrachidae) - a Molecular Perspective. *Australian Journal of Zoology*, 34(4):561-573.

Schäuble, C. S., Moritz, C. and Slade, R. W. 2000. A Molecular Phylogeny for the Frog Genus *Limnodynastes* (Anura: Myobatrachidae). *Molecular Phylogenetics and Evolution*, 16(3):379-391.

Schäuble, C. S. and Moritz, C. 2001. Comparative phylogeography of two open forest frogs from eastern Australia. *Biological Journal of the Linnean Society* 74:157-170.

Saunders, S. 2019. Morrison and Shorten's Big Australia: The overpopulation problem. News article published 17 April 2019 and downloaded from <https://independentaustralia.net/politics/politics-display/morrison-and-shortens-big-australia-the-overpopulation-problem,12584>

Steindachner, F. 1867. Amphibien in, Reise der oesterreichischen Fregatte Novara um die Erde in den Jahren 1857, 1858, 1859. *Zoologie* 1(4):1-70.

Tyler, M. J. 1976. A new genus and two new species of leptodactylid frogs from Western Australia. *Records of the Western Australian Museum* 4(1):45-52.

Tyler, M. J., Martin, A. A., and Davies, M. 1979. Biology and systematics of a new *Limnodynastine* genus (Anura: Leptodactylidae) from north-western Australia. *Australian Journal of Zoology* 27:135-150.

Vanderduys, E. 2012. *Field guide to the frogs of Queensland*. CSIRO, Collingwood, Victoria, Australia:192 pp.

Victorian Civil and Administrative Tribunal (VCAT). 2015. *Hoser v Department of Environment Land Water and Planning* (Review and Regulation) [2015] VCAT 1147 (30 July 2015, judgment and transcript).

Wells, R. W. and Wellington, C. R. 1985. A classification of the Amphibia and Reptilia of Australia. *Australian Journal of Herpetology, Supplementary Series*, (1):1-61.

Zaczek, Z. 2019. Former PM Kevin Rudd says Australia should drastically increase its population to 50 MILLION to make sure nation can defend itself in the face of threats from China. *Daily Mail* (Australia) (27 November), published online at: <https://www.dailymail.co.uk/news/article-7729689/Kevin-Rudd-says-Australia-increase-population-50-MILLION-defend-China.html>

CONFLICTS OF INTEREST

None.

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Formal identification and naming of a new subspecies of *Mixophyes (Quasimixophyes) fleayi* Corben and Ingram, 1987 from the Conondale Range, south-east Queensland.

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ABSTRACT

Long known to be morphologically divergent from populations south of the Brisbane River valley, this paper formally identifies and names *Mixophyes (Quasimixophyes) fleayi* Corben and Ingram, 1987 from the Conondale Range, south-east Queensland as a new subspecies in accordance with the rules of the *International Code of Zoological Nomenclature*.

This is a critically important first step to the conservation of this unique population, which in line with other frogs in the genus appears to be vulnerable to population declines arising from introduced pathogens.

Keywords: Taxonomy; Amphibia; nomenclature; Frog; Australia; Queensland; Conondale Range; *Mixophyes*; *Quasimixophyes*; *fleayi*; new subspecies; *conondaleensis*.

INTRODUCTION

In spite of a number of recent papers dealing with unnamed taxa within the genus *Mixophyes* Günther, 1864 *sensu lato* (e.g. Hoser, 2016, 2020a, 2020c), the divergent population of *Mixophyes (Quasimixophyes) fleayi* Corben and Ingram, 1987 from the Conondale Range, south-east Queensland has yet to receive taxonomic recognition.

While morphologically similar to the nominate form of *M. fleayi* with a type locality of Lamington National Park, south-east Queensland (south of the Brisbane River valley), The Conondale Range population is consistently sufficiently divergent to warrant taxonomic recognition at the subspecies level.

While normally there is no major urgency in identifying subpopulations or subspecies at a taxonomic level, this is not the case for frogs within the genus *Mixophyes*, which collectively have declined sharply over the last 50 years. This is presumably as a result of a high Chytrid Fungus (*Batrachochytrium dendrobatidis* Longcore, Pessier and Nichols, 1999) susceptibility.

Entire populations of *Mixophyes* have apparently vanished from areas where they were formally common, including in particular in southern New South Wales.

With the preceding in mind, it was decided to view specimens of *M. fleayi* from across the range of the putative species to confirm the need to formally recognize one or more populations at the subspecies level.

MATERIALS AND METHODS

Following on from the publications of Hoser (2016, 2020a, 2020c) there was no need to review the literature in any way, as the relevant species (*M. fleayi*) is well known, as is the distribution. Based on the habits of the species and the genus, it can be reasonably assumed that there are no other major unknown populations of this species awaiting detection by herpetologists.

The bulk of the population occurs south of the Brisbane River,

generally near the border ranges, including west of the coast in the east-facing ranges.

Specimens from here and the outlying population from the Conondale Range north of Brisbane were inspected (live, dead and from photos), to determine consistent differences (if any) that would enable taxonomic recognition of that population as a subspecies, when considered in combination with its divergence across a biogeographical barrier of known antiquity.

Noting that in times of recent glacial maxima, the south-east Queensland climate was drier than at present, there could not have been any recent mixing of populations in the recent geological past.

South of the Brisbane River there were two main populations, but it was quickly ascertained that they were morphologically indistinguishable.

In all about 20 (adult) specimens from the Conondale Range were inspected as was about 200 (adults) from areas generally south of the Brisbane River.

RESULTS

The Conondale Range population did show consistent morphological divergence, enabling it to be formally named as a new subspecies, which is done below.

This was not unexpected.

The Conondale Range is known for its endemism and includes the frog taxa *Assa jamesbondi* Hoser, 2020 (Hoser 2020b) and of course the well-known Gastric Brooding Frog *Rheobatrachus silus* Liem, 1973 also only known from the Conondale Range and nearby Blackhall Range.

While *Mixophyes sensu lato* is an archaic group, I have retained a conservative position by formally naming the Conondale Range population of putative *M. fleayi* as a subspecies and not a full species, in accordance with the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

**MIXOPHYES (QUASIMIXOPHYES) FLEAYI
CONONDALEENSIS SUBSP. NOV.**

LSIDurn:lsid:zoobank.org:act:93329BBB-9305-42D7-AC2D-093F82832C88

Holotype: A preserved specimen at the Queensland Museum, Brisbane, Queensland, Australia, specimen number QM J86613, collected from Bundaroo Creek, Conondale National Park, Queensland, Australia, Latitude -26.690 S., Longitude 152.610 E. This government-owned facility allows access to its holdings.

Paratypes: Two preserved specimens at the Queensland Museum, Brisbane, Queensland, Australia, specimen numbers J77256 and J92737 both collected from the Conondale Range, South-east Queensland, Australia.

Diagnosis: *Mixophyes fleayi conondaleensis* subsp. nov. from the Conondale Range is readily separated from the nominate form of *M. fleayi* from south of the Brisbane River valley by the following combination of adult characters: On the yellow area of the mid to lower flanks there are only a few blackish spots, versus many in nominate *M. fleayi*; the barring of the fore and hind limbs upper surfaces is either absent or barely noticeable, versus bold and well defined in nominate *M. fleayi*.

M. fleayi (both subspecies) are separated from the other two species within the subgenus *Quasimixophyes* (*M. hoserae* Hoser, 2020 and *M. balbus* Straughan, 1968) by having at least some well defined black spots on the mid or lower flanks.

M. fleayi conondaleensis subsp. nov. in life from the Conondale Range is depicted online at:

<https://www.inaturalist.org/observations/106232978>

M. fleayi of the nominate form is depicted in life in Clulow and Swan (2018) on page 229 and online at:

<https://www.flickr.com/photos/toddburrows/6829698020/>

and

<https://www.inaturalist.org/observations/145008570>

(all relevant links last checked and OK as of 5 May 2023)

Frogs within the subgenus *Quasimixophyes* Hoser, 2020 are separated from the nominate subgenus of *Mixophyes* Günther, 1864 by having a grey (not whitish) upper lip and areas of darker pigment being prominent on the upper lip, versus a pale creamy white upper lip without obvious darker blotches in *Mixophyes*.

The subgenus *Feremixophyes* Hoser, 2020 is readily separated from the other two subgenera within *Mixophyes* Günther, 1864 by the following two characters: The length of the inner metatarsal tubercle is approximately half the length of the first toe versus nearly equal to the length in the other two subgenera and the webbing between the toes extends to the second most distal joint of the fourth toe. The web extends to the third most distal joint of the fourth toe in the other two subgenera and to the terminal disc of the fourth toe in *Oxyslop* Hoser, 2020. *Feremixophyes* can be separated from *Paramixophyes* Hoser, 2016 by having a few or no scattered dark spots on the side versus a broad zone of numerous dark spots on the side.

Feremixophyes can also be distinguished from *Oxyslop* by the absence of an uninterrupted narrow vertebral stripe extending from between the eyes to just above the vent.

The nominate subgenus of *Mixophyes* includes the so-called *M. fasciolatus* Günther, 1864 species group, including *M. fasciolatus* Günther, 1864, *M. shireenae* Hoser, 2016 and *M. couperi* Hoser, 2016 from wet forested riverine habitats south of the wet tropics in Queensland along the coast and nearby ranges to southern New South Wales.

The subgenus *Feremixophyes* includes the north Queensland clade of species being *M. schevilli* Loveridge, 1933 (type species), *M. coggeri* Mahony, Donnellan, Richards and McDonald, 2016 and *M. carbinensis* Mahony, Donnellan, Richards and McDonald, 2016 and is confined to the wet tropics region of far north Queensland.

The subgenus *Quasimixophyes* includes members of the so-called *M. balbus* Straughan, 1968 group of species, including *M. hoserae* Hoser, 2020 (type species) (including relevant

subspecies), *M. balbus* and *M. fleayi* Corben and Ingram, 1987 and are found from south-east Queensland south along the coast and nearby ranges to northeast Victoria. Species in each of the three subgenera also have significantly different reproductive biology's further supporting the subgenus level split of Hoser (2020a)

Distribution: *Mixophyes fleayi conondaleensis* subsp. nov. is only known from the Conondale Range, Queensland, Australia.

Etiymology: Named in reflection of where it is known from.

Conservation: Due to the small area of known distribution of the subspecies and vulnerability of the genus to pathogens such as Chytrid Fungus, it is essential that this taxon be recognized immediately and a proper management plan be enacted to ensure the long term survival of this subspecies.

The comments in Hoser (2019a, 2019b) with respect to improper synonymisation of taxa are particularly relevant with regards to this subspecies.

END NOTE

On or about 2 June 2023, Jodi Rowley, published a paper in the notorious online PRINO "journal" *Zootaxa*, quite properly known in many circles as "*Zootoxic*".

The paper, known as Mahony *et al.* (2023) had as its sole basis the renaming of the frog *Mixophyes hoserae* Hoser, 2020 as *M. australis*.

It goes without saying that the junior synonym name should not be used.

Significantly the paper also provided substantiation of the generic and subgeneric arrangement of *Mixophyes sensu lato* as determined by Hoser (2016, 2020a, 2020c) as well as the newly named species and subspecies within those papers, most notably including those species named from Queensland.

What was particularly disgusting about the publication of Mahony *et al.* (2023) was the simultaneous and well-coordinated campaign of marketing, including a series of fake news releases and stories online within a week of the *Zootaxa* paper, alleging that Mahony *et al.* had in fact discovered this species.

See for example:

<https://www.miamiherald.com/news/nation-world/world/article276119091.html>

and

<https://phys.org/news/2023-06-species-frog-nsw-endangered.html>

and

<https://reptilesmagazine.com/researchers-discover-new-australian-barred-frog-species-in-new-south-wales/>

At all materially relevant times, Rowley and Mahony *et al.* knew this to be untrue.

Simultaneous to this was a next-level negative SEO campaign to ensure effective removal of *M. hoserae* from the searchable internet and its replacement with the improperly coined junior synonym *M. australis*.

This included Code-defying entries on the FrogID App run by Rowley on behalf of the Australian Museum as well as Darrel Frost's high traffic "Amphibians of the World" website under the umbrella of the American Museum of Natural History.

To maintain their veneer of unanimous approval, the cohort systematically removed posts and comments alerting others of the senior synonym *M. hoserae* from Facebook and other online platforms.

It goes without saying that the rules of the International Code of Zoological Nomenclature and Copyright laws are absolute and on this basis the correct nomen for the relevant taxon is *M. hoserae*.

REFERENCES CITED

Clulow, S. and Swan, M. 2018. *Australian Geographic, A complete guide to Frogs of Australia*. Australian Geographic, Sydney, Australia:336 pp.

Corben, C. J. and Ingram, G. J. 1987. A new barred river frog

(Myobatrachidae: *Mixophyes*). *Memoirs of the Queensland Museum* 25:233-237.

Günther, A. C. L. G. 1864. Third contribution to our knowledge of batrachians from Australia. *Proceedings of the Zoological Society of London* 1864:46-49.

Hoser, R. T. 2016. New frogs of the genus *Mixophyes* Günther, 1864 from Eastern Queensland, and New South Wales, Australia (Anura: Myobatrachidae). *Australasian Journal of Herpetology* 33:60-64.

Hoser, R. T. 2019a. 11 new species, 4 new subspecies and a subgenus of Australian Dragon Lizard in the genus *Tympanocryptis* Peters, 1863, with a warning on the conservation status and long-term survival prospects of some newly named taxa. *Australasian Journal of Herpetology* 39:23-52.

Hoser, R. T. 2019b. Richard Shine *et al.* (1987), Hinrich Kaiser *et al.* (2013), Jane Melville *et al.* (2018 and 2019): Australian Agamids and how rule breakers, liars, thieves, taxonomic vandals and law breaking copyright infringers are causing reptile species to become extinct. *Australasian Journal of Herpetology* 39:53-63.

Hoser, R. T. 2020a. The inevitable reassessment of the Australasian frog genera *Mixophyes* Günther, 1864 and *Taudactylus* Straughan and Lee, 1966, resulting in the formal descriptions of two new families, new subfamilies and tribes, three new genera, 2 new subgenera, 1 new species and 2 new subspecies. *Australasian Journal of Herpetology* 43:15-26.

Hoser, R. T. 2020b. Four new species of frog in the genus *Assa* from eastern Australia. *Australasian Journal of Herpetology* 47:57-63.

Hoser, R. T. 2020c. 3 new tribes, 3 new subtribes, 5 new genera, 3 new subgenera, 39 new species and 11 new subspecies of

mainly small ground-dwelling frogs from Australia. *Australasian Journal of Herpetology* 50-51:1-128.

Liem, D. S. S. 1973. A new genus of frog of the family Leptodactylidae from S. E. Queensland, Australia. *Memoirs of the Queensland Museum* 16:459-470.

Longcore, J. E., Pessier, A. P. and Nichols, D. K. 1999. *Batrachochytrium dendrobatidis* gen. et sp. nov., a chytrid pathogenic to amphibians. *Mycologia* 91(2):219-227.

Loveridge, A. 1933. Four new crinine frogs from Australia. *Occasional Papers of the Boston Society of Natural History* 8:55-60.

Mahony, M. J., Donnellan, S. C., Richards, S. J. and McDonald, K. R. 2006. Species boundaries among barred river frogs, *Mixophyes* (Anura: Myobatrachidae) in north-eastern Australia, with descriptions of two new species. *Zootaxa* (PRINO) (online) 1228:35-60.

Mahony, M. J., Bertozzi, T., Guzinski, J., Hines, H. B. and Donnellan, S. C. 2023. A new species of barred frog, *Mixophyes* (Anura: Myobatrachidae) from south-eastern Australia identified by molecular genetic analyses. *Zootaxa* (PRINO) (Online) 5297 (3):301-336.

Ride, W. D. L. (ed.) *et al.* (on behalf of the International Commission on Zoological Nomenclature) 1999. *International code of Zoological Nomenclature*. The Natural History Museum - Cromwell Road, London SW7 5BD, UK (also commonly cited as "The Rules", "Zoological Rules" or "ICZN 1999").

Straughan, I. R. 1968. A taxonomic review of the genus *Mixophyes* (Anura, Leptodactylidae). *Proceedings of the Linnean Society of New South Wales* 93: 52-59.

CONFLICTS OF INTEREST

None.

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A new species of *Ptychozoon* Kuhl and Van Hasselt, 1822 hitherto confused with *P. trinotaterra* Brown, 1999 from Vietnam, Asia.

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ABSTRACT

The last major review of *Ptychozoon* Kuhl and Van Hasselt, 1822 *sensu lato* was that of Hoser (2018) in which ten new species were formally named.

An ongoing audit of the south-east Asian herpetofauna flagged an eastern population of putative *P. trinotaterra* Brown, 1999 from east of the Mekong Valley in Vietnam as being morphologically divergent from the type form from west of the Mekong Valley, with a type location of Sakaerat, Amphoe Pak Thong Chai, Nakhon Ratchasima Province, Thailand.

Differences in form and the fact that the barrier between the two relevant populations is of known antiquity warranted the eastern population being named a new species.

It is therefore named herein as *Ptychozoon gregwallisi* sp. nov. in accordance with the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

Keywords: Taxonomy; reptilia; Gekkota; gecko; *Ptychozoon*; nomenclature; Asia; Vietnam; new species; *nathanscanesi*.

INTRODUCTION

South-east Asia has long been recognised as a region of high biodiversity. However in recent years, it has become increasingly apparent that previous estimates of biodiversity in herpetofauna have been far lower than the reality.

The last major review of geckoes in the genus *Ptychozoon* Kuhl and Van Hasselt, 1822 *sensu lato* was that of Hoser (2018) in which ten new species were formally named.

An ongoing audit of the south-east Asian herpetofauna form obviously unnamed species, flagged an eastern population of putative *P. trinotaterra* Brown, 1999 from east of the Mekong Valley in Vietnam as being morphologically divergent from the type form from west of the Mekong Valley, with a type location of Sakaerat, Amphoe Pak Thong Chai, Nakhon Ratchasima Province, Thailand.

Differences in form and the fact that the barrier between the two relevant populations is of known antiquity warranted the eastern population being named a new species.

It is therefore named herein as *Ptychozoon nathanscanesi* sp. nov. in accordance with the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

MATERIALS, METHODS AND RESULT

Before finalizing the decision to formally name the Vietnam population of putative *P. trinotaterra* as a new species a series of checks were done.

This included the literature relevant to *P. trinotaterra*, including the papers of Brown (1999) that originally described the species, but based on specimens from east and west of the central Mekong Valley, as well as Hartmann *et al.* (2014), Hoser (2018),

Kunya *et al.* (2011), Lalremsanga *et al.* (2023) and sources cited therein.

Specimens from either side of the Mekong Valley were inspected to confirm consistent differences between the populations.

There was no available name for the Vietnamese animals at the species level.

Furthermore, it was noted that the molecular evidence provided by Lalremsanga *et al.* (2023) relevant to their newly named taxon "*Gekko mizoramensis*" also indicated two species within what was regarded as putative *P. trinotaterra*.

In combination, the morphological divergence, across a barrier of known antiquity combined with DNA evidence of Lalremsanga *et al.* (2023), confirming the antiquity of the split, in combination made the case for naming the eastern population of putative *P. trinotaterra* as a new species compelling.

Therefore it is formally named in accordance with the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999) as a new species *Ptychozoon nathanscanesi* sp. nov. below.

PTYCHOZOON NATHANSCANESI SP. NOV.

LSIDurn:lsid:zoobank.org:act:B65EE8BB-31AA-499C-8417-BA2040AF7F21

Holotype: A preserved adult male specimen at the Royal Ontario Museum, Toronto, Canada, specimen number ROM 31912 collected from the south slope of Yok Don Mountain, Yok Don National Park, adjacent to the Dak Ken River, Vietnam, Latitude 12.054 N., Longitude 10.8042 E.

This facility allows access to its holdings.

The holotype was photographed in life and is depicted in Fig 2 in Brown (1999), where he lists it as a paratype of his taxon *P.*

trinotaterra.

Paratypes: Two preserved specimens at the Royal Ontario Museum, Toronto, Canada, specimen numbers ROM 31910 and ROM 31911 collected from Gia Lai Province, 2 km north of Tram Lap, adjacent to the Azum River, Gia Lai Province, Vietnam.

Diagnosis: *Ptychozoon nathanscanesi* sp. nov. is readily separated from the morphologically similar *P. trinotaterra* Brown, 1999 by having 3-4 chevron-like markings on the dorsum formed by thick dark blackish lines that are well defined and unbroken (versus extremely thin and usually broken in *P. trinotaterra*), the dark-blackish chevron-like markings extending as dark peppering on either side of the dorsum (versus absent in *P. trinotaterra*). At the distal end of the original tail, two of the dark rings on the tail are virtually black and well-defined, versus at most ill-defined dark in *P. trinotaterra*.

At the back of the head, the dark chevron-type markings are effectively joined or near joined and allow for a well defined interface between dark anterior and light posterior, the light in effect also having a well-defined triangular aspect at the centre of the back of the head, versus ill-defined and not obviously triangular-shaped in *P. trinotaterra*.

P. nathanscanesi sp. nov. lacks the single mid-vertebral row of flat dorsal tubercles seen in adult *P. trinotaterra*.

Both *P. nathanscanesi* sp. nov. and *P. trinotaterra* Brown, 1999 are separated from all other species of *Ptychozoon* Kuhl and Van Hasselt, 1822 by the unique combination of three (vs four) transverse bands in the axilla-groin region, 19-21 preanofemoral pore-bearing scales in a continuous series, 15-16 cutaneous denticulate lobes of the tail, lateral orientation of the caudal lobes, minimal reduction in total width of distal portions of the tail, absence of substantive lateral expansion of the straight-edged tail terminus beyond the nearest denticulate caudal lobe, minimal lobe fusion at the proximal border of the tail terminus, continuation of caudal tubercles distally on to the dorsal surface of tail terminus, and absence of a predigital notch in the preantibrachial cutaneous expansion (modified from Brown, 1999).

P. nathanscanesi sp. nov. (the holotype) is depicted in life on page 991 of Brown (1999) downloadable from <https://www.jstor.org/>

Images of *P. trinotaterra* Brown, 1999 in life can be downloaded from Kunya *et al.* (2011), on page 821 (3 images) and Hartmann *et al.* (2014) on page 13.

According to Hoser (2018), Lizards of the genus *Ptychozoon* Kuhl and Van Hasselt, 1822 as currently recognized are readily separated from all other living geckos by the following unique combination of characters: Digits strongly dilated, entirely webbed, with undivided lamellae below; all but the thumb and inner toe have a compressed curved distal phalanx with retractile claw, originating a little before the extremity of the digital expansion. Limbs and sides of head, body and tail with much developed membranous expansions acting as parachutes when lizards jump from elevated surfaces. Upper surfaces of the body are covered with juxtaposed granular scales and tubercles; lower surfaces have small, slightly imbricated scales; the parachute membrane is covered above with imbricated square scales arranged like the bricks of a wall to support it and are scaleless inferiorly. The genus *Alexteescolotes* Hoser, 2018 is separated from *Ptychozoon* by the absence of these support scales and it was until now included in the same genus. Caudal lobe angling is slight to strong. Pupil is vertical. Males with praeanal pores. Adults range from 60-110 mm maximal snout-vent length.

The genus *Alexteescolotes* Hoser, 2018 type species *Gecko rhacophorus* Boulenger, 1899, more recently known *Ptychozoon rhacophorus* (Boulenger, 1899) and species formerly included in the genus *Ptychozoon* Kuhl and Van Hasselt, 1822 and diagnosed as above, is readily separated from *Ptychozoon* by the absence of imbricate parachute support scales which are present in all species of *Ptychozoon* and *Cliveevattcalotes* Hoser,

2018 the species within *Cliveevattcalotes* Hoser, 2018 also until now being included in *Ptychozoon*. *Alexteescolotes* Hoser, 2018 is further separated from both other genera by the absence of an infra-auricular cutaneous expansion as seen in all other species. The genus *Cliveevattcalotes* Hoser, 2018 including the species until now known as *Ptychozoon lionotum* Annandale, 1905 and an allied form recently described as *Cliveevattcalotes steveteesi* Hoser, 2018 and type species for the genus, is separated from both *Ptychozoon* and *Alexteescolotes* Hoser, 2018 by the presence of a predigital notch in a preantibrachial expansion, versus none in all other species in both other genera.

Distribution: *Ptychozoon nathanscanesi* sp. nov. occurs in generally elevated areas east of the main Mekong River Valley in south and central Vietnam, generally away from the east coast.

P. trinotaterra Brown, 1999 occurs west of the main Mekong Valley in western Cambodia and eastern Thailand as well as presumably nearby parts of south-east Laos.

Etymology: *Ptychozoon nathanscanesi* sp. nov. is named in honour of Nathan Rodney Scanes of New South Wales, Australia, currently living at Ramornie in northern New South Wales, in recognition for his services to herpetology and aviculture in Australia spanning some decades, as well as his ongoing fight against taxonomic vandalism and copyright theft online, being an important part of his wildlife conservation effort.

Conservation: Few species of reptiles in south-east Asia can seriously be regarded as secure in the long term, noting the massive human overpopulation in the region. Delayed recognition of *P. nathanscanesi* sp. nov. could potentially result in the demise of the species in line with example/s cited in Hoser (2019a, 2019b). How well this taxon adapts to human disturbances over the long term is also effectively unknown, especially with regards to competing species and potential predators.

REFERENCES CITED

- Brown, R. M. 1999. New species of parachute gecko (Squamata: Gekkonidae: Genus *Ptychozoon*) from northeastern Thailand and central Vietnam. *Copeia* 1999(4):990-1001.
- Hartmann, T., Betts, A. B., De Greef, S. and Ihlow, F. 2014. First record of the rare parachute gecko *Ptychozoon trinotaterra* Brown, 1999 from Cambodia. *Cambodian Journal of Natural History*, 2014:12-13.
- Hoser, R. T. 2018. A revised taxonomy of the gecko genus *Ptychozoon* Kuhl and Van Hasselt, 1822, including the formal erection of two new genera to accommodate the most divergent taxa and description of ten new species. *Australasian Journal of Herpetology* 38:19-31.
- Hoser, R. T. 2019a. 11 new species, 4 new subspecies and a subgenus of Australian Dragon Lizard in the genus *Tympanocryptis* Peters, 1863, with a warning on the conservation status and long-term survival prospects of some newly named taxa. *Australasian Journal of Herpetology* 39:23-52.
- Hoser, R. T. 2019b. Richard Shine *et al.* (1987), Hinrich Kaiser *et al.* (2013), Jane Melville *et al.* (2018 and 2019): Australian Agamids and how rule breakers, liars, thieves, taxonomic vandals and law breaking copyright infringers are causing reptile species to become extinct. *Australasian Journal of Herpetology* 39:53-63.
- Kunya, K., Pauwels, O. S. G., Sairum, P. and Taokratok, A. 2011. Squamata, Gekkonidae, *Ptychozoon trinotaterra* Brown, 1999: rediscovery in Thailand. *Check List*, 7:820-822.
- Lalremsanga, H. L., Muansanga, L., Vabeiryureilai, M. and Mirza, Z. A. 2023. A new species of Parachute Gecko of the subgenus *Ptychozoon* (Sauria: Gekkonidae: Gekko) from the Indo-Burma region. *Salamandra* 59(2):125-135.
- Ride, W. D. L. (ed.) *et al.* (on behalf of the International Commission on Zoological Nomenclature) 1999. *International code of Zoological Nomenclature*. The Natural History Museum - Cromwell Road, London SW7 5BD, UK.

CONFLICTS OF INTEREST - NONE.

***Bitis (Macrocerastes) hoserae* Hoser, 2013 split.**

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ABSTRACT

In 2013, I (Raymond Hoser) published several papers that formed a major revision of the African viperidae, which among other things, split the putative species *Bitis (Macrocerastes) nasicornis* (Shaw and Nodder, 1792) across the Dahomey Gap into two species.

The central African taxon became known as *B. hoserae* Hoser, 2013 and is readily separated from *B. nasicornis* by the fact that under the eye there is no white separation of the brown on the upper labials, this being semi-circular in *B. nasicornis*.

Since the publication of Hoser, 2013 it has emerged that within putative *B. hoserae*, two quite divergent populations exist.

While more closely related to one another than they are to *B. nasicornis*, they diverged an estimated 1.5 MYA and so the population centred on Cameroon in Africa is formally named as *B. awe* sp. nov.. The name-bearing population from the Democratic Republic of Congo, Uganda, South Sudan, Kenya and nearby remains as *B. hoserae*.

Keywords: Taxonomy; nomenclature; Africa; Viper; viperidae; snake; Cameroon; *Bitis*; *Macrocerastes*; *hoserae*; *nasicornis*; new species; *awe*.

INTRODUCTION

In 2013, I (Raymond Hoser) published a major revision of the African viperidae, which among other things, split the putative species *Bitis (Macrocerastes) nasicornis* (Shaw and Nodder, 1792) across the Dahomey Gap into two species.

The central African taxon became known as *B. hoserae* Hoser, 2013 and is readily separated from *B. nasicornis* from East Africa by the fact that under the eye there is no white separation of brown on the upper labials, this being semi-circular in *B. nasicornis*.

Since the publication of Hoser, 2013 it has emerged that within putative *B. hoserae*, two quite divergent populations exist.

While more closely related to one another than they are to *B. nasicornis*, which is why Hoser (2013) treated them as a single species, the two populations diverged an estimated 1.5 MYA based on samples at Genbank and so the population centred on Cameroon in Africa is formally named as *B. awe* sp. nov.. The name-bearing population from the Democratic Republic of Congo, Uganda, South Sudan, west Kenya and nearby remains as *B. hoserae*. *B. nasicornis* is confined to rainforests west of the Dahomey Gap in Sub-Saharan west Africa, mainly in Ghana, The Ivory Coast and to a lesser extent, Liberia.

MATERIALS AND METHODS

Live and dead specimens within the *B. nasicornis* / *B. hoserae* complex were examined from across their known distribution to identify consistent differences between the three populations.

Upon identification of consistent differences between the east and west populations of *B. hoserae*, the decision was made to formally identify the species from the west of the range of putative *B. hoserae* as a new taxon, namely *B. awe* sp. nov. in accordance with the rules of the *International Code of Zoological Nomenclature* (Ride et al. 1999)..

BITIS MACROCERASTES AWE SP. NOV.

LSIDurn:lsid:zoobank.org:act:76FA5F75-7E3C-486B-BA3A-E1EDCE807D8C

Holotype: A preserved specimen at the California Academy of Sciences, San Francisco, USA, specimen number CAS HERP 253603 collected from a campsite at the Dja Reserve, Sud Province, Cameroon, Africa, Latitude 3.102568 N., Longitude 12.313583 E. at an elevation of about 646 metres ASL. This facility allows access to its holdings. The holotype snake has an SVL of 272 mm and tail of 22 mm.

Paratypes: 1/ A preserved specimen at the National Museum of Natural History, Smithsonian Institution,

Washington, DC, USA, specimen number USNM Amphibians & Reptiles 571013 collected from Nyasoso in the south-west region of Cameroon, Africa, Latitude 4.83 N., Longitude 9.68 E. at 900 metres ASL. 2/ A preserved juvenile specimen at the National Museum of Natural History, Smithsonian Institution, Washington, DC, USA, specimen number USNM Amphibians & Reptiles 571015 collected from Mt. Nlonako in the Littoral Province, Cameroon, Africa, Latitude 4.54 N., Longitude 9.58 E. at 1660 metres ASL. 3/ A preserved specimen at the California Academy of Sciences, San Francisco, USA, specimen number CAS HERP 16983 collected from near the Ogooue River, Lambarene, Moyen-Ogooue Province, Gabon, Africa, Latitude -0.6958 S., Longitude 10.2230 E. 4/ Six preserved specimens at the Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA, specimen number MCZ Herp R-7862 (all six), collected from Kribi, Cameroon, Africa, Latitude 2.95 N., Longitude 9.917 E.

Diagnosis: Both *Bitis hoserae* Hoser, 2013 and *B. awe* sp. nov. are readily separated from *B. nasicornis* (Shaw and Nodder, 1792) by the fact that the dark colouring of the upper labials below the eye runs into the eye, without complete separation by white below the eye as is seen in *B. nasicornis*.

This consistent trait allows for identification of the relevant species from photos alone.

Also of note is that the dark patch under the eye of *B. nasicornis* advances considerably anterior to the eye, as opposed to only slightly forward of the eye in *Bitis hoserae* and *B. awe* sp. nov..

In turn *B. hoserae* is readily separated from *B. awe* sp. nov. by the fact that the darker intrusions from the venter to the mid-flanks are bounded by well-defined black at the top edge, versus no such well-defined black edge in *B. awe* sp. nov.. The dark blackish blotches on the dorsum are bounded by bold purple red in adult *B. hoserae*, versus a more diffuse colour in adult *B. awe* sp. nov..

It should also be noted that *Bitis awe* sp. nov. from Nigeria sometimes have a triangular patch under the eye (not the semicircle of *B. nasicornis*), the base of the triangle being at the labials, but with the dark upper tip intersecting the orbit and dividing lighter areas into two. At the labials, there may be some lighter scales, but these do not form a continuous strip as seen in *B. nasicornis*. All of *B. hoserae*, *B. awe* sp. nov. and *B. nasicornis* are diagnosed as follows: They are a large and stout True Viper, similar in many respects to *B. gabonica* but easily separated from that taxon by their large raised granular scales on the upper surfaces of the head, neck and upper body.

The three species *B. hoserae*, *B. awe* sp. nov. and *B. nasicornis* range in length from 72 cm to 107 cm. Spawls *et al.* (2004) mentioned a maximum length of 120 cm, but admitted that this is exceptional, quoting an average length of 60-90 cm. Females grow larger than males.

The head is narrow, flat, triangular and relatively small compared to the rest of the body. The neck is thin. These snakes have a distinctive set of two or three horn-like scales on the end of their

noses, the front pair of which may be quite long. The eyes are small and set well forward. The fangs are not large,

in contrast to the *B. gabonica* species complex and are rarely more than 1.5 cm in length.

There are 31-43 dorsal midbody scale rows. These are so rough and heavily keeled that they occasionally inflict cuts on handlers when the snakes struggle, again diagnostic of the three species. There are 117-140 ventrals, single anal and 16-32 subcaudals, with males having a higher count

(25-30) than females (16-19).

The distinct dorsal colour pattern consists of a series of 15-18 blue or blue-green, oblong markings, each with a lemon-yellow line down the center. These are enclosed within irregular, black,

rhombic blotches. A series of dark crimson triangles run down the flanks, narrowly bordered with green or blue. Many of the lateral scales have white tips, giving the snake a velvety appearance. The top of the head is blue or green, overlaid with a distinct black arrow mark. The belly is dull green to dirty white, strongly marbled and blotched in black and gray.

Distribution: *B. awe* is found east of the Dahomey Gap in equatorial Africa, from about Nigeria in the west, into Cameroon, Equatorial Guinea, Gabon, Congo (Brazzaville) and into the western part of the Central African Republic. *B. hoserae* is herein confined to the Democratic Republic of Congo (DRC), Uganda, South Sudan, Rwanda and west Kenya.

B. nasicornis is found in wetter areas west of Ghana and including parts of west Togo.

Etymology: *B. awe* sp. nov. is named in reflection of the "awe" people have when encountering this magnificent serpent. The name is also short and therefore easy to remember.

Conservation: In spite of a putative wide distribution for all three species within the *B. nasicornis* / *B. hoserae* complex, intense human population growth in the relevant region is putting all three species at long-term risk of extinction. The most secure of the trio is *B. hoserae*, mainly because a lot of good habitat for this taxon is within national parks and reserves in Kenya and Uganda. Captive populations should be maintained as a safeguard against precipitous declines in the wild.

REFERENCES CITED

Hoser, R. T. 2013. A formal five-way division of the Gaboon Viper Species Complex: *Bitis* (*Macrocerastes*) *gabonica* (Duméril, Bibron and Duméril, 1854) and a two-way division of the Nose-horned Viper species complex *Bitis* (*Macrocerastes*) *nasicornis* (Shaw, 1802) (Serpentes: Viperidae: Bitisini). *Australasian Journal of Herpetology* 19:25-31.

Ride, W. D. L. (ed.) *et al.* (on behalf of the International Commission on Zoological Nomenclature) 1999. *International code of Zoological Nomenclature*. The Natural History Museum - Cromwell Road, London SW7 5BD, UK (also commonly cited as "The Rules", "Zoological Rules", "The Code" or "ICZN 1999").

CONFLICTS OF INTEREST - NONE.

Cite this paper as:

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Never say never! Two adult female Australian Copperhead Snakes sharing a single rock in the Spring.

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ABSTRACT

In mid October 2022, I (Raymond Hoser) as the Melbourne snake catcher was called to Hillcrest Christian College in the outer Melbourne suburb of Clyde, to catch a snake. It was a female Copperhead sunbaking on a rock in a rocky drainage ditch.

Turned out that there was two in the same site.

With Copperheads having a reputation of not liking their own kind to the extent that they eat one another regularly, and appear to have no immunity to their own venom, that two adult female snakes chose to be together is worth reporting as part of the scientific literature.

Keywords: Copperhead; snake; *Austrelaps*; *superbus*; Clyde north; two females.

INTRODUCTION AND SUMMARY

In mid October 2022, as the Melbourne snake catcher, I (Raymond Hoser) was called to Hillcrest Christian College, in Clyde North, Victoria, to catch a snake that had been seen basking in a rocky ditch on the perimeter of the school.

St. Patrick apparently is no good with Australian venomous snakes, so the "God Squad" get the Snake Man ® to deal with their snake problems instead.

Upon being shown where the snake was, I saw an adult Copperhead snake *Austrelaps superbus* (Günther, 1858) basking on a whitish piece of granite in a drainage ditch comprised of lots of mid-sized blocks of granite.

As I ran to the snake it fled under the rock, but I was able to grab it by the tail, stopping the escape.

At this point, I saw that the rock it was fleeing under was small enough to lift, so rather than pulling the snake from the hole, I simply lifted the rock to free the snake more easily.

As I did this, I saw and grabbed a second adult Copperhead.

The first snake that had retreated to the rock cavity, had in fact curled around the second one.

Both were adult females.

While the rock the snakes went under was in a ditch and to that extent out of wind, so too were countless rocks on every side of the ones the snakes had chosen to lodge under.

The whole ditch was filled with similar sized rocks and realistically there were no thermal advantages in the rock the snakes were hiding under as compared to others in the area.

In similar sites (e.g. Lynbrook Railway Station) where I am called to retrieve Copperheads most years in early spring, it is not uncommon for me to find and catch more than one copperhead, basking in the spring sun in a garden bed, or stony drainage ditch. But invariably the snakes make a point of keeping away from one another and not basking on top of one another.

It is for this reason, I found the two snakes being in the same site, so unusual.

That the two females had chosen to be together is beyond any doubt. I do not believe it was a chance situation of two snakes occupying the same rock.

The school staff had observed the snake coming out from under the rock, basking for a short period and then going back under it. They were unaware that there had been two snakes.

As already mentioned the thermal attributes of the site, when considered with other similar sites in the area and no shortage of them, meant that the snakes had made a deliberate choice to be together.

Copperheads are known to be cannibalistic, both of their own kind and of other snakes.

On one occasion in April 2020, I caught an Copperhead in Wonga Park. Upon being placed into a plastic tub, it regurgitated a live half-grown Tiger Snake (Peters, 1861). An hour later when I went to release the snakes, I noted that the Tiger Snake had been eaten again.

On another occasion in February 2019, I was called to catch a Copperhead at Wattle Glen, Victoria. Upon arrival, I found one adult male eating another. The half-eaten one was regurgitated out by the other one at the time I caught the snake/s, but it was also noticed to have died.

Lack of immunity to their own venom is known in Copperheads (Hoser 1985, 2006) and on the basis of this knowledge, two female Copperheads choosing to stay together is a high-risk option that must in this case, have some as yet unknown benefit.

As a final note, both snakes were tail sexed as females and probed as well to confirm the fact.

REFERENCES CITED

Günther, A. 1858. *Catalogue of Colubrine snakes of the British Museum*. London, UK:I-XVI,1-281.

Hoser, R. T. 1985. On the question of immunity of snakes. *Litteraturae Serpentiologiae* 5(6):219-232.

Hoser, R. T. 2006. Copperhead (*Austrelaps superbus*), lack of immunity to its venom. *Herpetofauna* (Sydney:Australia) 35(2):118-119.

Peters, W. C. H. 1861. Eine zweite Übersicht (vergl. Monatsberichte 1859 p. 269) der von Hrn. F. Jagor auf Malacca, Java, Borneo und den Philippinen gesammelten und dem Kgl. zoologischen Museum übersandten Schlangen. *Monatsber. Königl. Akad. Wiss. Berlin*. 1861 (Juli) 683-691.

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A close-up photograph of two brown frogs, *Crinia fiacummingae*, resting on a log. The frogs are positioned one above the other, with the top frog's head and front legs visible. They have a mottled brown and tan pattern on their backs and heads. The background is dark and out of focus, showing more of the log and some green foliage.

Crinia fiacummingae sp. nov. from Clyde North, Victoria.