

ISSUE 37, PUBLISHED 20 JUNE 2018

# ***Australasian Journal of Herpetology***



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

Cover photo by Raymond Hoser

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**Issue 37, 20 June 2018**

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**A new subspecies of the endangered Leadbeater's Possum *Gymnobelideus leadbeateri* McCoy, 1867 from the Victorian High Country, with comments about the long-term conservation of the species in view of the recent genocide of the species caused by the Victorian Government, their wildlife and forestry departments and their controlled business enterprises.**

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**Received 1 June 2017, Accepted 25 Feb 2018, Published 20 June 2018.**

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**ABSTRACT**

The Leadbeater's Possum *Gymnobelideus leadbeateri* McCoy 1867, has been subject of considerable scientific attention in recent years due to its legal status as "Endangered" or since 2015 as "Critically endangered". Importantly two regionally disjunct and genetically distinct groups are now well known and generally recognized as separate biological entities.

These mammals are being regulated, killed and controlled by the Victorian State Government and its business entities, namely the "Department of Environment, Land, Water and Planning" (DELWP) also known quite seriously as "The Department of Eco-terrorists and Lawbreakers with Limitless Powers" or "The Department of Frequent Name Changes" (for obvious reasons), The State Government wildlife habitat destruction loss-making business enterprise known as "Vicforests" and their dysfunctional animal display business enterprise "Zoos Victoria".

One of these groups of Leadbeater's Possum remains unnamed at the species or subspecies level and so it is important that it be given taxonomic recognition. Genetic divergence of the two relevant populations indicates that they separated many thousands of years ago (Hansen and Taylor, 2008) and so subspecies level recognition is given herein for the until now unnamed highland population.

*Gymnobelideus leadbeateri leadbeateri* McCoy 1867 is herein regarded as the type subspecies for the lowland form known to occur in floodplain forests at elevations below 150 m. This form is now quite likely extinct throughout its former range (including the type locality) and as of 2018 remains only in small numbers (less than 100) at Yellingbo, 48 km east from Melbourne's central business district, this being the last known outpost for this genetically distinct group.

Here it is being actively "managed" to extinction by DEWLP, Vicforests, "Parks Victoria" and their DEWLP controlled "Zoos Victoria" business.

The more widespread and numerous form from the old-growth Mountain Ash (*Eucalyptus regnans* Mueller, 1871) forests and adjacent areas in the Central Highlands of Victoria in north-east Victoria, is herein formally named *Gymnobelideus leadbeateri martinekae* subsp. nov. according to the rules of the *International Code of Zoological Nomenclature* (Ride et al. 1999). The urgency of this taxon being formally named cannot be underestimated.

This is because the Victorian Government is also aggressively "managing" this taxon to extinction with a coalition of departments and their owned and controlled business entities involved in the massacre. These include the Department of Environment, Land, Water and Planning (DEWLP), previously known under a variety of names including "Department of Sustainability and Environment" (DSE) and their associated business arms including The Arthur Rylah Institute (ARI), "Zoos Victoria" and other government-owned businesses "VicForests" and "Parks Victoria".

**Keywords:** Taxonomy; mammal; marsupial; Leadbeater's possum; Victoria; Maryann Martinek; Mountain Ash; genocide; Zoos Victoria; extinction; DEWLP; DSE; corruption; Vicforests; *Eucalyptus regnans*; *Gymnobelideus leadbeateri*; new subspecies; *martinekae*; conservation.

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## INTRODUCTION

The Leadbeater's Possum *Gymnobelideus leadbeateri* McCoy 1867, was originally described from a specimen caught in a lowland swamp at the Bass River, Victoria.

A small number of specimens (4 others) were found at other widely scattered localities across eastern Victoria in ensuing years to 1909.

Due to significant habitat removal in the relevant areas, as in the forests were totally removed as well as the impact of non-native mammals and the lack of further specimens being found, by 1950 the species was thought to be extinct.

After 50 years without a sighting of the species, a population of *G. leadbeateri* was found near Marysville, Victoria in 1961 in elevated Mountain Ash (*Eucalyptus regnans* Mueller, 1871) forests by Eric Wilkinson. Field surveys by amateurs with the "Field Naturalists Club of Victoria" has since yielded numerous other populations scattered across the high country of Eastern Victoria (now over 100 sites), with evidence of the species also being found in the Macedon Ranges, to the north-west of Melbourne (in owl scats).

In 1986 Ian Smales found a population of *G. leadbeateri* at Yellingbo, 48 km east from Melbourne's central business district.

From 1989 to 2015 numerous studies were conducted on *G. leadbeateri* at Yellingbo and other populations by Virginia Thomas, David Lindenmayer, Dan Harley, Birgita Hansen and others, including work on the genetics of each main population, with the finding that the lowland Yellingbo animals are of a different genetic lineage to the others from the higher elevation areas (usually more than 400 m above sea level versus under 150 m above sea level) (Hansen and Taylor 2008, Hansen *et al.* 2005, 2009).

On the basis of a known divergence measured in the thousands of years and a genetic bottleneck caused by the small number of individuals in the Yellingbo population (now believed to be well under 100 animals), scientists and government departments and business entities (e.g. "Zoos Victoria"), treat the Yellingbo population as a different taxon to the other populations.

The species *G. leadbeateri* has been variously listed by government departments as "extinct", "endangered" and "critically endangered".

There has not been a huge amount of science behind any of these listings and they appear to have been made more on the basis of political expediency and commercial self-interests of the regulating departments, and their "Zoos Victoria" business than on any sound scientific or ethical basis.

While in the past *G. leadbeateri* had been held and bred in private hands (see above), in recent years all have been seized or taken by the Victorian Government business entity "Zoos Victoria" who have aggressively marketed the species as their exclusive commercial domain.

To that end they have charged people to see these animals in cages and charged authors and others for the right to take and use photos of the relevant said animals in their control.

"Zoos Victoria" have regularly poached animals from the wild to top up their collections and yet their care of these animals has been so bad as to be reasonably described as acts of animal abuse and cruelty.

Based in suburban Blackburn in Melbourne, Des Hackett caught and then successfully bred *G. leadbeateri* for 17 years to 1980, by which stage the government owned Melbourne Zoo and branches ("Zoos Victoria") saw a business opportunity in taking control of his ever expanding colony.

Hackett was forced to "surrender" his animals to the State Government wildlife department in 1980, who then passed them on to their "Zoos Victoria" business (in fact they took them directly).

"Zoos Victoria" maintained an iron-clad monopoly on possession the species at all times to maximize the income they could derive from them, although they did transfer specimens to the similarly positioned government-owned Taronga Zoo in Sydney, who maintained a similar monopoly in New South Wales.

The last of a sizeable cohort of animals in the control of "Zoos Victoria" died at "Healesville Zoo" in 2006.

In 2012, "Zoos Victoria" poached more *G. leadbeateri* from the wild for their commercial self-interest, even though their controlling government department had the species listed as "Endangered" at the time meaning that none were supposed to be taken from the wild.

At the time (2012), Yellingbo was estimated to have a total population of about 60 individual animals.

While the claim was made by "Zoos Victoria" that they were poaching animals for a captive breeding program, the fact is that animals have been dying in their care since 2012.

Of course the Zoo has a vested interest in NOT breeding lots of the possums as that would ultimately require dispersal to other facilities, thereby removing their monopoly on the species.

Accordingly, in the following three years (and the entire time for which information has been published to date) no *G. leadbeateri* were bred by the government-owned "Zoos Victoria".

This is significant noting that decades earlier, the private hobbyist Des Hackett of Blackburn, had no trouble breeding large quantities of the species.

This he did without the government funding and largesse that the "Zoos Victoria" business enjoyed.

Simultaneous to the poaching and display of *G. leadbeateri* by "Zoos Victoria" a related business entity also owned by the Victorian Government, called "Vicforests" has been aggressively logging old growth Mountain Ash forests, in breach of so-called wildlife protection laws, in order to make the species rarer and therefore a bigger tourist drawcard at the government-owned Healesville Zoo (one of the three "Zoos Victoria" owned zoos). Healesville Zoo alone has *G. leadbeateri* and uses it as an exclusive trump card to attract paying visitors at the expense of similar sized non-government-owned zoos also on the outer fringe of Melbourne.

On 2 April 2015 *G. leadbeateri* was listed as "critically endangered" by the Federal Government, but this listing was challenged by the State government-owned Vicforests in 2017, after environmentalists won a series of legal battles stopping the wipe-out of habitat for the species in the Victorian highlands.

Meanwhile "Zoos Victoria" have aggressively marketed this endangered species and their exclusive ownership of these animals and the fact that they alone are the place to see them (Smith 2014).

On their website at:

<https://www.zoo.org.au/healesville/animals/leadbeaters-possum> under the heading:

"Want to fight extinction with us? There are many ways you can help save Leadbeater's Possums and other threatened species" They have written:

"Visit one of our three zoos" (Anonymous, 2018a).

For "Zoos Victoria" it is always all about money and their business monopoly on the endangered species *G. leadbeateri* is to make yet more money.

This is even made clear on their own website on a second webpage which under the heading "our objectives" has listed at number one the objective being "To maximise revenue" (Anonymous 2018b).

Elsewhere the "Zoos Victoria" website talks about the need for "Zoos Victoria" to position itself in a monopolistic position in terms of control of wildlife keeping, display and the wildlife business in general.

It is this very same ruthless and anti-wildlife conservation business strategy and government enforced monopoly on the keeping (and deliberate *not breeding* of) endangered species that led to the extinction event for the Thylacine (AKA Tasmanian Tiger) (*Thylacinus cynocephalus* Harris, 1808) in the 1930's.

That species was *banned*, the government using the word "*protected*" as it sounds nicer, with the only entities allowed to own them being the government owned zoos of Melbourne, Hobart, Adelaide and Taronga (at Sydney), all of whom drew large crowds of paying people to see them.

After a virus swept through their facilities, the last living Thylacine (*Thylacinus cynocephalus* Harris, 1808) died at Hobart Zoo in 1937.

Hence it must be noted that in terms of exterminating species, government owned zoos and their associated wildlife departments here in Australia are serial offenders in this space and the situation for *G. leadbeateri* is therefore dire in the long term as a result of this.

While two genetically distinct populations of *G. leadbeateri* are well known and recognized as such, it is clear that only one can be the nominate form.

As the holotype of McCoy matches the form from similar habitat at Yellingbo, it is clear that the so-called "Lowland Leadbeater's Possum" is in fact the nominate form (from a nomenclatural and taxonomic point of view) and that the (as of 2018) more abundant and widespread form from the higher elevations in eastern Victoria is in fact an unnamed taxon at the subspecies level.

Recognition of subspecies in animal groups that have diverged thousands of years prior is not uncommon and in the case where one or other is small in number and therefore likely to evolve at a faster rate than a larger population, such recognition is warranted. This is the case for the two groups of *G. leadbeateri* and why I have no issues at all in terms of formally describing the unnamed population as a new subspecies for the first time according to the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

As mentioned in the abstract, *G. leadbeateri leadbeateri* McCoy 1867 is herein regarded as the type subspecies for the lowland form known to occur in floodplain forests at elevations below 150 m. This form is now quite likely extinct throughout its former range (including the type locality) and remains only in small numbers at Yellingbo, 48 km east from Melbourne's central business district, this being the last known outpost for this genetically distinct group, where it is still being actively "managed" to extinction by "Zoos Victoria", DEWLP and other associated government-owned businesses like Vicforests.

The more widespread and numerous form from the old-growth Mountain Ash (*Eucalyptus regnans* Mueller, 1871) forests and adjacent areas in the Central Highlands of Victoria in north-east Victoria, is herein formally named *Gymnobelideus leadbeateri martinekae* subsp. nov. according to the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999). The urgency of this taxonomic group being formally named cannot be underestimated as the Victorian Government is also aggressively "managing" this taxon to extinction with a coalition of departments and their owned and controlled business entities involved in the massacre. These include the Department of Environment, Land, Water and Planning (DEWLP) and their associated business arms including The Arthur Rylah Institute (ARI), "Zoos Victoria" and other government-owned businesses "VicForests" and "Parks Victoria".

#### MATERIALS AND METHODS AND RESULTS

From the introduction of this paper, these are all obvious.

*G. leadbeateri* McCoy 1867 as presently recognized was reviewed including by sighting living and dead specimens as well as a review of the relevant published literature, most of which I should note can be readily found online on the internet.

Individuals in the two different populations, while similar in most respects do have sufficient differentiation morphologically to enable each to be identified and diagnosed as is done in the formal description below.

The molecular evidence cited herein also is confirmation of the correctness of the decision to recognize the newly named subspecies.

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).

Literature relevant to *G. leadbeateri* (both forms), the taxonomic and nomenclatural conclusions within this paper and to the long-term conservation of both identified subspecies include: Bilney *et al.* (2010), Borschmann (2017), Brazenor (1946, 1962), Hansen and Taylor (2008), Hansen *et al.* (2005, 2009), Harley, (2002, 2004, 2006a, 2006b, 2015, 2016), Harley and Lill (2007), Harley *et al.* (2004), Hoser (1991), Lindenmayer (2000, 2017), Lindenmayer and Lacy (1995), Lindenmayer and Meggs (1996), Lindenmayer and Ough (2006), Lindenmayer and Possingham (1994, 1995), Lindenmayer *et al.* (1989, 1990, 1991a, 1991b, 1997, 2003, 2011, 2013), Macfarlane and Seebeck (1991), Macfarlane *et al.* (1998, 2003), Smales (1994), Smith (1982, 1984), Smith and Harley (2008), Smith and Lindenmayer (1988, 1992), Smith *et al.* (1985), Threatened Species Scientific Committee (Australia) (2015), Weeks (2011), Wilkinson (1961), Woinarski and Burbidge (2016), Woinarski *et al.* (2014) and sources therein.

#### *GYMNOBELIDEUS LEADBEATERI MARTINEKAE SP. NOV.*

**Holotype:** A preserved male specimen at the National Museum of Victoria, Melbourne, Victoria, Australia specimen number: C18638 collected at Cumberland Road, 9.6 km from Marysville, Victoria Latitude -37.55 S, Longitude 145.85 E.

The National Museum of Victoria, Melbourne, Victoria, Australia allows access to its holdings.

**Paratypes:** 1/ A preserved specimen at the National Museum of Victoria, Melbourne, Victoria, Australia specimen number: C25036 collected from Lake Mountain Alpine Reserve, Alpine View Lookout, Latitude -37.50 S, Longitude 145.87 E.

2/ A preserved dry mounted specimen at the National Museum of Victoria, Melbourne, Victoria, Australia specimen number: C10234 collected from the Rotunda at Lake Mountain Road, Latitude -37.50 E, Longitude 145.83 S.

3/ A preserved female specimen at the National Museum of Victoria, Melbourne, Victoria, Australia specimen number: C26868, collected from Blue Range, Victoria, Latitude -37.38 S, Longitude 145.82 E.

**Diagnosis:** *Gymnobelideus leadbeateri martinekae* subsp. nov. is similar in most respects to *G. leadbeateri leadbeateri* McCoy 1867. However *G. leadbeateri martinekae* subsp. nov. is separated from the nominate subspecies by a preponderance of black hairs across the back, versus a very limited number of such hairs in *G. leadbeateri leadbeateri* and an ill defined temporal streak of blackish hair running from the snout to the ear, versus well-defined in *G. leadbeateri leadbeateri*.

The fur in *G. leadbeateri martinekae* subsp. nov. while subject to seasonal variation, is also significantly thicker than that seen in specimens of *G. leadbeateri leadbeateri*.

Lighter markings in adult *G. leadbeateri leadbeateri* have a strong yellowish hue, versus a weak yellowish hue in *G. leadbeateri martinekae* subsp. nov..

The holotype specimen for *G. leadbeateri leadbeateri* as depicted online at <https://collections.museumvictoria.com.au/specimens/138702> (downloaded on 24 Jan 2018) also conforms to the differential diagnosis above, which matches the animals from the Yellingbo population.

**Distribution:** *G. leadbeateri martinekae* subsp. nov. occurs in Mountain Ash (*Eucalyptus regnans* Mueller, 1871) forests and nearby areas in the eastern highlands of Victoria, at elevations generally over 400 metres above sea level. This is an area



generally bounded by Victoria Range in the north-west, Snobs Creek in the North, Swingler Dam in the east and Blue Range in the South-west.

Populations from relatively low elevations west of the Yarra River valley (Yellingbo) and coastal areas of southern Victoria (the latter now thought to be extinct), are of the nominate form *G. leadbeateri leadbeateri* McCoy 1867.

The taxonomic status of any specimens from the geographically disjunct Macedon Ranges, north-west of Melbourne, assuming they occur there, remains unknown.

**Further information (copied verbatim from Hoser 1991):**

“SIZE. 295-330 mm, tail; 145-180 mm, 127 gm.

IDENTIFICATION. Grey or greyish brown dorsally, with dark mid-dorsal stripe. Distinguishable from related Sugar Glider *Petaurus breviceps* by the absence of a gliding membrane. Also has a club-shaped tail, broader near the tip than the base.

DISTRIBUTION. Known from over fifty localities over about 1000 square kilometers of mountain ash forest in eastern Victoria, usually in pockets of high population density, (1.5-3 animals per hectare). May also occur in areas of suitable habitat in nearby New South Wales.

HABITAT. Mountain ash forests with an over-storey of mature trees with sufficient hollows for nesting. Also required are an adequate supply of relevant invertebrate food, and Silver or Hickory Wattle trees to provide gum. Found at elevations between 800 and 1340 metres.

NOTES. Known from only five specimens collected around the turn of the century, the Leadbeater's Possum was presumed extinct until re-discovered in 1961 near Marysville, Vic. This shy species is dusk active and nocturnal, is shy and fast moving. Some juveniles have been recorded as descending trees to watch human observers passing through their territories. When active it may be seen moving through the forest canopy at high speed, often making leaps of over a metre from tree to tree.

Colonies of up to eight animals build a communal nest of shredded bark in the hollow centre of a large dead or live Mountain Ash, usually 10-30 metres above ground. The nest is usually at the centre of a 1-2 hectare territory which is actively defended from members of adjacent colonies. Each colony consists of a monogamous breeding pair, offspring that may be of more than one generation and possibly one or more other unrelated males.

Females are more socially aggressive than males, and dispersing females from other colonies will be attacked and bitten by females who encroach on their domain. Outside males are allowed to share the nest. Young female offspring are forced to disperse from the nest at about 10 months of age, whereas males typically stay till about 15 months.

Sexual maturity occurs at about 18 months, but males don't mate until their second year. Breeding apparently occurs all year except during January and February, although most mating occurs from March to May and August to October. Births typically occur in May and June or October and November. Females have four teats and a well-developed pouch. 1-2 young are produced in a litter which leave the pouch at 12 weeks and are weaned at 17 weeks.

Virtually the entire habitat of this species is under threat from logging and proposed clear fell logging activities, which will remove important nesting trees, and cause other environmental damage.

STATUS. Endangered.

CAUSE/S OF CURRENT STATUS. Loss of habitat through clearing of forests and logging within remaining forests.

NUMBER LEFT. Between ten thousand and one hundred thousand.

PRINCIPAL ACTION REQUIRED. Habitat protection in the form of one or more national parks and a severe curtailment of proposed logging activities in areas inhabited by the Leadbeater's Possum.”

Since the above was published in 1991, further populations were discovered by teams of amateur naturalists searching for them and this is including sites outside the elevations quoted.

This includes for the newly described subspecies and of course the remaining population of the nominate subspecies from Yellingbo.

The only major improvement in the situation for the species survival prognosis has been others heeding the call of Hoser (1991) to create a National Park in the relevant areas as well as sensible calls to stop clear fell logging in relevant areas (see <https://www.greatforestnationalpark.com.au/park-plan.html> cited herein as myforests inc. 2017).

**Etymology:** Named in honour of Maryann Martinek of Bendigo, Victoria in recognition of her stellar contributions to wildlife conservation in Victoria. This includes for her courageous role in terms of exposing the misconduct of the DEWLP (at the time known as DSE) in 2009 for their culpability in relation to causing the Black Saturday Bushfire Holocaust (9 Feb), which besides killing 172 innocent Victorians, destroyed countless other people's lives and properties and wiped out many Leadbeater's Possums by the removal of their habitat.

Martinek played a critical role in exposing the biggest ever “fake news” story created and executed by a criminally culpable State Wildlife Department and their rotting staff, this being the “Sam the Koala” scam, as detailed by Hoser (2010).

**Conservation (the big picture):** Without doubt the biggest single threat to both subspecies of *G. leadbeateri* is the Victorian State Government and the Australian Federal Government.

In the first instance both have stated policy called “The Big Australia” policy which will increase the population of Australia from 25 million people (which it is approaching in 2018) to over 100 million within 100 years.

With Victoria's population also going up fourfold to in excess of 20 million people, (most to be squeezed into the already over-crowded Melbourne) the pressure on any remaining habitat for *G. leadbeateri* and pretty much any other kinds of wildlife must increase and probably to a degree sufficient to wipe out the species *G. leadbeateri* in the wild state.

Added to that is the monopolistic policies of the government wildlife departments and their owned and controlled Zoo's business, strictly “banning” the species from possession by anyone else capable of breeding and saving the species, there is little if any hope of there ever being decent self-sustaining captive populations.

With government run zoos making a point of not breeding endangered species in order to maintain their monopoly on owning them, enabling them to drag more paying customers through their gates to the exclusion of rival privately run animal businesses, selling photo and filming rights on the species, and so on, it is highly likely that *G. leadbeateri* will eventually go the same way as the Thylacine (*Thylacinus cynocephalus* Harris, 1808), which was actively “managed” to extinction in exactly the same way nearly 100 years earlier.

Significantly, Australian governments (over) regulate every aspect of life in Australia, with the exception of the one thing that seriously does need to be controlled and regulated. This is the nation's human population and the ongoing population growth.

Population (of people) needs to be stabilized as soon as possible and in the longer term reduced.

In terms of the need to stabilize population growth this best effected by a strict one child per person policy (equating in effect to two per couple), with no exceptions, including for second marriages, where children have already been had previously and anything else that may be used to circumvent the intended law.

This could be underpinned by forced relinquishment of any children born beyond those allowed, coupled with forced sterilization of those who conceive and have children beyond the legal amount.

While the policy may seem like a draconian attack on personal freedom, the survival of the Australian ecosystem and for that matter the wider planet, is best effected by such a policy, as a favourable alternative to any other likely outcome from the current situation of rampant human population growth.

Relinquished children could be put up for adoption by couples unable to conceive.

Immigration levels would also be capped at a level below the shortfall of children (beyond replacement level for the population)

achieved by the "one child per person" policy, so that the intended goal of a stable or slowly reducing population is in fact achieved.

#### Conservation (the smaller picture):

In terms of the specifics of *G. leadbeateri* conservation at the immediate time (end 2017 and 2018), the following key points need to be mentioned.

The Victorian government wildlife department (now called DEWLP) and their associated business entities including "Zoos Victoria" and "Vicforests" have used legislative means to forcibly stop all other Victorians from being able to do anything whatsoever to help preserve in the wild, protect or breed in captivity any *G. leadbeateri*.

People who have protested illegal clearing of the habitat by the government enterprise "Vicforests" have been raided, arrested and criminally charged and harassed in all manner of ways (Courtice 2016, Meacher 2012).

Same applies for those who tried to expose the culpability of the DSE (the predecessor in name of the DEWLP) in terms of the Black Saturday Holocaust of 7 Feb 2009, being a (DSE-made) man-made bushfire disaster which wiped out about 50% of the known habitat of *G. leadbeateri* in the space of a single day! (Hoser 2010, Court of Appeal 2014, VCAT 2015)

Add to this was the forced "forfeiture" to "The Crown" of all privately owned *G. leadbeateri* in the early 1980's, to enable "Zoos Victoria" to maintain a stranglehold on possession of the species as a significant money-making concern.

Those breeding animals and any progeny have long since been exterminated!

As mentioned already, the DEWLP have by control of the legislature, appropriated themselves and their controlled business enterprises full control of all specimens of *G. leadbeateri* in existence since the early 1980's.

At least one of these enterprises "Zoos Victoria" aggressively markets themselves as "Fighting extinction", until recently being a generic term, for which they now own a registered trademark (TM no. 1470848), which they registered on 23 January 2012 and aggressively prevent any other people or wildlife related businesses from claiming to be doing the same thing (fighting extinction in any way, shape or form).

According to the 2017 DEWLP, annual report (posted on the web at: <https://www2.delwp.vic.gov.au/our-department/annual-report/>), as of 24 Jan 2018 (State Government of Victoria, 2017), the department has an annual expenditure of just under \$2 billion a year to spend on conservation matters.

So with such vast amounts of funds and resources at their disposal on an annual ongoing basis, one would expect the DEWLP and their business enterprises to have absolutely no problem maintaining and increasing the numbers of this federally listed "critically endangered" species.

This is especially so, noting that as far back as the 1970's an unfunded amateur in suburban Blackburn, named Des Hackett had absolutely no trouble breeding the species in his back yard and ended up with more than he could handle ... until being made to forcibly forfeit them to the State Government!

Of course, it is a matter of public record that so-called captive breeding projects or "recovery programmes" at "Zoos Victoria" have not succeeded (all of Des Hackett's animals and any progeny are all long since dead), and evidently the zoos "recovery programmes" are designed to fail, so as to maintain their commercial monopoly on the possession of the species.

The key habitat, all within State Government controlled land, has also been systematically destroyed by the reckless activities of DEWLP (under various names) as detailed by Hoser (2010) and also the associated government business enterprise "Vicforests" as detailed by Panagiotopoulos (2017).

So as of 2017, the actual score card for the species *G. leadbeateri* was a decline in number by a staggering two thirds! (Borschmann 2017).

By any reasonable assessment, a well-planned 2/3 wipe out of a relatively uncommon species under total government control must

be treated as a government planned and executed genocide!

Not surprisingly, once the extent of this wipe-out entered the public domain, some of the government's own scientists had no choice but to publicly complain about the serious decline in the species (Borschmann 2017), only to find themselves being forcibly censored by a Government Ministerial employee and made to temper their publications and statements as a result (Lindenmayer 2017).

So *G. leadbeateri* has an ongoing serious decline that is now also being deliberately underplayed by senior members of Federal and State governments.

The species also faces hazards including:

1/ Censorship of potentially independent scientists who may wish to disclose facts that contradict statements by members of the government and their departments;

2/ Legislative exclusion of all potential stakeholders who could save the species, either by way of habitat protection or enhancement, or via captive breeding;

3/ The danger of ongoing serious corruption within DEWLP as detailed by the Court of Appeal (2014) and VCAT (2015).

This all means that the long-term prognosis for *G. leadbeateri* is very dire indeed.

If the species ultimately survives for more than a few short decades or centuries, it will be in spite of the preceding and not because of it as detailed in the endnote of this paper.

Now it is also worth mentioning that Wildlife Laws in Victoria specifically exempt "Zoos Victoria" from the need to comply. Furthermore they are effectively immune from prosecution for anything and so are in effect exempt from workplace safety laws, animal welfare laws, fair trading laws and so on. The same applies for the business entity, "Vicforests" also owned by the Victorian Government.

So because of the preceding, one may be fooled into assuming that while these entities are destroying the habitat of and wiping out *G. leadbeateri*, they are at least making money in the process. This is in fact far from the reality. As of 2017, DEWLP spends some \$2 billion of taxpayer's cash a year, of which pretty much all is wasted and squandered, with next to no revenue or public benefit in return.

Employees of the department do very well financially, live in nice homes in posh suburbs, take lots of expensive holidays and so on, but in terms of tangible public benefits, there are none.

As for their controlled business, "Zoos Victoria", which is continually subject of animal abuse and cruelty allegations (Turnbull, 2008), the picture is no better.

In spite of scamming millions of dollars in donations from misled well-meaning members of the public, charging like a wounded bull for questionable take-away food and the like, extorting money out of others in the environmental space for such things such as "permission" to be able to take photos of their animals for "any commercial purpose" and of course having business competitors in the animal display space raided and shut down at gunpoint by their owners at the DEWLP as detailed by Hoser (1993 and 1996), Court of Appeal (2014) and VCAT (2015) "Zoos Victoria" also manages to rack up losses on an annual basis, needing a 10.7 million a year top up from the taxpayer (as of 2011) (Cooper 2011, Ang 2011) and a swag of other hand outs for specific projects they embark on.

The State Government owned business "Vicforests" also loses money and costs millions on an annual basis, which also needs to be topped up by the taxpayer.

In 2017, Vicforests claimed in their annual report and associated media release a 3.2 million dollar loss (Larson 2017).

Panagiotopoulos (2017) on his website Vicforests Exposed wrote: "It can't survive without sponging off tax payers, it breaks laws you and I have to adhere to, it destroys ancient ecosystems and trees hundreds of years old, it stuffs up our water catchments, thumbs its nose at the public's concerns, leaves thousands of hectares of once-was forest as a weed infested mess, it lies, feeds government and communities outrageous spin, is unaccountable,

uneconomic, unprincipled, unlawful.  
Its existence is a shameful blight on Victoria.”

#### REFERENCES CITED

- Ang, A. 2011. Free Admission to Melbourne Zoos for Children. 13 Aug. Posted at:  
<https://altonabeauty.blogspot.com.au/2011/08/free-admission-to-melbourne-zoos-for.html>  
downloaded on 24 Jan 2018.
- Anonymous 2018a. Zoos Victoria website at url.  
<https://www.zoo.org.au/healesville/animals/leadbeaters-possum>  
downloaded on 24 January.
- Anonymous 2018b. Zoos Victoria website at url.  
<https://www.zoo.org.au/about-us/vision-and-mission/our-objectives>  
downloaded on 24 January.
- Bilney, R. J., Cooke, R. and White, J. G. 2010. Underestimated and severe: small mammal decline from the forests of south-eastern Australia since European settlement, as revealed by a top-order predator. *Biological Conservation* 143:52-59.
- Borschmann, G. 2017. Leadbeater's Possum population crashes by two thirds in past 20 years: report. Story posted online at: <http://www.abc.net.au/radionational/programs/breakfast/leadbeaters-possum-population-crashes/9037294>  
downloaded on 11 October 2017.
- Brazenor, C. W. 1946. Last chapter to come. A history of Victoria's rarest possum. *Wild Life*, 8:382-384.
- Brazenor, C. W. 1962. Rediscovery of a rare Australian possum. *Proceedings of the Zoological Society of London*, 139:429-431.
- Cooper, M. 2011. Zoos open free to children on holidays. 30 June 2011.  
Posted online at: <http://www.smh.com.au/entertainment/about-town/zoos-open-free-to-children-on-holidays-20110630-1g5fb.html>
- Courtice, B. 2016. 'Citizen scientists' force VicForests to halt logging. *Green-left Weekly* 5 May, online at: <https://www.greenleft.org.au/content/citizen-scientists-force-vicforests-halt-logging> downloaded on 24 Jan 2018.
- Court of Appeal Victoria. 2014. Hoser v Department of Sustainability and Environment [2014] VSCA 206 (5 September 2014).
- Hansen, B. D. and Taylor, A. C. 2008. Isolated remnant or recent introduction? Estimating the provenance of Yellingbo Leadbeater's possums by genetic analysis and bottleneck simulation. *Molecular Ecology* (2008) 17:4039-4052.
- Hansen, B. D., Sunnucks, P., Blacket, M. and Taylor, A. C. 2005. A set of microsatellite markers for an endangered arboreal marsupial, Leadbeater's possum. *Molecular Ecology Notes*, 5:796-799.
- Hansen, B., Harley, D., Lindenmayer, D., and Taylor, A. C. 2009. Population genetic analysis reveals a long-term decline of a threatened endemic Australian marsupial. *Molecular Ecology* 18:3346-3362.
- Harley, D. 2002. The discovery of Leadbeater's Possum *Gymnobelideus leadbeateri* along the Woori Yallock Creek, Yellingbo. *Victorian Naturalist*, 119:233-235.
- Harley, D. 2004. A Review of Recent Records of Leadbeater's Possum (*Gymnobelideus leadbeateri*). In: *The Biology of Australian Possums and Gliders* (eds Goldingay, R. L. and Jackson, S. M.), pp. 330-338. Surrey Beatty and Sons, Chipping Norton, NSW, Australia.
- Harley, D. 2006a. A role for nest boxes in the conservation of Leadbeater's Possum (*Gymnobelideus leadbeateri*). *Wildlife Research* 33:385-395.
- Harley, D. 2006b. The Yellingbo population of Leadbeater's Possum – remnant or introduced? *Victorian Naturalist*, 123:170-173.
- Harley, D. 2015. The use of call imitation to establish territory occupancy by Leadbeater's possum (*Gymnobelideus leadbeateri*). *Australian Mammalogy* 37:116-119.
- Harley, D. 2016. An overview of actions to conserve Leadbeater's Possum *Gymnobelideus leadbeateri*. *The Victorian Naturalist* 133(3):85-97.
- Harley, D. and Lill, A. 2007. Reproduction in a population of the endangered Leadbeater's possum inhabiting lowland swamp forest. *Journal of Zoology*, 272:451-457.
- Harley, D., Worley, M. A. and Harley, T. K. 2004. The distribution and abundance of Leadbeater's possum *Gymnobelideus leadbeateri* in lowland swamp forest at Yellingbo Nature Conservation Reserve. *Australian Mammalogy*, 27:7-15.
- Hoser, R. T. 1989. *Australian Reptiles and Frogs*. Pierson and Co., Mosman, NSW, 2088, Australia:238 pp.
- Hoser, R. T. 1991. *Endangered Animals of Australia*. Pierson Publishing, Mosman, NSW, 2088, Australia:240 pp.
- Hoser, R. T. 1993. *Smuggled: The Underground Trade in Australia's Wildlife*. Apollo Publishing, Moss Vale, NSW, Australia:160 pp.
- Hoser, R. T. 1996. *Smuggled-2: Wildlife Trafficking, Crime and Corruption in Australia*. Kotabi Publishing, Doncaster, Victoria, Australia:280 pp.
- Hoser, R. T. 2010. Sam the scam: Sam the koala is an imposter. *Australasian Journal of Herpetology* 8: 1-64.
- Larson, S. 2017. Media Release: VicForests reports positive operating result. 19 October. Posted online at:  
<http://www.vicforests.com.au/static/uploads/files/media-release-vicforests-reports-positive-operating-result-wftwjzbzymydu.pdf>  
downloaded on 24 January 2018.
- Lindenmayer, D. B. 2000. Factors at multiple scales affecting distribution patterns and their implication for animal conservation - Leadbeater's Possum as a case study. *Biodiversity and Conservation*, 9:15-35.
- Lindenmayer, D. B. 2017. Grovelling letter of apology to the former Australian Government Threatened Species Commissioner Gregory Andrews, dated 17 December: 1 p.
- Lindenmayer, D. B. and Lacy, R. C. 1995. Metapopulation viability of Leadbeater's possum, *Gymnobelideus leadbeateri*, in fragmented old-growth forests. *Ecological Applications*, 5:164-182.
- Lindenmayer, D. B. and Meggs, R. A. 1996. Use of Den Trees by Leadbeater's Possum (*Gymnobelideus leadbeateri*). *Australian Journal of Zoology*, 44:625-638.
- Lindenmayer, D. B. and Ough, K. 2006. Salvage logging in the montane ash Eucalypt forests of the Central Highlands of Victoria and its potential impacts on biodiversity. *Conservation Biology* 20:1005-1015.
- Lindenmayer, D. B. and Possingham, H. P. 1994. *The risk of extinction: ranking management options for Leadbeater's Possum using population viability analysis*. Centre for Resource and Environmental Studies, the Australian National University, Canberra, Australia.
- Lindenmayer, D. B. and Possingham, H. P. 1995. Modelling the viability of metapopulations of the endangered Leadbeater's possum in south-eastern Australia. *Biodiversity and Conservation*, 4, 984-1018.
- Lindenmayer, D. B., Smith, A. P., Craig, S. A. and Lumsden, L. F. 1989. A survey of the distribution of Leadbeater's Possum, *Gymnobelideus leadbeateri* McCoy in the Central Highlands of Victoria. *Victorian Naturalist*, 106:174-178.
- Lindenmayer, D. B., Cunningham, R. B., Tanton, M. T., and Smith, A. P. 1990. The conservation of arboreal marsupials in the montane ash forests of the Central Highlands of Victoria, south-east Australia. II. The loss of trees with hollows and its implications for the conservation of Leadbeater's possum *Gymnobelideus leadbeateri* McCoy (Marsupials: Petauridae). *Biological Conservation* 54:133-145.
- Lindenmayer, D. B., Nix, H. A., McMahon, J. P., Hutchinson, M. F. and Tanton, M. T. 1991a. The conservation of Leadbeater's possum, *Gymnobelideus leadbeateri* (McCoy): A case study of the use of bioclimatic modelling. *Journal of Biogeography*, 18:371-383.
- Lindenmayer, D. B., Cunningham, R. B., Tanton, M. T. and Smith, A. P. 1991b. The conservation of arboreal marsupials in the



- montane ash forests of the Central Highlands of Victoria, south-east Australia: III. *Biological Conservation* 56:295-315.
- Lindenmayer, D. B., Cunningham, R. B. and Donnelly, C. F. 1997. Decay and collapse of trees with hollows in eastern Australian forests: impacts on arboreal marsupials. *Ecological Applications* 7:625-641.
- Lindenmayer, D. B., Cunningham, R. B., MacGregor, C., Incoll, R. D. and Michael, D. 2003. A survey design for monitoring the abundance of arboreal marsupials in the Central Highlands of Victoria. *Biological Conservation* 110:161-167.
- Lindenmayer, D. B., Wood, J. T., McBurney, L., Michael, D., Crane, M., MacGregor, C., Montague-Drake, R., Gibbons, P. and Banks, S. C. 2011. Cross-sectional versus longitudinal research: a case study of trees with hollows and marsupials in Australian forests. *Ecological Monographs* 81:557-580.
- Lindenmayer, D. B., Blair, D., McBurney, L., Banks, S. C., Stein, J. A. R., Hobbs, R. J., Likens, G. E. and Franklin, J. F. 2013. New restoration forest management prescriptions to conserve Leadbeater's possum and rebuild the cover of ecologically mature forest in the Central Highlands of Victoria. *Australian Zoologist* 36:441-460.
- Macfarlane, M. A. and Seebeck, J. H. 1991. Draft management strategies for the conservation of Leadbeater's Possum, *Gymnobelideus Leadbeateri*, in Victoria. *Arthur Rylah Institute Technical Report Series* no. 111. Department of Conservation and Environment, Melbourne.
- Macfarlane, M. A., Smith, J. and Lowe, K. 1998. *Leadbeater's Possum Recovery Plan 1998-2002*. Department of Natural Resources and Environment, Melbourne.
- Macfarlane, M. A., Lowe, K. and Smith, J. 2003. Flora and Fauna Guarantee Action Statement: Leadbeater's Possum *Gymnobelideus Leadbeateri*. Department of Sustainability and Environment, Victoria. Posted online at <http://www.dse.vic.gov.au>.
- Meacher, S. 2012. Victoria drops charges against forest activists. *Green-Left Weekly* 6 September, online at: <https://www.greenleft.org.au/content/victoria-drops-charges-against-forest-activists> downloaded on 24 January 2018.
- Myforests inc. 2017. The Great Forest National Park, Victoria, Australia: The proposition. Webpage at: <https://www.greatforestnationalpark.com.au/park-plan.html> downloaded on 24 January 2018.
- Panagiotopoulos, P. 2017. A Dead Loss. Blog post dated 9 March. Posted online at: <http://www.vicforests.net/news/dead-loss> downloaded on 24 January 2018.
- Ride, W. D. L. (ed.) et. al. (on behalf of the International Commission on Zoological Nomenclature) 1999. *International code of Zoological Nomenclature*. The Natural History Museum - Cromwell Road, London SW7 5BD, UK (also commonly cited as "ICZN 1999").
- Smales, I. J. 1994. The discovery of Leadbeater's Possum, *Gymnobelideus leadbeateri* McCoy, Resident in a Lowland Swamp Woodland. *Victorian Naturalist*, 111:178-182.
- Smith, A. P. 1982. Leadbeater's Possum and its management. In: Groves, R. H. and Ride, W. D. L. (eds), *Species at Risk: Research in Australia*, pp. 129-145. Australian Academy of Science, Canberra, Australia.
- Smith, A. P. 1984. Diet of Leadbeaters Possum, *Gymnobelideus leadbeateri* (Marsupialia). *Australian Wildlife Research*, 11:265-273.
- Smith, A. P. and Harley, D. K. P. 2008. Leadbeater's Possum, *Gymnobelideus leadbeateri*. In: Van Dyck, S. and Strahan, R. (eds), *The mammals of Australia*. Third Edition, pp. 226-228. Reed New Holland, Sydney, Australia.
- Smith, A. P. and Lindenmayer, D. 1988. Tree Hollow Requirements of Leadbeater's Possum and Other Possums and Gliders in Timber Production Ash Forests of the Victorian Central Highlands. *Australian Wildlife Research*, 15:347-362.
- Smith, A. P. and Lindenmayer, D. B. 1992. Forest succession, timber production and conservation of Leadbeater's Possum (*Gymnobelideus leadbeateri* Marsupialia: Petauridae). *Forest Ecology and Management* 49:311-332.
- Smith, A., Lindenmayer, D. and Suckling, G. 1985. *The Ecology and Management of Leadbeater's Possum*. Research Report to the World Wildlife Fund Australia. Project 51. University of New England.
- Smith, B. 2014. Healesville: Leadbeater's possum death fuels fear. *The Age*. 3 June 2014. Downloaded 13/10/14 from <http://www.theweeklyreviewcity.com.au/story/1805356/healesville-leadbeater-s-possum-death-fuels-fears/events-calendar-city>.
- State Government of Victoria. 2017. DEWLP Annual Report 2017. 21 September 2017, online at: [https://www2.delwp.vic.gov.au/\\_data/assets/pdf\\_file/0025/83455/DELWP-Annual-Report-2016-17.pdf](https://www2.delwp.vic.gov.au/_data/assets/pdf_file/0025/83455/DELWP-Annual-Report-2016-17.pdf)
- Threatened Species Scientific Committee (Australia). 2015. Approved Conservation Advice *Gymnobelideus leadbeateri* Leadbeater's possum. Available as of 24 January 2018 at: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/273-conservation-advice.pdf>.
- Turnbull, J. 2008. Melbourne Zoo facing cruelty claims. *Sydney Morning Herald*, 19 January. Posted online at: <https://www.smh.com.au/national/melbourne-zoo-facing-cruelty-claims-20080119-1mul.html> downloaded 22 November 2017.
- Victorian Civil and Administrative Tribunal (VCAT). 2015. *Hoser v Department of Environment Land Water and Planning* (Review and Regulation) [2015] VCAT 1147 (30 July 2015, judgment and transcript).
- Weeks, A. 2011. *Effects of the 2009 Black Saturday fire on genetic diversity of the Leadbeater's Possum population at Lake Mountain*. Parks Victoria and Zoos Victoria, Melbourne.
- Wilkinson, H. E. 1961. The Rediscovery of Leadbeater's possum, *Gymnobelideus leadbeateri* McCoy. *Victorian Naturalist*, 78:97-102.
- Woinarski, J. and Burbidge, A. A. 2016. *Gymnobelideus leadbeateri*. The IUCN Red List of Threatened Species 2016: e.T9564A21959976. <http://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T9564A21959976.en>. Downloaded on 24 January 2018.
- Woinarski, J. C. Z., Burbidge, A. A. and Harrison, P. L. 2014. *The Action Plan for Australian Mammals 2012*. CSIRO Publishing, Collingwood.
- ENDNOTE:**
- If there is to be any hope for the long term survival of the Leadbeater's Possum, it almost certainly will not come from anyone within government or their associated entities, but rather from an uprising by civic minded wildlife conservationists. One such uprising was detailed by Meacher in 2012, which ultimately saved (for a short time at least), some Leadbeater's Possums inside a supposedly protected area, that was about to be exterminated by the Victorian State Government and their various departments and businesses. Rather than paraphrasing his accurate report, it is reproduced in full here for the purposes for fair comment and so that there can be no claims against this author of misrepresentation of anything by omission.
- "Victoria drops charges against forest activists  
Steve Meacher, Green-left Weekly  
September 6, 2012
- It was standing room only when community members and supporters attended Ringwood Magistrates' Court on September 6 to witness the dropping of all charges against 12 activists, arising from protests to protect the Gun Barrel coupe in Toolangi State Forest from clear-fell logging in July and August last year. The withdrawal of all charges, without explanation or reason, is a significant victory for the accused and their supporters, and every Victorian who cares for the protection of natural heritage. It vindicates the community's ongoing determination to protect this special place that means so much and belongs to all Victorians, from mindless destruction for the short-term profit of a few. For almost six weeks in July and August last year, a large number

of Toolangi residents with friends and supporters from surrounding communities, and others from further afield, united to protect Gun Barrel coupe on Sylvia Creek Road from clear-fell logging by a VicForests appointed contractor.

The coupe is a part of Toolangi State Forest, about a third of its total area, that had escaped destruction during the Black Saturday bushfires. It is therefore of special significance to many and is of critical importance to native wildlife, including the Victorian faunal emblem, the endangered Leadbeater's Possum.

In the coupe, vegetation had been identified as Leadbeater's habitat, as defined by the action statement for the species, which is supposed to guarantee protection under the Flora and Fauna Guarantee Act.

Submissions and letters were written, calls made and meetings held, including public meetings in Healesville and Toolangi halls. Yet VicForests persisted with plans to clear-fell the coupe.

Even when the Department of Sustainability and Environment identified an active nest-site within the coupe, this was played down, denied and eventually ignored as logging continued. As a result, many community members felt they had no option but to engage in peaceful but determined direct action to protect this special place.

The response from VicForests and the Victorian government, through its Departments of Primary Industry and, ironically, Sustainability and the Environment, was to use threats of arrest and laying of charges to try to intimidate the community into acquiescence while the logging was carried out.

In this they were unsuccessful and locals swung into action. Many attended the coupe every working day. It became the longest blockade of logging ever mounted in the Central Highlands, ceasing only when Healesville-based non-profit group MyEnvironment obtained an interim injunction in the Supreme

Court and the logging machinery was removed.

During the blockade, the authorities continued the intimidation. Objectors were threatened, harassed and photographed by government officers. Several were eventually arrested and charged.

At least one woman was tackled to the ground and bundled into a vehicle. There were even threats to release police dogs, accompanied by an ominous warning: "There is a danger of being bitten."

Those charged were given special bail conditions preventing them from returning to the coupe or even entering Toolangi State Forest. The bullying continued, with frequent reminders that to breach bail conditions would be a more serious offence than those that led to the original charges.

Campaigners particularly welcomed the dropping of charges on the eve of Threatened Species Day, which marks the death of the last thylacine (Tasmanian tiger) in 1936. We will not allow Leadbeater's Possum to follow the thylacine into extinction.

These charges have been hanging over us for more than a year and have been used by government officers to intimidate us, try to control our conduct and minimise our ability to oppose logging."





## **A new species of Freshwater Crocodile from the Bird's head region of New Guinea.**

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**Received 1 May 2018, Accepted 22 May 2018, Published 20 June 2018.**

### **ABSTRACT**

Until 2012 all Freshwater Crocodiles from the Island of New Guinea were treated as a single species-level taxon.

Best known as *Crocodylus novaeguinae* Schmidt, 1928, Hoser (2012), divided the taxon as then recognized into two species. The nominate form from north of the main cordillera in the vicinity of the Sepik River basin remained *novaeguinae*, although Hoser (2012) placed it within the genus *Oopholis* Gray, 1844.

The distinctive southern form with a distribution centred on the Fly River system was formally named for the first time as *O. adelynhoserae* Hoser, 2012, based on obvious morphological differences between both the type (Sepik River area) form and itself.

This paper formally names for the first time as a new species, the morphologically distinct population from the Bird's Head region of West Papua in Indonesia.

Intensive killing of specimens by natives in the range of this taxon has already made this a threatened species.

**Keywords:** Taxonomy; crocodile; freshwater; New Guinea; Irian Jaya; West Papua; *Crocodylus*; *Oopholis*; *novaeguinae*; *adelynhoserae*; *mindorensis*; *johnsoni*; *jackyhoserae*; Subgenus; *Philas*; Gray; new species; *oxyi*.

### **INTRODUCTION**

Hoser (2012) provided an updated genus-level taxonomy for the living Crocodiles including the description of three new tribes, a new genus, and two new species.

Hoser (2012) also resurrected a number of previously available, but until then little-used names for various species groups including the genus *Oopholis* Gray, 1844.

One species named by Hoser (2012) was a Freshwater Crocodile from the Liverpool River in the Northern Territory Australia and the other the southern New Guinea Freshwater Crocodile, previously treated as a variant of "*Crocodylus novaeguinae* Schmidt, 1928".

There is no need to repeat the detail of that paper herein.

I do however mention that a law-breaking group best known as the Wolfgang Wüster gang of thieves (as detailed in Hoser 2015a-f) loudly denounced the taxonomy and nomenclature within the Hoser (2012) paper.

Notwithstanding these denials, it is interesting to note that a number of websites they control (e.g. Wikipedia) now accept as self-evident that there are two different forms of Freshwater Crocodile on the main part of the Island of New Guinea.

As of 17 April 2018, at [https://en.wikipedia.org/wiki/New\\_Guinea\\_crocodile](https://en.wikipedia.org/wiki/New_Guinea_crocodile), is written:

"A separate population is found in the southern half of the island, with a range that extends from southeastern Papua New Guinea to the Indonesian provinces of Papua and West Papua. It is separated from the northern population by the New Guinea

Highlands, a mountain range that runs along the centre of the island. DNA analysis has revealed these to be genetically separate populations, and there are some differences in their morphology and behavior."

In other words *O. adelynhoserae* Hoser, 2012 is a valid species-level taxon.

In terms of the Australian species-level taxon named by Hoser (2012), Adam Britton and Graeme Webb, the two self appointed "Crocodile Kings" of the Northern Territory denounced the new Hoser-named taxon as non-existent. This was in spite of both men previously stating publicly that the Liverpool River taxon named by Hoser was a separate species to the others in the Northern Territory.

In 2012 in the tabloid media, after the publication of Hoser (2012), both men claimed that allegedly new (but unpublished) DNA evidence supported their claim that the species *Oopholis jackyhoserae* Hoser, 2012 was not genetically distinct from *O. johnsoni* Krefft, 1873.

However on ABC radio in 2014 (two years later), Britton confirmed that *Oopholis jackyhoserae* Hoser, 2012 was a genetically distinct species leading Hoser to call for an apology as reported in the media at the time and online at several sites, including (McCue 2014), published at: <http://www.ntnews.com.au/news/northern-territory/the-northern-territorys-pygmy-freshwaters-crocs-spark-big-debate/news-story/b3cf6630b3d9de0980d292b3b1b4f627>

It had been long suspected that Freshwater Crocodiles from the so-called "bird's head region" of western Irian Jaya, or West

Papua, were different again to the previously named two species of Freshwater Crocodile from New Guinea and while good DNA evidence supporting this is not yet available, the morphological divergence between the three forms is self-evident.

Furthermore the distinctiveness of these west Irian Jaya crocodiles reflects similar distinctiveness in other predominantly freshwater, river-dwelling taxa, such as Turtles in the genus *Elseya* Gray, 1867, for which parallel DNA data has been published.

#### MATERIALS, METHODS AND RESULTS

From the introduction of this paper, these are all obvious. A limited number of specimens of Freshwater Crocodiles from the Bird's Head region of New Guinea were inspected as were photographs of specimens alleged to have been taken from this area.

All were compared with other known Crocodile taxa. The differences between these specimens and other Freshwater Crocodile species were consistent enough to warrant this new taxon to be treated as full species.

Other taxa inspected included "*Crocodylus mindorensis* Schmidt, 1935" as well as all freshwater species from Australia, New Guinea and Indonesia.

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 the presently unnamed or potentially improperly assigned taxon at greater risk of extinction.

This comment is made noting the extensive increase in human population in South-east Asia and Australia, with a conservative forecast of a four-fold increase in human population in Australia 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.

For the island of Papua, the rate of population growth is greater than for Australia and therefore the damage and relative harm to the environment and indigenous species is likely to be even greater.

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) and likewise for the governments of both PNG and Indonesia.

Literature relevant to crocodiles in New Guinea and this paper is listed by Hoser (2012) and not repeated here. The new species is named according to the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999) and the spelling of the species name should not be altered in any way, unless totally mandatory according to the rules of the in force *International Code of Zoological Nomenclature*.

There are no conflicts of interest in relation to this paper.

#### OOPHOLIS (PHILAS) OXYI SP. NOV.

**Holotype:** A preserved specimen (skin and skull only) at the Bernice P. Bishop Museum, Honolulu, Hawaii, USA, specimen number: Herp-BPBM 5842, collected at a few km south of Oransbari, Manokwari Division, West Papua, Indonesia.

The Bernice P. Bishop Museum, Honolulu, Hawaii, USA, allows access to its holdings.

**Paratype:** A preserved specimen (skin and skull only) at the Bernice P. Bishop Museum, Honolulu, Hawaii, USA, specimen number: Herp-BPBM 3942, collected at a few km south of Oransbari, Manokwari Division, West Papua, Indonesia.

**Diagnosis:** *O. oxyi* sp. nov. is similar in most respects to *O. novaeguineae* (Schmidt, 1928) and is readily separated from *O. adelynhoserae* Hoser, 2012 as if it were *O. novaeguineae*, as outlined in Hoser (2012) and within this description, except in terms of the length of the snout.

*O. oxyi* sp. nov. is most readily separated from *O. novaeguineae* and *O. adelynhoserae* by the following suite of characters: the nostrils open vertically, as opposed to slightly forward and the inflection upwards of the upper snout past the third side tooth is significant and readily noticeable, as opposed to being slight in *O. novaeguineae* and *O. adelynhoserae*.

*O. oxyi* sp. nov. also has a shorter and broader snout than any of *O. novaeguineae*, *O. adelynhoserae* or any Australian species, noting that *O. johnsoni* Krefft, 1873 has the shortest and most blunt snout of any Australian species as outlined in Hoser (2012) and would perhaps be morphologically most similar to *O. oxyi* sp. nov. on that basis.

In *O. oxyi* sp. nov. the snout is not twice as long as wide, but in fact far shorter.

*O. oxyi* sp. nov. is also characterised by the presence of about 5-6 obvious and usually scattered white scales on the front flanks of the front limbs.

*O. adelynhoserae* Hoser, 2012 was formerly classified as a variant of *O. novaeguineae* until 2012.

It is separated from *O. novaeguineae* by 5 or 6 post-occipital scales on the neck, versus 4 (consistently) in *O. novaeguineae*.

*O. adelynhoserae* has a distinctly narrower snout than *O. novaeguineae*. *O. novaeguineae* appear to have triangular head and snout, with minimal curvature inwards at the posterior part of the snout, whereas in *O. adelynhoserae* the upper part of the snout narrows more rapidly giving the snout the appearance of being separate from the rest of the head

In both species the snout is roughly twice as long as it is wide at the base.

*O. adelynhoserae* sp. nov. nests during the wet season, whereas *O. novaeguineae* nests during the dry season. *O. adelynhoserae* sp. nov. lays fewer, larger eggs which hatch into significantly (by 5 cm) longer hatchlings on average.

The two species have quite different breeding biologies.

*O. novaeguineae* averages 35.2 eggs per clutch while *O. adelynhoserae* lays an average of 21.7 per clutch. *O. novaeguineae* typically nests on floating plant islands in overgrown canals and side-arms. By contrast *O. adelynhoserae* usually nests on land (Hall and Johnson 1987, Hollands 1987). Hatchling *O. adelynhoserae* measure 25-30 cm, versus 20-25 cm in *O. novaeguineae* and 18-20 cm in *O. johnsoni*.

*O. adelynhoserae* is the species of Freshwater Crocodile found south of the central cordillera of New Guinea, with the centre of distribution being the Fly River system and tributaries. Specimens from Port Moresby and environs formerly attributed to *O. novaeguineae* are attributable to *O. adelynhoserae*.

*O. novaeguineae* is now restricted to the river systems north of the central cordillera, with the distribution centred on the Sepik River System and tributaries.

While the species distribution boundaries for each of *O. novaeguineae* and *O. adelynhoserae* are not known, it is likely that *O. adelynhoserae* encroaches that of *O. novaeguineae* on the south-east end of Island New Guinea, based on known distributions of other species groups with north-south divisions on island New Guinea.

There have been numerous studies published on "*O. novaeguineae*". Unfortunately many of these would in fact be attributable to *O. adelynhoserae*. Herpetologists looking at studying New Guinea crocodiles in the future should be aware of the fact that previous studies did not differentiate between the various local Freshwater species.

The breeding biology of *O. oxyi* sp. nov. is not known.



**Distribution:** Restricted to the “Birds head” region of West Papua, Indonesia.

**Conservation:** Rapid population growth, degrading of aquatic ecosystems and a general fear of Crocodiles as a potential threat to human life have all combined to create a sharp decline in numbers of Freshwater Crocodiles in western New Guinea.

Very few specimens of this species have been lodged in museums anywhere and there are few if any alive and captive and being bred as a pure lineage at any recognized crocodile breeding facility.

The fact that this species does not grow as large as others does not make it a good business proposition for farming for skins and meat.

A proper study of the exact numbers, distribution and population stability of this taxon is required from which proper conservation action can be undertaken. This may include the creation of national parks and reserves in drainages holding significant populations of this taxon as well as public education of local people.

Furthermore the bringing of specimens into captivity for breeding and insurance purposes is likely to be required.

In the long term the only sustainable solution to conservation issues facing this and most other rare or threatened species is a reduction in the rate of human overpopulation globally as stated by Hoser (1991) and in the long term a general reduction.

**Etymology:** Named in honour of a now deceased Great Dane, named *Oxyuranus* (*Oxy* for short) in recognition of his services protecting our research facility from unlawful thefts and attacks and also protecting our young daughters over an eight year period. *Oxyuranus* Kinghorn, 1923 is a well-known genus of Australasian elapid snake.

#### REFERENCES CITED

Court of Appeal Victoria. 2014. *Hoser v Department of Sustainability and Environment* [2014] VSCA 206 (5 September 2014).

Hoser, R. T. 1989. *Australian Reptiles and Frogs*. Pierson and Co., Mosman, NSW, 2088, Australia:238 pp.

Hoser, R. T. 1991. *Endangered Animals of Australia*. Pierson Publishing, Mosman, NSW, 2088, Australia:240 pp.

Hoser, R. T. 1993. *Smuggled: The Underground Trade in Australia's Wildlife*. Apollo Publishing, Moss Vale, NSW, Australia:160 pp.

Hoser, R. T. 1996. *Smuggled-2: Wildlife Trafficking, Crime and Corruption in Australia*. Kotabi Publishing, Doncaster, Victoria, Australia:280 pp.

Hoser, R. T. 2002. A review of the taxonomy of the living Crocodiles including the description of three new tribes, a new

genus, and two new species. *Australasian Journal of Herpetology* 14:9-16.

Hoser, R. T. 2015a. Dealing with the “truth haters” ... a summary! Introduction to Issues 25 and 26 of *Australasian Journal of Herpetology*. Including “A timeline of relevant key publishing and other events relevant to Wolfgang Wüster and his gang of thieves.” and a “Synonyms list”. *Australasian Journal of Herpetology* 25:3-13.

Hoser, R. T. 2015b. The Wüster gang and their proposed “Taxon Filter”: How they are knowingly publishing false information, recklessly engaging in taxonomic vandalism and directly attacking the rules and stability of zoological nomenclature. *Australasian Journal of Herpetology* 25:14-38.

Hoser, R. T. 2015c. Best Practices in herpetology: Hinrich Kaiser's claims are unsubstantiated. *Australasian Journal of Herpetology* 25:39-52.

Hoser, R. T. 2015d. Comments on *Spracklandus* Hoser, 2009 (Reptilia, Serpentes, ELAPIDAE): request for confirmation of the availability of the generic name and for the nomenclatural validation of the journal in which it was published (Case 3601; see *BZN* 70: 234-237; comments *BZN* 71:30-38, 133-135). (unedited version) *Australasian Journal of Herpetology* 27:37-42.

Hoser, R. T. 2015e. PRINO (Peer reviewed in name only) journals: When quality control in scientific publication fails. *Australasian Journal of Herpetology* 26:3-64.

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

McCue, F. 2014. The Northern Territory's pygmy freshwaters crocs spark big debate. *NT News*, online published on 19 November, at: <http://www.ntnews.com.au/news/northern-territory/the-northern-territorys-pygmy-freshwaters-crocs-spark-big-debate/news-story/b3cf6630b3d9de0980d292b3b1b4f627> downloaded on 17 April 2018.

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

Various Authors 2018. Wikipedia New Guinea Crocodile. Page online at: [https://en.wikipedia.org/wiki/New\\_Guinea\\_crocodile](https://en.wikipedia.org/wiki/New_Guinea_crocodile), downloaded on 17 April 2018.

Victorian Civil and Administrative Tribunal (VCAT). 2015. *Hoser v Department of Environment Land Water and Planning* (Review and Regulation) [2015] VCAT 1147 (30 July 2015, judgment and transcript).

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

## **A new species-level classification for the *Aechmophrys cerastes* (Hallowell, 1854) species group of Rattlesnakes (Squamata: Viperidae).**

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Received 2 May 2018, Accepted 29 May 2018, Published 20 June 2018.

### **ABSTRACT**

The taxonomy of the Sidewinder Rattlesnakes *Aechmophrys cerastes* (Hallowell, 1854), known in most texts as "*Crotalus cerastes* Hallowell, 1854", has been the subject of significant scrutiny in recent years, including the papers of Douglas *et al.* (2006), Hoser (2009, 2012) and sources cited therein.

Clearly the current taxonomy as used by Beaman and Hayes (2008) does not match the correct phylogeny of the species complex.

This paper revises the taxonomy and nomenclature of the species group based on phylogeny, distribution and morphological differences between relevant populations.

The nominate form originally described as *Crotalus cerastes* Hallowell, 1854, is herein treated as a full species. The previously described subspecies are also herein regarded as being of different species. However the taxonomy of these is different to that previously presented.

With a divergence estimated at just one million years by Douglas *et al.* (2006), the taxa "*Crotalus cerastes laterorepens* Klauber, 1944" and "*Crotalus cerastes cercobombus* Savage and Cliff, 1953" are treated as a single species. The latter is regarded as a subspecies of the former.

Specimens, formerly treated as "*Crotalus cerastes*" or a population of "*Crotalus cerastes cercobombus* Savage and Cliff, 1953" from north-western Sonora, Mexico are herein elevated to full species rank and formally named for the first time.

Likewise the population formerly referred to "*Crotalus cerastes* Hallowell, 1854" from Death Valley, California are also elevated to the rank of full species and formally named for the first time.

The four species recognized herein all have divergences from one another in the vicinity of 2 MYA based on the molecular evidence of Douglas *et al.* (2006) at Fig. 5, are reproductively isolated from one another and so I have no hesitation in describing the two new species according to the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

Hoser (2009 and 2012) placed the species "*Crotalus cerastes* Hallowell, 1854" in the genus *Aechmophrys* Coues, 1875 instead of *Crotalus* Linnaeus, 1758. Based on numerous published phylogenies cited in those papers, *Aechmophrys* remains the most logical genus-level assignment for the species group.

**Keywords:** Taxonomy; nomenclature; USA; Mexico; Arizona; California; Death Valley; Sonora; Rattlesnake; *Crotalus*; *Aechmophrys*; *cerastes*; *laterorepens*; *cercobombus*; new species; *adelynhoserae*; *jackyhoserae*.

### **INTRODUCTION**

The Sidewinder Rattlesnake of the south-western United States of America and nearby Mexico is an iconic species group that has been a prominent feature of North American natural history and culture for centuries.

The taxonomy of the Sidewinder Rattlesnakes, *Aechmophrys cerastes* (Hallowell, 1854), known in most texts as "*Crotalus cerastes* Hallowell, 1854", has been the subject of significant scrutiny in recent years, including the papers of Douglas *et al.* (2006), Hoser (2009, 2012) and sources cited therein.

Anyone who has scrutinized these snakes would also be aware that the current taxonomy as used by Beaman and Hayes (2008) does not match the correct phylogeny of the species complex.

This paper revises the taxonomy and nomenclature of the species group based on phylogeny, distribution and morphological differences between relevant populations.

For the first time ever, this paper correlates the relevant species-level divisions, including as identified by Douglas *et al.* (2006), with the three previously named taxa in the species complex, based on holotype locations. Furthermore, by reliance on earlier literature, this paper shows that two well-known populations currently referred to as *Aechmophrys cerastes* (Hallowell, 1854), are in fact unnamed species.

### **MATERIALS AND METHODS**

Douglas *et al.* (2006) provided evidence that the putative species *Aechmophrys cerastes* (Hallowell, 1854), contains five distinctive and geographically disjunct lineages.

One diverged about 1 MYA and the other four some 2 MYA from one another.

It is also well known that three populations of *A. cerastes* have in fact been named and all broadly correspond with three of the lineages identified by Douglas *et al.* (2006).



Prior to the publication of this paper, specimens of all five lineages identified by Douglas *et al.* (2006) were inspected and all showed consistent differences to warrant being recognized as taxonomically distinct and worthy of taxonomic recognition, as in to be formally named according to the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

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 North America, now well in excess of 300 million and increasing rapidly year on year. There is a conservative forecast of a four-fold increase in human population in the next 200 years (from slightly over 300 million to more than 1 billion) and the general environmental destruction across the continent as documented by Hoser (1989 and 1991) mainly for Australia, but even more applicable to the United States of America and Mexico. This also notes significant destruction of environment and species in low density areas without a large permanent human population. I also note the abysmal environmental record of various National, State and Local governments across the planet over the past 200 years as detailed by Hoser (1989, 1991, 1993 and 1996), making the need to formally name and conserve species even more urgent.

#### RESULTS

As inspection of said species-level taxa, conforming to five distinct lineages identified by Douglas *et al.* (2006) showed consistent morphological differences between the forms, the previously unnamed forms are herein formally named as new species, according to the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

As mentioned in the abstract, while the name *Crotalus* Linnaeus, 1758 is the most common in use for the genus-level placement of this species complex, Hoser (2009 and 2012), using published molecular data, confirmed that a more sensible placement for the complex is within the genus *Aechmophrys* Coues, 1875 and so this is the preferred usage herein.

Where the relevant species are referred to as being within *Crotalus* in this paper, this is done only due to prior usage of the name for the relevant taxa, or by relevant cited authors and not because I view this as the correct genus-level placement.

The genus *Crotalus* Linnaeus, 1758, with a type Species of *Crotalus horridus* Linnaeus, 1758 is sufficiently divergent from "*Crotalus cerastes* Hallowell, 1854" based on phylogenies cited in Hoser (2009 and 2012) as to be regarded as of a different genus, being the reason for the resurrection of *Aechmophrys* Coues, 1875 by Hoser (2009).

The nominate form originally described as "*Crotalus cerastes* Hallowell, 1854", is herein treated as a full species. It has a type locality as coming from the bank of the Mojave River and Mojave Desert, California, USA.

The subspecies "*Crotalus cerastes laterorepens* Klauber, 1944", with a type locality of The Narrows, San Diego County, California, USA and the readily separated subspecies "*Crotalus cerastes cercobombus* Savage and Cliff, 1953", with a type locality of near Gila Bend, Maricopa County, Arizona, USA, are the only two previously named subspecies within "*Crotalus cerastes*".

A diagnosis to separate this taxon-group (including previously named subspecies) from the other known species of Rattlesnake outside of the "*Crotalus cerastes* Hallowell, 1854" group is in Hoser (2012) pages 7 and 8, noting that in that publication the subgenus *Aechmophrys* (being one of three) is treated as monotypic for *A. cerastes* (Hallowell, 1854), including as then recognized subspecies, just detailed herein.

In this paper and based on the molecular evidence of Douglas *et*

*al.* (2006), previously named subspecies are also herein regarded as being of different species. However the taxonomy of these is different to that previously presented in all other recent publications that recognize the three previously named forms.

With a divergence estimated at just one million years by Douglas *et al.* (2006), the taxa "*Crotalus cerastes laterorepens* Klauber, 1944" and "*Crotalus cerastes cercobombus* Savage and Cliff, 1953" are treated as a single species. As a pair, they represent two closely related lineages, of five identified by Douglas *et al.* (2006). Due to date priority and the rules specified in the *International Code of Zoological Nomenclature* (Ride *et al.* 1999), the latter is regarded as a subspecies of the former.

Specimens, formerly treated as "*Crotalus cerastes*" or a population of "*Crotalus cerastes cercobombus* Savage and Cliff, 1953" from north-western Sonora, Mexico are herein elevated to full species rank and formally named for the first time.

Likewise the population formerly referred to "*Crotalus cerastes* Hallowell, 1854" or "*Crotalus cerastes cerastes* Hallowell, 1854" from Death Valley, California are also elevated to the rank of full species and formally named for the first time.

The four species recognized herein all have divergences from one another in the vicinity of 2 MYA based on the molecular evidence of Douglas *et al.* (2006) at Fig. 5. They are reproductively isolated from one another and so I have no hesitation in describing the two new species according to the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

In terms of the following descriptions, it should be noted that the spelling of the species names should not be altered in any way, unless totally mandatory according to the rules of the in force *International Code of Zoological Nomenclature*.

There is a vast body of literature relevant to "*Crotalus cerastes* Hallowell, 1854", including that cited in Hoser (2009 and 2012) and sources cited therein and so it is not re-cited here. They should however be consulted by interested persons and are relied upon as part of and accompanying the relevant material within this paper as necessary.

#### **AECHMOPHRYS ADELYNHOSERAE SP. NOV.**

**Holotype:** A preserved specimen at the California Academy of Science, California, USA, specimen number: CAS HERP 192594, collected at Death Valley National Monument, Inyo County, California, USA, Latitude 36.28 N, Longitude -117.16 W.

This facility allows access to its holdings.

**Paratype:** A preserved specimen at the California Academy of Science, California, USA, specimen number: CAS HERP 192595, collected at Death Valley National Monument, Inyo County, California, USA, Latitude 36.28 N, Longitude -117.16 W.

**Diagnosis:** The genus *Aechmophrys* Coues, 1875, is a group of smaller sized rattlesnakes all with 21-23 mid body scale rows. One subgenus of the group, being the nominate one is separated from all other rattlesnakes by the fact that the outer edges of the supraoculars are extended into raised and flexible hornlike processes that are distinctly pointed at the tip. That is the species group known widely as "*Crotalus cerastes* Hallowell, 1854", or as a "sidewinder" in reference to one of its preferred forms of motion across sand dunes (Hoser 2012).

For *A. polystictus* (Cope, 1865), also placed in this genus but herein placed in the subgenus *Rattlewellsus* Hoser (2012), it is separated from all other rattlesnakes by the presence of two squarish

darker blotches on the upper labials, one at about the eye and running into it and the other anterior to it. *A. polystictus* is further separated from all other rattlesnakes by a dorsal pattern consisting of a series of longitudinal ellipses. It also has a pair of slim intercanthals, each about twice as long as wide.

All other species in the genus *Aechmophrys*, within the subgenus *Cottonus* Hoser, 2009 have a distinct whitish streak running across the upper labials running slightly higher towards the snout, and terminating around the back of the mouth region at the posterior end.

Other rattlesnakes with a similar streak invariably have the streak running through the eye, even if only the lower part, which is not

the case for this genus.

In the rest of *Aechmophrys* that is not part of the subgenus *Cottonus* Hoser, 2009 namely *A. cerastes* (including the four species recognized and/or described herein and all formerly treated as *A. cerastes*) and *A. polystictus*, there is no such line. In *A. cerastes* (including the four species recognized and/or described herein and all formerly treated as *A. cerastes*), at best there is a squarish light blotch under the eye, while in *A. polystictus*, any white line terminates before (posterior to) the eye. *Cottonus* Hoser, 2009 have distinctly smaller and narrower heads than those taxa in the nominate subgenus and likewise as compared to the defined (by Hoser 2009 and Hoser 2012) genera *Crotalus*, *Caudisona* and *Hoserea*.

For separation of *Aechmophrys* from *Crotalus* Linnaeus, 1758, *Uropsophus* Wagler, 1830, *Caudisona* Laurenti, 1768, *Matteoea* Hoser, 2009, *Hoserea* Hoser, 2009 and *Cummingea* Hoser, 2009 see the diagnoses in Hoser (2009 or 2012).

*Aechmophrys* are separated from *Sistrurus* Garman, 1883 and *Piersonus* Hoser, 2009 by the absence of large head shields at the center of the crown of the head. *Uropsophus* is separated from this genus (*Aechmophrys*) by the fact that males have less than 40 subcaudals and females less than 35. The subgenus *Aechmophrys* as defined by Hoser (2012) is herein divided into four species, two of which are formally named in this paper for the first time.

The nominate form for *Aechmophrys* is the species, *A. cerastes* (Hallowell, 1854), as described and diagnosed above.

The second previously named species in the group is *A. laterorepens* Klauber, 1944, (and herein includes the putative taxon "*A. cercobombus* (Savage and Cliff, 1953)" which differs from the species *A. cerastes* and *A. adelynhoserae* sp. nov. by having a black marking instead of a brown marking on the proximal lobe of the rattle-matrix in adults. There are other differences of morphology and pattern as discussed by Klauber (1944).

The subspecies *A. laterorepens cercobombus* (Savage and Cliff, 1953), this being how the putative taxon is treated herein, is separated from the nominate *A. laterorepens*, by having 141 or less ventrals in males and 145 or less in females, versus 142 or more ventrals in males and 146 or more in females and 21 instead of 23 dorsal mid-body scale rows.

*A. jackyhoserae* sp. nov., like the nominate subspecies *A. laterorepens* has 23 dorsal mid-body-scale rows and is separated from *A. laterorepens* by having limited darker brown pigment or speckling on the dorsal surface of the head, versus significant black speckling on the front of the head and obvious patches of darker brown pigment on the upper surface of the head in *A. laterorepens*.

The species *A. adelynhoserae* sp. nov., until now treated as a variant of *A. cerastes* is readily separated from it by colouration, being a very whitish-greyish brown, with faded and obscure dorsal markings, versus usually orangeish to red, rarely greyish brown, and in either event, with well-defined darker dorsal blotches, except in obviously aberrant individuals.

*A. adelynhoserae* sp. nov. is further separated from *A. cerastes* by the size of the (in this case faded) dorsal vertebral blotches at the anterior end of the body, being noticeably larger than the paler interspaces, versus the reverse or equal in *A. cerastes*.

*A. jackyhoserae* sp. nov. is also significantly more faded in colouration than *A. laterorepens* (although not to the extent of *A. adelynhoserae* sp. nov.), and besides being separated from *A. adelynhoserae* sp. nov. and *A. cerastes* by having a black marking instead of a brown marking on the proximal lobe of the rattle-matrix in adults, is also separated from *A. adelynhoserae* sp. nov. by having numerous large black spots or flecks scattered on the flanks, versus fewer or indistinct in *A. adelynhoserae* sp. nov..

*A. jackyhoserae* sp. nov. is also further separated from *A. laterorepens* by the greater preponderance of black spots on the flanks, these being obvious and prominent in the former (*A. jackyhoserae* sp. nov.) and indistinct or absent in the latter (*A. laterorepens*).

**Distribution:** *A. adelynhoserae* sp. nov. is restricted to the region of Death Valley in California and probably immediately adjacent

Nevada. *A. cerastes* occupies the region generally south of Highway 15, running from Los Angeles to Las Vegas in California and including adjacent parts of Nevada and Arizona.

**Etymology:** Named in honour of my daughter, Adelyn Hoser, of Park Orchards, Melbourne, Victoria, Australia, aged 19 as of end May 2018, in recognition of her monumental contributions to wildlife conservation and education in the first 19 years of her life. I note that it is absolutely disgusting that lying thieves like Wolfgang Wüster and Mark O'Shea of the UK have the audacity to condemn myself publicly for naming taxa in honour of family members, who unlike these people have in fact made significant contributions to wildlife conservation, the basis of their vocal complaints being merely that I have named taxa after family members ... as if this is some kind of crime. These thieves have then used this non-existent crime to engage in acts of extreme taxonomic vandalism to illegally rename taxa in breach of the *International Code of Zoological Nomenclature* in PRINO (Peer Reviewed In Name Only) journals that they control (see Hoser 2015a-f and sources cited therein for further details).

#### **AECHMOPHRYS JACKYHOSERAE SP. NOV.**

**Holotype:** A preserved specimen at the Museum of Vertebrate Zoology, UC Berkeley, USA, MVZ Herp Collection, specimen number: 76500, collected at Bahía de Kino, Hermosillo, Sonora, Mexico, Latitude 28.82 N, Longitude -111.94 W.

This is a facility that allows access to its holdings.

**Paratypes:** 1/ A preserved specimen at the San Diego Natural History Museum, San Diego, USA, SDNHM Herpetology Collection, specimen number: 42792, collected at 29.8 miles west-southwest of Hermosillo, Sonora, Mexico, Latitude 28.88 N., Longitude -111.35 W.

2/ A preserved specimen at the Museum of Southwestern Biology, Albuquerque, New Mexico, USA, MSB Amphibian and Reptile Collection, specimen number: 80383, collected at Bahia Kino, Sonora, Mexico, Latitude 28.81 N., Longitude -111.93 W.

**Diagnosis:** The subgenus *Aechmophrys* as defined by Hoser (2012) is herein divided into four species, two of which are formally named in this paper for the first time.

The nominate form for *Aechmophrys* is the species, *A. cerastes* (Hallowell, 1854), as described and diagnosed below.

The second previously named species in the group is *A. laterorepens* Klauber, 1944, (and herein includes the putative taxon "*A. cercobombus* (Savage and Cliff, 1953)" which differs from the species *A. cerastes* and *A. adelynhoserae* sp. nov. by having a black marking instead of a brown marking on the proximal lobe of the rattle-matrix in adults. There are other differences of morphology and pattern as discussed by Klauber (1944).

The subspecies *A. laterorepens cercobombus* (Savage and Cliff, 1953), this being how the putative taxon is treated herein, is separated from the nominate *A. laterorepens*, by having 141 or less ventrals in males and 145 or less in females, versus 142 or more ventrals in males and 146 or more in females and 21 instead of 23 dorsal mid-body scale rows.

*A. jackyhoserae* sp. nov., like the nominate subspecies *A. laterorepens* has 23 dorsal mid-body-scale rows and is separated from *A. laterorepens* by having limited darker brown pigment or speckling on the dorsal surface of the head, versus significant black speckling on the front of the head and obvious patches of darker brown pigment on the upper surface of the head in *A. laterorepens*.

The species *A. adelynhoserae* sp. nov., until now treated as a variant of *A. cerastes* is readily separated from it by colouration, being a very whitish-greyish brown, with faded and obscure dorsal markings, versus usually orangeish to red, rarely greyish brown, and in either event, with well-defined darker dorsal blotches, except in obviously aberrant individuals.

*A. adelynhoserae* sp. nov. is further separated from *A. cerastes* by the size of the (in this case faded) dorsal vertebral blotches at the anterior end of the body, being noticeably larger than the paler interspaces, versus the reverse or equal in *A. cerastes*.

*A. jackyhoserae* sp. nov. is also significantly more faded in colouration than *A. laterorepens* (although not to the extent of *A. adelynhoserae* sp. nov.), and besides being separated from *A.*



*adelynhoserae* sp. nov. and *A. cerastes* by having a black marking instead of a brown marking on the proximal lobe of the rattle-matrix in adults, is also separated from *A. adelynhoserae* sp. nov. by having numerous large black spots or flecks scattered on the flanks, versus fewer or indistinct in *A. adelynhoserae* sp. nov..

*A. jackyhoserae* sp. nov. is also further separated from *A. laterorepens* by the greater preponderance of black spots on the flanks, these being obvious and prominent in the former (*A. jackyhoserae* sp. nov.) and indistinct or absent in the latter (*A. laterorepens*).

The genus *Aechmophrys* Coues, 1875, is a group of smaller sized rattlesnakes all with 21-23 mid body scale rows. One subgenus of the group, being the nominate one is separated from all other rattlesnakes by the fact that the outer edges of the supraoculars are extended into raised and flexible hornlike processes that are distinctly pointed at the tip. That is the species group known widely as "*Crotalus cerastes* Hallowell, 1854", or as a "sidewinder" in reference to one of its preferred forms of motion across sand dunes (Hoser 2012).

For *A. polystictus* (Cope, 1865), also placed in this genus but herein placed in the subgenus *Rattlewellsus* Hoser (2012), it is separated from all other rattlesnakes by the presence of two squarish

darker blotches on the upper labials, one at about the eye and running into it and the other anterior to it. *A. polystictus* is further separated from all other rattlesnakes by a dorsal pattern consisting of a series of longitudinal ellipses. It also has a pair of slim intercanthals, each about twice as long as wide.

All others in this genus *Aechmophrys*, within the subgenus *Cottonus* Hoser, 2009 have a distinct whitish streak running across the upper labials running slightly higher towards the snout, and terminating around the back of the mouth region at the posterior end.

Other rattlesnakes with a similar streak invariably have the streak running through the eye, even if only the lower part, which is not the case for this genus.

In the rest of *Aechmophrys* that is not part of the subgenus *Cottonus* Hoser, 2009 namely *A. cerastes* (including the four species recognized and/or described herein and all formerly treated as *A. cerastes*) and *A. polystictus*, there is no such line. In *A. cerastes* (including the four species recognized and/or described herein and all formerly treated as *A. cerastes*), at best there is a squarish light blotch under the eye, while in *A. polystictus*, any white line terminates before (posterior to) the eye. *Cottonus* Hoser, 2009 have distinctly smaller and narrower heads than those taxa in the nominate subgenus and likewise as compared to the defined (by Hoser 2009 and Hoser 2012) genera *Crotalus*, *Caudisona* and *Hoserea*.

For separation of *Aechmophrys* from *Crotalus* Linnaeus, 1758, *Uropsophus* Wagler, 1830, *Caudisona* Laurenti, 1768, *Matteoea* Hoser, 2009, *Hoserea* Hoser, 2009 and *Cummingea* Hoser, 2009 see the diagnoses in Hoser (2009 or 2012).

*Aechmophrys* are separated from *Sistrurus* Garman, 1883 and *Piersonus* Hoser, 2009 by the absence of large head shields at the center of the crown of the head.

*Uropsophus* is separated from this genus (*Aechmophrys*) by the fact that males have less than 40 subcaudals and females less than 35.

**Distribution:** *A. jackyhoserae* sp. nov. is restricted to the Sonora region of Mexico in the general vicinity of the type locality. It is unsure how far north this species ranges, but specimens from Arizona, immediately to the north are of the species *A. laterorepens cercobombus* (Savage and Cliff, 1953).

**Etymology:** Named in honour of my daughter, Jacky Hoser, of Park Orchards, Melbourne, Victoria, Australia, aged 17 as of end May 2018, for her monumental contributions to wildlife conservation and education in the first 17 years of her life. I note that it is absolutely disgusting that lying thieves like Wolfgang Wüster and Mark O'Shea of the UK have the audacity to condemn myself publicly for naming taxa in honour of family members, who unlike these people have in fact made significant contributions to wildlife conservation, the basis of their vocal complaints being merely that I have named taxa after family members ... as if this is some kind of crime. These thieves have then used this non-existent crime to engage in acts of extreme taxonomic vandalism to illegally rename taxa in breach of the *International Code of*

*Zoological Nomenclature* in PRINO (Peer Reviewed In Name Only) journals that they control (see Hoser 2015a-f and sources cited therein for further details).

#### REFERENCES CITED

- Beaman, K. R. and Hayes, W. K. 2008. Rattlesnakes: Research Trends and Annotated Checklist. pp. 5-16. in: Hayes *et al.* (eds), *The biology of rattlesnakes*. Loma Linda University Press, USA.
- Court of Appeal Victoria. 2014. *Hoser v Department of Sustainability and Environment* [2014] VSCA 206 (5 September 2014).
- Douglas, M. E., Douglas, M. R., Schuett, G. W. and Porras, L. W. 2006. Evolution of Rattlesnakes (Viperidae: *Crotalus*) in the Warm Deserts of Western North America Shaped by Neogene Vicariance and Quaternary Climate Change. *Molecular Ecology* 15:3353-3374.
- Hallowell, E. 1854. Description of new reptiles from California. *Proc. Acad. Nat. Sci. Philad.* 7 [1854]:91-97.
- Hoser, R. T. 1989. *Australian Reptiles and Frogs*. Pierson and Co., Mosman, NSW, 2088, Australia:238 pp.
- Hoser, R. T. 1991. *Endangered Animals of Australia*. Pierson Publishing, Mosman, NSW, 2088, Australia:240 pp.
- Hoser, R. T. 1993. *Smuggled: The Underground Trade in Australia's Wildlife*. Apollo Publishing, Moss Vale, NSW, Australia:160 pp.
- Hoser, R. T. 1996. *Smuggled-2: Wildlife Trafficking, Crime and Corruption in Australia*. Kotabi Publishing, Doncaster, Victoria, Australia:280 pp.
- Hoser, R. T. 2009. A reclassification of the rattlesnakes; species formerly exclusively referred to the genera *Crotalus* and *Sistrurus*. *Australasian Journal of Herpetology* 3:1-21.
- Hoser, R. T. 2012. A reclassification of the Rattlesnakes; species formerly exclusively referred to the Genera *Crotalus* and *Sistrurus* and a division of the elapid genus *Micrurus*. *Australasian Journal of Herpetology* 11:2-24.
- Hoser, R. T. 2015a. Dealing with the "truth haters" ... a summary! Introduction to Issues 25 and 26 of *Australasian Journal of Herpetology*. Including "A timeline of relevant key publishing and other events relevant to Wolfgang Wüster and his gang of thieves." and a "Synonyms list". *Australasian Journal of Herp.* 25:3-13.
- Hoser, R. T. 2015b. The Wüster gang and their proposed "Taxon Filter": How they are knowingly publishing false information, recklessly engaging in taxonomic vandalism and directly attacking the rules and stability of zoological nomenclature. *Australasian Journal of Herpetology* 25:14-38.
- Hoser, R. T. 2015c. Best Practices in herpetology: Hinrich Kaiser's claims are unsubstantiated. *Australasian Journ. of Herp.* 25:39-52.
- Hoser, R. T. 2015d. Comments on *Spracklandus* Hoser, 2009 (Reptilia, Serpentes, ELAPIDAE): request for confirmation of the availability of the generic name and for the nomenclatural validation of the journal in which it was published (Case 3601; see *BZN* 70: 234-237; comments *BZN* 71:30-38, 133-135). (unedited version) *Australasian Journal of Herpetology* 27:37-42.
- Hoser, R. T. 2015e. PRINO (Peer reviewed in name only) journals: When quality control in scientific publication fails. *Australasian Journal of Herpetology* 26:3-64.
- Hoser, R. T. 2015f. Rhodin *et al.* 2015, Yet more lies, misrepresentations and falsehoods by a band of thieves intent on stealing credit for the scientific works of others. *Australasian Journal of Herpetology* 27:3-36.
- Klauber, L. M. 1944. The sidewinder, *Crotalus cerastes*, with description of a new subspecies. *Transactions of the San Diego Society of Natural History* 10(8):91-126.
- Ride, W. D. L. (ed.) *et al.* (on behalf of the International Commission on Zoological Nomenclature) 1999. *International code of Zoological Nomenclature*. The Natural History Museum - Cromwell Road, London SW7 5BD, UK.
- Savage, J. M. and Cliff, F. S. 1953. A new subspecies of sidewinder, *Crotalus cerastes*, from Arizona. *Nat. Hist. Misc. (Chicago Acad. Sci. J.)* (119):1-7.
- Victorian Civil and Administrative Tribunal (VCAT). 2015. *Hoser v Department of Environment Land Water and Planning (Review and Regulation)* [2015] VCAT 1147 (30 July 2015, judgment and transcript).

#### CONFLICTS OF INTEREST

There are no conflicts of interest in relation to this paper.

## **Two egg-eating snakes in India. *Elachistodon westermanni* Reinhardt, 1863 (Serpentes, Colubridae), divided into two allopatric subspecies.**

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Received 28 March 2018, Accepted 10 June 2018, Published 20 June 2018.

### ABSTRACT

*Elachistodon westermanni* Reinhardt, 1863, better known as the Indian egg-eating snake is a little –known taxon from the Indian Subcontinent. Two allopatric populations are known, separated by a distance of about 450 km at the narrowest point and while morphologically similar, are sufficiently divergent to warrant taxonomic recognition as separate biological entities.

Therefore the purpose of this paper is to formally name the south-west population as a new subspecies, *Elachistodon westermanni sloppi* subsp. nov. according to the rules of the *International Code of Zoological Nomenclature* (Ride et al. 1999).

Keywords: snake; taxonomy, nomenclature, India, *Elachistodon*; *westermanni*; new subspecies; *dannybrowni*; conservation.

### INTRODUCTION

*Elachistodon westermanni* Reinhardt, 1863, better known as the Indian egg-eating snake is a rarely seen (by herpetologists anyway) and consequently a little known taxon from the Indian Subcontinent.

Until now it has been treated as a monotypic taxon.

Long thought to be closely related to snakes of the genus *Dasyplectis* Wagler, 1830 from Africa and the Middle-east, the most recent molecular study by Mohan et al. (2018) has shown the closest relatives to be within the *Boiga sensu lato* group as defined by Hoser (2012) and Hoser (2013).

Two well-defined allopatric populations are known, shown to be separated by a distance of about 450 km at the narrowest point (Khandal et al. 2016).

Until now, all previous authors have treated all relevant snakes from both populations as being of one and the same species. However inspection of specimens by myself via the literature, numerous published photos and the limited number I could easily locate in Zoological Collections (a grand total of 3 specimens), confirmed that each population are morphologically distinct and divergent and should therefore be treated as separate taxonomic entities.

Therefore the purpose of this paper is primarily to formally name the unnamed south-western population as a new subspecies *Elachistodon westermanni dannybrowni* subsp. nov. according to the rules of the *International Code of Zoological Nomenclature* (Ride et al. 1999).

The formal naming as a subspecies is conservative and there is a strong likelihood that in the future, this taxon may need to be elevated to the status of full species.

In any event it is clearly geographically separated from the form herein identified as *Elachistodon westermanni westermanni* and therefore by the species definitions used by many, would already qualify as a fully functioning and evolving species in effective isolation of all others of similar form.

As inferred already, the materials and methods of this paper and results are self-evident.

The relevant key literature supporting the taxonomic decisions and actions within this paper are as follows: Boulenger (1890, 1896), Captain et al. (2015), Dandge et al. (2016), Gans (1954), Hoser (2012, 2013), Khandal et al. (2016), Mohan et al. (2018), Narayanan (2012), Schleich and Kästle (2002), Sharma (2004), Sharma (2014), Smith (1943), Vyas (2006, 2010, 2013, 2016), Vyas et al. (2017) and Wall (1913) including sources cited therein.

In terms of the formal description below, the spelling of the scientific name assigned should not be altered in any way unless absolutely mandatory under the rules of zoological nomenclature as published by the ICZN in the *International Code of Zoological Nomenclature* (Ride et al. 1999).

### **ELACHISTODON WESTERMANNI DANNYBROWNI SUBSP. NOV.**

**Holotype:** A preserved specimen, specimen number: NZC-V/3412 held at the National Zoological Collection at the Zoological Survey of India, (Jodhpur), collected at Bherounda Khurd, Sawai Madhopur, Rajasthan, India.

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

**Diagnosis:** *Elachistodon westermanni dannybrowni* subsp. nov. is readily separated from nominate *Elachistodon westermanni westermanni* by the possession of a distinctive angular yellowish cross band on the nape. In *Elachistodon westermanni westermanni* there is no such obvious band and the nape is brownish in colour and no band is obvious. *Elachistodon westermanni dannybrowni* subsp. nov. is also readily separated from the nominate subspecies by dorsal colouration. In *Elachistodon westermanni dannybrowni* subsp. nov. the light yellowish vertebral stripe is thick and well-defined for the entire body length, whereas in *Elachistodon westermanni westermanni* it is characterized by being thinner and often broken at the posterior end of the body.

In both taxa the mid-dorsal stripe is broken at the anterior end of the body (neck region) before it establishes further down.

Scale counts and configurations between both taxa appear to overlap and cannot be reliably used to separate the taxa.

Both are characterised by the following suite of characters: Rostral



is twice as broad as deep, just reaching the upper surface of the head; internasals and prefrontals are subequal in size; frontal is rather longer than broad, as long as its distance from the end of the snout, shorter than the parietals; loreal small, longer than deep, entering the eye; a small preocular is above the loreal; two postoculars; two very long temporals; 6 or 7 upper labials, third and fourth entering the eye equally; 3 pairs of large chin-shields.

There are 15 mid-body rows. 197-220 ventrals (higher counts in females); anal entire; 58-65 subcaudals.

Colouration is best described as being brownish above, with scattered lighter flecks on the flanks, almost arranged in a patterned configuration and with a distinctive yellowish vertebral band (see separation between the two subspecies given above); a cream or yellowish band commences on the snout and runs along each side of the head to the temporals and the angle of the mouth; in *Elachistodon westermanni westermanni* there is an angular yellowish cross band on the nape, this not being seen in *Elachistodon westermanni dannybrowni* subsp. nov.; lower parts in both taxa are yellowish to whitish and shiny, tending more whitish in *Elachistodon westermanni dannybrowni* subsp. nov. and more yellowish in *Elachistodon westermanni westermanni*.

The holotype of *Elachistodon westermanni dannybrowni* subsp. nov. is described in detail and depicted in the paper of Khandal et al. (2016). Vyas et al. (2017) also depict a number of photos of *Elachistodon westermanni dannybrowni* subsp. nov..

Nominate *Elachistodon westermanni westermanni* is depicted in Gans (1954) at Fig. 4, showing the distinctive head markings of this taxon as opposed to what is seen in *Elachistodon westermanni dannybrowni* subsp. nov. as depicted in the publications of Khandal et al. (2016) and Vyas et al. (2017).

**Distribution:** *Elachistodon westermanni dannybrowni* subsp. nov. occurs in northern India, generally south of the Ganges floodplain and flats, not including the eastern part of India.

Specimens north of the Ganges Valley and including Eastern India are of the nominate subspecies.

Sharma (2014) provides a distribution map for both subspecies at page 162, Fig. 1. *Elachistodon westermanni westermanni* has its distribution marked by the circles numbered, 1-5 and 15.

*Elachistodon westermanni dannybrowni* subsp. nov. has its distribution marked by circles 6-14 and 16, representing the approximate northern extremity of the range of this taxon.

**Conservation:** That the species *Elachistodon westermanni* survives in India is in spite of human activities and not because of any proper conservation measures in place. In common with much of planet Earth, India has an exploding human population that in turn puts pressure on the survival of countless species.

The most effective conservation measure for this and most other non-domestic species native to India and most other parts of the world, is for governments to regulate human population and birth rates in India and for that matter, elsewhere (Hoser 1991). In terms of *Elachistodon westermanni* it is clear that both subspecies can survive in severely degraded habitats and agricultural areas (or at least on the periphery of agricultural precincts), meaning the short term survival of the species is likely to continue and it may in fact be more abundant than current publications on the genus suggest.

**Etymology:** Named in honour of Dr. Danny Brown of the Sunshine Coast in south-east Queensland, Australia, herpetologist and author of numerous books specializing in the keeping of Australian reptiles including for example Brown (2014), generally regarded as being "best in class", recognizing his immense ongoing contributions to herpetology in Australia and elsewhere.

#### REFERENCES CITED

Boulenger, G. A. 1896. *Catalogue of the snakes in the British Museum, Vol. 3*. Taylor and Francis, London, UK: xiv + 727 pp.  
 Boulenger, A. G. 1890. *The Fauna of British India*. Taylor and Francis, London, UK:541 pp.  
 Captain, A., Tillack, F., Gumprecht, A., and Dandge, P. 2005. First record of *Elachistodon westermanni* Reinhardt, 1863 (Serpentes, Colubridae, Colubrinae) from Maharashtra State, India. *Russian Journal of Herpetology*, 12(2):121-123.

Brown, D. 2014. *A Guide to Australian Lizards in Captivity*. ABK Publications, Tweed Heads, NSW, Australia: 952 pp.

Dandge, P. H. and Tiple, A. D. 2016. Notes on Natural History, New Distribution Records and Threats of Indian Egg Eater Snake *Elachistodon westermanni* Reinhardt, 1863 (Serpentes: Colubridae): Implications for Conservation. *Russian Journal of Herpetology* 23(1):55-62.

Gans, C. 1954. Present knowledge of the snake *Elachistodon westermanni* Reinhardt. *Breviora* (36):1-17.

Hoser, R. T. 1991. *Endangered Animals of Australia*. Pierson Publishing, Mosman, NSW, 2088, Australia:240 pp.

Hoser, R. T. 2012. Divisions of the Asian colubrid snake genera *Xenochrophis*, *Dendrelaphis* and *Boiga* (Serpentes: Colubridae). *Australasian Journal of Herpetology* 12:65-76.

Hoser, R. T. 2013. Further division of the genera *Boiga* Fitzinger, 1826 and *Chrysopelea* Boie, 1826, with the creation of a new tribe, a new genus and a new subgenus. *Australasian Journal of Herpetology* 16:9-14.

Khandal, D., Sahu, K. and Sharma, V. 2016. New record of *Elachistodon westermanni* Reinhardt, 1863 (Serpentes, Colubridae) for Rajasthan State, India. *Zootaxa* (online) 3827 (1):5766.

Sharma, V. 2014. On the distribution of *Elachistodon westermanni* Reinhardt, 1863 (Serpentes: Colubridae). *Russian Journal of Herpetology*, 21(3):161-165.

Mohan, A. V., Visvanathan, A. C. and Vasudevan, K. 2018. Phylogeny and conservation status of the Indian egg-eater snake, *Elachistodon westermanni* Reinhardt, 1863 (Serpentes, Colubridae). *Amphibia-Reptilia*, May 2018 (posted online).

Narayanan, A. 2012. Records of Indian Egg Eater Snake *Elachistodon westermanni* in the localities of Shegaon, District Buldhana, Maharashtra, India. *Reptile Rap* (14):9-12.

Reinhardt, J. and Lütken, C. 1863. En ny Slaegt af Slangefamilien Rachiodontidae. *Overs. Dansk. Vid. Selsk. Forh.* [1862]

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

Schleich, H. H. and Kästle, W. 2002. *Amphibians and Reptiles of Nepal*. Koeltz, Königstein:1200 pp.

Sharma, R. C. 2004. *Handbook Indian Snakes*. Akhil Books, New Delhi, India:292 pp.

Sharma, V. 2014. On the Distribution of *Elachistodon westermanni* Reinhardt, 1863 (Serpentes, Colubridae). *Russian Journal of Herpetology* 21(3):161-165.

Smith, M. A. 1943. *The Fauna of British India, Ceylon and Burma, Including the Whole of the Indo-Chinese Sub-Region. Reptilia and Amphibia. 3 (Serpentes)*. Taylor and Francis, London, UK:583 pp.

Vyas, R. 2006. Story of a snake's photograph from Gujarat and notes on further distribution of the Indian egg-eater snake. *Herpinstance* 3(2):1-4.

Vyas, R. 2010. Distribution of *Elachistodon westermanni* in Gujarat. *Reptile Rap* (10):7-8.

Vyas, R. 2013. Notes and Comments on Distribution of a Snake: Indian Egg Eater (*Elachistodon westermanni*). *Russian Journal of Herpetology* 20(1):39-42.

Vyas, R. 2016. Distribution of the Indian Egg-eater (*Elachistodon westermanni* Reinhardt, 1864), with three new records from Gujarat, India, and descriptions of its pholidosis and hemipenis morphology. *Sauria* 38(1):15-21.

Vyas, R., Patel, H. and Dudhatra, B. 2017. The Indian Egg-Eating Snake, *Elachistodon westermanni* (Colubridae): Comments on Distribution and New Localities from Gujarat, India. *IRCF Reptiles and Amphibians* 24(3):203-206.

Wall, F. 1913. A rare Snake (*Elachistodon westermanni*) from the Jalpaiguri District. *Journal of the Bombay Natural History Society* 22:400.

#### CONFLICTS OF INTEREST

There are no conflicts of interest in relation to this paper.

## **Feresuta a new genus of West Australian snake and the formal description of a new species in the same genus.**

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Received 12 April 2018, Accepted 10 May 2018, Published 20 June 2018.

### **ABSTRACT**

Small elapid snakes in Australia, many with generally black heads, have been assigned to various genera as outlined by Hoser (2012a, 2012b).

That genus-level arrangement is maintained herein and has been supported by more recently published molecular studies such as Pyron *et al.* (2013).

One nominate species has been excluded from the more recent treatise by Hoser (2012b) and that was "*Denisonia monachus* Storr, 1964".

Phylogenetically it sits between the genera *Suta* Worrell, 1961 and *Hulimkai* Hoser, 2012. The divergence between both is however sufficient to warrant placement in a new genus.

The new genus is formally named according to the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999) as *Feresuta gen. nov.*

"*Denisonia monachus* Storr, 1964" as formally described by Storr clearly constitutes at least two species level taxa. The nominate form is from southern Western Australia.

The second from the Hamersley Ranges in Western Australia is formally named as a new species according to the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

Two central Australian populations of "*Denisonia monachus* Storr, 1964" are also formally described herein as new subspecies.

The species *Hulimkai punctata* (Boulenger, 1896) (see Hoser, 2012a for an explanation), is clearly separated into two divergent populations. The second is herein formally described as a new subspecies, namely *H. punctata divergens subsp. nov.*

Similar applies for *H. fasciata* (Rosén, 1905). The unnamed Pilbara population is herein formally named as a new subspecies *H. fasciata ruber subsp. nov.*

Further studies may necessitate elevation of one or more subspecies to full species.

**Keywords:** Taxonomy; nomenclature; snake; Western Australia; Northern Territory; Queensland; Hamersley Ranges; Australia; genus; *Suta*; *Hulimkai*; *Denisonia*; new genus; *Feresuta*; species; *monachus*; *punctata*; *fasciata*; new species; *hamersleyensis*; new subspecies; *centralis*; *interiorensis*; *divergens*; *ruber*.

### **INTRODUCTION**

Small elapid snakes in Australia, many with generally black heads, have been assigned to various genera as outlined by Hoser (2012a, 2012b).

That genus-level arrangement was the culmination of an audit of the relevant species over some decades.

The genus-level arrangement of Hoser (2012a, 2012b) is maintained herein and has been supported by more recently published molecular studies such as Pyron *et al.* (2013).

One nominate species had been excluded from the more recent treatise by Hoser (2012b) and that was the mainly West Australian putative taxon "*Denisonia monachus* Storr, 1964".

Phylogenetically it sits between the genera *Suta* Worrell, 1961 and *Hulimkai* Hoser, 2012. The divergence between both is however sufficient to warrant placement in a separate genus.

As it is effectively inevitable that the species group needs to be formally named at the genus level this is done herein.

The new genus is formally named according to the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999) as *Feresuta gen. nov.*

"*Denisonia monachus* Storr, 1964" as formally described by Storr also clearly constitutes at least two species level taxa. The nominate form is from southern Western Australia.

The second and probably most divergent population from the Hamersley Ranges in Western Australia is formally named as a new species according to the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

It is called *Feresuta hamersleyensis sp. nov.*

Two central Australian populations of "*Denisonia monachus* Storr, 1964" are also formally described herein as new subspecies.

These are *Feresuta monachus interiorensis subsp. nov.* and *Feresuta monachus centralis subsp. nov.* The species *Hulimkai punctata* (Boulenger, 1896) (see Hoser, 2012a for an explanation as to the placement of the species in this genus), is clearly separated into two divergent populations. The second is herein formally described as a new subspecies *H. punctata divergens subsp. nov.*

Similar applies for *H. fasciata* (Rosén, 1905). The unnamed Pilbara population is herein formally named as a new subspecies *H. fasciata ruber subsp. nov.*



I note that there is no question that the type specimen for Rosén's species is of the south-western Australian form of the species. While the type locality is given as "West Australia" and on the surface could mean anywhere in the State of Western Australia, the original description matches the southern form of *H. fasciata* and not that from the Pilbara. It is also significant that the other well-known species formally named by Rosén from "West Australia", "*Egernia inornata* Rosén, 1905", is only found in the region to the south and west of the Pilbara and it can also reasonably be assumed that both relevant types lodged at his museum were collected from the same general locality.

#### MATERIALS, METHODS AND RESULTS

As already inferred, inspection of numerous specimens, live, in jars in museums and via photos with accurate locality data, as well as a perusal of the limited published literature on the putative taxa was conducted over some decades. I have also collected extensively in the relevant regions in Australia, including caught *in situ* the taxa formally described herein.

This is all mentioned here, even though it could be described as trite. This is because there is no doubt that a well-known bunch of law-breaking haters and online trolls, known as the Wüster gang will emerge to allege I have no experience at all with the said taxa and that all my evidence is either "non-existent", "fabricated" or "stolen", (see for example Kaiser (2012a, 2012b, 2013, 2014a, 2014b) and Kaiser *et al.* (2013), the latter "paper" perhaps should be better known as "Wüster and others he can "add" to his authors list". However none of the inevitable claims by the haters are in fact the case.

Obviously I should note that morphological divergence on its own is not regarded by myself as sufficient grounds to assign the relevant populations to a new species, subspecies or genera.

However there are other important grounds.

The relevant species and subspecies populations are separated by well defined areas of unsuitable habitat and by all available evidence are evolving as if separate species.

Critically important is that each population is also reproductively isolated and evolving as separate evolutionary units, with zero likely prospect of interbreeding or introgression and so must be regarded as fully separate species or subspecies.

Hence the formal scientific descriptions below.

The genus-level group named herein is also of sufficient molecular divergence as to warrant being formally named. This is in addition to morphological divergence.

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 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 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).

While there are numerous bibliographic references to the putative taxa cited above, only the most relevant are cited herein. The most important ones in terms of the taxonomic decisions herein, and taken into consideration along with the physical evidence of the snakes themselves are: Boulenger (1896), Cogger (2014), Hoser (1989, 2012a, 2012b), Mengden (1983), Pyron *et al.* (2013), Rosén (1905a, 1905b), Smith (1980), Storr (1964, 1981), Storr, Smith and Johnstone (2002), Wells and Wellington (1984, 1985), Wilson and Knowles (1988), Wilson and Swan (2017), Worrell (1961a,b, 1963) and sources cited therein.

In terms of the descriptions, the spelling of the names should not be altered in any way unless mandatory under the rules of the *International Code of Zoological Nomenclature* (Ride *et al.*, 1999) or any other relevant ICZN code in force.

#### FERESUTA GEN. NOV.

**Type species:** *Feresuta hamersleyensis* sp. nov.

**Diagnosis:** The genus *Feresuta* gen. nov. are separated from all other Australian elapid snakes by the following suite of characters: A smooth-scaled snake; the head has a conspicuous dark upper surface or hood that has an unbroken black area, including being black between the eye and the snout, which contrasts strongly with the paler colour of the neck and body, no labial barring (as in no dark and light bars); the body lacking a darker vertebral zone; no suboculars; 15 mid-body rows; anal and subcaudals are all single; frontal more than 1.5 times as broad as the supraocular; three or more solid maxillary teeth following the fang; belly lacks a series of crescent-shaped, transverse black bars; ventrals are also smooth and lack keels or notches; the tail is normal in shape and not paddle shaped like seen in marine species.

**Distribution:** Most of Western Australia, excluding most of the northern third, as well as most of the western two thirds of South Australia and nearby parts of central Australia in the Northern Territory.

**Etymology:** *Fere* means "nearly" or "not quite" in Latin. So the genus implies that the subject species are "not quite *Suta*".

**Content:** *Feresuta hamersleyensis* sp. nov. (type species) (this paper), *F. monachus* (Storr, 1964)

#### FERESUTA HAMERSLEYENSIS SP. NOV.

**Holotype:** A preserved specimen in the Western Australian Museum, Perth, Western Australia, Australia, specimen number: R51654 collected from near Mount Bruce in the Hamersley Ranges, Western Australia, Australia, Latitude 22.36 S., Longitude 118.09 E. The Western Australian Museum, Perth, Western Australia, Australia allows access to its holdings.

**Paratypes:** Two preserved specimens in the Western Australian Museum, Perth, Western Australia, Australia, specimen numbers: R54338 and R62460 also collected from near Mount Bruce in the Hamersley Ranges, Western Australia, Australia.

**Diagnosis:** *Feresuta hamersleyensis* sp. nov. is readily separated from the other species in the genus *F. monachus* (Storr, 1964) including all subspecies, by the presence of 2 secondary temporals versus one in *F. monachus*. Adult *F. hamersleyensis* sp. nov. exceed 400 mm in snout-vent length, whereas this is not the case in *F. monachus*. *F. hamersleyensis* sp. nov. is significantly larger and more robust than *F. monachus*.

*Feresuta monachus interiorensis* subsp. nov. is readily separated from all of nominate *F. monachus*, *F. hamersleyensis* sp. nov., and *F. monachus centralis* subsp. nov. by the presence of a pale spot, usually bounded by black in front of each eye, which is sometimes very indistinct.

*Feresuta monachus centralis* subsp. nov. is readily separated from nominate *F. monachus*, *F. hamersleyensis* sp. nov., and *F. monachus interiorensis* subsp. nov. by the consistent presence of orange in the region between the eye and the snout and/or orange on the upper surface of the head.

The two species of snake within the genus *Feresuta* gen. nov. as defined herein, namely *Feresuta hamersleyensis* sp. nov. and *F. monachus* (Storr, 1964) are separated from all other Australian elapid snakes by the following suite of characters: A smooth-scaled snake; the head has a conspicuous dark upper surface or hood that has an unbroken black area, including being black between the eye and the snout, which contrasts strongly with the paler colour of the neck and body, no labial barring (as in no dark and light bars); the body lacking a darker vertebral zone; no suboculars; 15 mid-body rows; anal and subcaudals are all single; frontal more than 1.5 times as broad as the supraocular; three or more solid maxillary teeth following the fang; belly lacks a series of crescent-shaped, transverse black bars; ventrals are also smooth and lack keels or notches; the tail is normal in shape and not paddle shaped like seen in marine species.

**Distribution:** *Feresuta hamersleyensis* sp. nov. is as far as is known, restricted to the Hamersley Ranges, Australia.

**Etymology:** The species *Feresuta hamersleyensis* sp. nov. is named in reflection of where the taxon is found.

#### FERESUTA MONACHUS INTERIORENSIS SUBSP. NOV.

**Holotype:** A preserved specimen in the Western Australian Museum, Perth, Western Australia, Australia, specimen number: R22084 collected from the Warburton Mission, Western Australia, at the western side of the Warburton Ranges, Australia, Latitude 26.08

S., Longitude 126.39 E.

The Western Australian Museum, Perth, Western Australia, Australia allows access to its holdings.

**Paratype:** A preserved specimen in the Western Australian Museum, Perth, Western Australia, Australia, specimen number: R22085 collected from the Warburton Mission, Western Australia, at the western side of the Warburton Ranges, Australia, Latitude 26.08 S., Longitude 126.39 E.

**Diagnosis:** *Feresuta monachus interiorensis* subsp. nov. is readily separated from nominate *F. monachus*, *F. hamersleyensis* sp. nov., and *F. monachus centralis* subsp. nov. by the presence of a pale spot, usually bounded by black in front of each eye, which is sometimes very indistinct.

*Feresuta hamersleyensis* sp. nov. is readily separated from the other species in the genus *F. monachus* (Storr, 1964), by the presence of 2 secondary temporals versus one in *F. monachus* (all subspecies). Adult *F. hamersleyensis* sp. nov. exceed 400 mm in snout-vent length, whereas this is not the case in *F. monachus*. *F. hamersleyensis* sp. nov. is significantly larger and more robust than *F. monachus*. *Feresuta monachus centralis* subsp. nov. is readily separated from all of nominate *F. monachus*, *F. hamersleyensis* sp. nov., and *F. monachus interiorensis* subsp. nov. by the consistent presence of orange in the region between the eye and the snout and/or orange on the upper surface of the head.

The two species of snake within the genus *Feresuta* gen. nov. as defined herein, namely *Feresuta hamersleyensis* sp. nov. and *F. monachus* (Storr, 1964) are separated from all other Australian elapid snakes by the following suite of characters: A smooth-scaled snake; the head has a conspicuous dark upper surface or hood that has an unbroken black area, including being black between the eye and the snout, which contrasts strongly with the paler colour of the neck and body, no labial barring (as in no dark and light bars); the body lacking a darker vertebral zone; no suboculars; 15 mid-body rows; anal and subcaudals are all single; frontal more than 1.5 times as broad as the supraocular; three or more solid maxillary teeth following the fang; belly lacks a series of crescent-shaped, transverse black bars; ventrals are also smooth and lack keels or notches; the tail is normal in shape and not paddle shaped like seen in marine species.

**Distribution:** *Feresuta monachus interiorensis* subsp. nov. is believed to be restricted to the general vicinity of the Warburton Range in far western Australia in the region of the intersection of the Northern Territory, South Australia and Western Australia, extending into nearby parts of Western Australia.

**Etymology:** *F. monachus interiorensis* subsp. nov. is named in reflection of where it occurs, being the interior of Western Australia.

#### **FERESUTA MONACHUS CENTRALIS SUBSP. NOV.**

**Holotype:** A preserved specimen in the Western Australian Museum, Perth, Western Australia, Australia, specimen number: R46639 collected from Ayers Rock, Northern Territory, Australia, Latitude 15.21 S., Longitude 131.02 E.

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

**Diagnosis:** *Feresuta monachus centralis* subsp. nov. is readily separated from all of nominate *F. monachus*, *F. hamersleyensis* sp. nov., and *F. monachus interiorensis* subsp. nov. by the consistent presence of orange in the region between the eye and the snout and/or orange on the upper surface of the head.

*Feresuta monachus interiorensis* subsp. nov. is readily separated from nominate *F. monachus*, *F. hamersleyensis* sp. nov., and *F. monachus centralis* subsp. nov. by the presence of a pale spot, usually bounded by black in front of each eye, which is sometimes very indistinct.

*Feresuta hamersleyensis* sp. nov. is readily separated from the other species in the genus *F. monachus* (Storr, 1964), by the presence of 2 secondary temporals versus one in *F. monachus* (all subspecies). Adult *F. hamersleyensis* sp. nov. exceed 400 mm in snout-vent length, whereas this is not the case in *F. monachus*. *F. hamersleyensis* sp. nov. is significantly larger and more robust than *F. monachus*.

The two species of snake within the genus *Feresuta* gen. nov. as defined herein, namely *Feresuta hamersleyensis* sp. nov. and *F. monachus* (Storr, 1964) are separated from all other Australian elapid snakes by the following suite of characters: A smooth-scaled

snake; the head has a conspicuous dark upper surface or hood that has an unbroken black area, including being black between the eye and the snout, which contrasts strongly with the paler colour of the neck and body, no labial barring (as in no dark and light bars); the body lacking a darker vertebral zone; no suboculars; 15 mid-body rows; anal and subcaudals are all single; frontal more than 1.5 times as broad as the supraocular; three or more solid maxillary teeth following the fang; belly lacks a series of crescent-shaped, transverse black bars; ventrals are also smooth and lack keels or notches; the tail is normal in shape and not paddle shaped like seen in marine species.

**Distribution:** *Feresuta monachus centralis* subsp. nov. is believed to be restricted to the general vicinity of the the Macdonnell Ranges and nearby areas in central Australia.

**Etymology:** *F. monachus centralis* subsp. nov. is named in reflection of where the taxon occurs, this being the central part of Australia.

#### **HULIMKAI PUNCTATA DIVERGENS SUBSP. NOV.**

**Holotype:** A preserved specimen at the Australian Museum, Sydney, New South Wales, Australia, specimen number: R49088 collected at Mount Isa, Queensland, Australia, Latitude 20.44 S., Longitude 139.29 E.

The Australian Museum, Sydney, New South Wales, Australia is a government-owned facility that allows access to its holdings.

**Paratypes:** 1/ A preserved specimen at the Australian Museum, Sydney, New South Wales, Australia, specimen number: R46040 collected at Mount Isa, Queensland, Australia, Latitude 20.44 S., Longitude 139.29 E.

2/ A preserved specimen at the Northern Territory Museum, Australia, specimen number: R01155 collected at Mount Isa, Queensland, Australia, Latitude 20.44 S., Longitude 139.29 E.

**Diagnosis:** *Hulimkai punctata divergens* subsp. nov. is readily separated from nominate *H. punctata punctata* (Boulenger, 1896) by the fact that in *H. punctata punctata* all of the dorsal body scales are either black centered or black tipped, which is not the case in *Hulimkai punctata divergens* subsp. nov..

*Hulimkai punctata* (both subspecies) are readily separated from all other species of *Hulimkai* Hoser, 2012 and *Suta* Worrell, 1961 by a body with 15 or 17 mid body rows (versus 19-21 in *Suta*) and a body lacking numerous irregular, narrow, or sometimes broken dark cross-bands as seen in *H. fasciata* (Rosén, 1905).

*H. fasciata* has 17 mid body rows, versus 15 in *H. punctata*.

*Hulimkai punctata divergens* subsp. nov. is depicted on page 934 at top left in Cogger (2014).

*H. punctata punctata* is depicted on page 344, middle right of Wilson and Knowles (1998) and also page 591 at centre of Wilson and Swan (2017).

**Distribution:** *Hulimkai punctata divergens* subsp. nov. occurs throughout the drier tropical third of Australia, bounded in the east by wetter parts of north-east Queensland and in the west by the arid zone between the Kimberley and Pilbara.

*H. punctata punctata* is restricted to the Pilbara region of Western Australia.

**Etymology:** *Hulimkai punctata divergens* subsp. nov. is named in reflection of the fact that this taxon is divergent from the nominate form morphologically and also by distribution.

#### **HULIMKAI FASCIATA RUBER SUBSP. NOV.**

**Holotype:** A preserved specimen in the Western Australian Museum, Perth, Western Australia, Australia, specimen number: R538 collected from Marble Bar in Western Australia, Australia, Latitude 21.10 S., Longitude 119.44 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 in the Western Australian Museum, Perth, Western Australia, Australia, specimen number: R31983 collected from 2 km south of Whim Creek in Western Australia, Australia, Latitude 20.52 S., Longitude 117.50 E.

2/ A preserved specimen in the Western Australian Museum, Perth, Western Australia, Australia, specimen number: R41568 collected from Roebourne in Western Australia, Australia, Latitude 20.47 S., Longitude 117.09 E.

**Diagnosis:** *Hulimkai fasciata ruber* subsp. nov. (formerly placed by most authors, including Cogger 2017 in the genus *Suta* Worrell, 1961) is readily separated from *H. fasciata fasciata* by having a

dorsal colour pattern consisting of semi-distinct irregular dark brown markings on a rich reddish brown background colour, the area of lighter colour being significantly greater than the darker.

By contrast *H. fasciata fasciata* has well defined and large irregular blackish markings overlaying a light-brown to yellowish brown body. The darker markings occupy an area equal to or larger than the lighter areas.

*H. fasciata fasciata* is also characterised by a thick well defined dark line running from the snout, through the eye, to the back of the head and continuing onto the upper neck, where it merges on each side of the neck with a large dark body blotch. By contrast *Hulimkai fasciata ruber subsp. nov.* has an ill-defined and usually broken line running from the snout, through the eye and to the back of the head and it does not merge with blotches on the neck. In rare cases where it may appear to be continuous, the line tends to form broken blotches, separated by light zones and in no way resembles the thick bar seen in *H. fasciata fasciata*.

*Hulimkai* are separated from all species within *Suta* as defined by Cogger (2017), by having 15 or 17 mid body rows, versus 19-21 in *Suta*. The numerous irregular, narrow, dark cross-bands as seen in *H. fasciata* are not seen in the other species in the genus, namely *H. punctata* (Boulenger, 1896).

*H. fasciata* has 17 mid body rows, versus 15 in *H. punctata*.

*Hulimkai fasciata ruber subsp. nov.* is depicted in Storr, Smith and Johnstone (2002), plate 48 top photo, alongside *H. fasciata fasciata* at plate 48 bottom photo. *H. fasciata fasciata* is also depicted in Wilson and Swan (2017) at page 589 bottom.

*Hulimkai fasciata ruber subsp. nov.* is depicted in Cogger (2014) at page 933, top, as well as in Wilson and Knowles (1988) at page 344 bottom right and also Hoser (1989) on page 154 at bottom.

**Distribution:** *H. fasciata ruber subsp. nov.* is confined in general to the Pilbara region of Western Australia. The nominate form of *H. fasciata fasciata* occupies the rest of the range for the species, being generally south and south-east of the Pilbara in Western Australia, not including the far south, north-west and far west of the State. *H. fasciata* is an endemic species to Western Australia.

**Etymology:** The scientific name refers to the reddish-brown colouration of this subspecies.

#### REFERENCES CITED

- Boulenger, G. A. 1896. *Catalogue of the snakes in the British Museum*, Vol. 3. London (Taylor and Francis):xiv+727 pp.
- Cogger, H. G. 2014. *Reptiles and Amphibians of Australia*, 7th ed. CSIRO Publishing, Australia:xxx+1033 pp.
- Court of Appeal Victoria. 2014. Hoser v Department of Sustainability and Environment [2014] VSCA 206 (5 September 2014).
- Hoser, R. T. 1989. *Australian Reptiles and Frogs*. Pierson and Co., Mosman, NSW, 2088, Australia:238 pp.
- Hoser, R. T. 1991. *Endangered Animals of Australia*. Pierson Publishing, Mosman, NSW, 2088, Australia:240 pp.
- Hoser, R. T. 1993. *Smuggled: The Underground Trade in Australia's Wildlife*. Apollo Publishing, Moss Vale, NSW, Australia:160 pp.
- Hoser, R. T. 1996. *Smuggled-2: Wildlife Trafficking, Crime and Corruption in Australia*. Kotabi Pub., Australia:280 pp.
- Hoser, R. T. 2012a. The description of a new genus of west Australian snake and eight new taxa in the genera *Pseudonaja* Gunther, 1858, *Oxyuranus* Kinghorn, 1923 and *Panacodochis* Wells and Wellington, 1985 (Serpentes: Elapidae). *Australasian Journal of Herpetology* 11:32-50.
- Hoser, R. T. 2012b. Some new small-eyed snakes from Australia and New Guinea (Serpentes: Elapidae). *Australasian Journal of Herpetology* 13:3-7.
- Hoser, R. T. 2015a. Dealing with the "truth haters" ... a summary! Introduction to Issues 25 and 26 of *Australasian Journal of Herpetology*. Including "A timeline of relevant key publishing and other events relevant to Wolfgang Wüster and his gang of thieves." and a "Synonyms list". *Australasian Journal of Herpetology* 25:3-13.
- Hoser, R. T. 2015b. The Wüster gang and their proposed "Taxon Filter": How they are knowingly publishing false information, recklessly engaging in taxonomic vandalism and directly attacking the rules and stability of zoological nomenclature. *Australasian Journal of Herpetology* 25:14-38.
- Hoser, R. T. 2015c. Best Practices in herpetology: Hinrich Kaiser's claims are unsubstantiated. *Australasian Journal of Herp.* 25:39-52.
- Hoser, R. T. 2015d. Comments on *Spracklandus* Hoser, 2009 (Reptilia, Serpentes, ELAPIDAE): request for confirmation of the availability of the generic name and for the nomenclatural validation of the journal in which it was published (Case 3601; see *BZN* 70: 234-237; comments *BZN* 71:30-38, 133-135). (unedited version) *Australasian Journal of Herpetology* 27:37-42.

Hoser, R. T. 2015e. PRINO (Peer reviewed in name only) journals: When quality control in scientific publication fails. *Australasian Journal of Herpetology* 26:3-64.

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

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

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

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

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

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

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

Mengden, G. A., 1983. The taxonomy of Australian elapid snakes: a review. *Records of the Australian Museum* 35(5):195-222. [30 December 1983].

Pyron, R. A., Burbrink, F. T. and Wiens, J. J. 2013. A phylogeny and revised classification of Squamata, including 4151 species of lizards and snakes. *BMC Evolutionary Biology* 13:93.

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

Rosén, N. 1905a. List of the snakes in the Zoological Museum of Lund and Malmö, with descriptions of new species and a new genus. *Ann. Mag. nat. Hist.* (7)15:168-181.

Rosen, N. 1905b. List of the lizards in the Zoological Museum of Lund, with descriptions of new species. *Ann. Mag. nat. Hist.* (7)16:129-142

Smith, L. A. 1980. Taxonomy of *Denisonia punctata* and *Denisonia fasciata* (Serpentes: Elapidae). *Rec. of the West. Aus. Mus.* 8: 327-333.

Storr, G. M. 1964. *Denisonia monachus*, a new elapid snake from Western Australia. *Western Australian Naturalist* 9:89-90.

Storr, G. M. 1981. The *Denisonia gouldii* species-group (Serpentes, Elapidae) in Western Australia. *Rec. of the West. Aust. Mus.* 8:501-515.

Storr, G. M., Smith, L. A. and Johnstone, R. E. 2002. *Snakes of Western Australia*. West. Aust. Mus., Perth, Australia:309 pp.

Victorian Civil and Administrative Tribunal (VCAT). 2015. *Hoser v Department of Environment Land Water and Planning* (Review and Regulation) [2015] VCAT 1147 (30 July 2015, judgment and transcript).

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

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

Wilson, S. and Knowles, D. 1988. *Australia's Reptiles: A photographic reference to the terrestrial reptiles of Australia*. Collins, Australia:447 pp.

Wilson, S. and Swan, G. 2017. *A complete guide to reptiles of Australia*. New Holland, Australia:560 pp.

Worrell, E. 1961a. A new generic name for a nominal species of *Denisonia*. *Proc. of the Royal Society of NSW*, 1958-59:54-55.

Worrell, E. 1961b. Herpetological name changes. *Western Australian Naturalist* 8(1):18-27.

Worrell, E. 1963. A new elapine generic name (with skull diagrams of type species recently separated from the Australian genus *Denisonia*). *Australian Reptile Park Records*, No. 1.

#### CONFLICT OF INTEREST

There are no conflicts of interest in terms of this paper and the author.



## Six new species of Dwarf Goanna, *Worrellisaurus* Wells and Wellington, 1984 from Australia.

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Received 19 May 2018, Accepted 3 June 2018, Published 20 June 2018.

### ABSTRACT

As part of a long-term taxonomic review of Australian varanid lizards by the author over a 40 year period, it has emerged that some morphologically distinct and genetically divergent forms of some species of widely distributed Pygmy Monitors of the genus *Worrellisaurus* Wells and Wellington, 1984 remain unrecognized to science.

The purpose of this paper is to identify and formally name six of these forms.

All newly named species can be readily identified and separated from the nominate form of each closely related species on the basis of morphology. Furthermore previously published studies involving the analysis of DNA has shown species-level divergences for the relevant forms.

In terms of the divergence by way of DNA, earlier studies have shown divergences for each of the five newly named forms being greater than for other well-known and widely accepted taxa, such as *Worrellisaurus bushi* (Aplin, Fitch and King, 2006) versus *W. gilleni* (Lucas and Frost, 1895) (its nearest relative) or *Pantherosaurus flavirufus* (Mertens, 1958) versus *P. gouldi* (Gray, 1838) (its nearest relative).

It is for this reason I have not hesitated to recognise each taxon as full species, rather than to take the conservative position of giving them taxonomic recognition at the subspecies level.

I have no doubt that a group of thieves known as the Wüster gang, will make a lot of “noise” following the publication of this paper and falsely accuse this author of “taxonomic vandalism”, and then a few years down the track, when the obvious can no longer be ignored, they will attempt to steal this work and illegally rename the very same species.

The genus-level taxonomy used in this paper is that used in Hoser (2013), which as of 2018 is widely accepted by scientists as the most logical for the Australian varanids and is fully compliant with the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

**Keywords:** Taxonomy; nomenclature; Goanna; Monitor lizard; Varanidae; *Varanus*; *Worrellisaurus*; *Arborhabitatosaurus*; Pygmy Mulga Goanna; Storr’s Monitor; Ridge-tailed monitor; South Australia; Northern Territory; Western Australia, Queensland, Australia; *acanthurus*; *storri*; *ocreatus*; *makhani*; *gilleni*; *bushi*; new species; *kimaniadilbodeni*; *microocellata*; *tyeseeipperae*; *scotteippereri*; *dannybrowni*; *jenandersonae*.

### INTRODUCTION

As part of a long-term taxonomic review of Australian varanid lizards by the author over a 40 year period, the genus-level classification of the varanidae globally was reviewed and revised by Hoser (2013).

This classification has been widely accepted in the five years since then, including by regular critics of my scientific works known as the Wüster gang of thieves, who have even sought to illegally rename genera first formally named in the Hoser (2013) paper in Bucklitsch *et al.* (2016) as detailed by Hoser (2017).

Therefore the genus-level classification of Hoser (2013) is used throughout this paper.

The nefarious and often illegal activities of the Wüster gang of thieves are detailed in Hoser (2015a-f) and sources cited therein.

Post year 2000 papers naming new taxa of Australian varanid include the following: Doughty *et al.* (2014), Hoser (2013, 2014, 2015g), Maryan *et al.* (2014).

The post year 2000 varanid taxa named in Australia by these authors (using the nomenclature of Hoser 2013) are sixteen species and subspecies-level taxa as follows:

*Worrellisaurus* (*Arborhabitatosaurus*) *bushi* (Aplin, Fitch and King, 2006);

*Odatria* (*Odatria*) *hoserae* Hoser, 2013;

*Odatria* (*Honlamus*) *honlami* Hoser, 2013;

*Odatria* (*Honlamus*) *mitchelli hawkeswoodi* Hoser, 2013;

*Worrellisaurus* (*Worrellisaurus*) *makhani* (Hoser, 2013) (originally described by Hoser (2013) as a subspecies of *W. storri* (Mertens, 1966);

*Odatria* (*Odatria*) *tristis nini* Hoser, 2013;

*Euprepisaurus indicus wellsi* Hoser, 2013;

*Euprepisaurus indicus wellingtoni* Hoser, 2013;

*Odatria* (*Kimberleyvaranus*) *glebopalma funki* Hoser, 2014;

*Odatria* (*Kimberleyvaranus*) *glebopalma maderi* Hoser, 2014;

*Odatria (Pilbaravaranus) hamersleyensis* (Maryan, Oliver, Fitch and O'Connell, 2014);

*Worrellisaurus (Parvavaranus) sparnus* (Doughty, Keally, Fitch and Donnellan, 2014);

*Pantherosaurus (Aspetosaurus) maxhoseri* Hoser, 2015;

*Worrellisaurus (Worrellisaurus) primordius dalyi* Hoser, 2015;

*Pantherosaurus (Titanzius) giganteus queenslandensis* Hoser, 2015;

*Pantherosaurus (Titanzius) giganteus bulliardi* Hoser, 2015.

Non-Australian varanid taxa have been formally described and named by Hoser (2013) and other authors in the same post 2000 period.

In spite of this effort, it has also emerged that some seven morphologically distinct and genetically divergent forms of some species of widely distributed Pygmy Monitors of the genus *Worrellisaurus* Wells and Wellington, 1984 remain unrecognized to science, as do other Australian taxa.

As it happens, these would have been named many years ago were it not for a series of extremely damaging interruptions to our research effort, by money grabbing thieves, whose agenda is more along the lines of destruction for profit, rather than public benefit or science as detailed by Court of Appeal, Victoria (2014), Victorian Civil and Administrative Tribunal (VCAT) (2015), Hoser (1993, 1995, 1996, 1999a and 1999b).

Events detailed by Court of Appeal, Victoria (2014), Victorian Civil and Administrative Tribunal (VCAT) (2015), Hoser (1989, 1991, 1993, 1995, 1996, 1999a and 1999b, 2000a, 2000b) included illegal armed raids and unlawful thefts of research files, which caused irreparable harm to numerous research projects by the theft of records, photos and data that took many decades of hard work to accumulate.

While it would be preferable to either retrieve the stolen material or to replicate earlier research and accumulation of data, neither are likely to happen in my lifetime.

In terms of the former, corrupt wildlife officers and police who illegally took materials have refused to return them in spite of numerous court orders to do so. In terms of the latter, I am now aged 56 years of age, and am not likely to live another 40 years in good health to be able to go around the same parts of northern Australia collecting and recording species, as done in the previous 40 years.

As it is critically important that unnamed species be formally identified and named as the vital first step in their long-term conservation, I have absolutely no hesitation in describing the new to science forms herein, even though my available material and data is nowhere near as extensive as I would like it to be.

As stated in the abstract, the purpose of this paper is to identify and formally name six of these seven known undescribed varanid forms from northern parts of Australia.

The seventh form, most closely related to *Worrellisaurus kingorum* Storr, 1980 is named in a separate paper published at the same time as this one.

At the same time these papers are published, another formally names a new species in the *Odatria glauerti* (Mertens, 1957) species complex, this being in addition to *O. hoseri* Hoser, 2013, while yet another paper names a new taxon in the *Odatria (Kimberleyvaranus) glebopalma* (Mitchell, 1955) species complex.

All newly named species can be readily identified and separated from the nominate form of each closely related species on the basis of morphology. Furthermore previously published studies involving the analysis of DNA within the last decade by other authors, including as cited in Hoser (2013), including Fitch *et al.* (2006), has shown species-level divergences for the relevant forms.

In terms of the divergence by way of DNA, earlier studies including Fitch *et al.* (2006) have shown divergences for each of the five newly named forms being greater than for other well-known and widely accepted taxa, such as *Worrellisaurus bushi* (Aplin, Fitch and King, 2006) versus *W. gilleni* (Lucas and Frost, 1895) (its nearest relative) or *Pantherosaurus flavirufus* (Mertens, 1958) versus *P. gouldi* (Gray, 1838) (its nearest relative).

It is for this reason I have not hesitated to recognise each taxon as full species, rather than to take the conservative position of giving them taxonomic recognition at the subspecies level.

I have no doubt that a group of thieves known as the Wüster gang, will make a lot of "noise" following the publication of this paper and falsely accuse myself of "taxonomic vandalism", and then a few years down the track, when the obvious can no longer be ignored, they will attempt to steal this work and illegally rename the very same species.

The same gang will allege I have no experience at all with the said taxa and that all my evidence is either "non-existent", "fabricated" or "stolen", (see for example Kaiser (2012a, 2012b, 2013, 2014a, 2014b) and Kaiser *et al.* (2013), the latter "paper" perhaps should be better known as "Wüster and others he can "add" to his authors list".

As stated already, the genus-level taxonomy used in this paper is that used in Hoser (2013), which as of 2018 is widely accepted by scientists as the most logical for the Australian varanids and is also fully compliant with the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

#### MATERIALS, METHODS AND RESULTS

The basis of this long-term study has been the inspection of numerous specimens, live, in jars in museums and via photos with accurate locality data, as well as a perusal of the limited published literature on putative species within the genus *Worrellisaurus* Wells and Wellington, 1984.

In terms of the species "*Varanus kingorum* Storr, 1980" it was confirmed that two taxa are involved.

They are dealt with in a separate paper and so for the purposes of this paper are ignored.

However so readers can locate that paper by way of internet search, and locate the newly named species, I can state that it is named in honour of Stuart and James Bigmore of Lara (Geelong), Victoria, Australia and the description is published in the same journal as this and on the same date.

I have also collected the relevant regions in Australia, including caught *in situ* the species formally described herein.

This is all mentioned here, even though it could be described as trite.

However none of the inevitable claims by the haters as already mentioned are in fact the case.

Obviously I should note that morphological divergence on its own is not regarded by myself as sufficient grounds to assign a new species.

However there are other important grounds. All populations are separated by zones of clearly unsuitable habitat and are therefore reproductively isolated. Having said that, for some of the named species, geographic species boundaries between these species and others is not always clear at this stage.

Five of the six relevant species populations are strictly saxicoline (rock dwelling) in habits and so the species boundaries are easily inferred.

The sixth newly identified species is of a tree-dwelling complex (subgenus *Arborhabitiosaurus* Hoser, 2013) in central and western Australia and its range is broken by areas of unsuitable habitat in the form of treeless plains, gibber, and dunes and again, ascertaining exact species boundaries would not be too difficult if and when Australian governments spent funds on things such as this rather than starting very expensive wars in third-world countries and spending up to \$50 billion dollars on a single submarine that does not even run properly!

The three species groups from where the six new species are derived are as follows:

- 1/ The *Worrellisaurus storri* (Mertens, 1966), group (4 new species),
- 2/ The *Worrellisaurus acanthurus* (Boulenger, 1885) group (1 new species)
- 3/ The *Worrellisaurus (Arborhabitiosaurus) gilleni* (Lucas and Frost, 1895) group (1 new species).

In terms of *W. storri*, the following points are noted. Hoser (2013)

described a form from Mount Isa in north-west Queensland as a new subspecies, namely "*Worrellisaurus storri makhani*" at pages 51 and 52.

Previous to this, in 1980, Storr described as a subspecies "*Varanus storri ocreatus*" at pages 283-285.

Storr's original description and diagnosis was intended to apply only to Western Australian specimens until then referred to as "*Varanus storri*" as those from immediately adjacent far north-west Northern Territory.

The most readily identifiable difference between the West Australian and eastern Queensland specimens of "*Varanus storri*" was tail length, with it being significantly longer in West Australian specimens.

Storr's division of the east and west Australian "*Varanus storri*", was accepted by subsequent authors such as Wilson and Knowles (1988) and more recently Cogger (2017), both of whom treated both forms as subspecies in the way Storr had intended.

In years following Storr's (1980) description, it became clear that specimens more recently found at Mount Isa and nearby parts of Western Queensland and adjacent Northern Territory conformed morphologically more to the West Australian forms (at least by way of average proportional length of the tail being longer) than those from eastern Queensland and so they too were referred to as "*V. storri ocreatus*" by numerous authors including Wilson and Swan (2017).

Hoser (2013) decided that the specimens from north-west Queensland near Mount Isa conformed to neither and so conservatively described them as a subspecies of "*V. storri*", but placing all in the genus *Worrellisaurus* Wells and Wellington, 1984. Significantly and inadvertently overlooked by Hoser (2013) was the locality data for the DNA for the "*Varanus storri*" samples analysed by Fitch *et al.* (2006).

Their "*Varanus storri ocreatus*" samples were both from Western Australia, whereas their (alleged) "*Varanus storri storri*" samples were in fact from Mount Isa.

The divergence between the two was greater than that between other species of monitor. Therefore it cannot be credibly denied that Mount Isa "*Varanus storri*" are in fact a different species to the West Australian ones. As both are more alike one another than they are to the East Queensland "*Varanus storri*", all three must therefore be of different species!

This is in fact confirmed by the molecular phylogeny published by Thompson *et al.* (2008), who found their "*V. storri* WA" divergent from all of their "*V. storri* Qld", "*V. baritji*", "*V. acanthurus* WA" and "*V. acanthurus* NT", which formed a separate clade entirely. I should also mention that their "*V. storri* Qld" sample was from Mooranbah in north-east Queensland, being of the so-called nominate "*V. storri*" population.

Based on a merging of the molecular data of both Fitch *et al.* (2006) and Thompson *et al.* (2008), the unavoidable reality is that the three described subspecies of "*V. storri*", (treated here as *Worrellisaurus*) must be recognized as full species!

Hence each should be known as the following: *W. storri* (Mertens, 1966), *W. ocreatus* (Storr, 1980) and *W. makhani* (Hoser, 2013). Significantly, both the published phylogenies of Fitch *et al.* (2006) and Thompson *et al.* (2008), showed the "*W. ocreatus*" lineage as being basal to the rest and within this group of species, it clearly being derived from the Kimberley district of Western Australia, where two ancient and geographically proximal lineages were identified by Fitch *et al.* (2006).

One of those lineages remains unnamed and so it is formally described as a new species within this paper.

A third morphologically divergent Kimberley population from the central and north Kimberley is also formally named as a new species for the first time.

Another divergent population referred to as "*W. ocreatus*" from the Gregory National Park area of the Northern Territory is also formally named herein as a new species.

All four of the previously referred to taxa from the Kimberley and adjacent areas in the Northern Territory can be easily separated from one another by consistent character differences.

In terms of the western Queensland specimens until now treated as "*W. storri*", it is evident that there are two disjunct and morphologically divergent populations that are also clearly reproductively isolated. One is already named, herein regarded as the species *W. makhani* Hoser, 2013 with a type locality of Mount Isa. The other from rocky areas on the NT side of the Gulf of Carpentaria, is formally named for the first time.

These animals have until now been variously described in the recent past as "*Varanus storri ocreatus*" by Brown (2014), or as a monitor "with characters intermediate between *V. storri* and *V. primordius*" by Bennett (1998).

While this paper presents the irrefutable evidence to confirm that *W. ocreatus* is a full species and that this is confirmed by the molecular phylogeny of both Fitch *et al.* (2006) and Thompson *et al.* (2008), it is also appropriate to mention that the first herpetologists to get this fact correct in a publication were the much lampooned and attacked Wells and Wellington. These two men in both Wells and Wellington (1984) and Wells and Wellington (1985) got the classification correct and were effectively ignored until Hoser (2013) revisited the obvious facts and molecular evidence not available to Wells and Wellington in 1985 to confirm they had been correct all along.

Hoser (2007) also publicly alerted the herpetological community that it was time to grudgingly accept that the works of Wells and Wellington (1984, 1985) were largely correct and not a severe case of taxonomic vandalism as alleged by the Wüster gang of thieves over the preceding two decades.

Significantly, Fitch *et al.* (2006) and Thompson *et al.* (2008) also confirmed the genus level classification of the relevant species (*Worrellisaurus*) as originally determined by Wells and Wellington (1984 and 1985) to also be appropriate.

In reality Wells and Wellington (1984, 1985) had stated what at all materially relevant times had been blatantly obvious to anyone who cared to look!

The species best known as the "Ridge-tailed Monitor" or "*Varanus acanthurus* Boulenger, 1885", also now treated as being within the genus *Worrellisaurus*, has been subdivided into various subspecies, namely "*Varanus acanthurus acanthurus* Boulenger, 1885", "*Varanus acanthurus brachyurus* Sternfeld, 1919" and "*Varanus acanthurus insulanicus* Mertens, 1958", as well as another closely related taxon, formerly treated as "*Varanus acanthurus acanthurus* Boulenger, 1885", now usually known as "*Varanus baritji* King and Horner, 1987". These have type localities from various parts of northern and central Australia and clustered into two species groups in the phylogeny of Fitch *et al.* (2006). The two forms from the top end of the Northern Territory, namely "*Varanus acanthurus insulanicus* Mertens, 1958" and "*Varanus baritji* King and Horner, 1987" were minimally divergent, meaning that the latter should be treated either as a synonym of the former, or at best a subspecies of it.

In terms of the other two taxa, there was a similar result for the nominate forms of each. However a divergent lineage listed by Fitch *et al.* (2006) as "*V. acanthurus acanthurus*", was identified. It was of species-level divergence and conformed to the until now unnamed population from the area of the southern Pilbara region in Western Australia.

The type locality of "*Varanus acanthurus* Boulenger, 1885" (and by Gray, 1845) was given as the north-west coast of Australia.

However no exact location was given, leading an element of doubt until now as to from where the type material came from. What is however certain is where it did not come from!

The holotype and descriptions by Gray (1845) and Boulenger (1885) both conform to specimens from the Kimberley region of Western Australia, particularly with regard to Boulenger's reference to colouration of all available specimens.

Boulenger (1885) described the colour for the species as follows: "Blackish, with large yellow rings; limbs and tail yellow-spotted; a black and yellow temporal streak; neck sometimes with black and yellow longitudinal streaks; lower surfaces yellowish, the throat dotted with blackish."

The southern Pilbara lineage is of a different colouration and therefore, assuming it to be of a different taxon to Boulenger's



taxon, remains unnamed until now. It is therefore described herein as a new species.

The Pygmy Mulga Goanna most commonly known as "*Varanus gilleni* Lucas and Frost, 1895" occurs in central parts of Australia, including arid areas of South Australia, extending in South Australia almost to the Great Australian Bight.

Hoser (2013) confirmed the generic placement for the putative taxon into the genus *Worrellisaurus* Wells and Wellington, 1984 based on morphological and molecular divergence of the relevant species group.

Wells and Wellington (1984) carried a publication date of 1983 on the cover, but the paper apparently appeared in 1984, giving rise to confusion by many authors as to the year attributed to the name.

The purpose of this paper is to formally name the divergent population from the south as a new species similar to and related to "*Worrellisaurus gilleni* Lucas and Frost, 1895", namely *Worrellisaurus jenandersonae* sp. nov.

The new species *W. jenandersonae* sp. nov. is according to the molecular data of Fitch *et al.* (2006) more divergent from *W. gilleni* than *W. gilleni* is from *W. bushi* (Aplin, Fitch and King, 2006), which is why I have not hesitated to accord this new taxon species-level recognition.

In terms of the important bibliographic references for the species dealt with herein, refer to those in Hoser (2013) and sources cited therein. They are not relisted herein, unless cited elsewhere in this paper.

In terms of the descriptions herein, it should be noted that as for all similar papers published by myself, they are part of the permanent scientific record and should be treated accordingly. This also includes in terms of all relevant zoological nomenclature, as dictated by the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

No scientific names formally assigned herein should be altered in any way, unless absolutely mandatory under the rules of the *International Code of Zoological Nomenclature*.

In the unlikely event that a second reviser seeks to merge one or more newly named taxa, then the name to be used and retained is that of order of publication herein, that being page priority, or as the new names are listed in the abstract.

To conform with the relevant provisions of the *International Code of Zoological Nomenclature* material within given species descriptions may be repeated in subsequent ones in this paper and I make no apologies for this.

It also should be mentioned that in terms of all the newly named species within this paper, I have checked the relevant original species descriptions for related taxa, with particular reference to holotype material as listed in Cogger *et al.* (1983) or other relevant sources as cited in Hoser (2013) and this paper and confirmed that the newly named species are not synonyms of previously named forms.

In terms of the newly named species within the subgenus *Worrellisaurus* Wells and Wellington, 1983, as defined by Hoser (2013), I briefly outline where each comes from and also from where the species they were previously assigned to are found.

*W. primordius* (Mertens, 1942), occurs at the top end of the Northern Territory. South of the Daly River in the west of the species range is the subspecies *W. primordius dalyi* Hoser, 2015.

*W. storri* (Mertens, 1966) is found in north-east Queensland, west of Croydon, Queensland.

*W. ocreatus* (Storr, 1980) as defined herein occurs in the rocky areas of the lower Ord River drainage, in far north-west Western Australia, in the East Kimberley district.

*W. makhani* Hoser, 2013 occurs around Mount Isa, in north-west Queensland. It has been referred to both *W. storri* (Mertens, 1966), *W. ocreatus* (Storr, 1980) and *W. makhani* Hoser, 2013 by other authors.

*W. kimaniadilbodeni* sp. nov. (this paper) is known from the general vicinity of Turkey Creek and the Bungle Bungles in Western Australia (upper Ord River drainage) north to at least Halls Creek in the east Kimberley of Western Australia.

*W. microocellata* sp. nov. (this paper) is known from the general

vicinity of Theda Station in the north-east Kimberley ranges and includes populations north and west of there to the coast.

*W. tyeseeipperae* sp. nov. (this paper) occurs in the general region of the Gregory National Park in north-west Northern Territory and immediately adjacent rocky hills in the area east of the West Baines River.

*W. scotteipperi* sp. nov. (this paper), occurs in the rocky hilly area south of the Gulf of Carpentaria in the Northern Territory. The specific status of specimens from between this area and Mount Isa, on the Queensland side of the border and found also near the Gulf of Carpentaria is not known, but are thought to be conspecific.

*W. kingorum* (Storr, 1980) as recognized to date is found in two disjunct populations, one in far north-west Northern Territory, near the West Australian border in the general vicinity of Timber Creek and the other population is found in the Ord River drainage, mainly in the hills west of the river, in far north-west Australia, herein regarded as a separate species-level taxon and formally named in a separate paper published at the same time as this one in the same journal.

*W. acanthurus* (Boulenger, 1885) is found in most parts of the Northern Territory, excluding the far top end, where it is replaced by *W. insulanicus* (Mertens, 1958) and *W. bariitji* (King and Horner, 1987), the latter of the pair herein regarded as at best a subspecies of the former.

*W. acanthurus* also occurs in nearby parts of north-west Queensland as well as most of the top half of Western Australia, with the notable exception of most of the Pilbara region, where it is replaced with the species *W. dannybrowni* sp. nov..

*W. brachyurus* (Sternfeld, 1919) based on the phylogeny of Fitch *et al.* (2006) is herein regarded as a synonym of *W. acanthurus* at the species level.

*W. dannybrowni* sp. nov. occurs in the hillier parts of the Pilbara in Western Australia and immediately adjacent areas. The exact range zones boundary between *W. dannybrowni* sp. nov. and *W. acanthurus* are not known.

The entirety of the subgenus *Worrellisaurus* is therefore *W. acanthurus*, *W. dannybrowni* sp. nov., *W. insulanicus* which includes as a species-level junior synonym *W. bariitji*, *W. kimaniadilbodeni* sp. nov. (this paper), *W. kingorum*, *W. makhani*, *W. microocellata* sp. nov. (this paper), *W. ocreatus*, *W. primordius* including the subspecies *W. primordius dalyi*, *W. scotteipperi* sp. nov. (this paper), *W. storri* and *W. tyeseeipperae* sp. nov. (this paper).

Hoser (2013) has in effect been corrected herein to remove from the species list both *W. bariitji*, now a synonym of *W. insulanicus* and *W. brachyurus*, now a synonym of *W. acanthurus*. The other newly described forms (5 in this paper and *W. makhani*) have been added to the species in the subgenus.

The only other taxon formally named in this paper is from a subgenus of *Worrellisaurus*, namely *Arborhabitiosaurus* Hoser, 2013 and it has until now been treated as a population of *W. gilleni* (Lucas and Frost, 1895).

*W. gilleni* as recognized to date occurs throughout the interior of Australia in an area extending from just inside north-west Queensland, across the southern half of the Northern Territory and northern two thirds of South Australia, not including New South Wales or Victoria, but extending into most of the interior of Western Australia. In the far west, near the west Australian coast in the Pilbara it is replaced with the associated species-level taxon, *W. bushi* (Aplin, Fitch and King, 2006) and south of there with another closely associated taxon, *W. caudolineatus* (Boulenger, 1885).

The southern part of the range of what has until now been treated as *W. gilleni* in the area of South Australia north and west of the Flinders Ranges is of the taxon newly described herein namely *W. jenandersonae* sp. nov..

The four species, *W. gilleni*, *W. bushi*, *W. caudolineatus* and *W. jenandersonae* sp. nov. make up the entirety of the subgenus *Arborhabitiosaurus* Hoser, 2013.

The subgenus *Parvavaranus* Hoser, 2013 is the only other subgenus within the genus *Worrellisaurus* Wells and Wellington, 1984 and its component species are almost unchanged from

Hoser (2013), save for the addition of a single species formally named in 2014, namely "*Varanus sparnus* Doughty, Kealley, Fitch and Donnellan, 2014".

In other words it's status is as follows:

Type species of *Parvavaranus* is "*Varanus brevicauda* Boulenger, 1898".

Content of *Parvavaranus* is *Worrellisaurus brevicauda* (Boulenger, 1898), *W. eremius* (Lucas and

Frost, 1895) and *W. sparnus* Doughty, Kealley, Fitch and Donnellan, 2014.

In passing, I note that the phylogeny of Fitch *et al.* (2006) also provides a basis to divide the subgenus *Worrellisaurus* into two subgenus groups, one being the so-called "*acanthurus* group" and the other the so-called "*primordius* group".

However the more recent evidence of Pyron *et al.* (2013) while supporting the other genus and subgenus level splits of Hoser (2013) is ambiguous in terms of further division of *Worrellisaurus* beyond that of Hoser (2013), especially with reference to the "*acanthurus* group" and the "*primordius* group" and so no move with regards to splitting these groups is done in this paper.

At the same time these papers are published, another formally names a new species in the *Odatria glauerti* (Mertens, 1957) species complex, again supported by the published phylogeny of Fitch *et al.* (2006), this being in addition to *O. hoseerae* Hoser, 2013. Yet another paper names a new taxon in the *Odatria* (*Kimberleyvaranus*) *glebopalma* (Mitchell, 1955) species complex. these are in addition to the previously mentioned paper dealing with the splitting of putative *W. kingorum* (Storr, 1980).

#### **WORRELLISAURUS (WORRELLISAURUS) KIMANIADILBODENI SP. NOV.**

**Holotype:** A preserved specimen in the Northern Territory Museum, Darwin, Northern Territory, Australia, specimen number: R24074, collected from 5 KM west of the park Boundary, Bungle Bungles National Park, Western Australia, Australia, Latitude -17.37 S., Longitude 128.18 E.

The Northern Territory Museum, Darwin, Northern Territory, Australia is a government-owned facility that allows access to its collections.

**Paratype:** A preserved specimen in the Western Australian Museum, Perth, Western Australia, Australia, specimen number: R152716, collected at Purnululu (Bungle Bungles) National Park, Western Australia, Australia, Latitude -17.39 S., Longitude 128.26 E.

**Diagnosis:** In order to separate this and all other species formally named for the first time in this paper within the subgenus *Worrellisaurus* Wells and Wellington, 1984, as defined for the first time by Hoser (2013), the various species groups within *Worrellisaurus* need to be separated from one another first.

The so-called "*primordius*" group of species, defined herein includes, *W. kimaniadilbodeni* sp. nov. (this paper), *W. makhani* Hoser, 2013, *W. microocellata* sp. nov. (this paper), *W. ocreatus* (Storr, 1980), *W. primordius* (Mertens, 1942) (including the subspecies *W. primordius dalyi* Hoser, 2015) as defined in Hoser (2015g), *W. tyeseeipperae* sp. nov. (this paper), *W. scotteipperi* sp. nov. (this paper) and *W. storri* (Mertens, 1966). These species are readily separated from the "*acanthurus*" group of species by the following characters: A small monitor (up to 35 cm long) (versus 60-70 cm in the "*acanthurus*" group) with strongly spinose tail, the body lacks a distinct or indistinct pattern of medium-sized ocelli (versus present in the "*acanthurus*" group), lacks obvious narrow yellow or yellowish rings on the upper surface of the anterior tail, less than 91 mid-body rows (versus 70-115 in the "*acanthurus*" group), less than 58 transverse ventrals and the neck is never boldly striped (which it is in the "*acanthurus*" group).

The taxon *W. kingorum* (Storr, 1980), including the similar species from Western Australia from the hills adjacent to the Ord River drainage (also formally described as a new species by myself at the same time this paper has been published), until now treated as *W. kingorum* is phylogenetically grouped with the so-called "*primordius*" group of species. It they are readily separated from the other species in the group by the lack of a series of enlarged

keeled scales on either side of the vent. They are also separated from the "*acanthurus*" group on the same basis.

*W. primordius* (Mertens, 1942) (including the subspecies *W. primordius dalyi* Hoser, 2015) as defined in Hoser (2015g), are separated from all the other species in the group by the presence of fewer than 66 mid-body rows, versus more than 70 in all other species, which also appear to form a well-defined clade. Exceptional to this is the species *W. scotteipperi* sp. nov., which has 67-69 mid-body rows, separating this species from all other relevant taxa.

The species *W. storri* is herein restricted to an area east of Croydon in Queensland (Latitude -18.21 S., Longitude 142.24 E.) being found in drier rocky parts of north-east Queensland. Specimens from around the Mount Isa district in Western Queensland are *W. makhani*.

All others in the group, until now treated as *W. storri* by authors including Cogger (2014) and Wilson and Swan (2017) (as defined by them), except for *W. storri* are readily separated from *W. storri* by the enlarged scales under distal part of hindleg (not present in *W. storri*) as seen in the comparative image in Brown (2012), page 193 (second from top) and (in adults at least) the readily noticeably longer tail (1.7-1.9 times body length, versus 1.45-1.55 times), average lighter build in adults and slightly longer limbs.

*Worrellisaurus kimaniadilbodeni* sp. nov. (this paper), *W. makhani*, *W. microocellata* sp. nov. (this paper), *W. ocreatus* and *W. tyeseeipperae* sp. nov. (this paper) are readily separated from *W. storri* and *W. scotteipperi* sp. nov. (this paper) by colouration. *W. storri* and *W. scotteipperi* sp. nov. (this paper) are characterized by a distinctive dark temporal streak running through the eye, being wide or narrow between the nostril and the eye and broad beyond the eye, where it forms a thick temporal streak running to the back of the head. By contrast in the other species, the same temporal streak is indistinct beyond the eye and it is not bounded by a white streak underneath, as it is in *W. storri* and *W. scotteipperi* sp. nov.. *W. scotteipperi* sp. nov. is separated from *W. storri* by the presence of the thick well-defined dark streak running from the nostril to the eye, versus thin, sometimes broken, or triangular in *W. storri*. *W. storri* are further readily separated from *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. microocellata* sp. nov., *W. ocreatus*, *W. tyeseeipperae* sp. nov. and *W. scotteipperi* sp. nov. by the presence of distinctive dark flecks or spots below the temporal streak at the lower rear of the head, which tend to be absent, very small or indistinct on the other species.

*W. microocellata* sp. nov. is separated from *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. tyeseeipperae* sp. nov. and *W. scotteipperi* sp. nov. by a lack of white pigment on the lower jaw, throat and lower neck, with widely scattered tiny dark spots only. This trait it shares in common with *W. ocreatus* although the widely scattered spots are slightly more numerous in *W. ocreatus*. *W. microocellata* sp. nov., has an absence of darker spots on the lower jaw, which then abruptly become common on the throat and lower jaw. *W. makhani* and *W. kimaniadilbodeni* sp. nov. have an even and well defined pattern of dark spots on the lower jaw, throat and lower neck.

*W. tyeseeipperae* sp. nov. has flecks of dark pigment configured to form a series of broken cross-bands running across the lower throat region. *W. scotteipperi* sp. nov. has minimal dark spotting on the lower jaw and upper throat, while the throat and neck effectively lack any dark spots. Furthermore in *W. scotteipperi* sp. nov. the lower flanks of the neck are white and effectively lack any dark spotting as seen in all of *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. microocellata* sp. nov., *W. ocreatus* and *W. tyeseeipperae* sp. nov..

*W. microocellata* sp. nov. is separated from *W. ocreatus* by the presence of numerous regular patterned dark flecks on each side of the head and a top of the head darker in colour than the body, versus irregular scattered dark flecks on a light background on each side of the head and a head of same colour as the upper body.

*W. microocellata* sp. nov. is further separated from all of *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. ocreatus*, *W. tyeseeipperae* sp. nov. and *W. scotteipperi* sp. nov. by a unique

dorsal pattern consisting of a strong reddish tinge running along the vertebral line and nearby parts of the upper back on the body, becoming greyish-black on the upper flanks, with a dorsal pattern consisting of tiny white squarish blotches on the dorsal surface of the forebody, tending to become tiny ocelli on the posterior part of the upper body, all against a mainly blackish-grey background.

Both *W. microocellata* sp. nov. and *W. kimaniadilbodeni* sp. nov. are separated from all of *W. makhani*, *W. ocreatus*, *W. tyeseei* sp. nov. and *W. scottei* sp. nov. by the presence of a well defined dark curved line, bounded by white along the upper and lower side situated on the side of the supraciliary ridge on each side of the head.

*W. microocellata* sp. nov. is separated from all of *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. ocreatus*, *W. tyeseei* sp. nov. and *W. scottei* sp. nov. by the presence of prominent raised white spots on scales on the mid flanks of the base of the tail. *W. kimaniadilbodeni* sp. nov. has indistinct cream spots on the same raised scales. *W. ocreatus* has scattered black dots on some raised scales on the mid-flanks of the base of the tail.

Unlike the species *W. microocellata* sp. nov., *W. kimaniadilbodeni* sp. nov. and *W. ocreatus* the three species *W. makhani*, *W. tyeseei* sp. nov. and *W. scottei* sp. nov. are characterized by a lack of any consistent configuration of raised coloured scales on the flanks of the upper tail. In all three there is at best widely scattered and irregular dark tipped scales. For these three species the flanks of the anterior tail are best described as grading gradually from the dark upper colour to the whitish venter colour, with all scales being of similar colour consistency, as opposed to dark or light coloured centres, contrasting with the nearby scale colour.

*W. kimaniadilbodeni* sp. nov. and *W. scottei* sp. nov. are separated from all of *W. microocellata* sp. nov., *W. ocreatus*, *W. makhani*, and *W. tyeseei* sp. nov. by the fact that the upper labials above the eye are configured in alternating dark and light, being dark brown and yellowish white, the rectangular blotches giving the upper jaw a barred appearance.

Under the eye, the upper labials of *W. ocreatus*, *W. makhani* and *W. microocellata* sp. nov. are either one colour, one colour evenly peppered with numerous dark flecks, or one colour with irregular dark flecks.

*W. tyeseei* sp. nov. is separated from all of *W. kimaniadilbodeni* sp. nov., *W. scottei* sp. nov., *W. microocellata* sp. nov., *W. ocreatus*, and *W. makhani* by the unique presence of irregular large blotches on a whitish background on the upper labials, not forming any barred configuration as well as a pattern of dense dark speckling on the neck, becoming more dense on the sides and giving a reticulated appearance, the darker flecks extending onto the lower neck.

*W. tyeseei* sp. nov. is further separated from all of *W. kimaniadilbodeni* sp. nov., *W. scottei* sp. nov., *W. microocellata* sp. nov., *W. ocreatus*, and *W. makhani* by the fact that the front of the tail is characterised by the fact that from about scale row 11 past the pelvic girdle (back legs), the raised spines on the upper surface are all tipped with well-defined black spines, running to the end of the tail.

While all Western Australian species *W. tyeseei* sp. nov., *W. kimaniadilbodeni* sp. nov., *W. microocellata* sp. nov., and *W. ocreatus*, may have visible and prominent longitudinal stripes running along the rear end of the dorsal surface of the tail, this is not the case for any of the East Australian species, namely *W. makhani*, *W. scottei* sp. nov., or for that matter *W. storri*.

The longitudinal striping at the lower end of the tail in *W. tyeseei* sp. nov. is prominent, versus prominent, but with lighter, but still well-defined dark and light stripes in *W. ocreatus* and these are indistinct in *W. kimaniadilbodeni* sp. nov. and *W. microocellata* sp. nov..

*W. tyeseei* sp. nov. is different from all of *W. kimaniadilbodeni* sp. nov., *W. scottei* sp. nov., *W. microocellata* sp. nov., *W. ocreatus*, and *W. makhani* in that all but very aged specimens have the upper surface of the head including the snout characterised by distinctive dark markings on a very light

background, versus a dorsal surface of the head being generally unmarked, or occasionally peppered in all the other species, the peppered condition being most commonly seen in *W. makhani*.

*W. scottei* sp. nov. is separated from all of *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. microocellata* sp. nov., *W. ocreatus*, and *W. tyeseei* sp. nov. by a lack of any defined longitudinal striping at the latter part of the tail, save for a broken dorsolateral line, with the breaks being sufficiently wide to give the end of the tail an appearance of having cross-bands similar to those seen in the so-called "acanthurus" group of species.

Because *W. scottei* sp. nov. has no such rings on the anterior part of the tail, it cannot possibly be confused with any of the so-called "acanthurus" group of species.

*W. microocellata* sp. nov. is readily separated from *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. ocreatus*, *W. tyeseei* sp. nov. and *W. scottei* sp. nov. by tail length in adults. In *W. microocellata* sp. nov. it is 1.8-1.9 times the body length, versus 1.7-1.8 times body length in the other five species.

In terms of the other three species found in the Kimberley and nearby parts of the Northern Territory, this is a significant difference and appears to be due to a character displacement event that may have occurred in the areas inhabited by the other three. Those species are all apparently sympatric with *W. kingorum* (in the NT) and a newly described similar species from the Ord River drainage in Western Australia, that had until now been treated as a western population of *W. kingorum*. *W. kingorum* occupies similar and same habitat as the other species and it's most significant difference is a more gracile build, including a tail that is more than 200% the length of the body.

Where both *W. kingorum* and *W. kimaniadilbodeni* sp. nov., *W. ocreatus* or *W. tyeseei* sp. nov. occur in sympatry, *W. kingorum* is most common on large hills with large amounts of rock sheets across the ground, boulders and the like, whereas the other three are most common on rocky habitats between the hills if present, lower scree slopes and the like.

*W. microocellata* sp. nov. also appears to have a more elongate body and head than *W. kimaniadilbodeni* sp. nov., *W. ocreatus* and *W. tyeseei* sp. nov..

The holotype of *W. ocreatus* and all live specimens inspected by this author from the type locality are of the same form and colour. They are reddish across the entire dorsal surface, overlain with fine black peppering, in a configuration that occasionally gives a slightly reticulated pattern on the upper body surface. This is quite unlike any other species of *Worrellisaurus*. Closest to this condition among the relevant species is *W. kimaniadilbodeni* sp. nov. which is orangeish yellow on top of the body with similar flecks to *W. ocreatus* with significant dark brown scales as flecks in a banded configuration on the venter, as opposed to limited dark scales on the venter of *W. ocreatus*.

*W. tyeseei* sp. nov. is unusual among *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. microocellata* sp. nov., *W. ocreatus* and *W. scottei* sp. nov. in that on the upper surface of the body, specimens lacks obvious spots, flecks, peppering or markings on all but the upper back, this being the normal condition for even younger specimens.

*W. makhani* and *W. scottei* sp. nov. are both characterized by a dorsal colour pattern consisting of darker brown pigment overlain with lighter brown speckling in clusters or longitudinal lines, tending to form small dark edged ocelli on the back, with lighter centres. In *W. makhani* these ocelli merge on the lower back to form semi-distinct vertebral lines, which is not the case in *W. scottei* sp. nov..

Specimens attributed to "*Varanus storri ocreatus*" have been collected from Christmas Creek Station, Western Australia (south-east of Fitzroy Crossing in the south-east Kimberley), as well as the Mornington Wildlife Sanctuary (southern central Kimberley) and 50 km east of Derby in the south-west Kimberley. These specimens have not been examined by myself and so their specific status is not known. Specimens attributed to "*Varanus storri ocreatus*" from north and west of the Drysdale River in Western Australia are referable to *W. microocellata* sp. nov..



Photos of *Worrellisaurus kimaniadilbodeni* sp. nov. in life from Halls Creek, Western Australia, can be found on the photo sales site of <https://www.gettyimages.com.au>.

**Distribution:** *Worrellisaurus kimaniadilbodeni* sp. nov. is known only from a few scattered locations in the south-eastern part of the Kimberley District in Western Australia in an area, generally running from the Bungle Bungles, near Turkey Creek (AKA Warmun), Western Australia, south to about 26 km south of Halls Creek, Western Australia.

**Etymology:** Named in honour of Kimani Adil Boden, a lawyer based in Melbourne, Victoria, Australia for his work in taking on important human rights cases, such as when innocent, weak vulnerable new Australians are illegally bashed by violent thugs employed by the Victoria Police and/or wrongly charged and jailed for fictitious criminal offences often committed by the police (Larrant 2012, Gregory and Chessell 2012, Iaria and Best 2009, Lillebuen 2010, Szego 2014).

**WORRELLISAURUS (WORRELLISAURUS) MICROCELLATA SP. NOV.**

**Holotype:** A preserved specimen in the Western Australian Museum, Perth, Western Australia, Australia, specimen number: R57244, collected from the Old Theda Station Homestead at the junction of Palmoondoor Creek and Morgan River, Western Australia, Australia, Latitude -14.82 S., Longitude 126.67 E. The Western Australian Museum, Perth, Western Australia, Australia is a government-owned facility that allows access to its collections.

**Diagnosis:** In order to separate this and all other species formally named for the first time in this paper within the subgenus *Worrellisaurus* Wells and Wellington, 1984, as defined for the first time by Hoser (2013), the various species groups within *Worrellisaurus* need to be separated from one another first.

The so-called “*primordius*” group of species, defined herein includes, *W. kimaniadilbodeni* sp. nov. (this paper), *W. makhani* Hoser, 2013, *W. microocellata* sp. nov. (this paper), *W. ocreatus* (Storr, 1980), *W. primordius* (Mertens, 1942) (including the subspecies *W. primordius dalyi* Hoser, 2015) as defined in Hoser (2015g), *W. tyeseiepperæ* sp. nov. (this paper), *W. scotteipperi* sp. nov. (this paper) and *W. storri* (Mertens, 1966). These species are readily separated from the “*acanthurus*” group of species by the following characters: A small monitor (up to 35 cm long) (versus 60-70 cm in the “*acanthurus*” group) with strongly spinose tail, the body lacks a distinct or indistinct pattern of medium-sized ocelli (versus present in the “*acanthurus*” group), lacks obvious narrow yellow or yellowish rings on the upper surface of the anterior tail, less than 91 mid-body rows (versus 70-115 in the “*acanthurus*” group), less than 58 transverse ventrals and the neck is never boldly striped (which it is in the “*acanthurus*” group).

The taxon *W. kingorum* (Storr, 1980), including the similar species from Western Australia from the hills adjacent to the Ord River drainage (also formally described as a new species by myself at the same time this paper is/was published), until now treated as *W. kingorum* is phylogenetically grouped with the so-called “*primordius*” group of species. It/they are readily separated from the other species in the group by the lack of a series of enlarged keeled scales on either side of the vent. They are also separated from the “*acanthurus*” group on the same basis.

*W. primordius* (Mertens, 1942) (including the subspecies *W. primordius dalyi* Hoser, 2015) as defined in Hoser (2015g), are separated from all the other species in the group by the presence of fewer than 66 mid-body rows, versus more than 70 in all other species, which also appear to form a well-defined clade. Exceptional to this is the species *W. scotteipperi* sp. nov., which has 67-69 mid-body rows, separating this species from all other relevant taxa.

The species *W. storri* is herein restricted to an area east of Croydon in Queensland (Latitude -18.21 S., Longitude 142.24 E.) being found in drier rocky parts of north-east Queensland.

Specimens from around the Mount Isa district in Western Queensland are *W. makhani*.

All others in the group, until now treated as *W. storri* by authors

including Cogger (2014) and Wilson and Swan (2017) (as defined by them), except for *W. storri* are readily separated from *W. storri* by the enlarged scales under distal part of hindleg (not present in *W. storri*) as seen in the comparative image in Brown (2012), page 193 (second from top) and (in adults at least) the readily noticeably longer tail (1.7-1.9 times body length, versus 1.45-1.55 times), average lighter build in adults and slightly longer limbs.

*Worrellisaurus kimaniadilbodeni* sp. nov. (this paper), *W. makhani*, *W. microocellata* sp. nov. (this paper), *W. ocreatus* and *W. tyeseiepperæ* sp. nov. (this paper) are readily separated from *W. storri* and *W. scotteipperi* sp. nov. (this paper) by colouration. *W. storri* and *W. scotteipperi* sp. nov. (this paper) are characterized by a distinctive dark temporal streak running through the eye, being wide or narrow between the nostril and the eye and broad beyond the eye, where it forms a thick temporal streak running to the back of the head. By contrast in the other species, the same temporal streak is indistinct beyond the eye and it is not bounded by a white streak underneath, as it is in *W. storri* and *W. scotteipperi* sp. nov.. *W. scotteipperi* sp. nov. is separated from *W. storri* by the presence of the thick well-defined dark streak running from the nostril to the eye, versus thin, sometimes broken, or triangular in *W. storri*. *W. storri* are further readily separated from *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. microocellata* sp. nov., *W. ocreatus*, *W. tyeseiepperæ* sp. nov. and *W. scotteipperi* sp. nov. by the presence of distinctive dark flecks or spots below the temporal streak at the lower rear of the head, which tend to be absent, very small or indistinct on the other species.

*W. microocellata* sp. nov. is separated from *W. kimaniadilbodeni* sp. nov. *W. makhani*, *W. tyeseiepperæ* sp. nov. and *W. scotteipperi* sp. nov. by a lack of white pigment on the lower jaw, throat and lower neck, with widely scattered tiny dark spots only. This trait it shares in common with *W. ocreatus* although the widely scattered spots are slightly more numerous in *W. ocreatus*. *W. microocellata* sp. nov., has an absence of darker spots on the lower jaw, which then abruptly become common on the throat and lower jaw. *W. makhani* and *W. kimaniadilbodeni* sp. nov. have an even and well defined pattern of dark spots on the lower jaw, throat and lower neck.

*W. tyeseiepperæ* sp. nov. has flecks of dark pigment configured to form a series of broken cross-bands running across the lower throat region. *W. scotteipperi* sp. nov. has minimal dark spotting on the lower jaw and upper throat, while the throat and neck effectively lack any dark spots. Furthermore in *W. scotteipperi* sp. nov. the lower flanks of the neck are white and effectively lack any dark spotting as seen in all of *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. microocellata* sp. nov., *W. ocreatus* and *W. tyeseiepperæ* sp. nov..

*W. microocellata* sp. nov. is separated from *W. ocreatus* by the presence of numerous regular patterned dark flecks on each side of the head and a top of the head darker in colour than the body, versus irregular scattered dark flecks on a light background on each side of the head and a head of same colour as the upper body.

*W. microocellata* sp. nov. is further separated from all of *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. ocreatus*, *W. tyeseiepperæ* sp. nov. and *W. scotteipperi* sp. nov. by a unique dorsal pattern consisting of a strong reddish tinge running along the vertebral line and nearby parts of the upper back on the body, becoming greyish-black on the upper flanks, with a dorsal pattern consisting of tiny white squarish blotches on the dorsal surface of the forebody, tending to become tiny ocelli on the posterior part of the upper body, all against a mainly blackish-grey background.

Both *W. microocellata* sp. nov. and *W. kimaniadilbodeni* sp. nov. are separated from all of *W. makhani*, *W. ocreatus*, *W. tyeseiepperæ* sp. nov. and *W. scotteipperi* sp. nov. by the presence of a well defined dark curved line, bounded by white along the upper and lower side situated on the side of the supraciliary ridge on each side of the head.

*W. microocellata* sp. nov. is separated from all of *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. ocreatus*, *W. tyeseiepperæ* sp. nov. and *W. scotteipperi* sp. nov. by the

presence of prominent raised white spots on scales on the mid flanks of the base of the tail. *W. kimaniadilbodeni* sp. nov. has indistinct cream spots on the same raised scales. *W. ocreatus* has scattered black dots on some raised scales on the mid-flanks of the base of the tail.

Unlike the species *W. microocellata* sp. nov., *W. kimaniadilbodeni* sp. nov. and *W. ocreatus* the three species *W. makhani*, *W. tyeseeiopperae* sp. nov. and *W. scotteipperi* sp. nov. are characterized by a lack of any consistent configuration of raised coloured scales on the flanks of the upper tail. In all three there is at best widely scattered and irregular dark tipped scales. For these three species the flanks of the anterior tail are best described as grading gradually from the dark upper colour to the whitish venter colour, with all scales being of similar colour consistency, as opposed to dark or light coloured centres, contrasting with the nearby scale colour.

*W. kimaniadilbodeni* sp. nov. and *W. scotteipperi* sp. nov. are separated from all of *W. microocellata* sp. nov., *W. ocreatus*, *W. makhani*, and *W. tyeseeiopperae* sp. nov. by the fact that the upper labials above the eye are configured in alternating dark and light, being dark brown and yellowish white, the rectangular blotches giving the upper jaw a barred appearance.

Under the eye, the upper labials of *W. ocreatus*, *W. makhani* and *W. microocellata* sp. nov. are either one colour, one colour evenly peppered with numerous dark flecks, or one colour with irregular dark flecks.

*W. tyeseeiopperae* sp. nov. is separated from all of *W. kimaniadilbodeni* sp. nov., *W. scotteipperi* sp. nov., *W. microocellata* sp. nov., *W. ocreatus*, and *W. makhani* by the unique presence of irregular large blotches on a whitish background on the upper labials, not forming any barred configuration as well as a pattern of dense dark speckling on the neck, becoming more dense on the sides and giving a reticulated appearance, the darker flecks extending onto the lower neck.

*W. tyeseeiopperae* sp. nov. is further separated from all of *W. kimaniadilbodeni* sp. nov., *W. scotteipperi* sp. nov., *W. microocellata* sp. nov., *W. ocreatus*, and *W. makhani* by the fact that the front of the tail is characterised by the fact that from about row 11 past the pelvic girdle (back legs), the raised spines on the upper surface are all tipped with well-defined black spines, running to the end of the tail.

While all Western Australian species *W. tyeseeiopperae* sp. nov., *W. kimaniadilbodeni* sp. nov., *W. microocellata* sp. nov., and *W. ocreatus*, may have visible and prominent longitudinal stripes running along the rear end of the dorsal surface of the tail, this is not the case for any of the East Australian species, namely *W. makhani*, *W. scotteipperi* sp. nov., or for that matter *W. storri*.

The longitudinal striping at the lower end of the tail in *W. tyeseeiopperae* sp. nov. is prominent, versus prominent, but with lighter, but still well-defined dark and light stripes in *W. ocreatus* and these are indistinct in *W. kimaniadilbodeni* sp. nov. and *W. microocellata* sp. nov..

*W. tyeseeiopperae* sp. nov. is different from all of *W. kimaniadilbodeni* sp. nov., *W. scotteipperi* sp. nov., *W. microocellata* sp. nov., *W. ocreatus*, and *W. makhani* in that all but very aged specimens have the upper surface of the head including the snout characterised by distinctive dark markings on a very light background, versus a dorsal surface of the head being generally unmarked, or occasionally peppered in all the other species, the peppered condition being most commonly seen in *W. makhani*.

*W. scotteipperi* sp. nov. is separated from all of *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. microocellata* sp. nov., *W. ocreatus*, and *W. tyeseeiopperae* sp. nov. by a lack of any defined longitudinal striping at the latter part of the tail, save for a broken dorsolateral line, with the breaks being sufficiently wide to give the end of the tail an appearance of having cross-bands similar to those seen in the so-called "acanthurus" group of species.

Because *W. scotteipperi* sp. nov. has no such rings on the anterior part of the tail, it cannot possibly be confused with any of the so-called "acanthurus" group of species.

*W. microocellata* sp. nov. is readily separated from *W.*

*kimaniadilbodeni* sp. nov., *W. makhani*, *W. ocreatus*, *W. tyeseeiopperae* sp. nov. and *W. scotteipperi* sp. nov. by tail length in adults. In *W. microocellata* sp. nov. it is 1.8-1.9 times the body length, versus 1.7-1.8 times body length in the other five species.

In terms of the other three species found in the Kimberley and nearby parts of the Northern Territory, this is a significant difference and appears to be due to a character displacement event that may have occurred in the areas inhabited by the other three. Those species are all apparently sympatric with *W. kingorum* (in the NT) and a newly described similar species from the Ord River drainage in Western Australia, that had until now been treated as a western population of *W. kingorum*. *W. kingorum* occupies similar and same habitat as the other species and it's most significant difference is a more gracile build, including a tail that is more than 200% the length of the body.

Where both *W. kingorum* and *W. kimaniadilbodeni* sp. nov., *W. ocreatus* or *W. tyeseeiopperae* sp. nov. occur in sympatry, *W. kingorum* is most common on large hills with large amounts of rock sheets across the ground, boulders and the like, whereas the other three are most common on rocky habitats between the hills if present, lower scree slopes and the like.

*W. microocellata* sp. nov. also appears to have a more elongate body and head than *W. kimaniadilbodeni* sp. nov., *W. ocreatus* and *W. tyeseeiopperae* sp. nov.. however this is not quantified herein, due to insufficient sample sizes.

The holotype of *W. ocreatus* and all live specimens inspected by this author from the type locality are of the same form and colour. They are reddish across the entire dorsal surface, overlain with fine black peppering, in a configuration that occasionally gives a slightly reticulated pattern on the upper body surface. This is quite unlike any other species of *Worrellisaurus*. Closest to this condition among the relevant species is *W. kimaniadilbodeni* sp. nov. which is orangeish yellow on top of the body with similar flecks to *W. ocreatus* with significant dark brown scales as flecks in a banded configuration on the venter, as opposed to limited dark scales on the venter of *W. ocreatus*.

*W. tyeseeiopperae* sp. nov. is unusual among *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. microocellata* sp. nov., *W. ocreatus* and *W. scotteipperi* sp. nov. in that on the upper surface of the body, specimens lacks obvious spots, flecks, peppering or markings on all but the upper back, this being the normal condition for even younger specimens.

*W. makhani* and *W. scotteipperi* sp. nov. are both characterized by a dorsal colour pattern consisting of darker brown pigment overlain with lighter brown speckling in clusters or longitudinal lines, tending to form small dark edged ocelli on the back, with lighter centres. In *W. makhani* these ocelli merge on the lower back to form semi-distinct vertebral lines, which is not the case in *W. scotteipperi* sp. nov..

Specimens attributed to "*Varanus storri ocreatus*" have been collected from Christmas Creek Station, Western Australia (south-east of Fitzroy Crossing in the south-east Kimberley), as well as the Mornington Wildlife Sanctuary (southern central Kimberley) and 50 km east of Derby in the south-west Kimberley. These specimens have not been examined by myself and so their specific status is not known. Specimens attributed to "*Varanus storri ocreatus*" from north and west of the Drysdale River in Western Australia are referable to *W. microocellata* sp. nov..

Three photos of this species, *W. microocellata* sp. nov. are on page 873 of Brown (2014) all labelled as "*Varanus storri ocreatus*".

**Distribution:** The type locality of the Old Theda Station Homestead at the junction of Palmoondoor Creek and Morgan River, Kimberley district, Western Australia, Australia, Latitude - 14.82 S., Longitude 126.67 E, marks the approximate known region of the south-eastern limit of distribution of this species, *W. microocellata* sp. nov..

It is also found in areas to the north and west of here to the coasts where suitable habitat exists. It occurs an unknown distance from the vicinity of the Old Theda Station Homestead in other directions to the south and south-west.

**Etymology:** The name "*microocellata*" refers to the very small (as in "micro") ocelli on the lower back characteristic of this species.

**WORRELLISAURUS (WORRELLISAURUS) TYESEEIPPERAE SP. NOV.**

**Holotype:** A preserved specimen at the Museum and Art Gallery of the Northern Territory Reptile Collection (AKA Northern Territory Museum) at Darwin, Northern Territory, Australia, specimen number: R13860, collected at the Bullita Area, Gregory National Park, Northern Territory, Australia, Latitude -16.12 S., Longitude 130.42 E.

The Northern Territory Museum, Australia is a government-owned facility that allows access to its collections.

**Paratype:** A preserved specimen in the Western Australian Museum, Perth, Western Australia, Australia, specimen number: R60043, collected at Gordon Creek, 48 km south of Victoria River Downs, 1 km from a creek from within a loose "ant mound", Latitude -16.83 S., Longitude 131.02 E.

**Diagnosis:** In order to separate this and all other species formally named for the first time in this paper within the subgenus *Worrellisaurus* Wells and Wellington, 1984, as defined for the first time by Hoser (2013), the various species groups within *Worrellisaurus* need to be separated from one another first.

The so-called "primordius" group of species, defined herein includes, *W. kimaniadilbodeni* sp. nov. (this paper), *W. makhani* Hoser, 2013, *W. microocellata* sp. nov. (this paper), *W. ocreatus* (Storr, 1980), *W. primordius* (Mertens, 1942) (including the subspecies *W. primordius dalyi* Hoser, 2015) as defined in Hoser (2015g), *W. tyeseeipperae* sp. nov. (this paper), *W. scotteipperi* sp. nov. (this paper) and *W. storri* (Mertens, 1966). These species are readily separated from the "acanthurus" group of species by the following characters: A small monitor (up to 35 cm long) (versus 60-70 cm in the "acanthurus" group) with strongly spinose tail, the body lacks a distinct or indistinct pattern of medium-sized ocelli (versus present in the "acanthurus" group), lacks obvious narrow yellow or yellowish rings on the upper surface of the anterior tail, less than 91 mid-body rows (versus 70-115 in the "acanthurus" group), less than 58 transverse ventrals and the neck is never boldly striped (which it is in the "acanthurus" group).

The taxon *W. kingorum* (Storr, 1980), including the similar species from Western Australia from the hills adjacent to the Ord River drainage (also formally described as a new species by myself at the same time this paper is/was published), until now treated as *W. kingorum* is phylogenetically grouped with the so-called "primordius" group of species. It/they are readily separated from the other species in the group by the lack of a series of enlarged keeled scales on either side of the vent. They are also separated from the "acanthurus" group on the same basis.

*W. primordius* (Mertens, 1942) (including the subspecies *W. primordius dalyi* Hoser, 2015) as defined in Hoser (2015g), are separated from all the other species in the group by the presence of fewer than 66 mid-body rows, versus more than 70 in all other species, which also appear to form a well-defined clade. Exceptional to this is the species *W. scotteipperi* sp. nov., which has 67-69 mid-body rows, separating this species from all other relevant taxa.

The species *W. storri* is herein restricted to an area east of Croydon in Queensland (Latitude -18.21 S., Longitude 142.24 E.) being found in drier rocky parts of north-east Queensland.

Specimens from around the Mount Isa district in Western Queensland are *W. makhani*.

All others in the group, until now treated as *W. storri* by authors including Cogger (2014) and Wilson and Swan (2017) (as defined by them), except for *W. storri* are readily separated from *W. storri* by the enlarged scales under distal part of hindleg (not present in *W. storri*) as seen in the comparative image in Brown (2012), page 193 (second from top) and (in adults at least) the readily noticeably longer tail (1.7-1.9 times body length, versus 1.45-1.55 times), average lighter build in adults and slightly longer limbs.

*Worrellisaurus kimaniadilbodeni* sp. nov. (this paper), *W. makhani*, *W. microocellata* sp. nov. (this paper), *W. ocreatus* and *W. tyeseeipperae* sp. nov. (this paper) are readily separated from *W. storri* and *W. scotteipperi* sp. nov. (this paper) by colouration. *W. storri* and *W. scotteipperi* sp. nov. (this paper) are characterized by

a distinctive dark temporal streak running through the eye, being wide or narrow between the nostril and the eye and broad beyond the eye, where it forms a thick temporal streak running to the back of the head. By contrast in the other species, the same temporal streak is indistinct beyond the eye and it is not bounded by a white streak underneath, as it is in *W. storri* and *W. scotteipperi* sp. nov.. *W. scotteipperi* sp. nov. is separated from *W. storri* by the presence of the thick well-defined dark streak running from the nostril to the eye, versus thin, sometimes broken, or triangular in *W. storri*.

*W. storri* are further readily separated from *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. microocellata* sp. nov., *W. ocreatus*, *W. tyeseeipperae* sp. nov. and *W. scotteipperi* sp. nov. by the presence of distinctive dark flecks or spots below the temporal streak at the lower rear of the head, which tend to be absent, very small or indistinct on the other species.

*W. microocellata* sp. nov. is separated from *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. tyeseeipperae* sp. nov. and *W. scotteipperi* sp. nov. by a lack of white pigment on the lower jaw, throat and lower neck, with widely scattered tiny dark spots only. This trait it shares in common with *W. ocreatus* although the widely scattered spots are slightly more numerous in *W. ocreatus*. *W. microocellata* sp. nov., has an absence of darker spots on the lower jaw, which then abruptly become common on the throat and lower jaw. *W. makhani* and *W. kimaniadilbodeni* sp. nov. have an even and well defined pattern of dark spots on the lower jaw, throat and lower neck.

*W. tyeseeipperae* sp. nov. has flecks of dark pigment configured to form a series of broken cross-bands running across the lower throat region. *W. scotteipperi* sp. nov. has minimal dark spotting on the lower jaw and upper throat, while the throat and neck effectively lack any dark spots. Furthermore in *W. scotteipperi* sp. nov. the lower flanks of the neck are white and effectively lack any dark spotting as seen in all of *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. microocellata* sp. nov., *W. ocreatus* and *W. tyeseeipperae* sp. nov..

*W. microocellata* sp. nov. is separated from *W. ocreatus* by the presence of numerous regular patterned dark flecks on each side of the head and a top of the head darker in colour than the body, versus irregular scattered dark flecks on a light background on each side of the head and a head of same colour as the upper body.

*W. microocellata* sp. nov. is further separated from all of *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. ocreatus*, *W. tyeseeipperae* sp. nov. and *W. scotteipperi* sp. nov. by a unique dorsal pattern consisting of a strong reddish tinge running along the vertebral line and nearby parts of the upper back on the body, becoming greyish-black on the upper flanks, with a dorsal pattern consisting of tiny white squarish blotches on the dorsal surface of the forebody, tending to become tiny ocelli on the posterior part of the upper body, all against a mainly blackish-grey background.

Both *W. microocellata* sp. nov. and *W. kimaniadilbodeni* sp. nov. are separated from all of *W. makhani*, *W. ocreatus*, *W. tyeseeipperae* sp. nov. and *W. scotteipperi* sp. nov. by the presence of a well defined dark curved line, bounded by white along the upper and lower side situated on the side of the supraciliary ridge on each side of the head.

*W. microocellata* sp. nov. is separated from all of *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. ocreatus*, *W. tyeseeipperae* sp. nov. and *W. scotteipperi* sp. nov. by the presence of prominent raised white spots on scales on the mid flanks of the base of the tail. *W. kimaniadilbodeni* sp. nov. has indistinct cream spots on the same raised scales. *W. ocreatus* has scattered black dots on some raised scales on the mid-flanks of the base of the tail.

Unlike the species *W. microocellata* sp. nov., *W. kimaniadilbodeni* sp. nov. and *W. ocreatus* the three species *W. makhani*, *W. tyeseeipperae* sp. nov. and *W. scotteipperi* sp. nov. are characterized by a lack of any consistent configuration of raised coloured scales on the flanks of the upper tail. In all three there is at best widely scattered and irregular dark tipped scales. For these three species the flanks of the anterior tail are best described as



grading gradually from the dark upper colour to the whitish venter colour, with all scales being of similar colour consistency, as opposed to dark or light coloured centres, contrasting with the nearby scale colour.

*W. kimaniadilbodeni* sp. nov. and *W. scotteipperi* sp. nov. are separated from all of *W. microocellata* sp. nov., *W. ocreatus*, *W. makhani*, and *W. tyeseeipperae* sp. nov. by the fact that the upper labials above the eye are configured in alternating dark and light, being dark brown and yellowish white, the rectangular blotches giving the upper jaw a barred appearance.

Under the eye, the upper labials of *W. ocreatus*, *W. makhani* and *W. microocellata* sp. nov. are either one colour, one colour evenly peppered with numerous dark flecks, or one colour with irregular dark flecks.

*W. tyeseeipperae* sp. nov. is separated from all of *W. kimaniadilbodeni* sp. nov., *W. scotteipperi* sp. nov., *W. microocellata* sp. nov., *W. ocreatus*, and *W. makhani* by the unique presence of irregular large blotches on a whitish background on the upper labials, not forming any barred configuration as well as a pattern of dense dark speckling on the neck, becoming more dense on the sides and giving a reticulated appearance, the darker flecks extending onto the lower neck.

*W. tyeseeipperae* sp. nov. is further separated from all of *W. kimaniadilbodeni* sp. nov., *W. scotteipperi* sp. nov., *W. microocellata* sp. nov., *W. ocreatus*, and *W. makhani* by the fact that the front of the tail is characterised by the fact that from about row 11 past the pelvic girdle (back legs), the raised spines on the upper surface are all tipped with well-defined black spines, running to the end of the tail.

While all Western Australian species *W. tyeseeipperae* sp. nov., *W. kimaniadilbodeni* sp. nov., *W. microocellata* sp. nov., and *W. ocreatus*, may have visible and prominent longitudinal stripes running along the rear end of the dorsal surface of the tail, this is not the case for any of the East Australian species, namely *W. makhani*, *W. scotteipperi* sp. nov., or for that matter *W. storri*.

The longitudinal striping at the lower end of the tail in *W. tyeseeipperae* sp. nov. is prominent, versus prominent, but with lighter, but still well-defined dark and light stripes in *W. ocreatus* and these are indistinct in *W. kimaniadilbodeni* sp. nov. and *W. microocellata* sp. nov.

*W. tyeseeipperae* sp. nov. is different from all of *W. kimaniadilbodeni* sp. nov., *W. scotteipperi* sp. nov., *W. microocellata* sp. nov., *W. ocreatus*, and *W. makhani* in that all but very aged specimens have the upper surface of the head including the snout characterised by distinctive dark markings on a very light background, versus a dorsal surface of the head being generally unmarked, or occasionally peppered in all the other species, the peppered condition being most commonly seen in *W. makhani*.

*W. scotteipperi* sp. nov. is separated from all of *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. microocellata* sp. nov., *W. ocreatus*, and *W. tyeseeipperae* sp. nov. by a lack of any defined longitudinal striping at the latter part of the tail, save for a broken dorsolateral line, with the breaks being sufficiently wide to give the end of the tail an appearance of having cross-bands similar to those seen in the so-called "*acanthurus*" group of species.

Because *W. scotteipperi* sp. nov. has no such rings on the anterior part of the tail, it cannot possibly be confused with any of the so-called "*acanthurus*" group of species.

*W. microocellata* sp. nov. is readily separated from *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. ocreatus*, *W. tyeseeipperae* sp. nov. and *W. scotteipperi* sp. nov. by tail length in adults. In *W. microocellata* sp. nov. it is 1.8-1.9 times the body length, versus 1.7-1.8 times body length in the other five species.

In terms of the other three species found in the Kimberley and nearby parts of the Northern Territory, this is a significant difference and appears to be due to a character displacement event that may have occurred in the areas inhabited by the other three. Those species are all apparently sympatric with *W. kingorum* (in the NT) and a newly described similar species from the Ord River drainage in Western Australia, that had until now been treated as a western

population of *W. kingorum*. *W. kingorum* occupies similar and same habitat as the other species and it's most significant difference is a more gracile build, including a tail that is more than 200% the length of the body.

Where both *W. kingorum* and *W. kimaniadilbodeni* sp. nov., *W. ocreatus* or *W. tyeseeipperae* sp. nov. occur in sympatry, *W. kingorum* is most common on large hills with large amounts of rock sheets across the ground, boulders and the like, whereas the other three are most common on rocky habitats between the hills if present, lower scree slopes and the like.

*W. microocellata* sp. nov. also appears to have a more elongate body and head than *W. kimaniadilbodeni* sp. nov., *W. ocreatus* and *W. tyeseeipperae* sp. nov..

The holotype of *W. ocreatus* and all live specimens inspected by this author from the type locality are of the same form and colour. They are reddish across the entire dorsal surface, overlain with fine black peppering, in a configuration that occasionally gives a slightly reticulated pattern on the upper body surface. This is quite unlike any other species of *Worrellisaurus*. Closest to this condition among the relevant species is *W. kimaniadilbodeni* sp. nov. which is orangeish yellow on top of the body with similar flecks to *W. ocreatus* with significant dark brown scales as flecks in a banded configuration on the venter, as opposed to limited dark scales on the venter of *W. ocreatus*.

*W. tyeseeipperae* sp. nov. is unusual among *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. microocellata* sp. nov., *W. ocreatus* and *W. scotteipperi* sp. nov. in that on the upper surface of the body, specimens lacks obvious spots, flecks, peppering or markings on all but the upper back, this being the normal condition for even younger specimens.

*W. makhani* and *W. scotteipperi* sp. nov. are both characterized by a dorsal colour pattern consisting of darker brown pigment overlain with lighter brown speckling in clusters or longitudinal lines, tending to form small dark edged ocelli on the back, with lighter centres. In *W. makhani* these ocelli merge on the lower back to form semi-distinct vertebral lines, which is not the case in *W. scotteipperi* sp. nov..

Specimens attributed to "*Varanus storri ocreatus*" have been collected from Christmas Creek Station, Western Australia (south-east of Fitzroy Crossing in the south-east Kimberley), as well as the Mornington Wildlife Sanctuary (southern central Kimberley) and 50 km east of Derby in the south-west Kimberley. These specimens have not been examined by myself and so their specific status is not known. Specimens attributed to "*Varanus storri ocreatus*" from north and west of the Drysdale River in Western Australia are referable to *W. microocellata* sp. nov..

The specimen depicted as "Plate 11: A *Varanus storri ocreatus* from Gordon Creek, N.T. Photographed by G. Barron." in Storr (1980) is of the taxon *W. tyeseeipperae* sp. nov..

**Distribution:** *Worrellisaurus tyeseeipperae* sp. nov. occurs in the general region of the Gregory National Park in north-west Northern Territory and immediately adjacent rocky hills in the area east of the West Baines River, also within the Northern Territory, Australia.

**Etymology:** Named in honour of Tyese Eipper, wife of Scott Eipper, both herpetologists of the south-eastern suburbs of Brisbane, Queensland, Australia, running the education business "Nature 4 You" wildlife demonstrations (www.wildlifedemonstrations.com) for services to herpetology spanning some decades.

#### **WORRELLISAURUS (WORRELLISAURUS) SCOTTEIPPERI SP. NOV.**

**Holotype:** A preserved specimen at the Museum and Art Gallery of the Northern Territory Reptile Collection (AKA Northern Territory Museum) at Darwin, Northern Territory, Australia, specimen number: R20415, collected at the McArthur River Station, Barney Hill, Northern Territory, Australia, Latitude -16.42 S., Longitude 136.10 E.

The Northern Territory Museum, Australia is a government-owned facility that allows access to its collections.

**Paratypes:** Four specimens collected from the same location as the holotype (McArthur River Station, Barney Hill, Northern Territory, Australia, Latitude -16.42 S., Longitude 136.10 E.), also

held at the Museum and Art Gallery of the Northern Territory Reptile Collection (AKA Northern Territory Museum) at Darwin, Northern Territory, Australia, specimen numbers: R17432, R17433, R20414, R20415.

**Diagnosis:** In order to separate this and all other species formally named for the first time in this paper within the subgenus *Worrellisaurus* Wells and Wellington, 1984, as defined for the first time by Hoser (2013), the various species groups within *Worrellisaurus* need to be separated from one another first. The so-called “*primordius*” group of species, defined herein includes, *W. kimaniadilbodeni* sp. nov. (this paper), *W. makhani* Hoser, 2013, *W. microocellata* sp. nov. (this paper), *W. ocreatus* (Storr, 1980), *W. primordius* (Mertens, 1942) (including the subspecies *W. primordius dalyi* Hoser, 2015) as defined in Hoser (2015g), *W. tyeseei* sp. nov. (this paper), *W. scottei* sp. nov. (this paper) and *W. storri* (Mertens, 1966). These species are readily separated from the “*acanthurus*” group of species by the following characters: A small monitor (up to 35 cm long) (versus 60-70 cm in the “*acanthurus*” group) with strongly spinose tail, the body lacks a distinct or indistinct pattern of medium-sized ocelli (versus present in the “*acanthurus*” group), lacks obvious narrow yellow or yellowish rings on the upper surface of the anterior tail, less than 91 mid-body rows (versus 70-115 in the “*acanthurus*” group), less than 58 transverse ventrals and the neck is never boldly striped (which it is in the “*acanthurus*” group).

The taxon *W. kingorum* (Storr, 1980), including the similar species from Western Australia from the hills adjacent to the Ord River drainage (also formally described as a new species by myself at the same time this paper is/was published), until now treated as *W. kingorum* is phylogenetically grouped with the so-called “*primordius*” group of species. It/they are readily separated from the other species in the group by the lack of a series of enlarged keeled scales on either side of the vent. They are also separated from the “*acanthurus*” group on the same basis.

*W. primordius* (Mertens, 1942) (including the subspecies *W. primordius dalyi* Hoser, 2015) as defined in Hoser (2015g), are separated from all the other species in the group by the presence of fewer than 66 mid-body rows, versus more than 70 in all other species, which also appear to form a well-defined clade. Exceptional to this is the species *W. scottei* sp. nov., which has 67-69 mid-body rows, separating this species from all other relevant taxa.

The species *W. storri* is herein restricted to an area east of Croydon in Queensland (Latitude -18.21 S., Longitude 142.24 E.) being found in drier rocky parts of north-east Queensland.

Specimens from around the Mount Isa district in Western Queensland are *W. makhani*.

All others in the group, until now treated as *W. storri* by authors including Cogger (2014) and Wilson and Swan (2017) (as defined by them), except for *W. storri* are readily separated from *W. storri* by the enlarged scales under distal part of hindleg (not present in *W. storri*) as seen in the comparative image in Brown (2012), page 193 (second from top) and (in adults at least) the readily noticeably longer tail (1.7-1.9 times body length, versus 1.45-1.55 times), average lighter build in adults and slightly longer limbs.

*Worrellisaurus kimaniadilbodeni* sp. nov. (this paper), *W. makhani*, *W. microocellata* sp. nov. (this paper), *W. ocreatus* and *W. tyeseei* sp. nov. (this paper) are readily separated from *W. storri* and *W. scottei* sp. nov. (this paper) by colouration. *W. storri* and *W. scottei* sp. nov. (this paper) are characterized by a distinctive dark temporal streak running through the eye, being wide or narrow between the nostril and the eye and broad beyond the eye, where it forms a thick temporal streak running to the back of the head. By contrast in the other species, the same temporal streak is indistinct beyond the eye and it is not bounded by a white streak underneath, as it is in *W. storri* and *W. scottei* sp. nov.. *W. scottei* sp. nov. is separated from *W. storri* by the presence of the thick well-defined dark streak running from the nostril to the eye, versus thin, sometimes broken, or triangular in *W. storri*.

*W. storri* are further readily separated from *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. microocellata* sp. nov., *W. ocreatus*, *W. tyeseei* sp. nov. and *W. scottei* sp. nov. by the presence of distinctive dark flecks or spots below the temporal streak at the lower rear of the head, which tend to be absent, very small or indistinct on the other species.

*W. microocellata* sp. nov. is separated from *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. tyeseei* sp. nov. and *W. scottei* sp. nov. by a lack of white pigment on the lower jaw,

throat and lower neck, with widely scattered tiny dark spots only. This trait it shares in common with *W. ocreatus* although the widely scattered spots are slightly more numerous in *W. ocreatus*. *W. microocellata* sp. nov., has an absence of darker spots on the lower jaw, which then abruptly become common on the throat and lower jaw. *W. makhani* and *W. kimaniadilbodeni* sp. nov. have an even and well defined pattern of dark spots on the lower jaw, throat and lower neck.

*W. tyeseei* sp. nov. has flecks of dark pigment configured to form a series of broken cross-bands running across the lower throat region. *W. scottei* sp. nov. has minimal dark spotting on the lower jaw and upper throat, while the throat and neck effectively lack any dark spots. Furthermore in *W. scottei* sp. nov. the lower flanks of the neck are white and effectively lack any dark spotting as seen in all of *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. microocellata* sp. nov., *W. ocreatus* and *W. tyeseei* sp. nov..

*W. microocellata* sp. nov. is separated from *W. ocreatus* by the presence of numerous regular patterned dark flecks on each side of the head and a top of the head darker in colour than the body, versus irregular scattered dark flecks on a light background on each side of the head and a head of same colour as the upper body.

*W. microocellata* sp. nov. is further separated from all of *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. ocreatus*, *W. tyeseei* sp. nov. and *W. scottei* sp. nov. by a unique dorsal pattern consisting of a strong reddish tinge running along the vertebral line and nearby parts of the upper back on the body, becoming greyish-black on the upper flanks, with a dorsal pattern consisting of tiny white squarish blotches on the dorsal surface of the forebody, tending to become tiny ocelli on the posterior part of the upper body, all against a mainly blackish-grey background. Both *W. microocellata* sp. nov. and *W. kimaniadilbodeni* sp. nov. are separated from all of *W. makhani*, *W. ocreatus*, *W. tyeseei* sp. nov. and *W. scottei* sp. nov. by the presence of a well defined dark curved line, bounded by white along the upper and lower side situated on the side of the supraciliary ridge on each side of the head.

*W. microocellata* sp. nov. is separated from all of *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. ocreatus*, *W. tyeseei* sp. nov. and *W. scottei* sp. nov. by the presence of prominent raised white spots on scales on the mid flanks of the base of the tail. *W. kimaniadilbodeni* sp. nov. has indistinct cream spots on the same raised scales. *W. ocreatus* has scattered black dots on some raised scales on the mid-flanks of the base of the tail.

Unlike the species *W. microocellata* sp. nov., *W. kimaniadilbodeni* sp. nov. and *W. ocreatus* the three species *W. makhani*, *W. tyeseei* sp. nov. and *W. scottei* sp. nov. are characterized by a lack of any consistent configuration of raised coloured scales on the flanks of the upper tail. In all three there is at best widely scattered and irregular dark tipped scales. For these three species the flanks of the anterior tail are best described as grading gradually from the dark upper colour to the whitish venter colour, with all scales being of similar colour consistency, as opposed to dark or light coloured centres, contrasting with the nearby scale colour.

*W. kimaniadilbodeni* sp. nov. and *W. scottei* sp. nov. are separated from all of *W. microocellata* sp. nov., *W. ocreatus*, *W. makhani*, and *W. tyeseei* sp. nov. by the fact that the upper labials above the eye are configured in alternating dark and light, being dark brown and yellowish white, the rectangular blotches giving the upper jaw a barred appearance. Under the eye, the upper labials of *W. ocreatus*, *W. makhani* and *W. microocellata* sp. nov. are either one colour, one colour evenly peppered with numerous dark flecks, or one colour with irregular dark flecks. *W. tyeseei* sp. nov. is separated from all of *W. kimaniadilbodeni* sp. nov., *W. scottei* sp. nov., *W. microocellata* sp. nov., *W. ocreatus*, and *W. makhani* by the unique presence of irregular large blotches on a whitish background on the upper labials, not forming any barred configuration as well as a pattern of dense dark speckling on the neck, becoming more dense on the sides and giving a reticulated appearance, the darker flecks extending onto the lower neck.

*W. tyeseei* sp. nov. is further separated from all of *W. kimaniadilbodeni* sp. nov., *W. scottei* sp. nov., *W. microocellata* sp. nov., *W. ocreatus*, and *W. makhani* by the fact that the front of the tail is characterised by the fact that from about

row 11 past the pelvic girdle (back legs), the raised spines on the upper surface are all tipped with well-defined black spines, running to the end of the tail.

While all Western Australian species *W. tyeseieipperae* sp. nov., *W. kimaniadilbodeni* sp. nov., *W. microocellata* sp. nov., and *W. ocreatus*, may have visible and prominent longitudinal stripes running along the rear end of the dorsal surface of the tail, this is not the case for any of the East Australian species, namely *W. makhani*, *W. scotteipperi* sp. nov., or for that matter *W. storri*.

The longitudinal striping at the lower end of the tail in *W. tyeseieipperae* sp. nov. is prominent, versus prominent, but with lighter, but still well-defined dark and light stripes in *W. ocreatus* and these are indistinct in *W. kimaniadilbodeni* sp. nov. and *W. microocellata* sp. nov..

*W. tyeseieipperae* sp. nov. is different from all of *W. kimaniadilbodeni* sp. nov., *W. scotteipperi* sp. nov., *W. microocellata* sp. nov., *W. ocreatus*, and *W. makhani* in that all but very aged specimens have the upper surface of the head including the snout characterised by distinctive dark markings on a very light background, versus a dorsal surface of the head being generally unmarked, or occasionally peppered in all the other species, the peppered condition being most commonly seen in *W. makhani*.

*W. scotteipperi* sp. nov. is separated from all of *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. microocellata* sp. nov., *W. ocreatus*, and *W. tyeseieipperae* sp. nov. by a lack of any defined longitudinal striping at the latter part of the tail, save for a broken dorsolateral line, with the breaks being sufficiently wide to give the end of the tail an appearance of having cross-bands similar to those seen in the so-called "*acanthurus*" group of species.

Because *W. scotteipperi* sp. nov. has no such rings on the anterior part of the tail, it cannot possibly be confused with any of the so-called "*acanthurus*" group of species.

*W. microocellata* sp. nov. is readily separated from *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. ocreatus*, *W. tyeseieipperae* sp. nov. and *W. scotteipperi* sp. nov. by tail length in adults. In *W. microocellata* sp. nov. it is 1.8-1.9 times the body length, versus 1.7-1.8 times body length in the other five species.

In terms of the other three species found in the Kimberley and nearby parts of the Northern Territory, this is a significant difference and appears to be due to a character displacement event that may have occurred in the areas inhabited by the other three. Those species are all apparently sympatric with *W. kingorum* (in the NT) and a newly described similar species from the Ord River drainage in Western Australia, that had until now been treated as a western population of *W. kingorum*. *W. kingorum* occupies similar and same habitat as the other species and it's most significant difference is a more gracile build, including a tail that is more than 200% the length of the body.

Where both *W. kingorum* and *W. kimaniadilbodeni* sp. nov., *W. ocreatus* or *W. tyeseieipperae* sp. nov. occur in sympatry, *W. kingorum* is most common on large hills with large amounts of rock sheets across the ground, boulders and the like, whereas the other three are most common on rocky habitats between the hills if present, lower scree slopes and the like.

*W. microocellata* sp. nov. also appears to have a more elongate body and head than *W. kimaniadilbodeni* sp. nov., *W. ocreatus* and *W. tyeseieipperae* sp. nov..

The holotype of *W. ocreatus* and all live specimens inspected by this author from the type locality are of the same form and colour. They are reddish across the entire dorsal surface, overlain with fine black peppering, in a configuration that occasionally gives a slightly reticulated pattern on the upper body surface. This is quite unlike any other species of *Worrellisaurus*. Closest to this condition among the relevant species is *W. kimaniadilbodeni* sp. nov. which is orangeish yellow on top of the body with similar flecks to *W. ocreatus* with significant dark brown scales as flecks in a banded configuration on the venter, as opposed to limited dark scales on the venter of *W. ocreatus*.

*W. tyeseieipperae* sp. nov. is unusual among *W. kimaniadilbodeni* sp. nov., *W. makhani*, *W. microocellata* sp. nov., *W. ocreatus* and *W. scotteipperi* sp. nov. in that on the upper surface of the body, specimens lacks obvious spots, flecks, peppering or markings on all but the upper back, this being the normal condition for even younger specimens.

*W. makhani* and *W. scotteipperi* sp. nov. are both characterized by a dorsal colour pattern consisting of darker brown pigment overlain

with lighter brown specking in clusters or longitudinal lines, tending to form small dark edged ocelli on the back, with lighter centres. In *W. makhani* these ocelli merge on the lower back to form semi-distinct vertebral lines, which is not the case in *W. scotteipperi* sp. nov..

Specimens attributed to "*Varanus storri ocreatus*" have been collected from Christmas Creek Station, Western Australia (south-east of Fitzroy Crossing in the south-east Kimberley), as well as the Mornington Wildlife Sanctuary (southern central Kimberley) and 50 km east of Derby in the south-west Kimberley. These specimens have not been examined by myself and so their specific status is not known. Specimens attributed to "*Varanus storri ocreatus*" from north and west of the Drysdale River in Western Australia are referable to *W. microocellata* sp. nov.. Brown (2014) depicts a photo of *W. scotteipperi* sp. nov. in life on page 872, bottom right image.

**Distribution:** *Worrellisaurus scotteipperi* sp. nov. occurs in the general region of the hills on the southern edge of the Gulf of Carpentaria on the Northern Territory side of the Queensland border, within the vicinity of the type locality. It is not known if this taxon occurs elsewhere.

**Etymology:** Named in honour of Scott Eipper, husband of Tyese Eipper, both herpetologists of the south-eastern suburbs of Brisbane, Queensland, Australia, running the education business "Nature 4 You" wildlife demonstrations (www.wildlifedemonstrations.com) for services to herpetology spanning some decades.

#### **WORRELLISAURUS DANNYBROWNI SP. NOV.**

**Holotype:** A preserved specimen in the Western Australian Museum, Perth, Western Australia, Australia, specimen number: R117242, collected at 3 km south east of Yilbrinna Pool, Western Australia, Australia, Latitude -24.00 S., Longitude 118.54 E.

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

**Paratype:** A preserved specimen in the Western Australian Museum, Perth, Western Australia, Australia, specimen number: R117243, collected at 3 km south east of Yilbrinna Pool, Western Australia, Australia, Latitude -24.00 S., Longitude 118.54 E.

**Diagnosis:** *Worrellisaurus dannybrowni* sp. nov. would key out as *W. acanthurus* (AKA "*Varanus acanthurus*") using the key in Cogger (2000).

*Worrellisaurus dannybrowni* sp. nov. is best described layman's terms as a "red form" of *W. acanthurus*, although red *W. acanthurus* do also occur, making general colouration alone not a useful diagnostic of this taxon.

However this crude division does hold true for specimens in and around the Pilbara region of Western Australia, where *W. dannybrowni* sp. nov. and *W. acanthurus* do occur in close proximity, making it possible to reliably identify specimens of either at a glance in that region.

However for all *W. acanthurus*, be they blackish in general colour as is typical for West Australian specimens, yellow or red as in central and central eastern Australian specimens, possess well defined narrow yellow rings on the base of the tail on the upper side and flanks.

*W. dannybrowni* sp. nov. lack these well-defined yellow rings.

The dorsal ocelli on the back and flanks of *W. acanthurus* are of similar size throughout, whereas in *W. dannybrowni* sp. nov. these are noticeably larger on the midline and shrink significantly towards the mid flanks, disintegrating on the lower flanks, where they merge into the reddish pigment. By contrast the ocelli go down the flanks in *W. acanthurus* and meet with rectangular patches of white between these and the whiter venter.

*W. dannybrowni* sp. nov. is also significantly more thick-set than both *W. acanthurus* and the closely related *W. insulanicus* Mertens, 1958, and has a significantly shorter tail than both taxa. In adult *W. dannybrowni* sp. nov. the tail is 1.3 times the length of the body versus 1.4-1.5 times in *W. acanthurus* (including the synonymous *W. brachyurus* Sternfeld, 1919) and 1.6-1.7 times in *W. insulanicus* Mertens, 1958 (which also applies to the synonymous *W. baritji* (King and Horner, 1987)).

The limbs of all of *W. acanthurus* and the closely related *W. insulanicus* Mertens, 1958 (including synonyms) are invariably blackish in colour with well defined yellow spots and this is regardless of the overall general body colour of the animal. By contrast the limbs of *W. dannybrowni* sp. nov. are distinctly purplish



red in colour with well defined yellow spots on all four limbs. Photos in life of both *W. acanthurus* and *W. dannybrowni* sp. nov. side by side can be found in Storr, Smith and Johnstone (1983) at plate 13, in photo 1 for *W. acanthurus* and photo 2 for *W. dannybrowni* sp. nov..

Further photos of typical *W. acanthurus* can be found in Cogger (2014) at page 764, and Wilson and Swan (2017) at page 461 at top.

**Distribution:** The exact limits of the distribution of *W. dannybrowni* sp. nov. are not certain, but the taxon appears to be restricted to the southern half of the Pilbara region in Western Australia, generally south of the Fortescue River drainage.

**Etymology:** Named in honour of veterinary surgeon, Danny Brown of Deception Bay in south-east Queensland for numerous services to herpetology spanning some decades. He is best known for his magnificent books about the keeping and breeding of reptiles, generally regarded as “best in class”, the best known and largest volume being Brown (2014) as cited in this paper.

#### **WORRELLISAURUS JENANDERSONAE SP. NOV.**

**Holotype:** A preserved specimen at the South Australian Museum, Adelaide, South, Australia, Australia, in the Herpetology Collection, specimen number: R44782, collected at Wirramania South, South Australia, Latitude -31.20 S., Longitude 136.23 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 at the South Australian Museum, Adelaide, South, Australia, Australia, in the Herpetology Collection, specimen number: R21166, collected at South Olympic Dam, Roxby Downs, South Australia, Australia, Latitude -30.75 S., Longitude 136.87 E.

**Diagnosis:** Until now *W. jenandersonae* sp. nov. has been regarded as a variant of *W. gilleni* (Lucas and Frost, 1895). However the two taxa are readily separated on the basis of colour and markings.

*W. gilleni* is characterised by a dorsal pattern consisting of well-defined blotches on the dorsum arranged in well-defined broken crossbands. The head and neck are also dominated by lighter pigment overlain with a series of well defined darker spots and blotches.

By contrast *W. jenandersonae* sp. nov. has a dorsal body pattern consisting of ill defined spots and peppering with the same darker colour over the lighter background and with significant peppering on the sides of the head (including over the temporal streak) and the top of the head, this not being seen in *W. gilleni*.

There is also peppering between the main ill defined cross-bands in *W. jenandersonae* sp. nov., this not being seen in *W. gilleni*.

Photos of typical *W. jenandersonae* sp. nov. in life can (as of when this paper was written in 2018) be found online at: <https://www.aussiepythons.com/forum/threads/herping-sa-thernatty-and-the-peninsula.200800/> (Mahony 2013).

Typical *W. gilleni* in life are depicted in Cogger (2014) at page 771 and Wilson and Swan (2017) at page 65 (top left).

**Distribution:** *W. jenandersonae* sp. nov. appears to be generally found in most of South Australia and into the far southern Northern Territory immediately south of Alice Springs. However the exact distribution limit of this taxon is not known. *W. gilleni* is found throughout the rest of the southern Northern Territory and eastern Western Australia, before it is replaced with *W. caudolineatus* in most of the south-west of that state and *W. bushi* in the Pilbara region.

In the east the distribution of *W. gilleni* extends to far western Queensland around Birdsville and north of there.

**Etymology:** Named in honour of Jen Anderson of Ringwood, Victoria, Australia working with the team at Snakebusters, Australia's best reptiles shows to educate people about Australian wildlife, including the science of discovering species and learning about them and the further steps required to conserve species. Dealing with erratic members of the public is not difficult when compared with dealing with others in the business space imitating our successful formula. We continually are finding ourselves having to fend off unlawful attacks from these people who are in the animal business space, but have no concern for the animals and are only in the business for money.

These criminals attack our staff at displays, make false complaints against us to divert our clients to their unsafe alternatives and so on, and Jen has to work on the coalface unnecessarily having to deal with these unlawful attacks, being diverted from what the Snakebusters team does best, which is working for wildlife conservation.

#### **ACKNOWLEDGEMENTS**

Luke and Gina Faba, lawyers at Stenta Legal, 1 Queens Road, Melbourne, Victoria, Australia, successfully retrieved some, but not all, relevant data and hard drives illegally seized by Glenn Sharp and Emily Gibson, claiming to be acting on the orders of Ron Waters, head of wildlife law enforcement at the State Government wildlife department on 17 August 2011 during a unlawful violent armed raid on the author's facility.

The trio, and the dozens of others they employed in their so-called “Operation Bassett” (as detailed in Victorian Civil and Administrative Tribunal 2015) all worked for the Victorian Government Wildlife Department (at the time called “DSE”).

Their destructive armed raid, in which they also illegally killed numerous live reptiles held by the author, was found to be illegal by several courts of law after the fact, including by the Victorian Court of Appeal in 2014 and Victorian Civil and Administrative Appeals Tribunal (VCAT) in 2015.

#### **REFERENCES CITED**

- Aplin, K. P., Fitch, A. J. and King, D. J. 2006. A new species of *Varanus* Merrem (Squamata: Varanidae) from the Pilbara region of Western Australia, with observations on sexual dimorphism in closely related species. *Zootaxa* (online) 1313:1-38.
- Bennett, D. 1998. *Monitor Lizards: Natural history, biology and husbandry*. Edition Chimaira: Germany:352 pp.
- Boulenger, G. A. 1885. *Catalogue of the Lizards in the British Museum (Natural History) Volume II. Iguanidae, Xenosauridae, Zonuridae, Anguillidae, Anniellidae, Helodermatidae, Varanidae, Xantusiaidae, Teiidae, Amphisbaenidae*. Taylor and Francis, London, UK.
- Brown, D. 2012. *A guide to ... Australian Monitors in Captivity*. Reptile Publications, Tweed Heads, NSW, Australia: 222 pp.
- Brown, D. 2014. *A guide to ... Australian Lizards in Captivity*. Reptile Publications, Tweed Heads, NSW, Australia:952 pp.
- Bucklitsch, Y., Böhme, W. and Koch, A. 2016. Scale Morphology and Micro-Structure of Monitor Lizards (Squamata: Varanidae: *Varanus* spp.) and their Allies: Implications for Systematics, Ecology, and Conservation. *Zootaxa* (online) 4153(1):1-192.
- Cogger, H. G. 2014. *Reptiles and Amphibians of Australia* (Seventh edition), CSIRO. Sydney, Australia:1064 pp.
- Cogger, H. G., Cameron, E. E. and Cogger, H. M. 1983. *Zoological Catalogue of Australia, Volume 1: Amphibia and Reptilia*. Australian Government Publishing Service, Canberra, ACT:313 pp.
- Court of Appeal Victoria. 2014. *Hoser v Dept. of Sustainability and Environment* [2014] VSCA 206 (5 September 2014).
- Doughty, P., Kealley, L., Fitch, A. and Donnellan, S. C. 2014. A new diminutive species of *Varanus* from the Dampier Peninsula, western Kimberley region, Western Australia. *Records of the Western Australian Museum* 29:128-140.
- Farrant, D. 2002. You don't need a photocopier to win. *The Age*, 18 April, downloaded from <https://www.theage.com.au/articles/2002/04/17/1019020661135.html> on 1 March 2018.
- Fitch, A. J., Goodman, A. E. and Donnellan, S. C. 2006. A molecular phylogeny of the Australian monitor lizards (Squamata: Varanidae) inferred from mitochondrial DNA sequences. *Australian Journal of Zoology* 54:253-269.
- Gray, J. E. 1838. Catalogue of the slender-tongued saurians, with descriptions of many new genera and species. Part 3. *Ann. Mag. Nat. Hist.* (1)1:388-394.
- Gray, J. E. 1845. *Catalogue of the Specimens of Lizards in the British Museum*. British Museum, London, UK.
- Gregory, P. and Chessell, J. 2002. Dead farmer wins \$1 million. *The Age*. 12 June, downloaded from <https://www.theage.com.au/articles/2002/06/11/1022982845643.html> on 1 March 2018.
- Hoser, R. T. 1989. *Australian Reptiles and Frogs*. Pierson and Co., Mosman, NSW, 2088, Australia:238 pp.
- Hoser, R. T. 1991. *Endangered Animals of Australia*. Pierson Publishing, Mosman, NSW, 2088, Australia:240 pp.

- Hoser, R. T. 1993. *Smuggled: The Underground Trade in Australia's Wildlife*. Apollo Publishing, Moss Vale, NSW, Australia:160 pp.
- Hoser, R. T. 1996. *Smuggled-2: Wildlife Trafficking, Crime and Corruption in Australia*. Kotabi Publishing, Doncaster, Victoria, Australia:280 pp.
- Hoser, R. T. 1999a. *Victoria Police Corruption: The book the Victoria Police don't want you to read!* Kotabi Publishing, Doncaster, Victoria, 3108, Australia:736 pp.
- Hoser, R. T. 1999b. *Victoria Police Corruption-2: Including what the media didn't tell you!* Kotabi Pub., Vic., 3108, Australia:736 pp.
- Hoser, R. T. 2000a. *Taxi: Indecent Exposures*. Kotabi Publishing, Doncaster, Victoria, 3108, Australia:520 pp.
- Hoser, R. T. 2000b. *Taxi-2: More Indecent Exposures*. Kotabi Publishing, Doncaster, Victoria, 3108, Australia:504 pp.
- Hoser, R. T. 2007. Wells and Wellington - It's time to bury the hatchet. *Calodema* (Supplementary Paper) 1:1-9.
- Hoser, R. T. 2013b. Monitor Lizards reclassified with some common sense (Squamata: Sauria: Varanidae). *Australasian Journal of Herpetology* 21:41-58.
- Hoser, R. T. 2014. The break up of *Odatria* (Kimberleyvaranus) *glebopalma* (Mitchell, 1955) into three obvious subspecies. *Australasian Journal of Herpetology* 24:16-19.
- Hoser, R. T. 2015a. Dealing with the "truth haters" ... a summary! Introduction to Issues 25 and 26 of *Australasian Journal of Herpetology*. Including "A timeline of relevant key publishing and other events relevant to Wolfgang Wüster and his gang of thieves." and a "Synonyms list". *Australasian Journal of Herpetology* 25:3-13.
- Hoser, R. T. 2015b. The Wüster gang and their proposed "Taxon Filter": How they are knowingly publishing false information, recklessly engaging in taxonomic vandalism and directly attacking the rules and stability of zoological nomenclature. *Australasian Journal of Herpetology* 25:14-38.
- Hoser, R. T. 2015c. Best Practices in herpetology: Hinrich Kaiser's claims are unsubstantiated. *Australasian Journal of Herpetology* 25:39-52.
- Hoser, R. T. 2015d. Comments on *Spracklandus* Hoser, 2009 (Reptilia, Serpentes, ELAPIDAE): request for confirmation of the availability of the generic name and for the nomenclatural validation of the journal in which it was published (Case 3601; see *BZN* 70: 234-237; comments *BZN* 71:30-38, 133-135). (unedited version) *Australasian Journal of Herpetology* 27:37-42.
- Hoser, R. T. 2015e. PRINO (Peer reviewed in name only) journals: When quality control in scientific publication fails. *Australasian Journal of Herpetology* 26:3-64.
- Hoser, R. T. 2015f. Rhodin *et al.* 2015, Yet more lies, misrepresentations and falsehoods by a band of thieves intent on stealing credit for the scientific works of others. *Australasian Journal of Herpetology* 27:3-36.
- Hoser, R. T. 2015g. Hitherto overlooked species of reptile from Northern Australia: A result of science, taxonomy, molecular biology, systematics, history and forensic herpetology. *Australasian Journal of Herpetology* 30:21-27.
- Hoser, R. T. 2017. Taxonomic vandalism by Wolfgang Wüster and his gang of thieves continues. New names unlawfully coined by the rule breakers for species and genera previously named according to the rules of the *International Code of Zoological Nomenclature*. *Australasian Journal of Herpetology* 35:57-63.
- Iaria, M. and Best, C. 2009. Man wrongly jailed for rape walks free. *Sydney Morning Herald*, 7 December, downloaded from <https://www.smh.com.au/national/man-wrongly-jailed-for-rape-walks-free-20091207-kdoz.html> on 1 March 2018.
- Kaiser, H. 2012a. SPAM email sent out to numerous recipients on 5 June 2012.
- Kaiser, H. 2012b. Point of view. Hate article sent as attachment with SPAM email sent out on 5 June 2012.
- Kaiser, H. 2013. The Taxon Filter, a novel mechanism designed to facilitate the relationship between taxonomy and nomenclature, vis-à-vis the utility of the Code's Article 81 (the Commission's plenary power). *Bulletin of Zoological Nomenclature* 70(4) December 2013:293-302.
- Kaiser, H. 2014a. Comments on *Spracklandus* Hoser, 2009 (Reptilia, Serpentes, ELAPIDAE): request for confirmation of the availability of the generic name and for the nomenclatural validation of the journal in which it was published. *Bulletin of Zoological Nomenclature*, 71(1):30-35.
- Kaiser H. 2014b. Best Practices in Herpetological Taxonomy: Errata and Addenda. *Herpetological Review*, 45(2):257-268.
- Kaiser, H., Crother, B. L., Kelly, C. M. R., Luiselli, L., O'Shea, M., Ota, H., Passos, P., Schleip, W. D. and Wüster, W. 2013. Best practices: In the 21st Century, Taxonomic Decisions in Herpetology are Acceptable Only When supported by a body of Evidence and Published via Peer-Review. *Herpetological Review* 44(1):8-23.
- King, M. and Horner, P. 1987. A new species of monitor (Platynota: Reptilia) from northern Australia and a note on the status of *Varanus acanthurus insulanicus* Mertens. *The Beagle* 4(1)1987:73-79.
- Lillebuen, S. 2010. \$550,000 settlement in wrongful rape case: INNOCENT man gets \$550,000 after rape case bungle saw him imprisoned for "no reason". *news.com.au*, 30 June, downloaded from <http://www.news.com.au/national/k-settlement-in-wrongful-rape-case/news/87e9f4edcec9744131be406388c72b40> on 1 March 2018.
- Lucas, A. H. S. and Frost, C. 1895. Preliminary notice of certain new species of lizards from central Australia. *Proceedings of the Royal Society of Victoria*, 7:264-269.
- Mahony, S. 2013. Herping SA: Pernatty and the Peninsula. Post on online chat forum at: <https://www.aussiepythons.com/forum/threads/herping-sa-ernatty-and-the-peninsula.200800/> dated 18 Feb 2013, downloaded on 1 March 2018.
- Maryan, B., Oliver, P. M., Fitch, A. J. and O'Connell, M. 2014. Molecular and morphological assessment of *Varanus pilbarensis* (Squamata: Varanidae), with a description of a new species from the southern Pilbara, Western Australia. *Zootaxa* 3768(2):139-158.
- Mertens, R. 1958. Bemerkungen über die Warane Australiens. *Senckenbergiana biologica* 39:229-264.
- Mertens, R. 1966. Ein neuer Zwergwaran aus Australien. *Senckenbergiana biologica* 47:437-441.
- Ride, W. D. L. (ed.) *et al.* (on behalf of the International Commission on Zoological Nomenclature) 1999. *International code of Zoological Nomenclature*. The Natural History Museum - Cromwell Road, London SW7 5BD, UK.
- Sternfeld, R. 1919. Neue Schlangen und Echsen aus Zentralaustralien. *Senckenbergiana* 1:76-83.
- Storr, G. M. 1980. The monitor lizards (genus *Varanus* Merrem, 1820) of Western Australia. *Records of the Western Australian Museum* 8(2):237-293.
- Storr, G. M., Smith, L. A. and Johnstone, R. E. 1992. *Lizards of Western Australia 2: Dragons and Monitors*. Western Australian Museum, Perth, Western Australia, Australia:114 pp.
- Szego, J. 2014. Wrongfully accused: Seduced by DNA "evidence", but with precious little to corroborate it, a jury was quick to convict Farah Jama of rape. Julie Szego reports on a miscarriage of justice. *Sydney Morning Herald*, 29 March, online at <https://www.smh.com.au/national/wrongfully-accused-20140324-35cga.html> downloaded on 1 March 2018.
- Thompson, G. G., Clemente, C. J., Withers, P. C., Fry, B. G. and Norman, J. A. 2008. Is body shape of varanid lizards linked with retreat choice? *Australian Journal of Zoology*, 56:351-362.
- Victorian Civil and Administrative Tribunal (VCAT). 2015. *Hoser v Department of Environment Land Water and Planning* (Review and Regulation) [2015] VCAT 1147 (30 July 2015, judgment and transcript).
- Wells, R. W. and Wellington, C. R. 1984. A synopsis of the class Reptilia in Australia. *Australian Journal of Herpetology* 1(3-4):73-129.
- Wells, R. W. and C. R. Wellington. 1985. A classification of the Amphibia and Reptilia of Australia. *Australian Journal of Herpetology Supplementary Series* 1:1-61.
- Wilson, S. K. and Knowles, D. G. 1988. *Australia's Reptiles. A Photographic Reference to the Terrestrial Reptiles of Australia*. William Collins, Sydney, New South Wales, Australia:447 pp.
- Wilson, S. and Swan, G. 2017. *A complete guide to reptiles of Australia*. New Holland, Australia:560 pp.

**CONFLICT OF INTEREST**

There are no conflicts of interest in terms of this paper and the author.

***Varanus kingorum* Storr, 1980, *Varanus minor* Weigel, 1985, a damaging case of taxonomic vandalism by John Weigel and *Worrellisaurus bigmoreum* sp. nov., a new species of small monitor lizard, from the East Kimberley division of Western Australia.**

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Received 19 May 2018, Accepted 4 June 2018, Published 20 June 2018.

**ABSTRACT**

A long-term review of the species most widely known as *Varanus kingorum* Storr, 1980 showed that two morphologically divergent taxa have been treated as belonging to this species by all herpetologists since the date of original description.

*Varanus kingorum* Storr, 1980, was transferred to the genus *Worrellisaurus* Wells and Wellington, 1984 and while the generic placement made sense on the basis of evidence provided by Hoser (2013b), the genus level designation remains as of 2018 rarely if ever used.

In 1985, John Weigel, published "A preliminary description of a new dwarf rock goanna *Varanus minor* sp. nov." comparing Northern Territory specimens of *V. kingorum* (which he erroneously claimed was his new species) against West Australian specimens of *V. kingorum*, which both Weigel and most other herpetologists since 1985, erroneously believed was the type form for the species.

In fact Storr's holotype was the NT form. His paratypes were from a disjunct Western Australian population. Weigel's self published "paper" in his not peer reviewed "*Reptile Keepers Association of NSW Newsletter*", Issue 7, failed to designate a holotype and provided clearly erroneous comparative data between the two forms. No copies of the publication were sent to responsible repositories (e.g. *Zoological Review*) and because only a handful of copies of his paper were ever printed, his paper was effectively "lost" to herpetology until this author (Hoser) tracked down a copy at the Australian National Library, in Canberra, Australia.

Because "*Varanus minor* sp. nov." (Weigel, 1985) is in effect an objective junior synonym for *V. kingorum*, even though it is questionable if the name "*minor*" is available under the rules of the ICZN, the West Australian lizards previously assigned to *V. kingorum* have until now been an unnamed taxon, with a divergence from *V. kingorum* of an estimated 2 MYA.

The species is therefore formally named for the first time according to the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999), as *Worrellisaurus bigmoreum* sp. nov.

**Keywords:** Taxonomy; nomenclature; taxonomic vandalism; *Varanus minor*; John Weigel; Goanna; Monitor lizard; Varanidae; *Varanus*; *Worrellisaurus*; Kimberley; Western Australia; Australia; new species; *bigmoreum*.

**INTRODUCTION**

My first encounter with putative "*Varanus kingorum* Storr, 1980", the name this taxon is best known as was in 1983, when I found an adult specimen under a slab of rock on a hot January day near Lake Argyle in Western Australia. That specimen was later depicted in Hoser (1989) as "*Varanus kingorum*".

Hoser (1989) gives an accurate description of that putative species as known at the time. Cogger (2014) provides a description of the same putative taxon and by way of a dichotomous key, a means to separate it from all other varanid taxa in Australia. There is no need to repeat all this information within this paper.

For more than 30 years I have inspected specimens in private collections and in museums both in Australia and outside Australia. In terms of outside Australia this was most notably in the United States in 1993.

Since 1993, I have been well aware of the presence of two distinctive forms of the putative species "*V. kingorum*",

A long-term review of the species most widely known as *Varanus kingorum* Storr, 1980 by myself showed that two morphologically divergent taxa have been treated as belonging to this species by all herpetologists since the date of the original description.

While I was able to obtain the original description of the taxon from the Western Australian Museum, investigations yielded that in 1985, John Weigel also published a description of a lizard taxon he called *Varanus minor*, in a not peer reviewed self-published "newsletter".

Due to a series of major events including an illegal police armed raid in 1994 that saw most of my research files being stolen at the time (and never replaced), followed by the publishing of a series of 6 major best-selling corruption books (being 6 of 7, with one published earlier in 1993), see Hoser (1993, 1994, 1996, 1999a, 1999b, 2000a, 2000b), revisiting the concept of there being two species of putative "*Varanus kingorum*" was not possible until



about 2001.

An attempt to locate a copy of Weigel's description of "*Varanus minor*" failed, with no one having a copy of the said "newsletter" the publication appeared in.

Even John Weigel, the alleged author of the alleged paper, apparently had no copies as they had allegedly been destroyed in the fire that destroyed a section of his privately owned zoo at Somersby in 2000 (Hoser 2003a).

That fire in the lead up to the Sydney 2000 Olympics on 17 July 2000 occurred in questionable circumstances and while a lot of material was conveniently destroyed at the time, the event was notable for what was not destroyed, including his Rough-scaled Pythons *Jackypython carinata* Smith, 1981 (Hoser 2003a).

At the time they were rare in captivity and Weigel's snakes were later offered for sale by him at \$34K a pair.

Weigel had taken his Rough-scaled Pythons away from his private zoo just prior to the "accidental" fire.

I should mention that the insurer paid the damage claim.

The inability to locate a copy of Weigel's publication ostensibly naming or describing "*Varanus minor*" was problematic as in its absence I was unable to determine if the Western Australian population assigned to "*Varanus kingorum*" had in fact been named by Weigel, or if he had merely redescribed in error or oversight Storr's nominate form.

Hence, the potential naming of a new dwarf monitor from north-west Australia was literally put on ice until I managed to find out the content of the Weigel paper.

This situation is not uncommon in terms of how herpetological projects work, with projects and research commonly being put on hold as circumstances change and blockages occur. This is also why many herpetologists, myself included, work on several major projects at a time.

By chance in 2018, I located a copy at the National Library of Australia in Canberra, which in itself was remarkable. They did not have a complete set of Weigel's newsletter. This is required by law, under the "legal deposit" law.

However Weigel's compliance with the law, has been noted as being non-compliance on other occasions as well, as detailed in Hoser (2004/5).

As already stated, it was probably by good luck and not necessarily good management (by Weigel) that the National Library of Australia had a copy of the relevant "description" and were able to send me a pdf after I paid the relevant fee of just under \$20 Australian.

Weigel's paper was to put things bluntly, abysmal and for all the critics of scientific works out there, it was in the class of papers associated with pseudo-scientists like Scott Thomson, Wulf Schleip, Hinrich Kaiser, Anders Rhodin, Van Wallach, Travis Thomas, Van Wallach, Donald Broadley and Wolfgang Wüster (Hoser 2015a-f). Like their "works" (a term I use in the absence of any other), Weigel's paper was also a hotch-potch of erroneous information and questionable data. In finality was an unmitigated act of taxonomic vandalism (defined herein as recklessly renaming an existing taxon) and a scientific disaster zone, which I will discuss again shortly.

However, Weigel's new "species" was in fact nothing more than the original "*Varanus kingorum*" as described by Storr.

"*Varanus minor sp. nov.*" (Weigel, 1985) is in effect an objective junior synonym for *V. kingorum*, even though it is questionable if the name "*minor*" is available under the rules of the ICZN.

Weigel's paper did however for the first time ever in print, advance an argument that the Western Australian animals assigned to the same putative species were in fact something quite different.

Weigel's argument was so poor and the data clearly in error (it even misquoted data from Storr 1980), that at the time he published the paper in 1985, he was lampooned by other herpetologists for merely redescribing a previously named species and badly at that!

So in 1985, after publishing his description of "*Varanus minor*" Weigel promptly gave up any aspirations of being a taxonomist (as

in finding and naming new species) and as befitted the nature and quality of his abortive self-published paper, he was quite happy to see all copies of it disappear from the face of the earth.

He did not however realise the problem he was creating by 1/ Proposing a new name for a species in a non-ICZN compliant way and then 2/ By further failing to comply with recommendations of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999), making it almost impossible for future scientists like myself from being able to conduct proper reviews of the taxonomy and nomenclature of the said taxa.

Significantly, and only after I was able to get hold of John Weigel's paper, titled "A preliminary description of a new dwarf rock goanna *Varanus minor sp. nov.*" was I able to establish that he had been comparing Northern Territory specimens of *V. kingorum* (which he erroneously claimed was his new species) against West Australian specimens of *V. kingorum*.

Clearly both Weigel and most other herpetologists since 1985, have erroneously believed the west Australian animals were the type form for the species, when they were not. Importantly Weigel's paper did establish that his species was a synonym of *V. kingorum*, and that the west Australian animals were in fact unnamed.

As I have said, Storr's holotype was the NT form. His paratypes listed in his paper were from a disjunct Western Australian population.

The species *Varanus kingorum* Storr, 1980, was transferred to the genus *Worrellisaurus* Wells and Wellington, 1984 and the generic placement made sense on the basis of evidence provided by Hoser (2013b) and was therefore used by Hoser (2013b) as a result.

However, the genus level designation of *Worrellisaurus* remains as of 2018 rarely if ever used, save for Wells and Wellington (1984, 1985 and Hoser 2013b).

This is largely due to the anti-science tactics of a group known as the Wüster gang as detailed by Hoser (2007) or more recently Hoser (2015a-f) and the sources cited therein.

Because the Western Australian population is not named, the main basis of this paper is simply to formally describe and name this taxon as a new species as is done below.

#### MATERIALS, METHODS AND RESULTS

As already mentioned, inspection of numerous specimens, live, in jars in museums and via photos with accurate locality data, as well as a perusal of the limited published literature on putative "*Varanus kingorum*" has confirmed two taxa are involved. I have also collected the relevant region in Australia, including caught *in situ* the species formally described herein.

This is all mentioned here, even though it could be described as trite. This is because there is no doubt that a well-known bunch of law-breaking haters and online trolls, known as the Wüster gang will emerge to allege I have no experience at all with the said taxa and that all my evidence is either "non-existent", "fabricated" or "stolen", (see for example Kaiser (2012a, 2012b, 2013, 2014a, 2014b) and Kaiser *et al.* (2013), the latter "paper" perhaps should be better known as "Wüster and others he can "add" to his authors list, even though he wrote it all by himself".

However none of the inevitable claims by the haters are in fact the case.

Obviously I should note that morphological divergence on its own is not regarded by myself as sufficient grounds to assign the West Australian population to a new species.

However there are other important grounds. Both populations are separated by a straight line distance in excess of 100 km and by clearly unsuitable and mainly flat habitat. Both populations are strictly saxicoline (rock dwelling) in habits.

Geckos separated by the same barrier have been shown to have diverged from one another some 2 MYA (Hoser 2017, Neilsen *et al.* 2016) which clearly forms a basis to separate the two clades of lizards and have each treated as full species.

Critically important is that each population is also reproductively isolated and evolving as separate evolutionary units, with zero likely prospect of interbreeding or introgression and so must be

regarded as fully separate species. Hence the formal scientific description below. In terms of the description, the spelling of the name should not be altered in any way unless mandatory under the rules of the *International Code of Zoological Nomenclature* (Ride *et al.*, 1999) or any other relevant ICZN code in force.

While there are numerous bibliographic references to putative "*Varanus kingorum*" in the literature and in various scientific papers, they are not as a rule relevant to this paper, save for the images depicted that show one or other of the two species referred to that taxon to date.

For simplicity's sake it is easiest to note that generally, "*Varanus kingorum*" from the Northern Territory, invariably near Timber Creek are of the nominate type form. Those from the area of Kununurra / Lake Argyle and south to Turkey Creek in Western Australia's East Kimberley division are of the newly described form.

As noted in Hoser (2013b), the appropriate genus for both "*Varanus kingorum* Storr, 1980" and the newly described taxon is *Worrellisaurus* Wells and Wellington, 1984.

The original authors, Wells and Wellington clearly relied on morphological divergence to separate this group of small monitors from the better known and widely used genus "*Varanus* Merrem, 1820".

Molecular data published by Pyron *et al.* (2013) and others has confirmed the action by Wells and Wellington, 1984 as being correct and so I adopt that genus name as being correct for both relevant taxa in this paper.

#### **WORRELLISAURUS BIGMOREUM SP. NOV.**

**Holotype:** A preserved specimen at the Western Australian Museum, Perth, Western Australia, Australia, specimen number: R63341, (formerly held at the Northern Territory Museum, Darwin, Northern Territory, Australia, specimen number R6955), collected at Kununurra, Western Australia,

Latitude 15.46 S., Longitude 128.44 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 Northern Territory Museum, Darwin, Northern Territory, Australia, specimen number R6681, collected at Turkey Creek, Western Australia, Latitude -16.90 S., Longitude 128.32 E.

2/ A preserved specimen at the Western Australian Museum, Perth, Western Australia, Australia, specimen number: R63340, (formerly held at the Northern Territory Museum, Darwin, Northern Territory, Australia, specimen number R6681), collected at Turkey Creek, Western Australia, Latitude -16.90 S., Longitude 128.32 E.

3/ A preserved specimen at the Northern Territory Museum, Darwin, Northern Territory, Australia, specimen number R6954, collected at Turkey Creek, Western Australia, Latitude -16.90 S., Longitude 128.32 E.

**Diagnosis:** Until now the species *Worrellisaurus bigmoreum sp. nov.* has been regarded as a population of *W. kingorum* (Storr, 1980). Both would key as the same species using the dichotomous key in Cogger (2014).

*W. bigmoreum sp. nov.* is however separated from *W. kingorum* by the following suite of characters: The dorsal colouration of adult *W. bigmoreum sp. nov.* is a reddish-orange-yellow, versus greyish with a slight red tinge on the flanks in *W. kingorum*, making it appear purplish. This is consistent between the two taxa.

*W. bigmoreum sp. nov.* is further separated from *W. kingorum* by the presence of an obvious white line running from just behind the nostril, through the lower eye and just past it towards the ear. There is no such marking in *W. kingorum*.

Dorsally the body pattern in *W. kingorum* consists of a series of parallel moderately large spots in rows running down the body and onto the tail, on which they are sparse and irregular on the dorsal surface of the front half.

By contrast the dorsal colour pattern of *W. bigmoreum sp. nov.* is of a series of smallish dark bars and spots configured in a way to give a reticulated pattern, when viewed on the body as a whole, which at about the rear limbs becomes a dense series of

numerous squarish spots running down the dorsal surface of the first half of the tail.

In *W. bigmoreum sp. nov.* the rear half of the tail is noticeably striped, whereas in *W. kingorum* striping is indistinct on the second half of the tail.

Some *W. bigmoreum sp. nov.* have a dorsal pattern characterised by white spots, this not being seen in *W. kingorum*, which instead has a dorsal pattern of scattered dark spots on a grey background. Numerous white spots dorsally is a common configuration in hatchling *W. bigmoreum sp. nov.*, which is not the case in *W. kingorum*, which may sometimes be spotted with some white, but not in the dense configuration seen in neonate *W. bigmoreum sp. nov.*

Another obvious difference between *W. bigmoreum sp. nov.* and *W. kingorum* is the colour of the iris. In *W. bigmoreum sp. nov.* it is orange in colour, whereas in *W. kingorum* it is a rich deep red in colour.

Side by side, *W. bigmoreum sp. nov.* is noticeably more thick-set, especially in terms of the head and neck, this comparison in size and robustness being for typical healthy adult specimens of either sex.

As a suite of characters given above, all of which are consistent on dozens of specimens I have seen of each taxon, distinguishing random specimens of either, in the absence of locality information is not difficult. I have been able to do so consistently on "blind tests" when shown an image of one or other in the absence of locality data (later given) on ten such tests involving five specimens of each taxon.

Because of the reckless actions surrounding the publication of Weigel (1985) and John Weigel's actions post-dating that publication, there has for more than 30 years been a state of 1/ Ignorance as to the presence of more than one species within the putative taxon "*Varanus kingorum*", or 2/ If a person had a belief that there were in fact two species being labelled as one, an apparently not easily solved confusion became as to which of the two species in fact had been assigned names according to the rules of the *International Code of Zoological Nomenclature* (Ride *et al.*, 1999).

This was in particular as to whether or not Weigel's name "*Varanus minor*" was merely a junior synonym of "*Varanus kingorum*" or in fact something else.

Weigel's abject failure to rectify the problem he created, has created an unfavourable situation whereby all published literature in the last 30 years has without question, simply referred both species *W. kingorum* and *W. bigmoreum sp. nov.* to the one taxonomic entity, because any other alternative, was simply too hazardous to contemplate in the absence of knowing what Weigel's apparently "lost" paper contained.

So to partially rectify the mess created by Weigel, I hereby provide details of the identity of the two relevant species, based on specimens depicted in the published literature, all of which have been labelled by the authors as "*Varanus kingorum*".

Because a number of depicted specimens have either no locality data, or clearly erroneous data, the following is particularly important for people who may have cause to work on either species.

A photo of a *W. bigmoreum sp. nov.* in life caught by this author (with a government issued license) in 1983 is depicted on page 118 (top photo) in Hoser (1989) as well as in De Lisle 1996, which also happens to have a photo taken by this author of the habitat of the type locality for *W. bigmoreum sp. nov.* in the vicinity of Kununurra, Western Australia.

Further images of this taxon in life are depicted in Cogger (2014) page 776; in Wilson and Swan (2017) on page 467, third image down on the left; Patanant (2012) at page 75 in Fig. 1; Eidenmüller (2007) at page 81; Pianka, King and King (2004) at Fig. 7.28, and in Storr, Smith and Johnstone (1983), plate 13, image 4.

Bennett (1995) also provides images of an adult and juvenile *W. bigmoreum sp. nov.* in his unnumbered colour plates at the rear of the book.

Bennett (1998) at page 127 provides images of both *W.*

*bigmoreum* sp. nov. and *W. kingorum* with 4 of the three specimens depicted being *W. bigmoreum* sp. nov.. The third image down on the page, labelled “*Varanus kingorum* Photo: John Weigel” is in fact the only *W. kingorum* on the page and significantly also happens to be a specimen of his synonym taxon “*Varanus minor* sp. nov.” (Weigel, 1985).

A photo of *W. kingorum* in life is depicted on page 854 of Brown (2014), photo on top left of page.

Two live specimens in the same book on pages 853 and 854 listed as “*Varanus kingorum*” with a given locality of Turkey Creek, both photos by “G. Schmida”, appear to be typical Northern Territory, “*Varanus kingorum*” and of that species, being (*Worrellisaurus kingorum* (Storr, 1980)) as defined in this description.

I therefore assume that either an error in location attribution for those two images occurred or there is yet another potentially unnamed taxon. It is easy to see how as both “Timber Creek” and “Turkey Creek” can be easily mixed up as each location is the from where each of the two species are most commonly collected and both sound the same, noting that the photographer may not have been the collector and in any event that publisher and author of the book were both separately removed from the other party/ies as well.

While noting such a potential error in a book such as Brown's may be taken as adverse comment in terms of the book, I make a point here of emphasising the overall quality and usefulness of this and all other reptile-related works by Queensland vet surgeon Danny Brown and cannot recommend Brown (2014) highly enough and as one of the best relevant texts ever published.

Brown (2014) also has a close up image of male and female heads of *W. bigmoreum* sp. nov. shown side by side, on page 842, line two of images, the relevant image being on the right.

Brown (2014) at page 850 has a photo of hatchling *W. bigmoreum* sp. nov., including leucistic specimens. Larger specimens are depicted on page 852 (top two images) of Brown (2014).

Schmida (2017) also provides three images of what seems to be the NT (type form) *W. kingorum* at pages 200, 202 and 203, ostensibly supplied by Gavin Bedford from Turkey Creek in WA.

As for Brown (2014) this may be in error as the specimens seem to conform to the NT species and not that from Turkey Creek in Western Australia. Schmida's (2017) book did not have any photos of *W. bigmoreum* sp. nov. as defined herein.

This is understandable on the basis that this paper post-dates his book, and like all other herpetologists in Australia in 2017, except myself, Schmida was of the view that the two putative taxa were one and the same.

In passing, I also note that while Gunther Schmida's book claims to be a complete treatment of Australia's monitor lizards and does have excellent photos of most taxa, numerous described and widely recognized species and subspecies are omitted from the coverage, while others are erroneously labelled as being “undescribed”. Incorrect scientific names are given for several included species, the book is littered with typographical errors and factual information in the species accounts is often woefully incorrect and/or misleading.

It should also be noted that all identified images and species in the above cited books are readily assigned to each species (*W. bigmoreum* sp. nov. and *W. kingorum*) based on the preceding diagnosis, further confirming that the traits separating each are consistent.

**Distribution:** *Worrellisaurus bigmoreum* sp. nov. is known generally from the Kununurra / Lake Argyle area in the north, along the associated ranges south to about Halls Creek, all in far north-east Western Australia, Australia. *Worrellisaurus kingorum* (Storr, 1980) is herein confined to the immediate vicinity of Timber Creek (within 25 km east or west) in the north-west Northern Territory, about 100 km east of the Western Australia border.

**Etymology:** Named in honour of Stuart and James Bigmore, of Lara (near Geelong), Victoria, Australia, who along with the now deceased Neil Davie, also of Lara and Geelong, have provided critically important and lasting services to herpetology in Australia spanning many decades.

## TAXONOMIC VANDALISM AND THE JOHN WEIGEL PROBLEM

John Weigel is one of those individuals whose destructive role in Australian herpetology and his anti-conservation actions over some decades has been so negative that it has become well-known (Hoser 2003b, 2003c, 2004/2005). In fact his damage rivals that of the late Steve Irwin (Hoser 2013a). However none of this is relevant to this paper although some of his permanent damage to wildlife conservation and herpetology is dealt with in detail in Hoser (2003b, 2003c, 2004/2005).

What is relevant here is his act of taxonomic vandalism in terms of his original description of the taxon he called “*Varanus minor*” in his non-peer reviewed “paper”, that he published in his own newsletter. In breach of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999), his paper was not widely disseminated in any sense of the word and also in breach of the same code, a copy was not even sent to *Zoological Record*. This later course of action was in fact far more destructive than the physical act of recklessly publishing his “paper” in the first place.

Weigel's self published “paper” in his “Reptile Keepers Association of NSW Newsletter”, Issue 7, also failed to designate a holotype.

In terms of taxonomy and nomenclature, this is a so-called “hanging offence” and usually renders any such description and name “unavailable” in the sense of the code.

As his name “*Varanus minor*” is an objective junior synonym (in the broader sense) for the species “*Varanus kingorum* Storr, 1980”, even if Weigel's name were “legal” according to the *International Code of Zoological Nomenclature* (any of the four published editions) it would not be available for use for the taxon described within this paper from Western Australia.

However, as it could be argued that Weigel did in fact describe holotypes in his paper, even though assignment was vague and the rest of his “preliminary description” was vague, imprecise and failed to properly separate his putative taxon from any other, one could then argue that his name was in fact “available” in the sense of the *International Code of Zoological Nomenclature*.

Taking this arguable view on face value, as it must be, thereby makes “*Varanus minor*” an available name in terms of the relevant taxon, even if it will never be used due to it being an (effective) objective synonym.

However, where Weigel has been particularly destructive has been in effectively trying to hide and destroy any permanent evidence of his paper for later researchers to view and read.

His paper was effectively “lost” to herpetology until this author (Hoser) tracked down a copy at the Australian National Library, in Canberra, Australia and has now made widely available the details of that paper's contents.

Had Weigel's paper been made widely available when published and in the years between 1985 and 2018, it would have been likely myself or another scientist would have formally named *W. bigmoreum* sp. nov. decades earlier.

This would have allowed proper research and conservation on both potentially threatened taxa to have progressed.

Instead and as a direct result of Weigel's reckless actions, both by way of taxonomic vandalism in his publication and then by effectively hiding it from others after the fact, numerous herpetologists have published papers elsewhere about “*Varanus kingorum*” blissfully ignorant as to whether they were dealing with the nominate form or the other species described herein. As a result a lot of the valuable time spent collating breeding and other data has now become redundant and of little practical use in the ignorance as to which species was actually involved.

Put simply, Weigel's reckless actions have put this area of herpetology backward by up to three decades!

None of the preceding is being presented to attack John Weigel or attack his reputation in herpetology, as he has had a poor reputation for years and so nothing written here will change much in that regard. It is however presented so that others can ensure that such forms of taxonomic vandalism and abuse of the rules of the *International Code of Zoological Nomenclature* (whether intended or otherwise as may be the case for Weigel) do not occur again, or at least can be avoided by as many people as possible.



For science to progress, the rules of the *International Code of Zoological Nomenclature* need to be adhered to by all, and in the absence of so-called creative interpretations as employed by the likes of Wolfgang Wüster, Wulf Schleip, Van Wallach, Travis Thomas and Don Broadley, because without a robust nomenclature, scientific communication on any given taxon becomes distorted, potentially misleading and in terms of venomous species perhaps even dangerous!

What is disturbing in the context of the date of this paper (2018) is a plot by serial taxonomic vandal Wolfgang Wüster and his gang of thieves to attempt to have many hundreds of publications, including major scientific papers carrying descriptions of new taxa and numerous standard texts in herpetology which carry those ICZN compliant scientific names, completely destroyed, as in the publications pulped, and then to have them completely expunged from the scientific record, solely to enable them to steal the works of others and them to claim the "discoveries" as their own.

As demonstrated here, the apparent attempt to remove from the scientific record, one relatively minor (excuse the pun) "paper" from the scientific record, created over 30 years of substantial scientific confusion, which will no doubt be carried for many years beyond now. Weigel's actions in terms of his publication and more seriously his actions post-dating it have caused irreparable harm to herpetology, scientific research and conservation of two potentially threatened species.

I note here that the clear and evident suppression of Weigel's 1985 "paper" was in stark contrast to his usual behaviour as a "publicity junkie" in which he and his minions aggressively seeks TV and print media publicity for all and sundry to promote himself and his business, even going to far as to be effectively "buying" Facebook likes for his business social media account.

Wide and proper dissemination of works of a taxonomic nature is important and this is why Weigel's flagrant disregard for the provisions of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999) was so destructive.

Having said this, the actions of Weigel and his minions pales into insignificance, when compared to the ruthless actions of Wolfgang Wüster and his gang of thieves as detailed by Hoser (2015a-f). In this case the Wüster gang of thieves is seeking to wipe from the scientific record many hundreds of scientific papers, authored by numerous authors and involving well over 1,000 scientific names in the existing scientific record.

Already their actions have caused unprecedented chaos and anarchy in the science of herpetology and wider areas of zoology in general, the conservation of wildlife and for public safety.

Therefore it is important that the historical record of "*Varanus kingorum*", "*Varanus minor*" and "*Worrellisaurus bigmoreum*" by made widely known so that the mistakes caused by the taxonomic vandalism and subsequent actions of John Weigel not be repeated in the future.

#### ACKNOWLEDGEMENTS

Luke and Gina Faba, lawyers at Stenta Legal, 1 Queens Road, Melbourne, Victoria, Australia, successfully retrieved some relevant data and hard drives illegally seized by Glenn Sharp and Emily Gibson, claiming to be acting on the orders of Ron Waters, head of wildlife law enforcement at the Victorian Government Wildlife department on 17 August 2011 during an unlawful violent armed raid on the author's facility.

The trio, and the dozens of others they employed in their so-called "Operation Bassett" (as detailed in Victorian Civil and Administrative Tribunal 2015) all worked for the Victorian Government Wildlife Department (at the time called "DSE").

Their destructive armed raid, in which they also illegally killed numerous live reptiles held by the author, was found to be illegal by several courts of law after the fact, including by the Victorian Court of Appeal in 2014 and Victorian Civil and Administrative Appeals Tribunal (VCAT) in 2015.

#### REFERENCES CITED

Bennett, D. 1995. *A little book of monitor lizards*. Viper Press, Aberdeen, Great Britain:208 pp. and unnumbered colour plates.  
Bennett, D. 1998. *Monitor Lizards: Natural history, biology and*

*husbandry*. Edition Chimaira: Germany:352 pp.

Brown, D. 2014. *A guide to ... Australian Lizards in Captivity*. Reptile Publications, Tweed Heads, NSW, Australia:952 pp.

Cogger, H. G. 2014. *Reptiles and Amphibians of Australia* (Seventh edition), CSIRO. Sydney, Australia:1064 pp.

Court of Appeal Victoria. 2014. *Hoser v Department of Sustainability and Environment* [2014] VSCA 206 (5 September 2014).

De Lisle, H. 1996. *The Natural History of Monitor Lizards*. Krieger Publishing Company, Malabar, Florida, USA: 201 pp.

Eidenmüller, B. 2007. *Monitor Lizards: Natural history, captive care, breeding*. Edition Chamaira, Germany:176 pp.

Hoser, R. T. 1989. *Australian Reptiles and Frogs*. Pierson and Co., Mosman, NSW, 2088, Australia:238 pp.

Hoser, R. T. 1991. *Endangered Animals of Australia*. Pierson Publishing, Mosman, NSW, 2088, Australia:240 pp.

Hoser, R. T. 1993. *Smuggled: The Underground Trade in Australia's Wildlife*. Apollo Publishing, Moss Vale, NSW, Australia:160 pp.

Hoser, R. T. 1996. *Smuggled-2: Wildlife Trafficking, Crime and Corruption in Australia*. Kotabi Publishing, Doncaster, Victoria, Australia:280 pp.

Hoser, R. T. 1999a. *Victoria Police Corruption: The book the Victoria Police don't want you to read!* Kotabi Publishing, Doncaster, Victoria, 3108, Australia:736 pp.

Hoser, R. T. 1999b. *Victoria Police Corruption-2:Including what the media didn't tell you!* Kotabi Publishing, Doncaster, Victoria, 3108, Australia:736 pp.

Hoser, R. T. 2000a. *Taxi: Indecent Exposures*. Kotabi Publishing, Doncaster, Victoria, 3108, Australia:520 pp.

Hoser, R. T. 2000b. *Taxi-2: More Indecent Exposures*. Kotabi Publishing, Doncaster, Victoria, 3108, Australia:504 pp.

Hoser, R. T. 2003a. The Australian Herp Scene as of early 2003. *Bulletin of the Chicago Herpetological Society* 38(8):157-165, 38(10):193-203, 38(12):233-239.

Hoser, R. T. 2003b. OPMV in Australian Reptile Collections. *Macarthur Herpetological Society Newsletter*, June 2003. 38:2-8.

Hoser, R. T. 2003c. Reovirus - Successful treatment of small elapids. *Crocodylian: Journal of the Victorian Association of Amateur Herpetologists* 4(3):23-27.

Hoser, R. T. 2004/2005. An avoidable epidemic of reovirus in collections of Australian Snakes and the wider implications of the disease in Australia and elsewhere. *Herptile* (UK) 29(3): 94-106, 29(4): 162-169 and 30(1): 19-28 (Sept, Dec 2004 and March 2005).

Hoser, R. T. 2007. Wells and Wellington - It's time to bury the hatchet. *Calodema* Supplementary Paper 1:1-9.

Hoser, R. T. 2013a. The description of new snake subgenera, species and subspecies from Australia (Squamata:Serpentes). *Australasian Journal of Herpetology* 16:19-32.

Hoser, R. T. 2013b. Monitor Lizards reclassified with some common sense (Squamata: Sauria: Varanidae). *Australasian Journal of Herpetology* 21:41-58.

Hoser, R. T. 2015a. Dealing with the "truth haters" ... a summary! Introduction to Issues 25 and 26 of *Australasian Journal of Herpetology*. Including "A timeline of relevant key publishing and other events relevant to Wolfgang Wüster and his gang of thieves." and a "Synonyms list". *Australasian Journal of Herpetology* 25:3-13.

Hoser, R. T. 2015b. The Wüster gang and their proposed "Taxon Filter": How they are knowingly publishing false information, recklessly engaging in taxonomic vandalism and directly attacking the rules and stability of zoological nomenclature. *Australasian Journal of Herpetology* 25:14-38.

Hoser, R. T. 2015c. Best Practices in herpetology: Hinrich Kaiser's claims are unsubstantiated. *Australasian Journal of Herpetology* 25:39-52.

Hoser, R. T. 2015d. Comments on *Spracklandus* Hoser, 2009 (Reptilia, Serpentes, ELAPIDAE):

request for confirmation of the availability of the generic name and for the nomenclatural

validation of the journal in which it was published (Case 3601; see *BZN* 70: 234-237; comments *BZN*

71:30-38, 133-135). (unedited version) *Australasian Journal of Herpetology* 27:37-42.

Hoser, R. T. 2015e. PRINO (Peer reviewed in name only) journals: When quality control in scientific publication fails. *Australasian Journal of Herpetology* 26:3-64.

Hoser, R. T. 2015f. Rhodin *et al.* 2015, Yet more lies, misrepresentations and falsehoods by a

band of thieves intent on stealing credit for the scientific works of others. *Australasian Journal of Herpetology* 27:3-36.

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

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

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

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

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

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

Merrem, B. 1820. *Versuch eines Systems der Amphibien - Tentamen Systematis Amphibiorum*. Johann Christian Krieger, Marburg, Germany.

Patanant, K. C. 2012. Heads You Lose, Tails You Win: Notes on a Tail-assisted Foraging Behavior in *Varanus (Odatria) kingorum*. *Biawak* (International Varanid Interest Group), 6(2):74-77.

Pianka, E. R., King, D. R. and King, R. A. 2014. *Varanoid Lizards of the World*. Indiana University Press, Bloomington, IN, USA:568 pp.

Pyron, R. A., Burbrink, F. T. and Wiens, J. J. 2013. A phylogeny and revised classification of Squamata, including 4151 species of lizards and snakes. *BMC Evolutionary Biology* 13:93.

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

Schmid, G. 2017. *Australian Monitors*. Nature Shots, Queensland, Australia:220 pp.

Storr, G. M. 1980. The monitor lizards (genus *Varanus* Merrem, 1820) of Western Australia. *Records of the Western Australian Museum* 8(2):237-293.

Storr, G. M., Smith, L. A. and Johnstone, R. E. 1983. Lizards of Western Australia 2: dragons and Monitors. Western Australian Museum, Perth, Western Australia, Australia:114 pp.

Victorian Civil and Administrative Tribunal (VCAT). 2015. *Hoser v Department of Environment Land Water and Planning* (Review and Regulation) [2015] VCAT 1147 (30 July 2015, judgment and transcript).

Weigel, J. 1985. A preliminary description of a new dwarf rock goanna *Varanus minor* sp.nov.. *Newsletter of the Reptile Keeper Association of NSW*. 7:5-8.

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

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

Wilson, S. and Swan, G. 2017. *A complete guide to reptiles of Australia*. New Holland, Australia:560 pp.

#### CONFLICT OF INTEREST

There are no conflicts of interest in terms of this paper and the author.

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## A new species within the *Odatria glauerti* (Squamata: Varanidae) species complex.

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Received 21 March 2017, Accepted 21 May 2018, Published 20 June 2018.

### ABSTRACT

Hoser (2013) divided the taxon known at the time as *Odatria glauerti* (Mertens, 1957) into two, naming the distinctive Arnhem-land population as a new species, namely *O. hoserae* Hoser, 2013.

The same paper referred to eastern and western Kimberley populations as being morphologically distinct, but treated both as being of the same taxon.

This paper formally divides *O. glauerti* into two, formally naming the population found in the East Kimberley and nearby parts of the Northern Territory (extending to near the mouth of the Victoria River, on both sides) as a new species, namely *O. davidhancocki* sp. nov.. The new taxon is morphologically divergent to *O. glauerti*, with disjunct distribution and has significant molecular divergence as published by Fitch *et al.* (2006).

On that basis the decision to recognize the taxon as a full species as opposed to subspecies was made obvious.

**Keywords:** Taxonomy; nomenclature; Varanidae; *Odatria*; *Varanus*; *glauerti*; *hoserae*; Northern Territory, Western Australia; Australia; new species; *davidhancocki*.

### INTRODUCTION

As part of a global audit of the Varanidae, Hoser (2013) reclassified the mainly western Australian taxon known as *Varanus glauerti* Mertens, 1957 by transferring it into the genus *Odatria* Gray, 1838. The same act had been performed by Wells and Wellington (1984 and 1985), but unfortunately their eminently sensible (and in hindsight obvious) decision had been effectively boycotted by publishing herpetologists in the intervening two decades. In other words the taxon remained known to most as *Varanus glauerti*.

This boycott had absolutely nothing to do with science, but instead was an unscientific manifestation of ego politics among other so-called herpetologists and their intent to rob Wells and Wellington of any credit for their contributions to herpetology as outlined by Hoser (2007) or more recently Hoser (2015a-f).

As I have always put science before politics, it was for that reason that in 2013 I accepted the Wells and Wellington placement of *Varanus glauerti* Mertens, 1957 within the genus *Odatria* Gray, 1838, making it known as *Odatria glauerti* (Mertens, 1957) (Hoser 2013).

For some years it was known that a morphologically and biologically different population from Arnhem-land referred to *O. glauerti* existed and so it was inevitable that in Hoser (2013) it was afforded formal recognition as a species.

*O. hoserae* Hoser, 2013 was named in honour of Katrina Joan Hoser in recognition of her monumental contributions to Australian varanid conservation as outlined in Hoser (2013).

The same description in the same paper referred to eastern and western Kimberley populations as being morphologically distinct, but treated both as being of the same species-level taxon.

Further inspection of specimens from across the Kimberley shows that the East and West Kimberley populations are sufficiently divergent to warrant taxonomic recognition and in fact at the species-level.

Therefore the purpose of this paper is to formally divide *O. glauerti* as recognized to date into two, by formally naming the population found in the East Kimberley and nearby parts of the Northern Territory (extending to near the mouth of the Victoria River, on both sides) as a new species, namely *O. davidhancocki* sp. nov..

The new taxon is morphologically divergent to *O. glauerti*, of allopatric and disjunct range and also shows significant divergence by way of molecular data as published by Fitch *et al.* (2006).

On this basis the decision to recognize the taxon as a full species as opposed to subspecies was made obvious.

While there is a significant body of material published in relation to *O.*

*glauerti* as recognized prior to the publication of Hoser (2013), most of this is not relevant here, in as much as the sole purpose of this paper is the formally identify and name a new species in accordance with the rules set out in the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

However I do make mention of relevant materials and methods leading to the obvious results and conclusions, the finality being the published description herein.

Hoser (2013) flagged that there were two distinct populations being referred to as *O. glauerti*. The molecular data of Fitch *et al.* (2006) *et al.* confirmed that the two populations had species-level divergence. As the holotype for *O. glauerti* (Mertens, 1957) is from Wotjulum, West Kimberley, specimen number WAM R12337, at the Western Australian Museum in Perth, Western Australia, it is self evident that it is the population from the East Kimberley that needs to be formally named.

The reason for the delay in formally naming the East Kimberley population in 2013 was the lack of material from nearby parts of the north-west Northern Territory, to ascertain the species status of these animals or whether or not they had a relationship to *O. hoserae*. Specimens from both sides of the mouth of the Victoria River in the Northern Territory have since been inspected and morphologically in all major respects seem to conform with the specimens from the Lake Argyle and Bungle Bungles areas, which combined forms the whole known range of this newly named taxon.

In total I inspected about 100 specimens assigned to *O. glauerti*, including specimens of *O. hoserae* from across the range of all three putative taxa. These have included specimens in government-owned State Museums, for which acknowledgement is not normally explicitly given here or in my other taxonomic papers as it is should be assumed by any vaguely sensible reader. I have also seen numerous relevant specimens in life and by way of quality photos of specimens with known locality data.

While I have formally recognized the taxon from the East Kimberley, I should note that I am not entirely satisfied that all other Kimberley specimens are in fact of a single species, or of one single subspecies-level taxon.

This view is based on different morphotypes from the north and north-west Kimberley, versus those from the south-west, including the type locality for *O. glauerti* and of course including the type specimen for *O. glauerti* itself, which I have viewed.

I also note that it appears that until now, besides myself, no other



herpetologist appears to have countenanced that there may be more than one species within *O. glauerti* as generally recognized, but from where I stand, it appears patently obvious as I am sure it will to others in future years.

I should also note that there has not been any significant taxonomic review of the taxon generally known as *O. glauerti* post-dating the original scientific description by Mertens save for that of Storr (1980) and with the exception of a single poorly preserved specimen from near Kununurra, WA, it is self-evident from his paper that he never actually inspected any specimens of the East Kimberley form.

This is indicated by the fact that his paper did not even discuss regional variation in the putative taxon, whereas such discussion is given for other taxa inspected by Storr.

In terms of the scientific name assigned to this new species level taxon, it should not be amended in any way unless absolutely mandatory under the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 19999).

#### **ODATRIA DAVIDHANCOCKI SP. NOV.**

**Holotype:** A preserved specimen in the Western Australian Museum, Perth Western Australia, Australia, specimen number: WAM R103399 collected from the Bungle Bungle National Park in Western Australia, Australia, Latitude -17.19 S., Longitude 128.25 E.

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

**Paratypes: 1-2.** Two preserved specimens in the Western Australian Museum, Perth, Western Australia, Australia, specimen numbers: WAM R103400 and WAM R103401 collected from the Bungle Bungle National Park in Western Australia, Australia, Latitude -17.15 S., Longitude 128.18 E.

**3.** A specimen in the Western Australian Museum, Perth, Western Australia, Australia, specimen number: WAM R103371 from the Bungle Bungle National Park in Western Australia, Australia, Latitude -17.27 S., Longitude 128.25 E.

**Diagnosis:** *Odatria davidhancocki sp. nov.* would until now be keyed out as *O. glauerti* (Mertens, 1957), better known as *Varanus glauerti* Mertens, 1957 in most contemporary texts such as Cogger (2014). *Odatria davidhancocki sp. nov.* is readily separated from *O. glauerti* on the basis of colouration as stated in Hoser (2013).

*O. davidhancocki sp. nov.* is also readily separated from *O. glauerti* by the following: On the second half of the length of original unbroken tails there are 20-26 white cross bands, versus 14-19 in *O. glauerti*, while in *O. hoserae* Hoser, 2013, there are just 10-12 white cross bands, this being perhaps the most easy way to distinguish the three species from one another at a glance and in the absence of locality data. *O. davidhancocki sp. nov.* is characterised by a dorsal body pattern that is more-or-less reddish-orange with yellow bands, versus a grey to tan colour, generally being obviously grey on the forebody and head in *O. glauerti*, versus reddish at the forebody of *O. davidhancocki sp. nov.*

*O. hoserae* is separated from both *O. davidhancocki sp. nov.* and *O. glauerti* by having well developed and prominent ocelli on both the back of the neck and all four legs, this not being seen in the other two species, which instead have either spots on the legs or spots tending to form incomplete or indistinct ocelli, and no well defined ocelli on the neck.

*O. hoserae* is of similar body colouration to *O. davidhancocki sp. nov.* but differs in having much stronger contrast between the dark and light bands, as well as dark reddish bands being twice as wide as the yellowish ones, versus lighter bands being slightly wider than the dark bands or of the same width in *O. davidhancocki sp. nov.*

*O. glauerti* is readily separated from both *O. hoserae* and *O. davidhancocki sp. nov.* by the fact that the base and anterior of the upper surface of the tail does not have well-defined bands, whereas the banding on this part of the tail in the other two species is prominent.

*O. glauerti* is further separated from both *O. hoserae* and *O. davidhancocki sp. nov.* by the colouration on the throat, which is a thick dark yellow colour (slight orange), versus light yellow in both *O. hoserae* and *O. davidhancocki sp. nov.*

Specimens of *O. glauerti* from Mitchell Plateau, in line with the holotype form from further south on the south-west Kimberley coast, have reduced yellow markings on the back, giving a well defined ocellated pattern on the body not seen in other *O. glauerti* from other parts of the north Kimberley or south-west Kimberley, or the other two species. However on the neck, these ocelli are not prominent as seen in *O. hoserae*.

*O. glauerti*, *O. hoserae* and *O. davidhancocki sp. nov.* are separated from all other Australasian monitors by the following suite of characteristics: Medium adult size up to 80 cm in total length; gracile build, with a long neck and the tail that may exceed 1.8 times the body length; a black tail with brilliant white or bluish-white rings to the tip;

neck and shoulders being grey to tan or yellowish to rusty in colour, a prominent black temporal stripe; an unmarked yellow or white throat. Brown (2014), at page 853 bottom left has a photo of *O. davidhancocki sp. nov.* in life.

Brown (2014), at page 853 top has a photo of *O. glauerti* in life.

Brown (2015), at page 852 bottom has a pair of images of *O. glauerti* from the Mitchell Plateau area of Western Australia.

Brown (2014), at page 853 middle left has a photograph of *O. hoserae* in life.

All conform to the diagnosis just given.

**Distribution:** *O. davidhancocki sp. nov.* is known only from the East Kimberley in Western Australia, in the region of the Ord River drainage from about the Bungle Bungles in the south, north to about Kununurra and east to Bradshaw Station in the north-west Northern Territory, Australia. *O. glauerti* is found throughout the western half of the Kimberley district in Western Australia, including on numerous offshore islands. *O. hoserae* is confined to the Arnhem Land area in the Northern Territory, Australia.

**Etymology:** Named in honour of David Hancock, Barrister in Melbourne, Victoria, Australia, for services to wildlife conservation as well as for taking on powerful and corrupt government bureaucracies on behalf of victims of their systems (Griffin 2011).

#### **REFERENCES CITED**

- Brown, D. 2014. *A guide to ... Australian Lizards in Captivity*. Reptile Publications, Tweed Heads, NSW, Australia:952 pp.
- Cogger, H. G. 2014. *Reptiles and Amphibians of Australia* (Seventh edition), CSIRO. Sydney, Australia:1064 pp.
- Fitch, A. J., Goodman, A. E. and Donnellan, S. C. 2006. A molecular phylogeny of the Australian monitor lizards (Squamata: Varanidae) inferred from mitochondrial DNA sequences. *Australian Journal of Zoology* 54:253-269.
- Griffin, M. 2011. Disabled teen sues over dreams unfulfilled. *The Sydney Morning Herald*, 2 August, online at: <https://www.smh.com.au/education/disabled-teen-sues-over-dreams-unfulfilled-20110801-1189c.html>
- Hoser, R. T. 2007. Wells and Wellington - It's time to bury the hatchet. *Calodema* (Supplementary Paper) 1:1-9.
- Hoser, R. T. 2013. Monitor Lizards reclassified with some common sense (Squamata: Sauria: Varanidae). *Australasian Journal of Herpetology* 21:41-58.
- Hoser, R. T. 2015a. Dealing with the "truth haters" ... a summary! Introduction to Issues 25 and 26 of *Australasian Journal of Herpetology*. Including "A timeline of relevant key publishing and other events relevant to Wolfgang Wüster and his gang of thieves." and a "Synonyms list". *Australasian Journal of Herpetology* 25:3-13.
- Hoser, R. T. 2015b. The Wüster gang and their proposed "Taxon Filter": How they are knowingly publishing false information, recklessly engaging in taxonomic vandalism and directly attacking the rules and stability of zoological nomenclature. *Australasian Journal of Herpetology* 25:14-38.
- Hoser, R. T. 2015c. Best Practices in herpetology: Hinrich Kaiser's claims are unsubstantiated. *Australasian Journal of Herpetology* 25:39-52.
- Hoser, R. T. 2015d. Comments on *Spracklandus* Hoser, 2009 (Reptilia, Serpentes, ELAPIDAE): request for confirmation of the availability of the generic name and for the nomenclatural validation of the journal in which it was published (Case 3601; see *BZN* 70: 234-237; comments *BZN* 71:30-38, 133-135). (unedited version) *Australasian Journal of Herpetology* 27:37-42.
- Hoser, R. T. 2015e. PRINO (Peer reviewed in name only) journals: When quality control in scientific publication fails. *Australasian Journal of Herpetology* 26:3-64.
- Hoser, R. T. 2015f. Rhodin *et al.* 2015, Yet more lies, misrepresentations and falsehoods by a band of thieves intent on stealing credit for the scientific works of others. *Australasian Journal of Herpetology* 27:3-36.
- Mertens, R. 1957. Two new goannas from Australia. *Western Australian Naturalist* 5183-185.
- Ride, W. D. L. (ed.) *et al.* (on behalf of the International Commission on Zoological Nomenclature) 1999. *International code of Zoological Nomenclature*. The Natural History Museum - Cromwell Road, London SW7 5BD, UK (also commonly cited as "ICZN 1999").
- Storr, G. M. 1980. The monitor lizards (genus *Varanus* Merrem, 1820) of Western Australia. *Rec. of the West. Aust. Museum* 8(2):237-293.
- Wells, R. W. and Wellington, C. R. 1984. A synopsis of the class Reptilia in Australia. *Australian Journal of Herpetology* 1(3-4):73-129.
- Wells, R. W. and C. R. Wellington. 1985. A classification of the Amphibia and Reptilia of Australia. *Australian Journal of Herpetology Supplementary Series* 1:1-61.
- CONFLICT OF INTEREST**
- There are no conflicts of interest in terms of this paper and the author.

**The description of a fourth subspecies of  
*Odatria (Kimberleyvaranus) glebopalma*  
(Mitchell, 1955) (Reptilia: Squamata: Varanidae).**

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Received 2 April 2018, Accepted 10 June 2018, Published 20 June 2018.

**ABSTRACT**

Hoser (2014) formally divided the species *Odatria (Kimberleyvaranus) glebopalma* (Mitchell, 1955) known in most texts as *Varanus glebopalma* into three well-defined and geographically distinct subspecies, namely *O. glebopalma glebopalma* (Mitchell, 1955), *O. glebopalma funki* Hoser, 2014 and *O. glebopalma maderi* Hoser, 2014.

At the time Hoser (2014) was published, the Mount Isa (Queensland) population of the species was regarded as being of the type form from Groote Eylandt. However inspection of further live specimens and a disjunct distribution has confirmed that these lizards should also be treated as a separate subspecies.

The formal naming of the Mount Isa population as a biological entity is essential so that they can be managed as a separate taxon (or management unit) and that the conservation outcomes are managed as befits the importance of this regional population.

The subspecies is therefore formally named for the first time according to the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999), as *Odatria (Kimberleyvaranus) glebopalma jimgreenwoodi* subsp. nov.

**Keywords:** Taxonomy; nomenclature; Goanna; Monitor lizard; Varanidae; *Varanus*; *Odatria*; *Kimberleyvaranus*; genus; subgenus; species; *glebopalma*; subspecies; *maderi*; *funki*; Hoser; 2013; 2014; Kimberley; Western Australia; Northern Territory; Queensland; Groote Eylandt; Mount Isa; Australia; new subspecies; *jimgreenwoodi*; Jim Greenwood; veterinary surgeon.

**INTRODUCTION**

Hoser (2014) was the first significant review of the taxonomy of the clade of Australian varanids known as *Odatria (Kimberleyvaranus) glebopalma* (Mitchell, 1955), generally identified in texts as *Varanus glebopalma*.

The result of that paper was division of the taxon *O. glebopalma* into three well-defined and geographically distinct subspecies, namely *O. glebopalma glebopalma* (Mitchell, 1955), *O. glebopalma funki* Hoser, 2014 and *O. glebopalma maderi* Hoser, 2014.

At the time Hoser (2014) was published, the Mount Isa population of the species was regarded as being of the type form from Groote Eylandt. However inspection of further live specimens in the period preceding 2018 and a disjunct distribution of known specimens of the species has confirmed that the Mount Isa lizards should also be treated as a separate subspecies.

The formal naming of the Mount Isa population as a biological entity is essential so that they can be managed as a separate taxon (or management unit) and that the conservation outcomes are managed as befits the importance of this regional population.

The subspecies is therefore formally named for the first time according to the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999), as *Odatria (Kimberleyvaranus) glebopalma jimgreenwoodi* subsp. nov.

Hoser (2014) and sources cited therein, in particular Hoser (2013) and sources cited therein accurately account for the state of play in terms of the taxonomy and nomenclature of the relevant species and so none of this is repeated here. Both papers are widely available online as of 2018 and should be read in conjunction with this one.

I merely note that *Odatria* Gray, 1838 as a genus name has been around for a long time, although even as of 2018 it is rarely used. Hoser (2013) erected the subgenus *Kimberleyvaranus* for the single (as then recognized) species *O. glebopalma*.

Molecular data, as published by Fitch *et al.* (2006) at fig. 1., strongly supports the contention that *O. glebopalma* should be partitioned at least into subspecies, based on the divergence between isolated populations at different localities within the Northern Territory alone and it is for this reason that I have no hesitation in naming the fourth subspecies herein.

**ODATRIA (KIMBERLEYVARANUS) GLEBOPALMA  
JIMGREENWOODI SUBSP. NOV.**

**Holotype:** A preserved specimen in the Queensland Museum, Brisbane, Queensland, Australia, specimen number: J94266 collected at Lake Corella, 60 km west of Cloncurry, Queensland, Australia, Latitude -20.83 S., Longitude 140.03 E.

The Queensland Museum, Brisbane, Queensland, Australia is a government-owned facility that allows access to its holdings.

**Paratypes:** Three specimens at the Australian Museum in Sydney, New South Wales, Australia, specimen numbers: R18829, R107883 and R 66264, collected from Mount Isa in Queensland, Australia, Latitude -20.44 S., Longitude 139.29 E.

**Diagnosis:** *O. glebopalma jimgreenwoodi* subsp. nov. is similar in most respects to the nominate subspecies of *O. glebopalma*, and would identify as this subspecies based on the diagnosis of each of three subspecies then identified in Hoser (2014) as stated in Hoser (2014). However it differs from nominate *O. glebopalma glebopalma* in having a reddish sheen in colour (versus yellowish-brown) and adults are different from other subspecies in that feet and toes are dark black with very tiny bright yellow spots on them, versus toes that have medium to large white spots on them or white clusters of scales giving the toes a barred or banded appearance.

The nominate subspecies (*O. glebopalma glebopalma* (Mitchell, 1955) and *O. glebopalma jimgreenwoodi* subsp. nov. are separated from both subspecies (*O. glebopalma funki* Hoser, 2014 and *O. glebopalma maderi* Hoser, 2014) on the basis of colouration.

In the nominate subspecies and *O. glebopalma jimgreenwoodi* subsp. nov., there is a generally speckled pattern dorsally and little if any black anterior to the eye. No reticulated pattern or banding is on the neck and upper body and if markings are present on the body, they tend towards neither a reticulated pattern or banding. Hatchlings may have a very faint reticulated pattern at the head and fore-body, and this is as opposed to being very distinct and well-marked in hatchlings in the Arnhem Land form namely *O. glebopalma funki* Hoser, 2014.

Otherwise the diagnosis for this subspecies is as for the subgenus *Kimberleyvaranus* Hoser, 2013 as stated in Hoser (2013).

*O. glebopalma funki* Hoser, 2014 from the western side of the top end of the Northern Territory is readily separated from the other subspecies of *O. glebopalma* by the obvious dorsal patterning including an obvious and distinct reticulated pattern at the head and fore-body, which is not seen in any other subspecies.

The subspecies *O. glebopalma maderi* Hoser, 2014 is separated from the other subspecies of *O. glebopalma* as follows: It is diagnosed as for the nominate subspecies but separated from it by the presence of a distinct dark stripe or similar, anterior to the eye and running to it. No reticulated pattern is present on the fore-body or if there is one, it is tending towards indistinct bands (peaking near the hind limbs where ocelli form into bands). This tending towards bands is most notable in juveniles, which have a colouration consisting of moderately obvious darker and lighter cross-bands. These bands are discernible in all specimens, though less distinct with age. Some specimens have a distinct pattern of oversized brownish ocelli across the entire dorsal body, not forming any kind of reticulation

pattern as seen in *O. glebopalma funki* Hoser, 2014. The reticulation pattern as seen in *O. glebopalma funki* Hoser, 2014. separates that taxon from *O. glebopalma maderi* Hoser, 2014.

Otherwise the diagnosis for the subspecies *Odatria glebopalma maderi* is as for the subgenus *Kimberleyvaranus* Hoser, 2013 as stated within Hoser (2013).

The subgenus *Kimberleyvaranus* Hoser, 2013 within the genus *Odatria* Gray, 1838, monotypic for *O. glebopalma* is separated from all other living varanids by the following suite of characters: supraocular scales are subequal; the keels of the caudal scales are sometimes very strong, but never spinose; the tail is either round in section or somewhat dorsoventrally compressed, or at the very most, very slightly laterally compressed in the last half; there is no obvious median double keel dorsally along the tail; the scales on the top of the head are smooth; the tail is longer than the head and body, being well over twice as long as the head and body (unbroken and intact tail); tail pattern if present,

is transversely aligned distally; the last half of the tail is a distinctive creamy white to yellow in colour; the tubercles on the lower surfaces of the feet are large and glossy being a very dark brown or black in colour.

The subgenus *Kimberleyvaranus* Hoser, 2013 is further defined as follows: Colouration is dorsally black with individually fawn coloured scales which may form a reticulum on the flanks (where they predominate over the black) or alternatively small black centred ocelli on the midline (where black predominates), or occasionally flecks. The top of the head and upper surfaces of the limbs are black with small cream or fawn flecks and spots, clustering to form larger spots on the limbs. The anterior half of the tail is mostly black above and the posterior half is a distinct creamy white to yellow in colour. The throat is white often with a broad reticulum of light purplish fawn extending on to the sides of the throat, but forming bars on the lower lips. The belly and chest are white with indistinct transverse bars of light purplish fawn. The tail and limbs are creamy yellow below. Palms and soles have rounded shiny, very dark brown or black scales. The head scales are smooth, irregular and very small. The nostrils are much nearer to the tip of the snout than the eye and lateral in position. There are 130-170 scales around the middle of the body. Caudal scales are smooth or with low keels.

A photo of *O. glebopalma jimgreenwoodi* subsp. nov. in life is depicted on page 202 of Wilson (2015).

**Distribution:** This taxon (*O. jimgreenwoodi* subsp. nov.) is currently known only from the vicinity of Mount Isa in Queensland, Australia and rocky areas immediately north of there.

**Etymology:** *O. jimgreenwoodi* subsp. nov. is named in honour of Melbourne, Victoria, Australia based veterinary surgeon, Dr. Jim Greenwood, who for many years worked at Canterbury Veterinary Clinic in Melbourne's eastern suburbs in recognition of his significant contributions to reptile medicine and surgery in Melbourne. This included the ensuring that many rare and significant captive reptiles remained in good health. Many of these reptiles were used in vitally important captive breeding projects. He has also assisted Snakebusters: Australia's best reptiles shows on the rare occasions we have had to seek outside assistance when dealing with reptile health and management issues and this critically important contribution is acknowledged herein.

#### REFERENCES CITED

- Fitch, A. J., Goodman, A. E. and Donnellan, S. C. 2006. A molecular phylogeny of the Australian monitor lizards (Squamata: Varanidae) inferred from mitochondrial DNA sequences. *Australasian Journal of Zoology* 54:253-269.
- Hoser, R. T. 2013. Monitor Lizards reclassified with some common sense (Squamata: Sauria: Varanidae). *Australasian Journal of Herpetology* 21:41-58.
- Hoser, R. T. 2014. The break up of *Odatria* (*Kimberleyvaranus*) *glebopalma* (Mitchell, 1955) into three obvious subspecies. *Australasian Journal of Herpetology* 24:16-19.
- Mitchell, F. J. 1955. Preliminary account of the Reptilia and Amphibia collected by the National Geographic Society - Commonwealth Government - Smithsonian Institution Expedition to Arnhem Land (April to November, 1948). *Records of the South Australian Museum* 11:373-408.
- Ride, W. D. L. (ed.) et al. (on behalf of the International Commission on Zoological Nomenclature) 1999. *International code of Zoological Nomenclature*. The Natural History Museum - Cromwell Road, London SW7 5BD, UK (also commonly cited as "ICZN 1999").

Wilson, S. 2015. *A field Guide to Reptiles of Queensland*. Reed New Holland: 304 pp.

#### CONFLICT OF INTEREST

There are no conflicts of interest in terms of this paper and the author.



**A divided *Gehyra* makes sense! Assigning available and new names to recognize all major species groups within *Gehyra* Gray, 1834 *sensu lato* (Squamata: Gekkonidae) and the formal description of nine new species.**

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Received 21 March 2017, Accepted 19 June 2018, Published 20 June 2018.

**ABSTRACT**

The lizard genus *Gehyra* Gray, 1834 as currently recognized consists of roughly 50 recognized species found naturally occurring from mainland south-east Asia to Australia and nearby islands to the north and east including the mid Pacific.

This number of currently unrecognized species probably exceeds already described species-level taxa, even though this paper formally names 9 new species and 2 new subspecies, all bar one of which have been confirmed by published molecular data.

In spite of the ancient heritage of the assemblage, which is unusual in that numerous species occur on both the Asian and Australian continental plates, divergent lineages with antiquity measured potentially in excess of 25 MYA continue to be treated as being within a single genus.

To correct the anomaly, this paper recognizes major divergent species groups as self-contained genera using available and newly created genus names in accordance with the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

The assemblage of *Gehyra* as recognized by most authors to date is herein divided into 14 genera, ten of which are formally named for the first time. The species remaining within *Gehyra* are further divided into two subgenera, one of which is formally named for the first time. The species within *Dactyloperus* Fitzinger, 1843 are divided into five subgenera, four of which are formally named for the first time.

Another of the newly named genera *Edaxcolotes* *gen. nov.* is also divided into two subgenera.

All newly named genera and subgenera have divergences of more than 10 MYA from all other species based on numerous published phylogenetic studies.

Keywords: Taxonomy; Nomenclature; Lizard; Gekkota; Gekkonidae; Gecko; Dtella; *Gehyra*; *Perodactylus*; *Peropus*; *Phryia*; *Phreodora*; *Dactyloperus*; Asia; Australia; New Guinea; Cambodia; Thailand; new genus; *Propemaculosacolotes*; *Crocodylivotuscolotes*; *Edaxcolotes*; *Extensudigituscolotes*; *Brevicaudacolotes*; *Parvomentumparmacolotes*; *Papuacolotes*; *Quattuorunguiscolotes*; *Colotesmaculosadorsum*; *Thaigehyra*; New subgenus; *Halmaherasaurus*; *Purpuracolotes*; *Maculocolotes*; *Wedgedigitcolotes*; *Saxacolinecolotes*; *Macrocephalacolotes*; species; *lacerata*, *membranacruralis*; *xenopus*; *serraticauda*; *brevipalmata*; *fehlmanni*; *oceanica*; *australis*; *occidentalis*; *pilbara*; new species; *hangayi*; *paulhorneri*; *bradmaryani*; *sadlieri*; *glennsheai*; *shireenhoserae*; *marleneswileae*; *federicorossignolii*; *grismeri*; new subspecies; *bulliardii*; *graemecampbelli*.

**INTRODUCTION**

The lizard genus *Gehyra* Gray, 1834 as currently recognized consists of about 50 recognized species found naturally occurring from mainland south-east Asia to Australia and nearby islands to the north and east including the mid Pacific.

Numerous other forms await formal scientific description.

This number of currently unrecognized species probably exceeds already described species-level taxa even allowing for the nine new species named within this paper.

In spite of the ancient heritage of the assemblage, which is unusual in that numerous species occur on both the Asian and Australian continental plates, divergent lineages with antiquity measured potentially in excess of 25 MYA continue to be treated as being within a single genus.

When this is compared to other reptile groups, one finds that putative genera have been split in order to better reflect the correct phylogeny.

While the definition of a genus and necessary divergence between forms varies between herpetologists, most are effectively unanimous in recognizing species groups with a divergence in excess of 10 million years either as a genus or subgenus.

While most herpetologists utilize the taxonomic level of genus or sub-genus, a minority will for various reasons identify genus-level groupings as simply a "species group".

The latter position is not compatible with the *International Code of Zoological Nomenclature* (Ride *et al.* 1999) in that it allows for more than one potential name to be assigned to the same taxon

group.

The rule of homonymy is essential to the proper functioning of nomenclature and all the science that follows from this and hence it is appropriate that all divergent species groups be accorded genus-level recognition using names available, or when this is not possible newly assigned ones.

To correct the anomaly in terms of *Gehyra sensu lato*, this paper recognizes major and divergent species groups as self-contained genera.

When available names can be used, they are and in this case three are resurrected from synonymy.

Divergent species groups are herein named using genus-level descriptions compliant with the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

The assemblage of *Gehyra* as recognized by most authors to date (*sensu* Cogger 2014) is herein divided into 14 genera, ten of which are formally named for the first time. The species remaining within *Gehyra* are further divided into two subgenera, one of which is formally named for the first time. The species within *Dactyloperus* Fitzinger, 1843 are divided into five subgenera, four of which are formally named for the first time.

Another of the newly named genera *Edaxcolotes gen. nov.* is also divided into two subgenera.

All newly named groups have divergences of more than 10 MYA from all other species.

While I have named the more divergent groups as full genera and the less divergent ones as subgenera, noting the latter still have divergences of more than 10 MYA, I accept that there may be short-term inertia by some herpetologists to recognize all of the genus-level splits as proposed within this paper.

However there should be no such hesitation at all for people to adopt and use the names made available herein to define said species groups to clarify further the taxonomy of the relevant species.

It is also significant and noteworthy that at the species level, numerous new species of *Gehyra sensu lato* have been discovered and formally named in the 20 years preceding the publication of this paper.

However for more than 100 years the genus-level classification of the group has remained largely untouched.

To their credit Wells and Wellington (1984, 1985) made some eminently sensible splits of *Gehyra sensu lato*, but instead of being commended for their actions, there were severely lampooned by others for their actions as outlined in Hoser (2007).

No doubt there will be vocal opposition to the taxonomy and nomenclature proposed within this paper from a well-known gang of thieves and non-scientists known as the Wüster gang (as detailed in Hoser 2015a-f and sources cited therein).

Using fake id's on social media and elsewhere, this small gang of thieves will attempt to give their position the veneer as being the consensus view among numerous herpetologists and other scientists, when in fact the reverse is in fact the reality.

Even when they "buy" so-called "likes" for their social media pages over some years, they can only get a reported following of a few hundred in their cohort, as indicated by their Facebook group "Herpetological Taxonomy", which as of 16 June 2018, reported a total of just 357, even though it had been founded five years earlier (Twombly *et al.* 2018).

The Facebook page run by other herpetologists called "Herpetological taxonomy, phylogeny and systematic", had 6,192 "likes" as of the same date, even though it too had been created about five years prior (Bagaturov *et al.* 2018).

#### **MATERIALS, METHODS AND RESULTS**

The taxonomy presented herein is in effect a statement of the obvious.

As part of a global audit of the world's reptiles, all relevant species within *Gehyra* as defined by Cogger (2014) and similarly as generally defined by most authors as of the post year 2000 period were assessed to see if their placement within the genus *Gehyra* Gray, 1834 was in fact justified. If not, then the relevant taxon was assessed to see where it should in fact be placed.

In terms of the latter, available names were assessed to see if any were appropriate and if not, then the relevant taxon and/or others were placed in a newly named group.

Because all relevant species are morphologically conservative and physically look much the same, this being the original basis for placement within *Gehyra* or morphologically similar genera from the Asia/Australasia regions, I utilized all other available information including recently published molecular studies, biogeographical studies, geological studies and the like to assess factors such as likely divergences between species and species groups.

The main relevant studies leading to the taxonomic conclusions herein are cited below and confirm that there is in fact a strong scientific basis for the decisions made herein.

Scientific decisions should only be made when there is a strong body of evidence supporting it that has been confirmed by peer review (and not the PRINO (peer reviewed in name only) stuff used by the likes of Wolfgang Wüster and his gang of thieves as detailed by Hoser 2015a-f).

It is a matter of trite to state that in the 40 years prior to 2018, I have inspected numerous specimens of most, but not all putative species-level taxa identified within this paper, either live or in museums. When this has not been possible, all relevant and available published material, including papers, photos and the like have been inspected.

The results have already been summarized in the abstract and introduction and are as follows: 10 newly named genera, as well as three others resurrected from synonymy, meaning a total of 14 genera of species all formerly included within *Gehyra*.

Within this group, another 6 subgenera are recognized and all are also formally named for the first time according to the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999). No named group has a divergence from its nearest relatives of less than 10 MYA based on relevant molecular studies and associated statements by the relevant authors as cited herein.

It was for this reason, I had absolutely no hesitation in recognizing and where needed, naming the relevant species groups.

Furthermore nine obviously unnamed species and 2 allopatric subspecies (for which there are no available synonyms that can be used) are also formally named for the first time in this paper.

All but one of these taxa have had their species-level status validated already by way of published molecular data as cited within this paper.

The single species-level taxon named in this paper that is not supported by DNA evidence, this being a taxon from Cambodia, is morphologically divergent from its nearest relative and separated by many hundreds of kilometres of clearly unsuitable habitat across central Thailand, giving me full confidence in the specific status of that taxon.

I should also note that a number of synonyms have been created in terms of currently recognized taxa, in particular for putative species within Australia and to the immediate north.

There is little doubt that a number of these putative species do represent valid, albeit presently unrecognized species, including for example some of those putative taxa formally named by Wells and Wellington (1985) or referred to by them.

In terms of data or diagnoses presented within this paper, much can be regarded as being of a bare minimum to make the relevant names "available" in the sense of the *International Code of Zoological Nomenclature*.

I make no apologies for this.

In 2011, members of the Wüster gang induced officers of the Victorian State Government wildlife department, then known as "DSE" to unlawfully raid myself and shut down our globally successful wildlife education business at gunpoint.

The illegal armed raid on 17 August 2011 included a number of trucks and other vehicles being filled with research files from more than 40 filing cabinets. This was then taken away. Most were not returned and this effectively scuttled or severely disabled dozens of critically important research and conservation projects due to the unlawful theft of irreplaceable research materials and results.

The irreplaceable nature of the material was underscored by the decades it took to gather and my current age of 56, meaning I will not physically be able to duplicate what had been done previously. I therefore have made the decision to publish as indicated in the paper already, rather than to leave important species groups and the like unnamed and at greater potential risk of extinction.

This being true even for species currently not known to be under any identified threat.

The illegal armed raids and the dire results of them were detailed by Court of Appeal, Victoria (2014), Victorian Civil and Administrative Tribunal (VCAT) (2015) and other publications.

The publications of Court of Appeal, Victoria (2014), Victorian Civil and Administrative Tribunal (VCAT) (2015), Hoser (1989, 1991, 1993, 1995, 1996, 1999a and 1999b, 2000a, 2000b) included details of other illegal armed raids and unlawful thefts of research files, which have caused irreparable harm to numerous research projects by the theft of records, photos and data here in Australia and elsewhere, usually by corrupt government officers, who over many decades have hampered wildlife conservation and research projects of significant importance.

As already stated, while it would be preferable to either retrieve the stolen material or to replicate earlier research and accumulation of data, neither are likely to happen in my lifetime.

In terms of the former, corrupt wildlife officers and police who illegally took materials have refused to return them in spite of numerous court orders to do so. In terms of the latter, I am now aged 56 years of age, and am not likely to live another 40 years in good health to be able to go around the same parts of northern Australia collecting and recording species, as done in the previous 40 years.

Because it is critically important that unnamed species be formally identified and named as the vital first step in their long-term conservation, I have absolutely no hesitation in describing the new to science taxa identified herein, even though my available material and data is nowhere near as extensive as I would like it to be.

I again note that for any classification system and nomenclature to be usable by others, the scientific and evidentiary basis for the decisions made, needs to be readily available to those who care to check it out.

As it happens the trail of published literature alone supports the taxonomy and nomenclature herein and so I cite it all here.

The important published material relevant to the taxonomy and nomenclature of *Gehyra sensu lato* as defined herein and the decisions made herein are as follows: Andersson (1913), Barbour (1912), Bauer (1994), Bauer and Günther (1991), Beckon (1992), Bobrov and Semenov (2008), Boettger (1895), Bonetti (2002), Börner and Schüttler (1982, 1983), Boulenger (1883, 1885a, 1885b, 1887), Brongersma (1930, 1948), Brown (2014), Brown (1955), Brown *et al.* (2015), Bourke *et al.* (2017), Buden and Taboroši (2016), Chan-ard *et al.* (1999, 2015), Chrapliwy *et al.* (1961), Cogger (2014), Cogger *et al.* (1983), Crombie and Pregill (1999), Daan and Hillenius (1966), Davies (2012), de Rooij (1915), de Vis (1890), Doody *et al.* (2015), Doughty *et al.* (2012), Duméril and Bibron (1836), Duméril and Duméril (1851), Ezaz *et al.* (2009), Fallend (2007), Fisher (1997), Fitzinger (1843), Flecks *et al.* (2012), Fry (1914), Garman (1901), Gibbons and Clunie (1984), Girard (1858), Glauert (1955), Goldberg (2014), Gray (1834, 1842a, 1842b, 1845), Grismer *et al.* (2007), Günther (1877), Hagey *et al.* (2017), Hall (2002), Hediger (1933), Heinicke *et al.* (2011), Horner (2005), Hoser (1989), Hutchinson *et al.* (2014), King (1979, 1982a, 1982b, 1984a, 1984b), King and Horner (1989), Kinghorn (1924), Kluge (1982, 1993), Kopstein (1926), Laube and Langner (2007), Lesson (1830), Loveridge (1934, 1948), Low (1979), Lucky and Sarnat (2010), Macleay (1877), Manthey and Grossmann (2007), Maryan (2009), McCoy (2015), Mertens (1974), Meyer (1874), Moritz *et al.* (2017), Oliver *et al.* (2010, 2012, 2014, 2016a, 2016b, 2017), Mitchell (1965), Oudemans (1894), Peters (1874, 1875), Peters and Doria (1878), Pianka (1969), Pianka and Pianka (1976), Ride *et al.* (1999), Rocha *et al.* (2009), Rösler (2000, 2017), Rösler *et al.* (2005), Sang *et al.* (2009), Shea and Sadlier (1999), Sjöström *et al.* (2009, 2012, 2013), Skipwith and Oliver (2014), Strauch (1887), Steindachner (1867), Sternfeld (1925),

Storr (1978, 1982), Taylor (1962, 1963), Tiedemann *et al.* (1994), Tonione *et al.* (2016), Underwood (1954), Wiegmann (1834), Wells and Wellington (1984, 1985), Werner (1901), Wilson and Knowles (1988), Wilson and Swan (2017), Yamashiro and Ota (2005), Zug (1991, 2013), Zug and Kaiser (2014), Zug *et al.* (2011, 2012) and sources cited therein.

In terms of the nomenclature herein, no names should be altered in any way unless absolutely mandatory under the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

In the event that a so-called second reviser seeks to use one name for two groups defined herein, where there is a conflict of names first proposed herein, the name to be used should be the first formally described as per the order listed in the abstract of this paper (page priority).

#### **GEHYRA GRAY, 1834**

**Type species:** *Gehyra pacifica* Gray, 1832, a synonym of *Gecko oceanicus* Lesson, 1830.

**Diagnosis:** *Gehyra sensu lato* as understood to date (and herein divided into 14 genera), is separated from all other geckos from all places by the following suite of characters: Digits are dilated, the distal phalanges are compressed. The distal joint is long, free and rising from within the extremity of the digital expansion. Infradigital plates are in a simple or double series; the inner digit is clawless, while the other four have claws, or rarely there is a tiny claw on the fifth.

The genus *Gehyra*, type species *Gecko oceanicus* Lesson, 1830, as defined herein is separated from all other genera formerly included as part of *Gehyra* by the following suite of characters: Digital lamellae are undivided, 11 to 13 upper labials; toes are webbed at the base; 25 to 40 femoral pores.

Within *Gehyra* the subgenus *Halmaherasaurus gen. nov.*, type species *Gehyra marginata* Boulenger, 1887 is readily separated from *Gehyra* by the laterally compressed tail and body shape, (versus rounded and slightly depressed base of tail in the subgenus *Gehyra*) as well as dorsal colours that are in the spectrum of grays and browns, with a very distinctive light greenish iris, versus a red, brown, yellow or orange iris in *Gehyra*.

*Dactyloperus* Fitzinger, 1843, type species *Hemidactylus variegata* Duméril and Bibron, 1836 are readily separated from all other species formerly included within *Gehyra sensu lato* by the following suite of characters: Digital lamellae are divided by a median groove; hind limb is without a cutaneous fold; digits are free or with a very slight rudiment of a web and the male has 10-16 femoral pores.

Within *Dactyloperus*, the subgenus *Purpuracolotes subgen. nov.*, type species *Gehyra purpurascens* Storr, 1982, is readily separated from the nominate subgenus and other three subgenera by one or other of the following two suites of characters:

1/ No cutaneous fold along the hind edge of the hindlimb; the original tail is relatively long, tapering and slightly depressed at the base, but without a sharply delineated, denticular lateral edge on each side; less than nine divided subdigital lamellae under the dilated portion of the fourth toe, with each half either in contact or separated by no more than a small granule; colour is a purplish grey or brown with darker mottling, without spotting, or at most a few isolated spots anteriorly; 11 or less pre-anal pores in males; oblong rostral scale, which is almost twice as wide as high with a straight or at most slightly angular upper edge, adult size to 60 mm snout-vent (*D. purpurascens*) or:

2/ Small adult body size (rarely more than 40 mm adult snout-vent), few subdigital lamellae and a mid tan to golden dorsal coloration with a distinctive pattern of scattered pale ocelli and irregular dark-brown blotches on a stippled background (*D. einasleighensis*).

Within *Dactyloperus*, the subgenus *Maculocolotes subgen. nov.*, type species *Gehyra nana* Storr, 1978 is readily separated from the nominate subgenus and the other three subgenera by one or other of the following three suites of characters:

1/ No cutaneous fold along the hind edge of the hindlimb; the original tail is slightly depressed at the base, without a sharply delineated denticular lateral edge on each side; basal subdigital



lamellae divided, but each half is usually in contact or separated by no more than a single granule; less than nine divided subdigital lamellae under the dilated portion of the fourth toe; oblong-shaped rostral scale, almost twice as wide as high, with at most a slightly angular upper edge and usually bordered above, between the nostrils, by only two large (and occasionally small third) internasal scales; pinkish grey dorsal colour, with a pattern of dark spots and pale pinkish white spots on the back being irregular but tending towards transverse rows, (*D. nana*, *D. girloorloo*, *D. kimberleyi*), or:

2/ No cutaneous fold along the hind edge of the hindlimb; the original tail is slightly depressed at the base, and relatively long and tapering and without a sharply delineated denticular lateral edge on each side; the colour pattern of the tail is a more diffuse version than that seen on the lower back; 6-7 divided subdigital lamellae under the fourth toe; third and fourth toes are free and without webbing; dorsal colouration is reddish-brown above with scattered dark brown and pale cream spots tending to form about nine irregular rows of dark brown spots anteriorly or bars posteriorly on the back, mixed with irregular paler markings or spots; 11 or less pre-anal pores in males; an oblong rostral scale that is almost twice as wide as high and with a straight or at most a slightly angular upper edge; anterior chin shields are not in contact with the second infralabials, (*D. multiporosa*), or:

3/ No cutaneous fold along the hind edge of the hindlimb; the original tail is slightly depressed at the base, without a sharply delineated denticular lateral edge on each side; 9 or more basal subdigital lamellae divided under the dilated portion of the fourth toe, but each half is usually in contact or separated by no more than a single granule; 19 or more pre-anal pores in males; rostral scale is at most about 1.5 times wider than high angular above and bordered above, between the nostrils, by three or more (rarely two) internasal scales (*D. occidentalis*, *D. federicrossignolii* sp. nov.).

Within *Dactyloperus*, the subgenus *Wedgedigitcolotes* subgen. nov., type species *Gehyra spheniscus* Doughty, Palmer, Siström, Bauer and Donnellan, 2012, is readily separated from the nominate subgenus and the other three subgenera by the following suite of characters: No cutaneous fold along the hind edge of the hindlimb, the original tail is rounded at the base or slightly depressed, and lacks a sharply delineated denticular lateral edge on each side; digits are broadly expanded basally and subdigital scancers present on all digits of manus and pes. Digit I of manus and pes clawless or bearing a minute claw, penultimate phalanx of digits II–V free from scansorial pad. Body atuberculate. Basal subdigital lamellae are divided and separated by a wedge shaped series of tiny granules. Differs from other Australian species in the genus by small (approximately 45 mm SVL) body size and a wedge of granules at the base of the expanded terminal pads on the digits; 6 lamellae on fourth finger and toe, 7 or 8 upper and lower labials, single internasal, about 30 interorbital scales, about 25 preloacal and femoral pores in males in an unbroken chevron and a dorsal pattern with transverse rows of alternating light and dark spots or bars, (*D. spheniscus*).

Within *Dactyloperus*, the subgenus *Saxacolinecolotes* subgen. nov., type species *Dactyloperus lazelli* Wells and Wellington, 1985, is readily separated from the nominate subgenus and the other three subgenera by the following suite of characters: No cutaneous fold along the hind edge of the hindlimb; original tail is round or slightly depressed at the base and long and slender and lacks a sharply delineated lateral denticular edge on each side; less than nine divided subdigital lamellae under the dilated portion of the fourth toe, each being divided but either in contact or separated by no more than a tiny granule; rostral scale is oblong, being almost twice as wide as high and with at most a slightly angular edge, usually bordered above, between the nostrils, by only two large (and an occasional small third) internasal; anterior chin shields in contact with only the first supralabials; a dorsal colouration of being generally dull to grey brown, with thick darker brown peppering around light grey-brown spots, giving an overall appearance of being spotted or reticulated in general pattern, but not in the way of any banded formation and an adult snout-vent length rarely exceeding 40 mm, (*D. lazelli*).

The remaining species within the nominate type subgenus

*Dactyloperus* Fitzinger, 1843 are *D. variegata*, *D. minuta*, *D. montium*, *D. moritzi*, *D. pulingka*, *D. punctata*, *D. pilbara*, *D. versicolour* and *D. bradmaryani* sp. nov..

The genus *Phryia* Gray, 1842, type species *Phryia punctulata* Gray, 1842 (a synonym of *Phryia australis* (Gray, 1845)), are readily separated from all other species formerly included within *Gehyra sensu lato* by one or other of the following two suites of characters: 1/ 9-11 subdigital lamellae that are either undivided or sometimes with a medial depression or notch under the dilated portion of the fourth toe; rostral scale is oblong, being almost twice as wide as high, with at most a slightly angular upper edge and bordered above, between the nostrils, by only two large internasal scales (*P. australis*, *P. borrooloola*, *P. ipsa*, *P. koira*, *P. paulhorneri* sp. nov. (this paper), *P. robusta*), or:

2/ No cutaneous fold along the hind edge of the hindlimb; original tail is rounded or moderately depressed at the base and lacks a sharply delineated, denticular lateral edge on each side; 9-11 deeply notched or grooved, but seldom divided subdigital lamellae under the expanded portion of the fourth toe; toes usually free of webbing; 19 or more pre-anal pores in males; rostral scale is oblong, being almost twice as wide as high, with at most a slightly angular upper edge and bordered above, between the nostrils, by only two large internasal scales (*P. pamela*).

Geckos within the genus *Peropus* Wiegmann, 1835, type species *Hemidactylus (Peropus) mutilata* Wiegmann, 1834, are readily separated from all other species formerly included within *Gehyra sensu lato* by the following suite of characters: Digital lamellae are divided by a median groove; there is a fold of skin bordering the hind limb posteriorly; the inner pair of chin-shields are very large; rostral is quadrangular; 8 or 9 upper labials and 7 lower labials; tail normally has a sharpish lateral edge on each side.

Geckos within the genus *Propemaculosacolotes* gen. nov., type species *Peripia dubia* Macleay, 1877, are readily separated from all other species formerly included within *Gehyra sensu lato* by one or other of the following two suites of characters:

1/ The 9-11 subapical lamellae under the expanded part of the fourth toe may be divided or undivided; rostral scale is at most about 1.5 times wider than high, angular above, between the nostrils, separated by three internasal scales, two large outer and a small medial; slender tail that is distinctly depressed at the base; dorsal colouration is grey brown to grey to almost pale cream with or without darker blotches, variegations or marbling or scattered paler spots (*P. dubia*), or:

2/ The 7-8 subapical lamellae under the expanded part of the fourth toe are undivided or occasionally grooved; dorsal colouration is pale to dark grey above with a noticeable pattern consisting of a pair of dark brown zig-zag paravertebral stripes from the eye to the base of the tail, sometimes joined by a series of dark transverse bars resulting in a vertebral series of pale rhomboidal blotches. Head, flanks and limbs are speckled and streaked with dark brown; stocky in build (*P. catenata*).

Geckos within the genus *Crocodylilivoltuscolotes* gen. nov., type species *Gehyra xenopus* Storr, 1978 are readily separated from all other species formerly included within *Gehyra sensu lato* by the following suite of characters: There is no cutaneous fold along the hind edge of the hindlimb; the original tail is round or moderately depressed at the base and lacks a sharply delineated denticular lateral edge on each side; basal subdigital lamellae are divided and each half is separated by a wedge-shaped series of small granules; nine or more supralabials, nine or more lamellae under the fourth toe; third and fourth toes lack webbing; body is robustly built with a long and pointed somewhat turned up snout and large prominent eyes; maximum adult snout-vent length of more than 70 mm (*C. xenopus*, *C. shireenhoserae* sp. nov. (this paper), *C. marleneswileae* sp. nov. (this paper)).

Geckos within the genus *Edaxcolotes* gen. nov., type species *Gehyra vorax* Girard, 1858, are readily separated from all other species formerly included within *Gehyra sensu lato* by the following suite of characters: Undivided digital lamellae; 13 or 14 upper labials; digits webbed at the base; a strong fold of the skin bordering the fore limb anteriorly; 40 to 60 femoral pores; tail is

round in structure at the base; dorsal colors are composed of black, shades of yellow, and any color in between, versus dull greys and shades of brown only (*E. vorax*, *E. georgpotthasti*, *E. rohan*).

*Edaxcolotes* gen. nov. is also subdivided into two subgenera. The nominate subgenus includes both *E. vorax* and *E. georgpotthasti*, while the subgenus *Macrocephalacolotes* subgen. nov. includes the species *E. rohan*.

*Macrocephalacolotes* subgen. nov. is separated from all other *Edaxcolotes* gen. nov. and all other *Gehyra sensu lato* by the following unique suite of characters: very large adult size (adult SVL 130-150 mm), large head (HW/SVL 0.18-0.22, HD/SVL 0.11-0.14), prominent skinfolds on the anterior forelimbs and posterior hind limbs, weak lateral fold, heterogeneous dorsal scalation consisting of large rounded scales bordered by numerous much smaller rounded or triangular scales, massive digital discs with high number of wide undivided subdigital lamellae (finger four 23-25, toe four 22-26) that are not deeply notched or divided, rostral with near horizontal dorsal edge and not deeply notched, preloacal and femoral pores in a moderately long single continuous chevron of up to at least 40 pores, original tail without lateral

serrations, rounded at the base, but slightly compressed and with a prominent medial row of enlarged subcaudals, and a prominent ring of orange scales around the eye in life (Oliver *et al.* 2016).

Geckos within the genus *Extensudigituscolotes* gen. nov., type species *Gehyra membranacruralis* King and Horner, 1989, are readily separated from all other species formerly included within *Gehyra sensu lato* by the following suite of characters: A combination of undivided subdigital lamellae; adult snout-vent length of under 101 mm; no rudimentary webbing directly behind the knees and between the toes; no anterior and posterior skin folds on the forelimbs; a tail base that is round to ovoid in cross-section; no "U"-shaped rostral scale (*E. membranacruralis*, *E. sadlieri* sp. nov. (this paper), *E. glennsheai* sp. nov.).

Geckos within the genus *Brevicaudacolotes* gen. nov., type species *Hemidactylus baliolus* Duméril, 1851 are readily separated from all other species formerly included within *Gehyra sensu lato* by the following suite of characters: Digital lamellae are divided by a median groove; a fold of the skin borders the hind limb posteriorly; chin-shields are shorter; conical snout; cheeks not swollen; dorsal scales are larger, while those on the vertebral line are reduced in size; the rostral is horseshoe shaped; dorsally the colour is brown with lighter or reddish spots (*B. baliola*, *B. barea*).

Geckos within the genus *Parvomentumparmacolotes* gen. nov., type species *Hemidactylus (Peropus) brevipalmatus* Peters, 1874 are readily separated from all other species formerly included within *Gehyra sensu lato* by the following suite of characters: 14-15 digital lamellae under the fourth toes divided by a median groove; webbing between the digits; a fold of the skin bordering the hind limb posteriorly; chin-shields smaller; 10 upper and 9 lower labials; tail without a lateral keel; noticeable very small ventral scales (*P. brevipalmata*, *P. papuana*, *P. interstitialis*).

Geckos within the genus *Papuacolotes* gen. nov., type species *Gehyra serraticauda* Skipworth and Oliver, 2014 are readily separated from all other species formerly included within *Gehyra sensu lato* by the following suite of characters: a unique continuous fringe of prominent acuminate lateral scales running the length of the tail, a feature shared with no other species in *Gehyra sensu lato*. The genus is also characterised as having a robust body of intermediate size, numerous internasals, partially divided digital scansors and the presence of well-developed popliteal folds all of which further distinguishes this taxon from similar species in the Papuan region (*P. serraticauda*).

Geckos within the genus *Quattuorunguiscolotes* gen. nov., type species *Peropus fehlmanni* Taylor, 1962 are readily separated from all other species formerly included within *Gehyra sensu lato* by the following suite of characters: Digital lamellae divided by a median groove; hind limb is without a cutaneous fold; digits free or with a very slight rudiment of web; scales a good deal smaller on the median line of the back than on the sides; male usually has about

20-40 femoral pores; rostral pentagonal; four chin-shields, the median pair are large and elongated, being narrowest posteriorly; the tail is rounded at the base and slightly depressed and with a median row of large scutellae inferiorly. Dorsally the colour is greyish brown, minutely speckled with black or white; the belly is whitish, (*Q. fehlmanni*, *Q. grismeri* sp. nov. (this paper), *Q. insulensis*).

Geckos within the genus *Colotesmaculosadorsum* gen. nov., type species *Peropus laceratus* Taylor, 1962 are readily separated from all other species formerly included within *Gehyra sensu lato* by the following suite of characters: The subcaudal region has several series of small scales not transversely widened; 10 preanal pores on each side forming a continuous series, angular mesially, extending slightly on to the femora; dorsal surface and sides are grey. There are about 20 darker-grey spots on the head and scattered, larger grey spots on the back; belly is cream to whitish-yellow. The original tail is noticeably shorter than the body (*C. lacerata*).

Geckos within the genus *Thaigehyra* gen. nov., type species *Peropus angusticaudatus* Taylor, 1963 are readily separated from all other species formerly included within *Gehyra sensu lato* by the following suite of characters: The tail is not significantly widened beyond the base behind the vent and is only slightly longer than the head and body, unflattened below and terminating in a very fine point; the scales on the dorsal surface are small, flat, cycloid and imbricating, with a slight lateral caudal fringe, not or scarcely denticulate, males have 15-18 femoral and preanal pores that are continuous and angular mesially; the dorsal colouration is almost uniformly grey with a slightly lighter head; the tail is a darker lavender colour; chin, throat and venter are yellowish-white (*T. angusticaudata*).

**Distribution:** *Gehyra* as defined herein are found in islands of the South west Pacific and north of Australia (subgenus *Gehyra*). Subgenus *Halmaherasaurus* subgen. nov. occurs only in the vicinity of Halmahera Island in the Moluccas, Indonesia.

**Content:** *Gehyra oceanica* (Lesson, 1830) (type species); *G. hangayi* sp. nov. (this paper); *G. marginata* Boulenger, 1887.

#### SUBGENUS HALMAHERASAURUS GEN. NOV.

**Type species:** *Gehyra marginata* Boulenger, 1887.

**Diagnosis:** *Gehyra sensu lato* as understood to date (and herein divided into 14 genera), is separated from all other geckos from all places by the following suite of characters: Digits are dilated, the distal phalanges are compressed. The distal joint is long, free and rising from within the extremity of the digital expansion. Infradigital plates are in a simple or double series; the inner digit is clawless, while the other four have claws.

The genus *Gehyra*, type species *Gecko oceanicus* Lesson, 1830, as defined herein is separated from all other genera formerly included as part of *Gehyra* by the following suite of characters: Digital lamellae are undivided, 11 to 13 upper labials; toes are webbed at the base; 25 to 40 femoral pores.

Within *Gehyra* the subgenus *Halmaherasaurus* gen. nov., type species *Gehyra marginata* Boulenger, 1887 is readily separated from *Gehyra* by the laterally compressed tail and body shape, (versus rounded and slightly depressed base of tail in the subgenus *Gehyra*) as well as dorsal colours that are in the spectrum of grays and browns, with a very distinctive light greenish iris, versus red, brown, yellow or orange iris in *Gehyra*.

**Distribution:** Subgenus *Halmaherasaurus* subgen. nov. occurs only in the vicinity of Halmahera Island in the Moluccas, Indonesia.

**Content:** *Gehyra (Halmaherasaurus) marginata* Boulenger, 1887 (monotypic).

#### DACTYLOPERUS FITZINGER, 1843.

**Type species:** *Hemidactylus variegata* Duméril and Bibron, 1836.

**Diagnosis:** *Dactyloperus* Fitzinger, 1843, type species *Hemidactylus variegata* Duméril and Bibron, 1836 are readily separated from all other species formerly included within *Gehyra sensu lato* by the following suite of characters: Digital lamellae are divided by a median groove; hind limb is without a cutaneous fold; digits are free or with a very slight rudiment of a web and the male

has 10-16 femoral pores.

**Distribution:** Most of the drier parts of continental Australia.

**Content:** *Dactyloperus variegata* (Duméril and Bibron, 1836) (type species); *D. bradmaryani* sp. nov. (this paper), *D. einasleighensis* (Bourke, Pratt, Vanderduys and Moritz, 2017); *D. federicrossignolii* sp. nov. (this paper); *D. girloorloo* (Oliver, Bourke, Pratt, Doughty and Moritz, 2016); *D. kimberleyi* (Börner and Schüttler, 1982); *D. lazelli* Wells and Wellington, 1985; *D. minuta* (King, 1982); *D. montium* (Storr, 1982); *D. moritzi* (Hutchinson, Sistrom, Donnellan and Hutchinson, 2014); *D. multiporosa* (Doughty, Palmer, Sistrom, Bauer and Donnellan, 2012); *D. nana* (Storr, 1978); *D. occidentalis* (King, 1984); *D. pilbara* (Mitchell, 1965); *D. pulingka* (Hutchinson, Sistrom, Donnellan and Hutchinson, 2014); *D. punctata* (Fry, 1914); *D. purpurascens* (Storr, 1982); *D. spheniscus* (Doughty, Palmer, Sistrom, Bauer and Donnellan, 2012); *D. versicolor* (Hutchinson, Sistrom, Donnellan and Hutchinson, 2014).

#### SUBGENUS PURPURACOLOTES SUBGEN. NOV.

**Type species:** *Gehyra purpurascens* Storr, 1982.

**Diagnosis:** *Dactyloperus* Fitzinger, 1843, type species *Hemidactylus variegata* Duméril and Bibron, 1836 are readily separated from all other species formerly included within *Gehyra sensu lato* by the following suite of characters: Digital lamellae are divided by a median groove; hind limb is without a cutaneous fold; digits are free or with a very slight rudiment of a web and the male has 10-16 femoral pores.

Within *Dactyloperus*, the subgenus *Purpuracolotes* subgen. nov., type species *Gehyra purpurascens* Storr, 1982, is readily separated from the nominate subgenus and other three subgenera by one or other of the following two suites of characters:

1/ No cutaneous fold along the hind edge of the hindlimb; the original tail is relatively long, tapering and slightly depressed at the base, but without a sharply delineated, denticular lateral edge on each side; less than nine divided subdigital lamellae under the dilated portion of the fourth toe, with each half either in contact or separated by no more than a small granule; colour is a purplish grey or brown with darker mottling, without spotting, or at most a few isolated spots anteriorly; 11 or less pre-anal pores in males, oblong rostral scale, which is almost twice as wide as high with a straight or at most slightly angular upper edge, adult size to 60 mm snout-vent (*D. purpurascens*) or:

2/ Small adult body size (rarely more than 40 mm adult snout-vent), few subdigital lamellae and a mid tan to golden dorsal coloration with a distinctive pattern of scattered pale ocelli and irregular dark-brown blotches on a stippled background (*D. einasleighensis*).

**Distribution:** Known from most of the interior of Western Australia, South Australia and the southern Northern Territory as well as an apparently isolated population in drier north-east Queensland.

**Etymology:** The name *Purpuracolotes* in Latin means purple gecko, in reference to the purplish colour of many specimens.

**Content:** *Dactyloperus (Purpuracolotes) purpurascens* (Storr, 1982) (type species); *D. (Purpuracolotes) einasleighensis* (Bourke, Pratt, Vanderduys and Moritz, 2017).

#### SUBGENUS MACULOCOLOTES SUBGEN. NOV.

**Type species:** *Gehyra nana* Storr, 1978.

**Diagnosis:** *Dactyloperus* Fitzinger, 1843, type species *Hemidactylus variegata* Duméril and Bibron, 1836 are readily separated from all other species formerly included within *Gehyra sensu lato* by the following suite of characters: Digital lamellae are divided by a median groove; hind limb is without a cutaneous fold; digits are free or with a very slight rudiment of a web and the male has 10-16 femoral pores.

Within *Dactyloperus*, the subgenus *Maculocolotes* subgen. nov., type species *Gehyra nana* Storr, 1978 is readily separated from the nominate subgenus and the other three subgenera by one or other of the following three suites of characters:

1/ No cutaneous fold along the hind edge of the hindlimb; the original tail is slightly depressed at the base, without a sharply

delineated denticular lateral edge on each side; basal subdigital lamellae divided, but each half is usually in contact or separated by no more than a single granule; less than nine divided subdigital lamellae under the dilated portion of the fourth toe; oblong-shaped rostral scale, almost twice as wide as high, with at most a slightly angular upper edge and usually bordered above, between the nostrils, by only two large (and occasionally small third) internasal scales; pinkish grey dorsal colour, with a pattern of dark spots and pale pinkish white spots on the back being irregular but tending towards transverse rows, (*D. nana*, *D. girloorloo*, *D. kimberleyi*), or:

2/ No cutaneous fold along the hind edge of the hindlimb; the original tail is slightly depressed at the base, and relatively long and tapering and without a sharply delineated denticular lateral edge on each side; the colour pattern of the tail is a more diffuse version than that seen on the lower back; 6-7 divided subdigital lamellae under the fourth toe; third and fourth toes are free and without webbing; dorsal colouration is reddish-brown above with scattered dark brown and pale cream spots tending to form about nine irregular rows of dark brown spots anteriorly or bars posteriorly on the back, mixed with irregular paler markings or spots; 11 or less pre-anal pores in males; an oblong rostral scale that is almost twice as wide as high and with a straight or at most a slightly angular upper edge; anterior chin shields are not in contact with the second infralabials, (*D. multiporosa*), or:

3/ No cutaneous fold along the hind edge of the hindlimb; the original tail is slightly depressed at the base, without a sharply delineated denticular lateral edge on each side; 9 or more basal subdigital lamellae divided under the dilated portion of the fourth toe, but each half is usually in contact or separated by no more than a single granule; 19 or more pre-anal pores in males; rostral scale is at most about 1.5 times wider than high angular above and bordered above, between the nostrils, by three or more (rarely two) internasal scales (*D. occidentalis*, *D. federicrossignolii* sp. nov. (this paper)).

**Distribution:** Generally the Kimberley region in north-west Australia, with a single species extending across the dry tropical north of Australia.

**Etymology:** *Maculocolotes* in Latin means spotted gecko.

**Content:** *Dactyloperus (Maculocolotes) nana* (Storr, 1978) (type species); *D. federicrossignolii* sp. nov. (this paper); *D. girloorloo* (Oliver, Bourke, Pratt, Doughty and Moritz, 2016); *D. kimberleyi* (Börner and Schüttler, 1982); *D. multiporosa* (Doughty, Palmer, Sistrom, Bauer and Donnellan, 2012); *D. occidentalis* (King, 1984).

#### SUBGENUS WEDGEDIGITCOLOTES SUBGEN. NOV.

**Type species:** *Gehyra spheniscus* Doughty, Palmer, Sistrom, Bauer and Donnellan, 2012.

**Diagnosis:** *Dactyloperus* Fitzinger, 1843, type species *Hemidactylus variegata* Duméril and Bibron, 1836 are readily separated from all other species formerly included within *Gehyra sensu lato* by the following suite of characters: Digital lamellae are divided by a median groove; hind limb is without a cutaneous fold; digits are free or with a very slight rudiment of a web and the male has 10-16 femoral pores.

Within *Dactyloperus*, the subgenus *Wedgedigitcolotes* subgen. nov., type species *Gehyra spheniscus* Doughty, Palmer, Sistrom, Bauer and Donnellan, 2012, is readily separated from the nominate subgenus and the other three subgenera by the following suite of characters: No cutaneous fold along the hind edge of the hindlimb, the original tail is rounded at the base or slightly depressed, and lacks a sharply delineated denticular lateral edge on each side; digits are broadly expanded basally and subdigital scensors present on all digits of manus and pes. Digit I of manus and pes clawless or bearing a minute claw, penultimate phalanx of digits II-V free from scansorial pad. Body tuberculate. Basal subdigital lamellae are divided and separated by a wedge shaped series of tiny granules. Differs from other Australian species in the genus by small (approximately 45 mm SVL) body size and a wedge of granules at the base of the expanded terminal pads on the digits; 6 lamellae on fourth finger and toe, 7 or 8 upper and lower labials, single internasal, about 30 interorbital scales, about 25 preloacal and femoral pores in males in an unbroken chevron and a dorsal



pattern with transverse rows of alternating light and dark spots or bars, (*D. spheniscus*).

**Distribution:** North-west Kimberley of Western Australia, including some offshore islands.

**Etymology:** *Wedgedigitcolotes* in Latin means wedge-toed Gecko.

**Content:** *Dactyloperus (Wedgedigitcolotes) spheniscus* (Doughty, Palmer, Siström, Bauer and Donnellan, 2012).

#### SUBGENUS SAXACOLINECOLOTES SUBGEN. NOV.

**Type species:** *Dactyloperus lazelli* Wells and Wellington, 1985.

**Diagnosis:** *Dactyloperus* Fitzinger, 1843, type species *Hemidactylus variegata* Duméril and Bibron, 1836 are readily separated from all other species formerly included within *Gehyra sensu lato* by the following suite of characters: Digital lamellae are divided by a median groove; hind limb is without a cutaneous fold; digits are free or with a very slight rudiment of a web and the male has 10-16 femoral pores.

Within *Dactyloperus*, the subgenus *Saxacolinecolotes subgen. nov.*, type species *Dactyloperus lazelli* Wells and Wellington, 1985, is readily separated from the nominate subgenus and the other three subgenera by the following suite of characters: No cutaneous fold along the hind edge of the hindlimb; original tail is round or slightly depressed at the base and long and slender and lacks a sharply delineated lateral denticular edge on each side; less than nine divided subdigital lamellae under the dilated portion of the fourth toe, each being divided but either in contact or separated by no more than a tiny granule; rostral scale is oblong, being almost twice as wide as high and with at most a slightly angular edge, usually bordered above, between the nostrils, by only two large (and an occasional small third) internasal; anterior chin shields in contact with only the first supralabials; a dorsal colouration of being generally dull to grey brown, with thick darker brown peppering around light grey-brown spots, giving an overall appearance of being spotted or reticulated in general pattern, but not in the way of any banded formation and an adult snout-vent length rarely exceeding 40 mm, (*D. lazelli*).

**Distribution:** South-eastern South Australia and nearby parts of Western New South Wales, potentially including far south-west Queensland and north-west Victoria.

**Etymology:** *Saxacolinecolotes* in Latin means rock dwelling gecko.

**Content:** *Dactyloperus (Saxacolinecolotes) lazelli* Wells and Wellington, 1985.

#### GENUS PHRYIA GRAY, 1842

**Type species:** *Gehyra australis* Gray, 1845.

**Diagnosis:** The genus *Phryia* Gray, 1842, type species *Phryia punctulata* Gray, 1842 (a synonym of *Phryia australis* (Gray, 1845), are readily separated from all other species formerly included within *Gehyra sensu lato* by one or other of the following two suites of characters:

1/ 9-11 subdigital lamellae that are either undivided or sometimes with a medial depression or notch under the dilated portion of the fourth toe; rostral scale is oblong, being almost twice as wide as high, with at most a slightly angular upper edge and bordered above, between the nostrils, by only two large internasal scales (*P. australis*, *P. borroloola*, *P. ipsa*, *P. koira*, *P. paulhorneri* sp. nov. (this paper), *P. robusta*), or:

2/ No cutaneous fold along the hind edge of the hindlimb; original tail is rounded or moderately depressed at the base and lacks a sharply delineated, denticular lateral edge on each side; 9-11 deeply notched or grooved, but seldom divided subdigital lamellae under the expanded portion of the fourth toe; toes usually free of webbing; 19 or more pre-anal pores in males; rostral scale is oblong, being almost twice as wide as high, with at most a slightly angular upper edge and bordered above, between the nostrils, by only two large internasal scales (*P. pamela*).

**Distribution:** Rocky areas in the tropical top end of the Northern Territory and immediately adjacent parts of Queensland and Western Australia.

**Content:** *Phryia australis* (Gray, 1845) (type species); *P. borroloola* (King, 1984); *P. ipsa* (Horner, 2005), *P. koira* (Horner, 2005); *P.*

*pamela* (King, 1982); *P. paulhorneri* sp. nov. (this paper); *P. robusta* (King, 1984).

#### GENUS PEROPUS WIEGMANN, 1835.

**Type species:** *Hemidactylus (Peropus) mutilata* Wiegmann, 1834.

**Diagnosis:** Geckos within the genus *Peropus* Wiegmann, 1835, type species *Hemidactylus (Peropus) mutilata* Wiegmann, 1834, are readily separated from all other species formerly included within *Gehyra sensu lato* as defined in this paper, by the following suite of characters: Digital lamellae are divided by a median groove; there is a fold of skin bordering the hind limb posteriorly; the inner pair of chin-shields are very large; rostral is quadrangular; 8 or 9 upper labials and 7 lower labials; tail normally has a sharpish lateral edge on each side.

**Distribution:** Christmas and Cocos (Keeling) Islands, (Indian Ocean) (*P. mutilata*), and Manoi and Vogelkop peninsula, West New Guinea (*P. leopardi*).

**Content:** *Peropus mutilata* (Wiegmann, 1834) (type species); *P. leopardi* (Brongersma, 1930).

#### GENUS PROPEMACULOSACOLOTES GEN. NOV.

**Type species:** *Peripia dubia* Macleay, 1877.

**Diagnosis:** Geckos within the genus *Propemaculosacolotes* gen. nov., type species *Peripia dubia* Macleay, 1877, are readily separated from all other species formerly included within *Gehyra sensu lato* by one or other of the following two suites of characters:

1/ The 9-11 subapical lamellae under the expanded part of the fourth toe may be divided or undivided; rostral scale is at most about 1.5 times wider than high, angular above, between the nostrils, by three internasal scales, two large outer and a small medial; slender tail that is distinctly depressed at the base; dorsal colouration is grey brown to grey to almost pale cream with or without darker blotches, variegations or marbling or scattered paler spots (*P. dubia*), or:

2/ The 7-8 subapical lamellae under the expanded part of the fourth toe are undivided or occasionally grooved; dorsal colouration is pale to dark grey above with a noticeable pattern consisting of a pair of dark brown zig-zag paravertebral stripes from the eye to the base of the tail, sometimes joined by a series of dark transverse bars resulting in a vertebral series of pale rhomboidal blotches. Head, flanks and limbs are speckled and streaked with dark brown; stocky in build (*P. catenata*).

**Distribution:** Most parts of Queensland, Australia, except the very far west, extending into North-west NSW near the Darling River.

**Etymology:** In Latin, *Propemaculosacolotes* means not quite blotched gecko.

**Content:** *Propemaculosacolotes dubia* (Macleay, 1877) (type species); *P. catenata* (Low, 1979).

#### GENUS CROCODILIVOLTUSCOLOTES GEN. NOV.

**Type species:** *Gehyra xenopus* Storr, 1978.

**Diagnosis:** Geckos within the genus *Crocodylivoltuscolotes* gen. nov., type species *Gehyra xenopus* Storr, 1978 are readily separated from all other species formerly included within *Gehyra sensu lato* by the following suite of characters: There is no cutaneous fold along the hind edge of the hindlimb; the original tail is round or moderately depressed at the base and lacks a sharply delineated denticular lateral edge on each side; basal subdigital lamellae are divided and each half is separated by a wedge-shaped series of small granules; nine or more supralabials, nine or more lamellae under the fourth toe; third and fourth toes lack webbing; body is robustly built with a long and pointed somewhat turned up snout and with large prominent eyes; maximum adult snout-vent length of more than 70 mm (*C. xenopus*, *C. shireenhoserae* sp. nov. (this paper), *C. marleneswileae* sp. nov. (this paper)).

**Distribution:** Known only from the northern Kimberley in north-west Western Australia.

**Etymology:** In Latin *Crocodylivoltuscolotes* means crocodile faced gecko.

**Content:** *Crocodylivoltuscolotes xenopus* (Storr, 1978); *C. shireenhoserae* sp. nov. (this paper); *C. marleneswileae* sp. nov. (this paper).

**GENUS EDAXCOLOTES GEN. NOV.**

**Type species:** *Gehyra vorax* Girard, 1858.

**Diagnosis:** Geckos within the genus *Edaxcolotes* gen. nov., type species *Gehyra vorax* Girard, 1858, are readily separated from all other species formerly included within *Gehyra sensu lato* by the following suite of characters: Undivided digital lamellae; 13 or 14 upper labials; digits webbed at the base; a strong fold of the skin bordering the fore limb anteriorly; 40 to 60 femoral pores; tail is round in structure at the base; dorsal colors are composed of black, shades of yellow, and any color in between, versus dull greys and shades of brown only (*E. vorax*, *E. georgpottthasti*, *E. rohan*).

*Edaxcolotes* gen. nov. is also subdivided into two subgenera. The nominate subgenus includes both *E. vorax* and *E. georgpottthasti*, while the subgenus *Macrocephalacolotes* subgen. nov. includes the species *E. rohan*.

*Macrocephalacolotes* subgen. nov. is separated from all other *Edaxcolotes* gen. nov. (being in the subgenus *Edaxcolotes* subgen. nov.) and all other *Gehyra sensu lato* by the following unique suite of characters: very large adult size (adult SVL 130-150 mm), large head (HW/SVL 0.18-0.22, HD/SVL 0.11-0.14), prominent skinfolds on the anterior forelimbs and posterior hind limbs, weak lateral fold, heterogeneous dorsal scalation consisting of large rounded scales bordered by numerous much smaller rounded or triangular scales, massive digital discs with high number of wide undivided subdigital lamellae (finger four 23-25, toe four 22-26) that are not deeply notched or divided, rostral with near horizontal dorsal edge and not deeply notched, preloacal and femoral pores in a moderately long single continuous chevron of up to at least 40 pores, original tail without lateral serrations, rounded at the base, but slightly compressed and with a prominent medial row of enlarged subcaudals and a prominent ring of orange scales around the eye in life (Oliver *et al.* 2016).

**Distribution:** Fiji and adjacent islands, New Caledonia (Loyalty Islands: Dudun Island), Vanuatu (Malakula), French Polynesia (Tuamotu, Fakarava), Territory of Papua New Guinea (Manus Island, Los Negros Island, Mussau Island).

**Etymology:** In Latin *Edaxcolotes* means gluttonous or voracious gecko.

**Content:** *Edaxcolotes vorax* (Girard, 1858) (type species); *E. georgpottthasti* (Flecks, Schmitz, Böhme, Henkel and Ineich, 2012); *E. rohan* (Oliver, Clegg, Fisher, Richards, Taylor and Jocque, 2016).

**SUBGENUS EDAXCOLOTES SUBGEN. NOV.**

**Type species:** *Gehyra vorax* Girard, 1858.

**Diagnosis:** See as for the nominate genus above.

**Distribution:** Fiji and adjacent islands, New Caledonia (Loyalty Islands: Dudun Island), Vanuatu (Malakula), French Polynesia (Tuamotu, Fakarava).

**Content:** *Edaxcolotes (Edaxcolotes) vorax* (Girard, 1858) (type species); *E. (Edaxcolotes) georgpottthasti* (Flecks, Schmitz, Böhme, Henkel and Ineich, 2012).

**SUBGENUS MACROCEPHALACOLOTES SUBGEN. NOV.**

**Type species:** *Gehyra rohan* Oliver *et al.* 2016.

**Diagnosis:** *Edaxcolotes* gen. nov. is subdivided into two subgenera. The nominate subgenus includes both *E. vorax* and *E. georgpottthasti*, while the subgenus *Macrocephalacolotes* subgen. nov. includes the species *E. rohan*.

*Macrocephalacolotes* subgen. nov. is separated from all other *Edaxcolotes* gen. nov. (being in the subgenus *Edaxcolotes* subgen. nov.) and all other *Gehyra sensu lato* by the following unique suite of characters: very large adult size (adult SVL 130-150 mm), large head (HW/SVL 0.18-0.22, HD/SVL 0.11-0.14), prominent skinfolds on the anterior forelimbs and posterior hind limbs, weak lateral fold, heterogeneous dorsal scalation consisting of large rounded scales bordered by numerous much smaller rounded or triangular scales, massive digital discs with high number of wide undivided subdigital lamellae (finger four 23-25, toe four 22-26) that are not deeply notched or divided, rostral with near horizontal dorsal edge and not deeply notched, preloacal and femoral pores in a moderately long

single continuous chevron of up to at least 40 pores, original tail without lateral serrations, rounded at the base, but slightly compressed and with a prominent medial row of enlarged subcaudals and a prominent ring of orange scales around the eye in life (Oliver *et al.* 2016).

Geckos within the genus *Edaxcolotes* gen. nov., type species *Gehyra vorax* Girard, 1858, are readily separated from all other species formerly included within *Gehyra sensu lato* by the following suite of characters: Undivided digital lamellae; 13 or 14 upper labials; digits webbed at the base; a strong fold of the skin bordering the fore limb anteriorly; 40 to 60 femoral pores; tail is round in structure at the base; dorsal colors are composed of black, shades of yellow, and any color in between, versus dull greys and shades of brown only (*E. vorax*, *E. georgpottthasti*, *E. rohan*).

**Distribution:** Territory of Papua New Guinea, specifically meaning Manus Island, Los Negros Island, Mussau Island.

**Etymology:** In Latin *Macrocephalacolotes* means large-headed gecko.

**Content:** *E. rohan* (Oliver, Clegg, Fisher, Richards, Taylor and Jocque, 2016).

**GENUS EXTENSUSDIGITUSCOLOTES GEN. NOV.**

**Type species:** *Gehyra membranacuralis* King and Horner, 1989.

**Diagnosis:** Geckos within the genus *Extensusedigituscolotes* gen. nov., type species *Gehyra membranacuralis* King and Horner, 1989, are readily separated from all other species formerly included within *Gehyra sensu lato* by the following suite of characters: A combination of undivided subdigital lamellae; adult snout-vent length of under 101 mm; no rudimentary webbing directly behind the knees and between the toes; no anterior and posterior skin folds on the forelimbs; a tail base that is round to ovoid in cross-section; no "U"-shaped rostral scale (*E. membranacuralis*, *E. sadlieri* sp. nov. (this paper), *E. glennsheai* sp. nov. (this paper)).

**Distribution:** Known only from the territory of Papua New Guinea, including on both sides of the main central cordillera and also one or more islands to the south-east, but within the legal territory of Papua New Guinea.

**Etymology:** In Latin *Extensusedigituscolotes* means enlarged toed gecko with reference to the enlarged section of the fourth digit of the toe.

**Content:** *Extensusedigituscolotes membranacuralis* (King and Horner, 1989); *E. sadlieri* sp. nov. (this paper); *E. glennsheai* sp. nov. (this paper).

**GENUS BREVICAUDACOLOTES GEN. NOV.**

**Type species:** *Hemidactylus baliolus* Duméril, 1851.

**Diagnosis:** Geckos within the genus *Brevicaudacolotes* gen. nov., type species *Hemidactylus baliolus* Duméril, 1851 are readily separated from all other species formerly included within *Gehyra sensu lato* by the following suite of characters: Digital lamellae are divided by a median groove; a fold of the skin borders the hind limb posteriorly; chin-shields are shorter; conical snout; cheeks not swollen; dorsal scales are larger, while those on the vertebral line are reduced in size; the rostral is horseshoe shaped; dorsally the colour is brown with lighter or reddish spots (*B. baliola*, *B. barea*).

**Distribution:** Southern New Guinea and Torres Strait Islands (*B. baliola* (Duméril, 1851)) and Banda Islands, Raja Ampat Archipelago, Salawati Island, Batanta Island (*B. barea* (Kopstein, 1926)).

**Etymology:** In Latin *Brevicaudacolotes* means short tailed gecko.

**Content:** *Brevicaudacolotes baliola* (Duméril, 1851) (type species); *B. barea* (Kopstein, 1926).

**GENUS PARVOMENTUMPARMACOLOTES GEN. NOV.**

**Type species:** *Hemidactylus (Peropus) brevipalmatus* Peters, 1874.

**Diagnosis:** Geckos within the genus *Parvomentumparmacolotes* gen. nov., type species *Hemidactylus (Peropus) brevipalmatus* Peters, 1874 are readily separated from all other species formerly included within *Gehyra sensu lato* by the following suite of characters: 14-15 digital lamellae under the fourth toes divided by

a median groove; webbing between the digits; a fold of the skin bordering the hind limb posteriorly; chin-shields smaller; 10 upper and 9 lower labials; tail without a lateral keel; noticeable very small ventral scales (*P. brevipalmata*, *P. papuana*, *P. interstitialis*).

**Distribution:** Palau Island and Irian Jaya.

**Etymology:** In Latin *Parvomentum**parmacolotes* means small chin shielded gecko.

**Content:** *Parvomentum**parmacolotes* *brevipalmata* (Peters, 1874) (type species); *P. papuana* (Meyer, 1874); *P. interstitialis* (Oudemans, 1894).

#### GENUS PAPUACOLOTES GEN. NOV.

**Type species:** *Gehyra serraticauda* Skipworth and Oliver, 2014.

**Diagnosis:** Geckos within the genus *Papuacolotes* *gen. nov.*, type species *Gehyra serraticauda* Skipworth and Oliver, 2014 are readily separated from all other species formerly included within *Gehyra sensu lato* by the following suite of characters: a unique continuous fringe of prominent acuminate lateral scales running the length of the tail, a feature shared with no other species in *Gehyra sensu lato*. The genus is also characterised as having a robust body of intermediate size, numerous internasals, partially divided digital scansors and the presence of well-developed popliteal folds further distinguish this taxon from similar species in the Papuan region (*P. serraticauda*).

**Distribution:** Known only from Indonesian West Papua (Irian Jaya).

**Etymology:** In Latin *Papuacolotes* means gecko from Papua, in reflection of the type locality and entire known distribution of the taxon.

**Content:** *Papuacolotes serraticauda* (Skipworth and Oliver, 2014).

#### GENUS QUATTUORUNGUISCOLOTES GEN. NOV.

**Type species:** *Peropus fehlmanni* Taylor, 1962.

**Diagnosis:** Geckos within the genus *Quattuorunguiscolotes* *gen. nov.*, type species *Peropus fehlmanni* Taylor, 1962 are readily separated from all other species formerly included within *Gehyra sensu lato* by the following suite of characters: Digital lamellae divided by a median groove; hind limb is without a cutaneous fold; digits free or with a very slight rudiment of web; scales a good deal smaller on the median line of the back than on the sides; male has about 20-40 femoral pores; rostral pentagonal; four chin-shields, the median pair are large and elongated, being narrowest posteriorly; the tail is rounded at the base and slightly depressed and with a median row of large scutellae inferiorly. Dorsally the colour is greyish brown, minutely speckled with black or white, especially on the flanks; the belly is whitish, (*Q. fehlmanni*, *Q. griseri* *sp. nov.* (this paper), *Q. insulensis*).

**Distribution:** Thailand, Cambodia, Vietnam, Cook Islands, Tonga, Micronesia.

**Etymology:** In Latin *Quattuorunguiscolotes* means four-clawed gecko.

**Content:** *Quattuorunguiscolotes fehlmanni* (Taylor, 1962) (type species); *Q. griseri* *sp. nov.* (this paper); *Q. insulensis* (Girard, 1858).

#### GENUS COLOTESMACULOSADORSUM GEN. NOV.

**Type species:** *Peropus laceratus* Taylor, 1962.

**Diagnosis:** Geckos within the genus *Colotesmaculosadorsum* *gen. nov.*, type species *Peropus laceratus* Taylor, 1962 are readily separated from all other species formerly included within *Gehyra sensu lato* by the following suite of characters: The subcaudal region has several series of small scales not transversely widened; 10 preanal pores on each side forming a continuous series, angular mesially, extending slightly on to the femora; dorsal surface and sides are grey. There are about 20 darker-grey spots on the head and scattered, larger grey spots on the back; belly is cream to whitish-yellow. The original tail is noticeably shorter than the body (*C. lacerata*).

**Distribution:** Thailand.

**Etymology:** In Latin *Colotesmaculosadorsum* means gecko with a spotted head, with reference to the spots usually seen on the head of the lizard.

**Content:** *Colotesmaculosadorsum lacerata* (Taylor, 1962) (monotypic).

#### GENUS THAIGEHYRA GEN. NOV.

**Type species:** *Peropus angusticaudatus* Taylor, 1963.

**Diagnosis:** Geckos within the genus *Thaigehyra* *gen. nov.*, type species *Peropus angusticaudatus* Taylor, 1963 are readily separated from all other species formerly included within *Gehyra sensu lato* by the following suite of characters: The tail is not significantly widened beyond the base behind the vent and is only slightly longer than the head and body, unflattened below and terminating in a very fine point; the scales on the dorsal surface are small, flat, cycloid and imbricating, with a slight lateral caudal fringe, not or scarcely denticulate, males have 15-18 femoral and preanal pores that are continuous and angular mesially; the dorsal colouration is almost uniformly grey with a slightly lighter head; the tail is a darker lavender colour; chin, throat and venter are yellowish-white (*T. angusticaudata*).

**Distribution:** South-east Thailand.

**Etymology:** The name in simple English means *Gehyra* from Thailand.

**Content:** *Thaigehyra angusticaudata* (Taylor, 1963) (monotypic).

#### GEHYRA HANGAYI SP. NOV.

**Holotype:** A preserved specimen at the Australian Museum in Sydney, NSW, Australia, specimen number: R.132307 collected from Sideia Mission, Sideia Island, Milne Bay District, Papua New Guinea,

Latitude 10.32 S., Longitude 150.4° E.

The Australian Museum in Sydney, NSW, Australia is a government-owned facility that allows access to its holdings.

**Diagnosis:** *Gehyra hangayi* *sp. nov.* is similar in most respects to *G. oceanica* (Lesson, 1830), which it would otherwise key out as, from which it is most readily differentiated by colouration, in that the tiny white spots on the nominate form of *G. oceanica* are not as prominent in *Gehyra hangayi* *sp. nov.* in that they are either faded or absent.

Furthermore the iris in *G. oceanica* is brownish at the front and orangeish at the back, versus generally orangeish yellow (all over) in *G. hangayi* *sp. nov.*

**Distribution:** Known only from the small islands immediately adjacent to the mainland of the south-east tip of Papua New Guinea as well as the immediately adjacent mainland at the south-east tip of Papua New Guinea.

**Conservation status:** No immediate threats are known to this taxon, but the relevant statements in Hoser (1991) apply.

**Etymology:** Named in honour of George (György) Hangay, of Frenchs Forest, NSW, Australia, formerly of the Australian Museum in Sydney in recognition of his monumental contribution towards the scientific research of beetles and other wildlife.

#### PHRYIA PAULHORNRI SP. NOV.

**Holotype:** A preserved specimen at the Northern Territory Museum, Darwin, Northern Territory, Australia, specimen number: R07378, collected from Castle Rock, Yingarrakarjiyamurrumanja, Groote Eylandt, Northern Territory, Australia, Latitude -14.12 S., Longitude 136.47 E.

The the Northern Territory Museum, Darwin, Northern Territory, Australia is a government-owned facility that allows access to its holdings.

**Paratypes:** 1/ A preserved specimen at the Northern Territory Museum, Darwin, Northern Territory, Australia, specimen number: R07484, collected from Ngurrwadarrinumanja, Groote Eylandt, Northern Territory, Australia, Latitude -13.98 S., Longitude 136.63 E.

2/ A preserved specimen at the Northern Territory Museum, Darwin, Northern Territory, Australia, specimen number: R07540, collected from Ayakamindadina, Groote Eylandt, Northern Territory, Australia, Latitude -13.97 S., Longitude 136.68 E.

**Diagnosis:** Until now this taxon had been treated as either "*Gehyra australis*" or more recently "*Gehyra pamela*" or "*Gehyra borrooloola*" by most herpetologists who sought to identify the species when caught. It is in fact most closely related to "*Gehyra*



*australis*", herein placed in the genus *Phryia* Gray, 1842 and would otherwise key out to that species if using the relevant key on pages 354-355 of Cogger (2014).

*Phryia paulhorneri* sp. nov. is separated from *P. australis* (Gray, 1845), by a yellowish-brown iris as opposed to orangeish yellow in *P. australis*. *Phryia paulhorneri* sp. nov. has faint thin dark cross-bands on the upper surface of the (original) tail, versus thin white ones in *P. australis*.

**Distribution:** Known only from Groote Eylandt, in the Northern Territory, Australia, where it is common throughout, especially in rocky situations.

**Conservation status:** No immediate threats are known to this taxon, but the relevant statements in Hoser (1991) apply.

**Etymology:** Named in honour of Paul Horner, of Darwin in the Northern Territory who has spent many years working on Australian reptiles including in particular skinks of the genus *Cryptoblepharus* Wiegmann, 1834.

#### **DACTYLOPERUS BRADMARYANI SP. NOV.**

**Holotype:** A preserved specimen in the Western Australian Museum, Perth, Western Australia, Australia, specimen number: WAM R125082, collected 15 km east of Newman in Western Australia, Australia, Latitude -23.37 S., Longitude 119.90 E.

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

**Paratype:** A preserved specimen in the Western Australian Museum, Perth, Western Australia, Australia, specimen number: WAM R165733, collected in the Mount Newman area of Western Australia, Australia, Latitude -23.31 S., Longitude 119.83 E.

**Diagnosis:** *Dactyloperus bradmaryani* sp. nov. would key out as "*Gehyra pilbara*" using the relevant key in Cogger (2014) on pages 354 and 355. However *D. bradmaryani* sp. nov. is readily separated from *D. pilbara* (Mitchell, 1965), by colouration and markings.

*D. pilbara* has a reasonably well defined dorsal pattern including dark spots and semi-broken cross-bands, formed by dense peppered (darker) pigment across the dorsum of the body. By contrast in *Dactyloperus bradmaryani* sp. nov. the spotting is either so reduced as to not indicate any cross-bands or if they are present, they are faded, indistinct and do not extend down the flanks.

The darker spots or blotches on the dorsum are however readily discernible.

Specimens from south of the Fortescue River, in the Pilbara region, Western Australia, previously referred to as "*Gehyra pilbara*", should now be referred to *Dactyloperus bradmaryani* sp. nov..

*D. pilbara*, is herein confined to the region generally north of the Fortescue River in the Pilbara of Western Australia.

The subspecies *Dactyloperus bradmaryani bulliardi* subsp. nov. from the Cape Range and immediately south of there on the West Australian coast, is readily separated from both *D. pilbara* and nominate *D. bradmaryani* sp. nov. by colouration and pattern.

In *D. bradmaryani bulliardi* subsp. nov. black spots or crossbands of any sort are effectively absent from the dorsum of the lizard.

The colour is a dark brick red and the only black colouration on the dorsum is limited amounts of peppering, but no obvious spots, blotches or stripes of any form.

Further separating *D. bradmaryani bulliardi* subsp. nov. from *D. pilbara* and the nominate *D. bradmaryani* sp. nov. subspecies are the distinctive labial bars not seen on the other two taxa. For both *D. pilbara* and the nominate *D. bradmaryani* sp. nov. subspecies labial markings are indistinct.

*D. bradmaryani bulliardi* subsp. nov. has a dark brown iris as opposed to bright orange to red in both *D. pilbara* and the nominate *D. bradmaryani* sp. nov. subspecies.

**Comments:** "*Gehyra cognata* Borner and Schuttler, 1982", is not an available name for the newly named taxon as it either refers to another taxon or alternatively and more likely is a synonym of *D. pilbara* or *D. punctata*.

"*Gehyra fenestra* Mitchell, 1965" is also an apparent synonym of *D. punctata* (Fry, 1914).

In any event, both *D. cognata* and *D. fenestra* holotypes as well as that for *D. pilbara* (Mitchell, 1965) and *D. punctata* all come from outside the known distribution range of *D. bradmaryani* sp. nov., in that all four come from north of Fortescue River drainage, which is the relevant biogeographical barrier for these species and the newly named one and where their ranges intersect and terminate.

**Distribution:** *D. bradmaryani* sp. nov. is found in the Pilbara region, south or east of the Fortescue River system. *D. pilbara* (Mitchell, 1965) occurs generally north of this dividing line in suitable rocky habitats and ranges.

*D. bradmaryani bulliardi* subsp. nov. is confined to the Cape Range area of Western Australia, including areas immediately south near the coast.

**Conservation status:** No immediate threats are known to this taxon, but the relevant statements in Hoser (1991) apply.

**Etymology:** Named in honour of Brad Maryan of the Western Australian Museum in Perth, Western Australia in recognition of services to herpetology (even though he sometimes keeps bad company).

#### **DACTYLOPERUS BRADMARYANI BULLIARDI SUBSP. NOV.**

**Holotype:** A preserved specimen in the Western Australian Museum, Perth, Western Australia, Australia, specimen number: WAM R130445, collected at Cape Range, National Park in Western Australia, Australia, Latitude -22.10 S., Longitude 114.00 E.

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

**Paratype:** A preserved specimen in the Western Australian Museum, Perth, Western Australia, Australia, specimen number: WAM R123947, collected at Cape Range, National Park, 10 km south of Exmouth in Western Australia, Australia, Latitude -22.00 S., Longitude 114.01 E.

**Diagnosis:** *Dactyloperus bradmaryani* sp. nov. would key out as "*Gehyra pilbara*" using the relevant key in Cogger (2014) on pages 354 and 355. However *D. bradmaryani* sp. nov. is readily separated from *D. pilbara* (Mitchell, 1965), by colouration and markings.

*D. pilbara* has a reasonably well defined dorsal pattern including dark spots and semi-broken cross-bands, formed by dense peppered (darker) pigment across the dorsum of the body. By contrast in *Dactyloperus bradmaryani* sp. nov. the spotting is either so reduced as to not indicate any cross-bands or if they are present, they are faded, indistinct and do not extend down the flanks.

The darker spots or blotches on the dorsum are however readily discernible.

Specimens from south of the Fortescue River, in the Pilbara region, Western Australia, previously referred to as "*Gehyra pilbara*", should now be referred to *Dactyloperus bradmaryani* sp. nov..

*D. pilbara*, is herein confined to the region generally north of the Fortescue River in the Pilbara of Western Australia.

The subspecies *Dactyloperus bradmaryani bulliardi* subsp. nov. from the Cape Range and immediately south of there on the West Australian coast, is readily separated from both *D. pilbara* and nominate *D. bradmaryani* sp. nov. by colouration and pattern.

In *D. bradmaryani bulliardi* subsp. nov. black spots or crossbands of any sort are effectively absent from the dorsum of the lizard. The colour is a dark brick red and the only black colouration on the dorsum is limited amounts of peppering, but no obvious spots, blotches or stripes of any form. The appearance of the lizard is simply a red colour.

Further separating *D. bradmaryani bulliardi* subsp. nov. from *D. pilbara* and the nominate *D. bradmaryani* sp. nov. subspecies are the distinctive labial bars not seen on the other two taxa. For both *D. pilbara* and the nominate *D. bradmaryani* sp. nov. subspecies labial markings are indistinct.

*D. bradmaryani bulliardii* subsp. nov. has a dark brown iris as opposed to bright orange to red in both *D. pilbara* and the nominate *D. bradmaryani* sp. nov. subspecies.

**Distribution:** *D. bradmaryani bulliardii* subsp. nov. is confined to the Cape Range area of Western Australia, including areas immediately south near the coast.

*D. bradmaryani* sp. nov. is found in the Pilbara region, south or east of the Fortescue River system. *D. pilbara* (Mitchell, 1965) occurs generally north of this dividing line in suitable rocky habitats and ranges.

**Conservation status:** No immediate threats are known to this taxon, but the relevant statements in Hoser (1991) apply.

**Etymology:** Named in honour of Kaj-erik Bulliard of Perth, Western Australia in recognition of services to herpetology (even though like Brad Maryan (see above), he sometimes keeps bad company).

#### **EXTENSUSDIGITUSCOLOTES SADLIERI SP. NOV.**

**Holotype:** A preserved specimen at the Australian Museum in Sydney, New South Wales, Australia, specimen number: R.135529, collected from between Sibilanga Mission and Asier Village, in Papua New Guinea, Latitude -3.45 S., Longitude 142.50 E.. The Australian Museum in Sydney, New South Wales, Australia allows access to its holdings.

**Diagnosis:** *Extensusedigituscolotes sadlieri* sp. nov. is similar in most respects to *E. membranacuralis* King and Horner, 1989, but is readily separated from *E. membranacuralis* by its darker greyish brown colouration as opposed to reddish or yellowish brown dorsal colouration in adults in *E. membranacuralis*.

*E. glennsheai* sp. nov. formally described below is separated from both preceding species by having a greenish-grey base colouration and a yellowish-green eye in life.

*Extensusedigituscolotes sadlieri* sp. nov. is also defined by a lack of an obvious contour around the eye.

All three species within the genus *Extensusedigituscolotes* gen. nov., namely the type species *Gehyra membranacuralis* King and Horner, 1989, *E. sadlieri* sp. nov. and *E. glennsheai* sp. nov., are readily separated from all other species formerly included within *Gehyra sensu lato* by the following suite of characters: A combination of undivided subdigital lamellae; adult snout-vent length of under 101 mm; no rudimentary webbing directly behind the knees and between the toes; no anterior and posterior skin folds on the forelimbs; a tail base that is round to ovoid in cross-section and no "U"-shaped rostral scale.

**Distribution:** *Extensusedigituscolotes sadlieri* sp. nov. is found north of the main Cordillera in Papua New Guinea, west of the Huon Peninsula. *E. membranacuralis* is found generally south of the main Cordillera and potentially as far west in the north at the Huon Peninsula.

*E. glennsheai* sp. nov. is so far as is known, restricted to Sudest Island, PNG.

**Conservation status:** In common with most reptile species in south-east Asian and Pacific realm, the various effects of human overpopulation in the region may pose a real existential threat to this taxon, including so-called invisible threats such as pathogens, potential competing species introduced to the area this species inhabits and so on.

**Etymology:** Named in honour of Ross Sadlier, formerly collections manager at the Australian Museum in Sydney, NSW, Australia, in recognition of his services to herpetology spanning some decades.

#### **EXTENSUSDIGITUSCOLOTES GLENNSHEAI SP. NOV.**

**Holotype:** A preserved specimen at the Bernice P. Bishop Museum, Honolulu, Hawaii, USA, specimen number: BPBM 19756, collected from Sofuwo Mission, Sudest Island, Papua New Guinea, Latitude -11.32 S., Longitude 153.23 E. The Bernice P. Bishop Museum, Honolulu, Hawaii, USA, allows access to its holdings.

**Paratype:** A preserved specimen at the Bernice P. Bishop Museum, Honolulu, Hawaii, USA, specimen number: BPBM 19772, collected from near Araeda, Sudest Island, Papua New Guinea, Latitude -11.43 S., Longitude 153.42 E.

**Diagnosis:** *Extensusedigituscolotes glennsheai* sp. nov. has until

now been erroneously referred to "*Gehyra vorax*" or "*Gehyra mutilata*", by collectors of specimens.

However this newly described taxon is neither and in fact should be referred to the genus *Extensusedigituscolotes* as described within this paper.

*Extensusedigituscolotes glennsheai* sp. nov. is most readily separated from both *E. membranacuralis* and *E. sadlieri* sp. nov. by its adult dorsal colouration, this being essentially a greenish-grey base colouration including a yellowish-green eye in life, versus reddish or yellowish brown dorsal colouration in adults of *E. membranacuralis* or greyish brown in adults of *Extensusedigituscolotes sadlieri* sp. nov..

**Distribution:** *E. glennsheai* sp. nov. is so far as is known, restricted to Sudest Island, PNG.

*Extensusedigituscolotes sadlieri* sp. nov. is found north of the main Cordillera in Papua New Guinea, west of the Huon Peninsula. *E. membranacuralis* is found generally south of the main Cordillera and potentially as far west in the north at the Huon Peninsula.

**Conservation status:** In common with most reptile species in south-east Asian and Pacific realm, the various effects of human overpopulation in the region may pose a real existential threat to this taxon, including so-called invisible threats such as pathogens, potential competing species introduced to the area this species lives and the like.

**Etymology:** Named in honour of Glenn Shea of Sydney, NSW, Australia in recognition of his significant contributions to herpetology spanning some decades.

#### **CROCODILIVOLTUSCOLOTES SHIREENHOSERAE SP. NOV.**

**Holotype:** A preserved female specimen in the Western Australian Museum, Perth, Western Australia, Australia, specimen number: WAM R167808, collected at Surveyor's Pool, (Mitchell Plateau), Western Australia, Australia, Latitude -14.67 S., Longitude 125.73 E.

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

**Paratype:** A preserved specimen in the Western Australian Museum, Perth, Western Australia, Australia, specimen number: WAM R167807, collected at Surveyor's Pool, (Mitchell Plateau), Western Australia, Australia, Latitude -14.67 S., Longitude 125.73 E.

**Diagnosis:** *Crocodylivotuscolotes shireenhoserae* sp. nov. is readily separated from the other two species in the genus, *C. xenopus* (Storr, 1978) and *C. marleneswileae* sp. nov. by colouration.

*C. shireenhoserae* sp. nov. has a distinctive purplish yellow to purplish white colouration on the dorsal surface, versus brownish in *C. xenopus* and purplish yellow-brown in *C. marleneswileae* sp. nov..

Original tails of *C. xenopus* lack peppering on the yellow cross-bands on the anterior half, whereas the anterior yellow bands on the tails in *C. shireenhoserae* sp. nov. are faded and indistinct, while the same bands in *C. marleneswileae* sp. nov. while being fairly distinct and obvious differ in that they are irregular in shape and also have significant peppering.

White spotting at the back of each eye is indistinct in *C. xenopus* and *C. shireenhoserae* sp. nov. but are large, bright and prominent in *C. marleneswileae* sp. nov.. The shape of the somewhat faded large light grey to yellow-brown spots on the top of the back are distinct and well defined in both *C. xenopus* and *C. shireenhoserae* sp. nov., whereas the edges are faded and indistinct in *C. marleneswileae* sp. nov..

There are well-defined but faded large pale spots running along the sides of the mid flanks in *C. xenopus*. These are faded in *C. shireenhoserae* sp. nov. and absent in *C. marleneswileae* sp. nov.. *C. xenopus* has a dark orangeish red iris, versus light orangeish yellow in *C. shireenhoserae* sp. nov. and light orange in *C. marleneswileae* sp. nov..

*C. xenopus* has distinctive tiny white spots on the back of the head. In *C. shireenhoserae* sp. nov. any such spots, if present are very

scattered, faded and generally indistinct, or otherwise absent. In *C. marleneswileae* sp. nov. the back of the head is characterised by large areas of white on the darker background, but not forming any particular shape or spots.

*C. xenopus* has indistinct black spots or marks between the eye and the ear on each side. These are absent in both *C. shireenhoserae* sp. nov. and *C. marleneswileae* sp. nov..

The morphologically similar species *Dactyloperus (Wedgedigitcolotes) spheniscus* (Doughty, Palmer, Siström, Bauer and Donnellan, 2012) is readily separated from all three *Crocodyliivoltuscolotes* gen. nov. species by having a distinctive dorsal pattern comprising transverse rows of dark and light spots or lines on a dull reddish-brown background.

**Distribution:** *Crocodyliivoltuscolotes shireenhoserae* sp. nov. is known only from the Mitchell Plateau area in the Kimberley division of Western Australia, Australia. *C. xenopus* (Storr, 1978) is found to the north-east of here near the King Edward River in the north Kimberley. *C. marleneswileae* sp. nov. is found further south in the area of the Prince Regent River Nature Reserve in the south-west Kimberley.

**Conservation status:** No immediate threats are known to this taxon, but the relevant statements in Hoser (1991) apply.

**Etymology:** Named in honour of my magnificent wife Shireen Hoser in recognition of her many contributions to wildlife conservation spanning some decades.

**CROCODYLIVOLTUSCOLOTES MARLENESWILEAE SP. NOV.**

**Holotype:** A preserved specimen in the Western Australian Museum, Perth, Western Australia, Australia, specimen number: WAM R168051, collected at the Prince Regent River Nature Reserve, Western Australia, Australia, Latitude -15.75 S., Longitude 125.37 E.

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

**Holotype:** A preserved specimen in the Western Australian Museum, Perth, Western Australia, Australia, specimen number: WAM R168052, collected at the Prince Regent River Nature Reserve, Western Australia, Australia, Latitude -15.75 S., Longitude 125.37 E.

**Diagnosis:** *Crocodyliivoltuscolotes marleneswileae* sp. nov. is readily separated from the other two species in the genus, *C. xenopus* (Storr, 1978) and *C. marleneswileae* sp. nov. by colouration.

*C. shireenhoserae* sp. nov. has a distinctive purplish yellow to purplish white colouration on the dorsal surface, versus brownish in *C. xenopus* and purplish yellow-brown in *C. marleneswileae* sp. nov..

Original tails of *C. xenopus* lack peppering on the yellow cross-bands on the anterior half, whereas the anterior yellow bands on the tails in *C. shireenhoserae* sp. nov. are faded and indistinct, while the same bands in *C. marleneswileae* sp. nov. while being fairly distinct and obvious differ in that they are irregular in shape and also have significant peppering.

White spotting at the back of each eye is indistinct in *C. xenopus* and *C. shireenhoserae* sp. nov. but are large bright and prominent in *C. marleneswileae* sp. nov.. The shape of the somewhat faded large light grey to yellow-brown spots on the upper surface of the back is distinct and well defined in both *C. xenopus* and *C. shireenhoserae* sp. nov., whereas the edges are faded and indistinct in *C. marleneswileae* sp. nov..

There are well-defined but faded large pale spots running along the sides of the mid flanks in *C. xenopus*. These are faded in *C. shireenhoserae* sp. nov. and absent in *C. marleneswileae* sp. nov..

*C. xenopus* has a dark orangeish red iris, versus light orangeish yellow in *C. shireenhoserae* sp. nov. and light orange in *C. marleneswileae* sp. nov..

*C. xenopus* has distinctive tiny white spots on the back of the head. In *C. shireenhoserae* sp. nov. any such spots, if present are very scattered, faded and generally indistinct, or otherwise absent. In *C. marleneswileae* sp. nov. the back of the head is characterised by

large areas of white on the darker background, but not forming any particular shape or spots.

*C. xenopus* has indistinct black spots or marks between the eye and the ear on each side. These are absent in both *C. shireenhoserae* sp. nov. and *C. marleneswileae* sp. nov..

The morphologically similar species *Dactyloperus (Wedgedigitcolotes) spheniscus* (Doughty, Palmer, Siström, Bauer and Donnellan, 2012) is readily separated from all three *Crocodyliivoltuscolotes* gen. nov. species by having a distinctive dorsal pattern comprising transverse rows of dark and light spots or lines on a dull reddish-brown background.

**Distribution:** *Crocodyliivoltuscolotes marleneswileae* sp. nov. is found in the area of the Prince Regent River Nature Reserve in the south-west Kimberley. *C. shireenhoserae* sp. nov. is known only from the Mitchell Plateau area in the west Kimberley division of Western Australia, Australia. *C. xenopus* (Storr, 1978) is found to the north-east of here near the King Edward River in the north Kimberley.

**Conservation status:** No immediate threats are known to this taxon, but the relevant statements in Hoser (1991) apply.

**Etymology:** Named in honour of the mother of my magnificent wife Shireen Hoser, Marlene Swile, in recognition of her contributions to wildlife conservation and scientific research in untamed parts of southern Africa.

**DACTYLOPERUS (WEDGEDIGITCOLOTES) SPHENISCUS GRAEMECAMPBELLI SUBSP. NOV.**

**Holotype:** A preserved specimen in the Western Australian Museum, Perth, Western Australia, Australia, specimen number: WAM R167810, collected at Surveyor's Pool, Mitchell Plateau, West Kimberley, Western Australia, Australia, Latitude -14.67 S., Longitude 125.73 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 in the Western Australian Museum, Perth, Western Australia, Australia, specimen number: WAM R138898, collected 4.1 km south of Donkins Hill, West Kimberley, Western Australia, Australia, Latitude -14.99 S., Longitude 125.51 E.

2/ A preserved juvenile specimen in the Western Australian Museum, Perth, Western Australia, Australia, specimen number: WAM R168715, collected at Katers Island, West Kimberley, Western Australia, Australia, Latitude -14.47 S., Longitude 125.53 E.

**Diagnosis:** *Dactyloperus (Wedgedigitcolotes) spheniscus graemecampbelli* subsp. nov. is readily separated from *D. spheniscus spheniscus* (Doughty, Palmer, Siström, Bauer and Donnellan, 2012) by having a light orange iris versus yellow to yellowish orange in *D. spheniscus spheniscus*.

While both taxa have numerous white specks on the upper surfaces of the body, these are significantly more numerous and prominent in *D. spheniscus spheniscus*.

*D. spheniscus graemecampbelli* subsp. nov. and *D. spheniscus spheniscus* are both characterised by semi-distinct darker spots and markings tending towards indistinct crossbands on the body. In *D. spheniscus graemecampbelli* subsp. nov. this usually numbers six, versus 7-8 in *D. spheniscus spheniscus*.

*D. spheniscus graemecampbelli* subsp. nov. is characterised by the presence of well-defined dark brown spots on the side and back of the head, including immediately behind the eye, these tending to coalesce to form larger spots or broken bar-like markings. These same markings are either indistinct, significantly reduced or absent in *D. spheniscus spheniscus*.

**Distribution:** *Dactyloperus (Wedgedigitcolotes) spheniscus graemecampbelli* subsp. nov. is restricted to the Mitchell Plateau and immediately surrounding parts of the Kimberley Ranges in Western Australia, Australia. In the region of the Prince Regent National Park, the nominate form of *D. spheniscus spheniscus* (Doughty, Palmer, Siström, Bauer and Donnellan, 2012) occurs.

**Conservation status:** No immediate threats are known to this



taxon, but the relevant statements in Hoser (1991) apply.

**Etmology:** Named in honour of former Australian politician Graeme Campbell, of Western Australia, and member of the House of Representatives from 1980-1998 in recognition of his services to Australia in numerous fields including wildlife conservation, human rights, combating corruption at various levels of government and his skills with economic management.

**DACTYLOPERUS (MACULOCOLOTES)  
FEDERICOROSSIGNOLII SP. NOV.**

**Holotype:** A preserved specimen in the Western Australian Museum, Perth, Western Australia, Australia, specimen number: WAM R146018, collected at the Kimbolton Homestead, Western Australia, Australia, Latitude -16.68 S., Longitude 123.83 E. The Western Australian Museum, Perth, Western Australia, Australia is a government-owned facility that allows access to its holdings.

**Paratype:** A preserved specimen in the Western Australian Museum, Perth, Western Australia, Australia, specimen number: WAM R172076, collected on the north-west of Molema Island, Western Australia, Australia, Latitude -16.25 S., Longitude 123.82 E.

**Diagnosis:** *Dactyloperus federicorossignolii* sp. nov. has until now been treated as a population of *D. occidentalis* (King, 1984), as described in Doughty *et al.* (2012) and would key out as this species using the relevant key in Cogger (2014) at pages 354 to 355. However it is readily separated from that allopatric taxon by dorsal colour that is without a reddish hue and has limited indistinct white spots, which are effectively absent in *D. occidentalis*. The iris of *D. federicorossignolii* sp. nov. is yellowish, versus orangeish yellow in *D. occidentalis*.

*D. federicorossignolii* sp. nov. has less than 40 preloacal and femoral pores in adult males, which readily separates it from the morphologically similar species *D. multiprosa* (Doughty *et al.* 2012).

**Distribution:** *Dactyloperus federicorossignolii* sp. nov. is known only from the Yampi Peninsula area of Western Australia.

**Conservation status:** No immediate threats are known to this taxon, but the relevant statements in Hoser (1991) apply.

**Etmology:** Named in honour of Federico Rossignoli (better known as "Fred Rossignoli") of Hurstbridge, Victoria, Australia, formerly of North Ringwood, Victoria, in recognition of his services to herpetology and wildlife conservation spanning some decades.

**QUATTUORUNGUISCOLOTES GRISMERI SP. NOV.**

**Holotype:** A preserved sub-adult female specimen at the Department of Biology, La Sierra University, (USA) Herpetology Collection, specimen number: 7376, collected in the North-eastern Cardamoms in Cambodia. This specimen is also shown in life in Grismer *et al.* (2007) at page 736 at Fig. 25.

**Paratypes:** Two other preserved specimens collected from the same general location as the holotype also held at the Department of Biology, La Sierra University, Herpetology Collection, specimen numbers: 7379 and 7392.

**Diagnosis:** *Quattuorunguiscolotes grismeri* sp. nov. is clearly related to *Q. fehlmanni* (Taylor, 1962), which it would ordinarily key out to and was by Grismer *et al.* (2007) as outlined by those authors in their paper.

However *Q. grismeri* sp. nov. is readily separated from *Q. fehlmanni* by the following suite of characters: the scales on the snout are granular as opposed to being subimbricate in *Q. fehlmanni*; the subcaudal scales at the base of the tail are not enlarged; the femoropreanal pore series extends nearly the entire length of the femurs, as opposed to just one-half their lengths and is composed of 37, rather than 22 pores; the seventh, eighth, or ninth supralabial is below the pupil, as opposed to only the seventh; and the fifth, sixth, or seventh infralabial is below the pupil as opposed to only the seventh; and the presence of smaller but distinctive yellowish-white spots on the flanks behind and around the larger darker brown spots, the light spots being more numerous than the larger dark ones (adapted from Grismer *et al.* 2007).

**Distribution:** *Q. grismeri* sp. nov. is known only from the type series collected at the north-east Cardamom Mountains in Cambodia and is presumed to be restricted to this region.

*Q. fehlmanni* is believed to be confined to the hilly area near the type locality on the west side of Bangkok, Thailand.

**Conservation status:** In common with most reptile species in south-east Asia, the various effects of human overpopulation in the region may pose a real existential threat to this taxon, including so-called invisible threats such as pathogens, potential competing species introduced to the area and the like.

**Etmology:** Named in honour of Larry Lee Grismer of La Sierra University, USA in recognition of his significant contributions to herpetology over many decades.

**REFERENCES CITED**

- Andersson, L. G. 1913. On a small collection of reptiles and batrachians from German New Guinea and some other herpetological notes. *Jahrb. nassau. Verein Naturk.* 66:67-79.
- Bagaturov *et al.* 2018. Facebook page titled: "Herpetological taxonomy, phylogeny and systematics", online at: <https://www.facebook.com/Herptaxo/> downloaded on 16 June 2018.
- Barbour, T. 1912. A Contribution to the Zoögeography of the East Indian Islands. *Memoirs of the Museum of Comparative Zoölogy* 44(1):1-203.
- Bauer, A. M. 1994. Liste der rezenten Amphibien und Reptilien: Gekkonidae I (Australia). *Das Tierreich*, Vol. 108, W. de Gruyter and Co. (Berlin).
- Bauer, A. M. and Günther, R. 1991. An annotated type catalogue of the gekkos (Reptilia: Gekkonidae) in the Zoological Museum, Berlin. *Mitt. Zool. Mus. Berlin* 67:279-310.
- Beckon, W. N. 1992. The giant Pacific gekkos of the genus *Gehyra*: morphological variation, distribution, and biogeography. *Copeia*, 1992:443-460.
- Bobrov, V. V. and Semenov, D. V. 2008. *Lizards of Vietnam* [in Russian]. Moscow:236 pp.
- Boettger, O. 1895. Liste der Amphibien und Batrachier des Insel Halmaheira nach den Sammlungen Prof. Dr. W. Kükenthal's. *Zool. Anz.* 18:116-121,129-138.
- Bonetti, M. 2002. 100 *Sauri*. Mondadori (Milano):192 pp.
- Börner, A. R. and B. Schüttler. 1982. Notes on the Australian lizard genera *Gehyra*, *Hemidactylus* and *Heteronotia* (Gekkonidae). *Miscellaneous Articles in Saurology* (10):1-17.
- Börner, A. R. and Schüttler, B. I. 1983. An additional note on the Australian gekkos of the genus *Gehyra*. *Miscellaneous Articles in Saurology* 12:1-4.
- Boulenger, G. A. 1883. On the gekkos of New Calendonía. *Proc. Zool. Soc. London* 1883:116-130.
- Boulenger, G. A. 1885a. *Catalogue of the Lizards in the British Museum (Nat. Hist.) I. Geckonidae, Eublepharidae, Uroplatidae, Pygopodidae, Agamidae*. London: 450 pp.
- Boulenger, G. A. 1885b. *Catalogue of the Lizards in the British Museum (Natural History) Volume II. Iguanidae, Xenosauridae, Zonuridae, Anguillidae, Anniellidae, Helodermatidae, Varanidae, Xantusidae, Teiidae, Amphisbaenidae*. Taylor and Francis, London, UK.
- Boulenger, G. A. 1887. Remarks on Dr. A. Strauch's catalogue of gekkos in the Zoological Museum of the Imperial Academy of St Petersburg. *Annals and Magazine of Natural History*, 5(19):383-388.
- Bourke, G., Pratt, R. C., Vanderduys, E. and Moritz, C. 2017. Systematics of a small *Gehyra* (Squamata: Gekkonidae) from the Einasleigh Uplands, Queensland: description of a new range restricted species. *Zootaxa* (online) 4231(1):85-99.
- Brongersma, L. D. 1930. Sur un Gekkonidae nouveau. *Gehyra leopoldi* nov. sp., de la Nouvelle Guinée. *Bull. Mus. Roy. Hist. nat. Belg.* 6(11):1-3.
- Brongersma, L. D. 1948. Lizards from the island of Morotai (Moluccas). *Proc. Koninkl. Ned. Akad. Wet. Ser. C.* 51:486-495.
- Brown, D. 2014. *A guide to ... Australian Lizards in Captivity*. Reptile Publications, Tweed Heads, NSW, Australia:952 pp.

- Brown, W. C. 1955. A collection of lizards from Emirau Island (Saint Matthias Group). *The Silliman Journal*, 2:87-92.
- Brown, R. M., Siler, C. D., Richards, S. J., Diesmos, A. C. and Cannatella, D. C. 2015. Multilocus phylogeny and a new classification for Southeast Asian and Melanesian forest frogs (family Ceratobatrachidae). *Zoological Journal of the Linnean Society*, 174:130-168.
- Buden, D. W. and Taboroši, D. 2016. *Reptiles of the Federated States of Micronesia*. Island Research and Education Initiative:311 pp.
- Chan-ard, T., Grossmann, W., Gumprecht, A. and Schulz, K. D. 1999. *Amphibians and reptiles of peninsular Malaysia and Thailand - an illustrated checklist* [bilingual English and German]. Bushmaster Publications, Würselen, Germany:240 pp.
- Chan-ard, T., Parr, J. W. K. and Nabhitabhata, J. 2015. *A field guide to the reptiles of Thailand*. Oxford University Press, NY:352 pp.
- Chrapliwy, P. S., Smith, H. M. and Grant, C. 1961. Systematic status of the geckonid lizard genera *Gehyra*, *Peropus*, *Hoplodactylus* and *Naultinus*. *Herpetologica* 17:5-12.
- Cogger, H. G. 2014. *Reptiles and Amphibians of Australia* (Seventh edition), CSIRO. Sydney, Australia:1064 pp.
- Cogger, H. G., Cameron, E. E. and Cogger, H. M. 1983. *Zoological Catalogue of Australia, Volume 1: Amphibia and Reptilia*. Australian Government Publishing Service, Canberra, ACT:313 pp.
- Court of Appeal Victoria. 2014. *Hoser v Department of Sustainability and Environment* [2014] VSCA 206 (5 September 2014).
- Crombie, R. I. and Pregill, G. K. 1999. A Checklist of the Herpetofauna of the Palau Islands (Republic of Belau), Oceania. *Herpetological Monographs* 13:29-80.
- Daan, S. and Hillenius, D. 1966. Catalogue of the type specimens of amphibians and reptiles in the Zoological Museum, Amsterdam. *Beaufortia* 13:117-144.
- Davies, H. L. 2012. The geology of New Guinea - the cordilleran margin of the Australian continent. *Episodes*, 35:87-102.
- de Rooij, N. de 1915. *The Reptiles of the Indo-Australian Archipelago. I. Lacertilia, Chelonia, Emydosauria*. Leiden (E. J. Brill), xiv+384 pp.
- de Vis, C. W. 1890. Descriptions of two lizards of genera new to Australian Herpetology. *Proceedings of the Linnean Society of New South Wales*, 4:1034-1036 [1889].
- Doody, J. S., Ellis, R. and Rhind, D. 2015. *Gehyra australis* (tree dtella) and *Gehyra pilbara* (Pilbara dtella) environmentally cued hatching. *Herpetological Review* 46(2):257-258.
- Doughty, P., Palmer, R., Siström, M. J., Bauer, A. M. and Donnellan, S. C. 2012. Two new species of *Gehyra* (Squamata: Gekkonidae) geckos from the north-west Kimberley region of Western Australia. *Records of the Western Australian Museum*, 27:117-134.
- Duméril, A. M. C. and Bibron, G. 1836. *Erpetologie Générale ou Histoire Naturelle Complète des Reptiles*. Vol. 3. Libr. Encyclopédique Roret, Paris:528 pp.
- Duméril, C. and Duméril, A. 1851. *Muséum d'Histoire Naturelle de Paris Catalogue méthodique de la collection des reptiles*. Gide et Baudry, Paris:224 pp.
- Ezaz, T., Sarre, S. D., O'Meally, D., Graves, J. A. and Georges, A. 2009. Sex Chromosome Evolution in Lizards: Independent Origins and Rapid Transitions. *Cytogenet. Genome Res.* 127:249-260.
- Fallend, S. 2007. Auf Geckosuche in Australien. *Draco* 8(29):78-84.
- Fisher, R. 1997. Dispersal and evolution of the Pacific Basin gekkonid lizards *Gehyra oceanica* and *Gehyra mutilata*. *Evolution*, 51:906-921.
- Fitzinger, L. 1843. *Systema Reptilium, fasciculus primus, Amblyglossae*. Braumüller et Seidel, Wien: 106 pp.
- Flecks, M., Schmitz, A., Böhme, W., Henkel, F. W. and Ineich, I. 2012. A new species of *Gehyra* Gray, 1834 (Squamata, Gekkonidae) from the Loyalty Islands and Vanuatu, and phylogenetic relationships in the genus *Gehyra* in Melanesia. *Zoosystema*, 34:203-221.
- Fry, D. B. 1914. On a collection of reptiles and batrachians from Western Australia. *Records of the Western Australian Museum* 1:174-210
- Garman, S. 1901. Some reptiles and batrachians from Australasia. *Bull. Mus. Comp. Zool. Harvard* 39:1-14.
- Gibbons, J. R. H. and Clunie, F. 1984. Brief notes on the voracious gecko, *Gehyra vorax*. *Domodomo*, 2:34-36.
- Girard, C. 1858. Descriptions of some new Reptiles, collected by the United States Exploring Expedition, under the command of Capt. Charles Wilkes, U.S.N. Fourth Part. - Including the species of Saurians, exotic to North America, *Proceedings of the Academy of Natural Sciences of Philadelphia*, 9:195-199.
- Glauert, L. 1955. Herpetological Miscellanea. V. Western Australian geckoes. *Western Australian Naturalist* 4:174-184.
- Goldberg, S. R. 2014. *Gehyra lacerata* (Kanchanaburi four-clawed gecko) reproduction. *Herpetological Review* 45(3):496.
- Gray, J. E. 1834. Characters of two new genera of reptiles (*Geoemyda* and *Gehyra*). *Proc. Zool. Soc. London* 1834:99-100.
- Gray, J. E. 1842a. Description of some hitherto unrecorded species of Australian reptiles and batrachians. *Zoological Miscellany* 2: 51-57 (London: Treuttel, Würtz and Co.).
- Gray, J. E. 1842b. Description of some new species of Reptiles, chiefly from the British Museum collection. *Zoological Miscellany* 2: 57-59.
- Gray, J. E. 1845. *Catalogue of the specimens of lizards in the collection of the British Museum*. Trustees of die British Museum/ Edward Newman, London: xxvii+289 pp.
- Grismer, L. L., Chav, T., Neang, T., Wood, P. L. jr., Grismer, J. L., Youmans, T. M., Ponce, A., Daltry, J. C. and Kaiser, H. 2007. The herpetofauna of the Phnom Aural Wildlife Sanctuary and Checklist of the Herpetofauna of the Cardamom Mountains, Cambodia. *Hamadryad* 31(2):216-241.
- Günther, A. 1877. Descriptions of three new species of lizards from Islands of Torres Straits. *Ann. Mag. nat. Hist.* (4)19:413-415.
- Hagey, T. J., Harte, S., Vickers, M., Harmon, L. J. and Schwarzkopf, L. 2017. There's more than one way to climb a tree: Limb length and microhabitat use in lizards with toe pads. *PLoS ONE* 12(9):e0184641.
- Hall, R. 2002. Cenozoic geological and plate tectonic evolution of SE Asia and the SW Pacific: computer-based reconstructions, model and animations. *Journal of Asian Earth Sciences*, 20:353-431.
- Hediger, H. 1933. Über die von Herrn Dr. A. Bühler auf der Admiralitäts-Gruppe und eingien benachbarten Inseln gesammelten Reptilien und Amphibien. *Verhandlungen der Naturforschenden Gesellschaft in Basel*, 44:1-25.
- Heinicke, M. P., Greenbaum, E., Jackman, T. R. and Bauer, A. M. 2011. Phylogeny of a trans-Wallacean radiation (Squamata, Gekkonidae, *Gehyra*) supports a single early colonization of Australia. *Zoologica Scripta*, 40:584-602.
- Horner, P. 2005. *Gehyra koira* sp. nov. (Reptilia: Gekkonidae), a new species of lizard with two allopatric subspecies from the Ord-Victoria region of north-western Australia and a key to the *Gehyra australis* species complex. *The Beagle* 21:165-174.
- Hoser, R. T. 1989. *Australian Reptiles and Frogs*. Pierson and Co., Mosman, NSW, 2088, Australia:238 pp.
- Hoser, R. T. 1991. *Endangered Animals of Australia*. Pierson Publishing, Mosman, NSW, 2088, Australia:240 pp.
- Hoser, R. T. 1993. *Smuggled: The Underground Trade in Australia's Wildlife*. Apollo Publishing, Moss Vale, NSW, Australia:160 pp.
- Hoser, R. T. 1996. *Smuggled-2: Wildlife Trafficking, Crime and Corruption in Australia*. Kotabi Publishing. Doncaster, Victoria, Australia:280 pp.
- Hoser, R. T. 1999a. *Victoria Police Corruption: The book the Victoria Police don't want you to read!* Kotabi Publishing, Doncaster, Victoria, 3108, Australia:736 pp.

- Hoser, R. T. 1999b. *Victoria Police Corruption-2: Including what the media didn't tell you!* Kotabi Publishing, Doncaster, Victoria, 3108, Australia:736 pp.
- Hoser, R. T. 2000a. *Taxi: Indecent Exposures*. Kotabi Publishing, Doncaster, Victoria, 3108, Australia:520 pp.
- Hoser, R. T. 2000b. *Taxi-2: More Indecent Exposures*. Kotabi Publishing, Doncaster, Victoria, 3108, Australia:504 pp.
- Hoser, R. T. 2007. Wells and Wellington - It's time to bury the hatchet. *Calodema* (Supplementary Paper) 1:1-9.
- Hoser, R. T. 2015a. Dealing with the "truth haters" ... a summary! Introduction to Issues 25 and 26 of *Australasian Journal of Herpetology*. Including "A timeline of relevant key publishing and other events relevant to Wolfgang Wüster and his gang of thieves." and a "Synonyms list". *Australasian Journal of Herpetology* 25:3-13.
- Hoser, R. T. 2015b. The Wüster gang and their proposed "Taxon Filter": How they are knowingly publishing false information, recklessly engaging in taxonomic vandalism and directly attacking the rules and stability of zoological nomenclature. *Australasian Journal of Herpetology* 25:14-38.
- Hoser, R. T. 2015c. Best Practices in herpetology: Hinrich Kaiser's claims are unsubstantiated. *Australasian Journal of Herpetology* 25:39-52.
- Hoser, R. T. 2015d. Comments on *Spracklandus* Hoser, 2009 (Reptilia, Serpentes, ELAPIDAE): request for confirmation of the availability of the generic name and for the nomenclatural validation of the journal in which it was published (Case 3601; see *BZN* 70: 234-237; comments *BZN* 71:30-38, 133-135). (unedited version) *Australasian Journal of Herpetology* 27:37-42.
- Hoser, R. T. 2015e. PRINO (Peer reviewed in name only) journals: When quality control in scientific publication fails. *Australasian Journal of Herpetology* 26:3-64.
- Hoser, R. T. 2015f. Rhodin *et al.* 2015, Yet more lies, misrepresentations and falsehoods by a band of thieves intent on stealing credit for the scientific works of others. *Australasian Journal of Herpetology* 27:3-36.
- Hutchinson, M. N., Siström, M. J., Donnellan, S. C. and Hutchinson, R. G. 2014. Taxonomic revision of the Australian arid zone lizards *Gehyra variegata* and *G. montium* (Squamata, Gekkonidae) with description of three new species. *Zootaxa* (online) 3814(2):221-241.
- King, M. 1979. Karyotypic evolution in *Gehyra* (Gekkonidae: Reptilia) I. The *Gehyra variegata-punctata* complex. *Australian Journal of Zoology* 27:373-393.
- King, M. 1982a. A new species of *Gehyra* (Reptilia: Gekkonidae) from central Australia. *Transactions of the Royal Society of South Australia* 106:155-158.
- King, M. 1982b. Karyotypic evolution in *Gehyra* (Gekkonidae: Reptilia). II. A new species from the Alligator Rivers Region in Northern Australia. *Australian Journal of Zoology* 30:93-101.
- King, M. 1984a. The *Gehyra australis* species complex (Sauria: Gekkonidae). *Amphibia-Reptilia* 4(2-4) 1983:147-169.
- King, M. 1984b. A new species of *Gehyra* (Reptilia: Gekkonidae) from northern Western Australia. *Transactions of the Royal Society of South Australia* 108(1-2):113-117.
- King, M. and Horner, P. 1989. Karyotypic evolution in *Gehyra* (Gekkonidae: Reptilia). V. A new species from Papua New Guinea and the distribution and morphometrics of *Gehyra oceanica* (Lesson). *Beagle: Records of the Museums and Art Galleries of the Northern Territory*, 6:169-178.
- Kinghorn, J. R. 1924. Reptiles and batrachians from south and south-west Australia. *Records of the Australian Museum* 14(3):163-183.
- Kluge, A. G. 1982. The status of the parthenogenetic gekkonid lizard *Gehyra variegata ogasawarasimae* Okada. *Journal of Herpetology* 16(1):86-87.
- Kluge, A. G. 1993. *Gekkonoid Lizard Taxonomy*. International Gecko Society, San Diego:245 pp.
- Kopstein, P. F. 1926. Reptilien von den Molukken und den benachbarten Inseln. *Zoologische Mededelingen*, 9:71-112.
- Laube, A. and Langner, C. 2007. Die "Geckos" Australiens. *Draco* 8(29):4-21.
- Lesson, R. P. 1830. Description de quelques reptiles nouveaux ou peu connus. In: Duperrey, L.I. (Ed.), *Voyage Autour du Monde, Excurs par Ordre du Roi, sur la Corvette de La Majest, La Coquille, pendant les années 1822, 1823, 1824 et 1825*. Zoologie, Tome Second, 1re Partie. Arthur Bertrand, Paris, pp. 34-65. Plates 1-7.
- Loveridge, A. 1934. Australian reptiles in the Museum of Comparative Zoology, Cambridge, Massachusetts. *Bull. Mus. Comp. Zool. Harvard* 77:243-383.
- Loveridge, A. 1948. New Guinean reptiles and amphibians in the Museum of Comparative Zoology and United States National Museum. *Bull. Mus. Comp. Zool. Harvard* 101(2):305-430.
- Low, T. 1979. A new species of gecko, genus *Gehyra* (Reptilia: Gekkonidae) from Queensland. *Victorian Naturalist* 96:190-196.
- Lucky, A. and Sarnat, E. M. 2010. Biogeography and diversification of the Pacific ant genus *Lordomyrma* Emery. *Journal of Biogeography*, 37:624-634.
- Macleay, W. 1877. The lizards of the Chevert Expedition. *Proceedings of the Linnaean Society of New South Wales*, 2:60-69;97-104.
- Manthey, U. and Grossmann, W. 1997. Amphibien und Reptilien Südostasiens. *Natur und Tier Verlag* (Münster):512 pp.
- Maryan, B. 2009. Native gecko introductions. *Herpetofauna* 39(2):94-95.
- McCoy, M. 2015. *A Field Guide to the Reptiles of the Solomon Islands*. Michael McCoy, Kuranda.
- Mertens, R. 1974. Ein Fidji-Gecko (*Gehyra vorax*) als Bananenfresser. *Salamandra* 10(3-4):134-135.
- Meyer, A. B. 1874. Übersicht über die von mir auf Neu-Guinea und den Inseln Jobi, Mysore und Mafoor im Jahre 1873 gesammelten Amphibien. *Monatsber. K. Preuss. Akad. Wiss. Berlin* 1874:128-140.
- Mitchell, F. J. 1965. Australian geckos assigned to the genus *Gehyra* Gray (Reptilia, Gekkonidae). *Senckenbergiana Biologica* 46:287-319.
- Moritz, C. C., Pratt, R. C., Bank, S., Bourke, G., Bragg, J. G., Doughty, P., Keogh, J. S., Laver, R. J., Potter, S., Teasdale, L. C., Tedeschi, L. G. and Oliver, P. M. 2017. Cryptic lineage diversity, body size divergence, and sympatry in a species complex of Australian lizards (*Gehyra*). *Evolution* (online) 72(1):54-66.
- Oliver, P. M., Siström, M., Tjaturadi, B., Krey, K. and Richards, S. 2010. On the status and relationships of the gecko species *Gehyra barea* Kopstein 1926, with description of new specimens and a range extension. *Zootaxa* (online), 2354:45-55.
- Oliver, P. M., Siström, M. and Richards, S. 2012. Phylogeny and systematics of Melanesia's most diverse gecko lineage (*Cyrtodactylus*, Gekkonidae, Squamata). *Zoologica Scripta*, 41:437-454.
- Oliver, P. M., Skipwith, P. and Lee, M. S. Y. 2014. Crossing the line: increasing body size in a trans-Wallacean lizard radiation (*Cyrtodactylus*, Gekkota). *Biology Letters*, 10:2014-2017.
- Oliver, P. M., Bourke, P., Pratt, R., Doughty, P. and Moritz, C. C. 2016a. Systematics of the small *Gehyra* (Squamata: Gekkonidae) of the southern Kimberley, Western Australia: redescription of *Gehyra kimberleyi* Börner and Schüttler and description of a new restricted range species. *Zootaxa* (online), 4107 (1):49-64.
- Oliver, P. P., Clegg, J. R., Fisher, R. N., Richards, S. J., Taylor, P. N. and Jocque, M. M. T. 2016b. A new biogeographically disjunct giant gecko (*Gehyra*: Gekkonidae: Reptilia) from the East Melanesian Islands. *Zootaxa* (online): 4208(1):61-76.
- Oliver, P. M., Laver, R. J., Martins, F. D. M., Pratt, R. C., Hunjan, S. and Moritz, C. 2017. A novel hotspot of vertebrate endemism and an evolutionary refugium in tropical Australia. *Diversity and Distributions*, 23:53-66.
- Oudemans, J. Th. 1894. Eidechsen und Schildkröten. In Semon, R. *Zoologische Forschungsreisen in Australien und dem Malayischen Archipel. Denkschriften der Medicinisch-*



- Naturwissenschaftlichen Gesellschaft zu Jena, 8:127-146.
- Peters, W. H. C. 1874. Über neue Reptilien (*Peropus, Agama, Euprepes, Lygosoma, Typhlops, Heterolepis*) der herpetologischen Sammlung des Berliner zoologischen Museums. *M. Ber. k. preuss. Akad. Wiss. Berlin*, 1874:159-164.
- Peters, W. H. C. 1875. Eine Mittheilung von Hrn. Dr. Adolf Bernhard Meyer über die von ihm auf Neu-Guinea und den Inseln Jobi, Mysore und Mafoor im Jahre 1873 gesammelten Amphibien. *Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin*, 1874:128-140.
- Peters, W. C. H. and Doria, G. 1878. Catalogo dei retilli e dei batraci raccolti da O. Beccari, L. M. D'Alberts e A. A. Bruijn. nella sotto-regione Austro-Malese. *Annali del Museo Civico de Storia Naturale di Genova*. ser. 1, 13:323-450.
- Pianka, E. R. 1969. Habitat specificity, speciation, and species density in Australian desert lizards. *Ecology* 50(3):498-502.
- Pianka, E. R. and Pianka, H. D. 1976. Comparative ecology of twelve species of nocturnal lizards (Gekkonidae) in the western Australian desert. *Copeia* 1976(1):125-142.
- Ride, W. D. L. (ed.) et al. (on behalf of the International Commission on Zoological Nomenclature) 1999. *International code of Zoological Nomenclature*. The Natural History Museum - Cromwell Road, London SW7 5BD, UK (also commonly cited as "ICZN 1999").
- Rocha, S., Ineich, I. and Harris, D. J. 2009. Cryptic variation and recent bipolar range expansion within the Stumped-Toed Gecko *Gehyra mutilata* across Indian and Pacific Ocean islands. *Contributions to Zoology*, 78:1-8.
- Rösler, H. 1995. *Geckos der Welt - Alle Gattungen*. Urania, Leipzig:256 pp.
- Rösler, H. 2000. Kommentierte Liste der rezent, subrezent und fossil bekannten Geckotaxa (Reptilia: Gekkonomorpha). *Gekkota* 2:28-153.
- Rösler, H. 2017. Gecko-Chorologie (Squamata: Gekkota). *Gekkota* (4):1-160.
- Rösler, H., Glaw, F. and Günther, R. 2005. Aktualisierte Liste der Geckos von Neuguinea (Sauria: Gekkonidae: Gekkoninae) mit vorläufiger Charakterisierung von neun Formen aus den Gattungen *Cyrtodactylus* Gray, 1827, *Gehyra* Gray, 1834 und *Nactus* Kluge, 1983. *Gekkota* 5:33-64.
- Sang, N. V., Nguyen, H. T. C. and Truong, Q. 2009. *Herpetofauna of Vietnam*. Chimaira, Frankfurt:768 pp.
- Shea, G. M. and Sadler, R. A. 1999. A catalogue of the non-fossil amphibian and reptile type specimens in the collection of the Australian Museum: types currently, previously and purportedly present. *Technical Reports of the Australian Museum* 15, 1999:1-91.
- Sistrom, M. J., Hutchinson, M. N., Hutchinson, R. G. and Donnellan, S. C. 2009. Molecular phylogeny of Australian *Gehyra* (Squamata: Gekkonidae) and taxonomic revision of *Gehyra variegata* in south-eastern Australia. *Zootaxa*, 2277:14-32.
- Sistrom, M. J., Edwards, D. L., Donnellan, S. C. and Hutchinson, M. N. 2012. Morphological differentiation correlates with ecological but not with genetic divergence in a *Gehyra* gecko. *Journal of Evolutionary Biology* 25(4):647-660.
- Sistrom, M. J., Donnellan, S. C. and Hutchinson, M. N. 2013. Delimiting species in recent radiations with low levels of morphological divergence: A case study in Australian *Gehyra* geckos. *Molecular Phylogenetics and Evolution*:68:135-143.
- Skipwith, P. L. and Oliver, P. M. 2014. A new *Gehyra* (Gekkonidae: Reptilia) from New Guinea with unique caudal scalation. *Zootaxa*, 3827:57-66.
- Sternfeld, R. 1925. Beiträge zur Herpetologie Inner-Australiens. *Abhandlungen Herausgegeben von der Senckenbergischen Naturforschenden Gesellschaft*, 38:221-251.
- Storr, G. M. 1978. Seven new gekkonid lizards from Western Australia. *Records of the Western Australian Museum* 6:337-352.
- Storr, G. M. 1982. Two new *Gehyra* (Lacertilia: Gekkonidae) from Australia. *Records of the Western Australian Museum* 10:53-59.
- Strauch, A. A. 1887. Bemerkungen über die Geckoniden-Sammlung im zoologischen Museum der kaiserlichen Akademie der Wissenschaften zu St. Petersburg. *Mém. Acad. Impér. Sci. St.-Pétersbourg*, ser. 7, 35(2):1-72.
- Steindachner, F. 1867. In: Reise der Österreichischen Fregatte Novara um die Erde in den Jahren 1857, 1858, 1859 unter den Befehlen des Commodore B. von Wüllerstorff-Urbair (Zoologie), Vol. 1, part 3 (*Reptilien* p.1-98). K. Gerold's Sohn/Kaiserlich-Königl. Hof- und Staatsdruckerei, Wien.
- Taylor, E. H. 1962. New oriental reptiles. *Univ. Kansas Sci. Bull.* 43:209-263.
- Taylor, E. H. 1963. The lizards of Thailand. *Univ. Kansas Sci. Bull.* 44:687-1077.
- Tiedemann, F., Häupl, M. and Grillitsch, H. 1994. Katalog der Typen der herpetologischen Sammlung nach dem Stand vom 1. Jänner 1994. Teil II: Reptilia. *Kat. wiss. Samml. Naturhist. Mus. Wien* 10 (Vertebrata 4):1-110.
- Tonione, M. A., Fisher, R. N., Zhu, C. and Moritz, C. 2016. Deep divergence and structure in the Tropical Oceanic Pacific: A multilocus phylogeography of a widespread gekkonid lizard (Squamata: Gekkonidae: *Gehyra oceanica*). *Journal of Biogeography*, 43:268-278.
- Twombly et al. 2018. Facebook page titled: "Herpetological Taxonomy", online at: <https://www.facebook.com/groups/Herpetofauna.taxonomy/> downloaded on 16 June 2018.
- Underwood, G. 1954. On the classification and evolution of geckos. *Proc. Zool. Soc. London*, 124(3):469-492.
- Victorian Civil and Administrative Tribunal (VCAT). 2015. *Hoser v Department of Environment Land Water and Planning* (Review and Regulation) [2015] VCAT 1147 (30 July 2015, judgment and transcript).
- Wiegmann, A. F. A. 1834. In: Dr. F. J. F. Meyen: Beiträge zur Zoologie gesammelt auf einer Reise um die Erde. Siebente Abhandlung. *Nova Acta Physico-Medica Academiae Caesarea Leopoldino-Carolina* (Halle) 17:185-268 [1835]
- Wells, R. W. and Wellington, C. R. 1984. A synopsis of the class Reptilia in Australia. *Australian Journ. of Herp.* 1(3-4):73-129.
- Wells, R. W. and C. R. Wellington. 1985. A classification of the Amphibia and Reptilia of Australia. *Australian Journal of Herpetology Supplementary Series* 1:1-61.
- Werner, F. 1901. Ueber Reptilien und Batrachier aus Ecuador und Neu-Guinea. *Verh. Zool.-bot. Ges. Wien* 51:593-614.
- Wilson, S. K. and Knowles, D. G. 1988. *Australia's Reptiles. A Photographic Reference to the Terrestrial Reptiles of Australia*. William Collins, Sydney, New South Wales, Australia:447 pp.
- Wilson, S. and Swan, G. 2017. *A complete guide to reptiles of Australia*, (3rd ed.). New Holland, NSW, Australia:647 pp.
- Yamashiro, S. and Ota, H. 2005. On the clone type of *Lepidodactylus lugubris* (Duméril and Bibron, 1836) corresponding to *Gehyra variegata ogasawarasimae* Okada, 1930 (Reptilia: Gekkonidae). *Current Herpetology* 24(2):95-98.
- Zug, G. R. 1991. The lizards of Fiji: Natural history and systematics. *Bishop Mus. Bull. Zool.* 2:1-136.
- Zug, G. R. 2013. *Reptiles and amphibians of the Pacific Islands: a comprehensive guide*. University of California Press, Berkeley, CA, USA:320 pp.
- Zug, G. R. and Kaiser, H. 2014. A new species of four-toed skink (Squamata: Scincidae: *Carlia peronii* species group) from Pulau Sukur, Indonesia, and biogeographic notes on the herpetofauna of Flores and Komodo. *Proceedings of the Biological Society of Washington* 126(4):379-392.
- Zug, G. R., Hamilton, A. M. and Austin, C. C. 2011. A new *Emoia samoensis* group lizard (Squamata: Scincidae) from the Cook Islands, South-central Pacific. *Zootaxa* (Online) 2765:47-57.
- Zug, G. R., Ineich, I., Pregill, G. and Hamilton, A. M. 2012. Lizards of Tonga and a description of a new Tongan treeskink (Squamata: Scincidae: *Emoia samoensis* Group). *Pacific Science* 66(2):225-237.

**CONFLICT OF INTEREST**

There are no conflicts of interest in terms of this paper.

## GENUS AND SPECIES LIST (*GEHYRA SENSU LATO*)

### Genus *Gehyra* Gray, 1834

#### Subgenus *Gehyra* Gray, 1834

*Gehyra* (*Gehyra*) *oceanica* (Lesson, 1830) (Type species)

*Gehyra* (*Gehyra*) *hangayi* sp. nov.

#### Subgenus *Halmaherasaurus* gen. nov.

*Gehyra* (*Halmaherasaurus*) *marginata* Boulenger, 1887

#### *Dactyloperus* Fitzinger, 1843

##### Subgenus *Dactyloperus* Fitzinger, 1843

*Dactyloperus* (*Dactyloperus*) *variegata* (Duméril and Bibron, 1836) (Type species)

*Dactyloperus* (*Dactyloperus*) *bradmaryani* sp. nov.

*Dactyloperus* (*Dactyloperus*) *minuta* (King, 1982)

*Dactyloperus* (*Dactyloperus*) *montium* (Storr, 1982)

*Dactyloperus* (*Dactyloperus*) *moritzi* (Hutchinson, Siström, Donnellan and Hutchinson, 2014)

*Dactyloperus* (*Dactyloperus*) *pilbara* (Mitchell, 1965)

*Dactyloperus* (*Dactyloperus*) *pulingka* (Hutchinson, Siström, Donnellan and Hutchinson, 2014)

*Dactyloperus* (*Dactyloperus*) *punctata* (Fry, 1914)

*Dactyloperus* (*Dactyloperus*) *versicolor* (Hutchinson, Siström, Donnellan and Hutchinson, 2014)

##### Subgenus *Purpuracolotes* subgen. nov.

*Dactyloperus* (*Purpuracolotes*) *purpurascens* (Storr, 1982)

*Dactyloperus* (*Purpuracolotes*) *einasleyhensis* (Bourke, Pratt, Vanderduys and Moritz, 2017)

##### Subgenus *Maculocolotes* subgen. nov.

*Dactyloperus* (*Maculocolotes*) *nana* (Storr, 1978)

*Dactyloperus* (*Maculocolotes*) *girloorloo* (Oliver, Bourke, Pratt, Doughty and Moritz, 2016)

*Dactyloperus* (*Maculocolotes*) *kimberleyi* (Börner and Schüttler, 1982)

*Dactyloperus* (*Maculocolotes*) *multiporosa* (Doughty, Palmer, Siström, Bauer and Donnellan, 2012)

*Dactyloperus* (*Maculocolotes*) *occidentalis* (King, 1984)

*Dactyloperus* (*Maculocolotes*) *federicrossignolii* sp. nov.

##### Subgenus *Wedgedigitcolotes* subgen. nov.

*Dactyloperus* (*Wedgedigitcolotes*) *spheniscus* (Doughty, Palmer, Siström, Bauer and Donnellan, 2012)

##### Subgenus *Saxacolinecolotes* subgen. nov.

*Dactyloperus* (*Saxacolinecolotes*) *lazelli* Wells and Wellington, 1985

### Genus *Phryia* Gray, 1842

*Phryia australis* (Gray, 1845) (type species)

*Phryia borroloola* (King, 1984)

*Phryia koira* (Horner, 2005)

*Phryia pamela* (King, 1982)

*Phryia paulhorneri* sp. nov.

*Phryia robusta* (King, 1984)

### Genus *Peropus* Wiegmann, 1835

*Peropus mutilata* (Wiegmann, 1834) (type species)

*Peropus leopoldi* (Brongersma, 1930)

### Genus *Propemaculosacolotes* gen. nov.

*Propemaculosacolotes dubia* (Macleay, 1877)

*Propemaculosacolotes catenata* (Low, 1979)

### Genus *Crocodylivotuscolotes* gen. nov.

*Crocodylivotuscolotes xenopus* (Storr, 1978)

*Crocodylivotuscolotes shireenhoserae* sp. nov.

*Crocodylivotuscolotes marleneswileae* sp. nov.

### Genus *Edaxcolotes* gen. nov.

#### Subgenus *Edaxcolotes* subgen. nov.

*Edaxcolotes* (*Edaxcolotes*) *vorax* (Girard, 1858)

*Edaxcolotes* (*Edaxcolotes*) *georgpottthasti* (Flecks, Schmitz, Böhme, Henkel and Ineich, 2012)

#### Subgenus *Macrocephalacolotes* subgen. nov.

*Edaxcolotes* (*Macrocephalacolotes*) *rohan* (Oliver, Clegg, Fisher, Richards, Taylor and Jocque, 2016)

### Genus *Extensudigituscolotes* gen. nov.

*Extensudigituscolotes membranacruralis* (King and Horner, 1989)

*Extensudigituscolotes sadlieri* sp. nov.

*Extensudigituscolotes glennsheai* sp. nov.

### Genus *Brevicaudacolotes* gen. nov.

*Brevicaudacolotes baliola* (Duméril, 1851)

*Brevicaudacolotes barea* (Kopstein, 1926)

### Genus *Parvomentumparmacolotes* gen. nov.

*Parvomentumparmacolotes brevipalmata* (Peters, 1874)

*Parvomentumparmacolotes papuana* (Meyer, 1874)

*Parvomentumparmacolotes interstitialis* (Oudemans, 1894)

### Genus *Papuacolotes* gen. nov.

*Papuacolotes serraticauda* (Skipworth and Oliver, 2014) (New Guinea)

### Genus *Quattuorunguiscolotes* gen. nov.

*Quattuorunguiscolotes fehlmanni* (Taylor, 1962)

*Quattuorunguiscolotes grimeri* sp. nov.

*Quattuorunguiscolotes insulensis* (Girard, 1858)

### Genus *Colotesmaculosadorsum* gen. nov.

*Colotesmaculosadorsum lacerata* (Taylor, 1962)

### Genus *Thaigehyra* gen. nov.

*Thaigehyra angusticaudata* (Taylor, 1963)