Australasian Journal of Herpetology

Cover image: Adult female, Highlands Copperhead *Austrelaps ramsayi* from Warburton, Victoria.
Photo: Raymond Hoser.

ISSN 1836-5698 (Print)
ISSN 1836-5779 (Online)

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ISSUE 36, PUBLISHED 30 MARCH 2018

Australasian Journal of Herpetology

Issue 36, 30 March 2018

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Austrelaps superbus (Günther, 1858) from Warburton, Vic, Australia. Photo: R. Hoser.

Austrelaps ramsayi (Krefft, 1864) from Warburton, Vic, Australia. Photo: R. Hoser.

Australasian Journal of Herpetology ®

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Full details at:

http://www.herp.net

ISSN 1836-5698 (Print)
ISSN 1836-5779 (Online)

Online journals (this issue) do not appear for a month after the actual and listed publication date of the printed journals. Minimum print run of first printings is always at least fifty hard copies.

Australasian Journal of Herpetology 36:3-5.
Published 30 March 2018.

ISSN 1836-5698 (Print)
ISSN 1836-5779 (Online)

Yes there are two species of Copperhead in Victoria! The first ever recorded case of sympatry between Lowland and Highland Copperheads (Genus *Austrelaps* Worrell, 1963).

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Received 2 Aug 2017, Accepted 20 Feb 2018, Published 30 March 2018.

ABSTRACT

Hoser (2009), speculated that while there was a widespread belief that there were two species of Copperhead in Victoria, namely *Austrelaps superbus* (Günther, 1858) (type for the genus), better known as the "Lowland Copperhead" and *A. ramsayi* (Krefft, 1864), better known as the "Highland Copperhead", there was a possibility that the two forms may be conspecific.

This speculation was based on the absence of fieldwork where the ranges of either taxon abutted (as at that time this was not even known) and the absence of any obvious biogeographical barrier for the two species to remain separate.

Furthermore, the sole diagnostic feature separating the two species (labial markings in the form of presence of white triangles in *A. ramsayi* and absence of them in *A. superbus*), is somewhat fluid in *A. superbus*, with specimens of obvious *A. superbus* from some upland localities such as the Otway Ranges, in south west Victoria approaching *A. ramsayi* in their form.

However Hoser (2009) maintained an open and undecided position on the validity of both taxa making this view clear in that paper.

Notwithstanding the comments of Hoser (2009), the view that both alleged species may be one and the same gained credence among other herpetologists, in part as such a view would tend to refute the notion that New England, NSW specimens were not a different species, (*A. paulinus*) as named by Richard Wells and Ross Wellington in 1985.

This is in view of the fact that Wells and Wellington were strongly disliked by a number of other vocal herpetologists and so many irrationally jumped at any reason not to use a name for a putative taxon they had named. However no hard evidence was produced to confirm such a view as correct.

Misreading the detail of Hoser (2009), both the NSW and Victorian State wildlife departments were as of 2017 treating all Copperheads in Australia as being of a single species.

Refuting this position and confirming that *A. superbus* and *A. ramsayi* are in fact two different species by any reasonable definition is the new evidence presented in this paper.

This is the observed sympatry between both *A. superbus* and *A. ramsayi* on the east side of Warburton in Victoria, some 72 km east of the Melbourne CBD.

Keywords: Taxonomy; nomenclature; Australia; Victoria; Snake; Warburton; elapidae; Copperhead; *Austrelaps*; *superbus*; *ramsayi*; *paulinus*; *labialis*; Wells and Wellington; sympatry; two species.

INTRODUCTION

Hoser (2009a), speculated that while there was a widespread belief that there were two species of Copperhead in Victoria, namely *Austrelaps superbus* (Günther, 1858) (type for the genus), better known as the "Lowland Copperhead" and *A. ramsayi* (Krefft, 1864) better known as the "Highland Copperhead", there was a possibility that the two forms may be conspecific.

This speculation was based on the absence of fieldwork where the ranges of either taxon abutted (as at that time this was not even known) and the absence of any obvious biogeographical barrier for the two species to remain separate.

Hoser (2009a) speculated that perhaps the variation seen in specimens from different locations were merely local variation and nothing more and that variation observed to date was simply clinal and not representative of two different species.

Furthermore, the sole diagnostic feature separating the two species (labial markings in the form of presence of white triangles in *A. ramsayi* and absence of them in *A. superbus*), is somewhat fluid in *A. superbus*, with specimens of obvious *A. superbus* from some upland localities such as the Otway Ranges, in south west Victoria approaching *A. ramsayi* in their form.

However Hoser (2009a) maintained an open and undecided position on the validity of both taxa making this view clear in that paper.

It had been hoped that other herpetologists would seize the opportunity to do fieldwork in the region where the known ranges of each taxon appeared to join to see if there was a well-defined biogeographical break between the two putative taxa, whether there was merely clinal variation as seen in (relatively) closely related Tiger Snakes *Notechis scutatus* (Peters, 1861) across the same geographical range, or perhaps if the two species occurred in a single location sympatrically, giving a definitive answer as to the specific status of each.

Until now, no one has been able to definitively answer the important question as to whether or not the two putative species are in fact one or two.

Molecular data has been obtained for both *Austrelaps superbus* and the putative species *A. labialis* (Jan, 1859) from South Australia (Pyron *et al*. 2013) and this showed both to be closely related, but separate species level taxa. They also happen to have a well defined allopatric distribution.

See Hoser 1989 for details of distribution of all of *Austrelaps superbus*, *A. ramsayi* and *A. labialis* and Wells and Wellington (1985) for details of *A. paulinus* as described and named by them at the time.

Notwithstanding the qualifying comments of Hoser (2009a), the view that both alleged putative species (*A. superbus* and *A. ramsayi* as presently understood) may be one and the same taxon gained credence among other herpetologists, in part as such a view would tend to refute the notion that New England, NSW specimens were not a different species, (*A. paulinus*) as named by Richard Wells and Ross Wellington in 1985.

This is in view of the fact that Wells and Wellington were strongly disliked by a number of other vocal herpetologists and so many of them irrationally jumped at any reason not to use a name for a putative taxon the pair had named (see also Hoser 2015a-f). However no hard evidence was produced to confirm such a view as correct.

Both the NSW and Victorian State wildlife departments were as of 2017 treating all Copperheads in Australia as being of a single species, this being a direct result of a misinterpretation of Hoser (2009a).

Refuting this position and confirming that *A. superbus* and *A. ramsayi* are in fact two different species by any reasonable definition is the new evidence presented in this paper.

This is the observed sympatry between both *A. superbus* and *A. ramsayi* on the east side of Warburton in Victoria, some 72 km east of the Melbourne CBD, the detail of which is presented below.

Nothing in this paper can confirm or refute the notion that *A. paulinus* is a species separate from *A. ramsayi*, although there are obvious (albeit minor) morphological differences between the two putative taxa.

As the distributions for each are clearly allopatric, being split by the Hunter Valley intrusion, consisting of wholly unsuitable habitat, climate and competing species, only molecular analysis is likely to reliably confirm or refute the proposition that *A. paulinus* is a valid taxon.

MATERIALS AND METHODS

I own the business Snakebusters, and as part of this education business, I run the only 24/7 snake catcher service in Melbourne, Victoria, Australia, servicing all areas within a 50 km ring around the city and nearby suburbs of Melbourne. Beyond this zone, I occasionally catch and relocate snakes, when no other nearby government-licensed wildlife controllers are available.

It is not necessary for me to outline the generally unfounded fear many people have of snakes and the size of the demand for people like myself to attend people's homes at all hours to remove basically innocuous snakes.

While the most common snakes in Melbourne and environs are all dangerously venomous, these being Lowlands Copperheads *Austrelapis superbus*, Brown Snakes *Pseudonaja textilis* (Duméril, Bibron and Duméril, 1854) and Tiger Snakes *Notechis scutatus* (Peters, 1861), the harsh reality is that for any vaguely sensible person, it is almost impossible to get bitten by them.

In common with most other reptiles, they run from people at every opportunity and rarely bite even when handled. As a rule, the only thing likely to provoke a bite is the inflicting of extreme pain to the reptile (see Hoser 2009b).

Notwithstanding this reality, many people are brainwashed by trash TV shows like "Crocodile Hunter" and "Deadly Sixty" where pretty much everything that walks or crawls is a one dimensional people killing machine! As a result, snake controllers like myself regularly get calls to remove snakes from all over Melbourne and nearby areas.

This is the basis on which I was able to find both *A. superbus* and *A. ramsayi* at the same location.

RESULTS

Warburton is a small township, elevation 159 metres situated at the Upper Yarra River Valley about 72 km east of Melbourne. While the elevation of Warburton and the Yarra Valley running west of there is low, the surrounding countryside is mainly forested and mountainous. To the west of Warburton is Healesville to the north-west and the Dandenong Ranges to the South-west. While much of these areas are of significantly higher elevation than the township of Warburton (e.g. Kinglake 550 m, or Mount Dandenong 633 metres), both places are regularly serviced by myself and the only copperheads removed from both places (including nearby townships) have been Lowlands Copperheads (*A. superbus*).

In fact as a licensed snake catcher, all Copperheads caught by myself anywhere within a 70 km radius of Melbourne have been *A. superbus.* This includes a total of many hundreds of Copperheads taken from all sides of Melbourne.

This has included in the township of Warburton and suburbs west of there, such as Millgrove, Wesburn, and Yarra Junction where Copperheads are common. Over 2 decades to 2017, dozens of Copperheads have been retrieved from Warburton township and townships immediately west and all have been unquestionably very typical *A. superbus*.

On 30 December 2013 I received a call to catch a snake at the home of Brett Flemming at 40 Gilfords Road, Warburton, being about 1.5 km east of the Warburton township and of slightly higher elevation to the main township, but still well under 200 metres.

The location is of cleared areas for housing on acreage lots with forests on hills rising at the rear of each of the properties. A gravid female Tiger Snake was retrieved from under a stone step next to the family home. I undertook an inspection of the north end of the property where there were several sheets of tin on the grass next to a small shed.

(How can a snake catcher refuse to lift well positioned sheets of tin that have the word "snake" written all over them?).

At the time the weather was cool and sunny and it was late in the day (6 PM), making the said sheets of tin prime snake real estate.

An adult female Highlands Copperhead (*A. ramsayi*) was found under a sheet of corrugated iron and an adult female Lowlands Copperhead was found under an immediately adjacent sheet of tin.

Each was of the typical form for each putative species and there was no mistaking which was which.

This location appears to be the boundary where the two species ranges abuts and there is no evidence whatsoever of inbreeding between them. They are clearly sympatric.

Since 2013, I have further investigated the Warburton area and found that in areas east of Gilfords Road Highlands Copperheads (*A. ramsayi*) prevail (including at Reefton and McMahons Creek), while all areas west of the Warburton township (where there are far more homes), have only Lowlands Copperheads (*A. superbus*). Photos of a Highlands Copperhead and a Lowlands Copperhead, both from Warburton in Victoria, taken by myself are shown on page 2 of this issue of this journal.

While Hoser (2009) mentioned *A. superbus* with labial markings approaching those of *A. ramsayi*, this is definitely not the case around Warburton or anywhere nearby, indicating a character displacement effect between the two species where their ranges either abut or are close.

What has not been established is the extent of the area where both species appear to co-exist.

While it is likely that areas of sympatry between the two relevant copperhead species are only limited, both species are of similar form and habit and there is no obvious factor that appears to dictate why one occurs in one area and another elsewhere, other than the historical ranges for each.

There is also no indication as to whether one or other is expanding its range at the expense of the other.

It should also be noted that while Highland Copperheads (*A ramsayi*) are usually found at higher elevations to *A. superbus*, this is by no means always the case and altitude alone cannot explain the extant distributions of each species.

ACKNOWLEDGEMENTS

While I would like to thank the Victorian government wildlife department and the Victorian police force and roads departments (Vicroads) for giving me licenses to drive to people's homes, catch snakes and save both people and wildlife from potential risks, I cannot do this. For most of the past 30 years to end 2017, corrupt police, roads officials and wildlife officers have spent what often appears to be every waking hour plotting and executing ways to deprive me of my relevant licenses and to put people's lives at risk.

In fact as of 2018, I only retain the right to both drive a car and catch snakes as a result of over 1 Million dollars in cash and kind spent by myself defending this right in the law courts (see Court of Appeal 2014 and Victorian Civil and Administrative Tribunal (VCAT). 2015 for details).

The main motivation for government officers to curtail our lawful business is commercial, in that their own dysfunctional businesses (e.g. "Zoos Victoria") or their staff running snake control businesses on the side, would prefer to have the income Snakebusters derive from their educational wildlife shows, snake control work and the like and because they cannot match our higher standards, they instead use unlawful means to continually try to shut us down (Court of Appeal 2014, Victorian Civil and Administrative Tribunal (VCAT). 2015).

The Warburton Highway, being the only main road to the town from Melbourne is a particularly hazardous stretch of road, because police regularly exploit it to catch "speeding motorists' and issue fines to them.

These "speeding motorists" are people driving appropriately for the road conditions but literally entrapped by overly low limits and variable speed limit signs that change over a short distance and are regularly changed without notice.

In February 2018, I was booked by Victoria Police Highway Patrol for doing 82 kmh in a 60 zone on the way to Warburton to catch and relocate a lowlands Copperhead. The fine was about $300.

I should note however that the speed limit on this open four-lane dual carriageway road had been dropped from 80 to 60 two weeks prior and there was no signage indicating such a change on any road I had driven on. I had entered the relevant road at a roundabout and the reduced speed sign had been placed 2 km further back down the road, meaning I had not seen it, because I had entered the road after where the new sign was by turning into the road from a side road into the roundabout. The location was Swansea Road, Lilydale.

In other words, for doing a public service and saving the life of a snake and possibly a member of the public as well I was improperly fined $300 for driving 82 kmh on a road that in any reasonable circumstance should have had a 100 kph speed limit.

Interestingly, a few km further up the road, where the road becomes a windy, one lane each way road through suburbs, the posted speed limit is in fact 100 kmh!

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CONFLICT OF INTEREST

The author has no known conflicts of interest in terms of this paper and conclusions within, but does now try to avoid making trips to Warburton as it is costing more money in dodgy police traffic fines than money earned catching snakes.

Australasian Journal of Herpetology 36:6-10.
Published 30 March 2018.

ISSN 1836-5698 (Print)
ISSN 1836-5779 (Online)

The deadly duo. Sperm storage and synchronized breeding, identified via the world's first captive breedings of Australian Copperhead Snakes (*Austrelaps* Worrell, 1963) and also in captive bred Tiger Snakes (*Notechis* Boulenger, 1896).

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Received 10 March 2018, Accepted 20 March 2018, Published 30 March 2018.

ABSTRACT

Tiger snakes *Notechis scutatus* (Peters, 1861) and Copperheads *Austrelaps superbus* (Günther 1858) are well known large and dangerously venomous snakes from Australia (Hoser, 1989). While they are a popular captive among herpetoculturists and government licensed wildlife demonstrators it is common knowledge that few if any are actually bred in captivity.

Young are routinely sourced from gravid females as detailed by the relevant demonstrators on various internet chat forums including "Aussie Pythons" and "Facebook".

Excess snakes are then illegally sold to others wanting to keep the said species.

Selling snakes in itself is not illegal, but the taking from the wild without appropriate licenses is.

Contrary to this has been this author who for many years has been successfully breeding both Tiger Snakes and Copperheads as detailed in Hoser (2007).

To ensure that no claims are made against me that gravid snakes are being used to source young for profiteering purposes, no reptiles of any kind have ever been sold by myself to anyone and this includes species and animals typically otherwise valued in the hundreds of dollars that are regularly bred here.

In fact this author is the only person known to have genuinely bred the Copperhead in Australia, so it is important that the materials and methods be set out as done in this paper, so that others can emulate the methods, so as to reduce taking of specimens from the wild.

Significantly when breeding both species, most mating is in late summer and autumn, not in spring as generally assumed, even though ovulation is clearly in the spring, with young being born late in the summer.

This means a full one year breeding cycle and when including cooling over two winters may mean a full two year cycle for breeding these species is in fact the normal situation.

Assuming the adult snakes are kept in the same conditions at a given time and place, young tend to be born at the same time in any given season, even if the females mated at widely varying dates the previous year. This clearly indicates sperm storage in the two relevant species and may in fact be far more common in southern Australian elapid snakes than is generally known.

Keywords: Australia; Victoria; Snake; elapidae; Copperhead; Tiger Snake; captive breeding; sperm storage; synchronized breeding; *Austrelaps*; *superbus*; *Notechis*; *scutatus*; *Acanthophis*; *antarcticus*.

INTRODUCTION

Since 2003, to present (2018), this author has kept and regularly bred Lowland Copperheads *Austrelaps superbus* (Günther 1858) and as of 2018 is now onto the F3 generation, with all relevant snakes being bred at the author's facility. The same applies for other species of elapid held including Tiger Snakes *Notechis scutatus* (Peters, 1861), which are also up to F3 stage.

Also bred here in the same time period have been several litters of Death Adders (*Acanthophis spp.*), Eastern Brown Snakes *Pseudonaja textilis* (Duméril, Bibron and Duméril, 1854), Red-bellied Black Snakes *Pseudechis porphyriacus* (Shaw, 1794) and various species of pythons.

The taxonomy of Copperheads (Genus *Austrelaps* Worrell, 1963) is dealt with by Hoser (2009 and 2018), with Hoser (2018) confirming that *Austrelaps superbus* (Günther 1858), is a separate and distinct species from the morphologically similar Highlands Copperhead *Austrelaps ramsayi* (Krefft, 1864).

Hoser (2007) details the breeding of Tiger Snakes and in spite of many breedings since then, not much has changed, save for a greater emphasis on mating snakes in Autumn as opposed to the spring, although inducing that species to mate at most times of year is not difficult.

For snakes of given species unwilling to mate, this author was the first in the world to breed them using artificial insemination (AI) as detailed by Hoser (2008).

This paper lays out what is needed to successfully breed both *A. superbus* and *N. scutatus* in captivity, with an emphasis on the Copperheads *A. superbus* and the wider ramifications in terms of the species in the wild and other relevant species.

While I kept and bred Highland Copperheads, sourced from Oberon, New South Wales in the early 1970's at Lane Cove (Sydney), New South Wales, I have not kept that taxon since being in Victoria since 1985.

However in terms of husbandry and breeding, it appears all species of *Austrelaps* are much the same in terms of requirements, and results from given actions by the keeper.

The wider ramifications of the results of the captive breeding of Copperheads and Tiger Snakes, in terms of wild snakes is also outlined.

MATERIALS AND METHODS

Due to the busy schedule at our Melbourne reptile education business, no scientific experiments were planned and executed. Instead a sizeable number of elapid snakes have been maintained at our facility since 2003 for the primary purpose of doing educational venomous snake displays.

Because we have never had a shortage of specimens of the relevant species *A. superbus* and *N. scutatus*, breeding was never required for our own use. Instead it was merely done because it could be done and we knew that any excess offspring could easily be passed on to other appropriately licensed potential reptile keepers.

Of note also is that most of our snakes have been made venomoid (surgically devenomized) using the operation detailed in the papers of Hoser (2014a, 2014b and 2015). It should be noted that there is no evidence whatsoever that the snakes are materially altered in any other way (besides removal of venom glands) as they eat, behave and breed in a perfectly normal manner.

Of course it need not be mentioned that the venomoid snakes benefit from being "free handled" with human hands on all occasions and are relieved of the stress and burden of being stick handled.

There is also zero safety risk to myself and the handlers I employ to do our educational wildlife shows.

All snakes were housed in plastic tubs as detailed in Hoser (2009), see page 24 for the photos and as similarly explained in Hoser (2007).

Nothing at all has changed in the housing of the snakes in the intervening decade as the husbandry methods worked well, were effectively incident free and there has been no reason to change what appears to be the best and most time saving method of maintaining the snakes in a healthy condition.

To all intents and purposes the only common cause of death of the snakes have been ailments associated with extreme old age, meaning many relevant snakes live well beyond a decade.

The snakes are invariably housed one per cage and as a rule kept one per box when moved around for wildlife displays.

Exceptional to this is when snakes are grouped in a box for a publicity photo of myself or staff holding a bunch of venomous snake species, when one or more defecate in a box and it is decided to make it share with another as a time saving alternative to cleaning a box during a busy public display, or similar kind of situation, but grouped snakes is not the usual position for us.

Snakes are placed together for intended matings and most of the time expected matings result in successful copulations.

This is due to a knowledge of the cooling and ovulation cycles of the snakes and which males of our males are most inclined to mate. However I should note this is usually ascertained with a significant amount of "trial and error" in that snakes are introduced to one another to see likely interactions and/or males are checked for semen, semen plugs or other evidence of fertility.

The other evidence of fertility may include the male pacing the cage at times of falling air pressure or similar behavioural changes at other times.

The cage set up for all our elapid snakes as detailed in Hoser (2009) pages 24 and 25 is copied here in the two following pages, so that readers of this paper have an accurate view of the relevant caging set up.

The same is used for our Tiger Snakes (*N. scutatus*).

Our breeding programs took a major hit in the period post dating an illegal armed raid and gunpoint shutdown of our business on 17 August 2011 by corrupt Victorian wildlife officers, as detailed by Court of Appeal Victoria (2014) and the Victorian Civil and Administrative Tribunal (VCAT) (2015).

This violent raid included the unlawful execution of many breeding snakes and beyond that the twin burdens of ongoing litigation and the threat of having all our snakes seized at gunpoint on any given day, meant that breeding snakes was largely discontinued in this period.

We did not want to have our gravid snakes unlawfully seized by the wildlife department, handed to their own dysfunctional "Zoos Victoria" business; with the result they would then be able to tell the media that they had bred them.

Following all false charges against us being thrown out by the courts in 2014 (see Court of Appeal 2014), we were then able to put our minds to breeding our elapid snakes and so have had significant successes since then.

Across the board with all our snakes, by extending the length of the winter cooling and the severity of it (as in making the snakes colder for longer) commencing the winter of 2014 and then extending even further in 2015, we found that snakes were more inclined to mate in spring and produced greater quantities of sperm.

In the winters of 2015, 2016 and 2017, most elapids at our facility were "hibernated" for between 5 and 7 months.

(The correct term for inactivity in reptiles over cooler periods is brumation, or brumated, but the colloquial term hibernate or hibernation is most widely used by people and understood in the context of reptiles and hence is used in this paper).

In that period the snake's cages had no heat source and dropped to a room temperature usually between 10 and 20 degrees Celsius.

Added to that, Copperheads and Tiger Snakes that had sometimes previously failed to become gravid after being mated were housed for a period of 8-10 weeks in a small locked outdoor shed, with a stable 24 hour ambient temperature that in June to August sat at an average of about 10 degrees Celsius.

Other species we bred also got shorter stints in the same conditions, on top of other hibernation, including tropical Australian pythons which besides not falling ill, also bred successfully, these being Queensland Black-headed and Coastal South-east Queensland Carpet Pythons..

RESULTS

In the springs of 2015, 2016 and 2017, both Copperheads and Tiger Snakes mated. However only one of several males would mate and semen production by all was weak.

In early February (second half) to March (the whole month) in 2015, 2016 and 2017, the Copperheads and Tiger Snakes were given shorter heated periods in their cages each day (12 hours on and 12 off most days, versus 24/7 previously), with added stretches of time where no external heating was applied to the cages at all and temperature never got above the mid 20's (deg, C) and also was regularly below 20 Deg. C.

All years saw the Tiger Snakes and Copperheads mate strongly in the February/March period, with males typically mounting and mating females as soon as they were introduced into the cages.

Mating snakes are in no way agitated or stressed with human intervention or viewing of their actions and quite happy to be handled (gently), photographed with flash, be video recorded or both video recorded and photographed at the same time and then placed back into their cage, where they continue to mate.

This mating preceded the full winter cooling as outlined previously in this paper, but it should be noted this did occur in the years preceding the summers of 2015/2016 to that of 2017/2018..

In February/March of 2016, 2017 and 2018, both Tiger Snakes and Copperheads produced litters of young, most being from matings almost exactly 12 months prior, confirmed by the fact that the relevant snakes (all the Copperheads and some of the Tiger Snakes) had not been mated in the preceding spring.

In one case in March, a male and female Copperhead were mated 48 hours after she had given birth to a litter of 14 healthy live young.

Clearly it does not take 12 months for these snakes to develop young, and clearly there was no ovulation at the time of mating (recall a female had given birth two days earlier in one case) meaning that the females were storing sperm for some time prior to parturition.

With an estimated 4-5 months for young to develop in the females before being born, it is clear that the warming in spring, or some aspect of it, is causing the snakes to ovulate and begin the development of young, using viable sperm that has been stored over winter.

Also never previously reported, but apparently standard for both Copperheads and Tiger Snakes in our care over many years is that once an apparently successful copulation has taken place, females will avoid mating with other males introduced to them.

These same males (the later ones), try unsuccessfully to mate with the previously mated females, but have success in mounting and mating unmated females.

Exceptional to this was one particular female Tiger Snake, who regularly allowed herself to be mounted and mated (copulated) with more than one male over a period spanning several weeks.

DISCUSSION

The significance of the preceding is that people intending breeding Copperheads and Tiger Snakes in captivity by natural means (not via AI), should be both cooling the snakes severely over winter and for long periods and plan matings to coincide with a late summer/ autumn cooling of the relevant snakes, in preference to spring after the full winter cool-down, as is done for most other Australian snake breedings.

My breeding strategy for these two cold climate species (and the tropical ones here as well), has been to cool the snakes as much as possible over winter, without harming their health, meaning that snakes are monitored closely during this relatively inactive phase. Snakes that appear to be in any way unhealthy, or perhaps losing condition faster than expected, noting they cannot be fed when cold, are brought out of hibernation early or earlier than the main collection.

Having said this, planning in the autumn, means that most if not all relevant snakes are well fed before being hibernated and so all can be held at low temperature for many months. Countering this to a limited extent in our somewhat unique situation is the continued use of these same snakes in our educational reptile shows (often daily for days on end), causing them to lose condition at a considerably faster rate than otherwise inactive snakes.

Hence, we tend to have our snakes slightly obese when going into the cooling phase and they are thinner than many peers in other collections when finally heated again in the spring.

Spring matings and breedings can work for both Tiger Snakes and Copperheads, but the general success rate is lower, due at least in part to a reluctance of the snakes to mate or because ovulation may have already occurred and the female is not apparently receptive to sperm. This applies mainly to Copperheads, who clearly have a strong spike in mating in Autumn, whereas Tiger Snakes, who also have a mating peak in autumn, will more commonly mate through winter and into the early spring.

While Tiger Snakes mate at almost any time of year, except the height of Summer in early to mid January, clearly autumn matings appear to have the highest likelihood of success.

I note that a female Tiger Snake mated in the spring of 2016 produced slugs the following autumn. But when mated shortly thereafter (March 2017), produced a healthy litter of 24 young on 1 February 2018.

Clearly the warming in Spring is what causes the snakes to ovulate and breed (when fertilized) in both wild and captive specimens of Tiger Snakes and Copperheads.

As all snakes in a given place are affected by the same weather events (such as the first spring heatwave) it makes sense that development of young is generally synchronised, explaining why in the wild in an area such as Melbourne, Victoria, most years one sees Tiger Snakes or Copperheads commonly all give birth within a timeframe of a few weeks.

Birth of captive snakes in Copperheads and Tiger Snakes is similarly tied to when the females are warmed up in the spring.

Synchronized birth in a given species is thought to be a predator defence, in that at least some of the tidal wave of young can escape being eaten by predators at one short time.

This may or may not be the case in Copperheads and Tiger Snakes. More likely the breeding cycle and the synchronisation of parturition is merely an artefact of the physical needs and constraints of the breeding cycle, caused by the seasonal weather fluctuations, as opposed to any specific anti-predator defence.

Also of note is the activity patterns of wild Copperheads and Tiger Snakes as seen by myself as a Melbourne's busiest licensed snake catcher over some decades.

The trends seen year on year are consistent and based on a season average of more than 5 incoming "snake calls" a day. The snake season is taken as being from 1 September to end April each year, although often not all snakes emerge from hibernation in Melbourne until October and many go back into hibernation from late March onwards, meaning that April is commonly the quietest month for snake call outs even when the weather is conducive to snake activity (i.e. warm and sunny).

That Copperheads and Tiger Snakes mainly mate in late summer and early autumn (Feb/March) is seen through the massive preponderance of large males caught moving through people's properties.

Captive males subjected to a parallel seasonal heating cycle also become more restless in their cages and as already mentioned are most inclined to mate.

By contrast, the activity of Eastern Brown Snakes (*Pseudonaja textilis*) in Melbourne is limited in the autumn.

Also in contrast to Copperheads and Tiger Snakes, Eastern Brown Snakes mate in the wild and in captivity mainly in the early spring (Hoser, 2006).

As a snake catcher in Melbourne, I rarely get calls to catch more than one snake at a time, as in pairs fighting or mating, although each season I get a few such cases.

Invariably they conform to the pattern just outlined. Tiger Snakes are mainly found paired up and mating in the late summer / autumn period, as in February to March in particular.

For them, the mating activity usually starts after the peak of summer in early to mid February, when the nights show a distinctive cooling trend.

In 2018, quite unusually, I caught a pair of mating Tiger Snakes at Healesville, mating on a porch on 27 January 2017, during a heatwave which was also during the height of summer.

Copperheads are less often seen mating or fighting on call outs, but large numbers of large testosterone charged males are caught roaming through people's properties throughout the late summer / autumn period.

Whenever an attempt has been made to extract semen from the said wild-caught snakes in the late summer / autumn, this has been easy to do. In fact some wild caught males have ejaculated when tailed at time of capture.

Also noteworthy is that similar ejaculation at time of capture is common in Red Bellied Black Snakes, when caught in spring, which is their (strict) mating season and the only time of year that males appear to produce semen.

For Red Bellied Black Snakes, semen production is strongest in late August to late November.

SUMMARY

For maximum breeding success in captive Copperheads and Tiger Snakes, late summer and autumn matings are best, noting that the relevant snakes should have been severely cooled the previous winter.

Due to cannibalism risks, snakes should otherwise be held in separate cages and watched closely when introduced to one another.

Sperm storage is a fact of life for both Copperheads and Tiger Snakes, as is synchronized birth in the wild.

Hoser (1989) and sources cited therein provided evidence of sperm storage in Sydney, NSW, Australia Death Adders *Acanthophis antarcticus* (Shaw and Nodder, 1802) that mate in autumn.

How widespread both sperm storage and synchronised parturition is in other Australian squamates is yet to be determined.

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CONFLICT OF INTEREST

The author has no known conflicts of interest.

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Captive husbandry of Copperheads.

While this paper isn't about this, the basics are worth noting.
Put simply it is as for other elapids (or pythons for that matter).
Wild-caught snakes are usually riddled with parasites and must be treated aggressively for them.
Captive-bred young do well, graduating from assist to voluntary feeding readily and usually within a few months of birth, becoming ravenous within a year.
Adults take mice readily.
Housing is best in a rack system as shown above. Caging itself is sparse, clean and with hide, heat at the opposte end to the water (via "heat mat") and the water bowl is unspillable. Plastic tubs work well. See image at top right.
Copperheads are generally not aggressive to humans, but are to one another and other snakes. Hence should be housed individually.
As for other snakes, these snakes do not like to be stick-handled and free handling is best for the snake's welfare if one ignores risks to the handler. The specimens shown on the next page are "venomoid" and hence harmless.

Australasian Journal of Herpetology 36:11-20.
Published 30 March 2018.

ISSN 1836-5698 (Print)
ISSN 1836-5779 (Online)

A sensible breakup of the genus *Bungarus* Daudin, 1803 *sensu lato* and the description of a new species.

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Received 2 April 2017, Accepted 10 August 2017, Published 30 March 2018.

ABSTRACT

The genus *Bungarus* Daudin, 1803 has been found in molecular studies to be an ancient assemblage of morphologically similar snakes (e.g. Pyron *et al*. 2011, 2013). However in recent years herpetologists have persisted in assigning all species to the genus *Bungarus* even though there are available names for the two most divergent species groups.

To correct this situation, the genera *Megaerophis* Gray, 1849 and *Xenurelaps* Günther, 1864 are resurrected from synonymy.

Bungarus is confined to the core group, currently referred to as *B. fasciatus* (as one species only by most authors, but herein conservatively treated as three subspecies, following on from Laopichienpong *et al*. 2016). All have available names.

Another group comprising several species is herein placed into the resurrected genus *Aspidoclonion* Wagler, 1828. This has the type species *Aspidoclonion semifasciatum* Wagler, 1828, which is now known as *Bungarus candidus* (Linnaeus, 1758).

This in effect means *Bungarus* is split into four genera and these in turn remain within the tribe Bungarini Eichwald, 1831, as defined by Hoser (2012).

A new species previously grouped with *B. multicinctus* Blyth, 1861 or *B. wanghaotingi* Pope, 1928 (now in the genus *Aspidoclonion*) is formally named for the first time.

The species currently known as the Red-headed Krait, *Bungarus flaviceps* Reinhardt, 1843, (now placed in *Megaerophis*) is herein divided into four allopatric subspecies, two of which are formally named for the first time.

Keywords: Taxonomy; Bungarini; snakes; Asia; south-east Asia; Burma; Thailand; Malaysia; Sumatra; Java; Borneo; Indonesia; China; Kraits; *Bungarus*; *Megaerophis*; *Xenurelaps*; *Aspidoclonion*; *fasciatus*; *insularis*; *bifasciatus*; *multicinctus*; *wanghaotingi*; new species; *sloppi*; new subspecies; *promontoriumrursus*; *masalbidus*.

INTRODUCTION

The genus *Bungarus* Daudin, 1803 are better known as the Kraits. These are highly venomous elapid snakes with a centre of distribution in south-east Asia (Sundaland), including western Indonesia, Indo-China and nearby areas such as Bangladesh and southern China.

In the period post-dating 1990, using new technology, molecular studies have found that the genus *Bungarus* as currently recognized by most practicing herpetologists comprises an ancient assemblage of morphologically similar snakes (e.g. Pyron *et al*. 2011, 2013).

Notwithstanding the deep divergences between species groups, herpetologists have until now persisted in assigning all species to the genus *Bungarus.*

There are however available names for the two most divergent species groups.

These are the genera *Megaerophis* Gray, 1849, type species *Megaerophis formosus* Gray, 1849 (now treated as a synonym of the species currently known as *Bungarus flaviceps* Reinhardt, 1943) and *Xenurelaps* Günther, 1864, type species *Elaps bungaroides* Cantor, 1839, which is also currently placed in the genus *Bungarus.*

In light of the above facts, it became clear that a paper needed to be published giving the genus *Bungarus sensu lato* an overhaul to reflect known phylogeny, even if it merely meant the resurrection of names for well-defined genus groups.

To that end and in order to resolve other potential issues, the entire genus *Bungarus sensu lato* which forms the tribe Bungarini Eichwald, 1831, as defined by Hoser (2012) was audited to see if there were other unnamed genus level groupings, or obviously unnamed species.

It became clear that the species diversity reflected in the literature was an underestimation of the reality.

An audit of all currently recognized and named species was performed by way of review of the literature, relevant type specimens as described and specimens from across the range of all known species to form the basis of the final classification within this paper.

To that end, the following arrangement has been adopted.

Bungarus is confined to the core group, currently referred to as *B. fasciatus* only by most authors, but herein treated as three subspecies (following on from Laopichienpong *et al*. 2016). All have available names and so two (*B. bifasciatus* Mell, 1929 and *B. insularis* Mell, 1930) are resurrected from synonymy as subspecies.

Another group comprising several species is herein placed into a the resurrected genus *Aspidoclonion* Wagler, 1828. This in effect means *Bungarus* is split into four genera and these in turn remain within the tribe Bungarini Eichwald, 1831, as defined by Hoser (2012).

A new species previously grouped with *B. multicinctus* Blyth, 1861 or *B. wanghaotingi* Pope 1928 (now in the genus *Aspidoclonion*) from Myanmar (formerly Burma) is formally named for the first time.

The species currently known as *Bungarus flaviceps* Reinhardt, 1843, (now placed in *Megaerophis*) is herein divided into four allopatric subspecies, two of which are also formally named for the first time.

MATERIALS AND METHODS

These are not formally explained in a number of my recent papers under the heading "Materials and methods" or similar, on the basis they are self evident to any vaguely perceptive reader. However, the process by which the following taxonomy and nomenclature in this and other recent papers by myself of similar form (in *Australasian Journal of Herpetology* issues 1-36), has been arrived at, is explained herein for the benefit of people who have recently published so-called "criticisms" online of some of my recent papers. They have alleged a serious "defect" by myself not formally explaining "Materials and Methods" under such a heading.

The process involved in creating the final product for this and other relevant papers has been via a combination of the following:

Genera and component species have been audited to see if their classifications are correct on the basis of known type specimens, locations and the like when compared with known phylogenies and obvious morphological differences between relevant specimens and similar putative species.

Original descriptions and contemporary concepts of the species are matched with available specimens from across the ranges of the species to see if all conform to accepted norms.

These may include those held in museums, private collections, collected in the field, photographed, posted on the internet in various locations or held by individuals, and only when the location data is good and any other relevant and verifiable data is available.

Where specimens do not appear to comply with the described species or genera (and accepted concept of each), this non-conformation is looked at with a view to ascertaining if it is worthy of taxonomic recognition or other relevant considerations on the basis of differences that can be tested for antiquity or deduced from earlier studies.

When this appears to be the case (non-conformation), the potential target taxon is inspected as closely as practicable with a view to comparing with the nominate form or forms if other similar taxa have been previously named.

Other relevant data is also reviewed, including any available molecular studies which may indicate likely divergence of populations.

Where molecular studies are unavailable for the relevant taxon or group, other studies involving species and groups constrained by the same geographical or geological barriers, or with like distribution patterns are inspected as they give reasonable indications of the likely divergences of the taxa being studied herein.

Additionally other studies involving geological history, sea level and habitat changes associated with long-term climate change, including recent ice age changes in sea levels, versus known sea depths are utilized to predict past movements of species and genus groups in order to further ascertain likely divergences between extant populations (as done in this very paper), while also assessing likely habitat boundaries for given populations.

When all available information checks out to show taxonomically distinct populations worthy of recognition, they are then recognized herein according to the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

This means that if a name has been properly proposed in the past (even if in the absence of sound scientific data), it is used as is done in this paper. Alternatively, if no name is available, one is proposed according to the rules of the Code as is done in this paper.

As a matter of trite I mention that if a target taxon or group does check out as being "in order" or properly classified, a paper is usually not published unless some other related taxon is named for the first time.

The published literature relevant to *Bungarus sensu lato* and the taxonomic and nomenclatural judgements made within this paper includes the following: Abtin *et al.* (2014), Ahsan and Rahman (2017), Ali *et al.* (2016), Anderson (1871), Anwar (2011), Auliya (2006), Avadhani (2005), Baig *et al.* (2008), Bannerman (1905), Bauer (1998), Bauer and Günther (1992), Bhattarai *et al.* (2017), Bhupathy and Sathishkumar (2013), Biswas and Sanyal (1978), Blyth (1856, 1861), Boteju *et al.* (2012), Boulenger (1890, 1896, 1897), Brongersma (1948), Buden and Taboroši (2016), Cantor (1839), Castoe *et al.* (2007), Chan-ard *et al.* (1999, 2015), Chandramouli (2011), Chettri and Chettri (2013), Cholmondeley (1908), Cox *et al.* (1998), Das (2012), Das and Chaturvedi (1998), Das and De Silva (2005), Das and Palden (2000), Das *et al.* (2009), David and Vogel (1996), Deraniyagala (1955), Deshmukh *et al.* (2016), De Silva (1998), Dowling and Jenner (1988), Dravidamani *et al.* (2006), Duméril *et al.* (1854), Eichwald (1831), Evans (1905), Fellows (2015), Ganesh and Arumugam (2016), Ganesh and Gawor *et al.* (2016), Geissler *et al.* (2011), Glass (1946), Golay (1985), Grandison (1972), Gray (1849), Grismer (2011), Grismer *et al.* (2008a, 2008b, 2010), Grosselet *et al.* (2004), Grossmann (1990), Grossmann and Schäfer (2000), Gumprecht (2003), Günther (1858, 1864, 1888), Hecht *et al.* (2013), Hien *et al.* (2001), Hoser (2012), Iskandar and Mumpuni (2002), Janzen *et al.* (2007), Jayaneththi (2015), Jestrzemski (2016), Jestrzemski *et al.* (2013), Jiang *et al.* (2011), Kandamby (1997), Karns *et al.* (2015), Ka¨stle *et al.* (2013), Khan (1985, 1986, 2002), Kharin *et al.* (2011), Kinnear (1913), Knierim *et. al.* (2017), Kopstein (1932, 1936a, 1936b, 1938), Kral (1969), Kramer (1977), Kuch (1996, 2001, 2002, 2004), Kuch and Götzke (2000), Kuch and Mebs (2007), Kuch and Schneyder (1991, 1992, 1993, 1996), Kuch and Tillack (2004), Kuch *et al.* (2005), Kundu *et al.* (2016), Kyi and Zug (2003), Lang and Vogel (2015), Laopichienpong *et al.* (2016), Lenz (2012), Leviton *et al.* (2003), Linnaeus (1758), LiVigni (2013), Loveridge (1938), Mahony *et al.* (2009), Malkmus *et al.* (2002), Manthey (1983), Manthey and Grossmann (1997), Martin (1913), Masroor (2012), Mattison (2007), Mirza (2012), Mohapatra (2011), Murthy (2010), Nath *et al.* (2011), Onn *et al.* (2009), Orlov *et al.* (2003a, 2003b), Palot (2015), Pauwels *et al.* (2003), Pillay (1904), Pitman (1913), Pope (1928), Purkayastha *et al.* (2011), Pyron *et al.* (2011, 2013a, 2013b), Rahman *et al.* (2013), Rao and Zhao (2004), Rasmussen and Hughes (1996), Reinhardt (1843), Ride *et al.* (1999), Roemer and Mahyar-Roemer (2006), Rooijen and Rooijen (2002, 2007), Russell (1796), Saint Girons (1972), Sang *et al.* (2009), Schneider (1801), Schultz and Slegers (1985), Sclater (1891), Seung Hoon (2012), Shah (1998, 1999), Sharma (2004), Sharma *et al.* (2013), Singh *et al.* (1979), Siow and Figueroa (2016), Slowinski (1994), Smith (1913, 1914, 1943), Srinivasulu *et al.* (2009), Stejneger (1908, 1910), Stuart *et al.* (2006), Stuebing and Inger (1999), Switak (2006), Sworder (1933), Taylor (1953, 1965), Teynié *et al.* (2010), Thakur (2011), Theophilus *et al.* (2008), Thompson and Thompson (2008), Tillack (2003), Tillack and Grossmann (2001), Tillack and Kucharzewski (2004), Tsetan and Ramanibai (2011), Tweedie (1950, 1954), Vogel (2006), Vogel and Hoffmann (1997), Voris (2006), Vyas (1998, 2007, 2009, 2011, 2013, 2014), Wall (1905, 1906, 1907a, 1907b, 1908, 1909, 1911, 1913a, 1913b), Wall and Evans (1900, 1901), Wallach *et al.* (2014), Werning (2006), Whittaker and Captain (2004), Willey (1906), Zeeb (2012), Zhao (2006), Zhao and Adler (1993), Ziegler (2002), Ziegler *et al.* (2007, 2015) and sources cited therein.

Some material within descriptions below may be repeated for different described taxa and this is in accordance with the provisions of the *International Code of Zoological Nomenclature* and the legal requirements for each description. I make no apologies for this.

I also note that, notwithstanding the theft of relevant materials from this author in an illegal armed raid on 17 August 2011, which were not returned in breach of undertakings to the court (Court of Appeal Victoria 2014 and VCAT 2015), I have made a decision to publish this paper.

This is in view of the conservation significance attached to the formal recognition of unnamed taxa at all levels and on the basis that further delays may in fact put these presently unnamed or

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potentially improperly assigned taxa at greater risk of extinction.

This comment is made noting the extensive increase in human population in south-east Asia and elsewhere and the general environmental destruction across that continent as documented by Hoser (1991), including low density areas without a large permanent human population. These areas still remain heavily impacted by non-residential human activities.

I also note the abysmal environmental record of various National, State and Local governments in the region the past 200 years as detailed by Hoser (1989, 1991, 1993 and 1996).

NOTES ON THE DESCRIPTIONS FOR ANY POTENTIAL REVISORS

Unless mandated by the rules of the *International Code of Zoological Nomenclature*, none of the spellings of the newly proposed names should be altered in any way. Should one or more newly named taxa be merged by later authors to be treated as a single species or subspecies, the order of priority of retention of names should be the order (page priority) of the descriptions within this text.

TRIBE BUNGARINI EICHWALD, 1831.

(Terminal taxon: *Bungarus annularis* Daudin, 1803)

Diagnosis: The elapid snakes in this tribe are readily separated from all other species and genera of elapid by the following suites of characters:
1/ The maxillary bone is without a posterior process and there is no isolated anterior mandibular tooth and:
2/ The maxillary bone does not extend forward beyond the palatine and the vertebral scales are enlarged.

The four genera within this tribe are separated from one another by the following four suites of characters:
1/ Subcaudals single; 15 or rarely 17 dorsal mid-body rows; a dorsal ridge; tail ends very obtusely and the anterior temporal shield is scarcely longer than deep, (Genus *Bungarus* Daudin, 1803), or:

2/ Subcaudals single; 15 or rarely 17 dorsal mid-body rows; no dorsal ridge; tail tapers to a point; anterior temporal is much longer than deep (Genus *Aspidoclonion* Wagler, 1828), or:

3/ Subcaudals divided or partly single and partly divided. 13 mid-body rows (Genus *Megaerophis* Gray, 1849), or:

4/ Subcaudals divided or partly single and partly divided. 15 mid-body rows (Genus *Xenurelaps* Günther, 1864).

Distribution: South-east Asia.

Content: *Bungarus* Daudin, 1803 (Type genus); *Aspidoclonion* Wagler, 1828; *Megaerophis* Gray, 1849; *Xenurelaps* Günther, 1864.

GENUS *BUNGARUS* DAUDIN, 1803.

Type species: *Bungarus annularis* Daudin, 1803 (now known as *B. fasciatus* (Schneider, 1801).

Diagnosis: The genus *Bungarus* Daudin, 1803 is separated from all other species in the tribe Bungarini Eichwald, 1831by the following characters: Subcaudals single; 15 or rarely 17 dorsal mid-body rows; a dorsal ridge; tail ends very obtusely and the anterior temporal shield is scarcely longer than deep.

Distribution: From India, through south-east Asia to Indonesia and as far east on the mainland of Asia to southern China.

Content: *B. fasciatus* (Schneider, 1801) (including three subspecies).

GENUS *ASPIDOCLONION* WAGLER, 1828.

Type species: *Aspidoclonion semifasciatum* Wagler, 1828 (currently known as *Bungarus candidus* (Linnaeus, 1758).

Diagnosis: The genus *Aspidoclonion* Wagler, 1828 is separated from all other species in the tribe Bungarini Eichwald, 1831 by the following characters: Subcaudals single; 15 or rarely 17 dorsal mid-body rows; no dorsal ridge; tail tapers to a point; anterior temporal is much longer than deep.

Distribution: From India, through south-east Asia to Indonesia and as far east on the mainland of Asia to southern China.

Content: *A. candidus* (Linnaeus, 1758) (Type species); *A. andamanensis* (Biswas and Sanyal, 1978);

A. caeruleus (Schneider, 1801); *A. ceylonicus* (Günther, 1864); *A. lividus* (Cantor, 1839); *A. magnimaculatus* (Wall and Evans, 1901); *A. multicinctus* (Blyth, 1861); *A. niger* (Wall 1908); *A. persicus* (Abtin, Nilson, Mobaraki, Hooseini and Dehgannejhad, 2014); *A. sindanus* (Boulenger, 1897); *A. sloppi sp. nov.* (this paper); *A. walli* (Wall, 1907); *A. wanghaotingi* (Pope, 1928).

GENUS *MEGAEROPHIS* GRAY, 1849.

Type species: *Megaerophis formosus* Gray, 1849, (Currently known as *Bungarus flaviceps* Reinhardt, 1843).

Diagnosis: The genus *Megaerophis* Gray, 1849 is separated from all other species in the tribe Bungarini Eichwald, 1831 by the following characters: Subcaudals divided or partly single and partly divided; 13 dorsal mid-body rows.

Distribution: South-east Asia from Myanmar (formerly Burma) to Borneo.

Content: *Megaerophis flaviceps* (Reinhardt, 1843) (including four subspecies).

GENUS *XENURELAPS* GÜNTHER, 1864.

Type species: *Xenurelaps bungaroides* Günther 1864, (Currently known as *Bungarus bungaroides* (Cantor, 1839)).

Diagnosis: The genus *Xenurelaps* Günther 1864 is separated from all other species in the tribe Bungarini Eichwald, 1831 by the following characters: Subcaudals divided or partly single and partly divided; 15 dorsal mid-body rows.

Distribution: Known only from the southern Himalayas (*Xenurelaps bungaroides* (Cantor, 1839)) and nearby parts of northern Vietnam (*X. slowinskii* (Kuch, Kizirian, Nguyen, Lawson, Donnelly and Mebs, 2005)).

Content: *Xenurelaps bungaroides* (Cantor, 1839) (Type species); *X. slowinskii* (Kuch, Kizirian, Nguyen, Lawson, Donnelly and Mebs, 2005).

ASPIDOCLONION SLOPPI SP. NOV.

Holotype: An adult male preserved specimen at the California Academy of Science (CAS), USA, specimen number HERP 216419 listed as a "*Bungarus multicinctus*" collected from the Road between Ye Gyi and Gwa Town, Rakhine State, Myanmar (formerly Burma), Latitude 17.56 N; Longitude 94.74 E.

The California Academy of Science (CAS) is a facility that allows access to its holdings by scientists.

Paratype: An adult male preserved specimen at the California Academy of Science (CAS) specimen number HERP 210204 listed as a "*Bungarus multicinctus*" collected from Alaungdaw Kathapa National Park, Sunthaik Chaung (tributary to Hkaungdin Chaung), Sagaing Div. Myanmar (formerly Burma), Latitude 22.31 N; Longitude 94.41 E.

Diagnosis: *Aspidoclonion sloppi sp. nov.* has been treated until now as either "*Bungarus multicinctus* Blyth, 1861" or the similar "*B. wanghaotingi* (Pope, 1928)". Both those taxa are now also herein placed within the genus *Aspidoclonion* Wagler, 1828.

The species *A. wanghaotingi* (Pope, 1928), has until now been placed by most authors in synonymy with *A. multicinctus.*

A. candidus (Linnaeus, 1758) and *A. multicinctus* are readily separated from all others in the genus *Aspidoclonion* by having a frontal that is longer than broad, a rostral considerably broader than deep and obvious strongly enlarged vertebral scales.

Both are characterised by a pattern of alternating dark and light dorsal cross-bands.

A. multicinctus is separated from *A. candidus* by having more numerous (42-60) darker bands with correspondingly narrower light interspaces (on body and tail), versus less than 40 darker bands in *A. candidus* (on body and tail) and light and dark bands of similar width.

A. multicinctus is separated from the similar *A. wanghaotingi* by the higher number of light cross bands on the body and tail (this is 31-40 on the body and 9-17 on the tail in *A. multicinctus*, 20-31 and 7-11 respectively in *A. wanghaotingi*).

Both *A. multicinctus* type locality from Xiamen (= Amoy), China and *A. wanghaotingi* type locality Yuankiang, China are different species and form to *Aspidoclonion sloppi sp. nov*. from Myanmar.

Aspidoclonion sloppi sp. nov. is separated from both *A. multicinctus* and *A. wanghaotingi* by the following suite of characters: an absence of a large well-defined white cross-band on the upper nape, the dorsal white crossbands are of an immaculate white colour without any greyish or black flecks on the flanks, except the far lower flanks, versus obvious black or grey specking on the upper and mid flanks on the white bands in both *A. multicinctus* and *A. wanghaotingi*.

The tail of both *A. multicinctus* and *A. wanghaotingi* are characterised by well-defined circular white rings, alternating with slightly wider black ones, versus ill-defined often irregularly shaped whitish rings on the tail in *A. sloppi sp. nov*..

Significantly in both *A. multicinctus* and *A. wanghaotingi* the darker dorsal crossbands do for the entire length of the body run to the venter. In most if not all specimens of *A. sloppi sp. nov.* this is not the case for the darker cross-bands on the anterior half of the body. Instead they terminate on the lower flanks and are bounded by white, which in turn merges with the narrow light cross bands. This in effect makes the anterior darker dorsal cross-bands a pattern of enlarged ovoid rectangles divided by areas of white pigment.

A. sloppi sp. nov. is further separated by presence of whitish upper labials forming a distinctive yellow border line along the lower flank of the anterior of the snake to the first darker crossband, which in this species (unlike the others) are formed into large dark blotches across the upper body, bounded by white on the lower flanks.

Additional Comments:

There are numerous photos of *A. sloppi sp. nov.* on the internet and elsewhere invariably misidentified as something else. Most are misidentified as *A. multicinctus* or less often *A. wanghaotingi.*

I note that there is a book called "The Snake Charmer", by Jamie James (James 2008), which details the life and times of Joe Slowinski and how he died from the bite of a "Many Banded Krait" in Burma. There is no doubt that the species responsible for the bite was in fact *A. sloppi sp. nov.*.

However in terms of responsibility for the fatal bite and the death, there is absolutely no doubt that full blame and responsibility must rest with Joe Slowinski himself. The book by James, details Slowinski's lifetime of abusing and attacking snakes with brutal metal tongs, as depicted throughout the book (see for example the colour plate of Slowinski with tongs opposite page 181), or 5 pages earlier where there are two photos in succession of Slowinski attacking snakes with the very same tongs.

These barbaric devices are sold as snake handling tools, to allow people to grab snakes without use of hands and are therefore touted as a safety device. They do in fact break the snakes bones and internal organs and turn otherwise innocuous animals into crazy killing machines, crazed by the extreme and usually life-threatening pain and injuries sustained by the snake.

James (2008) even has a photo of Slowinski with a Many Banded Krait (in this case *A. sloppi sp. nov.*) with its neck clamped between the claws of a set of tongs in a pose which clearly shows Slowinski improperly inflicting life threatening injuries on the snake.

The same photo shows Brady Barr with a similar set of tongs in his hand, while below that is yet another image of a snake about to have its bones broken by a set of tongs.

While animal cruelty laws may not have existed in Burma at the time the photo was taken, such handling of a snake (likely to cause its injury or death) would be the sort of activity liable to lead to a prosecution for animal cruelty in a country such as the United States of America or Australia.

James (2008) is in effect a book that attempts to rewrite history and to describe the death of Slowinski by snakebite in Burma as some kind of extremely unfortunate event, for which the snake must be blamed. Slowinski is painted as some kind of hero. In fact nothing could be further from the truth.

By simple inspection of the images presented in the book, it is self-evident that Slowinski was a man who for some years had traded on committing acts of animal abuse and cruelty, through his mainly illegal use of metal tongs.

Anyone who attacks, torments and injures wildlife in breach of all civilized laws and protocols, deserves the inevitable consequences of their activity and blame shifting should not be employed.

The story of Slowinski (never known to me while he lived, I might add) is no different to that of the Late Steve Irwin. In the latter case, we had a police-protected criminal who scammed a fortune making TV shows displaying on camera acts of animal abuse and cruelty. After Steve Irwin died doing what he did best, that was illegally tormenting and abusing wildlife, in this case a Stingray, which took umbrage at his actions, his family and business did not do the honest thing and blame their man for the death arsing from Irwin's assault on the animal. Instead the Stingray was blamed, his followers went out and killed a few more and history was rewritten by the Irwin's business to falsely paint that man as some sort of wildlife conservation icon, which in fact he never was.

Distribution: Hiller parts of the western half of Myanmar (Burma).

Etymology: Named in honour of the Great Dane pet at the Hoser family household, named "Slopp" in recognition of his work in protecting the Hoser research facility and free of thefts by others employed or acting on behalf of others who would seek to steal what is not theirs.

At the time this paper was written in 2017, Slopp was 5 years old. I have no hesitation in naming a species in honour of a non-human inhabitant of this planet.

MEGAEROPHIS FLAVICEPS (REINHARDT, 1843)

Holotype: ZMUC R65301, from Java, Indonesia.

Diagnosis: The species currently known as *Bungarus flaviceps* Reinhardt, 1843, (now placed in *Megaerophis*) is herein divided into four allopatric subspecies, two of which are also formally named for the first time.

This species is separated from all others in the tribe by having subcaudals divided or partly single and partly divided and 13 dorsal mid-body rows.

It is further diagnosed by the following suite of characters: expanded neural crest of vertebrae forms distinct ridge down the back and tail; subcaudals undivided, although anteriorly those near the tip may be divided; ventrals: males 193-236, females 193-217; subcaudals: males 47-53, females 42-54. Black above; orange-yellow dorsal stripe often present; interstitial skin orange-yellow giving appearance of longitudinal stripes; head reddish to orange-yellow; tail and posterior part of body reddish to orange-yellow; belly orange, yellow, brown or whitish, sometimes edged with brown. (modified from Smith, 1943 at p. 411.).

The nominate subspecies *Megaerophis flaviceps flaviceps* Reinhardt, 1843 is separated from the other three subspecies by having less than 200 ventrals, versus over 200 in all other subspecies.

All of *M. flaviceps flaviceps* Reinhardt, 1843, *M. flaviceps promontoriumrursus subsp. nov.* from Peninsula Malaysia and Thailand, and *M. flaviceps masalbidus subsp. nov*. from northern Sumatra are characterised by a dorsal colouration of greyish black in colour and with a very distinctive orange to red head and tail and no overtly obvious body pattern or dorsal streak.

Both *M. flaviceps flaviceps* Reinhardt, 1843 and *M. flaviceps promontoriumrursus subsp. nov.* from Peninsula Malaysia and Thailand are characterised by a series of small yellow dots along the vertebral line, a yellow lateral streak along the two outer rows of scales a red tail and an elongate black marking on the back of the head. *M. flaviceps flaviceps* Reinhardt, 1843 has a yellowish or brown belly, versus whitish in *M. flaviceps promontoriumrursus subsp. nov*..

The subspecies *M. flaviceps formosus* (Gray, 1849) from the northern parts of Borneo, is easily the most divergent subspecies in terms of dorsal colouration, characterised by irregular white, red and black crossbands (that are absent in other subspecies) as well as a distinctive yellow vertebral line.

The more recent name "*Bungarus flaviceps baluensis* Loveridge, 1938", widely appearing in the literature (e.g. Manthey 1983 and Sang *et al.* 2009) is a junior synonym of the Gray name.

M. flaviceps formosus is further characterised by usually having the first and second labial merged to form one larger one.

M. flaviceps promontoriumrursus subsp. nov. from Peninsula Malaysia and Thailand are further separated from the other three subspecies by the presence of a wide squarish border on the second upper labial as well as a generally whitish belly.

M. flaviceps masalbidus subsp. nov. from northern Sumatra are separated from the other three subspecies by the combination of the following characters: a high ventral count (over 215 in both sexes), more or less triangular second upper labial and a generally whitish belly.

Only *M. flaviceps formosus* has a similar ventral count and that taxon from Borneo can be readily separated from *M. flaviceps masalbidus subsp. nov.* by the radically different dorsal colour pattern.

Distribution: Java, Indonesia.

MEGAEROPHIS FLAVICEPS FORMOSUS (GRAY, 1849).

Holotype: Two specimens in the British Museum of Natural History, UK (BMNH) from Sarawak, Borneo.

Diagnosis: See the description above for *Bungarus flaviceps* Reinhardt, 1843.

Distribution: Known only from Borneo, this being only the hillier northern parts.

MEGAEROPHIS FLAVICEPS PROMONTORIUMRURSUS SUBSP. NOV.

Holotype: A preserved specimen in the Museum of Natural History (UK) BMNH specimen number: 1860.3.19.1263 collected from Pinang (Penang), Peninsular Malaysia. The Museum of Natural History in London, UK allows access to its holdings.

Paratypes: Three preserved specimens in the Museum of Natural History (UK) BMNH specimen numbers: BMNH 1987.1148 collected from Surat Thani, Thailand; BMNH 1938.8.7.59 collected from Khao Ram, Nakousatamera Mts, (Siam) Thailand; BMNH 1969.1924 collected from Betong, Patani, Province, Thailand.

Diagnosis: The species currently known as *Bungarus flaviceps* Reinhardt, 1843, (now placed in *Megaerophis*) is herein divided into four allopatric subspecies, two of which are also formally named for the first time.

This species is separated from all others in the tribe by having subcaudals divided or partly single and partly divided and 13 dorsal mid-body rows.

It is further diagnosed by the following suite of characters: expanded neural crest of vertebrae forms distinct ridge down the back and tail; subcaudals undivided, although anteriorly those near the tip may be divided; ventrals: males 193-236, females 193-217; subcaudals: males 47-53, females 42-54. Black above; orange-yellow dorsal stripe often present; interstitial skin orange-yellow giving appearance of longitudinal stripes; head reddish to orange-yellow; tail and posterior part of body reddish to orange-yellow; belly orange, yellow, brown or whitish, sometimes edged with brown. (modified from Smith, 1943 at p. 411.).

The nominate subspecies *Megaerophis flaviceps flaviceps* Reinhardt, 1843 is separated from the other three subspecies by having less than 200 ventrals, versus over 200 in all other subspecies.

All of *M. flaviceps flaviceps* Reinhardt, 1843, *M. flaviceps promontoriumrursus subsp. nov.* from Peninsula Malaysia and Thailand, and *M. flaviceps masalbidus subsp. nov.* from northern Sumatra are characterised by a dorsal colouration of greyish black in colour and with a very distinctive orange to red head and tail and no overtly obvious body pattern or dorsal streak.

Both *M. flaviceps flaviceps* Reinhardt, 1843 and *M. flaviceps promontoriumrursus subsp. nov.* from Peninsula Malaysia and Thailand are characterised by a series of small yellow dots along the vertebral line, a yellow lateral streak along the two outer rows of scales a red tail and an elongate black marking on the back of the head.

M. flaviceps flaviceps Reinhardt, 1843 has a yellowish or brown belly, versus whitish in *M. flaviceps promontoriumrursus subsp. nov.*.

The subspecies *M. flaviceps formosus* (Gray, 1849) from the northern parts of Borneo, is easily the most divergent subspecies in terms of dorsal colouration, characterised by irregular white, red and black crossbands (that are absent in other subspecies) as well as a distinctive yellow vertebral line.

The more recent name "*Bungarus flaviceps baluensis* Loveridge, 1938", widely appearing in the literature (e.g. Manthey 1983 and Sang *et al.* 2009) is a junior synonym of the Gray name.

M. flaviceps formosus is further characterised by usually having the first and second labial merged to form one larger one.

M. flaviceps promontoriumrursus subsp. nov. from Peninsula Malaysia and Thailand are further separated from the other three subspecies by the presence of a wide squarish border on the second upper labial as well as a generally whtish belly.

M. flaviceps masalbidus subsp. nov. from northern Sumatra are separated from the other three subspecies by the combination of the following characters: a high ventral count (over 215 in both sexes), more or less triangular second upper labial and generally whitish belly.

Only *M. flaviceps formosus* has a similar ventral count and that taxon from Borneo can be readily separated from *M. flaviceps masalbidus subsp. nov.* by the radically different dorsal colour pattern, including cross-bands and a well-defined yellow vertebral stripe as outlined above.

Distribution: Peninsula Malaysia and nearby Thailand.

Etymology: The name *promontoriumrursus* refers in Latin to the obviously ridged back of this taxon.

MEGAEROPHIS FLAVICEPS MASALBIDUS SUBSP. NOV.

Holotype: A preserved female specimen in the Museum of Natural History (UK) BMNH specimen number: 1858.4.20.15 collected from Sumatra. The Museum of Natural History in London, UK allows access to its holdings.

Diagnosis: The species currently known as *Bungarus flaviceps* Reinhardt, 1843, (now placed in *Megaerophis*) is herein divided into four allopatric subspecies, two of which are also formally named for the first time.

This species is separated from all others in the tribe by having subcaudals divided or partly single and partly divided and 13 dorsal mid-body rows.

It is further diagnosed by the following suite of characters: expanded neural crest of vertebrae forms distinct ridge down the back and tail; subcaudals undivided, although anteriorly those near the tip may be divided; ventrals: males 193-236, females 193-217; subcaudals: males 47-53, females 42-54. Black above; orange-yellow dorsal stripe often present; interstitial skin orange-yellow giving appearance of longitudinal stripes; head reddish to orange-yellow; tail and posterior part of body reddish to orange-yellow; belly orange, yellow, brown or whitish, sometimes edged with brown. (modified from Smith, 1943 at p. 411.).

The nominate subspecies *Megaerophis flaviceps flaviceps* Reinhardt, 1843 is separated from the other three subspecies by having less than 200 ventrals, versus over 200 in all other subspecies.

All of *M. flaviceps flaviceps* Reinhardt, 1843, *M. flaviceps promontoriumrursus subsp. nov.* from Peninsula Malaysia and Thailand, and *M. flaviceps masalbidus subsp. nov.* from northern Sumatra are characterised by a dorsal colouration of greyish black in colour and with a very distinctive orange to red head and tail and no overtly obvious body pattern or dorsal streak.

Both *M. flaviceps flaviceps* Reinhardt, 1843 and *M. flaviceps promontoriumrursus subsp. nov.* from Peninsula Malaysia and Thailand are characterised by a series of small yellow dots along the vertebral line, a yellow lateral streak along the two outer rows of scales a red tail and an elongate black marking on the back of the head. *M. flaviceps flaviceps* Reinhardt, 1843 has a yellowish or brown belly, versus whitish in *M. flaviceps promontoriumrursus subsp. nov.*.

The subspecies *M. flaviceps formosus* (Gray, 1849) from the northern parts of Borneo, is easily the most divergent subspecies in terms of dorsal colouration, characterised by irregular white, red and black crossbands (that are absent in other subspecies) as well as a distinctive yellow vertebral line.

The more recent name “*Bungarus flaviceps baluensis* Loveridge, 1938”, widely appearing in the literature (e.g. Manthey 1983 and Sang *et al.* 2009) is a junior synonym of the Gray name.

M. flaviceps formosus is further characterised by usually having the first and second labial merged to form one larger one.

M. flaviceps promontoriumrursus subsp. nov. from Peninsula Malaysia and Thailand are further separated from the other three subspecies by the presence of a wide squarish border on the second upper labial as well as a generally whtish belly.

M. flaviceps masalbidus subsp. nov. from northern Sumatra are separated from the other three subspecies by the combination of the following characters: a high ventral count (over 215 in both sexes), more or less triangular second upper labial and a generally whitish belly.

Only *M. flaviceps formosus* has a similar ventral count and that taxon from Borneo can be readily separated from *M. flaviceps masalbidus subsp. nov.* by the radically different dorsal colour pattern, including cross-bands and a well-defined yellow vertebral stripe as outlined above.

Distribution: Sumatra and mainly in the hilly parts to the north and west.

Etymology: The name *masalbidus* refers in Latin to the whitish coloured belly of this taxon.

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CONFLICT OF INTEREST

The author has no known conflicts of interest in terms of this paper and conclusions within.

Australasian Journal of Herpetology 36:21-23.
Published 30 March 2018.

ISSN 1836-5698 (Print)
ISSN 1836-5779 (Online)

A sensible breakup of the South-east Asian Pitviper genus *Calloselasma* Cope, 1860 *sensu lato* and the description of a new species.

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Received 22 April 2017, Accepted 10 September 2017, Published 30 March 2018.

ABSTRACT

The taxonomy and nomenclature of the south-east Asian Pitviper genus *Calloselasma* Cope, 1860 has been stable for many years.

Most authors have treated it as being monotypic for the species originally described as *Trigonocephalus rhodostoma* Kuhl, 1824. Cope erected the genus *Calloselasma* to accommodate the species in 1860.

In 1933 Angel described the species *Ancistrodon annamensis*, which was synonymised with *Calloselasma rhodostoma* (Kuhl, 1824) by most later authors.

A review of snakes assigned to the species *Calloselasma rhodostoma* (Kuhl, 1824) found three distinctive regional populations worthy of taxonomic recognition at the species level based on both published molecular data from various studies as well as obvious morphological differences between populations.

Available names are assigned to two.

These are *Calloselasma rhodostoma* (Kuhl, 1824) for the nominate form from Java, Malaysia and potentially Rayong Province, Thailand. The available name C. *annamensis* (Angel, 1933) is applied to the population from north East Thailand and nearby Vietnam.

The third is formally named for the first time as *C. oxyi sp. nov.* and it is known from Kanchanaburi and Prachaup Khiri-Khan, Thailand and presumably occurs in immediately proximate parts of Myanmar (Burma).

Keywords: Taxonomy; Nomenclature; Viper; pitviper; South-east Asia; Asia; Thailand; Java; Cambodia; Myanmar; Burma; Malaysia; Vietnam; Laos; Indonesia; *Calloselasma*; *rhodostoma*; *annamensis*; new species; *oxyi*.

INTRODUCTION

The Malayan Pitviper *Calloselasma rhodostoma* (Kuhl, 1824) has had a stable taxonomy and nomenclature for decades.

The putative species occurs in the region of Peninsula Malaysia and nearby areas of south-east Asia.

Most authors have treated it as being monotypic for the species originally described as *Trigonocephalus rhodostoma* Kuhl, 1824. Cope from the United States of America erected the genus *Calloselasma* to accommodate the species in 1860 and this treatment of the species has been generally continued ever since.

In 1933 Angel described the species *Ancistrodon annamensis*, which has been synonymised with *Calloselasma rhodostoma* (Kuhl, 1824) by most later authors that have noted the two available names. A review of snakes assigned to the species *Calloselasma rhodostoma* (Kuhl, 1824) by inspection of live specimens, corpses in Museums and numerous published images, found three distinctive regional populations worthy of taxonomic recognition at the species level.
The evidence for this also came from published molecular data from various studies as well as obvious morphological differences between populations.

Available names are assigned to two of these populations.

These are *Calloselasma rhodostoma* (Kuhl, 1824) for the nominate form from Java, Malaysia and potentially Rayong Province, in southern Thailand. The available name C. *annamensis* (Angel, 1933) is applied to the population from north East Thailand and nearby Vietnam.

The third is formally named for the first time as *C. oxyi sp. nov.* according the the rules laid out in the *International Code of Zoological Nomenclature* (Ride *et al.* 1999) and it is known from Kanchanaburi and Prachaup Khiri-Khan, Thailand and presumably occurs in the immediately proximate parts of Myanmar (Burma).

MATERIALS AND METHODS

These are not formally explained in a number of my recent papers under the heading "Materials and methods" or similar, on the basis they are self evident to any vaguely perceptive reader.
However, the process by which the following taxonomy and nomenclature in this and other recent papers by myself of similar form (in *Australasian Journal of Herpetology* issues 1-36), has been arrived at, is explained herein for the benefit of people who have recently published so-called "criticisms" online of some of my recent papers. They have alleged a serious "defect" by myself not formally explaining "Materials and Methods" under such a heading in some papers.

The process involved in creating the final product for this and other relevant papers has been via a combination of the following:

Genera and component species (in this case just one putative species) have been audited to see if their classifications are correct on the basis of known type specimens, locations and the like when compared with known phylogenies and obvious morphological differences between relevant specimens and similar putative species.

Original descriptions and contemporary concepts of the species are matched with available specimens from across the ranges of the species to see if all conform to accepted norms.

These may include those held in museums, private collections, collected in the field, photographed, posted on the internet in various locations or held by individuals, and only when the location data is good and any other relevant and verifiable data is available.

Where specimens do not appear to comply with the described species or genera (and accepted concept of each), this non-conformation is looked at with a view to ascertaining if it is worthy of taxonomic recognition or other relevant considerations on the basis of differences that can be tested for antiquity or deduced from earlier studies.

When this appears to be the case (non-conformation), the potential target taxon is inspected as closely as practicable with a view to comparing with the nominate form or forms if other similar taxa have been previously named.

Other relevant data is also reviewed, including any available molecular studies which may indicate likely divergence of populations.

Where molecular studies are unavailable for the relevant taxon or group, other studies involving species and groups constrained by the same geographical or geological barriers, or with like distribution patterns are inspected as they give reasonable indications of the likely divergences of the taxa being studied herein.

Additionally other studies involving geological history, sea level and habitat changes associated with long-term climate change, including recent ice age changes in sea levels, versus known sea depths are utilized to predict past movements of species and genus groups in order to further ascertain likely divergences between extant populations (as done in this very paper), while also assessing likely habitat boundaries for given populations.

When appropriate other factors such as sea currents may be examined to indicate likely gene flow by rafting over distance and time.

When all available information checks out to show taxonomically distinct populations worthy of recognition, they are then recognized herein according to the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

This means that if a name has been properly proposed in the past (even if in the absence of sound scientific data at the time), it is used as is done in this paper. Alternatively, if no name is available, one is proposed according to the rules of *International Code of Zoological Nomenclature*, often called “The Code” as is also done in this paper.

As a matter of trite I mention that if a target taxon or group does check out as being “in order” or properly classified, a paper is usually not published unless some other related taxon is named for the first time.

The published literature relevant to *Calloselasma* Cope, 1860 *sensu lato* and the taxonomic and nomenclatural judgements made within this paper includes the following:

Angel (1933), Boie (1827), Boulenger (1896), Bulian (2003), Chanard *et al.* (1999, 2015), Cox *et al.* (1998), Daltry *et al.* (1996), Das (2012), de Rooij (1917), Duméril *et al.* (1854), Geissler *et al.* (2011a, 2011b), Grismer *et al.* (2008a, 2008b), Gumprecht *et al.* (2004), Koch (1991), Kopstein (1938), Kuhl (1824), Manthey and Grossmann (1997), McDiarmid *et al.* (2009), Onn *et al.* (2009), Parkinson (1999), Pauwels *et al.* (2000, 2003), Pyron *et al.* (2011, 2013a, 2013b), Ride *et al.* (1999), Sacha (2015), Saint Girons (1972), Sang *et al.* (2009), Seung Hoon (2012), Smith (1939), Strine *et al.* (2015), Stuart and Emmett (2006), Stuart *et al.* (2006), Sworder (1933), Taylor (1965), Visser (2015), Vonk and Richardson (2008), Wallach *et al.* (2014) and sources cited therein.

I also note that, notwithstanding the theft of relevant materials from this author in an illegal armed raid on 17 August 2011, which were not returned in breach of undertakings to the court (Court of Appeal Victoria 2014 and VCAT 2015), I have made a decision to publish this paper.

This is in view of the conservation significance attached to the formal recognition of unnamed taxa at all levels and on the basis that further delays may in fact put these presently unnamed or potentially improperly assigned taxa at greater risk of extinction.

This comment is made noting the extensive increase in human population in south-east Asia and elsewhere and the general environmental destruction across that continent as documented by Hoser (1991), including low density areas without a large permanent human population.

These areas still remain heavily impacted by non-residential human activities.

I also note the abysmal environmental record of various National, State and Local governments in the region over the past 200 years as detailed by Hoser (1989, 1991, 1993 and 1996).

NOTE ON THE DESCRIPTION HEREIN FOR ANY REVISORS

Unless mandated by the rules of the currently in force edition of the *International Code of Zoological Nomenclature*, the spelling of the newly proposed name should be altered in any way.

CALLOSELASMA OXYI SP. NOV.

Holotype: A preserved specimen at the US National Museum, now called the National Museum of Natural History; Smithsonian Institution; Washington, DC, USA, specimen number: USNM Amphibians and Reptiles, specimen number: 94939, collected from Prachuap Khiri Khan, Sam Roi Yot, Thailand in 1932. Lat. 12.2458 N, Long. 99.96 E.
The National Museum of Natural History; Smithsonian Institution; Washington, DC, USA, allows access to its holdings.

Diagnosis: *Calloselasma oxyi sp. nov.* has until now been regarded as a regional population of *Calloselasma rhodostoma* (Kuhl, 1824) as has a third species, herein given the available name *Calloselasma annamensis* (Angel, 1933).

All three vipers are separated from all other pitvipers and defined by the following suite of characters: Snout pointed and somewhat turned up at the end. The rostral is as deep as broad, or a little deeper than broad; they have a pair of internasals and a pair of prefrontals; the frontal is as long as or a little longer than its distance from the end of the snout and as long as or a little shorter than the parietals; upper preocular separated from the posterior nasal by a loreal; one or two postoculars and one subocular, separating the eye from the labials; loreal pit separated from the labials; 7 to 9 upper labials. Scales are smooth, in 21 dorsal mid-body rows. There are 138-157 ventrals; 34-54 single and/or divided subcaudals.

Dorsally the general colour may be reddish, greyish, or pale brown above, with large angular, dark brown, black-edged spots disposed in opposite pairs or alternating; a dark brown vertebral line; lips yellowish or pink, powdered with brown; a broad dark brown, yellowish venter that is uniform or powdered or spotted with greyish brown (adapted from Boulenger 1896, pages 526-527).

The species *C. rhodostoma* is separated from the other two species by the possession of a well-defined black-edged band, festooned below, from the eye to the angle of the mouth, with a light band above it.

In essence in this species it gives the appearance of a human bite mark on the lower edge, which is distinctive for this species.
In the species *Calloselasma oxyi sp. nov.* the darker region from the eye to the angle of the mouth is not blackish in colour as seen in *C. rhodostoma* and it is also very heavily peppered. In the species *C. annamensis* the darker region from the eye to the angle of the mouth is also not blackish in colour as seen in *C. rhodostoma* and is also of relatively even thickness as it progresses from front to back, versus obviously variable thickness from front to back in the other two species.

Calloselasma oxyi sp. nov. is the only species of the trio in which the darker region from the eye to the angle of the mouth does not have a well defined lower margin.

Calloselasma oxyi sp. nov. is further separated from both *C. rhodostoma* and *C. annamensis* by a noticeable degree of peppering or specks of darker pigment on the lower labials and nearby chin shields.

Distribution: *C. rhodostoma* is found on Java and nearby parts of Peninsula Malaysia, to far southern Thailand. *C. annamensis* is found in Vietnam, Cambodia and immediately adjacent parts of Thailand, east of Bangkok. *Calloselasma oxyi sp. nov.* is restricted to Western Thailand and presumably adjacent parts of Burma.

Etymology: Named in honour of the now deceased Great Dane pet at the Hoser family household, named “Oxy” (short for “*Oxyuranus*” an elapid snake genus) in recognition of his work over 8 years in protecting the Hoser research facility to keep it free of thefts by thieves and others who would seek to steal what is not theirs. I have no hesitation in naming a species in honour of a non-human inhabitant of this planet.

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CONFLICT OF INTEREST

The author has no known conflicts of interest.

Australasian Journal of Herpetology 36:24-27.
Published 30 March 2018.

ISSN 1836-5698 (Print)
ISSN 1836-5779 (Online)

Morelia cliffrosswellingtoni sp. nov., yet another new species of Carpet Python from Australia and other significant new information about Australian pythons, their taxonomy, nomenclature and distribution.

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Received 1 Dec 2017, Accepted 13 Dec 2017, Published 30 March 2018.

ABSTRACT

This paper provides updates to the taxonomy and nomenclature of Australian pythons, including in relation to the distribution of well-known forms and taxa to be current to 2018.

Some of the new information is contrary to widely published earlier material by numerous authors and so is significant for many herpetologists who work with Australian pythons.

The so-called intergrade between Diamond Pythons *Morelia spilota* (Lacepede, 1804) of coastal New South Wales and nearby north-east Victoria and Carpet Pythons *Morelia macdowelli* Wells and Wellington, 1984 from north-east New South Wales and Southern Queensland (as detailed by Hoser, 1989), has been studied at length over some decades and has been found to be a distinctive species level taxon.

It is therefore formally named according to the ICZN rules (Ride *et al.* 1999) for the first time.

Morelia cliffrosswellingtoni sp. nov. is the form of Diamond/Carpet Python found in a coastal region bounded by the Hunter Valley in the south and Bellinger River in the north, where at the northern boundary of its range it appears to occur sympatrically with *M. macdowelli.*

Published DNA evidence by Ciavaglia *et al.* (2014), also revealed the validity of the taxon described herein, including that it is not a hybrid or intergrade between the other two.

Ciavaglia *et al.* (2014) also confirmed the validity of the species level taxon *Morelia cheynei* Wells and Wellington 1984. However its range includes a wider region than stated by previous authors, including Wells and Wellington (1984) who thought the taxon was confined to the Atherton Tablelands, south-west of Cairns in Queensland. It does in fact include the Australian wet tropics and drier regions to the south in a zone ranging from at least Mackay in the south to Tully (Atherton Tableland) in the north.

This confirms that *M. cheynei* is a phenotypically diverse species.

The taxon *Morelia harrisoni* Hoser, 2000 from southern New Guinea was shown by Ciavaglia *et al.* (2014) to also occur in the dry zone of Cape York Peninsula, Queensland, Australia at least as far south as the northern wet tropics at Cape Tribulation, making it a newly recognized Australian taxon. The species *M. harrisoni* was also confirmed as separate to *M. variegata* (Gray, 1842) by the data of Ciavaglia *et al.* (2014).

The validity of *M. wellsi* Hoser, 2012 was also confirmed by the data of Ciavaglia *et al.* (2014).

Ciavaglia *et al.* (2014) also confirmed that there are two taxonomic groups of Scrub Python *Australiasis* Wells and Wellington, 1984 in Australia, these being *A. kinghorni* (Stull, 1933) from the southern wet tropics, and *A. amethistina* (Schneider, 1801) from the northern wet tropics to Torres Strait (and southern New Guinea), based on first available names.

The taxon name *A. clarki* (Barbour 1914) is a junior synonym of *A. amethistina*. This correction based on new evidence from 2014 renders previous use of the nomen *clarki* to describe any Scrub Pythons invalid.

Based on the DNA evidence provided by Ciavaglia *et al.* (2014), the taxon originally described as *Chondropython viridis adelynhoserae* Hoser, 2009 from South-eastern PNG, should be recognized as a full species.

Keywords: Python; taxonomy; nomenclature; Australia; snake; Hoser; Wells; Wellington; *Morelia*; *cheynei*; *spilota*; *variegata*; *wellsi*; *harrisoni*; *imbricata*; *bredli*; *metaclfei*; *macdowelli*; *mippughae*; Australiasis; *amethistina*; *clarki*; *Chondropython*; *viridis*; *adelynhoserae*; new species; *cliffrosswellingtoni*; New South Wales.

INTRODUCTION

For decades it has been taken as gospel by herpetologists that Diamond Pythons and Carpet Pythons hybridized in a zone where the ranges of both species allegedly abutted (e.g. Worrell 1970, Hoser 1989).

This has remained the position of most if not all herpetologists predating the publication of this paper.

However, several factors did over time lead me to doubt this proposition.

One was the width of the zone of alleged hybridization, which appeared to span a straight line distance in excess of 100 km, making it perhaps the widest known zone of reptile taxa hybridization in the world. Included in this zone was a relative homogeneity of colouration, with true Diamond Pythons *Morelia spilota* (Lacepede, 1804) taking over abruptly south of the Hunter Valley intrusion. The same applied in terms of true Coastal Queensland type Carpet Pythons *Morelia macdowelli* Wells and Wellington, 1984 from about Coffs Harbour and north of there.

Secondly, in the early 1980's Dr. David Sheumack at Macquarie University received three large Carpet Pythons from the Bellinger River in northern New South Wales, which I inspected and photographed.

As those images were stolen in an illegal armed raid by John Cook of the New South Wales National Parks and Wildlife Service (NPWS) in July 1983 and not returned in spite of an undertaking on National Television to do so by his superior officer, John Rex Giles (AK Jack Giles), these are not reproduced in this paper (Hoser 1993).

Two were of the true Carpet Python form *Morelia macdowelli* Wells and Wellington, 1984, while the third was of the so-called intergrade form. Other specimens from the same area were inspected over the following decade and all conformed to the true Carpet Python form *Morelia macdowelli* Wells and Wellington, 1984. There were never

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any snakes that could have been described as intergrades of the intergrades.

Thirdly, in August 1993 I was the plenary speaker at the National Reptile Breeders Expo at Orlando Florida, USA which at the time was the largest ever gathering of herpetologists and reptile breeders in history.

There and at several breeder's facilities I visited in Florida, such as Tom Crutchfield enterprises, I saw numerous hybrid Diamond/Carpet Python crosses, these being direct crosses of Diamond Pythons *Morelia spilota* (Lacepede, 1804) and Carpet Pythons *Morelia macdowelli* Wells and Wellington, 1984 and none of them looked anything remotely like the wild so-called intergrades from northern New South Wales.

The Diamond/Carpet crosses in the USA, were invariably strongly banded, reminiscent of so-called Jungle Carpet Pythons *Morelia cheynei* Wells and Wellington, 1984, with many being improperly sold as these to maximize profits.

The so-called intergrades from northern New South Wales, are best described as a "high-yellow" form of Diamond Python, with a distinctive pattern of large yellow dorsal blotches of size and brightness never seen in specimens south of the Hunter Valley and no pattern on the body that in any way resembles the strongly marked plain coloured scale markings seen in *Morelia macdowelli.*

This implied that the so-called intergrades were not in fact hybrid snakes, but rather, they were something entirely different, as in a species level taxon.

Fourthly a perusal of museum ascension records for specimens at the Australian Museum in Sydney, showed a relative gap in specimens in an east-west area north of the Hunter Valley from the coast, stretching inland, with specimens in the region north of there (including ranges, such as Barrington Tops) being of the so-called intergrade form. There was simply no zone of intergradations between Diamond Pythons *Morelia spilota* (Lacepede, 1804) and this so-called intergrade form.

At the northern periphery of the range of the so-called intergrades, there is a fairly abrupt shift from this form to the so-called true *Morelia macdowelli* although as already noted, the two forms appear to co-exist in the region of the Bellinger River, based on specimens received at Macquarie University in the early 1980's.

This again implied that the so-called intergrades were in fact a separate species-level taxon.

Due to the geographical location of these so-called intergrades being between the ranges of *Morelia spilota* and *Morelia macdowelli* and a general perception that their colour is intermediate between the two, I was loathe to taxonomically recognize a form that may ultimately prove to be nothing more than a hybrid or cline between two other forms, which to many authors such as Cogger *et al.* (1983) or Wilson and Swan (2017) were all of one species.

Finally, the publication of a paper by Ciavaglia *et al.* (2014) convinced me that the so-called intergrades were in fact a species level taxon in need of being formally named.

The mitochondrial DNA data presented in their Fig. 3. at page 301, shows a greater divergence between the so-called intergrades and Diamond Pythons *Morelia spilota* than between the intergrades and all of *Morelia metcalfi* Wells and Wellington, 1984, *M. macdowelli* Wells and Wellington, 1984, *M. wellsi* Hoser, 2014, *M. cheynei* Wells and Wellington, 1984, *M. harrisoni* Hoser, 2000 and *M. variegata* (Lacepede, 1804).

While the molecular evidence separating the so-called intergrades from Diamond Pythons *M. spilota* was irrefutable, significant is the fact that morphologically, they are clearly more like *M. spilota* than the other form they are meant to be a hybrid from, namely *M. macdowelli*.

In any event the molecular evidence of Ciavaglia *et al.* (2014) also showed *M. macdowelli* to be more closely related to all of *M. metcalfi*, *M. wellsi,* and *M. cheynei* than it was to the so-called intergrades.

If each of the preceding four taxa warrant species level recognition, it means that the so-called intergrades must also be afforded such recognition (based on their wider divergence), noting that they are not intergrades in any event!

Hence there is a formal description of this newly identified taxon below according to the rules as set out by the ICZN (Ride *et al.* 1999).

FURTHER IMPORTANT INFORMATION REVEALED BY THE DATA OF CIAVAGLIA *ET AL*. 2014.

The paper of Ciavaglia *et al.* (2014) was aimed at providing a molecular means to identify python species with a view to forensic law-enforcement. It was not aimed at resolving issues of taxonomy and nomenclature.

I have done this here based on the data presented in that paper, most notably being that from their table Fig. 3. In keeping with a general ban on using Wells and Wellington or Hoser names, being unlawfully enforced by the so-called Wolfgang Wüster gang, as detailed by Hoser (2007) and Hoser (2015a-f) and sources cited therein, Ciavaglia *et al.* (2014) simply identified their *Morelia* samples as a group under the heading "*M. spilota* complex".

However the resulting phylogeny is clear and identifiable both by stems, lengths of them and location data of specimens, matched with specimen voucher numbers. Hence each can be easily matched with the relevant putative taxa, as I have done here, but significantly was not done by Ciavaglia *et al.* (2014).

Besides convincingly identifying the so-called "intergrades" as a hitherto unnamed species level taxon, the phylogeny presented also validated all or most forms previously identified, recognized and named by Wells and Wellington (1984, 1985) and Hoser (2000, 2012).

From Fig 3. (a) of Ciavaglia *et al.* (2014) the following facts can be elucidated.

Ciavaglia *et al.* (2014) confirmed the validity of the species level taxon *Morelia cheynei* Wells and Wellington 1984. However its range includes a wider region than stated by previous authors, including Wells and Wellington (1984) who stated they thought the taxon was confined to the Atherton Tablelands, south-west of Cairns in Queensland. It does in fact include the Australian wet tropics in a zone ranging from Tully (Atherton Tableland) in the north to a drier region at least as far south as Mackay.

This confirms that *M. cheynei* is a phenotypically diverse species.

The taxon *Morelia harrisoni* Hoser, 2000 from southern New Guinea and at the time it was named (2000) thought to be confined to New Guinea, was shown by Ciavaglia *et al.* (2014) to also occur in the dry zone of Cape York Peninsula, Queensland, Australia at least as far south as the northern wet tropics at Cape Tribulation, making it a newly recognized taxon occurring in a large area within Australia.

The species *M. harrisoni* was also confirmed as separate to *M. variegata* (Gray, 1842) by the genetic data of Ciavaglia *et al.* (2014).

The validity of *M. wellsi* Hoser, 2012 of the Coopers Creek system, was also confirmed by the genetic data of Ciavaglia *et al.* (2014).

Because the results of Ciavaglia *et al.* (2014) have made a significant contribution to the resolution of the taxonomy and nomenclature of Australia's Carpet Pythons, the relevant part of their Fig 3 (a) is reproduced herein, with the insertion of the relevant taxon names alongside each phylogenetic grouping.

It is a phylogenetic tree constructed using the entire *cyt b* gene region.

Noteworthy is that the taxon *M. mippughae* Hoser, 2003 (redescribed by Hoser 2004) from the northern Flinders Ranges in South Australia was tested in Ciavaglia *et al.* (2014) as a specimen from Depot Springs in South Australia. In their Fig 3 (a) it was clearly grouped with *M. metcalfei*, whereas in a second phylogenetic tree constructed from the 278 bp fragment of bases 558-835 inclusive it grouped with *M. wellsi* Hoser, 2012.

In both trees the taxon *M. mippughae* was divergent from others in each group, indicating it should be recognized as a taxonomic unit (valid at the species level).

Morelia macburnei Hoser, 2003 from St. Francis Island, clearly shows as being a junior synonym of *M. imbricata* Smith, 1981 and unless compelling evidence to the contrary emerges, this form should be properly identified as nothing more than a variant of it (as in *M. imbricata* Smith, 1981). In other words *Morelia macburnei* Hoser, 2003 should not be used as a nomen to indentify Carpet Pythons from St. Francis Island, except perhaps as a very weakly defined subspecies.

In other words there are 11 obvious taxonomically recognized forms of Diamond/Carpet Snake in Australasia, all of which occur on continental Australia, with the distribution of just one of these also extending to New Guinea.

Ciavaglia *et al.* (2014) also confirmed that there are two taxonomic groups of Scrub Python *Australiasis* Wells and Wellington, 1984 in Australia, these being *A. kinghorni* (Stull, 1933) from the southern wet tropics, and *A. amethistina* (Schneider, 1801) from the northern wet tropics to Torres Strait (and southern New Guinea), based on first available names.

Significantly, the much maligned Wells and Wellington said exactly that in 1984 and 1985!

The taxon name *A. clarki* (Barbour 1914) is therefore a junior synonym of *A. amethistina.* This correction based on new evidence from 2014 renders previous use of the nomen *clarki* to describe any Scrub Pythons invalid.

Based on the DNA evidence provided by Ciavaglia *et al.* (2014) at Fig. 3, the taxon originally described as *Chondropython viridis adelynhoserae* Hoser, 2009, should be recognized as a full species.

Mitchondrial DNA divergence of this taxon from nominate *C. viridis* (Schlegel, 1872) is greater than between *Australiasis nauta* (Harvey, Barker, Ammerman and Chippindale, 2000), *A. kinghorni* (Stull, 1933) and *A. amethistina* (Schneider, 1801), which are all widely recognized as distinct species in the face of similar DNA evidence in the same paper.

In any event taxonomic recognition of *Chondropython viridis adelynhoserae* Hoser, 2009 conservatively as a subspecies was confirmed as justified by Ciavaglia *et al.* (2014).

Therefore claims of taxonomic vandalism by Kaiser *et al.* (2013) by Hoser (2009) are thoroughly refuted by the evidence of Ciavaglia *et al.* (2014).

MORELIA CLIFFROSSWELLINGTONI SP. NOV.

Holotype: A preserved specimen at the Australian Museum, Sydney, New South Wales, Australia, specimen number: R.174895, collected at 20km South of Port Macquarie, New South Wales, Australia at Bonny Hills, Latitude -31.57 S., Longitude 152.83 E.

This is a government-owned facility that allows access to its holdings.

Paratype: A preserved specimen at the Australian Museum, Sydney, New South Wales, Australia, specimen number: R.160443, collected on the Lake Cathie Road, immediately south of Port Macquarie, New South Wales, Australia, Latitude -31.48 S., Longitude 152.92 E.

Diagnosis: *Morelia cliffrosswellingtoni sp. nov.* has until now been viewed by herpetologists as an intergrade form between Diamond Pythons *Morelia spilota* (Lacepede, 1804) of coastal New South Wales and nearby north-east Victoria and Carpet Pythons *Morelia macdowelli* Wells and Wellington, 1984 from north-east New South Wales and Southern Queensland.

It would be identified in most contemporary texts as a Carpet and/or Diamond Python including as detailed in Hoser (1989) or Cogger (2014).

In colouration, *Morelia cliffrosswellingtoni sp. nov.* is readily separated from all within *Morelia* except *M. spilota* by its Diamond Python colouration, which is best described as follows. The dorsal surface is one of mainly black scales, in which the centre of each is bright yellow to white in colour, the exact colour of the bright spots varying with age and the stage of the shedding cycle. No species within *Morelia* have this trait except for *Morelia cliffrosswellingtoni sp. nov.* and *M. spilota.*

The size of these white or yellow spots is invariably larger and brighter in *Morelia cliffrosswellingtoni sp. nov.* than *M. spilota* except for aberrant or very aged specimens.

M. cliffrosswellingtoni sp. nov. is readily separated from *M. spilota* by having a well defined dorsal pattern of three to five rows of large yellow spots formed by clusters of an average of 8-12 joined all yellow scales. Spots of this size formed by clusters of white or yellow scales do not occur in *M. spilota* which are found south of the Hunter Valley in NSW, or if so, only on one distinctive dorsal row and not 3-5 obvious rows along the body that are both dorsal and on the flanks.

Furthermore the clusters of white or yellow scales (blotches) on both top and flanks of *M. cliffrosswellingtoni sp. nov.* are always surrounded by distinctive black scales, lacking the characteristic yellow or white centres, whereas this is not the case for flank blotches on *M. spilota. M. cliffrosswellingtoni sp. nov.* are characterised by thick black bars of even thickness in the upper labials, formed by a dark etching of the scales, that are otherwise cream or white, versus thin or incomplete bars in *M. spilota.*

M. macdowelli either lack such labial bars (usually the case) or alternatively they are weak and indistinct or incomplete as seen in photo 343 on page 134 of Hoser (1989).

Hoser (1989) contains photos of *M. spilota* at pages 15 and 133.

Photos of *M. cliffrosswellingtoni sp. nov*. are on page 137 (photos 356 and 357) of Hoser (1989).

All conform to the diagnosis of each taxon as given above.

Distribution: This species is a New South Wales endemic. It is found along the coast and nearby wetter ranges in a zone stretching from near Myall Lakes in the south, extending inland to Barrington Tops, and north to about the Bellinger River, (Urunga), New South Wales.

Etymology: Named in honour of Cliff Ross Wellington of New South Wales, Australia, best known for his publications (Wells and Wellington, 1984, 1985), but who has also made other significant contributions to herpetology in numerous ways over some decades. It is fitting that such a magnificent serpent be named in his honour.

SUMMARY

This paper has for the first time ever, done the simple intellectual exercise of matching recently published phylogenetic trees for the Carpet Snakes with relevant described taxa to correctly ascertain the relevant ranges of each and confirm the taxonomic status of each.

The result is radically different to that in all recent book publications and scientific papers that have derived information from these standard texts (e.g. Wilson and Swan 2017, or Cogger 2014).

As a result of this paper, the known distributions for relevant previously described forms of Carpet Snakes must be significantly rewritten.

Based on a simple matching of the phylogentic trees presented by Ciavaglia *et al.* (2014) with the relevant taxonomic entities, treated herein as species, and as subspecies by other authors such as Wilson and Swan (2017) or Cogger (2014) it is clear in hindsight that all recent authors are in error as to exactly what are the diagnostic characters of each taxon and also their correct distributions.

By way of example and referring only to the so-called Carpet Pythons, both Wilson and Swan (2017) and Cogger (2014), the two most widely distributed and read texts on these snakes as of 2018, reflecting the consensus view of Australian herpetologists, have clearly got major parts of their information wrong.

Both texts allege the taxon *M. macdowelli* (treated by them as a subspecies of *M. spilota*) is found from northern New South Wales along the coast of Queensland to include Cape York Queensland. We now know this not to be the case. In fact the northern coastal limit of distribution for *M. macdowelli* is in fact somewhere south of Mackay in Queensland.

This effectively halves the range and distribution of this well-known taxon.

Similarly, *M. cheynei*, is not confined to the Atherton Tableland as long claimed by those who recognize the taxon as described by Wells and Wellington, but instead it inhabits a wide area from about this part of Queensland (near Cairns in the southern Wet Tropics), south to include Mackay.

This is an expansion in known range of at least four-fold and greatly increases the known colour variation in this taxon. The New Guinea taxon, *M. harrisoni*, is shown to be separate and distinct from *M. variegata*, contradicting an assertion by Wilson and Swan (2017) that *harrisoni* is probably synonymous with *M. variegata.*

It goes without saying that the outrageously ridiculous claim of Wolfgang Wüster and his gang of thieves via Kaiser *at el.* (2013), that *M. harrisoni* from New Guinea should be synonymised with *M. spilota* from New South Wales, Australia is purely fanciful!

More significantly, *M. harrisoni*, is shown herein for the first time to be an Australian taxon as well as from New Guinea, with a range stretching from the north of Cape York, south to the northern Wet Tropics, at least as far south as Cape Tribulation in Queensland, being a straight line distance of about 600 km on the Australian mainland.

The range of the Diamond Python *M. spilota* is reduced by about 100 km in a straight line measurement at the northern end of its previously recognized distribution.

Significantly, the new species *M. cliffrosswellingtoni sp. nov.* is more divergent from both Diamond Pythons *M. spilota* and (Coastal NSW/ Qld) Carpet Pythons *M. macdowelli*, than all of *Australiasis nauta* (Harvey, Barker, Ammerman and Chippindale, 2000), *A. kinghorni* (Stull, 1933) and *A. amethistina* (Schneider, 1801) are from one another based on the DNA sequence evidence now lodged at Genbank as used by Ciavaglia *et al.* (2014).

Significantly, all relevant taxa identified within this paper can be easily identified with certainty from analysis of the mitochondrial DNA as outlined by Ciavaglia *et al.* (2014) as detailed by those authors in that paper, referrable to the taxa identified in this paper.

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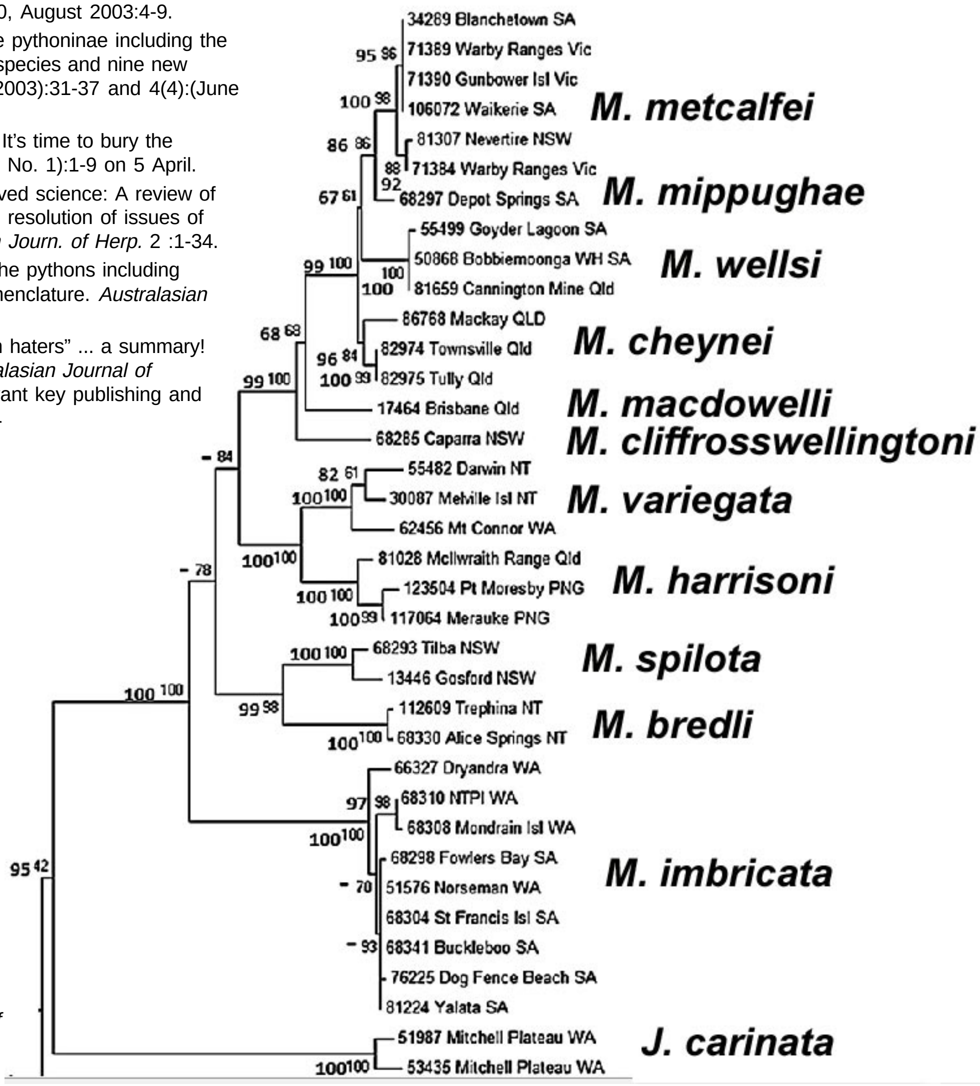
CONFLICT OF INTEREST

The author has no known conflicts of interest.



Australasian Journal of Herpetology 36:28-30.
Published 30 March 2018.

ISSN 1836-5698 (Print)
ISSN 1836-5779 (Online)

A new subgenus, new species and new subspecies of *Elseya* Gray, 1867 (Testudinata: Pleurodira: Chelidae) from Eastern Australia.

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Received 23 March 2017, Accepted 3 September 2017, Published 30 March 2018.

ABSTRACT

The taxonomy and nomenclature of the Australian freshwater turtles has been in a state of flux for many years, with a steady flow of new species and genera being formally named and described.
At times several species and genera have even been "redescribed" in reckless and culpable acts of taxonomic vandalism as detailed by Hoser (2015a-f)!

This paper formally names a new subgenus, new species and new subspecies of *Elseya* Gray, 1867 from Eastern Australia. All three taxonomic entities have been known for some time and should have been named far sooner.

It is important that significant potentially threatened biological entities be named sooner, rather than later and preferably before "official" government indifference leads to otherwise avoidable extinctions.

Keywords: Taxonomy; Nomenclature; *Elseya*; *Myuchelys*; *Wollumbinia*; *dentata*; *irwini*; *stirlingi*; *albagula*; Wells and Wellington; Thomson, Georges; Taxonomic Vandalism; Daintree River; subgenus; new subgenus; *Fitzroychelys*; new species; *shireenhoserae*; new subspecies; *fitzroyi.*

INTRODUCTION

The taxonomy and nomenclature of the Australian freshwater turtles has been in a state of flux for many years, with a steady flow of new species and genera being formally named and described. Cann and Sadlier (2017) give a fairly accurate and up to date overview of the taxonomy and nomenclature of Australian Freshwater Turtles, using correct ICZN compliant nomenclature for the relevant biological entities.

The only obvious defect in their work was the following:
The authors, while recognizing more than one species within the *Chelodina expansa* (Gray, 1856) group, failed to note the relevant scientific descriptions of forms by Hoser (2014).

A number of well-known, but currently unnamed entities within the Australian Freshwater Turtles remain unnamed, including as identified by Todd (2013) and Todd *et al.* (2013).
While the provisions of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999) allow workers on a group to monopolize name authority rights over potential new taxa for up to a year, any such right certainly evaporates after four years and so it is on this basis that I have decided to name unnamed entities.

This paper formally names a new subgenus, new species and new subspecies of *Elseya* Gray, 1867 from Eastern Australia. All three taxonomic entities have been known for some time and should have been named far sooner. It is important that significant potentially threatened biological entities be named sooner, rather than later and preferably before "official" government indifference leads to otherwise avoidable extinctions.

All three entities have until recent years been treated as eastern variants of *Elseya dentata* (Gray, 1863). More recently, all have been treated as other species within the same genus, albeit a different subgenus.

Todd (2013) identified a lineage in the Daintree River area as an unnamed species. This is formally named for the first time herein as *Elseya shireenhoserae sp. nov.*. The northern population of *E. albagula* Thomson, Georges and Limpus, 2006 from the Fitzroy River system is formally named as a subspecies *fitzroyi.*
Finally, *E. albagula* is placed in a regionally divergent subgenus *Fitzroychelys subgen. nov.*, separate from congeners found in northern Queensland.

I also note that for some taxa of Australian Freshwater Turtles, an illegal duel nomenclature has been created by Scott Thomson and other members of the so-called Wolfgang Wüster gang of thieves, as detailed by Hoser (2015a-f).

In order to comply with the rules of the ICZN as set out in the *International Code of Zoological Nomenclature* (Ride *et al.* 1999), their illegal names, created in acts of taxonomic vandalism are not used herein as correct.

MATERIALS AND METHODS

These are not formally explained in a number of my recent papers under the heading "Materials and methods" or similar, on the basis they are self evident to any vaguely perceptive reader.
However, the process by which the following taxonomy and nomenclature in this and other recent papers by myself of similar form (in *Australasian Journal of Herpetology* issues 1-36), has been arrived at, is explained herein for the benefit of people who have recently published so-called "criticisms" online of some of my recent papers, or others who may be misled by these online rants. The posters have alleged a serious "defect" by myself not formally explaining "Materials and Methods" under such a heading.

The process involved in creating the final product for this and other relevant papers has been via a combination of the following:

Genera and component species have been audited to see if their classifications are correct on the basis of known type specimens, locations and the like when compared with known phylogenies and obvious morphological differences between relevant specimens and similar putative species.

Original descriptions and contemporary concepts of the species are matched with available specimens from across the ranges of the species to see if all conform to accepted norms.

These may include those held in museums, private collections, collected in the field, photographed, posted on the internet in various locations or held by individuals, and only when the location data is good and any other relevant and verifiable data is available.

Where specimens do not appear to comply with the described species or genera (and accepted concept of each), this non-conformation is looked at with a view to ascertaining if it is worthy of taxonomic recognition or other relevant considerations on the basis of differences that can be tested for antiquity or deduced from earlier studies. When this is the case (non-conformation), the potential target or candidate taxon is inspected as closely as practicable with a view to comparing it with the nominate form or forms if other similar taxa have been previously named.

Other relevant data is also reviewed, including any available molecular studies which may indicate likely divergence of populations. Where molecular studies are unavailable for the relevant taxon or group, other studies involving species and groups constrained by the same geographical or geological barriers, or with like distribution patterns are inspected as they give reasonable indications of the likely divergences of the taxa being studied herein.

Additionally other studies involving geological history, sea level and habitat changes, ocean currents and other factors, including those affected or changed by long-term climate change, including recent ice age changes in sea levels, versus known sea depths, plate tectonics and other factors are utilized to predict past movements of species and genus groups in order to further ascertain likely divergences between extant populations (as done in this very paper), while also assessing likely habitat boundaries for given populations.

When all available information checks out to show taxonomically distinct populations worthy of recognition, they are then recognized herein according to the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

This means that if a name has been properly proposed in the past (even if in the absence of sound scientific data), it is used as is done in this paper. Alternatively, if no name is available, one is proposed according to the rules of the *International Code of Zoological Nomenclature* as is done in this paper.

As a matter of trite I mention that if a target taxon or group does check out as being "in order" or properly classified, a paper is usually not published unless some other related taxon is named for the first time.

The published literature relevant to the subject taxa within *Elseya* as defined in texts such as Cann and Sadlier (2017), or Cogger (2014) and the taxonomic and nomenclatural judgements made within this paper includes the following: Artner (2008), Cann (1997), Cann and Sadlier (2017), Cogger (2014), Georges and Thomson (2010), Hamann *et al.* (2008), Hoser (1989, 2014, 2015a-f), Meyer (1874), Ride *et al.* (1999), Thomson and Georges (2016), Thomson *et al.* (2006, 2015), Todd (2013), Todd *et al.* (2013), Vogt (1911), Wells (2002, 2007), Wells and Wellington (1983, 1985), Wilson and Swan (2017) and sources cited therein.

Some material within descriptions below may be repeated for different described taxa and this is in accordance with the provisions of the *International Code of Zoological Nomenclature* and the legal requirements for each description. I make no apologies for this.

I also note that, notwithstanding the theft of relevant materials from this author in an illegal armed raid on 17 August 2011, which were not returned in breach of undertakings by the thieves to the court (Court of Appeal Victoria 2014 and Victorian Civil and Administrative Tribunal (VCAT) 2015), I have made a decision to publish this paper.

This is in view of the conservation significance attached to the formal recognition of unnamed taxa at all levels and on the basis that further delays may in fact put these presently unnamed or potentially improperly assigned taxa at greater risk of extinction.

This comment is made noting the extensive increase in human population in the north of Australia, which is where the relevant species occur and the general environmental destruction across the planet as documented by Hoser (1991), including low density areas without a large permanent human population.

These areas still remain heavily impacted by non-residential human activities, including the flow of toxic wastes into the relevant river systems that these species live in.

I also note the abysmal environmental record of various National, State and Local governments in all parts of the world in terms of wildlife conservation in the past 200 years as detailed by Hoser (1989, 1991, 1993 and 1996).

NOTES ON THE DESCRIPTIONS FOR ANY POTENTIAL REVISORS

Unless mandated by the rules of the *International Code of Zoological Nomenclature*, none of the spellings of the newly proposed names should be altered in any way.

I also note that an attempted illegal hegemony of taxonomy involving herpetology and the turtles in particular by serial liars and thieves Wolfgang Wüster, Anders Rhodin, Scott Thomson and Arthur Georges should be rejected (VCAT 2015).

It is likely that members of their gang of thieves will unlawfully rename the relevant taxa and then use unethical and illegal means to force or induce others to use their non-ICZN compliant nomenclature.

This will no doubt include unlawful edits of websites like "Wikipedia" and "The Reptile Database".
Their actions should be totally rejected by all scientists and other users of the relevant taxonomy and nomenclature.

In passing I note that the name *Myuchelys* Thomson and Georges (2009) should not be used for the relevant group of turtles. The correct ICZN name is *Wollumbina* Wells, 2007, which has date priority for the same species.

Thomson and Georges engaged in an act of gross taxonomic vandalism, described by themselves once as "Taxonomic terrorism" in illegally renaming the genus *Wollumbinia*.
Their culpability has increased over the following decade as they have improperly urged others to use their illegally coined name, including via despotic control of use on the internet, including on hate-pages they control like "Wikipedia" which they use to peddle their warped world view.

In passing I also note that the species *Elseya flaviventralis* Thomson and Georges, 2016 is an unlawful junior synonym of *E. jukesi* Wells, 2002 and so that latter name only should be used.

SUBGENUS *FITZROYCHELYS SUBGEN. NOV.*

Type species: *Elseya albagula* Thomson, Georges and Limpus, 2006.

Diagnosis: This subgenus is separated from all other *Elseya* species by the following unique suite of characters: Anterior edges of the first and second marginal shields are equally forward and adult head shields are very deeply furrowed or wrinkled.

Distribution: Fitzroy, Burnett and Mary River drainages in Eastern Queensland.

Content: *Elseya albagula* Thomson, Georges and Limpus, 2006.

Etymology: Named after the river system it is found.

ELSEYA SHIREENHOSERAE SP. NOV.

Holotype: A preserved female specimen in the National Museum of Victoria Museum of Victoria, Melbourne, Victoria, Australia, collected by Charlie Tanner, specimen number: D11946, collected from near Bloomfield in far north Queensland, Latitude -15.80 S, Longitude 145.30 E.

This is a facility that allows access to its holdings.

The Museum database lists this specimen as being (erroneously) identified as "*Elseya irwini* Cann, 1997" by Arthur Georges and Scott Thomson in January of 2015.
Diagnosis: *Elseya shireenhoserae sp. nov.* is similar in most respects to *Elseya irwini* Cann, 1997 and *E. stirlingi* Wells and Wellington, 1985 and separated from both by the fact that the gular shields are triangular and of similar width to the shield between them, versus significantly wider than that shield in the other two species (most extreme in *E. stirlingi*).

In *E. irwini*, the gular shields are of similar length to that between them, versus much shorter in *Elseya shireenhoserae sp. nov.*.

Adult female *Elseya shireenhoserae sp. nov.* are also characterised by a significant upwards curling of the carapace on the front sides (seen also in *E. irwini*), but unlike in *E. irwini*, the rear of the carapace in *Elseya shireenhoserae sp. nov.* also inflects upwards.

Cogger (2014) provides a key to separate *E. irwini* (and by default this species as well) from all other recognized species in the genus as of that date.

The genetic data of Todd (2013) at page 82 implies that *E. irwini* and *E. stirlingi* are conspecific (which contradicts the position of Cann and Sadlier (2017). If this is the case (both conspecific), then the correct species name for the taxon would be *E. stirlingi* as this name has priority under the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).
In passing I note that the original description of *E. stirlingi* by Wells and Wellington, was a lousy piece of writing, but notwithstanding this, it conforms with the written requirements of the second, third and fourth editions of the *International Code of Zoological Nomenclature* (Ride *et al.* 1985, 1999, Stoll *et al.* 1964), and therefore the name is available for purposes of zoological

nomenclature under ICZN rules.

Distribution: Known only from the Daintree River and adjacent watercourses in far north Queensland.

Etymology: Named in honour of my magnificent wife Shireen Hoser in recognition of her significant contributions to herpetology in Australia over some decades.

ELSEYA ALBAGULA FITZROYI SUBSP. NOV.

Holotype: A preserved specimen in the Queensland Museum, Brisbane, Queensland, Australia, specimen number: J28449 collected at the Emerald town weir on the Nogoa River, Latitude -23.52 S.

Longitude 148.17 E. This specimen was listed as a paratype for *E. albagula* Thomson, Georges and Limpus, 2006.

This is a facility that allows access to its holdings.

Diagnosis: *Elseya albagula* Thomson, Georges and Limpus, 2006 of the subgenus *Fitzroychelys subgen. nov.* are separated from all other *Elseya* species by the following unique suite of characters: Anterior edges of the first and second marginal shields are equally forward and adult head shields are deeply furrowed or wrinkled.

Adult *Elseya albagula fitzroyi subsp. nov.* are readily separated from *E. albagula albagula* by the fact that the whitish pigment underneath and behind the eye is generally broken, versus more-or-less continuous in *E. albagula albagula.*

The rear flanks of the shell in *E. albagula albagula* are slightly raised in a manner not seen in *Elseya albagula fitzroyi subsp. nov.*.

The large female specimen identified as "*Elseya dentata*" at the bottom of page 53 in Hoser (1989) is believed to be of the taxon *Elseya albagula fitzroyi subsp. nov.*.

Note: Previous authors, including Todd (2013) and Todd *et al.* (2013) found that this population unit (*Elseya albagula fitzroyi subsp. nov.*) should be managed separately to that from further south, for wildlife conservation purposes.

Distribution: The Fitzroy River drainage in eastern Queensland.

Etymology: Named after the river system it is found.

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Published 30 March 2018.

ISSN 1836-5698 (Print)
ISSN 1836-5779 (Online)

A sensible four-way breakup of the South-American River Turtle genus *Podocnemis* Wagler, 1830 along obvious phylogenetic and morphological lines.

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Received 3 March 2017, Accepted 12 October 2017, Published 30 March 2018.

ABSTRACT

The taxonomy and nomenclature of the South American River Turtle genus *Podocnemis* Wagler, 1830 has been stable for many years.

The most recently named species in the genus *Podocnemis vogli* was named by Müller in 1935.

Notwithstanding this, recent molecular studies have consistently shown the species group to be archaic and relevant genus members to have diverged from one another between 15 and 36 million years ago.

Such deep divergences clearly warrant recognition at the genus level as is seen for similarly divergent Turtle genera elsewhere.

As a result, the genus *Podocnemis* is divided four ways for each group of species that divided 22.5 or more million years ago. Two generic names are available and two new ones formally assigned. For three species that diverged from one another between 15 and 18 million years ago, each are also placed in newly named subgenera.

Keywords: Taxonomy; Nomenclature; Pelomedusidae; *Podocnemis*; *Bartlettia*; South America; new genus; *Novamyuchelys*; *Wellsandwellingtonchelys*; new subgenus; *Magdalenachelys; Erythrocephalachelys*.

INTRODUCTION

The taxonomy and nomenclature of the iconic South American River Turtle genus *Podocnemis* Wagler, 1830 has been stable for many years.

The most recently named species in the genus *Podocnemis vogli* was named by Müller in 1935.

Notwithstanding this, recent molecular studies have consistently shown the species group to be archaic and relevant genus members to have diverged from one another between 15 and 36 million years ago (Vargas-Ramirez *et al.* 2008).

Such deep divergences clearly warrant recognition at the genus level as is seen for similarly divergent Turtle genera elsewhere. See for example Le *et al.* (2013) who accepted the genus level division for the Australian *Wollumbinia* Wells, 2007 (which they erroneously called *Myuchelys* Thomson and Georges, 2009) and *Emydura* Bonaparte, 1836.

They showed that each species group diverged from one another 22.5 MYA and upheld the previously proposed genus level separation.

As a result of known divergence timelines as set out by Vargas-Ramirez *et al.* (2008), the genus *Podocnemis* is divided four ways for each group of species that divided 22.5 or more million years ago. For three species that diverged from one another between 15 and 18 million years ago in group 4, each are placed in newly named subgenera.

While it may appear extravagant to give six putative species a genus level recognition, the divergences alone justify the move. Furthermore there is absolutely no doubt that in at least some of these putative species more than one so-called "cryptic species" await formal discovery and naming, thus meaning that some of these genus-level groupings will not remain monotypic.

Inspection of specimens of the relevant taxa in order to find cryptic species proved difficult. It soon became evident that a lot of the collection data for museum specimens was unreliable and that furthermore specimens had been sold, traded and translocated by people across significant land barriers and likely interbred with other populations.

This has also shown up in studies by other herpetologists (as cited below).

Hence this paper does not formally name or resurrect any species.

MATERIALS AND METHODS

These are not formally explained in a number of my recent papers under the heading "Materials and methods" or similar, on the basis they are self evident to any vaguely perceptive reader.

However, the process by which the following taxonomy and nomenclature in this and other recent papers by myself of similar form (in *Australasian Journal of Herpetology* issues 1-36), has been arrived at, is explained herein for the benefit of people who have recently published so-called "criticisms" online of some of my recent papers. They have alleged a serious "defect" by myself not formally explaining "Materials and Methods" under such a heading.

The process involved in creating the final product for this and other relevant papers has been via a combination of the following:

Genera and component species have been audited to see if their classifications are correct on the basis of known type specimens, locations and the like when compared with known phylogenies and obvious morphological differences between relevant specimens and similar putative species.

Original descriptions and contemporary concepts of the species are matched with available specimens from across the ranges of the species to see if all conform to accepted norms.

These may include those held in museums, private collections, collected in the field, photographed, posted on the internet in various locations or held by individuals, and only when the location data is good and any other relevant and verifiable data is available.

Where specimens do not appear to comply with the described species or genera (and accepted concept of each), this non-conformation is looked at with a view to ascertaining if it is worthy of taxonomic recognition or other relevant considerations on the basis of differences that can be tested for antiquity or deduced from earlier studies.

When this appears to be the case (non-conformation), the potential target taxon is inspected as closely as practicable with a view to comparing with the nominate form or forms if other similar taxa have been previously named.

Other relevant data is also reviewed, including any available molecular studies which may indicate likely divergence of populations.

Where molecular studies are unavailable for the relevant taxon or group, other studies involving species and groups constrained by the same geographical or geological barriers, or with like distribution patterns are inspected as they give reasonable indications of the likely divergences of the taxa being studied herein.

Additionally other studies involving geological history, sea level and habitat changes associated with long-term climate change, including recent ice age changes in sea levels, versus known sea depths are utilized to predict past movements of species and genus groups in order to further ascertain likely divergences between extant populations (as done in this very paper), while also assessing likely habitat boundaries for given populations.

When all available information checks out to show taxonomically distinct populations worthy of recognition, they are then recognized herein according to the rules of the *International Code of Zoological Nomenclature* (Ride *et al*. 1999).

This means that if a name has been properly proposed in the past (even if in the absence of sound scientific data), it is used as is done in this paper. Alternatively, if no name is available, one is proposed according to the rules of the Code as is also done in this paper.

As a matter of trite I mention that if a target taxon or group does check out as being “in order” or properly classified, a paper is usually not published unless some other related taxon is named for the first time.

The published literature relevant to *Podocnemis* Wagler, 1830 *sensu lato* and the taxonomic and nomenclatural judgements made within this paper includes the following: Abdala *et al*. (2008), Alarcon Pardo (1969), Alderton (1988), Baur (1893), Bernardes *et al*. (2014), Bernarde *et al*. (2011), Bernhard and Vogt (2012), Bonin *et al*. (2006), Boulenger (1889), Cañas-Orozco (2015), Cantarelli *et al*. (2014), Cardoso dos Santos *et al*. (2016), Carneiro and Pezzuti (2015), Catenazzi *et al*. (2015), Cisneros-Heredia (2006), Cole *et al*. (2013), Cornalia (1849), Cunha and Vogt (2014, 2017) Cunha *et al*. (2014), Da Silva *et al*. (2016), Duellman (2005), Duellman and Salas (1991), Duméril (1852), Duméril and Bibron (1835), Emmons (2016), Erickson and Baccaro (2016), Erickson and Kaefer (2015), Erickson *et al*. (2015), Ernst and Barbour (1989), Fabrezi *et al*. (2009), Fachín-Terán and Vogt (2004), Fachín-Terán *et al*. (2003), Fantin *et al*. (2007, 2015), Ferronato *et al*. (2011), Forrero-Medina *et al*. (2014a, 2014b), Frair *et al*. (1978), Fretey (1977), Gaffney *et al*. (2011), Gallego-García and Páez (2016), Goeldi (1886), Goin *et al*. (1978), Gómez-Saldarriaga *et al*. (2016), Gorzula and Senaris (1999), Gotte (1992), Gray (1830, 1871), Herz (2014), Hoogmoed and Avila-Pires (1990), Hoogmoed and Gruber (1983), Huang and Clark (1969), Iverson (1986, 1995), Jaffé *et al*. (2008), Joyce *et al*. (2013), Kahl *et al*. (1980), Knaack (2004), Kornacker and Dederichs (1998), Krysko *et al*. (2009), Le *et al*. (2013), Lehr (2002), Magalhães *et al*. (2014), Menezes *et al*. (2016), Merchán (1998, 2003), Methner (1989), Miorando *et al*. (2013), Mittermeier and Wilson (1974), Morato *et al*. (2014), Moravec and Aparicio (2004), Müller (1935), Noronha *et al*. (2016), Oliveira-Ferronato *et al*. (2013), Páez *et al*. (2013, 2015a, 2015b), Pauler and Tredau (1995), Pearse *et al*. (2006), Pedroza-Banda *et al*. (2014), Peñaloza *et al*. (2013), Pereira *et al*. (2014), Perrone *et al*. (2014, 2016a, 2016b), Pignati *et al*. (2013a, 2013b, 2013c), Portelinha *et al*. (2013, 2014), Pritchard and Trebbau (1984), Ramo (1982), Restrepo *et al*. (2008), Rivas *et al*. (2012), Rudge-Ferrara *et al*. (2014), Schlüter *et al*. (2004), Schneider *et al*. (2012), Schweigger (1812), Siebenrock (1902), Spix and Wagler (1824), Thomson *et al*. (2008), Troschel (1848), Valverde (2009), Vargas-Ramirez *et al*. (2007, 2008), Vergara-Ríos *et al*. (2015), Vogt (2014), Vogt *et al*. (2007, 2013), Wagler (1830), Wermuth and Mertens (1977), Winkler (2006), Zapata *et al*. (2014) and sources cited therein.

Some material within descriptions below may be repeated for different described taxa and this is in accordance with the provisions of the *International Code of Zoological Nomenclature* and the legal requirements for each description. I make no apologies for this.

I also note that, notwithstanding the theft of relevant materials from this author in an illegal armed raid on 17 August 2011, which were not returned in breach of undertakings to the court (Court of Appeal Victoria 2014 and VCAT 2015), I have made a decision to publish this paper.

This is in view of the conservation significance attached to the formal recognition of unnamed taxa at all levels and on the basis that further delays may in fact put these presently unnamed or potentially improperly assigned taxa at greater risk of extinction.

This comment is made noting the extensive increase in human population in the north of South America, which is where the relevant species occur and the general environmental destruction across the planet as documented by Hoser (1991), including low density areas without a large permanent human population.

These areas still remain heavily impacted by non-residential human activities.

I also note the abysmal environmental record of various National, State and Local governments in all parts of the world in terms of wildlife conservation in the past 200 years as detailed by Hoser (1989, 1991, 1993 and 1996).

NOTES ON THE DESCRIPTIONS FOR ANY POTENTIAL REVISORS

Unless mandated by the rules of the *International Code of Zoological Nomenclature*, none of the spellings of the newly proposed names should be altered in any way. Should one or more newly named taxa be merged by later authors to be treated as a single genus or subgenus, the order of priority of retention of names should be the order (page priority) of the descriptions within this text.

I also note that an attempted illegal hegemony of taxonomy and nomenclature involving herpetology and the turtles in particular by serial liars and thieves Wolfgang Wüster, Anders Rhodin, Scott Thomson and Arthur Georges should be rejected (VCAT 2015).

Furthermore in Australia, a court agreed settlement signed by members of the so called Wüster gang in August 2017, now expressly forbids the Wüster gang and anyone else acting on their behest or instigation, from illegally renaming taxa named by myself (Raymond Hoser), or any other illegal use or theft of any intellectual property (IP) of Raymond Hoser (Alexander, 2017).

It is likely that members of the Wüster gang of thieves will unlawfully rename the relevant genera and then use unethical and illegal means to force others to use their non-ICZN compliant nomenclature.

Their actions should be totally rejected by all scientists and other users of the relevant taxonomy and nomenclature and would be in breach of an Australian court enforceable signed agreement by the relevant gang.

GENUS *PODOCNEMIS* WAGLER, 1830.

Type Species: *Emys expansa* Schweigger, 1812.

Diagnosis: All turtles within the Pelomedusidae are separated from other Chelids by the following suite of characters: Plastral bones eleven, mesoplastra being present. Shell covered with epidermal shields. Neck completely retractile within the shell, second cervical vertebra biconvex. A bony temporal arch; no parieto-squamosal arch, palatine bones in contact; no nasals; praefrontals in contact; dentary single. Digits moderately elongate, four or five claws.

South American Pelomedusidae as currently understood and including all the South American species are separated from the majority of African and Madagascan species by the presence of a bony temporal roof, the quadratojugal forming a suture with the parietal and mesoplastra small and lateral.

They are further defined as having mesoplastral bones small, lateral, wedged in between the hyoand the hypoplastra; plastron is large, without hinge, with strong axillary and inguinal buttresses. A bony temporal roof, the quadratojugal forming a suture with the parietal; alveolar surface of upper jaw with one or more ridges; a single shield between the eyes; a pair of large parietal shields and an inter-parietal. Digits broadly webbed, fore foot with five claws, hind foot with four. Tail is very short.

South American Pelomedusidae within *Podocnemis* as currently recognized are further separated from similar species by a concave forehead (versus flat in the others) and the jugal and quadrate bones are separated.

Podocnemis is herein restricted to the species *P. expansa* (Schweigger, 1812). It is separated from all other species until now treated as also being in the genus *Podocnemis* by short and feeble alveolar ridges and two mental barbells.

Morphologically most similar to this genus is the resurrected genus *Bartlettia* Gray, 1870 for the species originally described as *Podocnemis sextuberculata*, which is separated from the species *P. expansa* (Schweigger, 1812), by having one instead of two mental barbels.

The genus *Novamyuchelys gen. nov.* (type species is *Podocnemis vogli* Müller, 1935) is separated from all other Pelomedusidae, including other species within *Podocnemis* as recognized to date, by the following suite of characters:

Vertebral keel feeble or absent; posterior margin of shell not expanded. Shields smooth or nearly so. Size not known to exceed 300 mm. Upper jaw feebly notched. Skull rather broad with three ridges on the triturating surface of the maxilla, all ridges roughened or dentate. Temporal region of skull well covered, only slightly emarginate dorsally or ventrally. Vomer present, tending to form part of choanal septum.

Shell with only a feeble nuchal indentation. Hatchlings with vertebral two large, exceeding vertebrals three or four in length and with black quadrangular blotches on each plastral scute. Skull is rather broad. A precolumellar fossa present. Width of cavum tympani equals width of orbit. Interorbital width less than height of orbit. Premaxillae not reaching choanal margin but joining vomer to separate maxillae. Foramina incisiva well within the margins of the premaxillae but almost concealed from ventral view by extensions of the parachoanal triturating ridges. Interparietal scale elongate, but parietal scales meeting behind it. Suboculars large. Maxillary scale light only posteriorly, being dark in the middle and anteriorly. Two barbells and three foot scales.

The three species within the genus *Wellsandwellingtonchelys gen. nov*. (type species is *Podocnemis unifilis* Troschel, 1848), are separated from all other Pelomedusidae, including other species within *Podocnemis* as recognized to date, by the following suite of characters:

Forehead concave; jugal and quadrate bones separated. Alveolar ridges of upper jaw strong, running along the whole length of the jaw. One or two mental barbells, but if two barbells, then two azygous shields between the parietals.

Within *Wellsandwellingtonchelys gen. nov.* the subgenus *Magdelenachelys subgen. nov*. (type species is *Podocnemis lewyana* Duméril, 1852), is readily separated from the other species in the genus by two, versus one mental barbell and three foot scales. There are two azygous shields between the parietals. This subgenus is further defined as follows:

Intergular broad, gulars not longer than intergular is wide anteriorly. Head never with yellow spots on the interparietal scale, always with sides of head light in color. Shell with vertebral keel barely or not at all visible. No nuchal indentation. Skull moderately elongate, upper jaw rounded, not notched at middle. Two parallel ridges on the triturating surface of the maxilla. Width of cavum tympani equals width of orbit. Interorbital width less than height of orbit.

Premaxillae not separating maxillae and not reaching choanal margin. Foramina incisiva well within the borders of the premaxillae. A vestigial vomer may be present. Interparietal scale heart-shaped. Suboculars present. Two barbells and three foot scales.

The subgenus *Erythrocephalachelys subgen. nov*. (type species is *Podocnemis erythrocephala* Spix, 1824) is separated from the other two subgenera by the following suite of characters:

Upper jaw notched medially, if feebly notched the interparietal scale elongate; shell more or less convex, much expanded posteriorly; vertebral keel distinct, most prominent on vertebral two or three. No nuchal indentation. Skull elongate with two parallel longitudinal ridges on surfaces of the maxilla. Suboculars present. Two barbells, two foot scales. Head is reddish in colour of individuals of 200 mm carapace length or greater.

Within the subgenus *Wellsandwellingtonchelys subgen. nov.* (type species is *Podocnemis unifilis* Troschel, 1848), the relevant species can be separated from others in the genus *Wellsandwellingtonchelys gen. nov.* by the following unique suite of characters:

Vertebral keel usually distinct, typically most prominent on vertebral three; posterior shell margin somewhat expanded; shell commonly concentrically ridged. Size known to exceed 600 mm. Upper jaw distinctly notched. Skull elongate with two ridges on the triturating surface of the maxilla, the internal ridge not sharply dentate. Temporal region of skull strongly emarginate both dorsally and ventrally. Vomer usually absent. Shell with a distinct nuchal indentation. Hatchlings with vertebral two usually only as long as vertebral three and with the plastron completely yellow or without a definite plastral pattern. Skull more or less elongate. A deep precolumellar fossa in the cavum tympani. Width of cavum tympani as great as or greater than the width of the orbit. Interorbital width less than height of orbit. Premaxillae not separating maxillae, not reaching choanal margin. Foramina incisive well within the borders of the premaxillae. The interchoanal bar, if present, formed from the palatines. Interparietal scale is very elongate but parietal scales usually meeting behind it. Suboculars usually present, usually not large. Maxillary scale light in color anteriorly and posteriorly, but dark in the middle. Usually only one barbel and three foot scales.

Distribution: All of northern South America east of the Andes, and the Magdalena drainage.

Content: *Podocnemis expansa* (Schweigger, 1812).

GENUS *BARTLETTIA* GRAY, 1870

Type species: *Bartlettia pitipii* Gray, 1870 (a synonym of *Podocnemis sextuberculata* Cornalia, 1849).

Diagnosis: See within the preceding description of *Podocnemis* Wagler, 1830.

The genus is further diagnosed and defined as follows:

Vertebral keel sharply raised into a swelling at the posterior margin of vertebral two; shell always smooth, concentric lines of growth if present, few and usually lines of pigment only, not ridges on the horny shields. Hatchlings with three pairs of prominent swellings on the sides of the plastron, the axillary pair often still indicated in the adult. Shell much expanded posteriorly. A nuchal indentation present, sometimes feeble. Skull broad, a single feeble ridge on the triturating surface of the maxilla. Premaxillae separating maxillae and reaching the choanal margin. Vomer absent. No precolumellar fossa in cavum tympani. Width of cavum tympani about equals width of orbit. Interorbital width less than height of orbit.

Interparietal scale usually widely separating the parietal scales. Large suboculars present. Two barbells and three foot scales and with a carapace length up to 310 mm.

Distribution: The Amazonian Region.

Content: *Bartlettia sextuberculata* (Cornalia, 1849).

GENUS *NOVAMYUCHELYS GEN. NOV.*

Type species: *Podocnemis vogli* Müller, 1935.

Diagnosis: All turtles within the Pelomedusidae are separated from other Chelids by the following suite of characters: Plastral bones eleven, mesoplastra being present. Shell covered with epidermal shields. Neck completely retractile within the shell, second cervical vertebra biconvex. A bony temporal arch; no parieto-squamosal arch, palatine bones in contact; no nasals; praefrontals in contact; dentary single. Digits moderately elongate, four or five claws.

South American Pelomedusidae as currently understood and including all the South American species are separated from the majority of African and Madagascan species by the presence of a bony temporal roof, the quadratojugal forming a suture with the parietal; mesoplastra small and lateral.

They are further defined as having mesoplastral bones small, lateral, wedged in between the hyoand the hypoplastra; Plastron large, without hinge, with strong axillary and inguinal buttresses. A bony temporal roof, the quadratojugal forming a suture with the parietal; alveolar surface of upper jaw with one or more ridges; a single shield between the eyes; a pair of large parietal shields and an inter parietal. Digits broadly webbed, for foot with five claws, hind foot with four. Tail very short.

South American Pelomedusidae within *Podocnemis* as currently recognized are further separated from similar species by a concave forehead (versus flat in the others) and the jugal and quadrate bones are separated.

Podocnemis is herein restricted to the species *P. expansa* (Schweigger, 1812). It is separated from all other species until now treated as also being in the genus *Podocnemis* by short and feeble alveolar ridges and two mental barbells.

Morphologically most similar to this genus is the resurrected genus *Bartlettia* Gray, 1870 for the species originally described as *Podocnemis sextuberculata*, which is separated from the species *P. expansa* (Schweigger, 1812), by having one instead of two mental barbells.

The genus *Novamyuchelys gen. nov.* (type species is *Podocnemis vogli* Müller, 1935) is separated from all other Pelomedusidae, including other species within *Podocnemis* as recognized to date, by the following suite of characters:

Vertebral keel feeble or absent; posterior margin of shell not expanded. Shields smooth or nearly so. Size not known to exceed 300 mm. Upper jaw feebly notched. Skull rather broad with three ridges on the triturating surface of the maxilla, all ridges roughened or dentate. Temporal region of skull well covered, only slightly emarginate dorsally or ventrally. Vomer present, tending to form part of choanal septum. Shell with only a feeble nuchal indentation. Hatchlings with vertebral two large, exceeding vertebrals three or four in length and with black quadrangular blotches on each plastral scute. Skull rather broad. A precolumellar fossa present. Width of cavum tympani equals width of orbit. Interorbital width less than height of orbit. Premaxillae not reaching choanal margin but joining vomer to separate maxillae.

Foramina incisiva well within margins of premaxillae but almost concealed from ventral view by extensions of the parachoanal triturating ridges. Interparietal scale elongate, but parietal scales meeting behind it. Suboculars large. Maxillary scale light only posteriorly, dark in middle and anteriorly.

Two barbells and three foot scales.

The three species within the genus *Wellsandwellingtonchelys gen. nov.* (type species is *Podocnemis unifilis* Troschel, 1848), are separated from all other Pelomedusidae, including other species within *Podocnemis* as recognized to date, by the following suite of characters:

Forehead concave; jugal and quadrate bones separated. Alveolar ridges of upper jaw strong, running along the whole length of the jaw. One or two mental barbells, but if two barbells, then two azygous shields between the parietals.

Within *Wellsandwellingtonchelys gen. nov.* the subgenus *Magdelenachelys subgen. nov.* (type species is is *Podocnemis lewyana* Duméril, 1852), is readily separated from the other species in the genus by two, versus one mental barbell and three foot scales. There are two azygous shields between the parietals.
This subgenus is further defined as follows:

Intergular broad, gulars not longer than intergular is wide anteriorly. Head never with yellow spots on the interparietal scale, always with sides of head light in color.

Shell with vertebral keel barely or not at all visible. No nuchal indentation. Skull moderately elongate, upper jaw rounded, not notched at middle. Two parallel ridges on the triturating surface of the maxilla. Width of cavum tympani equals width of orbit. Interorbital width less than height of orbit. Premaxillae not separating maxillae and not reaching choanal margin. Foramina incisiva well within the borders of the premaxillae. A vestigial vomer may be present. Interparietal scale heart-shaped. Suboculars present. Two barbells and three foot scales.

The subgenus *Erythrocephalachelys subgen. nov.* (type species is *Podocnemis erythrocephala* Spix, 1824) is separated from the other two subgenera by the following suite of characters:

Upper jaw notched medially, if feebly notched the interparietal scale elongate; shell more or less convex, much expanded posteriorly; vertebral keel distinct, most prominent on vertebral two or three. No nuchal indentation. Skull elongate with two parallel longitudinal ridges on surfaces of the maxilla. Suboculars present. Two barbells, two foot scales. Head is reddish in colour of individuals of 200 mm carapace length or greater.

Within the subgenus *Wellsandwellingtonchelys subgen. nov.* (type species is *Podocnemis unifilis* Troschel, 1848), the relevant species can be separated from others in the genus *Wellsandwellingtonchelys gen. nov.* by the following unique suite of characters:

Vertebral keel usually distinct, typically most prominent on vertebral three; posterior shell margin somewhat expanded; shell commonly concentrically ridged. Size known to exceed 600 mm. Upper jaw distinctly notched. Skull elongate with two ridges on the triturating surface of the maxilla, the internal ridge not sharply dentate. Temporal region of skull strongly emarginate both dorsally and ventrally. Vomer usually absent.

Shell with a distinct nuchal indentation. Hatchlings with vertebral two usually only as long as vertebral three and with the plastron completely yellow or without a definite plastral pattern. Skull more or less elongate. A deep precolumellar fossa in the cavum tympani. Width of cavum tympani as great as or greater than the width of the orbit. Interorbital width less than height of orbit. Premaxillae not separating maxillae, not reaching choanal margin. Foramina incisive well within the borders of the premaxillae. The interchoanal bar, if present, formed from the palatines. Interparietal scale very elongate but parietal scales usually meeting behind it. Suboculars usually present, usually not large. Maxillary scale light in color anteriorly and posteriorly, but dark in the middle. Usually only one barbel and three foot scales.

Distribution: Orinoco drainage, mainly in Venezuela.

Content: *Novamyuchelys vogli* (Müller, 1935).

Etymology: From the Australian Aboriginal word “myuna” meaning clear water and the Greek “chelys” meaning turtle is where the name “Myuchelys” comes from. The name *Myuchelys* was illegally coined by serial thieves Scott Thomson and Arthur Georges in 2009 in a crude and ill-conceived attempt to steal name authority for the Australian chelid genus *Wollumbinia* Wells, 2007.

As the name “*Myuchelys*” could be conceived as being “available” in Zoology, the name “nova-Myuchelys” has been assigned to this group of river-dwelling chelids, as in “new” *Myuchelys*.
Hence we have *Novamyuchelys*!

GENUS *WELLSANDWELLINGTONCHELYS GEN. NOV.*

Type species: *Podocnemis unifilis* Troschel, 1848.

Diagnosis: All turtles within the Pelomedusidae are separated from other Chelids by the following suite of characters: Plastral bones eleven, mesoplastra being present. Shell covered with epidermal shields. Neck completely retractile within the shell, second cervical vertebra biconvex. A bony temporal arch; no parieto-squamosal arch, palatine bones in contact; no nasals; praefrontals in contact; dentary single. Digits moderately elongate, four or five claws.

South American Pelomedusidae as currently understood and including all the South American species are separated from the majority of African and Madagascan species by the presence of a bony temporal roof, the quadratojugal forming a suture with the parietal; mesoplastra small and lateral.

They are further defined as having mesoplastral bones small, lateral, wedged in between the hyoand the hypoplastra; Plastron large, without hinge, with strong axillary and inguinal buttresses. A bony temporal roof, the quadratojugal forming a suture with the parietal; alveolar surface of upper jaw with one or more ridges; a single shield between the eyes; a pair of large parietal shields and an inter parietal. Digits broadly webbed, for foot with five claws, hind foot with four. Tail very short.

South American Pelomedusidae within *Podocnemis* as currently recognized are further separated from similar species by a concave forehead (versus flat in the others) and the jugal and quadrate bones are separated.

Podocnemis is herein restricted to the species *P. expansa* (Schweigger, 1812). It is separated from all other species until now treated as also being in the genus *Podocnemis* by short and feeble alveolar ridges and two mental barbells.

Morphologically most similar to this genus is the resurrected genus *Bartlettia* Gray, 1870 for the species originally described as *Podocnemis sextuberculata*, which is separated from the species *P. expansa* (Schweigger, 1812), by having one instead of two mental barbells.

The genus *Novamyuchelys gen. nov.* (type species is *Podocnemis vogli* Müller, 1935) is separated from all other Pelomedusidae, including other species within *Podocnemis* as recognized to date, by the following suite of characters:

Vertebral keel feeble or absent; posterior margin of shell not expanded. Shields smooth or nearly so. Size not known to exceed 300 mm. Upper jaw feebly notched. Skull rather broad with three ridges on the triturating surface of the maxilla, all ridges roughened or dentate. Temporal region of skull well covered, only slightly emarginate dorsally or ventrally. Vomer present, tending to form part of choanal septum.

Shell with only a feeble nuchal indentation. Hatchlings with vertebral two large, exceeding vertebrals three or four in length and with black quadrangular blotches on each plastral scute.

Skull rather broad. A precolumellar fossa present. Width of cavum tympani equals width of orbit. Interorbital width less than height of orbit. Premaxillae not reaching choanal margin but joining vomer to separate maxillae.

Foramina incisiva well within margins of premaxillae but almost concealed from ventral view by extensions of the parachoanal triturating ridges.

Interparietal scale elongate, but parietal scales meeting behind it. Suboculars large. Maxillary scale light only posteriorly, dark in middle and anteriorly.

Two barbells and three foot scales.

The three species within the genus *Wellsandwellingtonchelys gen. nov.* (type species is *Podocnemis unifilis* Troschel, 1848), are separated from all other Pelomedusidae, including other species within *Podocnemis* as recognized to date, by the following suite of characters:

Forehead concave; jugal and quadrate bones separated. Alveolar ridges of upper jaw strong, running along the whole length of the jaw. One or two mental barbells, but if two barbells, then two azygous shields between the parietals.

Within *Wellsandwellingtonchelys gen. nov.* the subgenus *Magdelenachelys subgen. nov.* (type species is is *Podocnemis lewyana* Duméril, 1852), is readily separated from the other species in the genus by two, versus one mental barbell and three foot scales. There are two azygous shields between the parietals.
This subgenus is further defined as follows:

Intergular broad, gulars not longer than intergular is wide anteriorly. Head never with yellow spots on the interparietal scale, always with sides of head light in color.

Shell with vertebral keel barely or not at all visible. No nuchal indentation.

Skull moderately elongate, upper jaw rounded, not notched at middle. Two parallel ridges on the triturating surface of the maxilla. Width of cavum tympani equals width of orbit. Interorbital width less than height of orbit.

Premaxillae not separating maxillae and not reaching choanal margin. Foramina incisiva well within the borders of the premaxillae. A vestigial vomer may be present. Interparietal scale heart-shaped. Suboculars present. Two barbells and three foot scales.

The subgenus *Erythrocephalachelys subgen. nov.* (type species is *Podocnemis erythrocephala* Spix, 1824) is separated from the other two subgenera by the following suite of characters:
Upper jaw notched medially, if feebly notched the interparietal scale elongate; shell more or less convex, much expanded posteriorly; vertebral keel distinct, most prominent on vertebral two or three. No nuchal indentation. Skull elongate with two parallel longitudinal ridges on surfaces of the maxilla. Suboculars present. Two barbells, two foot scales. Head is reddish in colour of individuals of 200 mm carapace length or greater.

Within the subgenus *Wellsandwellingtonchelys subgen. nov.* (type species is *Podocnemis unifilis* Troschel, 1848), the relevant species can be separated from others in the genus *Wellsandwellingtonchelys gen. nov.* by the following unique suite of characters:

Vertebral keel usually distinct, typically most prominent on vertebral three; posterior shell margin somewhat expanded; shell commonly concentrically ridged. Size known to exceed 600 mm. Upper jaw distinctly notched. Skull elongate with two ridges on the triturating surface of the maxilla, the internal ridge not sharply dentate. Temporal region of skull strongly emarginate both dorsally and ventrally. Vomer usually absent.

Shell with a distinct nuchal indentation. Hatchlings with vertebral two usually only as long as vertebral three and with the plastron completely yellow or without a definite plastral pattern. Skull more or less elongate. A deep precolumellar fossa in the cavum tympani. Width of cavum tympani as great as or greater than the width of the orbit. Interorbital width less than height of orbit. Premaxillae not separating maxillae, not reaching choanal margin. Foramina incisive well within the borders of the premaxillae. The interchoanal bar, if present, formed from the palatines. Interparietal scale very elongate but parietal scales usually meeting behind it. Suboculars usually present, usually not large. Maxillary scale light in color anteriorly and posteriorly, but dark in the middle. Usually only one barbel and three foot scales.

Distribution: Guianan, Amazonian regions and the Orinoco and Magdalena drainages.

Content: *Wellsandwellingtonchelys unifilis* (Troschel, 1848) (type species); *W. erythrocephala* (Spix, 1824); *W. lewyana* (Duméril, 1852).

Etymology: Named in honour of Australian herpetologists, Richard Wells and Cliff Ross Wellington, both of New South Wales, Australia, in recognition of their leading works on turtle systematics. The “chelys” suffix is the Greek word for turtle.

SUBGENUS *WELLSANDWELLINGTONCHELYS SUBGEN. NOV.*

Type species: *Podocnemis unifilis* Troschel, 1848.

Diagnosis: All turtles within the Pelomedusidae are separated from other Chelids by the following suite of characters: Plastral bones eleven, mesoplastra being present. Shell covered with epidermal shields. Neck completely retractile within the shell, second cervical vertebra biconvex. A bony temporal arch; no parieto-squamosal arch, palatine bones in contact; no nasals; praefrontals in contact; dentary single. Digits moderately elongate, four or five claws.

South American Pelomedusidae as currently understood and including all the South American species are separated from the majority of African and Madagascan species by the presence of a bony temporal roof, the quadratojugal forming a suture with the parietal; mesoplastra small and lateral.

They are further defined as having mesoplastral bones small, lateral, wedged in between the hyoand the hypoplastra; Plastron large, without hinge, with strong axillary and inguinal buttresses. A bony temporal roof, the quadratojugal forming a suture with the parietal; alveolar surface of upper jaw with one or more ridges; a single shield between the eyes; a pair of large parietal shields and an inter parietal. Digits broadly webbed, for foot with five claws, hind foot with four. Tail very short.

South American Pelomedusidae within *Podocnemis* as currently recognized are further separated from similar species by a concave forehead (versus flat in the others) and the jugal and quadrate bones are separated.

Podocnemis is herein restricted to the species *P. expansa* (Schweigger, 1812). It is separated from all other species until now treated as also being in the genus *Podocnemis* by short and feeble alveolar ridges and two mental barbells.

Morphologically most similar to this genus is the resurrected genus *Bartlettia* Gray, 1870 for the species originally described as *Podocnemis sextuberculata*, which is separated from the species *P. expansa* (Schweigger, 1812), by having one instead of two mental barbells.

The genus *Novamyuchelys gen. nov.* (type species is *Podocnemis vogli* Müller, 1935) is separated from all other Pelomedusidae, including other species within *Podocnemis* as recognized to date, by the following suite of characters:

Vertebral keel feeble or absent; posterior margin of shell not expanded. Shields smooth or nearly so. Size not known to exceed 300 mm. Upper jaw feebly notched. Skull rather broad with three ridges on the triturating surface of the maxilla, all ridges roughened or dentate. Temporal region of skull well covered, only slightly emarginate dorsally or ventrally. Vomer present, tending to form part of choanal septum.

Shell with only a feeble nuchal indentation. Hatchlings with vertebral two large, exceeding vertebrals three or four in length and with black quadrangular blotches on each plastral scute.

Skull rather broad. A precolumellar fossa present. Width of cavum tympani equals width of orbit. Interorbital width less than height of orbit. Premaxillae not reaching choanal margin but joining vomer to separate maxillae. Foramina incisiva well within margins of premaxillae but almost concealed from ventral view by extensions of the parachoanal triturating ridges.

Interparietal scale elongate, but parietal scales meeting behind it. Suboculars large. Maxillary scale light only posteriorly, dark in middle and anteriorly.

Two barbells and three foot scales.

The three species within the genus *Wellsandwellingtonchelys gen. nov.* (type species is *Podocnemis unifilis* Troschel, 1848), are separated from all other Pelomedusidae, including other species within *Podocnemis* as recognized to date, by the following suite of characters:

Forehead concave; jugal and quadrate bones separated. Alveolar ridges of upper jaw strong, running along the whole length of the jaw. One or two mental barbells, but if two barbells, then two azygous shields between the parietals.

Within *Wellsandwellingtonchelys gen. nov.* the subgenus *Magdelenachelys subgen. nov.* (type species is is *Podocnemis lewyana* Duméril, 1852), is readily separated from the other species in the genus by two, versus one mental barbell and three foot scales. There are two azygous shields between the parietals. This subgenus is further defined as follows:

Intergular broad, gulars not longer than intergular is wide anteriorly. Head never with yellow spots on the interparietal scale, always with sides of head light in color.

Shell with vertebral keel barely or not at all visible. No nuchal indentation.

Skull moderately elongate, upper jaw rounded, not notched at middle. Two parallel ridges on the triturating surface of the maxilla. Width of cavum tympani equals width of orbit. Interorbital width less than height of orbit.

Premaxillae not separating maxillae and not reaching choanal margin. Foramina incisiva well within the borders of the premaxillae. A vestigial vomer may be present.

Interparietal scale heart-shaped. Suboculars present. Two barbells and three foot scales.

The subgenus *Erythrocephalachelys subgen. nov.* (type species is *Podocnemis erythrocephala* Spix, 1824) is separated from the other two subgenera by the following suite of characters:
Upper jaw notched medially, if feebly notched the interparietal scale elongate; shell more or less convex, much expanded posteriorly; vertebral keel distinct, most prominent on vertebral two or three. No nuchal indentation. Skull elongate with two parallel longitudinal ridges on surfaces of the maxilla. Suboculars present. Two barbells, two foot scales. Head is reddish in colour of individuals of 200 mm carapace length or greater.

Within the subgenus *Wellsandwellingtonchelys subgen. nov.* (type species is *Podocnemis unifilis* Troschel, 1848), the relevant species can be separated from others in the genus *Wellsandwellingtonchelys gen. nov.* by the following unique suite of characters:

Vertebral keel usually distinct, typically most prominent on vertebral three; posterior shell margin somewhat expanded; shell commonly concentrically ridged. Size known to exceed 600 mm. Upper jaw distinctly notched. Skull elongate with two ridges on the triturating surface of the maxilla, the internal ridge not sharply dentate. Temporal region of skull strongly emarginate both dorsally and ventrally. Vomer usually absent.

Shell with a distinct nuchal indentation. Hatchlings with vertebral two usually only as long as vertebral three and with the plastron completely yellow or without a definite plastral pattern. Skull more or less elongate. A deep precolumellar fossa in the cavum tympani. Width of cavum tympani as great as or greater than the width of the orbit. Interorbital width less than height of orbit. Premaxillae not separating maxillae, not reaching choanal margin. Foramina incisive well within the borders of the premaxillae. The interchoanal bar, if present, formed from the palatines. Interparietal scale very elongate but parietal scales usually meeting behind it. Suboculars usually present, usually not large. Maxillary scale light in color anteriorly and posteriorly, but dark in the middle. Usually only one barbel and three foot scales.

Distribution: Guianan and Amazonian regions.

Content: *Wellsandwellingtonchelys* (*Wellsandwellingtonchelys*) *unifilis* (Troschel, 1848).

Etymology: As for the genus. Named in honour of Australian herpetologists, Richard Wells and Cliff Ross Wellington, both of New South Wales, Australia, in recognition of their leading works on turtle systematics. The "chelys" suffix is the Greek word for turtle.

SUBGENUS *MAGDELENACHELYS SUBGEN. NOV.*

Type species: *Podocnemis lewyana* Duméril, 1852.

Diagnosis: All turtles within the Pelomedusidae are separated from other Chelids by the following suite of characters: Plastral bones eleven, mesoplastra being present. Shell covered with epidermal shields. Neck completely retractile within the shell, second cervical vertebra biconvex. A bony temporal arch; no parieto-squamosal arch, palatine bones in contact; no nasals; praefrontals in contact; dentary single. Digits moderately elongate, four or five claws.

South American Pelomedusidae as currently understood and including all the South American species are separated from the majority of African and Madagascan species by the presence of a bony temporal roof, the quadratojugal forming a suture with the parietal; mesoplastra small and lateral.

They are further defined as having mesoplastral bones small, lateral, wedged in between the hyoand the hypoplastra; Plastron large, without hinge, with strong axillary and inguinal buttresses. A bony temporal roof, the quadratojugal forming a suture with the parietal; alveolar surface of upper jaw with one or more ridges; a single shield between the eyes; a pair of large parietal shields and an inter parietal. Digits broadly webbed, for foot with five claws, hind foot with four. Tail very short.

South American Pelomedusidae within *Podocnemis* as currently recognized are further separated from similar species by a concave forehead (versus flat in the others) and the jugal and quadrate bones are separated.

Podocnemis is herein restricted to the species *P. expansa* (Schweigger, 1812). It is separated from all other species until now treated as also being in the genus *Podocnemis* by short and feeble alveolar ridges and two mental barbells.

Morphologically most similar to this genus is the resurrected genus *Bartlettia* Gray, 1870 for the species originally described as *Podocnemis sextuberculata*, which is separated from the species *P. expansa* (Schweigger, 1812), by having one instead of two mental barbells.

The genus *Novamyuchelys gen. nov.* (type species is *Podocnemis vogli* Müller, 1935) is separated from all other Pelomedusidae, including other species within *Podocnemis* as recognized to date, by the following suite of characters:

Vertebral keel feeble or absent; posterior margin of shell not expanded. Shields smooth or nearly so. Size not known to exceed 300 mm. Upper jaw feebly notched. Skull rather broad with three ridges on the triturating surface of the maxilla, all ridges roughened or dentate. Temporal region of skull well covered, only slightly emarginate dorsally or ventrally. Vomer present, tending to form part of choanal septum.

Shell with only a feeble nuchal indentation. Hatchlings with vertebral two large, exceeding vertebrals three or four in length and with black quadrangular blotches on each plastral scute.

Skull rather broad. A precolumellar fossa present. Width of cavum tympani equals width of orbit. Interorbital width less than height of orbit. Premaxillae not reaching choanal margin but joining vomer to separate maxillae.

Foramina incisiva well within margins of premaxillae but almost concealed from ventral view by extensions of the parachoanal triturating ridges.

Interparietal scale elongate, but parietal scales meeting behind it. Suboculars large. Maxillary scale light only posteriorly, dark in middle and anteriorly.

Two barbells and three foot scales.

The three species within the genus *Wellsandwellingtonchelys gen. nov.* (type species is *Podocnemis unifilis* Troschel, 1848), are separated from all other Pelomedusidae, including other species within *Podocnemis* as recognized to date, by the following suite of characters:

Forehead concave; jugal and quadrate bones separated. Alveolar ridges of upper jaw strong, running along the whole length of the jaw. One or two mental barbells, but if two barbells, then two azygous shields between the parietals.

Within *Wellsandwellingtonchelys gen. nov.* the subgenus *Magdelenachelys subgen. nov.* (type species is is *Podocnemis lewyana* Duméril, 1852), is readily separated from the other species in the genus by two, versus one mental barbell and three foot scales. There are two azygous shields between the parietals. This subgenus is further defined as follows:

Intergular broad, gulars not longer than intergular is wide anteriorly. Head never with yellow spots on the interparietal scale, always with sides of head light in color.

Shell with vertebral keel barely or not at all visible. No nuchal indentation.

Skull moderately elongate, upper jaw rounded, not notched at middle. Two parallel ridges on the triturating surface of the maxilla. Width of cavum tympani equals width of orbit. Interorbital width less than height of orbit.

Premaxillae not separating maxillae and not reaching choanal margin. Foramina incisiva well within the borders of the premaxillae. A vestigial vomer may be present.

Interparietal scale heart-shaped. Suboculars present. Two barbells and three foot scales.

The subgenus *Erythrocephalachelys subgen. nov.* (type species is *Podocnemis erythrocephala* Spix, 1824) is separated from the other two subgenera by the following suite of characters:

Upper jaw notched medially, if feebly notched the interparietal scale elongate; shell more or less convex, much expanded posteriorly; vertebral keel distinct, most prominent on vertebral two or three. No nuchal indentation. Skull elongate with two parallel longitudinal ridges on surfaces of the maxilla. Suboculars present. Two barbells, two foot scales. Head is reddish in colour of individuals of 200 mm carapace length or greater.

Within the subgenus *Wellsandwellingtonchelys subgen. nov.* (type species is *Podocnemis unifilis* Troschel, 1848), the relevant species can be separated from others in the genus *Wellsandwellingtonchelys gen. nov.* by the following unique suite of characters:

Vertebral keel usually distinct, typically most prominent on vertebral three; posterior shell margin somewhat expanded; shell commonly concentrically ridged. Size known to exceed 600 mm. Upper jaw distinctly notched. Skull elongate with two ridges on the triturating surface of the maxilla, the internal ridge not sharply dentate. Temporal region of skull strongly emarginate both dorsally and ventrally. Vomer usually absent.

Shell with a distinct nuchal indentation. Hatchlings with vertebral two usually only as long as vertebral three and with the plastron completely yellow or without a definite plastral pattern. Skull more or less elongate. A deep precolumellar fossa in the cavum tympani. Width of cavum tympani as great as or greater than the width of the orbit. Interorbital width less than height of orbit. Premaxillae not separating maxillae, not reaching choanal margin. Foramina incisive well within the borders of the premaxillae. The interchoanal bar, if present, formed from the palatines. Interparietal scale very elongate but parietal scales usually meeting behind it. Suboculars usually present, usually not large. Maxillary scale light in color anteriorly and posteriorly, but dark in the middle. Usually only one barbel and three foot scales.

Distribution: Magdalena drainage, Colombia.

Content: *Wellsandwellingtonchelys* (*Magdalenachelys*) *lewyana* (Duméril, 1852).

Etymology: Magdalena is the drainage system that the genus occurs and "chelys" is the Greek for turtle.

SUBGENUS *ERYTHROCEPHALACHELYS SUBGEN. NOV.*

Type species: *Emys erythrocephala* Spix, 1824.

Diagnosis: All turtles within the Pelomedusidae are separated from other Chelids by the following suite of characters: Plastral bones eleven, mesoplastra being present. Shell covered with epidermal shields. Neck completely retractile within the shell, second cervical vertebra biconvex. A bony temporal arch; no parieto-squamosal arch, palatine bones in contact; no nasals; praefrontals in contact; dentary single. Digits moderately elongate, four or five claws.

South American Pelomedusidae as currently understood and including all the South American species are separated from the majority of African and Madagascan species by the presence of a bony temporal roof, the quadratojugal forming a suture with the parietal; mesoplastra small and lateral.

They are further defined as having mesoplastral bones small, lateral, wedged in between the hyoand the hypoplastra; Plastron large, without hinge, with strong axillary and inguinal buttresses. A bony temporal roof, the quadratojugal forming a suture with the parietal; alveolar surface of upper jaw with one or more ridges; a single shield between the eyes; a pair of large parietal shields and an inter parietal. Digits broadly webbed, for foot with five claws, hind foot with four. Tail very short.

South American Pelomedusidae within *Podocnemis* as currently recognized are further separated from similar species by a concave forehead (versus flat in the others) and the jugal and quadrate bones are separated.

Podocnemis is herein restricted to the species *P. expansa* (Schweigger, 1812). It is separated from all other species until now treated as also being in the genus *Podocnemis* by short and feeble alveolar ridges and two mental barbells.

Morphologically most similar to this genus is the resurrected genus *Bartlettia* Gray, 1870 for the species originally described as *Podocnemis sextuberculata*, which is separated from the species *P. expansa* (Schweigger, 1812), by having one instead of two mental barbells.

The genus *Novamyuchelys gen. nov.* (type species is *Podocnemis vogli* Müller, 1935) is separated from all other Pelomedusidae, including other species within *Podocnemis* as recognized to date, by the following suite of characters:

Vertebral keel feeble or absent; posterior margin of shell not expanded. Shields smooth or nearly so. Size not known to exceed 300 mm. Upper jaw feebly notched. Skull rather broad with three ridges on the triturating surface of the maxilla, all ridges roughened or dentate. Temporal region of skull well covered, only slightly emarginate dorsally or ventrally. Vomer present, tending to form part of choanal septum.

Shell with only a feeble nuchal indentation. Hatchlings with vertebral two large, exceeding vertebrals three or four in length and with black quadrangular blotches on each plastral scute.

Skull rather broad. A precolumellar fossa present. Width of cavum tympani equals width of orbit. Interorbital width less than height of orbit. Premaxillae not reaching choanal margin but joining vomer to separate maxillae.

Foramina incisiva well within margins of premaxillae but almost concealed from ventral view by extensions of the parachoanal triturating ridges.

Interparietal scale elongate, but parietal scales meeting behind it. Suboculars large. Maxillary scale light only posteriorly, dark in middle and anteriorly.

Two barbells and three foot scales.

The three species within the genus *Wellsandwellingtonchelys gen. nov.* (type species is *Podocnemis unifilis* Troschel, 1848), are separated from all other Pelomedusidae, including other species within *Podocnemis* as recognized to date, by the following suite of characters:

Forehead concave; jugal and quadrate bones separated. Alveolar ridges of upper jaw strong, running along the whole length of the jaw. One or two mental barbells, but if two barbells, then two azygous shields between the parietals.

Within *Wellsandwellingtonchelys gen. nov.* the subgenus *Magdelenachelys subgen. nov.* (type species is is *Podocnemis lewyana* Duméril, 1852), is readily separated from the other species in the genus by two, versus one mental barbell and three foot scales. There are two azygous shields between the parietals. This subgenus is further defined as follows:

Intergular broad, gulars not longer than intergular is wide anteriorly. Head never with yellow spots on the interparietal scale, always with sides of head light in color.

Shell with vertebral keel barely or not at all visible. No nuchal indentation.

Skull moderately elongate, upper jaw rounded, not notched at middle. Two parallel ridges on the triturating surface of the maxilla. Width of cavum tympani equals width of orbit. Interorbital width less than height of orbit.

Premaxillae not separating maxillae and not reaching choanal margin. Foramina incisiva well within the borders of the premaxillae. A vestigial vomer may be present.

Interparietal scale heart-shaped. Suboculars present. Two barbells and three foot scales.

The subgenus *Erythrocephalachelys subgen. nov.* (type species is *Podocnemis erythrocephala* Spix, 1824) is separated from the other two subgenera by the following suite of characters:
Upper jaw notched medially, if feebly notched the interparietal scale elongate; shell more or less convex, much expanded posteriorly; vertebral keel distinct, most prominent on vertebral two or three. No nuchal indentation. Skull elongate with two parallel longitudinal ridges on surfaces of the maxilla. Suboculars present. Two barbells, two foot scales. Head is reddish in colour of individuals of 200 mm carapace length or greater.

Within the subgenus *Wellsandwellingtonchelys subgen. nov.* (type species is *Podocnemis unifilis* Troschel, 1848), the relevant species can be separated from others in the genus *Wellsandwellingtonchelys gen. nov.* by the following unique suite of characters:

Vertebral keel usually distinct, typically most prominent on vertebral three; posterior shell margin somewhat expanded; shell commonly concentrically ridged. Size known to exceed 600 mm. Upper jaw distinctly notched. Skull elongate with two ridges on the triturating surface of the maxilla, the internal ridge not sharply dentate. Temporal region of skull strongly emarginate both dorsally and ventrally. Vomer usually absent.

Shell with a distinct nuchal indentation. Hatchlings with vertebral two usually only as long as vertebral three and with the plastron completely yellow or without a definite plastral pattern. Skull more or less elongate. A deep precolumellar fossa in the cavum tympani. Width of cavum tympani as great as or greater than the width of the orbit. Interorbital width less than height of orbit. Premaxillae not separating maxillae, not reaching choanal margin. Foramina incisive well within the borders of the premaxillae. The interchoanal bar, if present, formed from the palatines. Interparietal scale very elongate but parietal scales usually meeting behind it. Suboculars usually present, usually not large. Maxillary scale light in color anteriorly and posteriorly, but dark in the middle. Usually only one barbel and three foot scales.

Distribution: Guianan and Amazonian regions and the Orinoco.

Content: *Wellsandwellingtonchelys* (*Erythrocephalachelys*) *erythrocephala* (Spix, 1824).

Etymology: As for the species "Erythrocephala" relates to the red coloured head, while "chelys" is the Greek word for turtle.

FINAL NOTE

The estimated times of divergences for the various genus-level groupings outlined above based on the published results of Vargas-Ramirez *et al.* (2008), are as follows:

Podocnemis Wagler, 1830 from the rest is at least 36.86 MYA, *Novamyuchelys gen. nov.* from the rest is at least 26.53 MYA, *Bartlettia* Gray, 1870 from the rest (including *Wellsandwellingtonchelys gen. nov.*) is at least 22.27 MYA, *Wellsandwellingtonchelys gen. nov.* subgenera diverged from one another at least 18.45 and 15.45 MYA.

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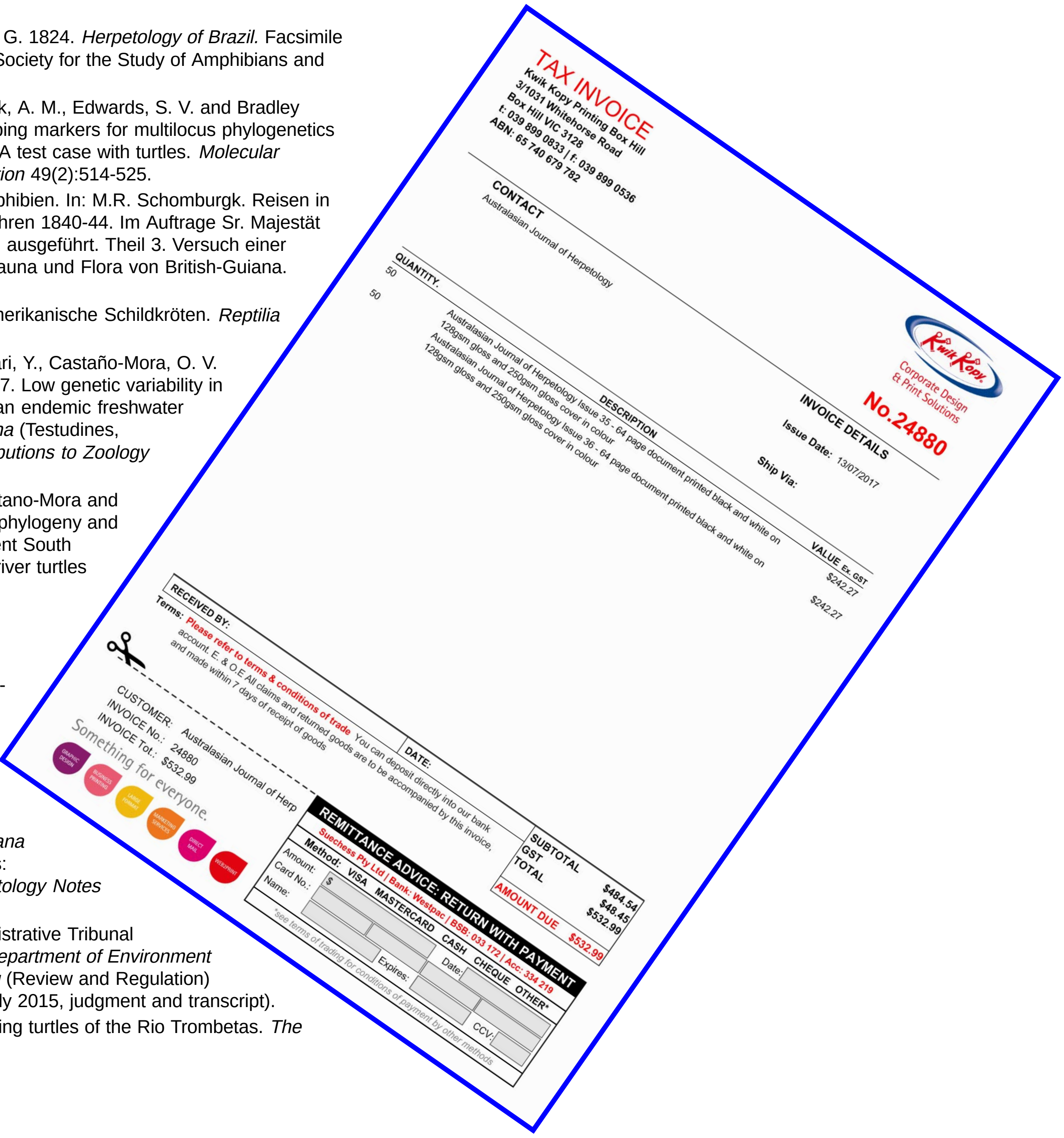
CONFLICT OF INTEREST

There are none.



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Australasian Journal of Herpetology **36:42-44.**
Published 30 March 2018.

ISSN 1836-5698 (Print)
ISSN 1836-5779 (Online)

A three way division of the Australian legless lizard, *Crottyopus jamesbondi* Hoser, 2017 and a new species of *Wellingtonopus* Hoser, 2017.

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Received 1 Jan 2018, Accepted 13 Jan 2018, Published 30 March 2018.

ABSTRACT

Until 2017, *Crottyopus jamesbondi* Hoser, 2017 had been regarded as a variant of the widespread and well-known taxon, *C. australis* (Kluge, 1974).

Two apparently isolated outlier populations of *C. jamesbondi* in Western Australia as identified by Hoser (2017) occurring at Cape Range and south-central Western Australia in Western Australia are herein formally described as new species according to the rules as set out in the current edition of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

These are *Crottyopus scottmarshalli sp.nov.* from south central, Western Australia and *C. daveausteni sp. nov.* from the Cape Range in Western Australia.

Both new species and *C. jamesbondi* diverged from one another at least 5 million years ago, supporting the contention that all should be treated as separate and allopatric species.

A divergent population of *Wellingtonopus butleri* (Storr, 1987) from the Cape Range area of Western Australia is also herein formally named as a new species *Wellingtonopus matthingleyi sp. nov.*.

Keywords: taxonomy; nomenclature; Australia; Western Australia; lizard; legless lizard; Pygopodidae; *Crottyopus*; *jamesbondi*; *australis*; *Wellingtonopus*; *butleri*; new species; *scottmarshalli*; *daveausteni*; *matthingleyi.*

INTRODUCTION

An ongoing audit of Australasian herpetofauna over some decades has yielded numerous potentially unnamed species and genera, including 13 well-defined Pygopodid species as identified and formally named by Hoser (2017).

A planned trip in late winter / early Spring to Western Australia in 2017 seeking further material of three other species was aborted after I was unable to avoid litigation against a police-protected criminal named Michael Alexander, of Launching Place, Victoria and a business he scammed in the form of Bunnings Limited (the well known seller of Chinese made hardware in Australia) for registered trademarks infringement.

Alexander had used the long registered Australian trademarks “snakeman” (Registered trademark number: 1175589) and “snake man” (Registered trademark number: 1214301) to divert Snakebusters reptile show clients to his unsafe alternative and was therefore putting people’s lives at risk.

He also defamed Snakebusters to potential clients, making recklessly false claims and in so doing seriously undermined many decades worth of valuable wildlife conservation work.

Consequently and as a matter of urgency the trademark infringement litigation was of critical importance and took priority over other matters.

By end of August 2017, we got court orders against the two infringing parties (Riley 2017), significant financial damages and compensation from Bunnings (Pullen 2017), as well as corrective advertising in the tabloid newspapers (Pullen 2017). Furthermore both law-breaking trademark infringing parties signed court enforceable undertakings to comply with the law and not infringe again, or get others to do so (Pullen 2017, Alexander, 2017).

There was also a written court-enforceable undertaking not to engage in any further taxonomic vandalism or other forms of misappropriation of the intellectual property of Raymond Hoser, including the illegal renaming of species or other taxa named by Raymond Hoser.

The undertaking also expressly prohibited the getting of others to do so in any way.

This court enforceable and approved undertaking (assuming it would be complied with) is a significant win for the stability of Zoological Nomenclature and should have put an end to the law-breaking mischief of Alexander’s cohort of thieves and associates, including Wolfgang Wuster, Mark O’Shea, Wulf Schleip, Scott Thomson, Anders Rhodin and R. Graham Reynolds, who have all been a party to illegally renaming species or genera properly named in the past, with their actions in breach of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999) and various intellectual property laws.

For details of the relevant acts of taxonomic vandalism to year 2015, see Hoser (2015a-f) and sources cited therein.

As of early January 2018, both Alexander and Bunnings have re-offended as have a number of others they have directed to (also in breach of the signed court orders), with Michael Alexander in particular, aggressively acting in breach of court orders and his signed undertaking of August 2017 (Alexander, 2017).

Therefore as of January 2018, more litigation against one or both for further trademark infringement and breach of orders and undertakings is pending and likely to commence about May 2018.

Because of this and on the basis that fieldwork in terms of the three relevant species by myself is not likely in the foreseeable future, and noting the limited available study material, I have made a decision to publish descriptions of all three species.

This is so that all three biological entities are properly named and highlighted in the scientific literature and associated databases. This will enable others to get government permission to collect more material so that these species can be further studied and protected and managed by governments and their employees, assuming they see fit to do so.

These three taxa have been known as distinct at the species level for some time (e.g. Brennan 2014), and this distinction is known to be based on morphological and molecular evidence as well as distributional disjunction.

Brennan (2014) provides substantial evidence for the specific status of the three forms formally described for the first time herein. It is therefore not necessary for me to rehash this material here or to falsely present the same data as "new".

However it is also worth making mention of fig 3.5 in Brennan (2014) which shows a divergence of two of the three newly described forms and *Crottyopus jamesbondi* Hoser, 2017 (the closest related taxon) as being in excess of 5 MYA from one another and less than 10 MYA.

This archaic timeline of divergence, morphological divergence and the allopatric distribution of those relevant forms confirms the necessity to identify each as full species.

In terms of the new species of *Wellingtonopus* Hoser, 2017, previously identified as an unnamed taxon associated with *Wellingtonopus butleri* (Storr, 1987), or alternatively as *Wellingtonopus butleri* (Storr, 1987), the grounds for recognition as a separate species are also compelling.

The known location of this new species is the Cape Range area of Western Australia, well north of the known distribution of *W. butleri*, both being separated by a well known biogeographic barrier in the form of a hyper arid zone, which also constrains several other species with similar habitat requirements.

Hence it is reasonable to infer that both taxa are distributionally disjunct and likely to have been so for some millions of years, based on known past climates in the region. As they are also morphologically distinguishable from one another, it makes sense that they be treated as two species and not one.

MATERIALS, METHODS, AND NOTES RELEVANT TO THE DESCRIPTIONS HEREIN.

In hindsight, the following descriptions should have been published with the paper Hoser (2017). Rather than repeating or rehashing material from Hoser (2017), I merely note the following key points.

The audit that applied to that paper applies herein. The material and methods as outlined in that paper, are wholly adopted herein, as is the obvious result. This is the description of three new species.

The key literature reviewed is the same as for Hoser (2017) and the taxonomic conclusions arising herein are the same, save for the addition of two new species, previously grouped within *Crottyopus jamesbondi* Hoser, 2017 and herein described as new and description of another taxon previously associated with *W. butleri*.

The notes relevant to the 13 species descriptions in Hoser (2017) apply herein, save for the fact that all names first used in that paper must take priority over any first used herein in order to remain compliant with the current edition of *the International Code of Zoological Nomenclature* (Ride *et al.* 1999).

Because Hoser (2017) cites all relevant literature relied upon, those papers are not cited again here. Instead I refer all interested parties to read Hoser (2017), which is readily available in both hard copy and an identical online version (with different ISSN).

CROTTYOPUS SCOTTMARSHALLI SP. NOV.

Holotype: A preserved specimen at the Western Australian Museum, Perth, Western Australia, Australia, specimen number: R137675 collected from, 74 km north-west of Balladonia Roadhouse, Western Australia, Latitude -32.03 S, Longitude 122.92 E, found inside a dead Spinifex clump. The Western Australian Museum, Perth, Western Australia is a government-owned facility that allows access to its holdings.

Paratype: A preserved specimen at the Western Australian Museum, Perth, Western Australia, Australia, specimen number: R137676 collected from, 74 km north-west of Balladonia Roadhouse, Western Australia, Latitude -32.03 S, Longitude 122.92 E.

Diagnosis: *Crottyopus daveausteni sp. nov.* and *C. scottmarshalli sp. nov.* have until now been treated as west Australian populations of *C. jamesbondi* Hoser, 2017. Refer to Hoser (2017) for a full diagnosis of that taxon, which can also be used as being diagnostic (in part at least) for these three. Furthermore detailed diagnostic information for the three relevant taxa (identified under different names) is also found in Brennan (2014).

Both *Crottyopus scottmarshalli sp. nov.* and *C. daveausteni sp. nov.* are separated from *C. jamesbondi* by the absence of a muddied grey dorsal head surface and yellow flushed lips and snout as seen in *C. jamesbondi*. Instead, these species appear as a somewhat weakly patterned intergrade between *C. jamesbondi* (less patterning) and both *C. australis* (Kluge, 1974) and *C. hebesa* (Maryan, Brennan, Adams and Aplin, 2015) (strong patterning).

C. scottmarshalli sp. nov. lacks even a slight lightening flush of the lips, whereas there is a very limited amount in *C. daveausteni sp. nov.* this difference readily separating the otherwise morphologically similar species.

C. scottmarshalli sp. nov. is yellowish brown in dorsal colour, versus more brownish in *C. jamesbondi* and brown, with a slight grey tinge in *C. daveausteni sp. nov.*.

Distribution: So far this species is only known from the type locality and the two type specimens.

Etymology: Named in honour of Scott Marshall of Ringwood, Victoria, Australia, a businessman and football coach, in recognition for his immense contribution to girls and women's Australian Rules Football in Australia, in particular his enormous contribution to coaching a number of girls teams with incredible on and off field success. Scott Marshall is regarded by his peers as the best girls Football coach in the State of Victoria., currently (as of 2018) coaching girls from the Melbourne suburb of Park Orchards.

CROTTYOPUS DAVEAUSTENI SP. NOV.

Holotype: A preserved female specimen at the Western Australian Museum, Perth, Western Australia, Australia, specimen number: R132470 collected from Shothole Canyon, Cape Range National Park, Western Australia (Lat. -22º03' S, Long. 114º01' E). The Western Australian Museum, Perth Western Australia is a government-owned facility that allows access to its holdings.

Diagnosis: *Crottyopus daveausteni sp. nov.* and *C. scottmarshalli sp. nov.* have until now been treated as west Australian populations of *C. jamesbondi* Hoser, 2017. Refer to Hoser (2017) for a full diagnosis of that taxon, which can also be used as being diagnostic (in part at least) for these three. Further diagnostic information for the three relevant taxa is also found in Brennan (2014).

Both *Crottyopus scottmarshalli sp. nov.* and *C. daveausteni sp. nov.* are separated from *C. jamesbondi* by the absence of a muddied grey dorsal head and yellow flushed lips and snout as seen in *C. jamesbondi*. Instead, these species appear as a somewhat weakly patterned intergrade between *C. jamesbondi* (less patterning) and both *C. australis* (Kluge, 1974) and *C. hebesa* (Maryan, Brennan, Adams and Aplin, 2015).

C. scottmarshalli sp. nov. lacks even a slight lightening flush of the lips, whereas there is a very limited amount in *C. daveausteni sp. nov.* this difference readily separating the otherwise morphologically similar species.

C. scottmarshalli sp. nov. is yellowish brown in dorsal colour, versus more brownish in *C. jamesbondi* and brown, with a slight grey tinge in *C. daveausteni sp. nov.*.

Distribution: So far this species is only known from the type locality and the single holotype specimen.

Etymology: Named in honour of David (Dave) Austen, a well-known Real Estate agent in Melbourne, Victoria, Australia in recognition of his many sacrifices in the public interest for a wide range of causes, including assisting Snakebusters with their critically important wildlife conservation and education work in numerous ways over many years.

WELLINGTONOPUS MATTHINGLEYI SP. NOV.

Holotype: A preserved specimen at the Western Australian Museum in Perth, Western Australia, Australia, specimen number: R156449 collected at the Learmonth Air Weapons Range, immediately south of the Cape Range National Park, Western Australia, Australia, Latitude -22°25 S., Longitude 113°46 E.

The Western Australian Museum, Perth, Western Australia is a government-owned facility that allows access to its holdings.

Diagnosis: *Wellingtonopus matthingleyi sp. nov.* was until now treated as a variant of *W. butleri* (Storr, 1987), from which it is readily separated by being olive in colour as opposed to brown.

W. matthingleyi sp. nov. has a well defined white patch posterior to the eye, which is not the case in the otherwise similar *W. stevebennetti* Hoser, 2017, also being olive in ground colour.

The bars or spots on the upper labials are well-defined in *W. matthingleyi sp. nov.*, versus indistinct in *W. stevebennetti.*

W. stevebennetti was until 2017 treated as an eastern Australian population of *W. butleri.*

Wellingtonopus matthingleyi sp. nov. (treated as a form of *W. butleri* by Hoser, 2017) is readily separated from *W. haroldi* Storr, 1987 by colouration as outlined in Hoser (2017) and distribution as outlined in Storr, Smith and Johnstone (1990).

Wellingtonopus matthingleyi sp. nov., *W. stevebennetti* Hoser, 2017 and *W. butleri* (Storr, 1987) are separated from the other species of *Wellingtonopus* Hoser, 2017 and the six genera *Aclys* Kluge, 1974, *Crottyopus* Hoser, 2017, *Delma* Gray, 1831, *Pseudodelma* Fischer, 1882,, *Sloppopus* Hoser, 2017, and *Wellsopus* Hoser, 2017. (all previously treated as being within *Delma*, prior to the publication of Hoser 2017) by the following suite of characters: 15-18 mid-body rows (usually 16), and smooth dorsal scales; no pale stripes on the body or tail; nasal and first supralabial are not fused anterior to the nostril; no dark transverse bands posterior either to the parietal scales or to any dark transverse band fully or partly enclosing the parietal scales; usually seven scales on top of the snout between the rostral and frontal; usually three often enlarged pre-anal scales; lateral lip pattern and dorsal head bands are absent or just flecking as opposed to lined; fourth or fifth supralabial is usually below the eye; dark pigment on the throat or venter may be present or absent; ventral scales with or without dark edges; there are usually 16 scales along a line across the top of the head and usually 17 scales along a line across the throat, each line extending from the angle of the mouth on each side; there is no dark dorso-lateral stripe extending from the posterior third of the body to the tail, dorsal scales are dark brown in colour and finely etched with blackish colour; ventral scales lack dark edges, or if present are indistinct.

Distribution: *Wellingtonopus matthingleyi sp. nov.* is only known from the type locality in Western Australia and believed to be endemic to the Cape Range bioregion.

The distribution of *W. butleri* (Storr, 1987) is in the region south of the very sandy hyper-arid zone that lies east of the Kennedy Range and west of the coast.

W. stevebennetti Hoser, 2017 occurs in drier parts of inland Eastern Australia, generally around the Murray/Darling basin and nearby areas to the west.

Etymology: Named in honour of Matthew (Matt) Hingley of Queensland, Australia, formerly of Melbourne, Victoria, Australia, in recognition of some decades of important work with reptiles and educating the public about the same at wildlife displays and the like.

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CONFLICT OF INTEREST

The author has no known conflicts of interest.

Australasian Journal of Herpetology 36:45-48.
Published 30 March 2018.

ISSN 1836-5698 (Print)
ISSN 1836-5779 (Online)

Fiacummingea a new genus of Australian skink.

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Received 29 Oct 2017, Accepted 5 Jan 2018, Published 30 March 2018.

ABSTRACT

As of 2018, the genus-level arrangement of Australian skinks is largely resolved.

Molecular studies in the post year 2000 period have consistently validated the generic arrangements and nomenclature of Wells and Wellington (1984, 1985) as well as more recent works by Richard Wells such as Wells (2009).

In spite of attempts by a gang of thieves known as the Wüster gang, to stop widespread adoption of the Wells and Wellington taxonomy and their ICZN rules compliant nomenclature (as detailed by Hoser 2015a-f), the lies and deception do have a limited shelf life and so more and more supposedly unnamed clades of Australian skinks are being recognized by herpetologists as distinct biological entities.

Following on from this has been general adoption and use of the so-called Wells and Wellington names, and other available names, as often first used in recent times by Wells and Wellington in 1984 and 1985.

An audit of the Australian skinks found that one divergent lineage had been placed erroneously in the genus *Concinnia* Wells and Wellington, 1984 and should in fact be placed within a monotypic genus of its own.

This paper therefore places the species *Eulamprus frerei* Greer, 1992, most recently placed in the genus *Concinnia* by Cogger (2014) into the new genus, *Fiacummingea gen. nov.*.

Keywords: Taxonomy; nomenclature; Australia; Queensland; Bartle Frere; skink; Richard Wells, Ross Wellington; *Eulamprus*; *Concinnia*; *frerei*; new genus; *Fiacummingea.*

INTRODUCTION

As of 2018, the genus-level arrangement of Australian skinks is largely resolved.

Molecular studies in the post year 2000 period have consistently validated generic arrangements and nomenclature of Wells and Wellington (1984, 1985) as well as more recent works by Wells such as Wells (2009).

This is a noteworthy state of affairs noting the extremely vocal opposition to the taxonomy and nomenclature of Richard Wells and Cliff Ross Wellington when first published in 1984 and 1985 (Wells and Wellington, 1984, 1985).

In spite of attempts by a gang of thieves known as the Wolfgang Wüster gang, to stop widespread adoption of the Wells and Wellington taxonomy and nomenclature (as detailed by Hoser 2015a-f) and more recently in contempt of an Australian Federal Court enforceable settlement, these non-scientists have continued to destabilize the taxonomy and nomenclature of the said reptiles by illegally coining alternative non ICZN compliant names for the same biological entities (Alexander 2017, Pullen 2017, Riley 2017).

However, the lies and deception do have a limited shelf life and so more and more supposedly unnamed clades of Australian skinks are being recognized by herpetologists as distinct biological entities.

Following on from this has been general adoption and use of the Wells and Wellington names, including as seen in Cogger (2014) as well as the use of other first available names, as often first used in recent times by Wells and Wellington in 1984 and 1985 and similar adopted by others as is again seen in Cogger (2014).

An audit of the Australian skinks found that one divergent lineage had been placed erroneously in the genus *Concinnia* Wells and Wellington, 1984 and should in fact be placed within a monotypic genus of its own.

The species *Eulamprus frerei* Greer, 1992, most recently placed in the genus *Concinnia* by Cogger (2014) is shown in the published phylogeny of Pyron *et al.* (2013) to be widely divergent of the type species for *Concinnia* and apparently all others in the genus.

In morphology, including colouration, the species *Eulamprus frerei* Greer, 1992 is clearly divergent from all others in the genus *Concinnia.*

This paper therefore places the species *Eulamprus frerei* Greer, 1992, most recently placed in the genus *Concinnia* by Cogger (2014) into the new genus, *Fiacummingea gen. nov.* as is done below.

It should be noted that unless mandated by the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999), the spelling of the genus name should not be altered in any way.

References relevant to the taxon originally described as "*Eulamprus frerei* Greer, 1992" include the following: Cogger (2014), Couper *et al.* (2006), Greer (1992), Pyron *et al.* (2013), Skinner *et al.* (2013), Wells (2009) and Wilson and Swan (2010).

Beneath the description is a cut and paste of the text from Wells (2009) outlining his dissection of the genera *Eulamprus*

Fitzinger, 1843 and *Graphyromorphus* Wells and Wellington, 1984, indicating the generic placement of each relevant species as identified by him at the time.

As his taxonomy was based on both molecular and morphological evidence as cited within his paper, it remains broadly correct, save for the obvious erection of a new genus for a single species in this paper. It is the best available taxonomy and nomenclature for the relevant assemblage of species.

A more recent phylogeny by Pyron *et al*. (2013) also broadly confirms the Wells (2009) arrangement as correct, save for the taxon *Eulamprus frerei* Greer, 1992, which clearly needed placement into a new genus.

FIACUMMINGEA GEN. NOV.

Type species: *Eulamprus frerei* Greer, 1992.

Diagnosis: The diagnosis for the monotypic genus genus *Fiacummingea gen. nov.* is effectively the same as for the type species.

Fiacummingea gen. nov. is separated from *Concinnia* Wells and Wellington, 1984, as well as other genera named by Wells and Wellington (1984, 1985) or Wells (2009), the relevant ones identified by Wells (2009), being within *Concinnia* as defined by Cogger (2014).

Fiacummingea gen. nov. is separated from *Concinnia* Wells and Wellington, 1984, as most recently defined by Cogger (2014) by the following unique suite of characters: Palmar surfaces and subdigital lamellae are mostly unpigmented; postmental is in contact with a single infralabial on each side; the lizard has a dark, broad, lateral dark grey or grey-black zone dotted with white, with the upper flanks having blackish markings in the form of a zig-zag or merged triangles running down the length of the body and breaking up on the tail, where they are separated by brown, with lower flanks being a mottled and indistinct pattern formed by black, yellow and white scales; there are no supranasals; prefrontals are usually separated or in point contact only with the frontal being broader; the lower secondary temporal scale overlaps the upper one; there are 69-74 paravertebral scales and the eye bulge is not prominent.

Concinnia Wells and Wellington, 1984 (as defined by Cogger 2014) and *Fiacummingea gen. nov.* are separated from all other Australian skinks, by the following unique suite of characters: pentadactyle limbs; smooth scales, anterior ear lobules are absent; supranasals may be present or absent; lower eyelid is movable; parietal scales are in contact behind the interparietal; the fourth toe is much longer than the third; the base of the fourth toe is moderate with no more than two granules or lamellae between the lateral scales, and basal lamellae sometimes divided, but all distal lamellae are undivided; lower surfaces of tail and rump are not flushed with red or pink; the hindlimb is long being at least 40% of the snout-vent length; viviparous.

Distribution: Known only from the wet high altitude areas of the Mount Bartle Frere summit in far north Queensland.

Conservation status: There are no known causes of decline or threat and all wild animals are within a reserve. However potential climate change or other human induced change may adversely affect this otherwise vulnerable species.

If one or more government-owned or supported zoos gets hold of this taxon and seeks to maximize their short term commercial gain by being the only facility with the species, they may deliberately orchestrate extermination in the wild so as to maximize the "endangered species value" of their holdings.

Such a scenario has happened in the past with government-owned zoos, including in relation to the following species, Tasmanian Tiger *Thylacinus cynocephalus* (Harris, 1808), Leadbeater's Possum *Gymnobelideus leadbeateri* McCoy, 1867, and Pygmy Bluetongue *Lazarusus adelaidensis* (Peters, 1863).

In the case of the first of this trio, four government-owned zoos, namely Hobart, Melbourne, Adelaide and Taronga (in Sydney), held a closely guarded monopoly on ownership of live Tasmanian Tigers for some decades, and at the same time the zoo's controlled departments enforcing wildlife laws, systematically exterminated specimens in the wild.

They even paid people to seek out and kill the last remaining specimens in the wild!

This drove the general public to pay their money to see live specimens at these zoos, as there was nowhere else to see them.

Extinction in the wild, further improved the short term commercial position of the zoos that held them, but the zoos were in fact unable to successfully maintain their captive populations or breed them to anything approaching replacement level.

As a result, the last Tasmanian Tiger cash cow held at a government-owned zoo died a sad and tragic death at Hobart Zoo in 1937.

Since the 1980's "Zoo's Victoria"(owner of the Melbourne, Healesville and Werribee Zoos) has been running a similar policy with the Victorian Faunal Emblem, the Leadbeater's Possum, which they hold a closely guarded monopoly on holding.

To see them, people must pay the Zoo's Victoria business to see them. Privately held specimens were forcibly repatriated to Zoos Victoria more than 20 years ago,

Meanwhile, all wild specimens, which happen to live entirely in Wildlife Department controlled land, are also being systematically exterminated to ensure that the commercial value of their Zoos Victoria held animals is maximized.

Over a 20 year period to 2017, the wild population has been decimated by two thirds by the deliberate extermination policies of the State Wildlife Department (who own and control Zoo's Victoria) and the associated government-owned "Vicforests" business (Borschmann 2017), while Zoo's Victoria have been singularly unsuccessful in maintaining captive colonies of this species, which notably had not been a problem when specimens were held in private (non-government) hands.

For the Pygmy Bluetongue, thought to be extinct and then rediscovered in the early 1990's, the government controlled Adelaide Zoo, quickly established a monopoly on holding the species, meaning that the only way for people to see them was to pay their money to the zoo.

The "recovery" program run by the zoo, was exactly not that. In fact it was to ensure that few if any were bred to ensure that none would ever fall into the hands of rivals in the wildlife business space and therefore maintain the Adelaide Zoo monopoly on ownership of the species.

The "recovery" program has in fact been a huge commercial success for the Adelaide Zoo in that they have successfully not bred the species and ensured it remains so rare in captivity that only the Adelaide Zoo holds them and people must still pay to see them at this zoo.

Fortunately for that species at least, its cryptic habit of hiding down spider holes across a significant geographical range, means that it is in fact far more abundant than ever originally suspected in the 1990's, when rediscovered.

Therefore any orchestrated government program to exterminate the species in the wild is unlikely to succeed.

Because of the small size of the species and ease of transport, it is only matter of when and not if, some German, American or other interested foreigner smuggles a few out of Australia, breeds them like all other Blutongued lizards and makes them a common household pet within a few years in every part of the world, except Australia.

Australia of course is where the government and their Adelaide Zoo business, will cling to the commercially motivated dream that they alone should be allowed to hold the species and make money from it.

Etymology: Named in honour of investigative journalist Fia Cumming, of Lyons in the ACT, Australia in recognition of her immense contribution to wildlife conservation in Australia as detailed in Hoser (1996).

GENERIC ARRANGEMENT OF *EULAMPRUS* FITZINGER, 1843 AND *GLAPHYROMORPHUS* WELLS AND WELLINGTON, 1984 AS PUBLISHED BY WELLS (2009).

“The genus *Eulamprus* Fitzinger, 1843 is restricted to the *quoyii* complex of species -

Eulamprus heatwolei Wells and Wellington, 1984; *Eulamprus herseyi* Wells and Wellington, 1985; *Eulamprus marnieae* Hutchinson and Rawlinson, 1995 *stat. nov.*; *Eulamprus quoyii* (Dumeril and Bibron, 1839); and *Eulamprus tympanum* (Lonnberg and Andersson, 1913).

The genus *Concinnia* Wells and Wellington, 1984 is restricted to the *tenuis* group of species -

Concinnia brachysoma (Lonnberg and Andersson, 1915); *Concinnia frerei* (Greer, 1992); *Concinnia martini* Wells and Wellington, 1985; *Concinnia sokosoma* (Greer, 1992); and *Concinnia tenuis* (Gray, 1831).

A new genus *Edenia* is proposed for the enigmatic *Hinulia tigrina* De Vis, 1888 - *Edenia tigrina* (De Vis, 1888) *comb. nov.*

Karma gen. nov. is proposed for the *murrayi* complex of species - *Karma murrayi* (Boulenger, 1887) *comb. nov.*; and *Karma tryoni* (Longman, 1918) *comb. nov.*

The genus *Costinisauria* Wells and Wellington, 1985 is restricted to the *kosciuskoi* group of species - *Costinisauria couperi sp. nov.* is formally described from the New England Plateau of NSW; *Costinisauria kosciuskoi* (Kinghorn, 1932); *Costinisauria leuraensis* (Wells and Wellington, 1984); and *Costinisauria worrelli* Wells and Wellington, 1985.

The genus *Deloidiogenes* Wells and Wellington, 1985 is restricted to a single species -

Deloidiogenes amplus (Covacevich and McDonald, 1980).

Magmellia gen. nov. is proposed for *luteilateralis* - *Magmellia luteilateralis* (Covacevich and McDonald, 1980) *comb. nov.*

The genus *Glaphyromorphus* Wells and Wellington, 1984 is now restricted to include only *Glaphyromorphus clandestinus* Hoskin and Couper, 2004*, and Glaphyromorphus punctulatus* (Peters, 1871).

The genus *Mawsoniascincus* Wells and Wellington, 1985 is restricted to the *isolepis* complex of species - *Mawsoniascincus brongersmai* (Storr, 1972); *Mawsoniascincus douglasi* (Storr, 1967); *Mawsoniascincus foresti* (Kinghorn, 1932); *Mawsoniascincus harwoodi* (Wells and Wellington, 1985 *comb. nov.*; *Mawsoniascincus isolepis* (Boulenger, 1887).

A new genus, *Serenitas* is erected for the *pardalis* complex - *Serenitas fuscicaudis* (Greer, 1979) *comb. nov.*; *Serenitas nigricaudis* (Macleay,1877) *comb. nov.;* and *Serenitas pardalis* (Macleay, 1877) *comb. nov.*

The genus *Opacitascincus* Wells and Wellington, 1985 is restricted to the *crassicaudus* complex of species - *Opacitascincus arnhemicus* (Storr, 1967); *Opacitascincus cracens* (Greer, 1985) *comb. nov.*; *Opacitascincus crassicaudus* (Dumeril and Dumeril, 1851); *Opacitascincus darwiniensis* (Storr, 1967); and *Opacitascincus pumilus* (Boulenger, 1887) *comb. nov.*

The genus *Patheticoscincus* Wells and Wellington, 1984 is used for its sole included species -

Patheticoscincus gracilipes (Steindachner, 1870) *comb. nov.*

Rhiannodon gen. nov. is proposed for a single species *Rhiannodon mjobergi* (Lonnberg and Andersson, 1915) *comb. nov.*.”

Note: Wells (2009) provides an extensive diagnosis of each genus he has defined and adopted.

SUMMARY OF THE SINGLE SPECIES WITHIN *FIACUMMINGEA GEN. NOV.* AS DETAILED BY WELLS 2009.

“***Concinnia frerei*** (Greer, 1992)

Eulamprus frerei Greer, 1992 - Rec. Aust. Mus. 44(1): 7-19 [p.16-18]. Type data: Holotype

QM J47985 . Type Locality: summit of Mount Bartle-Frere, Qld.

Eulamprus frerei Cogger, 2000 - Reptiles and Amphibians of Australia

Eulamprus frerei Wilson and Swan, 2003 - Complete Guide to Reptiles of Australia [p. 218-219]

Eulamprus frerei Wilson, 2005 - Field Guide Rept. Qld [p.124]

Eulamprus frerei Wilson and Swan, 2008 - Complete Guide to Reptiles of Australia 2nd Edition

[p. 234-235]

Description: The base body colour is a dark reddish-brown to greyish-brown over the dorsum with a pattern of small, blackish transversely aligned bars or cross-bands. The nuchal area lacks the dark midline streak of some other species of *Concinnia.* The side of the head and body is dominated by a dark pattern of black speckles, blotches and bars that collectively create a broad black zigzag pattern along the upper lateral zone, and a faintly to heavily speckled lower lateral; the base colour on the lateral of the body becomes progressively paler towards the ventrolateral margin, so the collective dark markings on a pale base create a highly disruptive pattern when this species is active on lichen covered boulders. The tail has a series of small blackish blotches along the sides, that may be separate to form transversely aligned banding over the tail (though faint on the dorsal surface) or coalesce to form an irregular line of blotching and speckling along almost the entire side of the tail. The ventral surface of the body is pale greenish, the lips are darkly barred, and the chin-shields edged with brown. The subdigital lamellae are pale brown, whereas the rest of the *tenuis* complex has very darkly pigmented subdigital lamellae. This northern member of the *tenuis* complex is immediately distinguished from most of its congenors by its temporal scale condition. In *C. frerei* the lower secondary temporal scale overlaps the upper, whereas in *C. tenuis* and all other except *C. martini*, the reverse condition occurs, where the upper secondary temporal scale overlaps the lower. Other significant features of this species’ morphology are: midbody scales in 32-35 rows; paravertebrals 69-74; nasals separated; prefrontals separated; supraoculars 4; supralabials usually 7; nuchals 6-7; supraciliaries 8; presuboculars 2; supralabials 7 (5th subocular); postmental in contact with first two infralabials on each side;ear-opening conspicuous; limbs pentadactyl and well-developed, overlapping when adpressed; 4th toe subdigital lamellae 24-27, smooth to bluntly keeled, and divided basally. It reaches a maximum length of only around 160mm (snout-vent length of around 65mm).

Distribution: Known only from a small area in the vicinity of the summit of Mount Bartle-Frere, in north-eastern Queensland.

Habitat: Inhabits cool, damp situations amongst lichen-covered granite boulders in a relativelysmall area of rock outcroppings with a vegetation cover of stunted heath, and mossy tropical rainforest. The habitat on this mountain summit is often heavily clouded, very windy and misty.

Biology/Ecology: This is a small, semi-arboreal and saxatile skink that is rarely observed.

Specimens have been located during daylight in both rock crevices and the cracks of logs. It feeds only on small invertebrates and presumably produces live young, but nothing has been recorded on its reproductive biology.

Survival Status: Protected under the Qld Nature Conservation Act (1992) [see also the Qld Nature Conservation (Wildlife) Regulation Act (1994)] [see also the Nature Conservation (Wildlife) Regulation Act (1994)], and generally considered to be rare, given its very restricted distribution.

Etymology: The name *‘frerei’* refers to the Type Locality of Mount Bartle Frere, Qld.”

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CONFLICT OF INTEREST

The author has no known conflicts of interest in terms of this paper and conclusions within.

Australasian Journal of Herpetology 36:49-64.
Published 30 March 2018.

ISSN 1836-5698 (Print)
ISSN 1836-5779 (Online)

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.

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Received 1 Jan 2018, Accepted 13 Jan 2018, Published 30 March 2018.

ABSTRACT

The Genus *Egernia* Gray, 1838 has been defined and redefined by many authors since the time of original description. Defined at its most conservative is perhaps that diagnosis in Cogger (1975) and reflected in Cogger *et al.* (1983), with the reverse (splitters) position being that articulated by Wells and Wellington (1985). They resurrected available genus names and added to the list of available names at both genus and species level.

Molecular methods have largely confirmed the taxonomic positions of Wells and Wellington (1985) at all relevant levels and their legally available ICZN nomenclature does as a matter of course follow from this.

However petty jealousies and hatred among a group of would-be herpetologists called the Wüster gang (as detailed by Hoser 2015a-f and sources cited therein) have forced most other publishing herpetologists since the 1980's to not use anything Wells and Wellington.

Therefore the most commonly "in use" taxonomy and nomenclature by published authors does not reflect the taxonomic reality.

This author will not be unlawfully intimidated by Wolfgang Wüster and his gang of law-breaking thugs using unscientific methods to destabilize zoology as encapsulated in the hate rant of Kaiser *et al.* (2013). Therefore the generic groupings generally defined by Wells and Wellington (1985) are adopted herein as the most sensible arrangement based on available evidence from all sources including those exclusive of and out of control of Wells and Wellington.

Beyond that position, this paper formally names obviously unnamed forms within the greater *Egernia* group, including three new genera for the *Silubosaurus depressus* Günther, 1875 species group, the *Egernia saxatilis* Cogger, 1960 group and for the divergent taxon "*Egernia formosa* Fry, 1914" as well as four new species, one within *Silubosaurus* Gray, 1845 *sensu stricto,* another within *Contundo* Wells and Wellington, 1984 and two within the "*Egernia saxatilis* Cogger, 1960" group. Some new subspecies are also formally named for the first time. The newly named species and subspecies are all geographically allopatric from one another and readily separated from their nearest relatives by obvious differences in morphology and/or colouration as well as disjunct distributions.

Some of the named subspecies may in fact be worthy of elevation to full species rank, but this paper has taken the most conservative position for these taxa.

Keywords: taxonomy; nomenclature; Australia; Western Australia; Queensland; Northern Territory; New South Wales, South Australia; Victoria; *Egernia*; *Silubosaurus*; *Liopholis*; *Bellatorias*; *Flamoscincus*; *Hortonia*; *Silvascincus*; *Contundo*; *Tropidolopisma*; *Lissolepis*; *Storrisaurus*; *hosmeri*; *napoleonis*; *stokesii*; *depressa*; *zellingi*; *formosa*; *saxatilis*; *intermedia*; *kintorei*; new genus; *Woolfscincus*; *Piersonsaurus*; *Mannixsaurus*; new species; *hoserae*; *maryannmartinekae*; *halcoggeri*; *rosswellingtoni*; new subspecies; *maxinehoserae*; *fiacummingae*; *scottgranti*; *doriskuenae*; *lynettehholdsworthae*; *matthingleyi; adrianpapalucai*; *crossi*; *crossmani.*

INTRODUCTION

An ongoing audit of Australasian herpetofauna over some decades has yielded numerous potentially unnamed species and genera. During this audit, available names are assessed for suitability for otherwise unnamed or improperly assigned taxa and when appropriate, relevant papers have been published over the past 20 years, commencing with Hoser (1998a) and Hoser (1998b).

Recognized species within the group of lizards most commonly referred to the genus *Egernia* Gray, 1838 (*sensu* Cogger *et al.* 1983) were audited and found to be generally improperly assigned at the genus level in most contemporary texts on Australian reptiles.

However a logical, sensible and patently obviously alternative and correct classification had been articulated by Wells and Wellington (1985).

However petty jealousies and hatred among a group of so-called herpetologists called the Wüster gang have forced most other publishing herpetologists since the 1980's to not use anything Wells and Wellington, due to a very real fear of unlawful reprisals and attacks.

Thus the most commonly "in use" taxonomy and nomenclature does not reflect the taxonomic reality. See for example the rant published in Kaiser *et al.* 2013 as just one of many examples of the sort of tactics used by this gang of thieves and for more detail see Hoser (2015a-f). As a scientist who deals in facts and not personal likes and hatreds, I will not be unlawfully intimidated by Wolfgang Wüster and his gang of law-breaking thugs using unscientific methods to destabilize zoology.

Therefore the generic groupings generally defined by Wells and Wellington (1985) are adopted herein as the most sensible arrangement based on available evidence from all sources including those exclusive of and out of control of Wells and Wellington.

See for example the published results of Pyron *et al.* (2013).

Notwithstanding the excellent job of Wells and Wellington (1985) in breaking up the Genus *Egernia* as defined by others at the time and descriptions of new species and subspecies by others both prior and since, there are as of the present time (2016-2018) as yet unnamed forms within this grouping.

To rectify these obvious errors, this paper effectively adopts the generic classification of Wells and Wellington (1985) as the only logical one for the group and furthermore defines and names a new genus for the *Silubosaurus depressus* Gunther, 1875 species group, another for the divergent taxon "*Egernia formosa* Fry, 1914" as well as another new genus for the *Egernia saxatilis* Cogger, 1960 group of lizards.

Molecular validation of the Wells and Wellington (1985) position and the minor adjustments herein also come from the paper of Pyron *et al.* (2013) as well as other relevant sources cited herein.

Beyond that position, this paper formally names four new species, one within *Silubosaurus* Gray, 1845 *sensu stricto,* another within *Contundo* Wells and Wellington, 1984 and two within the "*Egernia saxatilis* Cogger, 1960" group. Several new subspecies are also formally named for the first time. The newly named species and subspecies are all geographically allopatric from another and readily separated from their nearest relatives by obvious differences in morphology and/or colouration as defined herein. Some of the subspecies named herein may ultimately prove to be full species.

MATERIALS AND METHODS

This audit included collection of numerous live specimens in their native habitats, with appropriate legal authorities over a 40 year time frame. Preserved specimens in museums across Australia have also been inspected as well as numerous captives with good locality data, photos *in situ* of specimens and records from other active herpetologists.

Combined with this has been an objective review of the relevant scientific and other literature and the data presented within to form the taxonomic and nomenclatural conclusions and framework presented within this paper.

The nomenclature used is in accordance with the relevant provisions of the rules published by the ICZN including the fourth edition of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999) as amended online by the ICZN since then and prior to 10 August 2017.

I also note that, notwithstanding the theft of relevant materials from this author in an illegal armed raid on 17 August 2011, which were not returned in breach of undertakings to the court (Court of Appeal Victoria 2014 and VCAT 2015), I have made a decision to publish this paper.

This is in view of the conservation significance attached to the formal recognition of unnamed taxa at all levels and on the basis that further delays may in fact put these presently unnamed or potentially improperly assigned taxa at greater risk of extinction.

This comment is made noting the extensive increase in human population in Australia, with a conservative forecast of a four-fold increase in human population in the next 100 years (from 25 million to 100 million) and the general environmental destruction across the continent as documented by Hoser (1991), including low density areas without a large permanent human population.

I also note the abysmal environmental record of various Australian National, State and Local governments in the relevant Australian region over the past 200 years as detailed by Hoser (1989, 1991, 1993 and 1996).

Key publications relevant to this audit of *Egernia* Gray, 1838 *sensu lato* include the following:

Australian Faunal Directory (2014), Boulenger (1887, 1896), Bowles (2000), Brygoo (1985), Chapple (2003), Chapple and Scott Keogh (2004), Cogger (1960, 1975, 1983, 2014), Cogger *et al.* (1983), Couper *et al.* (2006), Day (1980), Dennison *et al.* (2015), Department of Environment and Conservation Western Australia (2012), De Vis (1884, 1888), Donnellan *et al.* (2002), Doughty *et al.* (2011), Duffield and Bull (1996, 1998, 2002), Dumeril and Bibron (1839), Eipper (2012), Fitzinger (1843), Ford (1963a, 1963b), Fry (1914), Gardner *et al.* (2001, 2002, 2007, 2008), Glauert (1956, 1960), Gray (1832, 1838, 1845), Greer (1989), Günther (1875, 1877, 1897), Horton (1972), Hoser (1989, 2007, 2015a-f), Hollenshead (2011), How *et al.* (2003), Kinghorn (1955), Lacépède (1804), Lanham and Bull (2000), Lee-Steere (2008), Longley (1946), Longman (1918), Loveridge (1934), Main and Bull (1996), Mensforth and Bull (2008), Mitchell (1950), Mitchell and Behrndt (1949), Nankivell (1976), Pearson (2012), Peters (1866, 1869, 1870, 1871), Pianka (1969, 1972), Pianka and Giles (1982), Pyron *et al.* (2013), Ride *et al.* (1999), Rosen (1905), Roux-Estève (1979), Sadlier (1990), Shea (1999), Shea and Sadlier (1999), Shea *et al.* (2000), Sternfeld (1919, 1925), Stirling and Zietz (1893), Storr (1960, 1968, 1978), Storr and Harold (1990), Storr, Smith and Johnstone (1999), Swan (1990), Swanson (1979), Threatened Species Scientific Committee of Western Australia (2015), Wells (1972), Wells and Wellington (1984, 1985), Werner (1910, 1917), Wilson and Knowles (1988), Wilson and Swan (2017) and sources cited therein.

SUMMARY OF RESULTS / NOTES ON THE DESCRIPTIONS FOR ANY POTENTIAL REVISORS

Unless mandated by the rules of the *International Code of Zoological Nomenclature*, none of the spellings of the newly proposed names should be altered in any way. The names created herein have also been created with a view to avoiding any potential homonymy with earlier established names.

Should one or more newly named taxa be merged by later authors to be treated as a single entity, the order of priority of retention of names should be the order (page priority) of the descriptions within this text (which is the same as that listed in the abstract).

Before the formal descriptions of new taxa are lists of the species within each genus as generally defined by Wells and Wellington, but incorporating obvious changes arising from the descriptions of new species and the removal of species from *Silubosaurus* Gray, 1845 to a newly erected genus for the divergent West Australian species and likewise for species removed from two other genera.

Each of the previously named genus groups are not formally described in this paper as they are well known and defined by other authors as species groups already (e.g. Storr 1978, Wells and Wellington, 1985, Gardner *et al.* 2008, or Cogger, 2014).

Where species within two genera named herein are placed within a single genus as defined by the preceding authors, the relevant species groups can be easily separated from one another via the keys in Cogger (2014). Hence there can be no doubt as to which species goes into which genus.

Below are the new genera descriptions followed by the species descriptions and subspecies descriptions. In terms of the latter (species and subspecies), they are placed within the genera as outlined in the following section of this paper, this being the new taxonomy and nomenclature for the relevant group/s of reptiles.

Characters used to identify each genus described below are largely derived from the standardized accounts given in Storr (1978), Wells and Wellington (1985), Gardner *et al.* (2008), or Cogger (2014) as they are both simple, widely available and can be employed easily in the field.

Of note are the following items.

The genus *Egernia* Gray, 1843 as defined by Wells and Wellington is accepted in toto herein. The fiction that all five species as defined by Wells and Wellington, 1985 are of a single species, being *Egernia cunninghami* (Gray, 1832) should have been dispensed with years ago!

There are at least three valid species within the group (which are so divergent morphologically, that no reasonable person could ever allege they are one and the same species) and based on known geological barriers at play and in the absence of evidence to the contrary, all five forms defined by Wells and Wellington are tentatively accepted herein.

Based on obvious morphological evidence alone as cited in Hoser (1989), the three valid species in the complex are the so-called New England form (*cunninghami*), the Sydney sandstone form (*Egernia kreffti* Peters, 1871) and the so-called Granite belt form from south of the Hunter Valley found throughout the great dividing range into South-east South Australia, for which Wells and Wellington have assigned the names *Egernia barnetti* Wells and Wellington, 1985 (for the SA population) and

Egernia jossae Wells and Wellington, 1985 (for the rest).

Speculation on the internet and by Brown (2014) that the specimens from the Kaputar Range in North-west New South Wales were an undescribed species appear to be fanciful. Numerous specimens seen by myself have not appeared to be anything other than bog standard New England form (*cunninghami*), although there is a preponderance of specimens with significantly reduced white pigment on the body and relatively indistinct patterning. However aberrant specimens like this appear elsewhere in the known range of New England form (*cunninghami*).

Silubosaurus Gray, 1845 appears to have been overlooked by Wells and Wellington in 1985, but it is clear from the rest of their paper that they recognized the genus as the "*stokesii* Gray, 1845" species group, even though this is not explicitly stated in their paper. The Australian snake genus *Tropidechis* was also inadvertently omitted in their monograph and it would be self evident that they recognized this well known arrangement as well.

Silubosaurus stokesii Gray, 1845 is herein divided into two species,

namely *S. stokesii* Gray, 1845 from Western Australia and *S. zellingi* De Vis, 1884 from eastern and central Australia.
This is a most conservative arrangement and largely carries over from existing taxonomy and in the face of ambiguous molecular and other data.

The West Australian forms are herein treated as three subspecies, with one formally named for the first time. In total they are *S. stokesii stokesii* Gray, 1845, *S. stokesii badia* Storr, 1978 and *S. stokesii lynettehholdsworthae subsp. nov.* as described in this paper.

S. stokesii aethiops Storr, 1978 is not recognized herein as a valid subspecies, even though it is morphologically distinct and listed (described) as such in this paper in the relevant subspecies descriptions.

The West Australian Threatened Species Committee wrote in 2015 "Doughty and colleagues (2011) present evidence that the genetic differences between *Egernia stokesii aethiops* and *E. s. badia* (individuals at Monkey Mia on Peron Peninsula) are less than the genetic difference between subpopulations of *E. s. stokesii. Egernia stokesii aethiops* is now treated as a synonym of *E. s. badia* (AFD, 2014)."
The east Australian and central Australian specimens formerly assigned to the species *S. stokesii* are herein placed within the species *Silubosaurus zellingi* De Vis, 1884. Three divergent populations are herein described as new subspecies on the basis of significant morphological differences and allopatry based on significant geographical barriers indicating zero gene flow between populations.

This conservative treatment is due to an absence of robust molecular data for these populations, although I can reasonably anticipate that in time some of these described forms will be recognized as full species.

There are three new subspecies formally named herein, these being *Silubosaurus zellingi fiacummingae subsp. nov.* from central Australia in the vicinity of Alice Springs in the Northern Territory, *Silubosaurus zellingi doriskuenae subsp. nov.* from far north-west NSW and adjoining Queensland in the region of the Grey Range and *Silubosaurus zellingi scottgranti subsp. nov.* from the Barrier Range, New South Wales, through the Lake Eyre region (east, south and west of there) and including south and west to the northern Eyre Peninsula and nearby parts of South Australia.

The north-east Australian species *Silubosaurus hosmeri* (Kinghorn, 1955) is herein divided into two full species. The dark-coloured population from rocky dry rain shadow areas on the east side of Cape York and nearby remain as *S. hosmeri.*
The remainder from the Mount Isa region and north into the western Gulf of Carpentaria, with a distribution broadly encompassing rocky parts of the Barkly Tableland is herein formally named as a new species, *Silubosaurus hoserae sp. nov.*. In turn this species is divided into two subspecies. The nominate form is that from around Mount Isa, while the distinctively patterned population from the Gulf of Carpentaria is formally described as a new subspecies, namely *Silubosaurus hoserae maxinehoserae sp. nov.*.

Liopholis Fitzinger, 1843 is herein resurrected from synonymy of *Egernia* as done by Wells and Wellington (1984) and again in Wells and Wellington (1985).

L. bradshawi Wells and Wellington, 1985 and *L. messeli* Wells and Wellington, 1985 are both tentatively recognized as valid herein, but one or other may be conspecific with *L. multiscutata* (Mitchell and Behrndt, 1949).

The taxon *Lissolepis aquarius* Wells and Wellington, 1985 is in the absence of evidence to the contrary, herein treated as conspecific with *L. coventryi* (Storr, 1978).

Molecular evidence published by Doughty *et al.* 2011 does not support recognition of either *Tropidolopisma dumerilii* Duméril and Bibron, 1839 or *Tropidolopisma paynei* Wells and Wellington, 1985 as proposed by those authors in Wells and Wellington, 1985.

Recognition of four species of *Hortonia* Wells and Wellington, 1985 is tentative and in the absence of robust molecular data, but based on the disjunct distribution of the four relevant forms.

Flamoscincus webberi Wells and Wellington, 1985 is herein recognized as a distinct species on the basis of minor morphological differences to *F. inornata* (Rosen, 1905) and a disjunct distribution, based on a zone on unsuitable habitat.

There is no molecular evidence at this stage that either refutes or supports this contention.

Storrisaurus husbandi Wells and Wellington, 1985 is sufficiently distinct (morphologically) from the nominate form for the genus *S. rugosa* De Vis, 1888 to be recognized as a valid species level taxon. It is also separated by a significant distributional gap, supporting the contention of long-term isolation.

The exact species composition of the genera *Silvascincus* Wells and Wellington, 1985, *Contundo* Wells and Wellington, 1984 and *Woolfscincus gen. nov.* within this paper is made on the basis of available evidence and some species (not including the types for each genus) may ultimately be assigned to a different genus. This is particularly the case for species herein placed within *Silvascincus.*

The taxonomic status of *Silvascincus wrani* Wells and Wellington, 1985 is uncertain and it is not included in the list within this paper. I make no judgement as to the validity or otherwise of this taxon and await further research on the relevant animals.

The species listed in Wells and Wellington (1985) as "*Silvascincus formosa* (Fry, 1914)" is herein placed in a new genus *Mannixsaurus gen. nov.*.

It also occurs in two regionally distinct forms. The undescribed Pilbara form is herein named as a new subspecies, namely *Mannixsaurus formosa matthingleyi sp. nov.*.

The *Egernia saxatilis* Cogger, 1960 species complex has been removed from *Contundo* Wells and Wellington, 1985 as defined in that paper and placed in the newly named genus *Woolfscincus gen. nov.*. Molecular evidence as presented by Pyron *et al.* (2013) confirms that the erection of this new genus is justified.

Woolfscincus intermedia (Cogger, 1960) as defined by Cogger (1960) and as amended in Cogger (2014) is also split into three distinctive groups, treated herein as full species, two of which are formally named for the first time.

A distinctive outlier population from the Grampians in south-west Victoria is formally described herein as a new species, namely *Woolfscincus maryannmartinekae sp. nov.*.

The nominate form is herein confined to the Blue Mountains region, west and south-west of Sydney, in a zone generally northwest of Moss Vale in the NSW Southern Highlands and including the escarpment country near Mittagong.
Specimens from far south-east NSW and most of Victoria (excluding the Grampians) are assigned to the new species *Woolfscincus halcoggeri sp. nov.*. Specimens from Moreton National Park, New South Wales and areas to the immediate south are also tentatively assigned to this new species, based on morphological similarities to the Victorian specimens.

Specimens from outlier hills near to the Grampians in western Victoria are presumed to be of the Grampians species.

Hence as of this paper, *Contundo* only includes the type species and another similar species from South-west Australia, herein formally described as *Contundo rosswellingtoni sp. nov.*.

The species herein identified as *Silvascincus richardi* (Peters, 1869) is divided into two groups based on allopatry and morphological differences and one of these, that generally found east of the western part of the Nullarbor in South Australia is formally described herein as a new subspecies *Silvascincus richardi adrianpapalucai subsp. nov.*.

While there is a potential argument to merge *Silvascincus* into *Contundo* to form a single genus, based on morphological affinities, as well as ambiguous molecular results as spelt out by Pyron *et al.* (2013), the two genera have been kept separate for the purposes of this paper more-or-less as defined by Wells and Wellington, 1985 and in anticipation of further published evidence one way or other.

The diagnosis of *Woolfscincus roomi* (Wells and Wellington, 1985), as "*Contundo roomi*" by the original authors was on its own clearly sufficient to differentiate it from congeners and it is therefore recognized as a valid taxon herein.

However this recognition is tentative in as much as Cogger (2014) has stated that the "enlarged paravertebral series" supposedly unique to the species "*Contundo roomi*" is also seen in other populations of the "*Egernia saxatilis* Cogger, 1960" species group.

As already mentioned, the present assignment of species to the genera *Woolfscincus gen. nov.*, *Contundo* and *Silvascincus* beyond the type species is tentative. This is particularly with reference to the *Egernia striolata* (Peters, 1870) group of species, which quite likely may need to be transferred to *Woolfscincus gen. nov.*.

The molecular data of both Doughty *et al.* (2011) and Pyron *et al.*

(2013) confirms that the erection of the new genus *Piersonsaurus gen. nov.* to accommodate the *Silubosaurus depressus* Günther, 1875 species group is justified, sensible and long overdue.

While this action should not arouse contention in herpetology, there is little doubt that Wolfgang Wüster and his gang of thieves will try to make the opposite the case.

GENUS *EGERNIA* GRAY, 1838

Egernia cunninghami (Gray, 1832) (type species)

Egernia barnetti Wells and Wellington, 1985

Egernia jossae Wells and Wellington, 1985

Egernia kennersoni Wells and Wellington, 1985

Egernia kreffti Peters, 1871

GENUS *SILUBOSAURUS* GRAY, 1845

Silubosaurus stokesii Gray, 1845 (type species)

Silubosaurus hoserae sp. nov. (this paper)

Silubosaurus hosmeri (Kinghorn, 1955)

Silubosaurus zellingi De Vis, 1884

GENUS *LIOPHOLIS* FITZINGER, 1843

Liopholis whitii (Lacépède, 1804) (type species)

Liopholis bradshawi Wells and Wellington ,1985

Liopholis bos (Storr, 1960)

Liopholis compressicaudus (Quoy and Gaimard, 1842)

Liopholis coplandi Wells and Wellington, 1985

Liopholis guthega (Donnellan, Hutchinson, Dempsey and Osborne, 2002)

Liopholis longicaudus (Ford, 1963)

Liopholis margaretae (Storr, 1968)

Liopholis messeli Wells and Wellington ,1985

Liopholis modesta Storr, (1968)

Liopholis montana (Donnellan, Hutchinson, Dempsey and Osborne, 2002)

Liopholis multiscutata (Mitchell and Behrndt, 1949)

Liopholis personata (Storr, 1968)

Liopholis pulchra (Werner, 1910)

Liopholis robertsoni Wells and Wellington, 1985

GENUS *LISSOLEPIS* PETERS, 1872

Lissolepis luctuosa (Peters, 1866) (type species)

Lissolepis coventryi (Storr, 1978)

GENUS *TROPIDOLOPISMA* DUMÉRIL AND BIBRON, 1839

Tropidolopisma kingi (Gray, 1839) (type species)

GENUS *BELLATORIAS* WELLS AND WELLINGTON, 1984

Bellatorias major (Gray, 1845) (type species)

GENUS *HORTONIA* WELLS AND WELLINGTON, 1985

Hortonia obiri Wells and Wellington, 1985 (type species)

Hortonia frerei (Günther, 1897)

Hortonia oakesi Wells and Wellington, 1985

Hortuna shinei Wells and Wellington, 1985

GENUS *FLAMOSCINCUS* WELLS AND WELLINGTON, 1984

Flamoscincus kintorei (Stirling and Zeitz, 1893) (type species)

Flamoscincus inornata (Rosen, 1905)

Flamoscincus slateri (Storr, 1968)

Flamoscincus striata (Sternfeld, 1919)

Flamoscincus virgata (Storr, 1968)

Flamoscincus webberi Wells and Wellington, 1985

GENUS *CONTUNDO* WELLS AND WELLINGTON, 1984

Contundo napoleonis (Gray, 1839) (type species)

Contundo rosswellingtoni sp. nov. (this paper)

GENUS STORRISAURUS WELLS AND WELLINGTON, 1985

Sorrisaurus husbandi Wells and Wellington, 1985 (type species)

Storrisaurus rugosa (De Vis, 1888)

GENUS *SILVASCINCUS* WELLS AND WELLINGTON, 1985

Silvascincus pilbaraensis (Storr, 1978) (type species)

Silvascincus douglasi (Glauert, 1956)

Silvascincus richardi (Peters, 1869)

Silvascincus striolata (Peters, 1870)

NEW GENUS *WOOLFSCINCUS GEN. NOV.*

Type species: *Egernia saxatilis* Cogger, 1960.

Diagnosis: The genus *Woolfscincus gen. nov.* is readily separated from all others in the *Egernia* Gray, 1838 *sensu lato* complex (as defined by Cogger 2014 at the top of page 538), by the following unique suite of characters: Strongly keeled dorsal scales, but the dorsal scales are neither completely smooth or alternatively not spinose in any way; there is a series of expanded upper caudals on the base of the tail; the colouration and pattern is somewhat dull or otherwise obscured; dark brown or black above with darker striations and when a broad blackish upper lateral zone is obvious, is usually restricted to the neck and anterior part of the body and does not strongly contrast with the throat which is heavily speckled and mottled with dark brown.

Similar looking species in other genera (e.g. *Silvascincus* Wells and Wellington, 1985 or *Contundo* Wells and Wellington, 1984) do not have the preceding suite of characters as a total package.

Distribution: Restricted to hilly parts of south-east Australia from north-east Victoria to south-east Queensland, including rocky areas near the coast and nearby ranges.

Etymology: Named in honour of Paul Woolf of Walloon, Queensland, Australia, the foundation president of the Herpetological Society of Queensland, Incorporated, for his many contributions to herpetology and wildlife conservation over some decades.

Content: *Woolfscincus saxatilis* (Cogger, 1960) (type species); *Woolfscincus halcoggeri sp. nov.*(this paper); *Woolfscincus intermedia* (Cogger, 1960); *Woolfscincus macpheei* (Wells and Wellington, 1984); *Woolfscincus maryannmartinekae sp. nov.* (this paper); *Woolfscincus roomi* (Wells and Wellington, 1985).

NEW GENUS *PIERSONSAURUS GEN. NOV.*

Type species: *Silubosaurus depressus* Günther, 1875.

Diagnosis: The genus *Piersonsaurus gen. nov.* is diagnosed and separated from all other similar Australian species as follows: Medium-sized (to 110 mm SVL) skinks with triangular head and a blunt snout, spinose dorsal scalation with each scale usually possessing a long central spine flanked by two smaller spines being most spinose as in largest spines on the tail. A very short stout non-fragile, strongly laterally compressed tail with long spines, no nuchal scales. Litter size is usually two (modified from Doughty *et al.* 2011).

Skinks in the genera *Egernia* Gray, 1838 and *Silubosaurus* Gray, 1845 are both easily separated from *Piersonsaurus gen. nov.* which is further defined and diagnosed by having nasal scales in contact and the caudal scales each with three well developed spines with the central one being the largest. By contrast skinks in the genera *Egernia* Gray, 1838 and *Silubosaurus* Gray, 1845 are both separated from *Piersonsaurus gen. nov.* by having nasal scales not in contact, caudal scales each with a single spine only or rarely two tiny lateral spines. *Egernia* Gray, 1838 is readily separated from *Silubosaurus* Gray, 1845 by having a tail that is more-or-less circular in cross section and more than 30 mid-body rows, which is a combination not seen in *Silubosaurus.*

Outside of *Egernia, Silubosaurus* and *Piersonsaurus gen. nov.* there are no other similar spiny skinks in the original group of species within *Egernia sensu lato.*

Distribution: Effectively endemic to Western Australia (most of that state except the tropics, far south and most of the far east of the state, although there are outlier populations inside the Northern Territory in the far south-west of that state. A detailed distribution map based on museum records in Australia has been published by Doughty *et al.* (2011).

Etymology: Named in honour of Charles Pierson, book publisher, of Mosman and Moss Vale in New South Wales, Australia, who published numerous books that made significant contributions to wildlife conservation in Australia and globally including Hoser (1989, 1991 and 1993). See Hoser (1996) for further details.

Content: *Piersonsaurus depressus* (Günther, 1875) (type species); *Piersonsaurus* cygnitos (Doughty, Kealy and Donnellan, 2011); *Piersonsaurus* eos (Doughty, Kealy and Donnellan, 2011); *Piersonsaurus* epsisolus (Doughty, Kealy and Donnellan, 2011).

NEW GENUS *MANNIXSAURUS GEN. NOV.*

Type species: *Egernia formosa* Fry, 1914.

Diagnosis: *Mannixsaurus gen. nov.*, while superficially similar to other genera and species within the *Egernia* Gray, 1838 genus complex, is sufficiently divergent and different from all other species to warrant being placed in its own genus.

Mannixsaurus gen. nov. are readily separated from all other similar Australian genera and species by the following unique suite of characters: Adult snout-vent length up to 110 mm, original tail is 108-150% of the snout-vent; Nasals are usually separated and weakly grooved. Prefrontals are usually in contact, 1-5 nuchals, 6-8 supraciliaries, 7 upper labials. The ear aperture is moderately narrow and nearly vertical; lobules number 3-6. There are 28-30 mid-body rows, the dorsals are smooth or striated. There are 17-23 lamellae under the longest toe. The dorsal colouration is with a back that is pale brown to olive with dark-brown oblong spots not extending to the latero-dorsal region and coalescing into two stripes on the fore-back.

Distribution: Interior parts of Western Australia, Australia, from the southern Pilbara south to nearly Norseman and east to the western edge of the Great Victoria Desert and Nullarbor Plain (Storr *et al.* 1981).

Etymology: Named in honour of Daniel Mannix of the Victorian Dog Training Academy (VDTA) for services to animal welfare in Australia.

Content: *Mannixsaurus formosa* (Fry, 1914) (including the subspecies formally described within this paper).

SILUBOSAURUS HOSERAE SP. NOV.

Holotype: A preserved specimen at the Australian Museum in Sydney, NSW, Australia, specimen number: R.18663, collected at Mount Isa, Queensland, Australia, Latitude -20.73 S, Longitude 139.48 E. The Australian Museum in Sydney, NSW, Australia, is a government-owned facility that allows access to its holdings.

Paratypes: Three preserved specimens at the Australian Museum in Sydney, NSW, Australia, specimen numbers: R.19292, R.16865, and R.91953, all collected at Mount Isa, Queensland, Australia, Latitude -20.73 S, Longitude 139.48 E, and a preserved specimen at the Queensland Museum in Brisbane, Queensland, Australia, specimen number: J79876, collected from near Cloncurry Creek, West of the Flinders Highway, Queensland, Australia, Latitude -20.77 S, Longitude 140.20 E.

Diagnosis: Until now, *Silubosaurus hoserae sp. nov.* has until now been treated as *S. hosmeri* (Kinghorn, 1955). In actual fact, the latter species is a substantially different animal described from a specimen in north-east Queensland, that is confined to that general region.

Proper *S. hosmeri* (Kinghorn, 1955) is sometimes referred to as the "black form" as depicted on page 510 of Brown (2014). The other two specimens of *S. hosmeri* (called "*Egernia hosmeri*") depicted on page 510 of Brown (2014) are in fact the two subspecies of *S. hoserae sp. nov.* as described herein.

S. hoserae sp. nov. is readily separated from *S. hosmeri* by having a well defined dorsal body pattern consisting of large obvious yellow spots on a light-brown background, each spot usually consisting of at least one full scale and at times more, or alternatively the light patches are large and consist of several scales (subspecies *S. hoserae maxinehoserae subsp. nov.*), versus an obviously chocolate brown dorsal colour and minimal light markings or spots in *S. hosmeri*.

The lower jaw and lower labials are usually a dark blackish brown in colour in *S. hosmeri*, versus overwhelmingly white (with limited dark markings) in both subspecies of *S. hoserae sp. nov.*.

In all but the most aged of specimens the upper surface of the head of *S. hoserae sp. nov.* has significant areas of whitish pigment versus little or none on *S. hosmeri.*

S. hosmeri has a continuous white line on the upper labials, as opposed to one that is clearly broken by brown intrusions or scale etchings on the upper labials in *S. hoserae sp. nov.*.

The subspecies *Silubosaurus hoserae maxinehoserae subsp. nov.* is readily separated from *S. hoserae hoserae subsp. nov.* by having well defined black or brown bars running across the upper and lower labials of similar thickness on the top and bottom labials, versus moderately defined bars on the labials with the part on the lower labials significantly thicker than those on the upper labials.

Also the most obvious feature differentiating *Silubosaurus hoserae maxinehoserae subsp. nov.* from the nominate subspecies is the general dorsal body pattern. In *S. hoserae hoserae subsp. nov.* the lighter yellow markings on the body (which is usually a reddish brown colour) are typically one, or less often two scales in size. By contrast, in *S. hoserae maxinehoserae subsp. nov.* the light (near white) markings on a background colour of yellowish brown are large and consist of patches of several scales, which often tend to merge to give an appearance of irregular bands, the darker ones being significantly thicker than those formed by the merging lighter scales.

Distribution: Essentially confined to the greater Barkly Tableland of north western Queensland and immediately adjoining parts of the Northern Territory, including adjoining areas to the north, where rocky habitat prevails. The population confined to rocky parts of the Einasleigh uplands on Cape York and nearby in the western rain shadow of the Great Dividing Range are the nominate form of *Silubosaurus hosmeri* (Kinghorn, 1955), with a type locality of Kaban, North-East Queensland, Australia, Latitude -17.52° S, Longitude 145.39° E.

The low-lying region between these areas (Julia Creek to Hughenden in the area of the Flinders River drainage) forms an impenetrable barrier between any gene flow between the populations and therefore it is appropriate that the two be treated as separate species.

Etymology: Named in honour of my magnificent wife, Shireen Vanessa Hoser in recognition of her globally significant contributions to wildlife conservation spanning in excess of two decades.

SILUBOSAURUS HOSERAE MAXINEHOSERAE SUBSP. NOV.

Holotype: A preserved specimen at the Australian Museum in Sydney, New South Wales (NSW), Australia, specimen number: R.106841, collected from "30km (Approx.) S. Mcarthur River Base Camp", Northern Territory, Australia, Latitude -16.63 S, Longitude 136.00 E.

The Australian Museum in Sydney, NSW, Australia, is a government-owned facility that allows access to its holdings.

Paratypes: Two preserved specimens at the Australian Museum in Sydney, NSW, Australia, specimen numbers: R.57050, R 57051, both collected from "30km (Approx.) S. Mcarthur River Base Camp", Northern Territory, Australia, Latitude -16.63 S., Longitude 136.00 E.

Diagnosis: The subspecies *Silubosaurus hoserae maxinehoserae subsp. nov.* is readily separated from *S. hoserae hoserae subsp. nov.* by having well defined black or brown bars running across the upper and lower labials of similar thickness on the top and bottom labials, versus moderately defined bars on the labials with the part on the lower labials significantly thicker than those on the upper labials.

Also the most obvious feature differentiating *Silubosaurus hoserae maxinehoserae subsp. nov.* from the nominate subspecies is the general dorsal body pattern. In *S. hoserae hoserae subsp. nov.* the lighter yellow markings on the body (which is usually a reddish brown colour) are typically one, or less often two scales in size. By contrast, in *S. hoserae maxinehoserae subsp. nov.* the light (near white) markings on a background colour of yellowish brown are large and consist of patches of several scales, which often tend to merge to give an appearance of irregular bands, the darker ones being significantly thicker than those formed by the merging lighter scales.

Typical specimens of both subspecies (called "*Egernia hosmeri*") are depicted on page 510 of Brown (2014)

Until now, *Silubosaurus hoserae sp. nov.* has until now been treated as *S. hosmeri* (Kinghorn, 1955). In actual fact, the latter species is a substantially different animal described from a specimen in north-east Queensland, that is confined to that general region (east of the Flinders River drainage system in central north Queensland).

Proper (nominate form) *S. hosmeri* (Kinghorn, 1955) is sometimes referred to as the "black form" as depicted on page 510 of Brown (2014). The other two specimens of *S. hosmeri* (called "*Egernia hosmeri*") depicted on page 510 of Brown (2014) are in fact the two subspecies of *S. hoserae sp. nov.* as described herein.

S. hoserae sp. nov. is readily separated from *S. hosmeri* by having a well defined dorsal body pattern consisting of large obvious yellow spots on a light-brown background, each spot usually consisting of at least one full scale and at times more, or alternatively the light patches are large and consist of several scales (subspecies *S. hoserae maxinehoserae subsp. nov.*), versus an obviously chocolate brown dorsal colour and minimal light markings or spots in *S. hosmeri.*

The lower jaw and lower labials of *S. hosmeri* are usually a dark blackish brown in colour, versus overwhelmingly white (with limited dark markings) in both subspecies of *S. hoserae sp. nov.*.

In all but the most aged of specimens the upper surface of the head of *S. hoserae sp. nov.* has significant areas of whitish pigment versus little or none on *S. hosmeri.*

S. hosmeri has a continuous white line on the upper labials, as opposed to one that is clearly broken by brown intrusions or scale etchings on the upper labials in *S. hoserae sp. nov.*.

Distribution: *S. hoserae sp. nov.* is essentially confined to the greater Barkly Tableland and adjoining areas to the north, where rocky habitat prevails.

The subspecies *S. hoserae maxinehoserae subsp. nov.* is known from the following region: generally from Lagoon Creek, Westmoreland Station, Gulf of Carpentaria, far north-west Queensland, (Latitude -17.49 S., Longitude 138.22 E.) west in rocky areas as far west as the type locality which is "30km (Approx.) S. Mcarthur River Base Camp", Northern Territory, Australia, Latitude -16.63 S., Longitude 136.00 E.

S. hoserae hoserae subsp. nov. occurs in the general vicinity of the Selwyn Range in the Mount Isa region of north-west Queensland. Most captive specimens and photos in books labelled as "*Egernia hosmeri*" are of this subspecies.

The population confined to rocky parts of the Einasleigh uplands on Cape York and nearby are the nominate form of *Silubosaurus hosmeri* (Kinghorn, 1955). The low-lying region between these areas (Julia Creek to Hughenden in the area of the Flinders River drainage) forms an impenetrable barrier between any gene flow between the populations and therefore it is appropriate that the two be treated as separate species.

One or more drainages apparently separate the populations of *S. hoserae maxinehoserae subsp. nov.* and *S. hoserae hoserae subsp. nov.* in the region north of the main Selwyn Range.

Etymology: Named in honour of Maxine Hoser, formerly of Margate in the United Kingdom (UK), daughter of the now deceased Cyril Hoser, also of Margate in the UK, and now currently resident in Israel, for assistances in research projects which have required time spent in the UK and Europe, visiting museums, zoos, and privately owned facilities.

SILUBOSAURUS HOSERAE HOSERAE SUBSP. NOV.

Holotype: A preserved specimen at the Australian Museum in Sydney, New South Wales (NSW), Australia, specimen number: R.18663, collected at Mount Isa, Queensland, Australia, Latitude -20.73 S, Longitude 139.48 E. The Australian Museum in Sydney, NSW, Australia, is a government-owned facility that allows access to its holdings.

Paratypes: Three preserved specimens at the Australian Museum in Sydney, NSW, Australia, specimen numbers: R.19292, R.16865, and R.91953, all collected at Mount Isa, Queensland, Australia, Latitude -20.73 S., Longitude 139.48 E., and a preserved specimen at the Queensland Museum in Brisbane, Queensland, Australia, specimen number: J79876, collected from near Cloncurry Creek, West of the Flinders Highway, Queensland, Australia, Latitude -20.77 S., Longitude 140.20 E.

Diagnosis: The subspecies *Silubosaurus hoserae maxinehoserae subsp. nov.* is readily separated from *S. hoserae hoserae subsp. nov.* by having well defined black or brown bars running across the upper and lower labials of similar thickness on the top and bottom labials, versus moderately defined bars on the labials with the part on the lower labials significantly thicker than those on the upper labials.

Also the most obvious feature differentiating *Silubosaurus hoserae maxinehoserae subsp. nov.* from the nominate subspecies is the general dorsal body pattern. In *S. hoserae hoserae subsp. nov.* the lighter yellow markings on the body (which is usually a reddish brown colour) are typically one, or less often two scales in size. By contrast, in *S. hoserae maxinehoserae subsp. nov.* the light (near white) markings on a background colour of yellowish brown are large and consist of patches of several scales, which often tend to merge to give an appearance of irregular bands, the darker ones being significantly thicker than those formed by the merging lighter scales.

Typical specimens of both subspecies (called "*Egernia hosmeri*") are depicted on page 510 of Brown (2014)

Until now, *Silubosaurus hoserae sp. nov.* has until now been treated as *S. hosmeri* (Kinghorn, 1955). In actual fact, the latter species is a substantially different animal described from a specimen in north-east Queensland, that is confined to that general region (east of the Flinders River drainage system in central north Queensland).

Proper *S. hosmeri* (Kinghorn, 1955) is sometimes referred to as the "black form" as depicted on page 510 of Brown (2014). The other two specimens of *S. hosmeri* (called "*Egernia hosmeri*") depicted on page 510 of Brown (2014) are in fact the two subspecies of *S. hoserae sp. nov.* as described herein.

S. hoserae sp. nov. is readily separated from *S. hosmeri* by having a well defined dorsal body pattern consisting of large obvious yellow spots on a light-brown background, each spot usually consisting of at least one full scale and at times more, or alternatively the light patches are large and consist of several scales (subspecies *S. hoserae maxinehoserae subsp. nov.*), versus an obviously chocolate brown dorsal colour and minimal light markings or spots in *S. hosmeri.*

The lower jaw and lower labials are usually a dark blackish brown in colour, versus overwhelmingly white (with limited dark markings) in both subspecies of *S. hoserae sp. nov.*.

In all but the most aged of specimens the upper surface of the head of *S. hoserae sp. nov.* has significant areas of whitish pigment versus little or none on *S. hosmeri.*

S. hosmeri has a continuous white line on the upper labials, as opposed to one that is clearly broken by brown intrusions or scale etchings on the upper labials in *S. hoserae sp. nov.*.

Distribution: *S. hoserae sp. nov.*.is essentially confined to the greater Barkly Tableland and adjoining areas to the north, where rocky habitat prevails.

The subspecies *S. hoserae maxinehoserae subsp. nov.* is known from the following region: Generally from Lagoon Creek, Westmoreland Station, Gulf of Carpentaria, far north-west Queensland, (Latitude -17.49 S., Longitude 138.22 E.) west in rocky areas as far west as the type locality which is "30km (Approx.) S. Mcarthur River Base Camp", Northern Territory, Australia, Latitude -16.63 S., Longitude 136.00 E.

S. hoserae hoserae subsp. nov. occurs in the general vicinity of the Selwyn Range in the Mount Isa region of north-west Queensland. Most captive specimens and photos in books identified as "*Egernia hosmeri*" are of this subspecies.The population confined to rocky parts of the Einasleigh uplands on Cape York and nearby are the nominate form of *Silubosaurus hosmeri* (Kinghorn, 1955).

The low-lying region between these areas (Julia Creek to Hughenden in the area of the Flinders River drainage) forms an impenetrable barrier between any gene flow between the populations and therefore it is appropriate they be treated as separate species.

One or more drainages apparently separate the populations of *S. hoserae maxinehoserae subsp. nov.* and *S. hoserae hoserae subsp. nov.* in the region north of the main Selwyn Range.

Etymology: Named in honour of my magnificent wife, Shireen Vanessa Hoser in recognition of her globally significant contributions to wildlife conservation spanning in excess of two decades.

WOOLFSCINCUS MARYANNMARTINEKAE SP. NOV.

Holotype: A preserved specimen at the National Museum of Victoria in Melbourne, Victoria, Australia, specimen number: D38230 collected at the Cave of Hands, Billywing, The Grampians, western Victoria, Latitude -37.27 S., Longitude 142.25 E.

The National Museum of Victoria in Melbourne, Victoria, Australia, is a government-owned facility that allows access to its holdings.

Paratypes: Three preserved specimens at the National Museum of Victoria in Melbourne, Victoria, Australia, specimen numbers: D33110, D33111 and D33112 from Tower Hill, Mt Rosea Track, The Grampians, Western Victoria, Latitude -37.20 S., Long. 142.47 E.

Diagnosis: *Woolfscincus maryannmartinekae sp. nov.* has until now been treated as a population of *Egernia saxatilis* Cogger, 1960 (now *Woolfscincus saxatilis*), or the subspecies or species *Woolfscincus saxatilis intermedia* (Cogger, 1960) / *Woolfscincus intermedia* (Cogger, 1960). As already stated in this paper, the four relevant previously described forms within this species group are all treated as full species.

While the description of *Woolfscincus roomi* (Wells and Wellington, 1985) is valid and the name available under the rules of *International Code of Zoological Nomenclature* (Ride *et al.* 1999), this taxon appears in most respects to be like *W. saxatilis* except for the greater preponderance of "an enlarged paravertebral series" (Wells and Wellington 1985), as outlined by Cogger (2014).

It is treated herein as a separate species-level taxon provisionally. However in terms of separating that taxon from others in this species group including the forms first described in this paper, it should be treated merely as a variant of *W. saxatilis* for the purposes of separating it from the newly described forms.

Woolfscincus saxatilis is defined as having 36-41 mid-body scale rows; four spinose auricular lobules on each side, a dark brown dorsal body colour and without lighter, broad dorsolateral stripes (Cogger 1960).

W. roomi (Wells and Wellington, 1985) from the Nandewar Range in NSW is similar in most respects to *W. saxatilis* except for what the describing authors said was unique in having an "enlarged paravertebral series". Cogger (2014) has stated that the same condition occurs in other specimens within the group he defines as *W. saxatilis*, but in the absence of information as to which particular population he refers to, noting other significant differences between populations and that they have been divided up in this paper, I tentatively accept that *W. roomi* is a taxon probably worthy of recognition.

W. intermedia is similar in most respects to *W. saxatilis*, except that the auricular lobules, though rugose, are rarely spinose, and may number as few as two on each side and this taxon has 28-35 mid-body scale rows, which separates it readily from *W. saxatilis* (Cogger 1960).

The species *W. mcpheei* (Wells and Wellington, 1984), from the coast of north-east New South Wales and nearby south-east Queensland is readily separated from *W. saxatilis* and *W. intermedia* and all other species in the complex by having prominently white spotted lips, side of face and neck, being on a dark background; usually less than 30 mid-body rows and ear lobules that are moderate or rounded.

W. halcoggeri sp. nov., has until now been treated as *W. intermedia* (see above), but is readily separated from *W. intermedia* by the presence of strongly contrasting white and black markings on the head and neck, versus dull and generally indistinct in *W. intermedia.*

W. halcoggeri sp. nov. generally lacks any prominent white spotting behind the eye as seen in *W. mcpheei* and if any at all is present, this is dull and indistinct.

W. halcoggeri sp. nov is also most readily separated from *W. intermedia* by the possession of obviously white upper labials, versus brown or mainly brown in *W. intermedia.*

Specimens from Moreton National Park, New South Wales, west of Nowra and immediately adjacent areas are tentatively assigned to *W. halcoggeri sp. nov.* on the basis of obviously white upper labials in these specimens. This appears to be the north-east limit for this taxon.

W. maryannmartinekae sp. nov. is most similar to *W. halcoggeri sp. nov.* and in the absence of further information would be diagnosed as that taxon.

W. maryannmartinekae sp. nov. is however easily separated from all others in the genus *Woolfscincus gen. nov.* by the following suite of characters: A strong reddish hue throughout, including over white areas on the upper body and labials, which are also otherwise white in colour and an obvious zone of fully whitish scales posterior to the eye, which is not seen in any other species in the group.

W. maryannmartinekae sp. nov. is also readily separated from all other species in *Woolfscincus gen. nov.* by the fact that all scales immediately anterior to the ear hole are light in colour versus some or all being darker in colour in all other species.

Distribution: *Woolfscincus maryannmartinekae sp. nov.* is known only from the Grampians (range of mountains) in Western Victoria and immediately adjacent outliers.

Etymology: Named in honour of Maryann Martinek, now of Bendigo, Victoria, Australia in recognition of her pivotal role in exposing one of the biggest "Fake News" stories to ever be fabricated for improper purposes in Australia, as documented in Hoser (2010).

WOOLFSCINCUS HALCOGGERI SP. NOV.

Holotype: A preserved specimen at the National Museum of Victoria in Melbourne, Victoria, Australia, specimen number: D38265 collected at 15.3 km West of Wingan Inlet, Victoria, Australia, Latitude -37.73 S., Longitude 149.32 E.

The National Museum of Victoria in Melbourne, Victoria, Australia, is a government-owned facility that allows access to its holdings.

Paratype: A preserved specimen at the National Museum of Victoria in Melbourne, Victoria, Australia, specimen number: D38266 collected at 15.3 km West of Wingan Inlet, Victoria, Australia, Latitude -37.73, Longitude 149.32.

Diagnosis: *Woolfscincus halcoggeri sp. nov.* has until now been treated as a population of *Egernia saxatilis* Cogger, 1960 (now *Woolfscincus saxatilis*), or the subspecies or species *Woolfscincus saxatilis intermedia* (Cogger, 1960) / *Woolfscincus intermedia* (Cogger, 1960).

As already stated in this paper, the four relevant previously described forms within this species group are all treated as full species.

While the description of *Woolfscincus roomi* (Wells and Wellington, 1985) is valid and the name available and within the rules of the ICZN, this taxon appears in most respects to be like *W. saxatilis* except for the greater preponderance of "an enlarged paravertebral series" (Wells and Wellington 1985), as outlined by Cogger (2014).

It is treated herein as a separate species-level taxon provisionally. However in terms of separating that taxon from others in this species group including the forms first described in this paper, it should be treated merely as a variant of *W. saxatilis* for the purposes of separating it from the newly described forms.

Woolfscincus saxatilis is defined as having 36-41 mid-body scale rows; four spinose auricular lobules on each side, a dark brown dorsal body colour and without lighter, broad dorsolateral stripes (Cogger 1960).

W. roomi (Wells and Wellington, 1985) from the Nandewar Range in NSW is similar in most respects to *W. saxatilis* except for what the describing authors said was a unique "enlarged paravertebral series". Cogger (2014) has stated that the same condition occurs in other specimens within the group he defines as *W. saxatilis*, but in the absence of information as to which particular population he refers to, noting other significant differences between populations, I tentatively accept that *W. roomi* is a taxon worthy of recognition.

W. intermedia is similar in most respects to *W. saxatilis*, except that the auricular lobules, though rugose, are rarely spinose, and may number as few as two on each side and this taxon has 28-35 mid-body scale rows, which separates it readily from *W. saxatilis* (Cogger 1960).

The species *W. mcpheei* (Wells and Wellington, 1984), from the coast of north-east New South Wales and nearby south-east Queensland is readily separated from *W. saxatilis* and *W. intermedia* and all other species in the complex by having prominently white spotted lips, side of face and neck, being on a dark background; usually less than 30 mid-body rows and ear lobules that are moderate or rounded.

W. halcoggeri sp. nov., has until now been treated as *W. intermedia* (see above), which it would otherwise be identified as, but is readily separated from *W. intermedia* by the presence of strongly contrasting white and black markings on the head and neck, versus dull and generally indistinct in *W. intermedia.*

W. halcoggeri sp. nov. generally lacks any prominent white spotting behind the eye as seen in *W. mcpheei* and if any at all is present, this is dull and indistinct and in contrast to otherwise prominent interfaces between dark and light scales on the head and neck.

W. halcoggeri sp. nov is also most readily separated from *W. intermedia* by the possession of obviously white upper labials, versus brown or mainly brown in *W. intermedia.*

Specimens from Moreton National Park, New South Wales, west of Nowra and immediately adjacent areas are tentatively assigned to *W. halcoggeri sp. nov.* on the basis of obviously white upper labials in these specimens. This appears to be the north-east limit for this taxon. *W. maryannmartinekae sp. nov.* is most similar to *W. halcoggeri sp. nov.* and in the absence of further information would be diagnosed as that taxon.

W. maryannmartinekae sp. nov. is however easily separated from all others in the genus *Woolfscincus gen. nov.* including *W. halcoggeri sp. nov.* by the following suite of characters: A strong reddish hue throughout the dorsum and sides, including over white areas on the upper body and labials, which are also white in colour and is further diagnosed and separated from all other species-level taxa in the genus by an obvious zone of fully whitish scales posterior to the eye, which is not seen in any other species in the group.

W. maryannmartinekae sp. nov. is also readily separated from all other species in *Woolfscincus gen. nov.* by the fact that all scales immediately anterior to the ear hole are light in colour versus some or all being darker in colour in all other species.

Distribution: The centre of distribution for *W. halcoggeri sp. nov.* is eastern Victoria, west to about Melbourne and environs, as well as nearby parts of southern New South Wales near the coast and north to about Moreton National Park and including the Wollongong Escarpment. *W. intermedia* is herein restricted to the area north and west of Moss Vale, New South Wales, including the Mittagong Escarpment and throughout the Blue Mountains region and immediately adjacent high altitude mountains.

Etymology: Named in honour of Dr. Harold (Hal) G. Cogger, formerly of Turramurra, New South Wales, Australia, now of Pearl Beach, just north of Sydney, New South Wales, who spent all or most of his professional career at the Australian Museum in Sydney, Australia. His contribution to Australian herpetology has been immense and is most obvious to most people in the major herpetological texts he has authored including Cogger (2014) being the seventh and best yet edition of his comprehensive texts on Australian reptiles and Amphibians. I note here that I have serious issues with his obviously overly conservative and out of date treatment of many taxa and that he sometimes takes advice from people that he should know not to listen to.

For example in Cogger (2014) he still refers to pythons as being in the family "Boidae", and refers to Australian Green Tree Snakes as being in the genus "*Dendrelaphis* Boulenger, 1890", even though this is a genus name for a completely different group of snakes from India! I could give dozens of similar examples from that book alone, but in spite of all this, his works still represent an amazing world-leading effort at dealing comprehensively with over 1,000 species from a single continent sized land mass in an identification guide, done in a way that puts Australian herpetological books at the front of the global pack.

No half-decent herpetologist in Australia would dare go without at least one copy of one edition of his most comprehensive text.

He has also done his work ethically in accordance with the relevant rules of Australian and international law and the scientific rules and dictates of the International Commission of Zoological Nomenclature (ICZN), on which he once sat as an esteemed member.

I also note that differences of opinion and even when presented with the same facts are part and parcel of honest scientific discourse and to that extent, nothing is to be held against Hal Cogger in terms of this. Noting that at all times he has acted within the rules and ethically and to that extent it puts him ahead of many of his contemporaries in the field of Australian herpetology.

Many people regard Hal Cogger as Australia's pre-eminent herpetologist and this has been the case for many years, including pretty much all of my own entire 50 year tenure as an active Australian herpetologist. In terms of the science of herpetology, Cogger must be held up with other so-called "Global Greats" like George Albert Boulenger, John Edward Gray, André Marie Constant Duméril and Gabriel Bibron.

CONTUNDO ROSSWELLINGTONI SP. NOV.

Holotype: A preserved specimen at the Western Australian Museum, Perth, Western Australia, Australia, specimen number: R97546 collected from Barrier Island Western Australia, Australia, Latitude 123.12 E., Longitude -33.98 S.

The Western Australian Museum, Perth, Western Australia, Australia is a facility that allows access to its holdings.

Paratype: A preserved specimen at the Western Australian Museum, Perth, Western Australia, Australia, specimen number: R97566 from Hope Island, Western Australia, Australia, Latitude -34.08 S., Longitude 122.17 E.

Diagnosis: Until now *Contundo rosswellingtoni sp. nov.* has been treated as the eastern population of *C. napoleonis* (Gray, 1839).

However *C. rosswellingtoni sp. nov.* is readily separated from *C. napoleonis* by the presence of numerous white spots and flecks on the upper surfaces of the body in adults, with a silvery grey and black pattern formed by flecks forming a somewhat indistinct dorsal pattern, versus a reddish grey dorsal pattern with distinct darker stripes running along the back and sides in *C. napoleonis.*

C. napoleonis has a distinct and obvious interface between black (top) and white (below) on the neck between the ear and front leg, versus no such distinct interface in *C. rosswellingtoni sp. nov.*.

On original tails *C. napoleonis* has a series of distinct large dark squarish flecks on lighter background running along the anterior two thirds of the tail. Any black or dark flecking on the tail of *C. rosswellingtoni sp. nov.* is indistinct.

Noteworthy is that the exact provenance of Gray's holotype for *C. napoleonis* is not given in the description he published in 1839. However from the very brief description, he clearly describes the colouration of the eastern population, herein referred to as *C. napoleonis.*

This is why it is the western population that is treated as undescribed and formally named herein.

The entirety of his four-line formal description reads as follows:

"*Tiliqua Napoleonis.* Scincus Napoleonis, *Cuv.*

Brown with three pale dorsal streaks; ear scales four, large; scales three-toothed behind, three-keeled.
New Holland."

Furthermore the holotype for *Egernia carinata* Smith, 1939 is from Toolbrunup, Western Australia, making this taxon synonymous with *E. napoleonis* as defined herein (also being from the westernmost population). Therefore the name "*carinata*" is unavailable for newly named taxon within this formal description.

Storr (1978) also recognized two populations of what he referred to as "*Egernia napoleonis*", now herein treated as two different species. He wrote:

"The eastern populations differ from the western in their colour pattern, greater size and more numerous mid-body scale rows, supraciliaries and upper labials. Coming from several islands and from widely separated sectors of the mainland coast, they are understandably less uniform than the western populations. In the Cape Le Grand National Park, for example, the number of midbody scale rows (40-46, N 13, mean 42.1), number of ear lobules (4-6, N 13, mean 4.7) and frequency of 9 upper labials (40%) are considerably higher than on nearby North Twin Peak Island (where the corresponding counts are 36-40, N 9, mean 38.1; 3-4, N 9, mean 3.8; and 9%)."

Cogger (2014) depicts an image of *C. rosswellingtoni sp. nov.* on the bottom of page 545.

Wilson and Swan (2017) on page 291 at the top show an image of *C. napoleonis* as recognized herein, depicted as "*Egernia napoleonis*" from Denmark, Western Australia.

Silvascincus richardi (Peters, 1869) (both subspecies) is readily separated from *Contundo napoleonis* (Gray, 1839) and *C. rosswellingtoni sp. nov.* by the absence of a pale dorso-lateral stripe or zone, versus the presence of one in *Contundo napoleonis* (Gray, 1839) and *C. rosswellingtoni sp. nov.*.

See for example the relevant images on page 291 of Wilson and Swan (2017). These are images of *C. napoleonis* and *S. richardi* (as defined in this paper, and labelled with the same species names).

Distribution: *C. rosswellingtoni sp. nov.* is found generally from Esperance, Western Australia, (where most specimens are known from) eastwards along the coastal strip to as far west as Eyre (Twilight Cove), Western Australia and including nearby numerous offshore islands.

C. napoleonis is found from Hopetoun along the south-west Australian coast, in a westerly direction and including nearby areas inland, along the west coast as far north as Green Head, WA.

Etymology: Named in honour of Cliff Ross Wellington, of New South Wales, Australia, formerly of the Australian Museum in Sydney, Australia and of the New South Wales National Parks and Wildlife Service (NPWS) and co-author of some of the most important scientific papers in the history of Australian herpetology in recognition of his globally significant contributions to herpetology and wildlife conservation spanning some five decades.

SILUBOSAURUS ZELLINGI FIACUMMINGAE SUBSP. NOV.

Holotype: A preserved specimen at the Northern Territory Museum, Darwin, Northern Territory, Australia, specimen number: R32894, collected from Santa Teresa Mission, Northern Territory, Australia (Central Australia) in part of the greater MacDonnell Ranges, Latitude -24.13 S., Longitude 134.37 E. The Northern Territory Museum, Darwin, Northern Territory, Australia, is a government-owned facility that allows access to its holdings.

Paratypes: Four preserved specimens at the Northern Territory Museum, Darwin, Northern Territory, Australia, specimen numbers: R32895, R32896, R32897, R32898 all collected from Santa Teresa Mission, Northern Territory, Australia (Central Australia) in part of the greater MacDonnell Ranges, Latitude -24.13 S., Longitude 134.37 E.

Hoser 2018 - Australasian Journal of Herpetology 36:49-64.

Diagnosis: Each of the various subspecies of *Silubosaurus zellingi* De Vis, 1884 (treated by most authors until now as *S. stokesii* Gray, 1845) are morphologically similar and it is for this reason that most herpetologists have treated all as being of a single species.

The diagnosis for the subspecies *Silubosaurus zellingi fiacummingae subsp. nov.* must therefore include means to separate this and all other subspecies within the *Silubosaurus zellingi* De Vis, 1884 and *S. stokesii* Gray, 1845 complex.

S. stokesii and S. zellingi are readily separated from other species in the genus *Silubosaurus* by having more than 30 mid-body scale rows. The other two species in the genus are *S. hoserae sp. nov.* (this paper) and *S. hosmeri* (Kinghorn, 1955).

The type form of *S. stokesii stokesii* from Western Australia is readily separated from all other subspecies and all forms of *S. zellingi* by the following suite of characters: the dorsal colour is blackish or dark brown; the back and sides are usually with clusters of whitish spots; upper lips whitish; nasals usually widely separated; postnarial groove strong and usually extending to top of the nasal.

S. stokesii badia Storr, 1978 also from Western Australia is readily separated from all other subspecies and all forms of *S. zellingi* by one or other of the following suites of characters, which are seen in two well-defined regional variants: 1/ Dorsal ground colour blackish or very dark brown with the back and sides usually unspotted; upper lips dark in colour; nasals narrowly separated; postnarial groove weak and usually not extending to the top of the nasal, (referred to by Storr (1978) as nominate *S. stokesii aethiops*) or 2/ Alternatively with a reddish brown dorsal colouration, upper labials being barely lighter than the scales above them, or the same colour as them, light patches on the upper body being usually two scales wide, but lacking obvious dark etching along the anterior edges (this form being identified by Storr (1978) as *S. stokesii badia*).

S. stokesii lynettehholdsworthae subsp. nov. from the interior of southern Western Australia in a region generally bounded by Yalgoo, Mt. Magnet, Cue and Murchison and slightly east of this approximately square-shaped region is readily separated from all other *S. stokesii* and *S. zellingi* on the basis of its unique glossy black colouration (as opposed to dull blackish colour in some other so-called *S. stokesii aethiops* from Shark Bay) and the possession of a relatively longer and less spinose tail as compared to other *S. stokesii* and *S. zellingi*.

In *E. stokesii lynettehholdsworthae subsp. nov*. the upper labials and limbs are also black in colour. The entire colouration is without markings, spots or flecks.

S. zellingi De Vis, 1884 is the species from central and Eastern inland Australia treated by most authors until now as a variant of *S. stokesii.* The form is herein divided into four readily separated subspecies.

The nominate form of *S. zellingi zellingi* from south-west Queensland, is readily separated from all other *S. zellingi* and *S. stokesii* by the following suite of characters: A reddish brown dorsal colouration, with upper labials being noticeably lighter than the scales above them, light patches on the upper body being usually two scales wide, and having obvious dark etching along the anterior edges, versus an absence in similarly coloured *S. stokesii* from Western Australia. Unlike all other forms of *S. zellingi* and *S. stokesii* nominate *S. zellingi zellingi* have strongly etched scales on the upper surface of the head. The forelimbs of *S. zellingi* are cream and dark brown (in life) versus white and reddish-orange in similarly coloured West Australian *S. stokesii badia.* The dorsal surfaces of the toes of all feet of *S. zellingi* are mainly a creamish colour, versus orangeish in similarly coloured *S. stokesii badia.*

S. zellingi fiacummingae subsp. nov. is the form found in the general vicinity of the MacDonnell Ranges of Central Australia. *S. zellingi fiacummingae subsp. nov*. is readily separated from all other *S. zellingi* and *S. stokesii* by the following suite of characters: A dark blackish brown body with few if any markings in adults. In contrast to dark coloured *S. zellingi* or *S. stokesii* from elsewhere the forelimbs of *S. zellingi fiacummingae subsp. nov*. are generally unmarked and merely blackish grey in colour. Markings in *S. zellingi fiacummingae subsp. nov.* on the dorsal surface are in the form of widely scattered scales of the same colour as the rest of the body, but of a lighter shade and most common in the region of the hind limbs and anterior tail. The upper labials are noticeably lighter (off white) in colour, in contrast to the darker scales above. The toes are also dark in colour. There is no obvious etchings on any of the body scales.

S. zellingi scottgranti subsp. nov. is the most commonly seen subspecies within the *S. zellingi* complex and occurs in far western New South Wales around the Barrier Range and west, through the northern Flinders Ranges and other hills surrounding the south, west and north-west of Lake Eyre in South Australia, including rocky areas at the top (north) side of the Eyre Peninsula, also in South Australia. *S. zellingi scottgranti subsp. nov.* is readily separated from all other *S. zellingi* and *S. stokesii* by the following suite of characters: A reddish orange-brown body colouration, with single scattered light yellow scales across the body giving a flecked appearance. While the light scales will join side by side to form broken bar-like markings, they are rarely back to back, or two wide, except around the anterior flanks and this is only usually seen in Eyre Peninsula specimens. The labials are noticeably white in colour, limbs orangey brown with obvious yellow flecks.

The lighter scales on these lizards are obvious and prominent, even in aged specimens.

S. zellingi doriskuenae subsp. nov. is the taxon from the Grey Range in north-west New South Wales and the immediately adjoining parts of south-west Queensland where suitable rocky habitat prevails. *S. zellingi doriskuenae subsp. nov.* is similar in most respects to *S. zellingi scottgranti subsp. nov.*, to which it would key out to using the data presented so far.

S. zellingi doriskuenae subsp. nov. is however separated from *S. zellingi scottgranti subsp. nov.* by the fact that the lighter dorsal scales do not strongly contrast with the darker surrounding ones as in the general colour pattern is indistinct, versus distinct in *S. zellingi scottgranti subsp. nov.*.

S. zellingi doriskuenae subsp. nov. also has obviously yellow-brown upper labials, versus white in *S. zellingi scottgranti subsp. nov.*. The limbs of *S. zellingi doriskuenae subsp. nov.* are either unmarked or indistinctly so only, versus obviously flecked in *S. zellingi scottgranti subsp. nov.*.

S. zellingi scottgranti subsp. nov. also has numerous white markings on the tail, including scales on at least some spines, whereas this is not the case in *S. zellingi doriskuenae subsp. nov.*. Lighter tail spines in *S. zellingi zellingi* are brown or yellowish brown, but never white as in *S. zellingi scottgranti subsp. nov.*.

Distribution: *S. zellingi fiacummingae subsp. nov.* is restricted to the MacDonnell Ranges area of central Australia in the Northern Territory.

Etymology: Named in honour of Fia Cumming, investigative journalist from Lyons (Canberra), ACT, Australia in recognition of her monumental and globally significant contributions to wildlife conservation and herpetology in particular as detailed in Hoser (1996).

SILUBOSAURUS ZELLINGI SCOTTGRANTI SUBSP. NOV.

Holotype: A preserved specimen in the South Australian Museum in Adelaide, South Australia, Australia, specimen number: R12807, collected at Thurlga in the Gawler Ranges, South Australia, Australia, Latitude -32.45 s., Longitude 135.78 E. The South Australian Museum in Adelaide, South Australia, Australia is a government-owned facility that allows access to its holdings.

Paratypes: Three preserved specimens in the South Australian Museum in Adelaide, South Australia, Australia, being specimen number: R29160, collected North East of Minnipa, South Australia, Australia, Latitude -32.17 S., Longitude 135.75 E.; specimen number: R25437, collected at the hills north-west of Mount Ive Homestead in the Gawler Ranges in South Australia, Australia, Latitude -32.40 S., Longitude 136.07 E.; specimen number: R17677 collected from North-west of Yardea Station Shearing Shed, in South Australia, Australia, Latitude -32.33 S., Longitude 135.67 E.

Diagnosis: Each of the various subspecies of *Silubosaurus zellingi* De Vis, 1884 (treated by most authors until now as eastern *S. stokesii* Gray, 1845) are morphologically similar and it is for this reason that most herpetologists have treated all as one species.

The diagnosis for the subspecies *Silubosaurus zellingi scottgranti subsp. nov.* must therefore include means to separate this and all other subspecies within the *Silubosaurus zellingi* De Vis, 1884 and *S. stokesii* Gray, 1845 complex.

S. stokesii and S. zellingi are readily separated from other species in the genus *Silubosaurus* by having more than 30 mid-body scale rows. The other two species in the genus are *S. hoserae sp. nov.* (this paper) and *S. hosmeri* (Kinghorn, 1955).

The type form of *S. stokesii stokesii* from Western Australia is readily separated from all other subspecies and all forms of *S. zellingi* by the following suite of characters: the dorsal colour is blackish or dark brown; the back and sides are usually with clusters of whitish spots; upper lips whitish; nasals usually widely separated; postnarial groove strong and usually extending to top of the nasal.

S. stokesii badia Storr, 1978 also from Western Australia is readily separated from all other subspecies and all forms of *S. zellingi* by one or other of the following suites of characters, which are seen in two well-defined regional variants: 1/ Dorsal ground colour blackish or very dark brown with the back and sides usually unspotted; upper lips dark in colour; nasals narrowly separated; postnarial groove weak and usually not extending to the top of the nasal, (referred to by Storr (1978) as nominate *S. stokesii aethiops*) or 2/ Alternatively with a reddish brown dorsal colouration, upper labials being barely lighter than the scales above them, or the same colour as them, light patches on the upper body being usually two scales wide, but lacking obvious dark etching along the anterior edges (this form being identified by Storr (1978) as *S. stokesii badia*).

S. stokesii lynettehholdsworthae subsp. nov. from the interior of southern Western Australia in a region generally bounded by Yalgoo, Mt. Magnet, Cue and Murchison and slightly east of this approximately square-shaped region is readily separated from all other *S. stokesii* and *S. zellingi* on the basis of its unique glossy black colouration (as opposed to dull blackish colour in some other so-called *S. stokesii aethiops* from Shark Bay) and the possession of a relatively longer and less spinose tail as compared to other *S. stokesii* and *S. zellingi.*

In *E. stokesii lynettehholdsworthae subsp. nov.* the upper labials and limbs are also black in colour. The entire colouration is without markings, spots or flecks. *S. zellingi* De Vis, 1884 is the species from central and Eastern inland Australia treated by most authors until now as a variant of *S. stokesii.* The form is herein divided into four readily separated subspecies.

The nominate form of *S. zellingi zellingi* from south-west Queensland, is readily separated from all other *S. zellingi* and *S. stokesii* by the following suite of characters: A reddish brown dorsal colouration, with upper labials being noticeably lighter than the scales above them, light patches on the upper body being usually two scales wide, and having obvious dark etching along the anterior edges, versus an absence in similarly coloured *S. stokesii* from Western Australia. Unlike all other forms of *S. zellingi* and *S. stokesii* nominate *S. zellingi zellingi* have strongly etched scales on the upper surface of the head. The forelimbs of *S. zellingi* are cream and dark brown (in life) versus white and reddish-orange in similarly coloured West Australian *S. stokesii badia.* The dorsal surfaces of the toes of all feet of *S. zellingi* are mainly a creamish colour, versus orangeish in similarly coloured *S. stokesii badia.*

S. zellingi fiacummingae subsp. nov. is the form found in the general vicinity of the MacDonnell Ranges of Central Australia. *S. zellingi fiacummingae subsp. nov.* is readily separated from all other *S. zellingi* and *S. stokesii* by the following suite of characters: A dark blackish brown body with few if any markings in adults. In contrast to dark coloured *S. zellingi* or *S. stokesii* from elsewhere the forelimbs of *S. zellingi fiacummingae subsp. nov.* are generally unmarked and merely blackish grey in colour. Markings in *S. zellingi fiacummingae subsp. nov.* on the dorsal surface are in the form of widely scattered scales of the same colour as the rest of the body, but of a lighter shade and most common in the region of the hind limbs and anterior tail. The upper labials are noticeably lighter (off white) in colour, in contrast to the darker scales above. The toes are also dark in colour. There is no obvious etchings on any of the body scales.

S. zellingi scottgranti subsp. nov. is the most commonly seen subspecies within the *S. zellingi* complex and occurs in far western New South Wales around the Barrier Range and west, through the northern Flinders Ranges and other hills surrounding the south, west and north-west of Lake Eyre in South Australia, including rocky areas at the top (north) side of the Eyre Peninsula, also in South Australia. *S. zellingi scottgranti subsp. nov.* is readily separated from all other *S. zellingi* and *S. stokesii* by the following suite of characters: A reddish orange-brown body colouration, with single scattered light yellow scales across the body giving a flecked appearance. While the light scales will join side by side to form broken bar-like markings, they are rarely back to back, or two wide, except around the anterior flanks and this is only usually seen in Eyre Peninsula specimens. The labials are noticeably white in colour, limbs orangey brown with obvious yellow flecks. The lighter scales on these lizards are obvious and prominent, even in aged specimens.

S. zellingi doriskuenae subsp. nov. is the taxon from the Grey Range in north-west New South Wales and the immediately adjoining parts of south-west Queensland where suitable rocky habitat prevails. *S. zellingi doriskuenae subsp. nov.* is similar in most respects to *S. zellingi scottgranti subsp. nov.*, to which it would key out to using the data presented so far.

S. zellingi doriskuenae subsp. nov. is however separated from *S. zellingi scottgranti subsp. nov.* by the fact that the lighter dorsal scales do not strongly contrast with the darker surrounding ones as in the general colour pattern is indistinct, versus distinct in *S. zellingi scottgranti subsp. nov.*.

S. zellingi doriskuenae subsp. nov. also has obviously yellow-brown upper labials, versus white in *S. zellingi scottgranti subsp. nov.*. The limbs of *S. zellingi doriskuenae subsp. nov.* are either unmarked or indistinctly so only, versus obviously flecked in *S. zellingi scottgranti subsp. nov.*.

S. zellingi scottgranti subsp. nov. also has numerous white markings on the tail, including scales on at least some spines, whereas this is not the case in *S. zellingi doriskuenae subsp. nov.*. Lighter tail spines in *S. zellingi zellingi* are brown or yellowish brown, but never white as in *S. zellingi scottgranti subsp. nov.*.

Distribution: *S. zellingi scottgranti subsp. nov.* is restricted far western New South Wales around the Barrier Range and west, through the northern Flinders Ranges and other hills surrounding the south, west and north-west of Lake Eyre in South Australia, including rocky areas at the top (north) side of the Eyre Peninsula, also in South Australia.

Etymology: Named in honour of Scott Grant, formerly of Victoria, Australia and now of Whyalla, South Australia, Australia where he continues to make significant ongoing contributions to wildlife conservation and education, including through his work in wildlife rescue, education of school children and owner of the local zoo at Whyalla, which he commenced to own and operate in early 2018.

SILUBOSAURUS ZELLINGI DORISKUENE SUBSP. NOV.

Holotype: A preserved specimen at the Australian Museum in Sydney, NSW, Australia, specimen number: R.151043.001 collected 12 km north of Tibooburra Post office, at The Granites, at Tibooburra, New South Wales, Australia, Latitude -29.47 S., Longitude 142.01 E. The Australian Museum in Sydney, NSW, Australia, is a government-owned facility that allows access to its holdings.

Paratypes: Two preserved specimens at the Australian Museum in Sydney, NSW, Australia, specimen numbers: R.151043.002 and R.151043.003 collected 12 km north of Tibooburra Post office, at The Granites, at Tibooburra, New South Wales, Australia, Latitude -29.47 S., Longitude 142.01 E.

Diagnosis: Each of the various subspecies of *Silubosaurus zellingi* De Vis, 1884 (treated by most authors until now as *S. stokesii* Gray, 1845) are morphologically similar and it is for this reason that most herpetologists have treated all as being of a single species.

The diagnosis for the subspecies *S. zellingi doriskuenae subsp. nov.* must therefore include means to separate this and all other subspecies within the *Silubosaurus zellingi* De Vis, 1884 and *S. stokesii* Gray, 1845 complex. *S. stokesii and S. zellingi* are readily separated from other species in the genus *Silubosaurus* by having more than 30 mid-body scale rows. The other two species in the genus are *S. hoserae sp. nov.* (this paper) and *S. hosmeri* (Kinghorn, 1955).

The type form of *S. stokesii stokesii* from Western Australia is readily separated from all other subspecies and all forms of *S. zellingi* by the following suite of characters: the dorsal colour is blackish or dark brown; the back and sides are usually with clusters of whitish spots; upper lips whitish; nasals usually widely separated; postnarial groove strong and usually extending to top of the nasal.

S. stokesii badia Storr, 1978 also from Western Australia is readily separated from all other subspecies and all forms of *S. zellingi* by one or other of the following suites of characters, which are seen in two well-defined regional variants: 1/ Dorsal ground colour blackish or very dark brown with the back and sides usually unspotted; upper lips dark in colour; nasals narrowly separated; postnarial groove weak and usually not extending to the top of the nasal, (referred to by Storr (1978) as nominate *S. stokesii aethiops*) or 2/ Alternatively with a reddish brown dorsal colouration, upper labials being barely lighter than the scales above them, or the same colour as them, light patches on the upper body being usually two scales wide, but lacking obvious dark etching along the anterior edges (this form being identified by Storr (1978) as *S. stokesii badia*).

S. stokesii lynettehholdsworthae subsp. nov. from the interior of southern Western Australia in a region generally bounded by Yalgoo, Mt. Magnet, Cue and Murchison and slightly east of this approximately square-shaped region is readily separated from all other *S. stokesii* and *S. zellingi* on the basis of its unique glossy black colouration (as opposed to dull blackish colour in some other so-called *S. stokesii aethiops* from Shark Bay) and the possession of a relatively longer and less spinose tail as compared to other *S. stokesii* and *S. zellingi*.

In *E. stokesii lynettehholdsworthae subsp. nov*. the upper labials and limbs are also black in colour. The entire colouration is without markings, spots or flecks. *S. zellingi* De Vis, 1884 is the species from central and Eastern inland Australia treated by most authors until now as a variant of *S. stokesii*. The form is herein divided into four readily separated subspecies.

The nominate form of *S. zellingi zellingi* from south-west Queensland, is readily separated from all other *S. zellingi* and *S. stokesii* by the following suite of characters: A reddish brown dorsal colouration, with upper labials being noticeably lighter than the scales above them, light patches on the upper body being usually two scales wide, and having obvious dark etching along the anterior edges, versus an absence in similarly coloured *S. stokesii* from Western Australia. Unlike all other forms of *S. zellingi* and *S. stokesii* nominate *S. zellingi zellingi* have strongly etched scales on the upper surface of the head. The forelimbs of *S. zellingi* are cream and dark brown (in life) versus white and reddish-orange in similarly coloured West Australian *S. stokesii badia*. The dorsal surfaces of the toes of all feet of *S. zellingi* are mainly a creamish colour, versus orangeish in similarly coloured *S. stokesii badia*.

S. zellingi fiacummingae subsp. nov. is the form found in the general vicinity of the MacDonnell Ranges of Central Australia. *S. zellingi fiacummingae subsp. nov*. is readily separated from all other *S. zellingi* and *S. stokesii* by the following suite of characters: A dark blackish brown body with few if any markings in adults. In contrast to dark coloured *S. zellingi* or *S. stokesii* from elsewhere the forelimbs of *S. zellingi fiacummingae subsp. nov*. are generally unmarked and merely blackish grey in colour. Markings in *S. zellingi fiacummingae subsp. nov*. on the dorsal surface are in the form of widely scattered scales of the same colour as the rest of the body, but of a lighter shade and most common in the region of the hind limbs and anterior tail. The upper labials are noticeably lighter (off white) in colour, in contrast to the darker scales above. The toes are also dark in colour. There is no obvious etchings on any of the body scales.

S. zellingi scottgranti subsp. nov. is the most commonly seen subspecies within the *S. zellingi* complex and occurs in far western New South Wales around the Barrier Range and west, through the northern Flinders Ranges and other hills surrounding the south, west and north-west of Lake Eyre in South Australia, including rocky areas at the top (north) side of the Eyre Peninsula, also in South Australia. *S. zellingi scottgranti subsp. nov*. is readily separated from all other *S. zellingi* and *S. stokesii* by the following suite of characters: A reddish orange-brown body colouration, with single scattered light yellow scales across the body giving a flecked appearance. While the light scales will join side by side to form broken bar-like markings, they are rarely back to back, or two wide, except around the anterior flanks and this is only usually seen in Eyre Peninsula specimens. The labials are noticeably white in colour, limbs orangey brown with obvious yellow flecks.

The lighter scales on these lizards are obvious and prominent, even in aged specimens.

S. zellingi doriskuenae subsp. nov. is the taxon from the Grey Range in north-west New South Wales and the immediately adjoining parts of south-west Queensland where suitable rocky habitat prevails. *S. zellingi doriskuenae subsp. nov*. is similar in most respects to *S. zellingi scottgranti subsp. nov*., to which it would key out to using the data presented so far.

S. zellingi doriskuenae subsp. nov. is however separated from *S. zellingi scottgranti subsp. nov*. by the fact that the lighter dorsal scales do not strongly contrast with the darker surrounding ones as in the general colour pattern is indistinct, versus distinct in *S. zellingi scottgranti subsp. nov*..

S. zellingi doriskuenae subsp. nov. also has obviously yellow-brown upper labials, versus white in *S. zellingi scottgranti subsp. nov*.. The limbs of *S. zellingi doriskuenae subsp. nov*. are either unmarked or indistinctly so only, versus obviously flecked in *S. zellingi scottgranti subsp. nov*.. *S. zellingi scottgranti subsp. nov*. also has numerous white markings on the tail, including scales on at least some spines, whereas this is not the case in *S. zellingi doriskuenae subsp. nov*.. Lighter tail spines in *S. zellingi zellingi* are brown or yellowish brown, but never white as in *S. zellingi scottgranti subsp. nov*..

Distribution: *S. zellingi doriskuenae subsp. nov*. is restricted far north western New South Wales around the Grey Range and outliers, including immediately adjacent parts of far south-west Queensland.

Etymology: Named in honour of Doris Kuen of Donvale, Victoria, Australia, for services to conservation, through her vitally important work in maintaining the structure, electrical fittings, plumbing and the like at the Snakebusters, wildlife displays facility in Park Orchards, Melbourne, Victoria, Australia.

SILUBOSAURUS STOKESII LYNETTEHOLDSWORTHAE SUBSP. NOV.

Holotype: A preserved adult female specimen at the Western Australian Museum, Perth, Western Australia, Australia, specimen number: R140952, collected from Woolgerong Rock, Western Australia, Australia, Latitude -27.40 S., Longitude 117.38 E. The Western Australian Museum, Perth, Western Australia, Australia is a government-owned facility that allows access to its holdings.

Paratypes: 1/ A preserved specimen at the Western Australian Museum, Perth, Western Australia, Australia, specimen number: R97011 from Woolgerong Rock, Western Australia, Australia, Latitude -27.40 S., Longitude 117.38 E., and 2/ A preserved specimen at the Western Australian Museum, Perth, Western Australia, Australia, specimen number: R154800 collected 4 km east of Yalgoo in Western Australia, Latitude -28.35 S., Long. 116.73 E.

Diagnosis: Each of the various subspecies of *Silubosaurus zellingi* De Vis, 1884 (treated by most authors until now as *S. stokesii* Gray, 1845) are morphologically similar and it is for this reason that most herpetologists have treated all as being of a single species.

The diagnosis for the subspecies *Silubosaurus stokesii lynetteholdworthae subsp. nov.* must therefore include means to separate this and all other subspecies within the *Silubosaurus zellingi* De Vis, 1884 and *S. stokesii* Gray, 1845 complex.

S. stokesii and S. zellingi are readily separated from other species in the genus *Silubosaurus* by having more than 30 mid-body scale rows. The other two species in the genus are *S. hoserae sp. nov.* (this paper) and *S. hosmeri* (Kinghorn, 1955).

The type form of *S. stokesii stokesii* from Western Australia is readily separated from all other subspecies and all forms of *S. zellingi* by the following suite of characters: the dorsal colour is blackish or dark brown; the back and sides are usually with clusters of whitish spots; upper lips whitish; nasals usually widely separated; postnarial groove strong and usually extending to top of the nasal.

S. stokesii badia Storr, 1978 also from Western Australia is readily separated from all other subspecies and all forms of *S. zellingi* by one or other of the following suites of characters, which are seen in two well-defined regional variants: 1/ Dorsal ground colour blackish or very dark brown with the back and sides usually unspotted; upper lips dark in colour; nasals narrowly separated; postnarial groove weak and usually not extending to the top of the nasal, (referred to by Storr (1978) as nominate *S. stokesii aethiops*) or 2/ Alternatively with a reddish brown dorsal colouration, upper labials being barely lighter than the scales above them, or the same colour as them, light patches on the upper body being usually two scales wide, but lacking obvious dark etching along the anterior edges (this form being identified by Storr (1978) as *S. stokesii badia*).

S. stokesii lynettehholdsworthae subsp. nov. from the interior of southern Western Australia in a region generally bounded by Yalgoo, Mt. Magnet, Cue and Murchison and slightly east of this approximately square-shaped region is readily separated from all other *S. stokesii* and *S. zellingi* on the basis of its unique glossy black colouration (as opposed to dull blackish colour in some other so-called *S. stokesii aethiops* from Shark Bay) and the possession of a relatively longer and less spinose tail as compared to other *S. stokesii* and *S. zellingi*.

In *E. stokesii lynettehholdsworthae subsp. nov*. the upper labials and limbs are also black in colour. The entire colouration is without markings, spots or flecks.

S. zellingi De Vis, 1884 is the species from central and Eastern inland Australia treated by most authors until now as a variant of *S. stokesii.* The form is herein divided into four readily separated subspecies.

The nominate form of *S. zellingi zellingi* from south-west Queensland, is readily separated from all other *S. zellingi* and *S. stokesii* by the following suite of characters: A reddish brown dorsal colouration, with upper labials being noticeably lighter than the scales above them, light patches on the upper body being usually two scales wide, and having obvious dark etching along the anterior edges, versus an absence in similarly coloured *S. stokesii* from Western Australia. Unlike all other forms of *S. zellingi* and *S. stokesii* nominate *S. zellingi zellingi* have strongly etched scales on the upper surface of the head. The forelimbs of *S. zellingi* are cream and dark brown (in life) versus white and reddish-orange in similarly coloured West Australian *S. stokesii badia.* The dorsal surfaces of the toes of all feet of *S. zellingi* are mainly a creamish colour, versus orangeish in similarly coloured *S. stokesii badia.*

S. zellingi fiacummingae subsp. nov. is the form found in the general vicinity of the MacDonnell Ranges of Central Australia. *S. zellingi fiacummingae subsp. nov.* is readily separated from all other *S. zellingi* and *S. stokesii* by the following suite of characters: A dark blackish brown body with few if any markings in adults. In contrast to dark coloured *S. zellingi* or *S. stokesii* from elsewhere the forelimbs of *S. zellingi fiacummingae subsp. nov.* are generally unmarked and merely blackish grey in colour. Markings in *S. zellingi fiacummingae subsp. nov.* on the dorsal surface are in the form of widely scattered scales of the same colour as the rest of the body, but of a lighter shade and most common in the region of the hind limbs and anterior tail. The upper labials are noticeably lighter (off white) in colour, in contrast to the darker scales above. The toes are also dark in colour. There is no obvious etchings on any of the body scales.

S. zellingi scottgranti subsp. nov. is the most commonly seen subspecies within the *S. zellingi* complex and occurs in far western New South Wales around the Barrier Range and west, through the northern Flinders Ranges and other hills surrounding the south, west and north-west of Lake Eyre in South Australia, including rocky areas at the top (north) side of the Eyre Peninsula, also in South Australia. *S. zellingi scottgranti subsp. nov.* is readily separated from all other *S. zellingi* and *S. stokesii* by the following suite of characters: A reddish orange-brown body colouration, with single scattered light yellow scales across the body giving a flecked appearance. While the light scales will join side by side to form broken bar-like markings, they are rarely back to back, or two wide, except around the anterior flanks and this is only usually seen in Eyre Peninsula specimens. The labials are noticeably white in colour, limbs orangey brown with obvious yellow flecks.

The lighter scales on these lizards are obvious and prominent, even in aged specimens.

S. zellingi doriskuenae subsp. nov. is the taxon from the Grey Range in north-west New South Wales and the immediately adjoining parts of south-west Queensland where suitable rocky habitat prevails. *S. zellingi doriskuenae subsp. nov.* is similar in most respects to *S. zellingi scottgranti subsp. nov.*, to which it would key out to using the data presented so far.

S. zellingi doriskuenae subsp. nov. is however separated from *S. zellingi scottgranti subsp. nov.* by the fact that the lighter dorsal scales do not strongly contrast with the darker surrounding ones as in the general colour pattern is indistinct, versus distinct in *S. zellingi scottgranti subsp. nov.*.

S. zellingi doriskuenae subsp. nov. also has obviously yellow-brown upper labials, versus white in *S. zellingi scottgranti subsp. nov.*. The limbs of *S. zellingi doriskuenae subsp. nov.* are either unmarked or indistinctly so only, versus obviously flecked in *S. zellingi scottgranti subsp. nov.*.

S. zellingi scottgranti subsp. nov. also has numerous white markings on the tail, including scales on at least some spines, whereas this is not the case in *S. zellingi doriskuenae subsp. nov.*. Lighter tail spines in *S. zellingi zellingi* are brown or yellowish brown, but never white as in *S. zellingi scottgranti subsp. nov.*.

Distribution: *S. stokesii lynettehholdsworthae subsp. nov.* occurs in the interior of southern Western Australia in a region generally bounded by Yalgoo, Mt. Magnet, Cue and Murchison and slightly east of this approximately square-shaped region.

Etymology: Named in honour of Lynette Holdsworth, President of the Friends of Toolern Creek, environment group in Melton, west of Melbourne, Victoria, Australia in recognition of her services to wildlife conservation and environmental education and protection.

MANNIXSAURUS FORMOSA MATTHINGLEYI SP. NOV.

Holotype: A preserved specimen at the Western Australian Museum, Perth, Western Australia, Australia, specimen number: R52702, collected at Marandoo Mine Site at Mount Bruce, Western Australia, Australia, Latitude -22.63 S., Longitude 118.15 E. The Western Australian Museum, Perth, Western Australia, Australia is a government-owned facility that allows access to its holdings.

Paratypes: Four preserved specimens at the Western Australian Museum, Perth, Western Australia, Australia, 1/ Specimen number: R23994, collected from 7 km south-west of Mt. Newman, Western Australia, Australia, Latitude -23.40 S., Longitude 119.63 E.; 2/ Specimen number: R12126 collected at Wittenoom Gorge, Western Australia, Australia, Latitude -22.28 S., Longitude 118.32 E.; 3/ Specimen number: R33423 collected at Python Pool, Mount Herbert, Western Australia, Australia, Latitude -21.33 S., Longitude 117.23 E.; 4/ Specimen number: R20016 collected at Tambrey Homestead, Western Australia, Australia, Latitude -21.63 S., Longitude 117.60 E.

Diagnosis: *Mannixsaurus formosa matthingleyi sp. nov.* has until now been treated as the northernmost population of *M. formosa* (Fry, 1914), but is sufficiently different to warrant recognition as a different taxon. Hence it is herein described as a new subspecies.

M. formosa matthingleyi sp. nov. from the Pilbara in Western Australia is readily separated from *M. formosa formosa* from further south by its pale dorsal spots, versus well defined in *M. formosa.* In *M. formosa matthingleyi sp. nov.* these dorsal spots are also less numerous than in the nominate form.

M. formosa matthingleyi sp. nov. also differ from the nominate form by their greater average size (SVL 84-107, mean 100.6), more numerous scale rows (30), more numerous lamellae under the fourth toe (21-23, mean 22.0), more numerous supraciliaries (7 or 8, mean 7.2) with first invariably largest and more numerous ear lobules (3-6, mean 4.6) (derived from Storr, 1978).

M. formosa (both subspecies) are readily separated from *Silvascincus richardi* by the absence of black pigment and presence of broad pale laterodorsal stripe. *M. formosa* (both subspecies) is distinguishable from *S. douglasi* (Glauert, 1956) by its spotted back, lesser (average) size and more numerous upper labials, midbody scale rows and subdigital lamellae. *M. formosa* (all subspecies) is distinguishable from both *S. richardi*, *C napoleonis* and *C. rosswellingtoni sp. nov.* by the presence of smooth or at most striated dorsal scales, versus strongly keeled in the other three species.

Distribution: Pilbara region of Western Australia.

Etymology: Named in honour of Matt Hingley, originally of Melbourne, Australia and recently of the Gold Coast in Queensland, Australia in recognition of his contributions to herpetology.

SILVASCINCUS RICHARDI ADRIANPAPALUCAI SUBSP. NOV.

Holotype: A preserved specimen in the South Australian Museum in Adelaide, South Australia, Australia, specimen number: R56696, collected at 9.7km SSE of the Ketchalby Rockhole, South Australia, Australia, Latitude -32.62 S., Longitude 135.04 E. The South Australian Museum in Adelaide, South Australia, Australia is a government-owned facility that allows access to its holdings.

Paratype: A preserved specimen in the South Australian Museum in Adelaide, South Australia, Australia, specimen number: R28383 collected from 38 km north-east of Minnipa, South Australia, Australia, Latitude -32.67 S., Longitude 135.50 E.

Diagnosis: Until now *Silvascincus richardi adrianpapalucai subsp. nov.* has simply been treated as the Eastern population of *S. richardi* (Peters, 1869).

Nominate *S. richardi richardi* is now restricted to Western Australia from the Russell Range and west of there, but not including regions nearest the low-lying coastal strip of the south-west coast of Western Australia.

Silvascincus richardi adrianpapalucai subsp. nov. is found from the coastal region just west of the Western Australian and South Australian border (in the vicinity of Eucla), along the coast to the northern parts of the Eyre Peninsula in South Australia.

While *S richardi adrianpapalucai subsp. nov.* is similar in most respects to nominate *S. richardi richardi*, *S richardi adrianpapalucai subsp. nov.* is readily separated from *S. richardi richardi* by a strong preponderance of dark greyish black scales over most of the dorsal surface of the body, versus few or any such scales in *S. richardi richardi.* This gives the lizard an overall darker appearance. In *S richardi adrianpapalucai subsp. nov.* the black zone running along the flanks from behind the eye, past the front leg and posterior along the body goes obviously more than half the length of the body (as measured between each set of limbs), versus usually less than half way in *S. richardi richardi.*

S richardi adrianpapalucai subsp. nov. has obvious blackish grey markings usually in the form of one or more irregular crossbands on the upper forelimbs, versus no such markings in *S. richardi richardi.*

At the interface of the lower flanks dark and light zone in *S richardi adrianpapalucai subsp. nov.* the black scales break up over the white scales to give a strongly flecked appearance. In *S. richardi richardi* the demarcation from black to white is clean along this line.

Silvascincus richardi (Peters, 1869) (both subspecies) is readily separated from *Contundo napoleonis* (Gray, 1839) and *C. rosswellingtoni sp. nov.* by the absence of a pale dorso-lateral stripe or zone, versus the presence of one in *Contundo napoleonis* (Gray, 1839) and *C. rosswellingtoni sp. nov.*.

See for example the relevant images on page 291 of Wilson and Swan (2017). These are images of typical *C. napoleonis* and *S. richardi* (as defined in this paper and labelled with the same species names).

Distribution: *Silvascincus richardi adrianpapalucai subsp. nov.* is found from the coastal region just west of the Western Australian and South Australian border, along the coast to the northern parts of the Eyre Peninsula in South Australia.

Etymology: Named in honour of Adrian Papaluca of The Templestowe Family Chiro, Melbourne, Australia, who has kept countless people in good health and able to work, including several members of the Snakebusters, wildlife conservation team, who have been able to continue their critically important conservation and education work to the best of their physical abilities.

In the case of myself, I was unlawfully assaulted by a corrupt thug policeman named Richard George Valentine in 1990 and several of his police officer mates, after I complained to the Victoria Police Internal Investigations division (IID, or B11).

The attack occurred after he stalked and ambushed me at gunpoint, with fellow officer Craig Sharkie and took me to the nearby Kew Police station, where I was stripped naked and bashed.

This attack occurred as a direct result of myself giving evidence about other police green-lighting criminal attacks on Melbourne taxi drivers by thieves operating with corrupt police protection.

The relevant police officer, Ross Allen Bingley, then unlawfully got his friends Valentine and Sharkie to attack me and then fabricate a series of criminal charges against me.

Known as a "hamburger with the lot", the charges included assault police, resist arrest and abusive language to police.

These succeeded in the first instance in the magistrates court, but were thrown out at the County Court, when a bunch of police "rent-a-witnesses" were unable to lie straight and had changed their stories between the two courts.

The County Court Judge Gordon Lewis also found that the police were in fact guilty of an unlawful assault and an unlawful arrest of myself, but the police have refused to pay a cent in compensation, even though their own law court found against them.

It turned out that the "rent-a-witnesses" were criminals picked up by police for various offences, including molesting young children, who were then offered a green light to continue to re-offend in return for giving false evidence in court cases such as the one I was in.

Valentine, remained a serving Victorian Police force member as of at least 2005 and was better known for green-lighting criminal activities of law-breakers, including notorious paedophile Brett David Winduss of Kew, whom he personally green-lighted to commit heinous crimes.

Winduss later attacked the wrong young girl and was subsequently jailed as the victim was a VIP's daughter and even Valentine couldn't save him.

The back injuries to myself caused by the unlawful police assault (confirmed as an unlawful police assault by the courts two years after the attack) are permanent, cause extreme pain and can never be cured.

Further details about the corrupt police officer, Richard George Valentine, police protection of paedophiles, including Winduss and others and the unlawful assault at Kew and vindication of myself in the courts can be found in Hoser (1994).

Notwithstanding this severe back injury, for which I have never been compensated, Adrian Papaluca has done an amazing job of trying to mitigate the permanent and ongoing pain and suffering.

FLAMOSCINCUS KINTOREI CROSSI SUBSP. NOV.

Holotype: A preserved specimen at the Northern Territory Museum, Darwin, Northern Territory (NT), Australia, specimen number: R32743, collected from Ayers Rock, NT, Australia, Latitude -25.03 S., Longitude 131.02 E.

The Northern Territory Museum, Darwin, NT, Australia, is a government-owned facility that allows access to its holdings.

Paratype: A preserved specimen at the Northern Territory Museum, Darwin, NT, Australia, specimen number: R00402, collected from Angas Downs, NT, Australia, Latitude -25.05 S., Longitude 132.28 E.

Diagnosis: *Flamoscincus kintorei crossi subsp. nov.* and *F. kintorei crossmani subsp. nov.* are readily separated from all other *Flamoscincus kintorei* (Stirling and Zeitz, 1893) by colouration.

F. kintorei crossi subsp. nov. is characterised by a distinctive yellowish belly, the yellow extending onto the lower flanks near the forelimbs and to a lesser extent at the hindlimbs and an absence of an indistinct but noticeable mottling pattern on the mid flanks. In *F. kintorei crossi subsp. nov.* there is either a slight mottling on the far lower flanks of the forebody or none at all. By contrast *F. kintorei* of all other subspecies has a whitish belly and a noticeable indistinct mottling of light (whitish) and coloured scales on the mid flanks and also lower flanks.

Specimens from inland Western Australia (of the type form of *F. kintorei* and "*Egernia dahlii* Boulenger, 1896" from further west, which is synonymous with it) are readily separated from *F. kintorei crossi subsp. nov.* by the presence of noticeable indistinct mottling of light (whitish) and coloured scales on the mid flanks and also the paler whitish belly. They also have strongly whitish as opposed to yellowish lower labials.

Like *F. kintorei crossi subsp. nov.* nominate *F. kintorei kintorei* is obviously reddish in colour on all the upper body.

The subspecies *Flamoscincus kintorei crossmani subsp. nov.* is readily separated from all other *F. kintorei* by the obvious presence of light bluish, whitish grey on the flanks including on the head behind and beneath the eye, not seen in the other subspecies. It also has a noticeable indistinct mottling of light (whitish) and coloured scales on the mid flanks.

The dorsal surface of *Flamoscincus kintorei crossmani subsp. nov.* is also greyish brown as opposed to red or brick-red as seen in the other two subspecies.

All but very aged specimens of *F. kintorei crossmani subsp. nov.* have a distinctive configuration of dorsal scales that gives them an appearance of having semi-distinct dorsolateral stripes running down the body. This is caused by alternating rows of scales being darker in colouration.

F. kintorei crossi subsp. nov. in life is depicted on page 512 of Brown (2014), second photo from top on right hand side.

F. kintorei crossmani subsp. nov. in life is depicted at the top of page 638 of Cogger (2014) and plate 12 (second from top on left) in Storr, Smith and Johnstone (1981).

Nominate *F. kintorei* in life is depicted on page 512 of Brown (2014), third photo from the top of the page.

The genetic distinctiveness of the relevant subspecies as defined herein was shown by Dennison *et al.* (2015), and so I have no hesitation in naming the relevant geographically disjunct forms in order to give them taxonomic recognition and to allow proper conservation measures for each population to be planned and executed.

Dennison *et al.* (2015) found that the Uluru population, herein described as *F. kintorei crossi subsp. nov.* diverged from the other populations "between 350 kya and 1.31 million years ago."

They also wrote: "Uluru in particular should be considered separately for management, and this distinctiveness should be recognised if intervention such as translocation or captive breeding is to be undertaken."

Of course this taxon can only be "considered separately for management" if it is properly identified and named, which is a compelling reason for this scientific description.

Distribution: *F. kintorei crossi subsp. nov.* appears to be restricted to the Uluru region of central Australia and similar sandy habitat to the east.

Etymology: Named in honour of the inspirational Graham Cross, of Park Orchards, Victoria, Australia, in recognition for his services to women's sports and training athletes in general, in particular in his role as coach for various sporting teams.

FLAMOSCINCUS KINTOREI CROSSMANI SUBSP. NOV.

Holotype: A preserved specimen at the Northern Territory Museum, Darwin, Northern Territory (NT), Australia, specimen number: R32751, collected from the Tanami Desert in the NT, Australia, Latitude -20.87 S., Longitude 130.58 E.

The Northern Territory Museum, Darwin, NT, Australia, is a government-owned facility that allows access to its holdings.

Paratype: A preserved specimen at the Northern Territory Museum, Darwin, NT, Australia, specimen number: R32772, collected from the Tanami Desert in the NT, Australia, Lat. -20.58 S., Long. 131.18 E.

Diagnosis: *Flamoscincus kintorei crossmani subsp. nov.* and *F. kintorei crossi subsp. nov.* are readily separated from all other *Flamoscincus kintorei* (Stirling and Zeitz, 1893) (the nomiminate form from Western Australia) by colouration.

F. kintorei crossi subsp. nov. is characterised by a distinctive yellowish belly, the yellow extending onto the lower flanks near the forelimbs and to a lesser extent at the hindlimbs and an absence of an indistinct but noticeable mottling pattern on the mid flanks. In *F. kintorei crossi subsp. nov.* there is either a slight mottling on the far lower flanks of the forebody or none at all. By contrast *F. kintorei* of all other subspecies has a whitish belly, and a noticeable indistinct mottling of light (whitish) and coloured scales on the mid flanks and also lower flanks.

Specimens from inland Western Australia (of the type form of *F. kintorei* and "*Egernia dahlii* Boulenger, 1896" which is synonymous with it) are readily separated from *F. kintorei crossi subsp. nov.* by the presence of noticeable indistinct mottling of light (whitish) and coloured scales on the mid flanks and also the paler whitish belly. They also have strongly whitish instead of yellowish lower labials.

Like *F. kintorei crossi subsp. nov.*, nominate *F. kintorei kintorei* is obviously reddish in colour on all the upper body.

The subspecies *Flamoscincus kintorei crossmani subsp. nov.* is readily separated from all other *F. kintorei* by the obvious presence of light bluish, whitish grey on the flanks including on the head behind and beneath the eye, not seen in the other subspecies. It also has a noticeable indistinct mottling of light (whitish) and coloured scales on the mid flanks and lower flanks.

The dorsal surface of *F. kintorei crossmani subsp. nov.* is also greyish brown as opposed to red or brick-red as seen in the other two subspecies.

All but very aged specimens of *F. kintorei crossmani subsp. nov.* have a distinctive configuration of dorsal scales that gives them an appearance of having semi-distinct dorsolateral stripes running down the body. This is caused by alternating rows of scales being darker in colouration.

F. kintorei crossi subsp. nov. in life is depicted on page 512 of Brown (2014), second photo from top on right hand side.

F. kintorei crossmani subsp. nov. in life is depicted at the top of page 638 of Cogger (2014) and plate 12 (second from top on left) in Storr, Smith and Johnstone (1981).

Nominate *F. kintorei* in life is depicted on page 512 of Brown (2014), third photo from the top of the page.

The genetic distinctiveness of the relevant subspecies as defined herein was shown by Dennison *et al.* (2015), and so I have no hesitation in naming the relevant geographically disjunct forms in order to give them taxonomic recognition.

Dennison *et al.* (2015) found that the Uluru population, herein described as *F. kintorei crossi subsp. nov.* diverged from the other populations "between 350 kya and 1.31 million years ago."

They also wrote: "Uluru in particular should be considered separately for management, and this distinctiveness should be recognised if intervention such as translocation or captive breeding is to be undertaken."

Recognition of one significant group and not another is inconsistent and so I had no hesitation in also recognizing the morphologically distinct Tanami Desert population as a separate species-level taxon, described herein as a subspecies, due to a mitochondial DNA divergence of under 2 per cent Dennison *et al.* (2015).

Distribution: *F. kintorei crossmani subsp. nov.* appears to be restricted to the Tanami Desert region of the Northern Territory, Australia.

Etymology: Named in honour of Bradley Crossman, formerly of Sydney, NSW, Australia, and after that Proserpine in Queensland, Australia in recognition for his services to herpetology and wildlife conservation in general, including through his work as a government licensed snake controller (relocations) in Queensland.

SUMMARY

Numerous people have assisted in this and associated research projects. Due to harassment of our co-workers by Wolfgang Wüster, his gang of law-breaking thieves and associates, they are not routinely cited and named in this and most other papers I have published in recent years. However their assistance's are greatly appreciated.

In summary this paper has divided *Egernia* Gray, 1838 as widely known into appropriate genera, using available names and erecting new genus names. These are (in no particular order), *Egernia*; *Silubosaurus*; *Liopholis*; *Bellatorias*; *Flamoscincus*; *Hortonia*; *Silvascincus*; *Contundo*; *Tropidolopisma*; *Lissolepis*; *Storrisaurus*; *Woolfscincus*; *Piersonsaurus*; *Mannixsaurus*. Four new species and several subspecies have also been formally named for the first time.

There have been no conflicts of interest in terms of the preparation of this paper or conclusions made within.

When appropriate wildlife departments have issued to me relevant scientific, collection or other permits in all mainland Australian states and territories over some decades.

In total this has been well over 100 separate permits and authorities spanning over 40 years and to get these permits and authorities has created enough paperwork to do significant damage to the relevant ecosystems from where the paper was sourced.

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POTENTIAL CONFLICT OF INTEREST: There is none.