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gibbonsi subsp. nov.*

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Two new legless lizards from Eastern Australia (Reptilia: Squamata: Sauria: Pygopodidae).

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ABSTRACT

Two new subspecies of legless lizards from south-eastern Australia within the genus *Aprasia* Gray, 1839 are formally identified and named according to the rules of the *International Code of Zoological Nomenclature*.

Both are morphologically distinct from their nominate forms and both are allopatric in distribution with respect to the nominate forms.

One of these populations, this being from Bendigo, Victoria and currently referred to as a population of *Aprasia parapulchella*, Kluge, 1974 has long been recognized as being taxonomically distinct from the nominate form (Osborne and Jones, 1995).

The second taxon, referred to as being within *Aprasia inaurita* Kluge, 1974, was found to be distinct for the first time as part of this audit.

Keywords: Taxonomy; nomenclature; Lizards; *Aprasia*; *parapulchella*; *pseudopulchella*; *inaurita*; new subspecies; *gibbonsi*; *rentoni*.

INTRODUCTION

As part of an audit of the reptiles in Victoria, Australia, two regionally isolated of legless lizards in the genus *Aprasia* Gray, 1839 were inspected with a view to assess their relationships with the nominate forms.

Both were within the genus *Aprasia* Gray, 1839, these being *Aprasia parapulchella*, Kluge, 1974 and *A. inaurita* Kluge, 1974.

For both species, the Victorian animals were found to be different from those from interstate and sufficiently so as to warrant taxonomic recognition. The Victorian populations were also allopatric in distribution and with no known point of contact.

For the species *Aprasia parapulchella*, Kluge, 1974, the type locality is Coppins Crossing in the ACT, and the population in and around Bendigo, Victoria is apparently isolated from the next nearest population in Albury, NSW, by some 120 km in a straight line measurement, being an area of habitat known to be unsuitable for the taxon.

For the species *A. inaurita* Kluge, 1974, type locality Sunset Country, Victoria, the specimens from West of the Flinders Ranges in South Australia were found to be allopatric from the nominate form and also morphologically distinct.

The barrier between these populations of this taxon appears to be a population of another recognized taxon, known as *Aprasia pseudopulchella*, Kluge 1974, type locality Burra, South Australia and generally restricted to this region. In terms of *A. inaurita* Kluge, 1974, there is no known zone of contact between the two main populations.

The same applies in terms of the Bendigo, Victoria, the ACT/ NSW and the South Australian populations of *A. parapulchella* and *A. pseudopulchella*.

MATERIALS, METHODS AND RESULTS

The audit consisted of looking at specimens from all relevant species, herein effectively treated as two groups, namely *A. inaurita* and *A. parapulchella* / *A. pseudopulchella* (the latter two species being near identical in features) with a view to identifying obvious morphological differences between the populations in order to decide whether or not any unnamed populations were worthy of taxonomic recognition.

Added to this was an audit of the relevant published literature and available molecular data for species and species complexes affected by similar geographical barriers.

On a morphological level, each population was distinct, albeit only slightly, and on the basis of this alone, worthy of taxonomic recognition. However on the basis of molecular results for species affected by the same geographical barriers (e.g. the *Varanus rosenbergi* group, Smith *et al.* 2007, as cited by Hoser 2013), these recognized differences were decided to be only significant enough to warrant designation as subspecies.

Hence the formal descriptions below.

APRASIA PARAPULCHELLA AND A. PSEUDOPULCHELLA.

The species *Aprasia parapulchella*, Kluge, 1974, with the type locality of Coppins Crossing in the ACT and *Aprasia pseudopulchella*, Kluge 1974, from the type locality of Burra, South Australia when described by Arnold Kluge, were known from two widely scattered locations about 800 km apart and separated by an arid zone of clearly unsuitable habitat.

While morphologically similar, Kluge no doubt relied on this geographical separation to decide each should be treated as separate species.

The more recent discovery of a third population of similar lizards

in and around Bendigo, Victoria, in part midway between the other two populations has confused things somewhat.

While some authorities have treated this population as being either an undescribed or unidentified species, most recent authors have treated it merely as an outlying population of *A. parapulchella*.

Notwithstanding this, it appears that no one has actually compared this population with *A. pseudopulchella*.

When doing so, I found all three to be very similar and quite likely of one and the same species.

However in order to maintain nomenclatural stability for the time being and in the absence of molecular data, I herein provisionally treat *A. pseudopulchella* as a separate species.

This is in itself problematic, as the Bendigo population is in many ways intermediate in form and location between the ACT/NSW animals (*A. parapulchella*) and the South Australian animals (*A. pseudopulchella*).

This is even if one accepts the likelihood of specimens attributable to *A. parapulchella* being found in likely habitats south of the NSW/Victoria border in areas near Beechworth and Myrtleford, Victoria.

However in view of the fact that two, and possibly all three of the relevant major populations are conspecific (ignoring for the time being the mid-northern NSW outlier populations, which also differ from the nominate group), I herein take the conservative step of formally naming the Victorian population as a subspecies of *A. parapulchella*, pending a more detailed molecular study that will determine whether or not it should be elevated to full species status.

Relevant literature in terms of *A. parapulchella* and *A. pseudopulchella* include the following: Barrer (1992), Brown (2009), Cogger (2000, 2014), Henle (1989), Jennings *et al.* (2003), Jones (1992, 1999),

Kluge (1974, 1976), Michael (2004), Michael and Herring (2005), Michael *et al.* (2008), Osborne and Jones (1995), Osborne and McKergow (1993), Osborne *et al.* (1991), Patchell and Shine (1986), Rankin (1976), Robertson and Heard (2008), Robinson (1996), Wong *et al.* (2011) and sources cited therein.

APRASIA INAURITA

This species (*A. inaurita*) is readily separated from *A. parapulchella* and *A. pseudopulchella* in form and habitat preferences (as outlined in Cogger 2014), so much so that Wells (2007), placed this and related species into a new genus *Abilaena* Wells, 2007.

This generic name has been little used since 2007, but certainly has merit in use, at least to the subgenus level as each group *Aprasia* and *Abilaena* describe distinctive species groups, of different form and ecology.

Abilaena species are found in arid desert-type regions across southern Australia as opposed to cooler, more temperate and usually rocky habitats for *Aprasia*. Significantly and not reported in the literature (e.g. Cogger 2014) is a distinct gap in the population of specimens attributed to the species *A. inaurita* in the region of the Flinders Ranges in South Australia.

This is however ascertained quite easily via a search of the specimens lodged in Australian museums and plotting them on a map of Australia, all easily done via a computer.

It is also worth noting that *A. inaurita* is found in the lower foothills of the ranges near the coastal strip.

While there would be a presumption that the habitat, especially on the eastern side of the ranges is the barrier to movement of *A. inaurita*, this may only be a part of the situation. This is because within the relevant area, another species, namely *A. pseudopulchella* occurs and is reasonably abundant there, implying that it may also aid the excusion process.

The species groups *A. parapulchella* and *A. pseudopulchella* versus *A. inaurita* may well have a strong process of mutual

exclusion.

In any event, it is clear that the eastern (east of the Flinders Ranges) population and western (west side of the Flinders Ranges) populations are disjunct and also morphologically different. In the absence of molecular data, there is no effective way to ascertain how long each population has been divergent and it is for that reason the unnamed western population is herein described conservatively as a new subspecies.

Further significant literature in terms of *A. inaurita*, include the following: Cogger (2014), Kluge (1974, 1976), Wells (2007) and Wilson and Swan (2010).

SUBSPECIES APRASIA PARAPULCHELLA GIBBONSI SUBSP. NOV.

Holotype: A specimen at the National Museum of Victoria (NMV), specimen number: D61531 from Whipstick Forest, Bendigo, Victoria, Lat. -36.67 Longitude 144.25, collected by Peter Robertson in a pitfall trap. The National Museum of Victoria (NMV) is a government-owned facility that allows access to its specimens.

Paratypes: Specimens at the National Museum of Victoria (NMV), specimen number: D61534, D61535, and D61646 from Whipstick Forest, Bendigo, Victoria, Lat. -36.67 Longitude 144.25, collected by Peter Robertson in a pitfall trap. The National Museum of Victoria (NMV) is a government-owned facility that allows access to its specimens.

Diagnosis: *Aprasia parapulchella gibbonsi* subsp. nov. is separated from *Aprasia pulchella* Gray, 1839, nominate *A. parapulchella* Kluge, 1974 and *A. pseudopulchella* Kluge 1974 by the presence of a lightish coloured head (versus darkish grey in the others) and well-defined tail stripes, versus ill defined in the others.

A comparative study of large numbers *Aprasia parapulchella gibbonsi* subsp. nov. and nominate *A. parapulchella* found the new subspecies to attain a larger adult size on average.

The species *Aprasia pulchella* Gray, 1839, *A. parapulchella* Kluge, 1974 and *A. pseudopulchella* Kluge 1974 are all separated from from all other *Aprasia* Gray, 1839 by the following suite of characters: External ear opening absent; prefrontal not in contact with the subocular labial; five supralabials bordering the upper lip on each side; colour of the head and tail tip not contrasting with the remainder of the body; nasal and first supralabial are completely or partially fused posterior to the nostril.

Aprasia pulchella Gray, 1839 is separated from *A. parapulchella* Kluge, 1974 and *A. pseudopulchella* Kluge 1974 by having two preanal scales, versus three in the other two species. *A. pseudopulchella* Kluge 1974 is separated from *A. parapulchella* Kluge, 1974 (both subspecies) by having a single preocular scale and usually a well defined lateral head pattern, versus usually two preoculars and a weak or absent lateral head pattern.

Distribution: Known only from the Bendigo area in central Victoria, Australia, with all known specimens coming from within 25 km of the centre of the city of Bendigo.

According to Wong (2013), "In NSW, *A. parapulchella* has a widespread, though disjunct distribution, being recorded mostly at isolated sites, including near Tarcutta, Bathurst, Cootamundra, Adelong, Lake Burrinjuck, Yass, Wee Jasper, West Wyalong, Buddigower, Bredbo, Cooma, Queanbeyan, Googong Foreshores, Holbrook, Howlong, Walbundrie (Goombargana Hill), Albury (Nail Can Hill), Goulburn River National Park (Hunter Valley), Mudgee and Gunnedah (Cogger 1992; Ecology Partners Pty Ltd 2009; Jenkins and Bartell 1980; Michael and Herring 2005; NSW National Parks and Wildlife Service 1999; Osborne *et al.* 1991; Sass *et al.* 2008)."

The ACT fits within this range.

Within the ACT, according to Wong (2013), "*A. parapulchella* is mainly distributed along the Murrumbidgee and Molonglo River

corridors and surrounding areas as well as on some of the hills found within Canberra Nature Park (Osborne *et al.* 1991; Osborne and McKergow 1993).” The species appears to be absent from areas of apparently suitable habitat, indicating a fragmented range.

Etymology: Named in honour of Bendigo-based herpetologist, Dale Gibbons, now of Maiden Gully (City of Bendigo), Victoria, for his valuable contribution to the herpetology of Bendigo, including through considerable fieldwork spanning some decades.

SUBSPECIES *APRASIA INAURITA RENTONI* SUBSP. NOV.

Holotype: A specimen at the Western Australian Museum, Perth, number: R92012 collected from 2 km North-west of Middini Beach, Western Australia, Australia, Lat -32.22, Longitude 127.43. The Western Australian Museum is a government-owned facility that allows access to its specimens.

Paratype: A specimen at the Western Australian Museum, Perth, number: R137756 collected from 12 km East of the Western Australia and South Australia border in South Australia, Australia, Latitude -31.65, Longitude 129.12. The Western Australian Museum is a government-owned facility that allows access to its specimens.

Diagnosis: *Aprasia inaurita rentoni* subsp. nov. are readily separated from *A. inaurita inaurita* Kluge, 1974 by the following suite of characters: The distance from the snout to the eye is twice or more than twice that of the eye itself, versus less than twice the width of the eye in *A. inaurita inaurita*. Furthermore *A. inaurita rentoni* subsp. nov. are characterized by white on the upper labials which has a well defined upper border, versus an ill defined upper border in *A. inaurita inaurita*.

A. inaurita rentoni subsp. nov. is also separated from *A. inaurita inaurita* by having well-defined dark etching on the scales of the upper body, versus poorly defined in *A. inaurita inaurita*.

Both *A. inaurita rentoni* subsp. nov. and *A. inaurita inaurita* are separated from all other *Aprasia* Gray, 1839 by the following suite of characters: External ear opening absent; prefrontal not in contact with the subocular labial; five supralabials bordering the upper lip on each side; colour of the head and tail tip not contrasting with the remainder of the body; nasal and first supralabial are not fused posterior to the nostril; there is usually 14, or occasionally 12 mid-body scale rows; there are usually three preanal scales; the snout is rounded and not strongly projecting when viewed from above or the side.

Distribution: *A. inaurita rentoni* subsp. nov. is found from coastal far south-eastern Western Australia, east to the western slopes of the Flinders Ranges and the Adelaide Hills. *A. inaurita inaurita* is found in drier areas east of the Flinders Ranges and the Adelaide Hills into nearby parts of Victoria and southern New South Wales.

Etymology: Named in honour of Ian Renton of Snake-away services (AKA “snake away”), a registered trademark/s (TM numbers 1670772, 1354355), of Paradise, (Adelaide) South Australia, in recognition of his many services to herpetology in Australia spanning some decades.

FIRST REVISOR’S INSTRUCTIONS

Unless mandatory under the rules of zoological nomenclature of the time, no new scientific names are to have spellings altered in any way. The spellings of the new scientific names, if lacking the usual suffixes attached to such names or other deemed proper name formations, are deliberate on the part of the author. The same applies to all other names published by this author prior to this date in other earlier papers.

Should a reviser decide that more than one described subspecies herein are of the same taxon (extremely unlikely in this case), then name priority is given to the taxon named first, as in by page priority in this paper.

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CONFLICT OF INTEREST

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



Aprasia parapulchella gibbonsi subsp. nov.
from the southern outskirts of Bendigo,
Victoria.

A division of the Meso-American lizard genus *Laemanctus* Wiegmann, 1834 as currently recognized, with the formal description of a new genus, new species and a new subspecies.

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ABSTRACT

The genus *Laemanctus* Wiegmann, 1834 has in recent years been treated as including two species, namely *L. longipes* Wiegmann, 1834 and *L. serratus* Cope, 1864.

Various forms similar to each have been treated as both species and subspecies by different authors, although in the absence of molecular data, most recent herpetologists have conservatively treated these as subspecies.

Notwithstanding the obvious similarities between *L. longipes sensu lato* and *L. serratus sensu lato*, indicating an obvious family-level relationship between the two, both taxa as recognized are sufficiently divergent from one another to warrant recognition in different genera.

Furthermore, those forms recognized most recently as subspecies of *L. longipes sensu lato* and *L. serratus sensu lato* by authors such as McCoy (1968), are treated herein as full species, as effectively done by Boulenger (1887) for those previously named forms he had on hand.

This is done on the basis that each are morphologically distinct from one another and geographically isolated from one another as well, thereby satisfying modern species delineation criteria.

In the absence of a pre-existing genus name, the taxon *L. serratus* and those forms associated with it, are herein placed in the new genus *Brunaviridisaurus gen. nov.* in accordance with the International Code of Zoological Nomenclature (Ride *et al.* 1999).

One geographically isolated and distinct form most recently treated as a variant of *L. longipes*, long recognized as distinct by authors including McCoy (1968) is herein formally named as a new species *L. viridis sp. nov.*

This paper therefore recognizes four species of *L. longipes* and three of *L. serratus*, the latter now in the genus *Brunaviridisaurus gen. nov.*

An isolated population until now referred to the species *L. deborrei* (Boulenger, 1887) is defined herein as a newly named subspecies.

Keywords: Taxonomy; nomenclature; lizards; Mexico; *Laemanctus*; *longipes*; *deborrei*; *serratus*; new genus; *Brunaviridisaurus*; new species; *viridis*; new subspecies; *tuxtlasensis*.

INTRODUCTION

The iconic genus *Laemanctus* Wiegmann, 1834 has been treated as consisting up to six species by herpetologists, although most recent treatments of the genus as recognized to date have included just two species, namely *L. longipes* Wiegmann, 1834 and *L. serratus* Cope, 1864, with other the other four named and recognized forms relegated to being subspecies of one or other.

An audit of the modern literature and the taxa themselves indicated that the present classification for these lizards is not consistent with other lizards, including those other genera within

the Corytophanidae and the associated Dactyloidae.

As a result, the genus *Laemanctus* Wiegmann, 1834 as presently conceived was reviewed and assessed dispassionately in order to correct the taxonomy and nomenclature that arose from it.

Each of *L. longipes sensu lato* and *L. serratus sensu lato* are clearly very different from one another morphologically and are therefore had to be treated herein as being of different genera.

In the absence of a pre-existing genus name, the taxon *L. serratus* and those forms associated with it, are herein placed in the new genus *Brunaviridisaurus gen. nov.* in accordance with

the International Code of Zoological Nomenclature (Ride *et al.* 1999).

One geographically isolated and distinct form most recently treated as a variant of *L. longipes*, for some time already recognized as distinct by authors including McCoy (1968) is herein formally named as a new species *L. viridis sp. nov.*

This paper therefore recognizes four species of *L. longipes* and three of *L. serratus*, the latter now in the genus *Brunaviridisaurus gen. nov.*, the species divisions within being an effectively expanded form of the key presented by Boulenger (1887) at page 104 (and immediately following species accounts) and incorporating all described and recognized forms to date, including the species *L. viridis sp. nov.* described herein.

MATERIALS AND METHODS

The body of literature available in terms of the relevant species, is extensive and formed the primary basis for developing the taxonomy presented within this paper.

While it is not practical for me to list all the published material reviewed, specimens examined or herpetologists consulted in the 30 year period preceding the writing of this paper, some key publications of relevance are listed herein.

I also note that a considerable body of relevant materials was stolen from my property during an illegal armed raid on my facility on 17 August 2011, representing an accumulation of data spanning more than three decades. While the Court of Appeal in Victoria on 5 September 2014 found the raid to be illegal and ordered the government wildlife officers to return the stolen material, pay costs and the like, this has not yet happened and the relevant officers have made it clear that they do not intend returning to me any of my stolen property.

Although I note that as of June 2015, I am engaged in litigation to effect the return of stolen materials, damages, monies owed, etc. Any potential deficiencies in this paper, are a direct result of this unlawful theft of data and materials.

Due to the relative rarity of the relevant taxa involved and potential threats to them posed by the ever expanding human population juggernaut, I have decided to publish this paper now, rather than potentially delay publication for many years in the hope I can re-acquire lost data, by which stage I may be dead and therefore never get to publish the paper.

In terms of the taxonomy and other relevant aspects of the genus *Laemanctus* as recognized to date, relevant publications include: Barbour and Cole (1906), Boulenger (1887, 1885), Canseco-Marquez and Gutierrez-Mayen (1998), Casas-Andreu *et al.* (2004), Cope (1864, 1866a, 1866b), Dathe (1988), Dixon and Lemos-Espinal (2010), Duellman (1963), Duméril and Bibron (1837), Garcia *et al.* (1996), Günther (1885), Hribal and Holanova (2004), Köhler (2000), Lee (1996, 2000), Lemos-Espinal and Smith (2015), Martin (1958), Mata-Silva *et al.* (2015), McCoy (1968), McCranie (2015), McCranie and Köhler (2004a, 2004b), Müller (1880), Perez-Higareda and Vogt (1985), Pyron *et al.* (2013), Schmidt (1933), Smith and Taylor (1950), Solis *et al.* (2014), Stuart (1948), Sunyer (2014), Townsend *et al.* (2014), Vieira *et al.* (2005), Weber (1945), Wiegmann (1834) and sources cited therein.

CONSEQUENCES OF THE RESULTS AND TAXONOMIC ACTIONS.

Before engaging in the formal taxonomic actions within this paper, it is trite for me to note that the nomenclature follows the taxonomy and is used in accordance with the rules, recommendations and spirit of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999), known as “the code”, or “the rules”.

In terms of the descriptions below, if and when a name is found by a later author to be in error in terms of formation, gender or similar, it should not be amended in any way, unless totally mandatory under the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

In terms of order of preference for use of new names by a first

revisor, in the event that that they seek to merge defined taxonomic entities as defined herein, then the order should be in page priority order as seen in the text herein. Those entities named first take priority.

GENUS *LAEMANCTUS* WIEGMANN, 1834.

Type species: *Laemanctus longipes* Wiegmann, 1834.

Diagnosis: The diagnosis of Boulenger, 1887 still broadly applies to the genus, although it is modified slightly to separate it from the now associated genus *Brunaviridisaurus gen. nov.*

Laemanctus and *Brunaviridisaurus gen. nov.* are both defined as follows: Tympanum distinct. Head plane above, shelving forwards, the occipital region more or less raised and reduced beyond the occiput. Body compressed, covered with imbricate keeled scales; dorsal crest feebly developed or absent. A strong transverse gular fold; no gular pouch. Limbs very long; infradigital lamellae with a median tubercle-like keel. No femoral pores. Tail very long and round. Lateral teeth tricuspid; pterygoid teeth. Clavicle loop-shaped proximally. No sternal fontanelle. No abdominal ribs.

Laemanctus is separated from *Brunaviridisaurus gen. nov.* by the following: Anterior dorsal head scales small and irregular; posterior edge of head lacking a fringe of enlarged conical scales; mid-dorsal scales are not enlarged; no free serrate dorsal crest.

By contrast *Brunaviridisaurus gen. nov.* is separated from *Laemanctus* by the following: Anterior dorsal head scales are large and regular; consisting of paired or both paired and azygous scales; posterior edge of the head with a projecting with a series of enlarged flattened conical scales; body scales of mid-dorsal row much enlarged and pointed forming a serrate dorsal crest.

Distribution: Mexico (Veracruz, Colima, Oaxaca, Yucatan), Belize, North-west Honduras, Nicaragua and Guatemala at 0-1200 m elevation.

Content: *Laemanctus longipes* Wiegmann, 1834 (type species); *L. deborrei* (Boulenger, 1877); *L. viridis sp. nov.*; *L. waltersi* Schmidt, 1933.

SPECIES *LAEMANCTUS VIRIDIS SP. NOV.*

Holotype: A specimen at the US National Museum (USNM), USNM 48097 collected from near Santa Domingo (= Petapa), Oaxaca, Mexico.

The US National Museum in Washington DC, USA, is a government facility that allows scientists access to specimens.

Paratype: A specimen at the US National Museum (USNM), USNM 48099 collected from near Santa Domingo (= Petapa), Oaxaca, Mexico.

Diagnosis: The species *L. viridis sp. nov.* is separated from all others in the genus *Laemanctus* Wiegmann, 1834 by the following suite of characters: 42-47 mid-body scale rows and anterior head scales that are intermediate between the very large ones seen in *L. longipes* Wiegmann, 1834 (those being nearly double the size of the posterior casque ones) and the very distinctly small ones (not

distinctly larger than those on occipital region) seen in *L. deborrei* (Boulenger, 1877).

In *L. viridis sp. nov.* anterior head scales are not near double the size of the posterior casque ones, but are noticeably larger than them.

L. waltersi Schmidt, 1933 is separated from all others in the genus by its small adult size and large body scales (average of 31 mid-body rows, with a known range of 30-32), gular fold absent or interrupted (versus well defined in the other species) and all dorsal head scales being subequal in size.

L. longipes is readily separated from *L. viridis sp. nov.* by having an average of 55 mid body rows and always a number higher than 47.

Distribution: Known only from near Santa Domingo (= Petapa) and Santa Maria Chimalapa, Oaxaca and from the vicinity of

Jesus Carranza, Veracruz, Mexico.

Etymology: Named in reflection of the dominantly green colour of the species.

**SUBSPECIES *LAEMANCTUS DEBORREI TUXTLASENSIS*
SUBSP. NOV.**

Holotype: A juvenile specimen at the Texas Cooperative Wildlife Collectrion (TCWC) at the Texas A and M University, USA, specimen number TCWC 21327 hatched from an egg collected at the Rio Quetzalapan two miles east of Lago Catemato, Mexico. This facility allows access to specimens by scientists.

Paratypes: Two juvenile specimens at the Texas Cooperative Wildlife Collectrion (TCWC) at the Texas A and M University, USA, specimen numbers TCWC 21238 and TCWC 21239 hatched from eggs collected at the Rio Quetzalapan two miles east of Lago Catemato, Mexico.

Diagnosis: This taxon is most readily separated from the nominate species by having 42-45 mid body scale rows, versus 47 or more in other Mexican specimens and 4 rows of granular gular fold scales, versus 2-3 in Guatemalan specimens, which are otherwise characterised by lower mid-body scale row counts than other Mexican specimens not including this subspecies and in line with this subspecies.

The population is further separated from the nominate form by distribution and habitat partitioning from the main population generally further east or south by at least 250 km in either direction.

Distribution: An isolated population from La Venta, Tabasco and west of the mouth of the Rio Coatzacoalcos in the Tuxtlas Range of coastal Veracruz, Mexico.

The nominate form is found from the Yucatan Peninsula south to Honduras.

Etymology: Named in recognition of the region it is known from, this being generally near the Tuxtlas Range of coastal Veracruz, Mexico.

GENUS *BRUNAVIRIDISAURUS* GEN. NOV.

Type species: *Laemanctus serratus* Cope, 1864.

Diagnosis: The diagnosis of Boulenger, 1887 for the genus *Laemanctus* still broadly applies to this associated genus, although it is modified slightly to separate both genera.

Laemanctus and *Brunaviridisaurus* gen. nov. are both defined as follows: Tympanum distinct. Head plane above, shelving forwards, the occipital region more or less raised and reduced beyond the occiput. Body compressed, covered with imbricate keeled scales; dorsal crest feebly developed or absent. A strong transverse gular fold; no gular pouch. Limbs very long; infradigital lamellae with a median tubercle-like keel. No femoral pores. Tail very long and round. Lateral teeth tricuspid; pterygoid teeth. Clavicle loop-shaped proximally. No sternal fontanelle. No abdominal ribs.

Brunaviridisaurus gen. nov. is separated from *Laemanctus* by the following: Anterior dorsal head scales are large and regular; consisting of paired or both paired and azygous scales; posterior edge of the head with a projecting with a series of enlarged flattened conical scales; body scales of mid-dorsal row much enlarged and pointed forming a serrate dorsal crest.

By contrast *Laemanctus* is separated from *Brunaviridisaurus* gen. nov. by the following: Anterior dorsal head scales small and irregular; posterior edge of head lacking a fringe of enlarged conical scales; mid-dorsal scales are not enlarged; no free serrate dorsal crest.

Distribution: Mexico (Yucatan, Oaxaca, Veracruz, Guanajuato, Hidalgo, Campeche, San Luis Potosí, Tamaulipas, Puebla, Quéretaro), Belize, Honduras and Guatemala.

Etymology: Named in reflection of the dominant colours of the taxon group and the fact the genus is a lizard.

Content: *Brunaviridisaurus serratus* Cope, 1864 (type species); *B. alticoronatus* (Cope, 1866); *B. mccoysi* (Perez-Higareda and Vogt, 1985).

FIRST REVISOR'S INSTRUCTIONS

Unless mandatory under the rules of zoological nomenclature of the time, no new scientific names are to have spellings altered in any way. No alteration is to be made for the purposes of gender allocation, correction or the like as all spellings and the like are intentional and designed to accommodate the rules of homonymy and the recommendations that the names be easy to use by others.

If two or more described taxa or taxon groups described herein are to be treated as one and the same and therefore in need to be merged, the name that shall take priority is that which appears first in this paper as a full description.

Unless otherwise indicated in any specific papers, these same rules are to be applied to all previous papers I, Raymond Hoser, have published as sole or senior author.

CONFLICT OF INTEREST

None is reported for this paper in any way.

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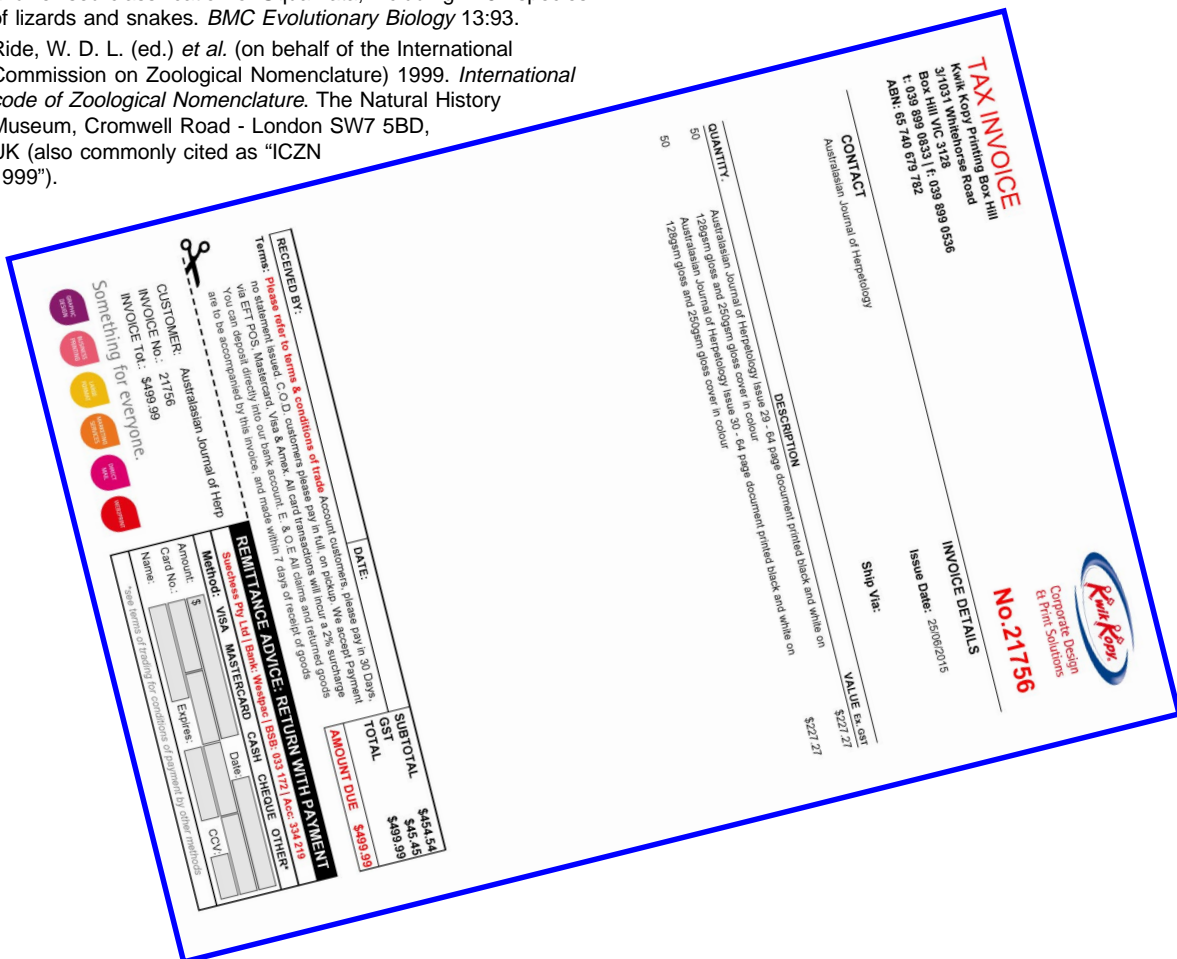
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Two new genera of Lacertid lizards (Reptilia: Squamata: Sauria: Lacertidae) from the Middle-east.

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ABSTRACT

In spite of the excellent reclassification of the Lacertidae by Arnold *et al.* (2007), now widely accepted by most herpetologists, two genera as widely recognized consist of taxa sufficiently divergent to warrant being placed in their own genera.

Molecular studies indicate that the most divergent species within the genera *Phoenicolacerta* Arnold *et al.* 2007 and *Timon* Tschudi, 1836 as recognized to date, diverged from other species within their genus about 10 Million years ago.

Coupled with significant morphological differences, this makes a compelling case for the divergent taxa to be placed in new genera.

As there are no available names, the relevant taxa are herein placed within genera newly named according to the rules of the *International Code of Zoological Nomenclature* (Third edition) (Ride *et al.* 1999).

The species *Atlantolacerta andreanskyi* (Werner, 1929) is also sufficiently divergent from others within the tribe Eremiadini to warrant being placed within its own monotypic tribe, which is where Arnold *et al.* (2007) had placed the taxon. It is therefore placed in a new tribe, namely Atlantolacertiini *tribe nov.*

Keywords: Taxonomy; snakes; nomenclature; lizards; Lacertidae; *Atlantolacerta*; *Phoenicolacerta*; *Timon*; *andreanskyi*; genus; genera; new genera; *Duboisilacerta*; *Greerlacerta*; new tribe; Atlantolacertiini.

INTRODUCTION

As part of an ongoing audit of the world's reptiles, including snakes and lizards, a review of the generic level placement of species within the Lacertidae as of 2015 found that the excellent reclassification of the Lacertidae by Arnold *et al.* (2007), largely resolved the issue of species assigned to wrong genera (prior to that publication).

Their paper reassigned species to various genera and when none were available, several were erected.

In spite of the excellent reclassification of the Lacertidae by Arnold *et al.* (2007), now widely accepted by most herpetologists, two genera as widely recognized, consist of taxa sufficiently divergent to warrant being placed in their own genera.

Molecular studies (e.g. Pyron *et al.* 2013, Tamar *et al.* 2015) indicated that the most divergent species within the genera *Phoenicolacerta* Arnold *et al.*, 2007 and *Timon* Tschudi, 1836 as recognized to date, diverged from other species within their genus about 10 Million years ago.

Coupled with significant morphological differences that have been known for a long time, this makes a compelling case for the divergent taxa to be placed in new genera.

As there are no available names, the relevant taxa are herein

placed within genera newly named according to the rules of the *International Code of Zoological Nomenclature* (Third edition) (Ride *et al.* 1999).

The species *Atlantolacerta andreanskyi* (Werner, 1929) is also sufficiently divergent from others within the tribe Eremiadini to warrant being placed within its own monotypic tribe, which is where Arnold *et al.* (2007) had placed the taxon. It is therefore placed in a new tribe, namely Atlantolacertiini *tribe nov.*

The relevant materials and methodology used as a basis for the taxonomic decisions herein include inspection of specimens when in Europe in 1980 as well as a review of all the relevant and available literature available to me in Australia as of mid 2015 and earlier.

Unfortunately records, including photos, notes, computers, disks and the like (all we held at the time) was seized during an illegal armed raid on 17 August 2011 and most of the material relevant to this paper was not returned to me (Court of Appeal, 2014, Magistrates Court of Victoria 2014, VCAT 2015).

I should note that the Court of Appeal, 2014 made a costs order in my favour and in contempt of the court the rogue government department officials have yet to pay me a cent in costs, damages, restitution or compensation.

Rather than delay publication indefinitely in the hope this

material is eventually returned, something that in 2015 I think is unlikely, or that I find time to go on a collecting or research trip to Europe and the currently politically unstable Middle-East or North Africa, the following descriptions are published herein to enable other zoologists to properly assign the relevant taxa and for conservation agencies to better plan management of the relevant taxa, noting the greater degree of uniqueness of the relevant species.

The literature relevant to the taxonomy of the three genera subject to taxonomic actions in this paper, namely *Phoenicolacerta* Arnold *et al.* 2007, *Timon* Tschudi, 1836 and *Atlantolacerta* Arnold *et al.* 2007 is extensive. Publications directly relevant to the taxonomic decisions herein include the following:

Al-Quran (2009), Arets (2003a, 2003b), Arnold *et al.* (2007), Bannert (1994), Bar and Haimovitch (2012), Barbour (1914), Barata *et al.* (2015), Berroneau *et al.* (2010), Bertolotto *et al.* (2004), Bird (1936), Bischoff (1982, 1985a, 1985b, 2005, 2007), Bischoff and Müller (1999), Bischoff *et al.* (1984), Blanford (1874), Boettger (1880), Bonetti (2002), Boulenger (1889, 1891, 1916), Bruekers (2010), Budak and Göcmen (1995), Busack (1987), Castroviejo and Mateo (1998), Cortés (1982), Daudin (1802), Disi *et al.* (2001), Doré *et al.* (2011), Duméril and Bibron (1839), Eiselt (1968, 1969), Engelmann (1933), Esser and Böhme (2009), Frommer (2008), Frynta (1997), Funke (1999), Galán (1931), Galán Regalado (2014), Galán Regalado and Fernandez Arias (1993), Gebhart (2013), Geniez *et al.* (2004), Ghaffari and Parsa (2007), Godinho *et al.* (2005), Gray (1838), Hahne (1994), Hahne and Fenske (1992, 1994), Hediger (1935), Hraoui-Bloquet (2002), Ilgaz and Kumluta^o (2008), In den Bosch (1998, 1999, 2002), In den Bosch *et al.* (2003), Kober (2004, 2013), Kwet (2010) and Trapp (2014), Langerwerf (1981), Lantermann (2005), Lantermann and Lantermann (2013), Lataste (1880), Laurent (1935), Leviton *et al.* (1982), Malkmus (1981, 1982, 1990, 1995, 2003, 2013), Mateo and Castroviejo (1991), Mateo *et al.* (1996, 1999, 2004), Mayer and Bischoff (1996), Mediani *et al.* (2015), Meinig and Schlüpman (1987), Melani (2006), Mertens (1952), Mertens and Wermuth (1965), Michels and Bauer (2004), Modryi *et al.* (2013), Montori *et al.* (2005), Mulder (1998), Müller and Wettstein (1932, 1933), Nathan and Werner (1999), Odierna *et al.* (1990), Pfau (1988), Podnar *et al.* (2009), Pottier *et al.* (2008), Pyron *et al.* 2013, Rutschke (1989), Rykena and Bischoff (1997), Rykena *et al.* (1977), Salvador (1998), Schleich *et al.* (1996), Schlüter (2004, 2012), Schmidtler and Bischoff (1999), Seoane (1885), Sindaco and Jeremcenko (2008), Sindaco *et al.* (1995, 2004), Sprünken and Rutschke (1992), Tamar *et al.* (2015), Trapp (2006), Trold (1999), Trutnau (1975), Warnecke *et al.* (2002), Werner (1929, 1931, 1935, 1936), Wettstein (1960), Wirth (2010), Zauner (2002), Zawadzki (2000, 2013) and sources cited therein.

In terms of the descriptions that follow, the spellings of the names should not be changed unless mandatory under the relevant rules of the *International Code of Zoological Nomenclature*.

GENUS DUBOISLACERTA GEN. NOV.

Type species: *Lacerta princeps* Blanford, 1874.

Currently widely known as *Timon princeps* (Blanford, 1874).

Diagnosis: The genera *Duboislacerta gen. nov.* and *Timon* Tschudi, 1836 differ from all other Lacertidae by the following suite of characters: larger adult body sizes (100-210 mm or more from snout to vent); maxillary-jugal suture not stepped, medial loop of clavicle more often interrupted posteriorly, occipital scale more frequently very broad, dorsal body scales not always keeled; no narrow light stripes in dorsal pattern, often well defined blue ocelli on flanks, hemipenial microornamentation of hook-shaped spines, 32 single-armed and 2 double-armed macrochromosomes and two microchromosomes.

The genus *Duboislacerta gen. nov.* is separated from *Timon* by having long recurved spines occurring on the hemipenial lobe

flanks, a state not seen in *Timon*. In *Duboislacerta gen. nov.* the nasal process of premaxilla is slender, versus broad in the genus *Timon*.

Arnold *et al.* (2007) wrote: "*Timon* consists of two distinct units: the *Timon lepidus* group of the western Mediterranean region (*T. lepidus*, *T. pater*, *T. tangitanus*) and *T. princeps* of southwest Asia. It is this second identified group that consists *Duboislacerta gen. nov.*"

Distribution: Iran, Iraq, Turkey, Syria.

Etymology: Excluding the obvious reference in the name to the genus being within the Lacertidae, the genus is named in honour of Dr Alain Dubois, who in 2014 was working at Muséum National

d'Histoire Naturelle, Department of Systematics and Evolution, in Paris, France.

This is in recognition for his defence of the zoological code (Ride *et al.* 1999) and previous versions of the same document from taxonomic vandalism by others who set to operate outside of the code and use their own coined names in favour of properly proposed scientific names.

Dubois publicly supported the works of Wells and Wellington (1983 and 1985) in the face of unwarranted attacks from others who sought to steal the work of these authors and put their own coined names on the taxa first scientifically described by Wells and Wellington (Dubois *et al.* 1988).

More recently, he defended the code from similar actions by others and highlighted improper actions within the ICZN secretariat by people who had apparently hijacked the organisation to further their own unscientific, code violating activities (Dubois 2005).

In 2014, Dubois came out in support of myself against the reckless and unwarranted attacks by the Wüster gang, as stated via the documents Kaiser (2012a, 2012b, 2013, 2014a, 2014b) and Kaiser *et al.* (2013), (Dubois 2014).

I have no hesitation in having etymologies for species in honour of people who have made significant and lasting contributions to science and in this case the actions of Alain Dubois are clearly worthy of such recognition.

I also make no apologies for naming more than one species or genus in honour of such a person and in recognition of the work of such worthy people.

Content: *Duboislacerta princeps* (Blanford, 1874) (type species); *D. kurdistanica* (Suchow, 1936).

GENUS GREERLACERTA GEN. NOV.

Type species: *Lacerta kulzeri* Müller and Wettstein, 1932.

Diagnosis: Treated here as a monotypic genus, there are quite likely three full species within the *Greerlacerta kulzeri* complex based on the findings of Tamar *et al.* 2015.

Greerlacerta gen. nov. and *Phoenicolacerta* Arnold *et al.*, 2007 are separated from all other Lacertidae by the following suite of characters:

Pterygoid teeth sometimes present, sternal fontanelle occasionally weakly heart-shaped, occipital scale often broad; five upper labial scales in front of subocular, apical sections of hemipenial lobes longer than basal ones, their sulcal lips large. Other more widely distributed features include: head and body not or moderately depressed, seven to eleven premaxillary teeth in adults, usual number of presacral vertebrae 26 in males, inscriptional ribs frequently absent, tail not brightly coloured in hatchlings; hemipenial microornamentation of crownshaped tubercles.

They are small to medium-sized Lacertini up to about 90 mm from snout to vent; adult males larger than females. Head and body not or moderately depressed and head very large in some male *Phoenicolacerta laevis*.

There are seven to eleven premaxillary teeth; pterygoid teeth sometimes present; nasal process of premaxilla slender;

postfrontal and postorbital bones separate and postorbital often relatively short; maxillary-jugal suture not stepped. Supraocular osteoderms often complete in adults, occasionally fenestrated.

The post-cranial skeleton is characterised as follows: Usual number of presacral vertebrae 26 in males and 27 in females (ranges 25-26 and 26-28 respectively); usually six posterior presacral vertebrae with short ribs; medial loop of clavicle often continuous but sometimes interrupted posteriorly; lateral arms of interclavicle more or less perpendicular to sagittal axis; sternal fontanelle oval or sometimes weakly heart-shaped; inscriptional ribs frequently absent; pattern of caudal vertebrae A- or B-type.

Scaling is as follows: Rostral separated from frontonasal scale; row of supraciliary granules often complete but not always so; outer edge of parietal scale reaching lateral border of parietal table posteriorly, and sometimes also anteriorly in *Greerlacerta gen. nov.*; two postnasal scales; no contact between supranasal and anterior loreal above nostril; five upper labial scales in front of subocular; first upper temporal scale large; masseteric scale often but not always present (absent in some *Greerlacerta gen. nov.*). Dorsal body scales small but clearly keeled, especially in males. Collar more or less smooth, six or eight longitudinal rows of ventral scales; preanal scale relatively large, bordered by one semicircle of smaller subequal scales; scales under toes smooth or tubercular; whorls of scales on tail often more or less subequal.

In colour the flanks are often dark, sometimes with pale spots, and the back plain or dark-speckled with these markings sometimes confined to a broad vertebral band. Dorsal ground colour often brown. No blue ocelli in the shoulder region. Underside white, green, greenish-blue or red; throat colour sometimes differentiated; dark spotting frequent ventrally; blue spots often present on outer row of ventral scales; tail not brightly coloured in hatchlings.

Distinctive internal features are the insertion of retractor lateralis anterior muscle in front of vent lateral, away from mid-line.

Hemipenis is characterised as follows: Lobes with plicae, apical section of each longer than basal one (less so than in *Podarcis* Wagler, 1830), their sulcal lips large; no armature or folding of lobes in retracted hemipenis; microornamentation consisting of crown-shaped tubercles.

There is a diploid number (2n) of chromosomes = 38; 36 single-armed macrochromosomes and 2 microchromosomes; sex chromosomes ZW-type; nucleolar organizer in a medium-small macrochromosome (MS-type).

When mating the males have been observed to bite the flank of females during copulation; clutches consisting of about 2-6 eggs.

These lizards are often climbing on rocks, walls, and sometimes trees, including human habitation and ruins when available and including montane areas.

Greerlacerta gen. nov. is separated from *Phoenicolacerta* Arnold *et al.*, 2007 by the following characters: females are larger than the males (reversed in *Phoenicolacerta*; Arnold *et al.*, 2007),

The mean values of the masseteric / parietal index is small in *Greerlacerta gen. nov.* being 15-27, versus 31-40 in *Phoenicolacerta*.

Young specimens of *Greerlacerta gen. nov.* display bluish or greenish (turquoise) tails, never present in *Phoenicolacerta*.

Adult *Phoenicolacerta* always display blue points on the outer ventrals. Throat and belly are mostly blue, green, yellow or red, especially in adult males (less pronounced in females, missing in juveniles), invariably in all in that genus. However in *Greerlacerta gen. nov.* none of these colours occur at these areas.

Distribution: Higher regions of the Lebanon Mountains including the Antilebanon, at Mount Hermon, at Djabal Druz in Syria, and near Petra in Jordan, and areas occupied by Israel.

Etymology: Named in honour of Dr. Allen E. Greer in recognition of his work on Lizards from various parts of the world and also more significantly for his spirited defence of the *International Code of Zoological Nomenclature* in the 1980's when he caught the wrath of a group now known as the Wüster gang after making a submission published in the *Bulletin of Zoological Nomenclature* (Greer 1988) against the illegal attempt by Richard Shine and others to suppress the works of Wells and Wellington (1984, 1985).

The ICZN in 1991 and again in 2001, accepted the submission of Greer and others and ruled in favour of the works of Wells and Wellington (1984, 1985) in two separate judgements in order to defend the rules of zoology from unscientific attacks.

In the 30 years since 1985, most times other herpetologists have revisited the taxa classified by Wells and Wellington they have upheld the validity of the taxonomic judgements the men made at the time and the nomenclature has followed from this, with these two men properly being cited as the "name authority" for the relevant taxa.

Content: *Greerlacerta kulzeri* Müller and Wettstein, 1932 (treated herein as monotypic, but most likely consisting at least three full species).

TRIBE ATLANTOLACERTINI TRIBE NOV.

(Terminal taxon: *Lacerta andreanskyi* Werner, 1929)

Diagnosis: The tribe is monotypic for the genus *Atlantolacerta* Arnold *et al.* and therefore the current diagnosis for the tribe is as for the genus.

Atlantolacertini *tribe nov.* species are separated from all other Lacertinae by the following suite of characters: Lacks a derived condition of the ulnar nerve, an armature and folded lobes in the hemipenis and from all genus groups except *Omanosaura* Lutz, Bischoff and Mayer, 1986 in possessing

a clavicle loop that is sometimes interrupted behind, and A and B-type caudal vertebrae. Other features

that in combination distinguish it from other genera of tribes Eremiadini and of Lacertini (the only others in the Lacertinae) include the following: small body size, often high numbers of presacral vertebrae (26-28 in males, 29 in females), sternal fontanelle sometimes weakly heart-shaped, edge of parietal scale reaching lateral border of parietal table both posteriorly and anteriorly, one postnasal scale, supranasal scale contacting anterior loreal above nostril; narrow light supraciliary stripes often present; no blue spots on outer ventral scales; outer sulcal lips on lobes of hemipenis large.

Other more widely distributed features found in all of Atlantolacertini *tribe nov.*, Eremiadini and Lacertini include: head and body not strongly depressed and supraocular osteoderms complete in adults, seven premaxillary teeth in adults, inscriptional ribs often present, tail brightly coloured in hatchlings, hemipenial microornamentation of hookshaped spines.

Atlantolacertini *tribe nov.* are smallish lizards being up to about 55 mm from snout to vent; adult females often larger than males; head and body not strongly depressed.

The skull of Atlantolacertini *tribe nov.* is described as follows: Seven premaxillary teeth in adults; pterygoid teeth absent; nasal process of premaxilla slender; postfrontal and postorbital bones separate, subequal in length; maxillary-jugal suture not stepped. Supraocular lamellae complete in adults.

The postcranial skeleton of Atlantolacertini *tribe nov.* is described as follows: Number of presacral vertebrae 26, 27 or 28 in males and 29 in females; six or seven posterior presacral vertebrae with short ribs; medial loop of the clavicle continuous or interrupted posteriorly; lateral arms of interclavicle more or less perpendicular to the sagittal axis; sternal fontanelle oval or weakly heart-shaped; inscriptional ribs often present; pattern of tail vertebrae A- and B-type.

The scaling of Atlantolacertini *tribe nov.* is described as follows:

Rostral separated from frontonasal scale; row of supraciliary granules complete; outer edge of parietal scale reaching lateral border of parietal table both posteriorly and anteriorly. One postnasal scale; supranasal scale in contact with anterior loreal above nostril; four upper labial scales in front of subocular; first upper temporal large, masseteric scale usually well developed. Dorsal scales small and smooth, about 36 to 42 in a transverse row at mid-body. Collar fairly smooth; six longitudinal rows of ventral scales; preanal scale broad and of moderate size, bordered by a semicircle of smaller scales; scales under toes smooth or tubercular; whorls of scales on tail subequal in length.

The colouring of *Atlantolacertini* *tribe nov.* is described as follows: Often with a clear pattern of longitudinal stripes, including a dark vertebral stripe and flanks and narrow light dorsolateral stripes, although pattern may be reduced to spots in some adult males which may be faintly reticulated. Background colour brown or greyish. No blue ocelli in shoulder region. Underside whitish sometimes with a greenish tinge, the throat not differentiated, some dark spotting often present; no blue spots on outer ventral scales. Juveniles have greenish-blue tails. The distinctive internal features of *Atlantolacertini* *tribe nov.* are described as follows: Partial thoracic fascia present; insertion of retractor lateralis anterior muscle in front of vent lateral, away from mid-line.

The hemipenis of *Atlantolacertini* *tribe nov.* is described as follows: Lobes with plicae, apical section of each not longer than basal one, their sulcal lips large; no armature, or folding of lobes in retracted hemipenis; microornamentation consisting of recurved spines.

The chromosomes of *Atlantolacertini* *tribe nov.* is described as follows: Diploid number (2n) = 38; 36 single-armed macrochromosomes and 2 microchromosomes; sex chromosomes ZW-type; position of nucleolar organizer unknown.

Ecology of *Atlantolacertini* *tribe nov.* is described as follows: They are mainly ground-dwelling in a variety of mountain situations: screes and areas with boulders, meadows, among low clump-forming shrubs, and in places without plant cover; frequently found in the vicinity of small watercourses.

Arnold *et al.* (2007) stated: The relatively large and apparently disjunct range of *Atlantolacerta* with populations occurring on isolated 'mountain islands' suggests it may not be a single species. The correct spelling of the name of the one species of *Atlantolacerta* recognised to date is *andreanskyi*, as used in the type description (Werner 1929), rather than *andreanszkyi* (with a "z"). This latter spelling is closer to the real name of the Hungarian botanist, Baron Gábor Andreánzsky (1895-1967), to whom the species was dedicated, and was used subsequently by the describer (Werner 1931), but it does not have priority. Also, it is clear that *andreanskyi* is not a *lapsus calami*, as Werner uses this spelling more than once in his original paper and misspells Andreánzsky's name in a similar way.

The species *Atlantolacerta andreanskyi* (Werner, 1929), as defined by herpetologists at the present time (e.g. Arnold *et al.* 2007) in fact consists of at least six full species (Barata *et al.* 2015).

Distribution: Higher parts of the western and central part of the High Atlas Mountains in Morocco, Africa.

Content: *Atlantolacerta* Arnold *et al.*, 2007 (monotypic).

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CONFLICT OF INTEREST

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

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Two hitherto overlooked subspecies of Papuan Python *Liasis (Apodora) papuana* Peters and Doria, 1878 from New Guinea.

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ABSTRACT

A reassessment of Papuan Olive Pythons, *Liasis (Apodora) papuana* Peters and Doria, 1878, finds that a sensible reclassification is needed.

The genus *Apodora* Kluge, 1993, rejected by Hoser 2000 (and all later papers by myself) and others (e.g. Reynolds *et al.* 2013a, 2013b and 2014) is herein resurrected, but as a subgenus only.

While regional variation has been known for some years (e.g. McDowell, 1973), until now no one has considered affording taxonomic recognition to these forms.

This paper for the first time formally names two morphologically distinct regional races as subspecies.

Notwithstanding this, further studies may require the elevation of one or both forms to full species status.

It is likely that these may be the last large python taxa to be named for the first time from island New Guinea.

Keywords: Taxonomy; snake; python; *Apodora*; *Liasis*; *papuana*; Olive Python; new subgenus; Papua New Guinea; Irian Jaya; new subspecies; *sharonhoserae*; *cyrilhoseri*.

INTRODUCTION

Since 2000, there have been a number of papers reassessing the taxonomy and nomenclature of pythons from New Guinea.

Hoser (2000, 2003, 2004, 2009 and 2012a), in combination provided revisions of all genera and species from New Guinea (including Irian Jaya), with the exception of the New Guinea Olive Python, originally described as *Liasis papuanus* Peters and Doria.

That species was effectively left untouched.

Harvey *et al.* (2000) provided a revision of the Scrub Pythons (*Australiasis*), naming taxa that I had also named in a paper written in 1999, but with the relevant taxonomic acts removed in the final publication (Hoser 2000) on request from co-author of Harvey *et al.* (David G. Barker).

Two papers by Schleich dated 2008 and 2014 can be effectively disregarded from a taxonomic and nomenclatural point of view. They represent holotype examples of taxonomic and nomenclatural vandalism of the worst kind, published in a PRINO (peer reviewed in name only) journal, namely the *Journal of Herpetology*. In both papers, he has created a raft of junior synonyms for *Leiopython* species previously described according to the *International Code of Zoological Nomenclature* as detailed by Hoser (2015).

In passing, I mention that there is now a significant amount of molecular evidence to support the transfer of the New Guinea python species *Liasis boeleni* Brongersma, 1953 to the genus *Lenhoserus* Hoser, 2000 including for example that of Rawlings *et al.* (2008) and Reynolds *et al.* (2013a, 2013b and 2014).

Therefore the name *Lenhoserus boeleni* (Brongersma, 1953) should be used for that taxon.

The species *Liasis papuanus* Peters and Doria as generally defined and recognized, was more recently placed by Kluge in a new monotypic genus *Apodora* in 1993.

While a number of later authors have continued to recognize this genus and use the name *Apodora* (e.g. Rawlings *et al.* 2008, Schleich and O'Shea 2010, Barker *et al.* 2015), I have never done so, instead preferring to treat the taxon as within the established genus *Liasis*.

This remains my position.

However with regards to the sensible arguments presented by authors in both the pro *Apodora* camp (best exemplified by Barker *et al.* 2015) and those in the anti *Apodora* camp (e.g. Reynolds *et al.* 2013a, 2013b and 2014), I have decided to take an action that addresses the arguments of both sides and best reflects the taxonomic reality of the relevant entity.

That is, I herein continue to recognize *Liasis* as the genus encompassing the relevant taxa, that being Australian and New Guinea Olive Pythons, while recognizing the differences between the populations of each major landmass by affording each subgeneric status.

This is effect means recognition of *Apodora* Kluge, 1993 as a subgenus. Hence we have a *comb. nov.* of *Liasis (Apodora) papuana*. In summary I am astounded that this logical action has not been done before.

Because *Apodora* was well defined by Kluge 1993, there is no need for me to formally redefine the subgenus here.

However *Apodora* is readily separated from *Liasis olivaceus* from Australia and all *Katrinus* Hoser, 2000 by the following suite of characters: *Apodora* has a low neural spine on the vertebrae

of the neck and body relative to the other subgenus and genus species, which is believed to be a primitive condition (Scanlon and Mackness, 2002).

Apodora has darkly pigmented skin, including the lining of the mouth and cloaca, and has an extremely long and deeply forked tongue. *Apodora* has thermoreceptive pits in the rostral while this is not the case in other *Liasis*, and such a condition is otherwise only known from some specimens of *K. mackloti*, which may show shallow rostral pits. *Apodora* has 14-17 maxillary teeth, versus 19-20 in *Liasis olivaceus* and higher numbers in *Katrinus*. *Apodora* has 82-88 subcaudals (all divided) versus 100-114 in *Liasis olivaceus*.

Divisions of other python species / genera from New Guinea by Hoser in the post year 2000 period, based on morphological grounds have invariably been confirmed as valid on molecular data.

This includes for example the division of the White-lipped Pythons, formerly known as *Leiopython albertisi* Peters and Doria, 1878 into two species by Hoser (2000), the newly described one being *Leiopython hoseri* Hoser, 2000.

While this division was based on morphology (the two taxa are obviously quite different) (see Hoser 2000), supported by DNA (see for example Schleich 2008, or the publicly available data at Genbank), the obvious geological barrier is the central cordillera of New Guinea.

Leiopython hoseri Hoser, 2000 came from the south while *Leiopython albertisi* Peters and Doria, 1878 is from the north.

This same barrier was clearly the feature that divided populations of Death Adders (*Acanthophis*) as first identified by Hoser (1998) who divided taxa on purely morphological grounds and without consideration of the (in hindsight obvious) natural barrier.

Hoser 2009, became the first herpetologist to resurrect *Chondropython azureus* Meyer, 1874 from the synonymy of *C. viridis* (Schlegel, 1872), two taxa similarly separated by the geological/geographical barrier of the central cordillera.

Harvey *et al.* (2000) and Hoser (2012) provided evidence to show that the Scrub Pythons (*Australiasis*) from north of the Cordillera were a different species level taxon to the specimens found to the south.

Hoser (2012b) found that the species formerly known as *Dendrelaphis lorentzi* (Lidth De Juede, 1911), now of the genus *Charlespiersonserpens* Hoser, 2012, in fact consisted of two morphologically different species level taxa, separated again by the central cordillera.

Revisiting the taxon *Liasis (Apodora) papuana* with a view to assessing the known regional differences, it is self-evident that they deserve taxonomic recognition. Three major populations appear to be separated by the better known barriers in New Guinea, these being the Huon Peninsula in the north-east and more significantly the central cordillera across the middle of the main island.

Hence the nominate form of *L. papuana* is therefore more-or-less confined to the north of the Island of New Guinea, in the general region west of the Huon Peninsula (Upper Morobe District), while the other two forms are found in the far east and south of the main cordillera on the island of New Guinea.

Other than the type population (which includes the synonyms *Liasis tornieri* Werner, 1897 and *Liasis maximus* Werner, 1936) all from the same general area west of the Huon Peninsula on the north of island New Guinea, neither of the other two major populations have available names. So both are formally named herein according to the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

While the likely divergences between the populations are liable to be much the same as for the other python genera referred to above, due to the fact that they have been affected by the same

separation factors, I have chosen to take a conservative position and describe both herein as subspecies.

However if later molecular data is in line with that for other genera such as *Australiasis*, *Leiopython* or *Chondropython* (for which we have available data), at least one of the subspecies named herein will have to be elevated to full species status.

This would of course make *Apodora* a two or more species subgenus.

LIASIS (APODORA) PAPUANA SHARONHOSERAE SUBSP. NOV.

Holotype: Specimen number AMNH 57501 at the American Museum of Natural History, collected in 1935 from 5 miles below Palmer Junction on the Fly River, Western Province, Papua New Guinea.

The American Museum of Natural History, New York, USA, is a facility that allows public access to its holdings.

Paratype: Specimen number: CAS 133803 at the California Academy of Science, an adult specimen collected by Fred Parker on 5 Oct 1969 at Oriomo Station, Oriomo River, PNG. Lat: 8.86, Long, 143.18, Western Province, Papua New Guinea.

Diagnosis: The subspecies *Liasis (Apodora) papuana sharonhoseri subsp. nov.* is readily separated from all other subspecies by the presence of 14 maxillary teeth on either side, versus 15 or more (usually 16) in the others.

The subspecies *Liasis (Apodora) papuana cyrilhoseri subsp. nov.* is readily separated from the other two subspecies by having 11 supralabials, sixth or seventh entering the eye, versus 10 supralabials with the fifth and sixth entering the eye in the other two subspecies. It is further separated from the other two subspecies by the presence of a shallow pit in the third supralabial, which is absent in the others. The subspecies is further separated from the other subspecies by pits in supralabial 1 in all, versus 1 and 2 in most of the rest, and 3 postoculars versus 2 in the other forms.

Etymology: Named in honour of Sharon Menzies (formerly Sharon Hoser), formerly of New Guinea in recognition of her contributions to herpetology.

Distribution: Western Province of Papua New Guinea and nearby parts of Irian Jaya, south of the central cordillera and most common in savannah-type habitats.

LIASIS (APODORA) PAPUANA CYRILHOSERI SUBSP. NOV.

Holotype: Specimen number AMNH 73989 at the American Museum of Natural History, collected on 10 August 1935 by G. M. Tate from Biniguni Village, between Mount Dayman and Collingwood Bay, Milne Bay District, Papua New Guinea. The American Museum of Natural History, New York, USA, is a facility that allows public access to its holdings.

Paratypes: Specimen numbers AMNH 73991, 73992, 73993 at the American Museum of Natural History collected on in August 1935 by G. M. Tate from Biniguni Village or immediately adjacent to it, between Mount Dayman and Collingwood Bay, Milne Bay District, Papua New Guinea.

Diagnosis: The subspecies *Liasis (Apodora) papuana cyrilhoseri subsp. nov.* is readily separated from the other two subspecies by having 11 supralabials, sixth or seventh entering the eye, versus 10 supralabials with the fifth and sixth entering the eye in the other two subspecies. It is further separated from the other two subspecies by the presence of a shallow pit in the third supralabial, which is absent in the others. The subspecies is further separated from the other subspecies by pits in supralabial 1 in all, versus 1 and 2 in most of the rest, and 3 postoculars versus 2 in the other forms.

The subspecies *Liasis (Apodora) papuana sharonhoseri subsp. nov.* is readily separated from all other subspecies by the presence of 14 maxillary teeth on either side, versus 15 or more (usually 16) in the others.

Etymology: Named in honour of Cyril Hoser, of Thanet, UK in recognition of his contributions to herpetology, including

important logistical support for this author when in the UK.

Distribution: Milne Bay along the northern coast to the lower Morobe District in Papua New Guinea.

SUMMARY

These are not the last python or boa taxa in need of formal taxonomic recognition. By ways of examples, the Spotted Pythons (*Antaresia maculosa*) from southern New Guinea are clearly different from those of North Queensland, Australia, meaning that at least subspecies level taxa are within the species. Suarez-Atilano *et al.* (2014) identified what they said was an undescribed species, formerly treated as *Boa constrictor* from the Pacific Coast region of Mexico. However the authors created taxonomic and nomenclatural uncertainty and instability by overlooking the fact that it had in fact been described by Smith (1943). He named it as "*Constrictor constrictor sigma*", thereby meaning the taxon should now be properly identified as *Boa sigma* (Smith, 1943).

FIRST REVISOR'S INSTRUCTIONS

Unless mandatory under the Zoological Rules of the time, no new scientific names are to have spellings altered in any way. In the event of a name conflict (that is a later worker decides both taxa named herein are the same at either subspecies or species level), the name used should be that which comes first by line or page order. That is *sharonhoserae* should take precedence over *cyrilhoseri*.

CONFLICT OF INTEREST

This author reports no conflict of interest in terms of any material within this paper.

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Hitherto overlooked species of reptile from Northern Australia: A result of science, taxonomy, molecular biology, systematics, history and forensic herpetology.

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ABSTRACT

New reptile taxa are identified from Northern Australia.

Following earlier papers involving science, taxonomy, molecular biology and systematics, all involving the elapid species *Pseudonaja guttata* (Parker, 1926) as recognised to date, an audit was done for two large reptile species with identical distribution.

Both were similarly confined to the area known as the Mitchell Downs Grasslands. A habitat region more-or-less split between a large central Queensland section and the mainly Northern Territory section straddling the border with Queensland.

Both species were found to have significant and consistent differences between individuals within each section as opposed to one another. Combined with an audit of Museum records for each taxon as presently recognized yielding disjunct distribution consistent with a known biological barrier, likely to have in existence for about 2 million years, each is herein formally described and named as new species according to the *International Code of Zoological Nomenclature*.

The large varanid species *Pantherosaurus (Aspetosaurus) spenceri* (Lucas and Frost, 1903) as defined by Hoser (2013b) is herein restricted to the Northern Territory and immediately adjacent parts of Western Queensland west of the Selwyn and Waggoobunyah ranges, 86 km west of Mount Isa, Queensland.

The remainder of the specimens from central Queensland in the region generally south of Dajarra and Hughenden is herein described as a new species *Pantherosaurus (Aspetosaurus) maxhoseri* sp. nov..

The elapid species *Demansia rimicola* Scanlon, 2007, is herein confined to the Mitchell Grass Downs of central Queensland.

Populations from the Barkly Tableland in the region generally west of the Selwyn and Waggoobunyah Ranges in West Queensland, and across Northern Australia in suitable habitat are herein described as a new species *Demansia johnscanloni* sp. nov..

Audits of relevant related taxon groups yielded other undescribed taxa which are also formally named herein.

The westernmost population of *Worrellisaurus primordius* (Mertens, 1942) is described as a new subspecies, while the southern and eastern populations of the Perentie *Pantherosaurus (Titanzius) giganteus* (Gray, 1845), has two subspecies named for the first time.

The species *Demansia quaesitor* Shea, 2007 is divided into three subspecies and the westernmost population of *Demansia shinei* Shea, 2007 is also formally defined as a subspecies.

Keywords: Taxonomy; snake; lizard; new species; new subspecies; Queensland; Northern Territory; Western Australia; Whipsnake; Mitchell grass downs; Elapidae; *Pseudonaja guttata*; *Placidaserpens*; *Demansia*; *rimicola*; *johnscanloni*; *quaesitor*; *shinei*; *pelleyorum*; *starkeyi*; *garrodi*; *Varanus*; *spenceri*; *Pantherosaurus*; *Aspetosaurus*; *Worrellisaurus*; *Titanzius*; *primordius*; *maxhoseri*.

INTRODUCTION

In 2009, I published a paper describing new subspecies-level taxa of Brown Snakes (*Pseudonaja*) from various parts of Australia (Hoser, 2009). This was based on a thorough review of existing literature as well as the incorporation of data accumulated from more than 30 years of intensive fieldwork in all mainland Australian states and inspections of specimens in State museums in all mainland Australian states.

Of relevance here is that Hoser (2009) formally divided the taxon *Pseudonaja guttata* (Parker, 1926) as recognised to date into two subspecies, based mainly on the published results of Gillam (1979).

Skinner, *et al.* (2005) published a molecular phylogeny for the genus, finding a within clade sequence divergence of 0.132-4.370 for what he recognized as a single species-level taxon, *P. guttata*. A later paper (Skinner 2009) didn't consider the taxonomy of the species, considering it uncontroversial and settled.

However a year later, Gregory (2010) did consider this very matter. Following on from Hoser (2009), he revisited the idea that the eastern and western populations of *P. guttata* were sufficiently divergent to warrant taxonomic recognition as part of a wider analysis of the *Pseudonaja sensu lato* group.

He agreed with Hoser (2009) in recognizing various subspecies within *Pseudonaja sensu lato* as first named by Hoser and among these he declared *P. guttata whybrowi* Hoser 2009 (the mainly Northern Territory population) to be a valid subspecies. Besides the morphological differences between the two populations as relied upon by Hoser (2009), Gregory also cited the sequence divergence reported by Skinner *et al.* (2005) in support of his contention.

Gregory (2010) also wrote: "It is likely the two populations are – or may be heading towards becoming – separate species."

Of peripheral relevance also is that Gregory produced significant evidence to support the placement of *P. guttata sensu lato* into the genus *Placidaserpens* Wells, 2002, treated as monotypic for *P. guttata sensu lato*, which is a position I also agree with.

In other words the relevant taxa should be known under that generic name.

With a divergence of over 4% between the populations cited by Skinner *et al.* (2005), the well-defined morphological differences between specimens of *whybrowi* (from the NT) and *guttata* (from Qld), based on a clear demarcation gap in distributions shown by all Australian museum accessions records (from the museums including Sydney, Brisbane and Darwin) for all "*Pseudonaja guttata*" my current view is that *whybrowi* should be given full species recognition.

This divergence level (4%) being worthy of species recognition is common in herpetology as seen for example in Avila *et al.* (2008), who described a new species of *Liolaemus* based on a 4% sequence divergence. Harvey *et al.* (2000) subdivided the Scrub Pythons (genus *Australiasis*) based on sequence divergences as little as 2%, relying primarily on morphology and geographical isolation of populations.

In other words, *Pseudonaja guttata*, as most widely known to date, should be removed from the genus *Pseudonaja* Günther, 1858, and treated as two species, these being *Placidaserpens guttata* (Parker, 1926) and *Placidaserpens whybrowi* (Hoser, 2009), noting that Hoser(2009) did foreshadow the potential use of the generic name *Placidaserpens*.

These ultimate conclusions were tentatively reached by Gregory (2009), who if not constrained by the so-called politics of herpetology of the present, would have simply stated the obvious more bluntly.

Gregory however was constrained by the overt actions and in the ever-present shadow of a group of thieves and renegades seeking to suppress the works of myself and Wells (Kaiser 2012, Kaiser *et al.* 2012 and Kaiser *et al.* 2013), who have been operating with the same agenda since 2001 (see for example

Wüster 2001 and Wüster *et al.* 2001) and actively harassing all other herpetologists who seek to use the names of authors whose work they seek to suppress and then steal (Hoser 2012, Hoser 2013a).

Numerous other authors have also discredited the views of Wüster, Kaiser and the gang, as outlined and listed in Hoser (2013a) and many times since (e.g. Cogger 2014).

However none of the preceding is the purpose of this paper, but is rather presented as a preamble to what follows.

With the final summary of the taxonomy of *Placidaserpens* yielding two well demarcated populations of related species, I sought to audit other species as presently recognized confined to the same bioregion, this being the Mitchell Grass Downs of the NT and Queensland to see if they too were divided into separate populations across the same approximate or other boundary and whether or not each should be accorded taxonomic status as either subspecies or species.

For the snakes, the only logical suspect was *Demansia rimicola* Scanlon, 2007 and a check of Australian museum records yielded a similar break in the populations as seen for *Placidaserpens*, across the same geographical barrier.

Inspection of dozens of live specimens also yielded consistent differences indicating taxonomic recognition of each population was warranted.

Within the lizards, I did in the first instance confine my audit to the monitors, with the only species confined to this habitat being *Pantherosaurus (Aspetosaurus) spenceri* (Lucas and Frost, 1903) as defined by Hoser (2013b) and sources cited therein. Australian museum accession records again yielded a similar break in the populations as seen for *Placidaserpens* and at the same geographical location.

Inspection of dozens of live specimens also yielded consistent differences indicating taxonomic recognition of each population was warranted.

It is significant in that as far as I am aware, no one else had previously sought to look at specimens of either above taxon (as currently recognized) with a view to potentially dividing well recognized and wide-ranging species with the initial prompt being a disjunct distribution in their known populations or as a result of similar being the case for an elapid within the same region.

While there is an inherent likelihood that the disjunct distributions for both *Demansia rimicola* and *Pantherosaurus spenceri* as recognized could be a result of non-collection in the relevant zones or sampling error, this was discounted. This was on the basis that the relevant area has in fact been heavily collected and the relevant museums have plenty of other species from the relevant areas, meaning the likelihood of either taxon being missed was remote.

As compensation for the relative impoverishment of reptile species inhabiting the Mitchell Downs Grasslands, the relative abundance and ease of finding those few species inhabiting the area is somewhat improved as compared to more speciose habitats.

This means that the two subject species, both relatively large and obvious reptiles, would be expected to be among the first species encountered in the area if they occurred there.

Also of relevance is that each population of the species as currently recognized does in fact have consistent differences warranting taxonomic recognition, even if the populations were apparently connected.

While it is possible to argue over the taxonomic significance of such features as dorsal mid body scale rows in snakes (as had been done by those arguing against recognition of *Placidaserpens whybrowi*), it is much harder to argue against the molecular evidence of time separation of populations.

With the east and west populations of each taxon apparently affected by the same barriers, it only makes sense to assume all were split by the same geological events and associated habitat

changes at the time (including being hampered in movements by competing species that do better in alternative habitats).

Hence, even without molecular evidence, it is reasonable to assume that the populations of *Pantherosaurus spenceri* (east and west populations) and *Demansia rimicola* (east and west populations) as currently recognized, diverged at around the same time (2 MYA).

However there are other ways to establish the timing of the creation of the barrier that separated the mainly NT populations from the central Queensland ones.

The soils in the plains in the intervening area have been dated at about 1.6 million years of age, indicating a significant change at about that time or earlier. This correlates roughly with the molecular evidence for the division of the two populations of *Placidaserpens*.

While many maps of the Mitchell Downs Grasslands show the two regions (one being mainly in the NT west of Camooweal, Qld, and the other in inland Qld south of Dajarra and Hughenden) connected by a broad swathe running south west of the Dajarra ranges, more detailed maps paint a different picture.

The zone between the two main areas is in fact disjunct and separated by areas of alternative habitat. While these breaks are small and may be thought of as not consisting a significant barrier, they do on the surface appear to be sufficient in their own right to keep the two main areas apart in terms of movement of habitat dependent taxa.

Also significant is the likely extent of the Mitchell Downs Grasslands in the recent past.

While it is hard to read into the past, it is known that the current interglacial has resulted in a considerably warmer and wetter Australia than that of the ice-ages.

With Mitchell Downs Grasslands best suited to a rainfall of between 250-500 mm annually (mainly in summer) (Department of Agriculture, Fisheries and Forestry, Queensland 2014), it is clear that significant parts of this region would not have carried the same grasses when rainfall was lower. This is particularly the case for the narrow strips closest to extant desert, as seen in the zone generally south-west of Mount Isa in Queensland.

This fact, combined with the geographical reality of the Selwyn and Waggoobunyah ranges, 86 km west of Mount Isa, Queensland and part of the Mount Isa Inlier Biogeographical Region, means that an effective barrier between the two main areas would have been present in the glacial periods.

Of note is that a map of current distribution of the Mitchell Downs Grasslands published online by Department of Agriculture, Fisheries and Forestry, Queensland (2014) also shows a distinct gap in the region more-or-less due south of Mount Isa, which corresponds also with the distribution gaps in the relevant species as presently recognized, in effect partitioning the northern Australian Mitchell Downs Grasslands into two distinct sectors.

An added factor implying long-term separation of the relevant populations is the different soil and vegetation regimes in the intervening areas.

A dominant feature in the region south of Mount Isa are the limestone based soils, as opposed to the black cracking soils that typify the Mitchell grass plains elsewhere. Known as the Georgina Limestone sub-bioregion within the Mitchell Grass Downs, the soil type literally splits the two main regions as indicated already.

With surface soils in the area having been dated at around 1.6 MYA in age, it is again reasonable to infer this as being the relevant date of the population splits for the typical Mitchell grass plains taxa on either side of this zone that are apparently unable to cross this zone.

It is on that basis that I hereby treat the populations of *Pantherosaurus spenceri* and *Demansia rimicola* (as recognized to date) as being separated from most, if not all of the past 2 million years and therefore worthy of taxonomic recognition at

the species level.

Also of note are two of the better-known reptile species restricted to Mitchell Grass Downs found in the central Queensland zone and not in the mainly Northern territory sector (beyond the Georgina Limestone sub-bioregion). These are the Collett's Snake *Panacedechis colletti* (Boulenger, 1902) and the Downs Bearded Dragon *Pogona henrylawsoni* Wells and Wellington, 1985.

Relevant molecular phylogenies including both taxa, including the supermatrix as published by Pyron *et al.* (2013) indicates that both are species of recent origin and divergence from other known forms, the former from the taxon *Panacedechis guttata* De Vis, 1905 (as defined by Wells and Wellington 1985) of southern Queensland and northern NSW (or alternatively *Panacedechis papuanus* Peters and Doria, 1878), or vice-versa and *Pogona henrylawsoni* from *Pogona vitticeps* (Ahl, 1926) a widespread Australian species as presently recognized.

While the recent past distribution for the precursor of *Pogona henrylawsoni* is hard to determine, and may in fact be from northwest of the current centre of distribution, it is self evident based on current distribution and known phylogenetic histories of other Australian snakes, that *Panacedechis colletti*, the closely related *Panacedechis guttata* (as identified by molecular data of Wüster *et al.* 2005), or *Panacedechis papuanus* Peters and Doria, 1878 (as identified by the molecular data of Pyron *et al.* 2013) or their immediate ancestors have almost certainly never inhabited the Mitchell Grass Downs of the Northern Territory, due to being stopped from getting there by the extant barrier zone (The Georgina Limestone sub-bioregion within the Mitchell Grass Downs) and quite likely in combination with the competitive advantage afforded to similar and competing species including *Pseudechis (Pailsus) pailsei* (Hoser, 1998).

In line with the preceding, if species status is to be accorded to *Placidaserpens whybrowi*, it would also make sense to do likewise for the as yet unnamed taxonomically distinct forms currently assigned to *Pantherosaurus spenceri* and *Demansia rimicola* from either side of the known barrier to movement of species (that being clearly shown in the Department of Agriculture, Fisheries and Forestry, Queensland (2014) map as published online and elsewhere.

In the extremely unlikely event that a molecular biologist or field zoologist is able to establish recent genetic interchange between the two populations (predating potential translocations post-dating European settlement), there is nothing to stop later herpetologists relegating the below named taxa to subspecies status.

However as the distinctiveness of the separate populations is not at issue and there are ongoing potential threats to them via the human population explosion in Australia and a stated government policy encouraging a "Big Australia", the taxonomic recognition of each should be done as a matter of urgency. This will enable government agencies and conservation bodies to better plan for and manage the relevant taxon gene pools and also highlight the need to conserve suitable areas within each of the major Mitchell Grass Downs zones.

Two other widely distributed *Demansia* species with regionally distinct subpopulations are formally divided into subspecies for the first time. The basis of this action is essentially an objective re-assessment of the data provided by Shea and Scanlon (2007).

The monitor species *Pantherosaurus (Titanzius) giganteus* (Gray, 1845), has a known distribution that is almost a mirror image of that of the Desert Death Adder *Acanthophis pyrrhus* Boulenger, 1898.

Hoser (2014) named two new subspecies, *Acanthophis pyrrhus maryani* from drier parts of Western Australia south of the Pilbara region and away from the southern margins of the state and *Acanthophis pyrrhus moorei* from an elevated site in the Channel Country of south-west Queensland, based on consistent morphological differences. Noting that within the

same geographical range, both species have a preference for the same habitat (hilly areas with rocks and *Spinifex*), specimens of *P. giganteus* were audited to see if there were consistent differences worthy of taxonomic recognition. These were identified and as a result, subspecies from the same general regions are named herein.

For some time there has been significant known variation in colour and scalation in specimens of *Worrellisaurus primordius* (Mertens, 1942) from various localities. An audit showed that in many cases there was as great as or greater variation within localities as opposed to between them. However it became apparent that those specimens found south-west of Darwin, differed significantly from those found near and east of Darwin. The nominate form is clearly that of the Alligator River type of animals based on the original description of Mertens, (Mertens, 1942, Storr 1966) and the holotype itself, meaning that the south-western specimens are taxonomically unrecognized. They are therefore formally named as a subspecies herein based on consistent differences and an apparently allopatric distribution.

The molecular results of Fitch *et al.* (2006) corroborate these actions in showing apparent divergences in relevant taxa they inspected.

PANTHEROSAURUS (ASPETOSAURUS) MAXHOSERI SP. NOV.

Holotype: Specimen number J60056 at the Queensland Museum, Brisbane, Queensland, Australia. It was collected wild from just south of Longreach, Queensland on 5 September 1994 and retained as a preserved specimen. The Queensland Museum is a government facility that allows public access to its collection.

Paratype: Specimen number J73851 at the Queensland Museum, Brisbane, Queensland, Australia. It was collected wild from just south of Longreach, Queensland on 20 December 1997 and retained as a preserved specimen. The Queensland Museum is a government facility that allows public access to its collection.

Diagnosis: Both *Pantherosaurus (Aspetosaurus) maxhoseri sp. nov.* and *P. spenceri* (the entirety of the subgenus *Aspetosaurus* Wells and Wellington, 1985) are separated from all other Australian varanids by the following suite of characters:

The tail is strongly laterally compressed except at the base; there is a distinct double median keel dorsally along the posterior half of the tail; caudal scales are arranged in regular rings, occasionally incomplete on the sides of the tail; the tail is no more than 1.2 times as long as the head and body; the scales on upper side of basal portion of tail are rugose. A detailed description of the colour of both species is in Cogger (2014) who describes them as one.

P. spenceri are separated from *P. maxhoseri sp. nov.* by the following suite of characters: tending towards leucystic towards the snout (except in neonates), a lack of any striations in colouration on the back of upper neck (these being prominent in *P. maxhoseri sp. nov.*), with the markings here instead appearing as distinct broad bands; usually a darkish bluish iris, vs usually red (occasionally blue) in *P. maxhoseri sp. nov.* from Queensland; 8 or less bands between front and back legs (counted from level to the limbs), versus 9 or more in *P. maxhoseri sp. nov.*, meaning *P. spenceri* has noticeably broader bands; the upper labials in front of the eye are more light than dark versus more dark than light in *P. maxhoseri sp. nov.*, many specimens of *P. spenceri* have large black dots on the gular fold below the line of the ear (e.g. top of page 784 in Cogger, 2014).

Varanus ingrami Boulenger, 1906 is a junior synonym for *Pantherosaurus (Aspetosaurus) spenceri* Lucas and Frost, 1903 as recognized herein (type locality Alexandria, Northern Territory, Australia) and by virtue of its location of origin is therefore not an available name for the newly described taxon herein.

Distribution and habitat: The often treeless black soil plains of

Western and central Queensland and immediately adjacent habitats at the boundaries or interfaces between the habitat zones in a region generally bounded by Boulia in the north-west, McKinlay and Hughenden in the north, Alpha and Tambo in the east, Adavale in the south and Bedourie in the south-west.

The species *Pantherosaurus (Aspetosaurus) spenceri* Lucas and Frost, 1903 is hereby restricted to the Barkly Tablelands in a region generally west of Camooweal in western Queensland and encompassing an area mainly within the Northern Territory.

Etymology: *Pantherosaurus (Aspetosaurus) maxhoseri sp. nov.* is named in honour of my cousin Max Hoser of Campbelltown, NSW in recognition for his contributions to herpetology and human services.

WORRELLISAURUS PRIMORDIUS DALYI SUBSP. NOV.

Holotype: A specimen at the Northern Territory Museum, number: NTM R17884 from Elizabeth Downs Station in the Northern Territory, Australia. The Northern Territory Museum is a government-owned facility that allows access to its holdings.

Diagnosis: The subspecies *W. primordius dalyi subsp. nov.* is most easily separated from other *W. primordius* by the presence of an unbroken semicircular ring of whitish yellow colour on the fold above the eye. In other *W. primordius* this ring is broken. In *W. primordius* there is significant speckling on the lower external mouth parts (the scales), particularly near the gular region. By comparison in *W. primordius dalyi subsp. nov.* the speckling is nearly absent or at least markedly reduced.

In *W. primordius dalyi subsp. nov.* there is limited lightening along the labial line, whereas in the nominate form, the lightening is so distinct as to appear to form a line.

Distribution: Known only from the Daly River region and nearby Litchfield National Park. Nominate *W. primordius* occupies the rest of the range for this species.

Etymology: Named in reference to the region the species is known from, that being the Daly River region of the Northern Territory.

PANTHEROSAURUS (TITANZIUS) GIGANTEUS QUEENSLANDENSIS SUBSP. NOV.

Holotype: Specimen number J88440 at the Queensland Museum, Brisbane, Australia, collected in the Barcoo Shire, Queensland, Australia. The Queensland Museum is a government-owned facility that allows access to its holdings.

Paratype: Specimen number J51749 at the Queensland Museum, Brisbane, Australia, collected in the Barcoo Shire, Queensland, Australia.

Diagnosis: The subspecies *Pantherosaurus (Titanzius) giganteus queenslandensis subsp. nov.* is most easily separated from the other two subspecies (the nominate form and *T. giganteus bulliardi subsp. nov.*) by colour.

P. giganteus queenslandensis subsp. nov. is characterised by a lack of distinct markings anterior to the eye as is the nominate subspecies. In *T. giganteus bulliardi subsp. nov.* from southern parts of Western Australia, the anterior snout has a well defined pattern of darker and lighter bars.

In both *T. giganteus bulliardi subsp. nov.* and *T. giganteus giganteus* markings on the back of the neck appear to form well-defined angled cross bands. This is especially the case in *T. giganteus bulliardi subsp. nov.*. However in *P. giganteus queenslandensis subsp. nov.* the markings on the back of the neck are more broken and/or of reticulated pattern, meaning that there are no defined crossbands visible on the neck.

P. giganteus queenslandensis subsp. nov. and *T. giganteus giganteus* are characterised by a pattern of 5-7 distinct black lines or reticulations running from the lower jaw. These are thin, being one scale wide. In *T. giganteus bulliardi subsp. nov.* these lines are two or more scales wide.

T. giganteus bulliardi subsp. nov. also has a well-defined dark line commencing anterior to the eye, running through it and along the temple.

In the other two subspecies the line is so thin and indistinct that it appears as mere etching of the scales to the rear of the eye, as opposed to being a thick line running across the scales. In *P. giganteus queenslandensis* subsp. nov. this line is indistinct anterior to the eye.

Distribution: An apparently isolated population in Western Queensland.

Etiology: Named in reflection of where these lizards are found.

PANTHEROSAURUS (TITANZIUS) GIGANTEUS BULLIARDI SUBSP. NOV.

Holotype: Specimen number R78177 at the Western Australian Museum, Perth, Australia, collected 15 km south of Menzies, Western Australia, 121°05' E, 29°49' S. The Western Australian Museum is a government-owned facility that allows access to its holdings.

Paratype: Specimen number R144588 at the Western Australian Museum, Perth, Australia, collected at Mount Jackson, Western Australia 119°15' E, 30°15' S.

Diagnosis: The subspecies *Pantherosaurus (Titanzius) giganteus bulliardi* subsp. nov. is most easily separated from the other two subspecies (the nominate form and *T. giganteus queenslandensis* subsp. nov.) by colour.

P. giganteus queenslandensis subsp. nov. is characterised by a lack of distinct markings anterior to the eye as is the nominate subspecies. In *T. giganteus bulliardi* subsp. nov. from southern parts of Western Australia, the anterior snout has a well defined pattern of darker and lighter bars.

In both *T. giganteus bulliardi* subsp. nov. and *T. giganteus giganteus* markings on the back of the neck appear to form well-defined angled cross bands. This is especially the case in *T. giganteus bulliardi* subsp. nov.. However in *P. giganteus queenslandensis* subsp. nov. the markings on the back of the neck are more broken and/or of reticulated pattern (the dark lines being noticeably thinner), meaning that there are no defined crossbands visible on the neck.

P. giganteus queenslandensis subsp. nov. and *T. giganteus giganteus* are characterised by a pattern of 5-7 distinct black lines or reticulations running from the lower jaw. These are thin, being one scale wide. In *T. giganteus bulliardi* subsp. nov. these lines are two or more scales wide.

T. giganteus bulliardi subsp. nov. also has a well-defined dark line commencing anterior to the eye, running through it and along the temple.

In the other two subspecies the line is so thin and indistinct that it appears as mere etching of the scales to the rear of the eye, as opposed to being a thick line running across the scales. In *P. giganteus queenslandensis* subsp. nov. this line is indistinct anterior to the eye.

Distribution: Southern Western Australia, including the lower west coast of Western Australia.

Etiology: Named in honour of Perth based herpetologist, Kai Bulliard in recognition of his contributions to the science of herpetology over some decades.

DEMANSIA JOHNSCANLONI SP. NOV.

Holotype: Specimen number R32363, at the Northern Territory Museum from Rockhampton Downs Airstrip, NT. (listed in the online Australian Museums database as *Demansia torquata*). The Northern Territory Museum is a government facility that allows public access to its collection.

Paratypes: Specimens numbers R32390 and R32391 at the Northern Territory Museum from Rockhampton Downs Airstrip, NT. The Northern Territory Museum is a government facility that allows public access to its collection.

Diagnosis: *Demansia rimicola* Scanlon, 2007, is separated from *D. johnscanloni* sp. nov. by the following suite of characters: dorsal colouration is grayish olive dorsally, becoming yellowish grayish posteriorly; the white bar in front of the eye is more or

less even in width, versus *D. johnscanloni* sp. nov. which is yellowish-grayish dorsally both anteriorly and posteriorly and with the white bar in front of the eye being noticeably wider at level with the center of the eye, then becoming narrower below. Both *D. johnscanloni* sp. nov. and *D. rimicola* are separated from other *Demansia* by the following suite of characters: 178-203 ventrals; anterior ventrals lacking a dark median spot or streak, instead, the anterior ventrals each have a pair of dark spots, aligning to form a pair of posteriorly diverging broken dark lines. For further detail see Shea and Scanlon (2007).

Richard Wells has indicated an intention to divide the genus *Demansia* as presently recognized in Australia. Although I am not privy to his review and the ultimate decisions he makes, it is my considered opinion that a split of the genus is warranted at least to subgeneric level on the basis of morphological and available molecular evidence and an action I had intended taking.

Distribution: The black soil plains and immediately adjacent habitats in an area commencing about 90 km west of Mount Isa, Queensland and across the Northern Territory to the region of the West Australian border (including within Western Australia). *Demansia rimicola* Scanlon, 2007 is hereby restricted to central Queensland and southern Queensland, including immediately adjacent parts of South Australia and far western New South Wales.

It is notable that the region of Western Queensland separating the populations of *D. johnscanloni* sp. nov. and *D. rimicola* is inhabited by *D. flagellatio* Wells and Wellington, 1985, which combined with the generally hilly habitat of the relevant region (known as the Mount Isa Inlier Bioregion) is presumably a significant factor in terms of division of the two similar species populations in recent geological times.

Another notable endemic of the region that may have some bearing on the distribution of *Demansia* species is *Pseudechis (pailsus) pailsei* Hoser, 1998, currently only known from this bioregion.

Etiology: Named in honour of John D. Scanlon, formerly of Northbridge (Sydney), Australia, and since resident of several widely spread locations, in recognition for his lifetime contributions to herpetology in Australia.

DEMANSIA QUAESITOR PELLEYORUM SUBSP. NOV.

Holotype: Specimen number: J52510, at the Queensland Museum, Brisbane, Australia, from an opal mine, 52 km West of Vergemont Station, Queensland, Australia, Lat 23.5° S Longitude: 143.0° E. The Queensland Museum, Brisbane, Australia is a facility that allows public access to its holdings.

Paratype: Specimen number: J39472 at the Queensland Museum, Brisbane, Australia, from near Winton in Queensland, Lat. 22.4° S, Long. 143° E.

Diagnosis: The subspecies *Demansia quaesitor pelleyorum* subsp. nov. is essentially similar to the nominate species as described by Shea and Scanlon (2007), but is separated from it by the following: The nape band as seen in *D. quaesitor quaesitor* is absent, except in small juveniles, which usually show traces of it laterally. Further, there is variation in the position of the dark teardrop marking. In some individuals, apparently due to loss of the upper margin, the dark teardrop marking resembles that of *D. angusticeps*, a resemblance heightened by greater development of pale edges to the teardrop, reduction in the posterior extension of the dark transrostral streak to the orbit, coarser marbling of the anterior supralabials, and a strongly variegated and spotted gular region, as opposed to only weakly variegated and spotted in *D. quaesitor quaesitor*.

Demansia quaesitor pelleyorum subsp. nov. is separated from both *D. quaesitor garrodi* subsp. nov. (formally described below) and most *D. quaesitor quaesitor* by having a bluish head as opposed to orangeish.

Demansia quaesitor is defined and separated from other

Demansia species by Shea and Scanlon 2007.

Distribution: Generally drier parts of Northwestern Queensland, Australia, northwest of the type locality, Vergemont Station, Queensland, Australia, to the region surrounding Mount Isa.

Etymology: Named in honour of Doreen (Melbourne), Victoria based snake catcher Mark Pelley and his five daughters for their contributions to reptile awareness and public safety in Victoria.

DEMANSIA QUAESITOR GARRODI SUBSP. NOV.

Holotype: Specimen number R28071 from the Western Australian Museum, collected on Koolan Island, Western Australia, Australia, Lat. 16.1° S, Long. 123.7° E. The Western Australian Museum at Perth, Western Australia is a government owned facility that allows access to its holdings.

Paratypes: Specimen numbers: R47684, R82993, R83863, R83967 and R103730, from the Western Australian Museum, collected on Koolan Island, Western Australia, Australia.

Diagnosis: *Demansia quaesitor garrodi subsp. nov.* is similar in most respects to nominate *D. quaesitor quaesitor*, from which it is separated from it by having a darkish dorsal body colouration, meaning that the nape band is consequently not as pronounced as seen in the nominate form. *Demansia quaesitor pelleyorum subsp. nov.* is separated from both *D. quaesitor garrodi subsp. nov.* and most *D. quaesitor quaesitor* by having a bluish head as opposed to orangeish.

Demansia quaesitor is defined and separated from other *Demansia* species by Shea and Scanlon 2007.

Distribution: Known only from Koolan Island, Western Australia.

Etymology: Named in honour of Nathan Garrod for services to herpetology. His occupation was as a licensed reptile demonstrator in Queensland, Australia.

Garrod was harassed by business rivals, notably Tony Harrison of the Gold Coast, Queensland, who attacked him ruthlessly online and by making threatening phone calls. Furthermore, Harrison orchestrated an armed raid on Garrod's facility by wildlife officers, this being a tactic Harrison has employed a number of times, including on our business here in Melbourne. This sequence of events led to Garrod being in fear of facing criminal charges for hybridising python species he held and a potential jail term.

The stress of this and a relationship break up arising from the business harassment by Harrison led to Garrod taking his own life in early 2015.

DEMANSIA SHINEI STARKEYI SUBSP. NOV.

Holotype: Specimen number: R102712 at the Western Australian Museum, collected at Site Savoury 2, in 23°53'S 120°36'E, Little Sandy Desert, Western Australia, Australia.

Paratype: Specimen number: R127178, at the Western Australian Museum, collected at Nifty Mine, Western Australia, Australia, Lat. 21.65°S Long. 121.57°E.

Diagnosis: *Demansia shinei starkeyi subsp. nov.* are readily separated from nominate *D. shinei* by the presence of a weak dark nuchal collar, as opposed to one that is well-defined, and in the character state of having a narrow pale postocular bar, which does not extend to the temporal scales, versus one that is moderately wide that extends to the temporal scales.

Demansia shinei is defined and separated from other *Demansia* species by Shea and Scanlon 2007.

Distribution: Known only from the type localities in region east of the Pilbara in Western Australia. The nominate form of *Demansia shinei* is known only from drier parts of the Northern Territory and immediately adjacent parts of northern Western Australia.

Etymology: Named in honour of Brian Starkey of Ravenshoe North Queensland, Australia, previously of New South Wales, Australia, in recognition of a lifetime's work with reptiles, often in difficult circumstances.

FIRST REVISOR'S INSTRUCTIONS

Unless mandatory under the rules of zoological nomenclature of the time, no new scientific names formally defined herein are to have spellings altered in any way.

CONFLICT OF INTEREST

This author reports no conflict of interest in terms of any material within this paper.

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A new taxonomy for the *Vipera latastei* species complex (Serpentes: Viperidae).

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ABSTRACT

The Lataste's Viper (*Vipera latastei*) species complex has been the subject of numerous studies in recent years and yet the taxonomy of the group has not been appropriately updated.

This paper presents a new taxonomy for the species complex recognizing eight species, for which names are available for three and five are formally described and named for the first time according to the rules of the International Code of Zoological Nomenclature.

Recognized as full species are the taxa *Vipera latastei* Bosca, 1878, *V. gaditana* (Saint Girons, 1977) and *V. monticola* (Saint-Girons, 1954).

Supported by robust molecular data, allopatry and morphological differences, two new species are described from North Africa, namely *Vipera hoserae* sp. nov. and *Vipera wellsii* sp. nov. and three from Spain, namely *Vipera wellingtoni* sp. nov., *Vipera britoi* sp. nov. and *Vipera veloantoni* sp. nov..

Keywords: Taxonomy; Snake; Viperidae; serpents; Viper; Europe; Spain; Portugal; Morocco; Algeria; Atlas Mountains; Rif Mountains; Hoser; Wells; Wellington; *Vipera*; *latastei*; *monticola*; *gaditana*; *nigricaudata*; new species; *hoserae*; *wellsii*; *wellingtoni*; *britoi*; *veloantoni*.

INTRODUCTION

The Lataste's Viper (*Vipera latastei*) species complex as currently recognized has a distribution centred on the Iberian Peninsula (Spain and Portugal), with outlying populations in northern Morocco, Algeria and Tunisia.

The taxonomic and phylogenetic history of *Vipera latastei* Bosca, 1878, related species and the entire *Vipera* genus (*Vipera* Laurenti, 1768) to date is summarised by Brito *et al.* (2006) and is not repeated here.

Most significantly in terms of the species *Vipera latastei* Bosca, 1878, the current state of play is that most herpetologists recognize either one species only, that being the nominate form, or alternatively, two species, the second being *Vipera monticola* (Saint-Girons, 1954), a taxon originally described as a subspecies and later elevated to full species.

That taxon was described from a holotype from the West High Atlas Mountains in Morocco.

In 1977, Saint-Girons erected a new subspecies *V. latastei gaditana* Saint Girons, 1977, which has been widely recognized in the literature since (e.g. Brito *et al.* 2006, Niskanen and Mappes 2005, Velo-Antón *et al.* 2012 and many others).

The holotype for "*gaditana*" is the southern part of Spain, west of the Gibraltar Strait.

Significant recent studies on the phylogeny, taxonomy and systematics of the *V. latastei* species complex, have shown there to be anything up to 20 discrete and allopatric populations of potential taxonomic significance as identified by Britto *et al.* (2006) (19) and Saint Girons (1977) (one other identified).

The current taxonomy proposed in this paper is based on a review of

the published literature and inspection of relevant material to conservatively assign local populations to one or more species.

MATERIAL, METHODS AND RESULTS

The basis of the following revision included a review of the relevant literature as a starting point and working logically from there.

The results follow from this in the relevant species descriptions.

As mentioned already, using morphological data Britto *et al.* (2006) and Saint Girons (1977) identified 20 apparently allopatric populations and in each case were able to identify consistent morphological differences between each.

Britto *et al.* (2006) reduced their original 19 groups down to 9 which they regarded as having taxonomic significance and presented a series of tables identifying differences between each group.

More recently Velo-Antón *et al.* (2012) published a paper with a detailed molecular phylogeny relevant to the *V. latastei* species complex across their entire known range and including the holotype populations for each form.

They too identified groups worthy of recognition at the species level, the detail of which need not be repeated here except as relevant.

At the time this paper was published in 2012, I was working on a global audit of the Viperidae and had within this ambit intended publishing descriptions of unnamed forms within the *V. latastei* species complex.

However the publication of Velo-Antón *et al.* (2012) identified unnamed clades within the *V. latastei* species complex and so those authors had at the time an effective priority reservation on naming these taxa under the current edition of the *International Code of Zoological Nomenclature*.

Under the recommendations of the *International Code of Zoological*

Nomenclature, Third edition (Ride *et al.* 1999), Appendix A, the Code of Ethics reads as follows:

"Code of Ethics

1. Authors proposing new names should observe the following principles, which together constitute a "Code of Ethics".
2. A zoologist should not publish a new name if he or she has reason to believe that another person has already recognized the same taxon and intends to establish a name for it (or that the taxon is to be named in a posthumous work). A zoologist in such a position should communicate with the other person (or their representatives) and only feel free to establish a new name if that person has failed to do so in a reasonable period (not less than a year).
3. A zoologist should not publish a new replacement name (a nomen novum) or other substitute name for a junior homonym when the author of the latter is alive; that author should be informed of the homonymy and be allowed a reasonable time (at least a year) in which to establish a substitute name.

On that basis I deferred naming any new species within the *V. latastei* species complex for the duration of 2012 and 2013 in order to comply with the Code's ethics.

In fact I chose to allow an extra year (2014) for relevant authors of earlier studies including the most recently published Velo-Antón *et al.* (2012) to assign names to taxa they had identified in their papers and not yet named, but none chose to do so within the relevant time frame.

Noting the fact that all populations within the *V. latastei* species complex are potentially threatened by human activities, or consequences of them, even when resident in "conservation areas", I find that the need to properly identify each taxonomic group outweighs any potential benefit in delaying taxonomic recognition of each group any longer.

Hence I have chosen to do so herein.

I need not mention the ongoing human tidalwave of people, commonly "refugees" from Africa and the Middle-east currently overrunning areas inhabited by these relevant allopatric populations. See also Pleguezuelos *et al.* (2007).

It is not necessary for me to rehash earlier papers by relevant authors to remanufacture their evidence and fraudulently present it as "new" to ostensibly justify my taxonomic actions (as done by Reynolds *et al.* 2013a, 2013b, 2014), although in that case the authors sought to steal the works of others, without crediting them properly, these people being myself (Raymond Hoser) (Hoser 2004), as well as Wells and Wellington (1984, 1985); or similarly Maddock *et al.* (2015) who also sought to steal the work of Wells and Wellington (1985), by illegally renaming the taxon *Acanthophis lancasteri* Wells and Wellington, 1985.

Herein I merely cite and use the evidence acquired by earlier authors by means of proper and ethical citation of their works as a basis to effectively validate my taxonomic decisions.

The new nomenclature within this paper simply follows the taxonomic reality we are faced with.

This paper therefore presents a new taxonomy for the species complex recognizing eight species, for which names are available for three (mentioned already) and five are formally described and named for the first time according to the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

Recognized as full species are the taxa *Vipera latastei* Bosca, 1878, *V. gaditana* (Saint Girons, 1977) and *V. monticola* (Saint-Girons, 1954). I note that each of the latter two taxa were originally described by Saint-Girons as subspecies only.

Supported by robust molecular data showing a minimal divergence of 3 million years for each group named herein, allopatry and morphological differences, two new species are described from North Africa, namely *Vipera hoserae* sp. nov. and *Vipera wellsi* sp. nov. and three from Spain, namely *Vipera wellingtoni* sp. nov., *Vipera britoi* sp. nov. and *Viper veloantoni* sp. nov..

It is because of these obvious factors that I have absolutely no hesitation in describing the new forms as full species as opposed to merely subspecies, noting that by all widely used definitions of species to date, each taxon named herein properly qualifies.

While there is a considerable body of literature and evidence to support the taxonomic conclusions herein, the majority of the most significant material was published in the last 20 years, including the considerable amount of work by José C. Brito, Guillermo Velo-Antón and co-workers, noting that Brito and Guillermo Velo-Antón are not listed as a lead authors for some of the significantly relevant papers. It is for that reason two of the species level taxa are named in their

honour.

Literature significant and relevant in terms of the taxonomy, nomenclature and ongoing conservation requirements within the *Vipera latastei* complex include the following: Beerli *et al.* (1986), Bernis (1968), Billing (2000), Boscá (1878, 1879), Boulenger (1891, 1913), Brito (2003), Brito and Álvares (2004), Brito *et al.* (2006), Brodmann (1987), Busack and Salvador (1984), Daan and Hillenius (1966), Dobiey and Vogel (2007), Engelmann *et al.* (1993), Ferrer and Filella (2011), Garrigues *et al.* (2005), Gruber (1989), Kreiner (2009), Kwet (2010), Kwet and Trapp (2014a, 2014b), Malkmus (1982, 1995, 1997, 2013), Mallow *et al.* (2003), Martínez-Freiria *et al.* (2006, 2010), McDiarmid *et al.* (1999), Mediani *et al.* (2015), Mertens and Müller (1928), Obst (1983), Parellada and Santos (2002), Phelps (2010), Pillet (1994), Pleguezuelos *et al.* (2007), Saint Girons (1953, 1954, 1977), Santos *et al.* (2007), Schleich *et al.* (1996), Schlüter (2009), Schwarzer (1999), Schweiger (2009), Sochurek (1979), Trapp (2014), Trutnau (1975), Velo-Antón *et al.* (2012), Venchi and Sindaco (2006), Weima (2013), Westerström (2010), Wirth (2010) and sources cited therein.

In passing and for completeness snake, I mention a relevant online document.

On a website at:

<http://www.viborasdelapeninsulaiberica.com/viper-articles2.html>

Juan Timms Rangel and Raúl Doblado Regaño

published a document titled:

"*Vipera latastei abulensis* – a new subspecies of viper from the Central mountain range (Sierra de Gredos), in the Iberian Peninsula. Comparative data with the nominate race *Vipera latastei latastei* and the southern race *Vipera latastei gaditana*."

However the so-called description while containing useful information, was not in any way compliant with the *International Code of Zoological Nomenclature* (Third edition) (Ride *et al.* 1999), for several reasons:

Necessary identifying details of the alleged holotype were lacking and the document was only published online and hence not published according to the code, as later admitted by one of the authors.

The document on the website, downloaded in 2015 carried a date of 2005.

Furthermore on 16 August 2014 in a post at:

<http://fieldherping.eu/Forum/viewtopic.php?f=15&t=1988&start=10>

one of the authors disclaimed the work when he posted on that site via an administrator named "Mario".

He wrote:

"Hello Mario,

I did the *V. latastei abulensis* study quite a few years ago, at the time I was pretty sure this was a valid subspecies. Right now I am not so sure about it, in fact I tend to think it is just a separate population with morphological variations. The study has not been published, but I keep it on the website for the sake of information.

Cheers,

Juan"

Hence the the purpose of this paper and the nomenclature of this species, the name "*Vipera latastei abulensis*" is ignored as it is not available and cannot be affixed to any relevant taxon.

The name "*Rhinaspis latastei nigrocaudata* Reuss, 1933" is a junior synonym of *Vipera latastei* as recognized in this paper, meaning it is included within that population, even after the other species named and identified herein are accounted for.

THEFT OF MATERIALS TO IMPEDE SCIENCE AND WILDLIFE CONSERVATION

I also note the following: In 2006 an online petition sponsored by a group of animal-hating pseudo-scientists including Wolfgang Wüster, Mark O'Shea, David John Williams, Bryan Fry and others posted at: <http://www.aussiereptileclassifieds.com/phpPETITION> (Hunter *et al.* 2006) called for my successful wildlife education business (Snakebusters®) and all my other herpetological activity to be shut down by the government of Victoria, Australia.

These men were successful in that after a ruthless five-year campaign, on 17 August 2011, 11 heavily armed police and wildlife officers conducted a highly illegal and violent raid on our family home and research facility. The raid was also a reprisal for several publications I had made that were highly critical of corruption involving the relevant people (e.g. Hoser 1993, 1996, 2010). Myself, my wife and two vulnerable young daughters were arrested at gunpoint and held captive in the kitchen of the house for nine

hours while the facility was ransacked. Besides the unspeakable acts of killing captive snakes and criminal damage to cages and household goods, the raiding officers illegally shut down our business and effectively placed myself under house arrest at gunpoint for some months after the raid.

An application by myself to the Supreme Court of Victoria led to the re-opening of our unlawfully shut down wildlife education business, although much of the damage to the business and our reputation built up over more than 4 decades was irreparable.

Later proceedings resolved in 2014 and 2015, cleared me of dozens of fabricated criminal charges spanning some decades (Magistrates Court Victoria 2014), and a judicial finding that I was legally a cleanskin in that I had never acted illegally (VCAT 2015).

The government was ordered to pay me costs, restitution, compensation and damages (Court of Appeal, 2014), which as of mid 2015 remain unpaid.

Of greater relevance here is that at the time of the raid, research files spanning more than 40 years were taken and never returned, including materials and records relevant to this paper.

Material taken included all the computers, disks, hard drives, backups, cameras, scientific literature and other forms of information and information storage at the facility. All were loaded into the back of a truck and trailer and carted off.

Faced with the dilemma of deciding whether to spend another forty years gathering data, by which time I may be dead from old age, being aged 53 as of 2015, or publishing the relevant paper/s with minimal data, I have opted to publish.

Underlying this motivation has been an increasing concern that a delay to formally identify and name undescribed biodiversity may lead to its extinction before another scientist gets around to the matter.

Engstrom *et al.* (2002) wrote: "The documentation of this diversity must be seen as an activity that is done not just for posterity but for immediate action and protection."

A number of authors including Kaiser (2012a, 2012b, 2013, 2014a and 2014b), Kaiser *et al.* (2013), Naish (2013) and Wüster *et al.* (2014), all part of the group of people effectively controlled by Wolfgang Wüster of Wales, UK, have been highly critical of the fact that I have assigned names to unnamed clades of snakes and more recently for other reptiles. Their unscientific and childish attacks, continued incessantly on social media such as Facebook and Twitter are rejected herein as destabilizing the nomenclature, impeding the progress of science and in some cases putting people's lives at risk. Their ridiculous comments and false and defamatory statements are systematically rebutted by Hoser (2012a, 2012b, 2013, 2015a-f), as well as Cogger (2013, 2014), Dubois (2014), Dubois *et al.* (1988), Eipper (2013), Mutton (2014a, 2014b), Shea (2013a-d), Thomson (2003), Thorpe (2013, 2014a-c), Wellington (2013, 2014a, 2014b), Wells and Wellington (1999), Wells (2013, 2014a, 2014b), and many others, so this history is not reviewed here.

I also note that many taxa formally named by myself for the first time in earlier publications (e.g. Hoser 2000a, 2000b) are in fact threatened species.

Therefore I note the sensible remarks of Engstrom *et al.* (2002) as a perfectly reasonable explanation for the publishing of taxon descriptions for such unnamed groups. This remains the case even if a sizeable amount of my original research, files, photos and data have been stolen (more than once) and therefore cannot be relied upon and incorporated into these contemporary publications.

I also note that I welcome redescriptions of the relevant taxa by later authors unfettered by illegal break ins and thefts by corrupt government officers and if fortunate, even funded by these people, and who will hopefully have time and money to be able to do a more thorough description of the same and other taxa.

One does however expect these and all other herpetologists to abide by the letter and spirit of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999) and all other relevant laws.

NOTES ON THE DESCRIPTIONS THAT FOLLO

Names as spelt for newly named taxa herein should not be changed under any circumstance unless mandatory under the relevant code of Zoological Nomenclature in force at the time, even if gender formation or name formation appears in any way to be incorrect.

In the event a first or subsequent revisor seeks to merge one or more taxa described herein, then the name to be used is that which is published first herein in page priority order in this paper.

That is as follows: *hoserae*; *wellsi*; *wellingtoni*; *britoi*; *veloantoni*.

As for all papers published by this author where new taxa are

named, including all those listed in "Zoobank" (at <http://zoobank.org>) as of this date, and including all published in *Australasian Journal of Herpetology* issue 27 in 2015 (pages 44-51) (as well as the later paper in issues 28 and 29), it is published in accordance with the provisions of the *International Code of Zoological Nomenclature* (the issue in force at the time, this being the fourth edition as of 2015), for the purposes of being a permanent scientific record and so that the names, combinations and the like are available for use by other scientists and users of scientific nomenclature.

This includes all names and combinations listed in pages 52 to 63 of *Australasian Journal of Herpetology* Issue 27, published in 2015 and those published in later issues of the same journal.

SPECIES *VIPERA HOSERAE* SP. NOV.

Holotype: A specimen at the Muséum national d'Histoire naturelle, Paris, France, specimen number: 1961.333 from the Rif Mountains in Morocco, North Africa. This is a government-owned facility that allows access to its holdings.

Paratype: A specimen from the Rif Mountains in Morocco, North Africa, held at the Museum of Natural History, London, United Kingdom, specimen number: BMNH 94.3.22.5. This is a government-owned facility that allows access to its holdings.

Diagnosis: The species *Vipera latastei* Bosca, 1878, including the taxa *V. gaditana* (Saint Girons, 1977), *V. monticola* (Saint-Girons, 1954), *Vipera hoserae* sp. nov., *Vipera wellsii* sp. nov., *Vipera wellingtoni* sp. nov. and *Vipera britoi* sp. nov. are defined as follows: A viper of typical viperine form. It has a triangular-shaped head and distinct nose horn present, with small central head scales, excluding the large supraoculars and sometimes frontal. The rostral scale clearly extends onto the front of the nose-horn which is usually covered by less than nine scales. The raised section is usually covered behind by 4 or more scales, versus 2-3 in *Vipera aspis* (Linnaeus, 1758). The rostral scale is 1.5 to 2 times as deep as wide as compared to 1.5 times or less in *V. aspis*. There are usually 2 rows of scales between the eye and the supralabials. There are usually, but not always 21 dorsal mid-body rows.

Colouration is usually a greyish ground colour, but may be brownish or sometimes reddish. The typical pattern is a wavy or zig-zag dorsal stripe with a darker edge. Belly is usually greyish or blackish, usually with lighter or darker spots. There is often some yellow on the underside of the tail.

Vipera hoserae sp. nov. is readily separated from all the other species within the *V. latastei* species complex by the following unique suite of characters: An average of 134 ventrals (range 133-135), 38 subcaudals in males (range 35-43), 38 subcaudals in females (range 37-40), 7 apical scales (range 6-8), 8 loreals (range 7-9), 21 dorsal mid-body rows, and about a third of specimens have a fragmented nasorostral.

The dorsal mid body scale row count of *V. monticola* (Saint-Girons, 1954) is 19, which readily separates that taxon from *Vipera hoserae* sp. nov., while the other African taxon *V. wellsii* sp. nov. is separated by having 23 dorsal mid-body rows (rarely 22 or 24).

The species *V. monticola* (Saint-Girons, 1954) is readily separated from all the other species within the *V. latastei* species complex by the following unique suite of characters: An average of 136 ventrals (range 134-138), 37 subcaudals in males (range 36-39), 37 subcaudals in females (range 35-40), 5 apical scales (range 4-6), 7 loreals (range 6-8), 19 dorsal mid body scale rows and the nasorostral is always entire.

The species *Vipera wellsii* sp. nov. is readily separated from all the other species within the *V. latastei* species complex by the following unique suite of characters: An average of 125 ventrals (range 121-130), 35 subcaudals in males (range 35-35), 35 subcaudals in females (range 32-37), 5 apical scales (range 4-6), 8 loreals (range 7-9), 23 dorsal mid-body rows (occasionally 22 or 24) and 80 per cent of specimens have a fragmented nasorostral.

All three non-Iberian species within the *V. latastei* complex can be readily separated from them by one or other of a combination of mid-body scale rows and apical scales, the like of which is not seen in Iberian animals, as well as the combinations of characters just given.

Only *V. hoserae* sp. nov. has 21 dorsal midbody rows, a trait shared with Iberian animals, but it is separated from them by the significantly higher number of apical scales.

The species *Vipera britoi* sp. nov. is readily separated from all the other species within the *V. latastei* species complex by the following unique suite of characters: An average of 142 ventrals (range 139-147) this being the highest count within the species complex; 42

subcaudals in males (range 39-46), 35 subcaudals in females (range 33-36), 5 apical scales (range 4-6), 8 loreals (range 7-9), 21 mid-body rows and a nasorostral that is always entire. *Vipera britoi sp. nov.* also differs from all others in the *V. latastei* species complex by females not only having wider heads than in males, but also by the unique trait of having larger head areas than males.

The ground colour of *Vipera britoi sp. nov.* is usually a distinctive silver-grey. The lower upper labials are whitish, with one or two dark triangles on them, with the base on the lip.

The species *Vipera wellingtoni sp. nov.* from the Sierra de Ronda Mountains, Spain, is identical in most respects to nominate *V. latastei* and *V. veloantoni sp. nov.* from the Sierra Nevada Mountains, Spain and separated from others in the *V. latastei* complex by the possession of the following unique suite of characters: An average of 139 ventrals (range 137-142), 42 subcaudals in males (range 39-44), 35 subcaudals in females (range 31-36), 5 apical scales (range 4-6), 7 loreals (range 6-8), 21 dorsal mid-body rows, nasorostral is usually entire.

In life, nominate *V. latastei* and *V. veloantoni sp. nov.* are characterised by an overall light greyish body colouration with a sharp edged zigzag pattern that is usually distinct, although red and brown specimens do occur. By contrast *Vipera wellingtoni sp. nov.* is almost always characterised by a strong reddish-brown colouration with or without a distinct zig-zag pattern.

V. veloantoni sp. nov. is characterised by a relatively thick white line across the rear upper labials, versus a thin line at the same point in *Vipera wellingtoni sp. nov.*, which readily separates the two taxa.

By contrast nominate *V. latastei* is separated from both *V. veloantoni sp. nov.* and *V. wellingtoni sp. nov.* by the possession of a fading lightening on the rear upper labials as opposed to any distinct white line.

Differently however, specimens of *V. latastei* from the north-east of Spain are characterised by a distinctive white bar running along the entire upper labial, which is also not seen in either of the other two species or for that matter any other Spanish species in the *V. latastei* complex.

Vipera wellingtoni sp. nov. is the largest species in the complex, with the following average sizes for each sex being 452.2 mm for males and 424.5 mm for females. In West Iberian and Catalonia, nominate female *V. latastei* do sometimes average larger sizes than for *Vipera wellingtoni sp. nov.*, but this is not the case in males from anywhere.

The species *Vipera gaditana* (Saint Girons, 1977) is readily separated from all the other species within the *V. latastei* species complex by the following unique suite of characters: An average of 131 ventrals (range 130-133), (lower than for all other Spanish species in the *V. latastei* complex), an average of 37 subcaudals in females (range 34-42), (being lower than for all other Spanish species in the *V. latastei* complex), 6 apical scales (range 5-7), 11 loreals (range 9-14), (being higher than for all other Spanish species in the *V. latastei* complex), 21 dorsal midbody rows and less than 25 per cent of specimens have a fragmented nasorostral.

The species from Africa as well as *Vipera gaditana* (Saint Girons, 1977) are separated from the other species by an increased division of cephalic scales as compared to the other taxa.

All the above defined species taxa are allopatric in distribution, three being found in North Africa and five on the Iberian Peninsula.

Distribution: Restricted to the Rif Mountain range and the Middle and High Atlas Mountains in Morocco, Africa.

Etymology: Named in honour of my mother, Katrina Hoser, born in Dagenham Essex, UK and now living in Lane Cove North, Sydney, NSW, Australia for valuable services to herpetology globally, and financially supporting the footwear industry and economic development in China.

SPECIES VIPERA WELLSI SP. NOV.

Holotype: A specimen, number 85.4.20.15 in the Museum of Natural History, London, UK, collected from Annaba (Bône), Algeria, Africa. This is a government-owned facility that allows access to its holdings.

Paratypes: Two specimens, numbers 89.12.7.5 and 1920.1.20.2546 in the Museum of Natural History, London, UK, collected from Annaba (Bône), Algeria, Africa. This is a government-owned facility that allows access to its holdings.

Diagnosis: The species *Vipera latastei* Bosca, 1878, including the taxa *V. gaditana* (Saint Girons, 1977), *V. monticola* (Saint-Girons, 1954), *Vipera hoserae sp. nov.*, *Vipera wellsi sp. nov.*, *Vipera wellingtoni sp. nov.* and *Vipera britoi sp. nov.* are defined as follows:

A viper of typical viperine form. It has a triangular-shaped head and distinct nose horn present, with small central head scales, excluding the large supraoculars and sometimes frontal. The rostral scale clearly extends onto the front of the nose-horn which is usually covered by less than nine scales. The raised section is usually covered behind by 4 or more scales, versus 2-3 in *Vipera aspis* (Linnaeus, 1758). The rostral scale is 1.5 to 2 times as deep as wide as compared to 1.5 times or less in *V. aspis*. There are usually 2 rows of scales between the eye and the supralabials. There are usually, but not always 21 dorsal mid-body rows.

Colouration is usually a greyish ground colour, but may be brownish or sometimes reddish. The typical pattern is a wavy or zig-zag dorsal stripe with a darker edge. Belly is usually greyish or blackish, usually with lighter or darker spots. There is often some yellow on the underside of the tail.

Vipera hoserae sp. nov. is readily separated from all the other species within the *V. latastei* species complex by the following unique suite of characters: An average of 134 ventrals (range 133-135), 38 subcaudals in males (range 35-43), 38 subcaudals in females (range 37-40), 7 apical scales (range 6-8), 8 loreals (range 7-9), 21 dorsal mid-body rows, and about a third of specimens have a fragmented nasorostral.

The dorsal mid body scale row count of *V. monticola* (Saint-Girons, 1954) is 19, which readily separates that taxon from *Vipera hoserae sp. nov.*, while the other African taxon *V. wellsi sp. nov.* is separated by having 23 dorsal mid-body rows (rarely 22 or 24).

The species *V. monticola* (Saint-Girons, 1954) is readily separated from all the other species within the *V. latastei* species complex by the following unique suite of characters: An average of 136 ventrals (range 134-138), 37 subcaudals in males (range 36-39), 37 subcaudals in females (range 35-40), 5 apical scales (range 4-6), 7 loreals (range 6-8), 19 dorsal mid body subcaudal rows and the nasorostral is always entire.

The species *Vipera wellsi sp. nov.* is readily separated from all the other species within the *V. latastei* species complex by the following unique suite of characters: An average of 125 ventrals (range 121-130), 35 subcaudals in males (range 35-35), 35 subcaudals in females (range 32-37), 5 apical scales (range 4-6), 8 loreals (range 7-9), 23 dorsal mid-body rows (occasionally 22 or 24) and 80 per cent of specimens have a fragmented nasorostral.

All three non-Iberian species within the *V. latastei* complex can be readily separated from them by one or other of a combination of mid-body scale rows and apical scales, the like of which is not seen in Iberian animals, as well as the combinations of characters just given.

Only *V. hoserae sp. nov.* has 21 dorsal midbody rows, a trait shared with Iberian animals, but it is separated from them by the significantly higher number of apical scales.

The species *Vipera britoi sp. nov.* is readily separated from all the other species within the *V. latastei* species complex by the following unique suite of characters: An average of 142 ventrals (range 139-147) this being the highest count within the species complex; 42 subcaudals in males (range 39-46), 35 subcaudals in females (range 33-36), 5 apical scales (range 4-6), 8 loreals (range 7-9), 21 mid-body rows and a nasorostral that is always entire. *Vipera britoi sp. nov.* also differs from all others in the *V. latastei* species complex by females not only having wider heads than in males, but also by the unique trait of having larger head areas than males.

The ground colour of *Vipera britoi sp. nov.* is usually a distinctive silver-grey. The lower upper labials are whitish, with one or two dark triangles on them, with the base on the lip.

The species *Vipera wellingtoni sp. nov.* from the Sierra de Ronda Mountains, Spain, is identical in most respects to nominate *V. latastei* and *V. veloantoni sp. nov.* from the Sierra Nevada Mountains, Spain and separated from others in the *V. latastei* complex by the possession of the following unique suite of characters: An average of 139 ventrals (range 137-142), 42 subcaudals in males (range 39-44), 35 subcaudals in females (range 31-36), 5 apical scales (range 4-6), 7 loreals (range 6-8), 21 dorsal mid-body rows, nasorostral is usually entire.

In life, nominate *V. latastei* and *V. veloantoni sp. nov.* are characterised by an overall light greyish body colouration with a sharp edged zigzag pattern that is usually distinct, although red and brown specimens do occur. By contrast *Vipera wellingtoni sp. nov.* is almost always characterised by a strong reddish-brown colouration with or without a distinct zig-zag pattern.

V. veloantoni sp. nov. is characterised by a relatively thick white line across the rear upper labials, versus a thin line at the same point in *Vipera wellingtoni* sp. nov., which readily separates the two taxa.

By contrast nominate *V. latastei* is separated from both *V. veloantoni* sp. nov. and *V. wellingtoni* sp. nov. by the possession of a fading lightening on the rear upper labials as opposed to any distinct white line.

Differently however, specimens of *V. latastei* from the north-east of Spain are characterised by a distinctive white bar running along the entire upper labial, which is also not seen in either of the other two species or for that matter any other Spanish species in the *V. latastei* complex.

Vipera wellingtoni sp. nov. is the largest species in the complex, with the following average sizes for each sex being 452.2 mm for males and 424.5 mm for females. In West Iberian and Catalonia, nominate female *V. latastei* do sometimes average larger sizes than for *Vipera wellingtoni* sp. nov., but this is not the case in males from anywhere. The species *Vipera gaditana* (Saint Girons, 1977) is readily separated from all the other species within the *V. latastei* species complex by the following unique suite of characters: An average of 131 ventrals (range 130-133), (lower than for all other Spanish species in the *V. latastei* complex), an average of 37 subcaudals in females (range 34-42), (being lower than for all other Spanish species in the *V. latastei* complex), 6 apical scales (range 5-7), 11 loreals (range 9-14), (being higher than for all other Spanish species in the *V. latastei* complex), 21 dorsal midbody rows and less than 25 per cent of specimens have a fragmented nasorostral.

The species from Africa as well as *Vipera gaditana* (Saint Girons, 1977) are separated from the other species by an increased division of cephalic scales as compared to the other taxa.

All the above defined species taxa are allopatric in distribution, three being found in North Africa and five on the Iberian Peninsula.

Distribution: Known only to occur in the region of the Petite Kabylie Mountains and foothills, Algeria and immediately west of there in North Africa as well as near the capital Algiers, Algeria.

Etymology: Named in honour of Richard Wells (co-author of Wells and Wellington, 1984, 1985), currently of Lismore, NSW, in recognition of a significant contribution to herpetology in Australia over some decades going way beyond those cited papers.

SPECIES VIPERA WELLINGTONI SP. NOV.

Holotype: A specimen, number 94.5.25.12 in the Museum of Natural History, London, UK, collected from Costo del Rei, Spain. This is a government-owned facility that allows access to its holdings.

Diagnosis: The species *Vipera latastei* Bosca, 1878, including the taxa *V. gaditana* (Saint Girons, 1977), *V. monticola* (Saint-Girons, 1954), *Vipera hoseræ* sp. nov., *Vipera wellsi* sp. nov., *Vipera wellingtoni* sp. nov. and *Vipera britoi* sp. nov. are defined as follows: A viper of typical viperine form. It has a triangular-shaped head and distinct nose horn present, with small central head scales, excluding the large supraoculars and sometimes frontal. The rostral scale clearly extends onto the front of the nose-horn which is usually covered by less than nine scales. The raised section is usually covered behind by 4 or more scales, versus 2-3 in *Vipera aspis* (Linnaeus, 1758). The rostral scale is 1.5 to 2 times as deep as wide as compared to 1.5 times or less in *V. aspis*. There are usually 2 rows of scales between the eye and the supralabials. Usually, but not always 21 dorsal mid-body rows.

Colouration is usually a greyish ground colour, but may be brownish or sometimes reddish. The typical pattern is a wavy or zig-zag dorsal stripe with a darker edge. Belly is usually greyish or blackish, usually with lighter or darker spots. There is often some yellow on the underside of the tail.

Vipera hoseræ sp. nov. is readily separated from all the other species within the *V. latastei* species complex by the following unique suite of characters: An average of 134 ventrals (range 133-135), 38 subcaudals in males (range 35-43), 38 subcaudals in females (range 37-40), 7 apical scales (range 6-8), 8 loreals (range 7-9), 21 dorsal mid-body rows, and about a third of specimens have a fragmented nasorostral.

The dorsal mid body scale row count of *V. monticola* (Saint-Girons, 1954) is 19, which readily separates that taxon from *Vipera hoseræ* sp. nov., while the other African taxon *V. wellsi* sp. nov. is separated by having 23 dorsal mid-body rows (rarely 22 or 24).

The species *V. monticola* (Saint-Girons, 1954) is readily separated from all the other species within the *V. latastei* species complex by the following unique suite of characters: An average of 136 ventrals

(range 134-138), 37 subcaudals in males (range 36-39), 37 subcaudals in females (range 35-40), 5 apical scales (range 4-6), 7 loreals (range 6-8), 19 dorsal mid body scale rows and the nasorostral is always entire.

The species *Vipera wellsi* sp. nov. is readily separated from all the other species within the *V. latastei* species complex by the following unique suite of characters: An average of 125 ventrals (range 121-130), 35 subcaudals in males (range 35-35), 35 subcaudals in females (range 32-37), 5 apical scales (range 4-6), 8 loreals (range 7-9), 23 dorsal mid-body rows (occasionally 22 or 24) and 80 per cent of specimens have a fragmented nasorostral.

All three non-Iberian species within the *V. latastei* complex can be readily separated from them by one or other of a combination of mid-body scale rows and apical scales, the like of which is not seen in Iberian animals, as well as the combinations of characters just given.

Only *V. hoseræ* sp. nov. has 21 dorsal midbody rows, a trait shared with Iberian animals, but it is separated from them by the significantly higher number of apical scales.

The species *Vipera britoi* sp. nov. is readily separated from all the other species within the *V. latastei* species complex by the following unique suite of characters: An average of 142 ventrals (range 139-147) this being the highest count within the species complex; 42 subcaudals in males (range 39-46), 35 subcaudals in females (range 33-36), 5 apical scales (range 4-6), 8 loreals (range 7-9), 21 mid-body rows and a nasorostral that is always entire. *Vipera britoi* sp. nov. also differs from all others in the *V. latastei* species complex by females not only having wider heads than in males, but also by the unique trait of having larger head areas than males.

The ground colour of *Vipera britoi* sp. nov. is usually a distinctive silver-grey. The lower upper labials are whitish, with one or two dark triangles on them, with the base on the lip.

The species *Vipera wellingtoni* sp. nov. from the Sierra de Ronda Mountains, Spain, is identical in most respects to nominate *V. latastei* and *V. veloantoni* sp. nov. from the Sierra Nevada Mountains, Spain and separated from others in the *V. latastei* complex by the possession of the following unique suite of characters: An average of 139 ventrals (range 137-142), 42 subcaudals in males (range 39-44), 35 subcaudals in females (range 31-36), 5 apical scales (range 4-6), 7 loreals (range 6-8), 21 dorsal mid-body rows, nasorostral is usually entire.

In life, nominate *V. latastei* and *V. veloantoni* sp. nov. are characterised by an overall light greyish body colouration with a sharp edged zigzag pattern that is usually distinct, although red and brown specimens do occur. By contrast *Vipera wellingtoni* sp. nov. is almost always characterised by a strong reddish-brown colouration with or without a distinct zig-zag pattern.

V. veloantoni sp. nov. is characterised by a relatively thick white line across the rear upper labials, versus a thin line at the same point in *Vipera wellingtoni* sp. nov., which readily separates the two taxa.

By contrast nominate *V. latastei* is separated from both *V. veloantoni* sp. nov. and *V. wellingtoni* sp. nov. by the possession of a fading lightening on the rear upper labials as opposed to any distinct white line.

Differently however, specimens of *V. latastei* from the north-east of Spain are characterised by a distinctive white bar running along the entire upper labial, which is also not seen in either of the other two species or for that matter any other Spanish species in the *V. latastei* complex.

Vipera wellingtoni sp. nov. is the largest species in the complex, with the following average sizes for each sex being 452.2 mm for males and 424.5 mm for females. In West Iberian and Catalonia, nominate female *V. latastei* do sometimes average larger sizes than for *Vipera wellingtoni* sp. nov., but this is not the case in males from anywhere. The species *Vipera gaditana* (Saint Girons, 1977) is readily separated from all the other species within the *V. latastei* species complex by the following unique suite of characters: An average of 131 ventrals (range 130-133), (lower than for all other Spanish species in the *V. latastei* complex), an average of 37 subcaudals in females (range 34-42), (being lower than for all other Spanish species in the *V. latastei* complex), 6 apical scales (range 5-7), 11 loreals (range 9-14), (being higher than for all other Spanish species in the *V. latastei* complex), 21 dorsal midbody rows and less than 25 per cent of specimens have a fragmented nasorostral.

The species from Africa as well as *Vipera gaditana* (Saint Girons, 1977) are separated from the other species by an increased division of cephalic scales as compared to the other taxa.

All the above defined species taxa are allopatric in distribution, three being found in North Africa and five on the Iberian Peninsula.

Distribution: Known only to occur in the region of the Serrania de Ronda Mountains of southern Spain and immediately adjacent areas.

Etymology: Named in honour of Cliff Ross Wellington (co-author of Wells and Wellington, 1984, 1985), currently of Woy Woy, NSW, in recognition of a significant contribution to herpetology in Australia over some decades going way beyond those cited papers.

SPECIES VIPERA BRITOI SP. NOV.

Holotype: A specimen at the Museum of Natural History (Museum d'Histoire naturelle) Geneva, Switzerland (MG), number 1207.87, from Zamora, Spain. This is a government-owned facility that allows access to its holdings.

Diagnosis: The species *Vipera latastei* Bosca, 1878, including the taxa *V. gaditana* (Saint Girons, 1977), *V. monticola* (Saint-Girons, 1954), *Vipera hoseræ* sp. nov., *Vipera wellsi* sp. nov., *Vipera wellingtoni* sp. nov. and *Vipera britoi* sp. nov. are defined as follows: A viper of typical viperine form. It has a triangular-shaped head and distinct nose horn present, with small central head scales, excluding the large supraoculars and sometimes frontal. The rostral scale clearly extends onto the front of the nose-horn which is usually covered by less than nine scales. The raised section is usually covered behind by 4 or more scales, versus 2-3 in *Vipera aspis* (Linnaeus, 1758). The rostral scale is 1.5 to 2 times as deep as wide as compared to 1.5 times or less in *V. aspis*. There are usually 2 rows of scales between the eye and the supralabials. Usually, but not always 21 dorsal mid-body rows.

Colouration is usually a greyish ground colour, but may be brownish or sometimes reddish. The typical pattern is a wavy or zig-zag dorsal stripe with a darker edge. Belly is usually greyish or blackish, usually with lighter or darker spots. There is often some yellow on the underside of the tail.

Vipera hoseræ sp. nov. is readily separated from all the other species within the *V. latastei* species complex by the following unique suite of characters: An average of 134 ventrals (range 133-135), 38 subcaudals in males (range 35-43), 38 subcaudals in females (range 37-40), 7 apical scales (range 6-8), 8 loreals (range 7-9), 21 dorsal mid-body rows, and about a third of specimens have a fragmented nasorostral.

The dorsal mid body scale row count of *V. monticola* (Saint-Girons, 1954) is 19, which readily separates that taxon from *Vipera hoseræ* sp. nov., while the other African taxon *V. wellsi* sp. nov. is separated by having 23 dorsal mid-body rows (rarely 22 or 24).

The species *V. monticola* (Saint-Girons, 1954) is readily separated from all the other species within the *V. latastei* species complex by the following unique suite of characters: An average of 136 ventrals (range 134-138), 37 subcaudals in males (range 36-39), 37 subcaudals in females (range 35-40), 5 apical scales (range 4-6), 7 loreals (range 6-8), 19 dorsal mid body scale rows and the nasorostral is always entire.

The species *Vipera wellsi* sp. nov. is readily separated from all the other species within the *V. latastei* species complex by the following unique suite of characters: An average of 125 ventrals (range 121-130), 35 subcaudals in males (range 35-35), 35 subcaudals in females (range 32-37), 5 apical scales (range 4-6), 8 loreals (range 7-9), 23 dorsal mid-body rows (occasionally 22 or 24) and 80 per cent of specimens have a fragmented nasorostral.

All three non-Iberian species within the *V. latastei* complex can be readily separated from them by one or other of a combination of mid-body scale rows and apical scales, the like of which is not seen in Iberian animals, as well as the combinations of characters just given.

Only *V. hoseræ* sp. nov. has 21 dorsal midbody rows, a trait shared with Iberian animals, but it is separated from them by the significantly higher number of apical scales.

The species *Vipera britoi* sp. nov. is readily separated from all the other species within the *V. latastei* species complex by the following unique suite of characters: An average of 142 ventrals (range 139-147) this being the highest count within the species complex; 42 subcaudals in males (range 39-46), 35 subcaudals in females (range 33-36), 5 apical scales (range 4-6), 8 loreals (range 7-9), 21 mid-body rows and a nasorostral that is always entire. *Vipera britoi* sp. nov. also differs from all others in the *V. latastei* species complex by females not only having wider heads than in males, but also by the unique trait of having larger head areas than males.

The ground colour of *Vipera britoi* sp. nov. is usually a distinctive

silver-grey. The lower upper labials are whitish, with one or two dark triangles on them, with the base on the lip.

The species *Vipera wellingtoni* sp. nov. from the Sierra de Ronda Mountains, Spain, is identical in most respects to nominate *V. latastei* and *V. veloantoni* sp. nov. from the Sierra Nevada Mountains, Spain and separated from others in the *V. latastei* complex by the possession of the following unique suite of characters: An average of 139 ventrals (range 137-142), 42 subcaudals in males (range 39-44), 35 subcaudals in females (range 31-36), 5 apical scales (range 4-6), 7 loreals (range 6-8), 21 dorsal mid-body rows, nasorostral is usually entire.

In life, nominate *V. latastei* and *V. veloantoni* sp. nov. are characterised by an overall light greyish body colouration with a sharp edged zigzag pattern that is usually distinct, although red and brown specimens do occur. By contrast *Vipera wellingtoni* sp. nov. is almost always characterised by a strong reddish-brown colouration with or without a distinct zig-zag pattern.

V. veloantoni sp. nov. is characterised by a relatively thick white line across the rear upper labials, versus a thin line at the same point in *Vipera wellingtoni* sp. nov., which readily separates the two taxa.

By contrast nominate *V. latastei* is separated from both *V. veloantoni* sp. nov. and *V. wellingtoni* sp. nov. by the possession of a fading lightening on the rear upper labials as opposed to any distinct white line.

Differently however, specimens of *V. latastei* from the north-east of Spain are characterised by a distinctive white bar running along the entire upper labial, which is also not seen in either of the other two species or for that matter any other Spanish species in the *V. latastei* complex.

Vipera wellingtoni sp. nov. is the largest species in the complex, with the following average sizes for each sex being 452.2 mm for males and 424.5 mm for females. In West Iberian and Catalonia, nominate female *V. latastei* do sometimes average larger sizes than for *Vipera wellingtoni* sp. nov., but this is not the case in males from anywhere. The species *Vipera gaditana* (Saint Girons, 1977) is readily separated from all the other species within the *V. latastei* species complex by the following unique suite of characters: An average of 131 ventrals (range 130-133), (lower than for all other Spanish species in the *V. latastei* complex), an average of 37 subcaudals in females (range 34-42), (being lower than for all other Spanish species in the *V. latastei* complex), 6 apical scales (range 5-7), 11 loreals (range 9-14), (being higher than for all other Spanish species in the *V. latastei* complex), 21 dorsal midbody rows and less than 25 per cent of specimens have a fragmented nasorostral.

The species from Africa as well as *Vipera gaditana* (Saint Girons, 1977) are separated from the other species by an increased division of cephalic scales as compared to the other taxa.

All the above defined species taxa are allopatric in distribution, three being found in North Africa and five on the Iberian Peninsula.

Distribution: Restricted to the northern part of the Western Iberian Peninsula. It is believed that a population of the species may also occur in the south-west Iberian Peninsula as well.

Etymology: Named in honour of José C. Brito, of CIBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, Universidade do Porto, Campus Agrário de Vairão, Rua Padre Armando Quintas, nº 7, 4485-661 Vairão, Portugal, in recognition of his services to herpetology, in particular the taxa relevant to this paper.

SPECIES VIPERA VELOANTONI SP. NOV.

Holotype: A specimen at the Museum of Natural History (Museum d'Histoire naturelle) Geneva, Switzerland (MG), number 1353.02, from Sierra Nevada, Spain. This is a government-owned facility that allows access to its holdings.

Paratype: A specimen at the Museum of Natural History (Museum d'Histoire naturelle) Geneva, Switzerland (MG), number 1353.03, from Sierra Nevada, Spain. This is a government-owned facility that allows access to its holdings.

Diagnosis: The species *Vipera latastei* Bosca, 1878, including the taxa *V. gaditana* (Saint Girons, 1977), *V. monticola* (Saint-Girons, 1954), *Vipera hoseræ* sp. nov., *Vipera wellsi* sp. nov., *Vipera wellingtoni* sp. nov. and *Vipera britoi* sp. nov. are defined as follows: A viper of typical viperine form. It has a triangular-shaped head and distinct nose horn present, with small central head scales, excluding the large supraoculars and sometimes frontal. The rostral scale clearly extends onto the front of the nose-horn which is usually covered by less than nine scales. The raised section is usually covered behind by 4 or more scales, versus 2-3 in *Vipera aspis*

(Linnaeus, 1758). The rostral scale is 1.5 to 2 times as deep as wide as compared to 1.5 times or less in *V. aspis*. There are usually 2 rows of scales between the eye and the supralabials. There is usually, but not always 21 dorsal mid-body rows.

Colouration is usually a greyish ground colour, but may be brownish or sometimes reddish. The typical pattern is a wavy or zig-zag dorsal stripe with a darker edge. Belly is usually greyish or blackish, usually with lighter or darker spots. There is often some yellow on the underside of the tail.

Vipera hoserae sp. nov. is readily separated from all the other species within the *V. latastei* species complex by the following unique suite of characters: An average of 134 ventrals (range 133-135), 38 subcaudals in males (range 35-43), 38 subcaudals in females (range 37-40), 7 apical scales (range 6-8), 8 loreals (range 7-9), 21 dorsal mid-body rows, and about a third of specimens have a fragmented nasorostral.

The dorsal mid body scale row count of *V. monticola* (Saint-Girons, 1954) is 19, which readily separates that taxon from *Vipera hoserae* sp. nov., while the other African taxon *V. wellsi* sp. nov. is separated by having 23 dorsal mid-body rows (rarely 22 or 24).

The species *V. monticola* (Saint-Girons, 1954) is readily separated from all the other species within the *V. latastei* species complex by the following unique suite of characters: An average of 136 ventrals (range 134-138), 37 subcaudals in males (range 36-39), 37 subcaudals in females (range 35-40), 5 apical scales (range 4-6), 7 loreals (range 6-8), 19 dorsal mid body scale rows and the nasorostral is always entire.

The species *Vipera wellsi* sp. nov. is readily separated from all the other species within the *V. latastei* species complex by the following unique suite of characters: An average of 125 ventrals (range 121-130), 35 subcaudals in males (range 35-35), 35 subcaudals in females (range 32-37), 5 apical scales (range 4-6), 8 loreals (range 7-9), 23 dorsal mid-body rows (occasionally 22 or 24) and 80 per cent of specimens have a fragmented nasorostral.

All three non-Iberian species within the *V. latastei* complex can be readily separated from them by one or other of a combination of mid-body scale rows and apical scales, the like of which is not seen in Iberian animals, as well as the combinations of characters just given.

Only *V. hoserae* sp. nov. has 21 dorsal midbody rows, a trait shared with Iberian animals, but it is separated from them by the significantly higher number of apical scales.

The species *Vipera britoi* sp. nov. is readily separated from all the other species within the *V. latastei* species complex by the following unique suite of characters: An average of 142 ventrals (range 139-147) this being the highest count within the species complex; 42 subcaudals in males (range 39-46), 35 subcaudals in females (range 33-36), 5 apical scales (range 4-6), 8 loreals (range 7-9), 21 mid-body rows and a nasorostral that is always entire. *Vipera britoi* sp. nov. also differs from all others in the *V. latastei* species complex by females not only having wider heads than in males, but also by the unique trait of having larger head areas than males.

The ground colour of *Vipera britoi* sp. nov. is usually a distinctive silver-grey. The lower upper labials are whitish, with one or two dark triangles on them, with the base on the lip.

The species *Vipera wellingtoni* sp. nov. from the Sierra de Ronda Mountains, Spain, is identical in most respects to nominate *V. latastei* and *V. veloantoni* sp. nov. from the Sierra Nevada Mountains, Spain and separated from others in the *V. latastei* complex by the possession of the following unique suite of characters: An average of 139 ventrals (range 137-142), 42 subcaudals in males (range 39-44), 35 subcaudals in females (range 31-36), 5 apical scales (range 4-6), 7 loreals (range 6-8), 21 dorsal mid-body rows, nasorostral is usually entire.

In life, nominate *V. latastei* and *V. veloantoni* sp. nov. are characterised by an overall light greyish body colouration with a sharp edged zigzag pattern that is usually distinct, although red and brown specimens do occur. By contrast *Vipera wellingtoni* sp. nov. is almost always characterised by a strong reddish-brown colouration with or without a distinct zig-zag pattern.

V. veloantoni sp. nov. is characterised by a relatively thick white line across the rear upper labials, versus a thin line at the same point in *Vipera wellingtoni* sp. nov., which readily separates the two taxa.

By contrast nominate *V. latastei* is separated from both *V. veloantoni* sp. nov. and *V. wellingtoni* sp. nov. by the possession of a fading lightening on the rear upper labials as opposed to any distinct white line.

Differently however, specimens of *V. latastei* from the north-east of

Spain are characterised by a distinctive white bar running along the entire upper labial, which is also not seen in either of the other two species or for that matter any other Spanish species in the *V. latastei* complex.

Vipera wellingtoni sp. nov. is the largest species in the complex, with the following average sizes for each sex being 452.2 mm for males and 424.5 mm for females. In West Iberian and Catalonia, nominate female *V. latastei* do sometimes average larger sizes than for *Vipera wellingtoni* sp. nov., but this is not the case in males from anywhere.

The species *Vipera gaditana* (Saint Girons, 1977) is readily separated from all the other species within the *V. latastei* species complex by the following unique suite of characters: An average of 131 ventrals (range 130-133), (lower than for all other Spanish species in the *V. latastei* complex), an average of 37 subcaudals in females (range 34-42), (being lower than for all other Spanish species in the *V. latastei* complex), 6 apical scales (range 5-7), 11 loreals (range 9-14), (being higher than for all other Spanish species in the *V. latastei* complex), 21 dorsal midbody rows and less than 25 per cent of specimens have a fragmented nasorostral.

The species from Africa as well as *Vipera gaditana* (Saint Girons, 1977) are separated from the other species by an increased division of cephalic scales as compared to the other taxa.

All the above defined species taxa are allopatric in distribution, three being found in North Africa and five on the Iberian Peninsula.

Distribution: Centred on the Sierra Nevada, southern Spain and immediately adjacent mainly hilly habitat to the north.

Etymology: Named in honour of Guillermo Velo-Antón of Centro de Investigación em Biodiversidade e Recursos Genéticos, Universidade do Porto, Campus Agrário de Vairão, R. Padre Armando Quintas, 4485-661 Vairão, Portugal, in recognition of his services to herpetology, in particular the taxa relevant to this paper.

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CONFLICT OF INTEREST

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

**Australian agamids: Eighteen new species from the genera
Amphibolurus Wagler, 1830, *Lophognathus* Gray, 1842, *Rankinia*
Wells and Wellington, 1984, *Diporiphora* Gray, 1842, *Tympanocryptis*
Peters, 1863, as well as three new genera and six new subgenera.**

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ABSTRACT

To correct anomalies in recently published studies, a total of eighteen new species, three new genera and six new subgenera are described herein according to the *International Code of Zoological Nomenclature*.

The type species for the genus *Amphibolurus* Wagler, 1830, the well known Jacky Lizard *Amphibolurus muricatus* (White, 1970) has long been known to be composite in terms of phylogenetic origins, but in spite of this has been treated by recent authors as being of a single species (see Cogger *et al.* 1983).

One of four divergent clades was referred to a new species *Amphibolurus norrisi* Witten and Coventry, 1984, which has been widely accepted since.

Notwithstanding this, three other divergent clades, as identified by Melville *et al.* (2011) remain undescribed.

The isolated central and western Victorian populations of what until now have been treated as *Amphibolurus muricatus* is herein named *Amphibolurus jacky sp. nov.*, those from North-east New South Wales are named *A. eipperri sp. nov.*; the population of lizards assigned to *Amphibolurus norrisi* west of the Spencer Gulf in South Australia is now named *Amphibolurus adelyn sp. nov.*

In terms of the species *Lophognathus gilberti* Gray, 1842 (type for that genus), the complex been partially divided and yet two obvious and well known species within the complex remain unnamed (Melville *et al.* 2011).

The northern-most population of *Lophognathus centralis* Loveridge (1933), recently transferred to the genus *Amphibolurus* is herein named *Amphibolurus wellsi sp. nov.* and specimens from a western Australian population previously referred to as *Lophognathus gilberti* Gray, 1842 is herein named *Lophognathus wellingtoni sp. nov.*

In terms of the lizards assigned to the species *Rankinia diemensis* (Gray, 1841), only one of at least six obvious species has been named and recognized widely in herpetology. The taxon, *Rankinia boylani* Wells and Wellington, 1984, is herein recognized as valid and four previously identified and yet unnamed taxa within the same species complex are herein formally recognized.

Grampians (Victoria) lizards formerly assigned to *Rankinia diemensis* are herein formally described as *Rankinia neildaviei sp. nov.* while specimens from the Anglesea and central Victoria population are herein named as *Rankinia hoserae sp. nov.* The population from Victoria, just east of Lake Eildon is formally described as *Rankinia jameswhybrowi sp. nov.* while the divergent population from Goonoo National Park, NSW is herein formally described as *Rankinia fergussonae sp. nov.*

Furthermore the divergent taxon *Grammatophora temporalis* Günther, 1867, as widely recognized is herein treated as more than one species, them being most recently placed in the genus *Lophognathus* is herein placed in a new genus. Because *Grammatophora* is not available and no other name is either, a new genus is formally named, *Melvillesaurea gen. nov.*

The genus *Ctenophorus* Fitzinger, 1843 as recognized by Melville *et al.* (2008) and most authors since, is dissected along phylogenetic lines into four genera (three named for the first time) and subgenera, using three available Wells and Wellington names and seven new ones in a continuation of the quite appropriate dismemberment of the genus commenced by Wells and Wellington (1984, 1985) with each group defined properly.

Smith *et al.* (2011), identified what they said were eight deeply divergent clades within the *Diporiphora bilineata* Gray, 1842 species complex and other lesser ones, but did not resolve the taxonomy and nomenclatural issues arising. This paper accounts for the ten main clades by resurrecting available names and formally naming six unnamed and morphologically distinct groups as species. Three new species within the genus *Tympanocryptis* Peters, 1863 are also formally named for the first time.

An unnamed subgenus within *Diporiphora* is also formally described.

Keywords: Taxonomy; Dragon; tree dragon; Australia; Victoria; Northern Territory, South Australia; Western Australia; Richard Wells; Ross Wellington; Jane Melville; Adelyn Hoser; Jacky Hoser; Shireen Hoser, Neil Davie, *Amphibolurus*; *muricatus*; *norrisi*; *Gowidon*; *Lophognathus*; *temporalis*; *gilberti*; *centralis*; *nobbi*; *Rankinia*; *diemensis*; *boylani*; *Ctenophorus*; *Licentia*; *Phthanodon*; *Tachyon* new species; *jacky*; *adelyn*; *eipperri*; *wellingtoni*; *wellsi*; *hoserae*; *neildaviei*; *jameswhybrowi*; *fergussonae*; *melvilleae*; *smithae*; *shooi*; *harmoni*; *nolani*; *garrodi*; *bottomi*; *markteesi*; *alexteesi*; new genera; *Melvillesaurea*; *Notactenophorus*; *Paractenophorus*; *Pseudoctenophorus*; new subgenera; *Chapmanagama*; *Turnbullagama*; *Leucomaculagama*; *Arenicolagama*; *Valenagama*; *Aurantiacoagama*; *Membrumvariegatagama*; *Pailsagama*.

INTRODUCTION

The Jacky Dragon Lizard *Amphibolurus muricatus* (White, 1970) as recognized to date is one of Australia's icon species, being familiar to Australians as an inhabitant of bushland within Australia's largest cities of Sydney and Melbourne.

However only recently with the studies of Melville *et al.* (2011) and Pepper *et al.* (2014) have there been significant molecular studies into the lizards long assigned to this apparently widespread species.

The dismemberment of the species as defined by Cogger *et al.* (1983) and herpetologists before them, commenced in 1984 when Witten and Coventry assigned western individuals to their newly named species *Amphibolurus norrisi*.

Notwithstanding this, four other divergent clades, as identified by Melville *et al.* (2011) remain undescribed.

One of these unnamed species (until now treated as a south-west population of *Amphibolurus muricatus*) has a centre of distribution near Melbourne, Victoria, which as of 2015 is Australia's fastest growing urban metropolis and has a population already of roughly 5 million humans.

Noting the appalling conservation record of the Victorian State Government (of all political persuasions) and their wildlife bureaucrats who in fact control them in terms of relevant activity, it is important that this species (with a 6% mtDNA separation from the nominate *A. muricatus* according to Pepper *et al.* 2014) be formally named and recognized so that someone, somewhere may in fact safeguard the future of the taxon.

A similar situation applies to a population from North-east New South Wales, also currently treated as *A. muricatus*, but with sufficient divergence to be better treated as its own taxonomic entity at the species level. This is described herein as *Amphibolurus epperi sp. nov.*

Recognizing that there is just one other undescribed species level taxon within the *Amphibolurus muricatus* complex besides these two also remaining unnamed, that being the south-west population currently referred to as being within *Amphibolurus norrisi*, it makes sense to properly formalize the taxonomy of the group and name them as well in accordance with the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

The isolated central and western Victorian populations of what until now have been treated as *Amphibolurus muricatus* is herein named *Amphibolurus jacky sp. nov.*, the population of lizards assigned *Amphibolurus norrisi* west of the Spencer Gulf in South Australia is herein named *Amphibolurus adelyn sp. nov.* and as mentioned the name *Amphibolurus epperi sp. nov.* applies to the North east NSW animals.

The same situation applies in terms of the species *Lophognathus gilberti* Gray, 1842 (type for that genus) which has been partially divided and yet two obvious and well known species within the complex remain unnamed as outlined by Melville *et al.* (2011).

The northern-most population of *Lophognathus centralis* Loveridge (1933) (treated for a long time as a variant of *Lophognathus gilberti* Gray, 1842, was recently transferred to *Amphibolurus* by Wilson (2015) on the evidence of Melville *et al.* (2011). This taxon is different to the nominate form of *Lophognathus centralis* Loveridge (1933) from central Australia. It is herein formally named *Amphibolurus wellsii sp. nov.* and specimens from a western Australian population previously referred to as *Lophognathus gilberti* Gray, 1842 is herein named *Lophognathus wellingtoni sp. nov.*

In terms of the lizards assigned to the species *Rankinia diemensis* (Gray, 1841), only one of at least six obvious species has been named and recognized widely in herpetology. The taxon, *Rankinia boylani* Wells and Wellington, 1984, is herein recognized as (quite obviously) valid and four previously identified and yet unnamed taxa within the same species complex are herein formally named for the first time.

Grampians (Victoria) lizards formerly assigned to *Rankinia diemensis* are herein formally described as *Rankinia neildaviei sp. nov.* (3.7% mtDNA divergence from the nominate form according to Ng *et al.* 2014, with this being the least divergent of the four newly named species), while specimens from the Anglesea and central Victoria population are herein named as *Rankinia hoserae sp. nov.*; the population from Victoria, just east of Lake Eildon is formally described as *Rankinia jameswhybrowi sp. nov.* while the divergent population from Goonoo National Park, NSW is herein formally described as *Rankinia fergussonae sp. nov.*

Furthermore the divergent taxon *Grammatophora temporalis* Günther, 1867, herein treated as three (until now synonymised species) species and most recently placed in the genus *Lophognathus* is herein placed in a new genus. Because the name *Grammatophora* is not available (see Cogger *et al.* 1983) and no other name is either, a new genus is formally named, *Melvillesaurea gen. nov.*

The genus *Ctenophorus* Fitzinger, 1843 as recognized by Melville *et al.* (2008) and most authors since, is dissected along phylogenetic lines into four genera (three named for the first time) and ten subgenera, using three available names and seven new ones in a continuation of the dismemberment of the genus commenced by Wells and Wellington (1984, 1985).

The phylogeny produced in Melville *et al.* (2008) generally validated the taxonomic decisions of Wells and Wellington (1984, 1985) who dissected *Ctenophorus* as generally recognized at the time. Their genera *Licentia* Wells and Wellington, 1984; *Phthanodon* Wells and Wellington, 1985; *Tachyon* Wells and Wellington, 1985 and of course *Rankinia* Wells and Wellington, 1984 are all recognized herein.

However, all of *Licentia*, *Phthanodon* and *Tachyon* are relegated to subgenus status herein within *Ctenophorus* on the basis that Melville showed divergences for each group, but it is questionable if this was sufficient for each to be accorded full genus status.

Five other as yet unnamed groups within *Ctenophorus* are formally named for the first time as are the three most divergent groups (another three), which are sufficiently divergent to warrant being treated as full genera as per the phylogenies produced by Pyron *et al.* (2013) and Melville *et al.* (2008).

One of these is also divided into three subgenera.

These groups are also supported by obvious morphological differences.

As a rule, genera defined elsewhere by other authors are not redefined here in this paper.

However within *Ctenophorus sensu lato* (as recognized by most authors to date, including Cogger 2014), each genus and subgenus is defined properly according to the new generic and subgeneric arrangement and the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

Smith *et al.* (2011) identified eight deeply divergent clades within the *Diporiphora bilineata* Gray, 1842 species complex and other lesser divergent groups, two of which were almost as divergent as their preferred eight, but they did not resolve the taxonomy and nomenclatural issues arising.

This is in spite of the authors stating, "we choose to delimit the eight most divergent clades as taxonomic units", but then failing to assign names to most of them. As they have had some four years to correct this omission and not yet done so, it is appropriate that this be done now bearing in mind the following.

For their eight preferred clades, the authors also claimed a "divergence between species (8-12%)".

When this is combined with non-breeding between populations and apparent allopatry in all cases, with the exception being non-cross-breeding sympatry known in one case only, the need to formally name each biological entity is compelling.

The relevant unnamed and named taxonomic units are easily delineated and defined and so are correctly named according to the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

In summary for this species complex, this paper accounts for each species by resurrecting available names and formally naming six unnamed groups as species.

Recognized and defined herein in the *Diporiphora bilineata* Gray, 1842 species complex are the following species: *Diporiphora bilineata* Gray, 1842; *D. lalliae* Storr, 1974; *D. magna* Storr, 1974; *D. jugalaris* (Macleay, 1877), this last listed taxon being resurrected from synonymy of *D. bilineata* to account for the population found in north Queensland.

I note that in spite of the much lampooned Wells and Wellington (1984, 1985) correctly resurrecting that taxon in their papers, their action has been quite forcibly suppressed by a the so-called Wüster gang ever since.

This even postdates the molecular verification of the species by Smith *et al.* (2011).

For the other six unnamed groups (all currently treated as regional variants of *Diporiphora magna* by most herpetologists in Australia,

they are named as follows: *D. melvilleae* sp. nov.; *D. smithae* sp. nov.; *D. shooi* sp. nov., *D. harmoni* sp. nov., *D. nolani* sp. nov. and *D. garrodi* sp. nov..

The widespread taxon *Diporiphora lalliae* Storr, 1974 described from a type specimen from Langey Crossing, Western Australia is known to have two main morphotypes as stated in numerous publications and obvious to anyone familiar with the taxon. These are one from the south Kimberley region of Western Australia (the nominate form) and the other from the rest of the known range (central Australia). The unnamed form is herein described as a new species *D. nolani* sp. nov..

The divergence of the two groups within the *D. lalliae* Storr, 1974 complex is estimated to be in the order of more than 2 million years and therefore sufficient to warrant division at the species level.

Cogger (2014) claimed a total of 21 species in the genus *Diporiphora* (including the species "*Diporiphora superba*" treated as *Diporiphora*), but notes that the total number given is less than the actual diversity.

Wells and Wellington (1984 and 1985) dissected the genus along obvious phylogenetic lines using existing nomenclature or erecting names for groups that lacked any.

While their classification has been effectively unused since published, as the size of the genus expands, it is appropriate that subgenera be named and recognized, to identify obvious phyletic groups.

The only remaining taxon within *Diporiphora* as recognized herein not appropriately placed in any available subgenus is the species *Diporiphora reginae* Glauert, 1959 and it is placed in a newly named subgenus herein called *Pailsagama* gen. nov..

Of the 21 species of *Diporiphora* claimed by Cogger (2014), widely recognized in herpetology in Australia as of 2015, only three are relevant to this paper in terms of the species descriptions herein.

These are:

Diporiphora bilineata Gray, 1842; *D. lalliae* Storr, 1974 and *D. magna* Storr, 1974.

These are defined within this paper within the context of the descriptions of the other newly named taxa and that resurrected from synonymy, this being the taxon *D. jugalaris* (Macleay, 1877) to enable readers to be able to identify and diagnose the relevant species.

The genus *Tympanocryptis* Peters, 1863 has long been recognized as having significant undescribed species diversity. Six new species were named in this paper, but just hours before this paper was to be sent to the printers on 3 November 2015, Doughty *et al.* published a paper naming three of these (Doughty *et al.* 2015).

The (effective) duplicate descriptions of those taxa within the *T. cephalus* Günther, 1867 group (subgenus *Roundacryptus* Wells and Wellington, 1985) have been removed from the final published draft of this paper seen here. The other three species, one formerly treated as a variant of *T. intima* Mitchell, 1948 and the other two formerly treated as variants of *T. lineata* Peters, 1863 are described herein for the first time.

All patronym names are in honour of individuals who have made monumental and relevant contributions to the science of herpetology in Australia and in particular with respect to the relevant agamid genera, with the exception of five species.

Those ones, *Diporiphora nolani* sp. nov., *D. garrodi* sp. nov., *Tympanocryptis bottomi* sp. nov., *T. markteesi* sp. nov. and *T. alexteesi* sp. nov. are named in honour of individuals who have made significant contributions to herpetology in other areas.

MATERIALS AND METHODS

While it is not necessary to cite earlier works when publishing descriptions of new taxa, it worthwhile mentioning some key texts relevant to the preparation of this paper and detail materials and methods at the same time.

All relevant taxa have been inspected by myself across a period spanning more than four decades both live, in specimen collections and via numerous photos of specimens with accurate locality data.

Besides the fact that the newly named species taxa are geographically isolated from one another (within their immediate species complexes, being the species they are most similar to), they are also morphologically distinct.

Until recently this alone would have been regarded as being sufficient grounds to grant each formal taxonomic recognition.

In the post 2010 period, most species are only recognized on the basis of molecular data or some kind of equivalent that establishes a timeline of divergence.

This is adequately done in the papers of Melville *et al.* (2011), Ng *et al.* (2014), Pepper *et al.* (2014) and others.

Examples include estimates of at least 3.5 MYA divergence for the three clades until now treated as *Amphibolurus muricatus* (White, 1790) and 2.3 MYA for the two clades until now treated as *A. norrisi* Witten and Coventry, 1984 (Melville *et al.* 2011, table 5, p. 267).

The three relevant unnamed clades are named within this paper.

Most herpetologists and biologists in other disciplines of zoology recognize reproductive isolation and divergence of over 1.5 MYA as sufficient grounds to consider dividing a species as may have been previously recognized (e.g. Harvey *et al.* 2000).

Melville *et al.* (2011) also correctly pointed out that the species *Lophognathus temporalis* (Günther, 1867) should be placed in a new genus, giving proper reasons for the statement, but then failed to do so.

The basis of the statement was the molecular results (e.g. figs. 3 and 5 and table 5 in her paper) which clearly showed *Lophognathus* as presently recognized should be split into three genera.

This paper corrects that mistake (also identified by Cogger 2014, at page 739) and at the same time seeks to recognize the work of the lead author by naming the taxon in her honour.

I note that in order to recognize the genus for the species *Lophognathus temporalis* as recognized by her, she would have needed to recognize another genus, formerly treated as synonymous with *Lophognathus*. That genus was *Gowidon* Wells and Wellington, 1984 and is also recognized and used (quite properly) by Cogger (2014) and in spite of the illegal protestations of Kaiser *et al.* as spelt out in Kaiser *et al.* (2013), as explained by Hoser (2015).

Of course, it is here that I should explain the ridiculous, unscientific and childish attitude of many so-called "professional herpetologists" (including Melville) with respect to the works of Wells and Wellington and a pig-headed refusal to use their works, cite their works or be seen to accept their (often blindingly obvious) taxonomy and nomenclature, unless vetoed by one of a select few individuals, usually by the names of Glenn Shea or Hal Cogger.

This ridiculous attitude manifested by anti Wells and Wellington crusaders, is beyond a joke and is severely hampering the progress of herpetology and conservation in Australia as seen in the examples of Anonymous (1987), Anonymous (2001), Anstis (2002), Aplin (1999), Barker and Barker (1994), Cogger (1975, 1992, 1996), Kaiser *et al.* (2013), Mirtschin and Davis (1992), Sprackland *et al.* (1997), Turner and Valentic (1998), Tyler (1992) and Tyler *et al.* (1994).

However countering these ridiculous actions are the publications of Cogger (2014), Dubois (2014), Dubois *et al.* (1988), Hoser (1989, 1998, 2000a, 2001 and 2007), ICZN (1991, 2001), Shea (1995), Thomson (2003) and many others as cited by Hoser (2015).

By way of example I also note that the molecular results of Melville *et al.* (2011) upheld the Wells and Wellington action in 1984 of splitting the species *Rankinia diemensis* by naming the most divergent species in the complex as *Rankinia boylani* and yet Melville *et al.* effectively ignored their result and effectively said nothing, as did Ng *et al.* (2014).

This of course has meant that in the following years (post-dating 1984 to present), pretty much all other herpetologists have continued to recognize only *Rankinia diemensis* (Gray, 1841) and not the second species *Rankinia boylani* Wells and Wellington, 1984.

I need not mention that the latter taxon has a centre of distribution around Sydney, Australia, Australia's largest urban area in terms of population, already surpassing 5 million people in 2015 and clearly putting the taxon at potential risk.

It would be scandalous if this and other even more vulnerable taxa within the *Rankinia diemensis* complex or other threatened taxa named by Wells and Wellington were exterminated simply as a result of so-called jealousy by other Australian herpetologists.

The papers of Wells and Wellington (1984, 1985), subject of an illegal attempted suppression by the President of the Australian Society of Herpetologists, who at the time was none other than Richard Shine, now a professor at the University of Sydney, are still regularly condemned and lampooned by so-called herpetologists within Australia.

While they contain many errors, as do almost all other herpetology papers of similar size and scope, one fact has emerged in the three decades since it was published.

The taxonomy and nomenclature within as an account of the

systematics of Australian herpetofauna is considerably more accurate than any similar publications before or since, up to and including the present date. Most of the taxonomic decisions within the papers have been validated by molecular methods and phylogenies published since (e.g. Pyron *et al.* 2013), noting that these methods were not available to the original authors and all the nomenclature within the Wells and Wellington papers complied with the relevant edition/s of the *International Code of Zoological Nomenclature*.

While the most recent edition of Cogger (2014) has according to Cogger himself, been acting on behalf of the current views of the majority of Australian herpetologists, adopted numerous taxonomic and nomenclatural acts of Wells and Wellington (1984, 1985), many other obvious and sensible actions by them continue to be ignored by the herpetological community at large.

Examples are many and include the non-recognition of divergent taxa such as *Rankinia boylani* or the similarly vulnerable "*Pantherosaurus kurringai*" still ridiculously treated as a synonym for "*Varanus rosenbergi* Mertens, 1957" even though they are morphologically quite different, come from almost opposite sides of the continent and have even had their separate species status validated by molecular studies! Now of course, if there is anyone on the planet with a genuinely valid reason to take offense and to not want to recognize the name "*Rankinia boylani*" it is myself.

After all on 8 May 1981, Mr. Terry Boylan, the man whom the species was named after, was one of five men who illegally entered my home, tied me up in a chair and then proceeded to steal reptiles, files and whatever else took their fancy.

The NSW National Parks and Wildlife Service (NPWS) who led the raid later admitted they had acted illegally and were at fault and even returned some of the 14 stolen snakes, files taken and so on.

A decade later, Boylan to his credit made an apology and amends with me and as far as the rules of science go, none of this even matters!

The taxon *Rankinia boylani* Wells and Wellington, 1984 is valid; the name is valid according to the rules of the *International Code of Zoological Nomenclature*, and the sooner people get over the politics the better.

The name must be used and the species must be preserved.

In terms of the Wells and Wellington (1984 and 1985) papers however, I must state that it remains a key document in Australian herpetology and the sooner the obviously correct taxonomic decisions within those papers are adopted, the better!

This includes those agamid taxa described by them and until now treated as synonyms of others, even though they are morphologically distinct and when coupled with other publicly available evidence, make a compelling case for their proper recognition, for which the Wells and Wellington nomenclature must inevitably follow.

I also note the haste with which unethical herpetologists have literally stolen the works of Wells and Wellington (1984, 1985) and used their papers as a basis for their own alleged "discoveries", which they have then trumpeted far and wide and without even so much as a shred of decency to acknowledge the earlier works of these authors.

Hoser (2015) cites examples of this and another as yet uncited example is the paper of McLean *et al.* (2013), with the bold title: "Taxonomic assessment of the *Ctenophorus decreasii* complex (Reptilia: Agamidae) reveals a new species of dragon lizard from western New South Wales."

It is a brazen attempt to claim the discovery of a new species as a result of their allegedly original scientific work.

A close reading of the paper makes such a very claim and scandalously nowhere in this document is there even a reference to the works of Wells and Wellington.

Now because some of the co-authors have been very critical of the Wells and Wellington papers, we know that they have read them, or at least would reasonably expect this to be the case.

In Wells and Wellington (1984) the two men wrote:

"*Ctenophorus decreasii* (Duméril and Bibron, 1837): We believe the N.S.W. population to represent an undescribed species. *C. decreasii* is confined to South Australia."

Or in case McLean *et al.* missed that, Wells and Wellington (1985) wrote:

"We have deferred describing a number of species in this complex a Mr. Magnus Peterson has formally informed us of his intentions to name some members".

So clearly we have Wells, Wellington and at least another well-known

herpetologist at the time (1980's) well aware that the NSW animals assigned to *C. decreasii* were definitely of another species!

Now I am not going to deny that McLean *et al.* (2013) did a small amount of work on the relevant taxa and in naming this long known and undescribed species, but they have engaged in the morally repugnant action of plagiarism of the works of others in their process and it is this that I object to.

Hoser (2015) and sources cited therein, detail many other cases of similar attempts to steal the works of authors by a ratbag group known as the Wüster gang.

Not only are their actions ethically wrong and potentially illegal under intellectual property laws, they serve to hamper the progress of the science of herpetology and associated wildlife conservation efforts by acting to deter potential new entrants to the field, who may be in fear of many years work being stolen by pirates who have attempted to set themselves up as high priests or gatekeepers of herpetology in direct breach of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

In terms of the other taxa named herein within the *Rankinia diemensis* complex I note that the least divergent of these named herein is that from the Grampians, Western Victoria with a 3.7% mtDNA divergence from the nominate Tasmanian form according to Ng *et al.* 2014. Other forms described have divergences considerably in excess of this.

Noting that for similarly distributed reptilian species complexes with similar divergences, including within the genera *Austrelaps* Worrell, 1963 (long treated as a single species) and *Cyclodomorphus* Fitzinger, 1843 (where the type species from south-east Australia was split), the various species have already been split, formally named and widely recognized, it is clearly not consistent that the *Rankinia diemensis* complex with similar deep splits be treated any differently.

Hence I have no hesitation describing the relevant forms as new species as opposed to mere subspecies.

It is also relevant that past authors, including Ng *et al.* (2014) and Clemann (2003) already effectively treat each form as separate species with explicit statements to this effect and they recommend that governments from whom their projects were funded also manage the populations as such.

I also note that with sequence divergences in excess of 3.7% mtDNA, morphological differences and disjunct distributions there is no question that each form described herein represents a full species by any commonly used criteria.

One may look also at other recently named and widely accepted reptile species, such as "*Morelia nauta*" Harvey *et al.*, 2000, now known as *Australiasis nauta* (Harvey *et al.* 2000), separated from congeners on the basis of a mere 1-2% divergence as was their "*Morelia kinghorni* Stull", properly known now as *Australiasis clarki* (Barbour, 1914) (see Hoser 2000a and Hoser 2015 and sources cited therein).

If their "species" are to be recognized on divergences of 1-2%, it stands to reason that those named herein must be recognized at amounts at or significantly more than double this!

Perhaps in passing I should also mention that general acceptance of the Wells and Wellington (1985) breakup of the *Egernia cunninghami* species complex is also well overdue!

The genus *Ctenophorus* Fitzinger, 1843 as recognized by Melville *et al.* (2008) and most authors since, is dissected along phylogenetic lines into four genera (three named for the first time) and subgenera, using available names and three new ones in a continuation of the dismemberment of the genus commenced by Wells and Wellington (1984, 1985).

The phylogeny produced in Melville *et al.* (2008) generally validated the taxonomic decisions of Wells and Wellington (1984, 1985) who dissected *Ctenophorus* as generally recognized at the time, this including species that had been shunted between various genera by various authors.

The genera *Licentia* Wells and Wellington, 1984; *Phthanodon* Wells and Wellington, 1985; *Tachyon* Wells and Wellington, 1985 and of course *Rankinia* Wells and Wellington, 1984 have been largely supported by research results since 1985, but due to the pig-headed inertia of a vocal minority of herpetologists in Australia and their improper tactics of bludgeoning others to submit to their warped perceptions, the adoption and use of Wells and Wellington genera or subgenera, including these has been at times scandalously limited.

However I am not into personality politics and instead prefer to stick

with the science and hence, based on the molecular and morphological facts, all are recognized herein as defined by the original authors unless otherwise indicated in the detail of this paper. However, I should point out that all of *Licentia*, *Phthanodon* and *Tachyon* are conservatively relegated to subgenus status herein on the basis that Melville showed divergences for each group, but it is questionable if this divergence as presented by her was sufficient for each to be accorded full genus status.

They may be elevated by later authors in some years hence.

Three other as yet unnamed groups within *Ctenophorus* of similar divergences and morphological differences are formally named for the first time as are the three most divergent groups (another three), which are sufficiently divergent to warrant being treated as full genera as per the phylogenies produced by Pyron *et al.* (2013) and Melville *et al.* (2008) when compared to other reptile groups.

Once again these three groups are also supported by obvious morphological differences and it is astounding that they have not been formally named until now.

Genera defined elsewhere by other authors are not redefined here in this paper, with current definitions of each being contained in either Cogger (2014) or the papers of Wells and Wellington (1984, 1985).

There are of course numerous relevant papers in terms of the taxonomy and nomenclature of the genus *Amphibolurus sensu lato*, including the likes of *Lophognathus*, *Chlamydosaurus* Gray, 1825, *Ctenophorus* Fitzinger, 1843, *Diporiphora* Gray, 1842, *Gowidon* Wells and Wellington, 1984, *Pogona* Storr, 1982, *Rankinia* Wells and Wellington, 1984, *Tympanocryptis* Peters, 1863, *Uxoriurosauria* Wells and Wellington, 1985 and *Wittenagama* Wells and Wellington, 1985 and others mentioned above, not of all of which I need mention here.

However the key ones of relevance include the following: Austin *et al.* (2006), Boulenger (1883, 1885), Brygoo (1988), Chapple *et al.* (2005), Clemann (2003), Cogger (2014), Cogger *et al.* (1983), Colgan *et al.* (2009), Covacevich *et al.* (1990), de Rooij (1915), Dolman and Moritz (2006), Doughty *et al.* (2007, 2015), Driscoll and Hardy (2005), Dubey and Shine (2010), Edwards and Melville (2010, 2011), Ellis and Higgins (1993), Fairbairn *et al.* (1998), Fitzinger (1843), Glauert (1959), Gray (1841, 1845), Greer (1987, 1989), Günther (1867), Günther and Kapisa (2003), Hoser (1989), Houston (1978), Hugall and Lee (2004), Iglesias *et al.* (2012), Loveridge (1933), Macleay (1877), Maryan (1992), McLean *et al.* (2013), Melville *et al.* (2001, 2006, 2008, 2011), Ng *et al.* (2013), Paull (2002), Pepper *et al.* (2014), Pyron *et al.* (2013), Rawlinson (1967, 1974), Ryder (1986), Shea (1995), Shoo *et al.* (2008), Smith *et al.* (2011), Storr (1964, 1967, 1974, 1977), Thompson and Thompson (2001), Welling (1999), Wells and Wellington (1984, 1985), Werning (1995, 2002, 2004), Wilson and Swan (2010), Witten (1972, 1984), Witten and Coventry (1984), Worrell, 1963) and sources cited therein.

THEFT OF MATERIALS TO IMPEDE SCIENCE AND WILDLIFE CONSERVATION

I also note the following: In 2006 an online petition sponsored by a group of animal-hating pseudo-scientists including Wolfgang Wüster, Mark O'Shea, David John Williams, Bryan Fry and others posted at: <http://www.aussiereptileclassifieds.com/phpPETITION> (Hunter *et al.* 2006) called for my successful wildlife education business (Snakebusters®) and all my other herpetological activity to be shut down by the government of Victoria, Australia.

These men were successful in that after a ruthless five-year campaign, on 17 August 2011, 11 heavily armed police and wildlife officers conducted a highly illegal and violent raid on our family home and research facility. The raid was also a reprisal for several publications I had made that were highly critical of corruption involving the relevant people (e.g. Hoser 1993, 1996, 2010).

Myself, my wife and two vulnerable young daughters were arrested at gunpoint and held captive in the kitchen of the house for nine hours while the facility was ransacked. Besides the unspeakable acts of killing captive snakes and criminal damage to cages and household goods, the raiding officers illegally shut down our business and effectively placed myself under house arrest at gunpoint for some months after the raid.

An application by myself to the Supreme Court of Victoria led to the re-opening of our unlawfully shut down wildlife education business, although much of the damage to the business and our reputation built up over more than 4 decades was irreparable.

Later proceedings resolved in 2014 and 2015, cleared me of dozens of fabricated criminal charges spanning some decades (Magistrates

Court Victoria 2014), and a judicial finding that I was legally a cleanskin in that I had never acted illegally (VCAT 2015).

The government was ordered to pay me costs, restitution, compensation and damages (Court of Appeal, 2014), which as of mid 2015 remain unpaid.

Of greater relevance here is that at the time of the raid, research files spanning more than 40 years were taken and never returned, including materials and records relevant to this paper.

Material taken included all the computers, disks, hard drives, backups, cameras, scientific literature and other forms of information and information storage at the facility. All were loaded into the back of a truck and trailer and carted off.

Faced with the dilemma of deciding whether to spend another forty years gathering data, by which time I may be dead from old age, being aged 53 as of February 2015, or publishing the relevant paper/s with minimal data, I have opted to publish.

Underlying this motivation has been an increasing concern that a delay to formally identify and name undescribed biodiversity may lead to its extinction before another scientist gets around to the matter.

Engstrom *et al.* (2002) wrote: "The documentation of this diversity must be seen as an activity that is done not just for posterity but for immediate action and protection."

A number of authors including Kaiser (2012a, 2012b, 2013, 2014a and 2014b), Kaiser *et al.* (2013), Naish (2013) and Wüster *et al.* (2014), all part of the group of people effectively controlled by Wolfgang Wüster of Wales, UK, have been highly critical of the fact that I have assigned names to unnamed clades of snakes and more recently for other reptiles. Their unscientific and childish attacks, continued incessantly on social media such as Facebook and Twitter are rejected herein as destabilizing the nomenclature, impeding the progress of science and in some cases putting people's lives at risk.

Their ridiculous comments and false and defamatory statements are systematically rebutted by Hoser (2013), as well as Cogger (2013, 2014), Dubois (2014), Eipper (2013), Mutton (2014a, 2014b), Shea (2013a-d), Thorpe (2013, 2014a-c), Wellington (2013, 2014a, 2014b), Wells (2013, 2014a, 2014b), and many others, so this history is not reviewed here.

I also note that many taxa formally named by myself for the first time in earlier publications (e.g. Hoser 2000a, 2000b) are in fact threatened species.

Therefore I note the sensible remarks of Engstrom *et al.* (2002) as a perfectly reasonable explanation for the publishing of taxon descriptions for such unnamed groups. This remains the case even if a sizeable amount of my original research, files, photos and data have been stolen (more than once) and therefore cannot be relied upon and incorporated into these contemporary publications.

I also note that I welcome redescriptions of the relevant taxa by later authors unfettered by illegal break ins and thefts by corrupt government officers and if fortunate, even funded by these people, and who will hopefully have time and money to be able to do a more thorough description of the same and other taxa.

One does however expect these and all other herpetologists to abide by the letter and spirit of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999).

SPECIES AMPHIBOLURUS JACKY SP. NOV.

Holotype: A preserved specimen at the national Museum of Victoria, Melbourne, Australia, specimen number: D1522 collected from Winchelsea, Victoria.

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

Diagnosis: *Amphibolurus jacky sp. nov.* are separated from the morphologically similar *A. muricatus* (White, 1790) and *A. eipperii sp. nov.* by the dark colouration dark under the eye, this being a continuation of the canthal streak from above the back of the upper jawline. This dark under the eye is not seen in typical *A. muricatus* or *A. eipperii sp. nov.*

A. eipperii sp. nov. distributed in north-east NSW and adjacent parts of southern Queensland, are readily separated from *A. muricatus* (White, 1790) and *A. jacky sp. nov.* by the fact that in the males, they possess a large dark black patch behind the ear and above the leg. This patch is small in the other taxa. Males of *A. eipperii sp. nov.* differ from males of the other two species by their smallish to medium sized well-defined black triangles running in a pattern along the inner dorsolateral stripes on the back. Female *A. eipperii sp. nov.* are readily separated from the other two species by the presence of seven moderately well-defined

stripes running in a dorsolateral direction, radiating from the back of the head, behind the eyes to the neck.

The forelimbs of female *A. eipperii* sp. nov. are characterised with well defined dark and light crossbands and while these are sometimes seen in specimens of the other two species, in *A. eipperii* sp. nov. the difference is that these well defined crossbands extend onto the toes. Female *A. eipperii* sp. nov. differ from the other species in that the dark patches across the mid back are wider than the light patches. In *A. muricatus* (White, 1790) and *A. jacky* sp. nov. the reverse is the case. On the tail of male *A. eipperii* sp. nov. the lighter part of the crossbands flare significantly outwards. The flaring is only minor in *A. muricatus* (White, 1790) and not present in *A. jacky* sp. nov..

Male *A. muricatus* have a large and well defined nuchal crest. It is only of moderate size in *A. jacky* sp. nov.. In *A. eipperii*, the nuchal crest is small, separating it from the other two species.

The three species *Amphibolurus jacky* sp. nov., *A. eipperii* sp. nov. and *A. muricatus* are separated from *A. norrisi* Witten and Coventry, 1984 and *A. adelyn* sp. nov. by the fact that the dark canthal stripe extends only to the nostril or to the lower eye, versus to the tip of the snout in the other taxa.

Amphibolurus jacky sp. nov. and *A. muricatus* also have dark transverse markings on the snout in the internarial region, which is not seen in the other taxa.

Adult male *A. muricatus* invariably have two distinct light coloured stripes running down either side of the back, partially broken with dark triangular incursions. In adult male *Amphibolurus jacky* sp. nov. the same striping is significantly broken tending towards the female colouration.

Distribution: Southern Victoria from the Mornington Peninsula, west to the region of the Victorian and South Australian border, near the coast. Within this range distribution is patchy and restricted to coastal dune habitats and dry wooded areas.

Populations from East Gippsland, east of the Latrobe Valley and north into New South Wales are referred to the species *Amphibolurus muricatus* (White, 1790).

Etymology: Named after my younger daughter Jacky Hoser, in recognition for her monumental work in reptile education over the first 14 years of her life, with Snakebusters, Australia's best reptile displays. She has had to face illegal armed raids by corrupt wildlife officers working on behalf of rival wildlife display businesses owned by police-protected criminals and other totally unjustified attacks when doing excellent work educating the general public about reptiles.

Childish online rants by a little angry Englishman named Mark O'Shea complaining about myself naming taxa after family members are not only offensive, but against the rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999), a document he treats with utter contempt.

SPECIES AMPHIBOLURUS EIPPERI SP. NOV.

Holotype: A specimen number R148375 at the Australian Museum in Sydney, New South Wales, Australia, collected on the road to Mulligans Hut at the Gibraltar Range, National Park in New South Wales, Australia, Latitude -29.53, Longitude 152.32.

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

Paratype: A specimen number R148385 at the Australian Museum in Sydney, New South Wales, Australia, collected on the road to Mulligans Hut at the Gibraltar Range, National Park in New South Wales, Australia, Latitude -29.53, Longitude 152.32.

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

Diagnosis: *Amphibolurus jacky* sp. nov. are separated from the morphologically similar *A. muricatus* (White, 1790) and *A. eipperii* sp. nov. by the dark colouration dark under the eye, this being a continuation of the canthal streak from above the back of the upper jawline. This dark under the eye is not seen in typical *A. muricatus* or *A. eipperii* sp. nov..

A. eipperii sp. nov. distributed in north-east NSW and adjacent parts of southern Queensland, are readily separated from *A. muricatus* (White, 1790) and *A. jacky* sp. nov. by the fact that in the males, they possess a large dark black patch behind the ear and above the leg. This patch is small in the other taxa. Males of *A. eipperii* sp. nov. differ from males of the other two species by their smallish to medium sized well-defined black triangles running in a pattern along the inner dorsolateral stripes on the back. Female *A. eipperii* sp. nov. are readily separated from the

other two species by the presence of seven moderately well-defined stripes running in a dorsolateral direction, radiating from the back of the head, behind the eyes to the neck.

The forelimbs of female *A. eipperii* sp. nov. are characterised with well defined dark and light crossbands and while these are sometimes seen in specimens of the other two species, in *A. eipperii* sp. nov. the difference is that these well defined crossbands extend onto the toes. Female *A. eipperii* sp. nov. differ from the other species in that the dark patches across the mid back are wider than the light patches. In *A. muricatus* (White, 1790) and *A. jacky* sp. nov. the reverse is the case. On the tail of male *A. eipperii* sp. nov. the lighter part of the crossbands flare significantly outwards. The flaring is only minor in *A. muricatus* (White, 1790) and not present in *A. jacky* sp. nov..

Male *A. muricatus* have a large and well defined nuchal crest. It is only of moderate size in *A. jacky* sp. nov.. In *A. eipperii*, the nuchal crest is small, separating it from the other two species.

The three species *Amphibolurus jacky* sp. nov., *A. eipperii* sp. nov. and *A. muricatus* are separated from *A. norrisi* Witten and Coventry, 1984 and *A. adelyn* sp. nov. by the fact that the dark canthal stripe extends only to the nostril or to the lower eye, versus to the tip of the snout in the other taxa.

Amphibolurus jacky sp. nov. and *A. muricatus* also have dark transverse markings on the snout in the internarial region, which is not seen in the other taxa.

Distribution: North-eastern New South Wales, on the coastal plain and nearby ranges (where they are most common) and into adjacent parts of southern Queensland.

Etymology: Named in honour of Scott Eipper, now of Brisbane, Queensland, Australia, formerly of Caulfield, Victoria, Australia in recognition of his many services to herpetology in Australia, including via the publication of two excellent books on keeping reptiles and frogs in 2012 (Eipper 2012a, 2012b).

SPECIES AMPHIBOLURUS ADELYN SP. NOV.

Holotype: A preserved specimen number R45649 collected at Twilight Cove, Western Australia, Lat. 32°15'00" S, Long. 126°02'00"E, held at the Western Australian Museum, Perth, Western Australia, Australia.

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

Paratype: A juvenile preserved specimen at the Western Australian Museum, Perth, Western Australia, Australia, specimen number R151108 collected at 3 km west of Burnabie, Western Australia Latitude 126.18'00" E, Longitude 32.13'33" S.

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

Diagnosis: *Amphibolurus adelyn* sp. nov. is separated from the similar *A. norrisi* Witten and Coventry, 1984 by the following suite of characters:

The canthal stripe does not significantly widen towards the rear; there is a distinct supraciliary pattern of about five alternating light and dark patches, the light patches being larger, forming the supracilia commencing anterior to and above the eye; an oversized dark patch on the flank above the anterior limb (this occurs sometimes in *A. norrisi* but is not common in the taxon); the irregular and more-or-less triangular dark patches on the back are not noticeably lighter in the centres (as seen in *A. norrisi*).

In *A. norrisi* the canthal stripe noticeably darkens at the tip of the snout. This is not the case in *Amphibolurus adelyn* sp. nov..

Amphibolurus jacky sp. nov., *A. eipperii* sp. nov. and *A. muricatus* are separated from *A. norrisi* Witten and Coventry, 1984 and *A. adelyn* sp. nov. by the fact that the dark canthal stripe extends only to the nostril or to the lower eye, versus to the tip of the snout in the other taxa.

Amphibolurus jacky sp. nov., *A. eipperii* sp. nov. and *A. muricatus* also have dark transverse markings on the snout in the internarial region, which is not seen in the other taxa.

Distribution: Southern Australia in the near coastal region west of the Spencer Gulf, South Australia, through Mallee habitats across the Great Australian Bight to near Nullabor parts of south-east Western Australia to the general region of Ravensthorpe, Western Australia. Populations of similar lizards from Big Desert Victoria and nearby regions and east of the Spencer Gulf are *Amphibolurus norrisi* Witten and Coventry, 1984.

Etymology: Named after Adelyn Hoser, elder daughter of this author in recognition for her monumental work in reptile education over the first 16 years of her life, with Snakebusters, Australia's best reptile

displays. She has had to face illegal armed raids by corrupt wildlife officers working on behalf of rival wildlife display businesses owned by police-protected criminals, including suffering the extreme trauma of being arrested at gunpoint and other totally unjustified attacks when doing excellent work educating the general public about reptiles.

Childish online rants by a little angry English man named Mark O'Shea complaining about myself naming taxa after family members are not only offensive and illegal, but also against the similarly legally binding rules of the *International Code of Zoological Nomenclature* (Ride *et al.* 1999), a document he treats with utter contempt.

SPECIES AMPHIBOLURUS WELLSI SP. NOV.

Holotype: A preserved specimen number D72709, at the National Museum of Victoria, Melbourne, Australia, collected 108 km South of Cape Crawford on Tablelands Highway, Northern Territory Lat. 17.54 S, Long. 135.68 E.

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

Paratype: A preserved specimen number D72710, at the National Museum of Victoria, Melbourne, Australia, collected 3 km S of Heartbreak Inn on Tablelands Highway, Northern Territory, Australia, Latitude -16.70°39", Longitude 135.72°90".

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

Diagnosis: The species *Amphibolurus wellsi* sp. nov. is readily separated from *Amphibolurus centralis* (Loveridge, 1933) by the presence of a strong almost white bar along the lower jaw, running past the neck and onto the lighter broad dorsolateral stripes (one either side of the spine) which are also whitish at the anterior end of the body, before becoming brownish yellow towards the rear. By contrast, *A. centralis*, while marginally lighter along the lower jaw, lacks the obvious white bar as seen in this species and likewise the almost white anterior section of the dorsolateral stripes.

In some adult males, the strong almost white bar along the lower jaw has a strong yellow hue, but remains distinct.

Both *Amphibolurus wellsi* sp. nov. and *Amphibolurus centralis* (Loveridge, 1933) are readily separated from congeners by the fact that the lining of the mouth is either flesh-coloured or pink in life, versus bright yellow in life in all other species. *Amphibolurus wellsi* sp. nov. and *Amphibolurus centralis* (Loveridge, 1933) are further separated from congeners by the fact that dorsal and upper body lateral scales (excluding longitudinal rows of enlarged keeled scales) are mostly heterogeneous, but lower lateral scales are homogenous or subequal, versus strongly heterogeneous in shape and size dorsal and lateral body scales in other congeners.

A key to separate the genus *Amphibolurus* from other recognized Australian agamid genera is in Cogger (2014), pages 692-693.

Distribution: *Amphibolurus wellsi* sp. nov. is found in an area centred on the Barkly Tableland region of the Northern Territory and nearby parts of Queensland, west to near the Western Australian border and not found in the drier red soiled regions of central Australia to the south, where the species *A. centralis* is found instead. There is no known zone of sympatry between the taxa.

Etymology: Named in honour of Richard Wells (coauthor of Wells and Wellington, 1984, 1985), currently of Lismore, NSW, in recognition of a significant contribution to herpetology in Australia over some decades going way beyond those cited papers.

SPECIES LOPHOGNATHUS WELLINGTONI SP. NOV.

Holotype: Preserved specimen number D73809 at the National Museum of Victoria, Melbourne, Australia, collected from Gibb River Road crossing of the Durack River in the Kimberley region of Western Australia, Australia. Lat. -15.9738, Long. 127.154.

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

Paratype: Preserved specimen number D72652 at the National Museum of Victoria, Melbourne, Australia, collected from Montejinni Creek, Buntine Highway, Northern Territory, Australia. Lat. -16.635, Long. 131.756.

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

Diagnosis: *Lophognathus wellingtoni* sp. nov. is readily separated from *Lophognathus gilberti* Gray, 1842 by the presence of a thick creamish-white bar that runs on both the upper and lower jawline, versus mainly on the upper side in *L. gilberti*. In *L. wellingtoni* sp. nov. the upper margin of this white line is effectively straight whereas in *L. gilberti* there is a strong uptick in the region of the eye (usually a fraction behind the lowest point), meaning there is no straight line appearance at the upper margin of the bar.

In *L. wellingtoni* sp. nov. the dark region between the eye and the ear

is bounded at the top by a well defined line. This is not the case in *L. gilberti*, where the colour merely merges into that at the top of the head.

Melvillesaurea gen. nov. (formally described in this paper) is separated from all similar genera (e.g. *Gowidon* Wells and Wellington, 1984 and *Lophognathus* Gray, 1842), by the following suite of characters:

The nostril is nearer the snout than the eye (versus equidistant in *Gowidon*), the light labial stripe includes supralabials and several scale rows above them (the labial stripe does not include supralabials and several scale rows above them in *Gowidon*), the posterior margin of the ear does not have a small white spot (versus a small white spot on the black posterior margin of the ear in *Gowidon*).

Gowidon and *Melvillesaurea* gen. nov. are both separated from the morphologically similar genus *Lophognathus* by the fact that the keels of dorsal scales form ridges running obliquely to the vertebral scale row, versus running parallel in *Lophognathus*, (this trait being diagnostic for the genus *Lophognathus*).

A key to separate these and other recognized Australian agamid genera is in Cogger (2014), pages 692-693.

Distribution: The dry tropics of the Northern Territory from the Victoria River region in the west of that "Territory" west, through the Kimberley ranges and adjoining areas and skirting the Great Sandy Desert to include the north-west parts of the Pilbara in Western Australia.

Etymology: Named in honour of Cliff Ross Wellington (coauthor of Wells and Wellington, 1984, 1985), currently of Woy Woy, NSW, in recognition of a significant contribution to herpetology in Australia over some decades going way beyond those cited papers.

GENUS MELVILLESAUREA GEN. NOV.

Type species: *Grammatophora temporalis* Günther, 1867.

Diagnosis: *Melvillesaurea* gen. nov. is separated from all similar genera (e.g. *Gowidon* Wells and Wellington, 1984 and *Lophognathus* Gray, 1842), by the following suite of characters:

The nostril is nearer the snout than the eye (versus equidistant in *Gowidon*), the light labial stripe includes supralabials and several scale rows above them (the labial stripe does not include supralabials and several scale rows above them in *Gowidon*), the posterior margin of the ear does not have a small white spot (versus a small white spot on the black posterior margin of the ear in *Gowidon*).

Gowidon and *Melvillesaurea* gen. nov. are both separated from the morphologically similar genus *Lophognathus* by the fact that the keels of dorsal scales form ridges running obliquely to the vertebral scale row, versus running parallel in *Lophognathus*.

A key to separate these and other recognized Australian agamid genera is in Cogger (2014), pages 692-693.

Distribution: Northern Australia and southern New Guinea.

Etymology: Named in honour of Jane Melville, currently at the Museum of Victoria, in Melbourne, Australia in recognition of her work on these lizards.

Content: *Melvillesaurea temporalis* (Günther, 1867) (type species); *M. lateralis* (Macleay, 1877).

GENUS NOTACTENOPHORUS GEN. NOV.

Type species: *Tympanocryptis maculosa* Mitchell, 1948.

Diagnosis: *Notactenophorus* gen. nov. is readily separated from all other members of the genus *Ctenophorus* (where it has been placed until now, as defined in Cogger 2014), by the following unique suite of characters: Tympanum is hidden being covered by skin, the body scales are smooth, mostly small, homogenous, with scattered larger but small, flat scales, not keeled or spinose, with a dorsal pattern of a longitudinal dorso-lateral series of five or six large black spots on either side.

Ctenophorus as defined until now (Cogger 2014) is defined by the following definition, modified to take into account the new genera as defined herein. *Ctenophorus* is defined as an Australian agamid genus characterised by small dorsal scales, homogenous or with at most slightly enlarged tubercles; a few species with distinct rows of paravertebral or dorsolateral spinose scales; a row of enlarged scales from below the eye to above the ear; tympanum exposed (not exposed in *Notactenophorus* gen. nov. and most *Pseudoctenophorus* gen. nov.); tail long, ranging from slightly to much longer than the head and body; femoral and preanal pores present in males; adult males usually with distinctive black or dark grey markings on the throat and/or chest.

Specimens within the genus *Pseudoctenophorus* gen. nov. are

separated from all other *Ctenophorus* Fitzinger, 1843, the genus they were placed in previously, and *Notactenophorus gen. nov.* by the following suite of characters, being one or other of the following three:

1/ Tympanum exposed; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Pseudoctenophorus subgen. nov.*), or:

2/ Tympanum hidden; covered by skin; body scales are strongly heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Chapmanagama subgen. nov.*), or:

3/ Tympanum hidden; covered by skin; body scales are strongly heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; no series of enlarged, spinose scales on either side of the base of the tail (subgenus *Turnbullagama subgen. nov.*).

The genus *Paractenophorus gen. nov.* is separated from *Ctenophorus*, *Notactenophorus gen. nov.* and *Pseudoctenophorus gen. nov.* by the following suite of characters: tympanum exposed; no series of enlarged, spinose scales on either side of the base of the tail; hindlimb reaching no further than the tympanum when adpressed; tail usually less than 1.5 times as long as the head and body; nasal region is not swollen, the nostril lying below an angular canthal ridge; pores fewer than 15; nostril is slit-like or narrowly elliptical.

Distribution: The Lake Eyre basin in the north of South Australia, Australia.

Etmology: Named as it is not properly placed in the genus *Ctenophorus* Fitzinger, 1843, (not-a-ctenophorus).

Content: *Notactenophorus maculosus* Mitchell, 1948 (monotypic).

GENUS PSEUDOCTENOPHORUS GEN. NOV.

Type species: *Grammatophora muricata adelaidensis* Gray, 1841.

Diagnosis: Specimens within the genus *Pseudoctenophorus gen. nov.* are separated from all other *Ctenophorus* Fitzinger, 1843, the genus they were placed in previously, by the following suite of characters, being one or other of the following three:

1/ Tympanum exposed; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Pseudoctenophorus subgen. nov.*), or:

2/ Tympanum hidden; covered by skin; body scales are strongly heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Chapmanagama subgen. nov.*), or:

3/ Tympanum hidden; covered by skin; body scales are strongly heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; no series of enlarged, spinose scales on either side of the base of the tail (subgenus *Turnbullagama subgen. nov.*).

Ctenophorus as defined until now (Cogger 2014) is defined by the following definition, modified to take into account the new genera as defined herein. *Ctenophorus* is defined as an Australian agamid genus characterised by small dorsal scales, homogenous or with at most slightly enlarged tubercles; a few species with distinct rows of paravertebral or dorsolateral spinose scales; a row of enlarged scales from below the eye to above the ear; tympanum exposed (not exposed in *Notactenophorus gen. nov.* and most *Pseudoctenophorus gen. nov.*); tail long, ranging from slightly to much longer than the head and body; femoral and preanal pores present in males; adult males usually with distinctive black or dark grey markings on the throat and/or chest.

Notactenophorus gen. nov. is readily separated from all other members of the genus *Ctenophorus* (where it has been placed until now, as defined in Cogger 2014) and *Pseudoctenophorus gen. nov.*, by the following unique suite of characters: Tympanum is hidden being covered by skin, the body scales are smooth, mostly small, homogenous, with scattered larger but small, flat scales, not keeled or spinose, with a dorsal pattern of a longitudinal dorso-lateral series of five or six large black spots on either side.

The genus *Paractenophorus gen. nov.* is separated from *Ctenophorus*, *Notactenophorus gen. nov.* and *Pseudoctenophorus gen. nov.* by the following suite of characters: tympanum exposed; no series of enlarged, spinose scales on either side of the base of the tail; hindlimb reaching no further than the tympanum when adpressed; tail usually less than 1.5 times as long as the head and body; nasal region is not swollen, the nostril lying below an angular canthal ridge; pores fewer

than 15; nostril is slit-like or narrowly elliptical.

Distribution: Coastal regions of southern Western Australia and adjacent parts of South Australia.

Etmology: Named as it is not properly placed in the genus *Ctenophorus* Fitzinger, 1843, therefore pseudo, and hence is a "pseudo-ctenophorus".

Content: *Pseudoctenophorus adelaidensis* (Gray, 1841) (type species); *C. butleri* (Storr, 1977); *P. chapmani* (Storr, 1977); *P. parviceps* (Storr, 1964).

SUBGENUS PSEUDOCTENOPHORUS SUBGEN. NOV.

Type species: *Grammatophora muricata adelaidensis* Gray, 1841.

Diagnosis: Specimens within the genus *Pseudoctenophorus gen. nov.* are separated from all other *Ctenophorus* Fitzinger, 1843, the genus they were placed in previously, by the following suite of characters, being one or other of the following three:

1/ Tympanum exposed; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Pseudoctenophorus subgen. nov.*) this information being diagnostic for the subgenus, or:

2/ Tympanum hidden; covered by skin; body scales are strongly heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Chapmanagama subgen. nov.*), or:

3/ Tympanum hidden; covered by skin; body scales are strongly heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; no series of enlarged, spinose scales on either side of the base of the tail (subgenus *Turnbullagama subgen. nov.*).

Ctenophorus as defined until now (Cogger 2014) is defined by the following definition, modified to take into account the new genera as defined herein. *Ctenophorus* is defined as an Australian agamid genus characterised by small dorsal scales, homogenous or with at most slightly enlarged tubercles; a few species with distinct rows of paravertebral or dorsolateral spinose scales; a row of enlarged scales from below the eye to above the ear; tympanum exposed (not exposed in *Notactenophorus gen. nov.* and most *Pseudoctenophorus gen. nov.*); tail long, ranging from slightly to much longer than the head and body; femoral and preanal pores present in males; adult males usually with distinctive black or dark grey markings on the throat and/or chest. *Notactenophorus gen. nov.* is readily separated from all other members of the genus *Ctenophorus* (where it has been placed until now, as defined in Cogger 2014) and *Pseudoctenophorus gen. nov.*, by the following unique suite of characters: Tympanum is hidden being covered by skin, the body scales are smooth, mostly small, homogenous, with scattered larger but small, flat scales, not keeled or spinose, with a dorsal pattern of a longitudinal dorso-lateral series of five or six large black spots on either side.

The genus *Paractenophorus gen. nov.* is separated from *Ctenophorus*, *Notactenophorus gen. nov.* and *Pseudoctenophorus gen. nov.* by the following suite of characters: tympanum exposed; no series of enlarged, spinose scales on either side of the base of the tail; hindlimb reaching no further than the tympanum when adpressed; tail usually less than 1.5 times as long as the head and body; nasal region is not swollen, the nostril lying below an angular canthal ridge; pores fewer than 15; nostril is slit-like or narrowly elliptical.

Distribution: Coastal regions of southern Western Australia on the west coast in the region from the Murchison River in the north to around Perth in the south.

Etmology: Named as it is not properly placed in the genus *Ctenophorus* Fitzinger, 1843, therefore pseudo, and hence is a "pseudo-ctenophorus".

Content: *Pseudoctenophorus (Pseudoctenophorus) adelaidensis* (Gray, 1841) (monotypic).

SUBGENUS CHAPMANAGAMA SUBGEN. NOV.

Type species: *Amphibolurus adelaidensis chapmani* Storr, 1977.

Diagnosis: Specimens within the genus *Pseudoctenophorus gen. nov.* are separated from all other *Ctenophorus* Fitzinger, 1843, the genus they were placed previously, by the following suite of characters, being one or other of the following three:

1/ Tympanum exposed; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Pseudoctenophorus subgen. nov.*), or:

2/ Tympanum hidden; covered by skin; body scales are strongly

heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Chapmanagama subgen. nov.*), this information being diagnostic for the subgenus, or:

3/ Tympanum hidden; covered by skin; body scales are strongly heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; no series of enlarged, spinose scales on either side of the base of the tail (subgenus *Turnbullagama subgen. nov.*).

Ctenophorus as defined until now (Cogger 2014) is defined by the following definition, modified to take

into account the new genera as defined herein. *Ctenophorus* is defined as an Australian agamid genus characterised by small dorsal scales, homogenous or with at most slightly enlarged tubercles; a few species with distinct rows of paravertebral or dorsolateral spinose scales; a row of enlarged scales from below the eye to above the ear; tympanum exposed (not exposed in *Notactenophorus gen. nov.* and most *Pseudoctenophorus gen. nov.*); tail long, ranging from slightly to much longer than the head and body; femoral and preanal pores present in males; adult males usually with distinctive black or dark grey markings on the throat and/or chest.

Notactenophorus gen. nov. is readily separated from all other members of the genus *Ctenophorus* (where it has been placed until now, as defined in Cogger 2014) and *Pseudoctenophorus gen. nov.*, by the following unique suite of characters: Tympanum is hidden being covered by skin, the body scales are smooth, mostly small, homogenous, with scattered larger but small, flat scales, not keeled or spinose, with a dorsal pattern of a longitudinal dorso-lateral series of five or six large black spots on either side.

The genus *Paractenophorus gen. nov.* is separated from *Ctenophorus*, *Notactenophorus gen. nov.* and *Pseudoctenophorus gen. nov.* by the following suite of characters: tympanum exposed; no series of enlarged, spinose scales on either side of the base of the tail; hindlimb reaching no further than the tympanum when adpressed; tail usually less than 1.5 times as long as the head and body; nasal region is not swollen, the nostril lying below an angular canthal ridge; pores fewer than 15; nostril is slit-like or narrowly elliptical.

Distribution: From the Stirling Ranges in Western Australia, eastwards across the Nullarbor to the Yorke Peninsula in South Australia.

Etymology: The species "*Amphibolurus adelaidensis chapmani* Storr, 1977" was named after Mr Andrew Chapman of the Western Australian Museum in appreciation of his contributions to Western Australian herpetology.

The subgenus *Chapmanagama gen. nov.* is not.

It is in fact named in honour of Christopher Chapman a lawyer from Sydney, New South Wales, Australia who spent many years advocating for the rights of private individuals to have the legal right to own reptiles in Australia. He also wrote a preface to the first edition of the best-selling book *Smuggled: The Underground Trade in Australia's Wildlife* (Hoser, 1993) and a second preface for the second edition published in 1996. It was a result of the sequence of events arising from the publishing of this book and the sequel, *Smuggled-2: Wildlife, trafficking, crime and corruption in Australia* (Hoser, 1996), that for the first time in decades, private individuals in Australia were legally allowed to keep reptiles as pets without fear of being raided and jailed for doing so. It is fitting that Chris Chapman be honoured with a patronym in his name, noting that he is largely responsible for the fact that there will be another young generation of herpetologists in Australia legally allowed to train in their science.

Content: *Pseudoctenophorus chapmani* (Storr, 1977) (monotypic).

SUBGENUS TURNBULLAGAMA SUBGEN. NOV.

Type species: *Tympanocryptis parviceps* Storr, 1964.

Diagnosis: Specimens within the genus *Pseudoctenophorus gen. nov.* are separated from all other *Ctenophorus* Fitzinger, 1843, the genus they were placed previously, by the following suite of characters, being one or other of the following three:

1/ Tympanum exposed; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Pseudoctenophorus subgen. nov.*), or:

2/ Tympanum hidden; covered by skin; body scales are strongly heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Chapmanagama subgen. nov.*), or:

3/ Tympanum hidden; covered by skin; body scales are strongly heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; no series of enlarged, spinose scales on either side of the base of the tail (subgenus *Turnbullagama subgen. nov.*), this information being diagnostic for the subgenus.

Ctenophorus as defined until now (Cogger 2014) is defined by the following definition, modified to take

into account the new genera as defined herein. *Ctenophorus* is defined as an Australian agamid genus characterised by small dorsal scales, homogenous or with at most slightly enlarged tubercles; a few species with distinct rows of paravertebral or dorsolateral spinose scales; a row of enlarged scales from below the eye to above the ear; tympanum exposed (not exposed in *Notactenophorus gen. nov.* and most *Pseudoctenophorus gen. nov.*); tail long, ranging from slightly to much longer than the head and body; femoral and preanal pores present in males; adult males usually with distinctive black or dark grey markings on the throat and/or chest.

Notactenophorus gen. nov. is readily separated from all other members of the genus *Ctenophorus* (where it has been placed until now, as defined in Cogger 2014) and *Pseudoctenophorus gen. nov.*, by the following unique suite of characters: Tympanum is hidden being covered by skin, the body scales are smooth, mostly small, homogenous, with scattered larger but small, flat scales, not keeled or spinose, with a dorsal pattern of a longitudinal dorso-lateral series of five or six large black spots on either side.

The genus *Paractenophorus gen. nov.* is separated from *Ctenophorus*, *Notactenophorus gen. nov.* and *Pseudoctenophorus gen. nov.* by the following suite of characters: tympanum exposed; no series of enlarged, spinose scales on either side of the base of the tail; hindlimb reaching no further than the tympanum when adpressed; tail usually less than 1.5 times as long as the head and body; nasal region is not swollen, the nostril lying below an angular canthal ridge; pores fewer than 15; nostril is slit-like or narrowly elliptical.

Distribution: West coast of Western Australia between Exmouth Gulf and Shark Bay (*P. parviceps*) and West coast of Western Australia between Shark Bay and Kalbarri (*P. butleri*).

Content: *Pseudoctenophorus (Turnbullagama) parviceps* (Storr, 1964) (type species); *P. (Turnbullagama) butleri* (Storr, 1977).

Etymology: Named after Croppa Creek, north of Moree, NSW, Australia farmer, Ian Robert Turnbull in recognition of a lifetime's work in agriculture and environmental management. Turnbull got nationwide media attention after he shot and killed an alcoholic NSW Government, Office of Environment and Heritage compliance officer Glen Turner on 29 July 2014.

Turner had grossly misused his office and powers to run a personal vendetta against Turnbull and his family spanning a decade, including stalking and harassing the elderly (in his 70's), Mr. Turnbull.

Turner publicly humiliated Turnbull, accusing him of numerous heinous crimes on the basis of what could at best be described as very flimsy evidence. Furthermore via a series of vexatious legal proceedings he initiated against Turnbull using creative interpretations of the law, he literally ruined Turnbull financially.

These illegal actions by Turner eventually drove Turnbull to wits end.

With Turnbull and his hard-working family facing financial ruin as a direct result of a vexatious legal campaign against him by Turner and other departmental officers, Turnbull shot a round of bullets into Turner after he had illegally entered Turnbull's property.

This killed Turner instantly.

Turner had already cost Turnbull several hundred thousand dollars in losses.

Turnbull later remarked "I simply cracked", in describing how and why Turner drove him to retaliate by killing him (Hall, 2014).

Not surprisingly the government-controlled tabloid media did a scandalous job of blame shifting against Turnbull and made out that Turner was some kind of saint.

Turnbull was charged with murder as soon as he was arrested (the same day) and before it was even possible for any semblance of an impartial investigation could take place.

He was immediately imprisoned and repeatedly refused bail.

As a rule in such matters, in Australia, a person may be arrested, but charges are not laid until after an investigation is done, the evidence is assessed and the inquiry is properly completed.

That this did not occur, clearly showed that there was never an intent by the NSW Police, the NSW Government, Office of Environment and

Heritage and other associated agencies to have an impartial inquiry into the events leading to the shooting incident.

As a result, it is reasonable to expect that Turnbull (aged 79 in 2014) and in ill health as of October that year, will only leave jail in a body bag and not as a result of any fair criminal trial or acquittal.

At the time of the shooting and also prior, local politicians aware of the situation stated publicly that the actions of Turner and fellow officers had led to the shooting and that it had been a case of when, not if, such an event happened.

While I do not advocate killings or illegal actions, the effective self sacrifice by Turnbull at a very late stage in his life, to highlight the Nazi-like actions of anti-environmentalist and highly paid self-serving corrupt government wildlife officers, only concerned with their own financial welfare and not that of the environment, does deserve some kind of formal recognition.

As no government in Australia will ever admit that their officers have ever done wrong, or acknowledge the actions of the innocent victims of their illegal actions, I shall do this here.

Warnings of revenge attacks against wildlife officers acting illegally and harassing law-abiding conservationists have been made many times in the past.

In 2011, and following an illegal armed raid on my facility by Victorian wildlife officers, I directly told one of them, Glenn Sharp, that had they acted in a similar way against another law-abiding person besides myself, that the victim would well have been within reason to shoot them and that they should start acting within the law to prevent such an event possibly occurring.

Instead of taking on board my eminently sensible advice, noting that just a few years prior David Merceica had punched out an ocerzealous wildlife officer in Melbourne named Tony Zidarich, the corrupt Victorian Wildlife Officer, Glenn Sharp falsely accused me of threatening to kill him instead!

The claim was thrown out of court in 2015, when a covertly made tape of a phone call in August 2011, that Sharp himself had made without my knowledge, was played to the court (VCAT 2015).

Playing for his own tape recording, he repeatedly stated to me "are you threatening me", to which I repeatedly told him "no" and to "take that idea out of your mind".

In defiance of my sensible advice, in the three years post-dating the 2011 conversation, Sharp himself and several subordinates under his control, continued to harass, stalk and assault innocent members of the public as well as breach countless other rules and regulations, including such things as hoon driving through suburban streets, breaking numerous road rules, including driving on the wrong side of the road, over double lines, into oncoming traffic and even having the audacity to film themselves doing so.

The photographic and video evidence of this illegal activity that they themselves had created, was inadvertently passed to me in the lead up to a court hearing in 2015 (VCAT 2015).

Significantly, Sharp and his fellow wildlife officers under his control are police-protected criminals, as when their own evidence of their criminal actions was passed on to the relevant authorities (in this case the Victoria Police), they chose not to prosecute him or the other offenders (VCAT 2015).

In other words, if a victim of Sharp's illegal actions doesn't take the law into their own hands and kill one of Sharp or his underlings, it is considerably more likely that one or more of them will kill themselves, and perhaps an innocent member of the public, as they hoon around the streets of Melbourne driving down the wrong side of the road and sooner or later crash their car into an oncoming vehicle, as happened in a similar case as documented by Hoser (1999).

While I did not know, or know of either Turner, or Turnbull prior to the shooting incident in NSW in 2014, after which both media and family contacted me to give me details of the relevant events, I am very familiar with the kind of situation that gave rise to the shooting and I have absolutely no doubt at all that Turner is totally to blame for himself being killed by an otherwise law-abiding man he had tormented and harassed and publicly humiliated over the previous decade.

In summary the alcoholic government wildlife officer got what he deserved!

The word to describe this is Karma!

GENUS PARACTENOPHORUS GEN. NOV.

Type species: *Amphibolurus clayi* Storr, 1967.

Diagnosis: The genus *Paractenophorus gen. nov.* is separated from *Ctenophorus*, *Notactenophorus gen. nov.* and *Pseudoctenophorus gen. nov.* by the following suite of characters: tympanum exposed; no series of enlarged, spinose scales on either side of the base of the tail; hindlimb reaching no further than the tympanum when adpressed; tail usually less than 1.5 times as long as the head and body; nasal region is not swollen, the nostril lying below an angular canthal ridge; pores fewer than 15; nostril is slit-like or narrowly elliptical.

Specimens within the genus *Pseudoctenophorus gen. nov.* are separated from all other *Ctenophorus* Fitzinger, 1843, the genus they were placed in previously, by the following suite of characters, being one or other of the following three:

1/ Tympanum exposed; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Pseudoctenophorus subgen. nov.*), or:

2/ Tympanum hidden; covered by skin; body scales are strongly heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Chapmanagama subgen. nov.*), or:

3/ Tympanum hidden; covered by skin; body scales are strongly heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; no series of enlarged, spinose scales on either side of the base of the tail (subgenus *Turnbullagama subgen. nov.*).

Ctenophorus as defined until now (Cogger 2014) is defined by the following definition, modified to take

into account the new genera as defined herein. *Ctenophorus* is defined as an Australian agamid genus characterised by small dorsal scales, homogenous or with at most slightly enlarged tubercles; a few species with distinct rows of paravertebral or dorsolateral spinose scales; a row of enlarged scales from below the eye to above the ear; tympanum exposed (not exposed in *Notactenophorus gen. nov.* and most *Pseudoctenophorus gen. nov.*); tail long, ranging from slightly to much longer than the head and body; femoral and preanal pores present in males; adult males usually with distinctive black or dark grey markings on the throat and/or chest.

Notactenophorus gen. nov. is readily separated from all other members of the genus *Ctenophorus* (where it has been placed until now, as defined in Cogger 2014) and *Pseudoctenophorus gen. nov.*, by the following unique suite of characters: Tympanum is hidden being covered by skin, the body scales are smooth, mostly small, homogenous, with scattered larger but small, flat scales, not keeled or spinose, with a dorsal pattern of a longitudinal dorso-lateral series of five or six large black spots on either side.

Distribution: From Exmouth Gulf region of Western Australia, through the eastern deserts of Western Australia to the south-eastern Northern Territory and adjacent part of far western Queensland.

Etymology: Named as it is not quite placed in the genus *Ctenophorus* Fitzinger, 1843, therefore para, and hence is a "para-ctenophorus".

Content: *Paractenophorus clayi* (Storr, 1967) (type species); *Paractenophorus raffertyi* (Wells and Wellington, 1985).

GENUS CTENOPHORUS FITZINGER, 1843.

Type species: *Grammatophora decresii* Dumeiril and Bibron 1837.

Diagnosis: *Ctenophorus* as defined until now (Cogger 2014) is defined by the following definition, modified to take into account the new genera as defined herein. *Ctenophorus* is defined as an Australian agamid genus characterised by small dorsal scales, homogenous or with at most slightly enlarged tubercles; a few species with distinct rows of paravertebral or dorsolateral spinose scales; a row of enlarged scales from below the eye to above the ear; tympanum exposed (not exposed in *Notactenophorus gen. nov.* and most *Pseudoctenophorus gen. nov.*); tail long, ranging from slightly to much longer than the head and body; femoral and preanal pores present in males; adult males usually with distinctive black or dark grey markings on the throat and/or chest.

The genus *Paractenophorus gen. nov.* is separated from *Ctenophorus*, *Notactenophorus gen. nov.* and *Pseudoctenophorus gen. nov.* by the following suite of characters: tympanum exposed; no series of enlarged, spinose scales on either side of the base of the tail; hindlimb reaching no further than the tympanum when adpressed; tail usually less than 1.5 times as long as the head and body; nasal region is not swollen, the nostril lying below an angular canthal ridge; pores fewer than 15; nostril is slit-like or narrowly elliptical.

Specimens within the genus *Pseudoctenophorus gen. nov.* are separated from all other *Ctenophorus* Fitzinger, 1843, the genus they were placed in previously, by the following suite of characters, being one or other of the following three:

1/ Tympanum exposed; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Pseudoctenophorus subgen. nov.*), or:

2/ Tympanum hidden; covered by skin; body scales are strongly heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Chapmanagama subgen. nov.*), or:

3/ Tympanum hidden; covered by skin; body scales are strongly heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; no series of enlarged, spinose scales on either side of the base of the tail (subgenus *Turnbullagama subgen. nov.*).

Notactenophorus gen. nov. is readily separated from all other members of the genus *Ctenophorus* (where it has been placed until now, as defined in Cogger 2014) and *Pseudoctenophorus gen. nov.*, by the following unique suite of characters: Tympanum is hidden being covered by skin, the body scales are smooth, mostly small, homogenous, with scattered larger but small, flat scales, not keeled or spinose, with a dorsal pattern of a longitudinal dorso-lateral series of five or six large black spots on either side.

Distribution: Most parts of continental Australia.

Content: *C. decresii* (Duméril and Bibron, 1837) (type species); *Ctenophorus caudicinctus* (Günther, 1875); *C. cristatus* (Gray, 1841); *C. dudleyi* Wells and Wellington 1985; *C. femoralis* (Storr, 1965); *C. fionni* (Procter, 1923); *C. fordi* (Storr, 1965); *C. gibba* (Houston, 1974); *C. hawkeswoodi* (Wells and Wellington, 1985); *C. isolepis* (Fischer, 1881); *C. maculatus* (Gray, 1831); *C. mckenziei* (Storr, 1981); *C. mirriyana* McLean, Moussalli, Sass and Stuart-Fox, 2013; *C. nguyarna* Doughty, Maryan, Melville and Austin, 2007; *C. nuchalis* (De Vis, 1884); *C. ornatus* (Gray, 1845); *C. pictus* (Peters, 1866); *C. reticulatus* (Gray, 1845); *C. rubens* (Storr, 1965); *C. rufescens* (Stirling and Zietz, 1893); *C. salinarum* Storr, 1966; *C. scutulatus* (Stirling and Zietz, 1893); *C. tjantjalka* Johnston, 1992; *C. vadhappa* Houston, 1974; *C. yinnietharra* (Storr, 1981).

SUBGENUS LICENTIA WELLS AND WELLINGTON, 1984.

Type species: *Grammatophora christata* Gray, 1841.

Diagnosis: The subgenus *Licentia* Wells and Wellington, 1984, is herein treated as monotypic for the type species, noting however that it may be composite and the name *websteri* (Boulenger, 1904) is already potentially available for a south-western Australian population. The concept of this grouping is significantly different to that published by Wells and Wellington, 1985.

The subgenus *Licentia* is herein defined and separated from all other *Ctenophorus* Fitzinger, 1843 by the following unique suite of characters:

Tympanum exposed; no series of enlarged, spinose scales on either side of the base of the tail; hindlimb usually reaching to eye or beyond when adpressed; tail usually much more than 1.5 times as long as the head and body; canthus rostralis angular or moderately swollen but nostrils, when viewed from above, face outwards as opposed to distinctly upwards; a distinct nuchal crest; a series of differentiated small or enlarged keeled scales form a distinct vertebral series along at least the anterior two thirds of the body; dorsal, caudal and hindlimb scales heterogeneous with scattered, enlarged keeled scales, especially along the dorso-lateral skin fold; tail without dark dorso-lateral streaks, usually banded distally.

Ctenophorus as defined until now (Cogger 2014) is defined by the following definition, modified to take into account the new genera as defined herein. *Ctenophorus* is defined as an Australian agamid genus characterised by small dorsal scales, homogenous or with at most slightly enlarged tubercles; a few species with distinct rows of paravertebral or dorsolateral spinose scales; a row of enlarged scales from below the eye to above the ear; tympanum exposed (not exposed in *Notactenophorus gen. nov.* and most *Pseudoctenophorus gen. nov.*); tail long, ranging from slightly to much longer than the head and body; femoral and preanal pores present in males; adult males usually with distinctive black or dark grey markings on the throat and/or chest. The genus *Paractenophorus gen. nov.* is separated from *Ctenophorus*, *Notactenophorus gen. nov.* and *Pseudoctenophorus gen. nov.* by the following suite of characters: tympanum exposed; no series of

enlarged, spinose scales on either side of the base of the tail; hindlimb reaching no further than the tympanum when adpressed; tail usually less than 1.5 times as long as the head and body; nasal region is not swollen, the nostril lying below an angular canthal ridge; pores fewer than 15; nostril is slit-like or narrowly elliptical.

Specimens within the genus *Pseudoctenophorus gen. nov.* are separated from all other *Ctenophorus* Fitzinger, 1843, the genus they were placed in previously, by the following suite of characters, being one or other of the following three:

1/ Tympanum exposed; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Pseudoctenophorus subgen. nov.*), or:

2/ Tympanum hidden; covered by skin; body scales are strongly heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Chapmanagama subgen. nov.*), or:

3/ Tympanum hidden; covered by skin; body scales are strongly heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; no series of enlarged, spinose scales on either side of the base of the tail (subgenus *Turnbullagama subgen. nov.*).

Notactenophorus gen. nov. is readily separated from all other members of the genus *Ctenophorus* (where it has been placed until now, as defined in Cogger 2014) and *Pseudoctenophorus gen. nov.*, by the following unique suite of characters: Tympanum is hidden being covered by skin, the body scales are smooth, mostly small, homogenous, with scattered larger but small, flat scales, not keeled or spinose, with a dorsal pattern of a longitudinal dorso-lateral series of five or six large black spots on either side.

Distribution: Drier parts of southern Western Australia and south-western South Australia, west of the Spencer Gulf.

Content: *Ctenophorus (Licentia) cristatus* (Gray, 1841) (monotypic).

SUBGENUS PHTHANADON WELLS AND WELLINGTON, 1984.

Type species: *Uromastix maculatus* Gray, 1831.

Diagnosis: The subgenus as defined herein is considerably narrower than the original genus as described by Wells and Wellington in 1984.

Specimens of *Phthanodon* Wells and Wellington, 1984 are readily separated from all other *Ctenophorus* Fitzinger, 1843 by one or other of the following suites of characters:

1/ Tympanum exposed; no series of enlarged, spinose scales on either side of the base of the tail; hindlimb usually reaching to eye or beyond when adpressed; tail usually much more than 1.5 times as long as the head and body; canthus rostralis angular or moderately swollen but nostrils, when viewed from above, face outwards as opposed to distinctly upwards; at most a few enlarged keeled scales on the nape; a series of enlarged vertebral scales, if present forming a distinct linear series only to about the level of the forelimbs; dorsal and even small dorso-lateral scales with distinct sharp central keels forming continuous ridges running obliquely towards vertebral line; scales on the chest strongly keeled; pores more than 32, extending to more than halfway along thigh; black on the throat, at least in adult males; pre-anal pores not arching in the midline; black throat markings, when present not in a single undivided band and black on chest of males not extending to the abdomen (species: *isolepis* and *maculatus*), or:

2/ Tympanum exposed; no series of enlarged, spinose scales on either side of the base of the tail; hindlimb usually reaching to eye or beyond when adpressed; tail usually much more than 1.5 times as long as the head and body; canthus rostralis angular or moderately swollen but nostrils, when viewed from above, face outwards as opposed to distinctly upwards; at most a few enlarged keeled scales on the nape; a series of enlarged vertebral scales, if present forming a distinct linear series only to about the level of the forelimbs; dorsal and even small dorso-lateral scales with distinct sharp central keels forming continuous ridges running obliquely towards vertebral line; scales on the chest strongly keeled; pores 32 or fewer, extending to more than halfway along thigh; no black on the throat (species *femoralis*).

Ctenophorus as defined until now (Cogger 2014) is defined by the following definition, modified to take into account the new genera as defined herein. *Ctenophorus* is defined as an Australian agamid genus characterised by small dorsal scales, homogenous or with at most slightly enlarged tubercles; a few species with distinct rows of

paravertebral or dorsolateral spinose scales; a row of enlarged scales from below the eye to above the ear; tympanum exposed (not exposed in *Notactenophorus gen. nov.* and most *Pseudoctenophorus gen. nov.*); tail long, ranging from slightly to much longer than the head and body; femoral and preanal pores present in males; adult males usually with distinctive black or dark grey markings on the throat and/or chest.

The genus *Paractenophorus gen. nov.* is separated from *Ctenophorus*, *Notactenophorus gen. nov.* and *Pseudoctenophorus gen. nov.* by the following suite of characters: tympanum exposed; no series of enlarged, spinose scales on either side of the base of the tail; hindlimb reaching no further than the tympanum when adpressed; tail usually less than 1.5 times as long as the head and body; nasal region is not swollen, the nostril lying below an angular canthal ridge; pores fewer than 15; nostril is slit-like or narrowly elliptical.

Specimens within the genus *Pseudoctenophorus gen. nov.* are separated from all other *Ctenophorus* Fitzinger, 1843, the genus they were placed in previously, by the following suite of characters, being one or other of the following three:

1/ Tympanum exposed; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Pseudoctenophorus subgen. nov.*), or:

2/ Tympanum hidden; covered by skin; body scales are strongly heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Chapmanagama subgen. nov.*), or:

3/ Tympanum hidden; covered by skin; body scales are strongly heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; no series of enlarged, spinose scales on either side of the base of the tail (subgenus *Turnbullagama subgen. nov.*).

Notactenophorus gen. nov. is readily separated from all other members of the genus *Ctenophorus* (where it has been placed until now, as defined in Cogger 2014) and *Pseudoctenophorus gen. nov.*, by the following unique suite of characters: Tympanum is hidden being covered by skin, the body scales are smooth, mostly small, homogenous, with scattered larger but small, flat scales, not keeled or spinose, with a dorsal pattern of a longitudinal dorso-lateral series of five or six large black spots on either side.

The taxon *Ctenophorus (Phthanodon) hawkeswoodi* Wells and Wellington, 1985 is readily separated from *C. fordii*, the species it has been synonymised with by all herpetologists since the original description both by distribution and colouration. It is found in the Spinifex belt of central NSW, and the fact that the two yellowish dorso-lateral stripes are one, as opposed to two or more scales wide.

There is no doubt whatsoever that it is a different species to *C. fordii*.

Distribution: Drier parts of southern Australia from west Victoria and NSW, extending north in Western Australia to the Exmouth Gulf.

Content: *Ctenophorus (Phthanodon) maculatus* (Gray, 1831) (type); *C. (Phthanodon) femoralis* (Storr, 1965); *C. (Phthanodon) hawkeswoodi* Wells and Wellington, 1985; *C. (Phthanodon) fordii* (Storr, 1965).

SUBGENUS TACHYON WELLS AND WELLINGTON, 1985.

Type species: *Grammatophora caudicincta* Günther, 1875.

Diagnosis: Species within the subgenus *Tachyon* Wells and Wellington, 1985 are separated from all other *Ctenophorus* Fitzinger, 1843 by the following suite of characters being one or other of:

1/ Tympanum exposed; no series of enlarged, spinose scales on either side of the base of the tail; hindlimb usually reaching to eye or beyond when adpressed; tail usually much more than 1.5 times as long as the head and body; canthus rostralis swollen, but nostrils, when viewed from above, face distinctly upwards as opposed to outwards (species *caudicinctus*) or:

2/ Tympanum exposed; no series of enlarged, spinose scales on either side of the base of the tail; hindlimb usually reaching to eye or beyond when adpressed; tail usually much more than 1.5 times as long as the head and body; canthus rostralis angular or moderately swollen, but nostrils, when viewed from above, face outwards as opposed to distinctly upwards (as seen in the species *caudicinctus*); at most a few enlarged keeled scales on the nape; a series of enlarged vertebral scales, if present, forming a distinct linear series only to about the level of the forelimbs; dorsal scales at most with low, irregular keels which do not form distinct continuous ridges; dorso-lateral scales and those on the chest smooth, or with low blunt edges;

nostril elliptical in a swollen nasal scale lying on a swollen canthal ridge; tibial region with a series of anterior proximal scales which are very much larger than those on the posterior surface (species *ornatus* and *yinnietharra*).

Ctenophorus as defined until now (Cogger 2014) is defined by the following definition, modified to take into account the new genera as defined herein. *Ctenophorus* is defined as an Australian agamid genus characterised by small dorsal scales, homogenous or with at most slightly enlarged tubercles; a few species with distinct rows of paravertebral or dorsolateral spinose scales; a row of enlarged scales from below the eye to above the ear; tympanum exposed (not exposed in *Notactenophorus gen. nov.* and most *Pseudoctenophorus gen. nov.*); tail long, ranging from slightly to much longer than the head and body; femoral and preanal pores present in males; adult males usually with distinctive black or dark grey markings on the throat and/or chest.

The genus *Paractenophorus gen. nov.* is separated from *Ctenophorus*, *Notactenophorus gen. nov.* and *Pseudoctenophorus gen. nov.* by the following suite of characters: tympanum exposed; no series of enlarged, spinose scales on either side of the base of the tail; hindlimb reaching no further than the tympanum when adpressed; tail usually less than 1.5 times as long as the head and body; nasal region is not swollen, the nostril lying below an angular canthal ridge; pores fewer than 15; nostril is slit-like or narrowly elliptical.

Specimens within the genus *Pseudoctenophorus gen. nov.* are separated from all other *Ctenophorus* Fitzinger, 1843, the genus they were placed previously, by the following suite of characters, being one or other of the following three:

1/ Tympanum exposed; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Pseudoctenophorus subgen. nov.*), or:

2/ Tympanum hidden; covered by skin; body scales are strongly heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Chapmanagama subgen. nov.*), or:

3/ Tympanum hidden; covered by skin; body scales are strongly heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; no series of enlarged, spinose scales on either side of the base of the tail (subgenus *Turnbullagama subgen. nov.*).

Notactenophorus gen. nov. is readily separated from all other members of the genus *Ctenophorus* (where it has been placed until now, as defined in Cogger 2014) and *Pseudoctenophorus gen. nov.*, by the following unique suite of characters: Tympanum is hidden being covered by skin, the body scales are smooth, mostly small, homogenous, with scattered larger but small, flat scales, not keeled or spinose, with a dorsal pattern of a longitudinal dorso-lateral series of five or six large black spots on either side.

Distribution: Drier parts of northern, central and Western Australia, including the south-west and invariably associated with rock outcrops.

Content: *Ctenophorus (Tachyon) caudicinctus* (Günther, 1875) (type species); *C. (Tachyon) ornatus* (Gray, 1845); *C. (Tachyon) yinnietharra* (Storr, 1981).

SUBGENUS LEUCOMACULAGAMA SUBGEN. NOV.

Type species: *Amphibolurus gibba* Houston, 1974.

Diagnosis: Specimens within the subgenus *Leucomaculagama subgen. nov.* are separated from all other *Ctenophorus* Fitzinger, 1843, the genus they remain a part of, by the following suite of characters:

Tympanum exposed, small but distinct; no series of enlarged, spinose scales on either side of the base of the tail; hindlimb usually reaching no further than the tympanum when adpressed; tail is usually less than 1.5 times as long as the head and body; nasal region not swollen, the nostril lying below and angular canthal ridge; pores more than 25; nostril is oval in shape and facing outward; a series of 20-30 dark spots or blotches along each side of the tail.

Ctenophorus as defined until now (Cogger 2014) is defined by the following definition, modified to take into account the new genera as defined herein. *Ctenophorus* is defined as an Australian agamid genus characterised by small dorsal scales, homogenous or with at most slightly enlarged tubercles; a few species with distinct rows of paravertebral or dorsolateral spinose scales; a row of enlarged scales from below the eye to above the ear; tympanum exposed (not exposed in *Notactenophorus gen. nov.* and most *Pseudoctenophorus gen. nov.*);

nov.); tail long, ranging from slightly to much longer than the head and body; femoral and preanal pores present in males; adult males usually with distinctive black or dark grey markings on the throat and/or chest. The genus *Paractenophorus gen. nov.* is separated from *Ctenophorus*, *Notactenophorus gen. nov.* and *Pseudoctenophorus gen. nov.* by the following suite of characters: tympanum exposed; no series of enlarged, spinose scales on either side of the base of the tail; hindlimb reaching no further than the tympanum when adpressed; tail usually less than 1.5 times as long as the head and body; nasal region is not swollen, the nostril lying below an angular canthal ridge; pores fewer than 15; nostril is slit-like or narrowly elliptical.

Specimens within the genus *Pseudoctenophorus gen. nov.* are separated from all other *Ctenophorus* Fitzinger, 1843, the genus they were placed previously, by the following suite of characters, being one or other of the following three:

1/ Tympanum exposed; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Pseudoctenophorus subgen. nov.*), or:

2/ Tympanum hidden; covered by skin; body scales are strongly heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Chapmanagama subgen. nov.*), or:

3/ Tympanum hidden; covered by skin; body scales are strongly heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; no series of enlarged, spinose scales on either side of the base of the tail (subgenus *Turnbullagama subgen. nov.*).

Notactenophorus gen. nov. is readily separated from all other members of the genus *Ctenophorus* (where it has been placed until now, as defined in Cogger 2014) and *Pseudoctenophorus gen. nov.*, by the following unique suite of characters: Tympanum is hidden being covered by skin, the body scales are smooth, mostly small, homogenous, with scattered larger but small, flat scales, not keeled or spinose, with a dorsal pattern of a longitudinal dorso-lateral series of five or six large black spots on either side.

Distribution: Known only from the Lake Eyre basin in north-eastern South Australia.

Etymology: Named in reflection of the Latin derivative of its colour pattern (white spots or more commonly speckling) and the fact it is an agamid.

Content: *Ctenophorus (Leucomaculagama) gibba* (Houston, 1974) (monotypic).

SUBGENUS ARENICOLAGAMA SUBGEN. NOV.

Type species: *Amphibolurus salinarum* Storr, 1966.

Diagnosis: Specimens within the subgenus *Arenicolagama subgen. nov.* are separated from all other *Ctenophorus* Fitzinger, 1843, the genus they remain a part of, by the following suite of characters:

Tympanum exposed; no series of enlarged, spinose scales on either side of the base of the tail; hindlimb reaching no further than the tympanum when adpressed; tail usually less than 1.5 times as long as the head and body; nasal region is not swollen, the nostril lying below an angular canthal ridge; pores fewer than 25, nostril is circular or broadly elliptical; no linear series of dark spots or blotches along each side of the tail; dorsal scalation heterogeneous, with numerous low, enlarged scales on the back and sides.

Ctenophorus as defined until now (Cogger 2014) is defined by the following definition, modified to take into account the new genera as defined herein. *Ctenophorus* is defined as an Australian agamid genus characterised by small dorsal scales, homogenous or with at most slightly enlarged tubercles; a few species with distinct rows of paravertebral or dorsolateral spinose scales; a row of enlarged scales from below the eye to above the ear; tympanum exposed (not exposed in *Notactenophorus gen. nov.* and most *Pseudoctenophorus gen. nov.*); tail long, ranging from slightly to much longer than the head and body; femoral and preanal pores present in males; adult males usually with distinctive black or dark grey markings on the throat and/or chest.

The genus *Paractenophorus gen. nov.* is separated from *Ctenophorus*, *Notactenophorus gen. nov.* and *Pseudoctenophorus gen. nov.* by the following suite of characters: tympanum exposed; no series of enlarged, spinose scales on either side of the base of the tail; hindlimb reaching no further than the tympanum when adpressed; tail usually less than 1.5 times as long as the head and body; nasal region is not swollen, the nostril lying below an angular canthal ridge; pores fewer

than 15; nostril is slit-like or narrowly elliptical.

Specimens within the genus *Pseudoctenophorus gen. nov.* are separated from all other *Ctenophorus* Fitzinger, 1843, the genus they were placed in previously, by the following suite of characters, being one or other of the following three:

1/ Tympanum exposed; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Pseudoctenophorus subgen. nov.*), or:

2/ Tympanum hidden; covered by skin; body scales are strongly heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Chapmanagama subgen. nov.*), or:

3/ Tympanum hidden; covered by skin; body scales are strongly heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; no series of enlarged, spinose scales on either side of the base of the tail (subgenus *Turnbullagama subgen. nov.*).

Notactenophorus gen. nov. is readily separated from all other members of the genus *Ctenophorus* (where it has been placed until now, as defined in Cogger 2014) and *Pseudoctenophorus gen. nov.*, by the following unique suite of characters: Tympanum is hidden being covered by skin, the body scales are smooth, mostly small, homogenous, with scattered larger but small, flat scales, not keeled or spinose, with a dorsal pattern of a longitudinal dorso-lateral series of five or six large black spots on either side.

Distribution: Drier parts of the interior and southern regions of Western Australia.

Etymology: Named in reflection of the sand dwelling nature of the component species and the fact it/they is/are an agamid.

Content: *Ctenophorus (Arenicolagama) salinarum* Storr, 1966 (type species); *C. (Arenicolagama) nguyarna* Doughty, Maryan, Melville and Austin, 2007.

SUBGENUS VALENAGAMA SUBGEN. NOV.

Type species: *Grammatophora reticulata* Gray, 1845.

Diagnosis: Specimens within the subgenus *Valenagama subgen. nov.* are separated from all other *Ctenophorus* Fitzinger, 1843, the genus they remain a part of, by the following suite of characters:

Tympanum exposed; no series of enlarged, spinose scales on either side of the base of the tail; hindlimb reaching no further than the tympanum when adpressed; tail usually less than 1.5 times as long as the head and body; nasal region swollen, the nostril lying on or above the curved canthal ridge.

Ctenophorus as defined until now (Cogger 2014) is defined by the following definition, modified to take into account the new genera as defined herein. *Ctenophorus* is defined as an Australian agamid genus characterised by small dorsal scales, homogenous or with at most slightly enlarged tubercles; a few species with distinct rows of paravertebral or dorsolateral spinose scales; a row of enlarged scales from below the eye to above the ear; tympanum exposed (not exposed in *Notactenophorus gen. nov.* and most *Pseudoctenophorus gen. nov.*); tail long, ranging from slightly to much longer than the head and body; femoral and preanal pores present in males; adult males usually with distinctive black or dark grey markings on the throat and/or chest.

The genus *Paractenophorus gen. nov.* is separated from *Ctenophorus*, *Notactenophorus gen. nov.* and *Pseudoctenophorus gen. nov.* by the following suite of characters: tympanum exposed; no series of enlarged, spinose scales on either side of the base of the tail; hindlimb reaching no further than the tympanum when adpressed; tail usually less than 1.5 times as long as the head and body; nasal region is not swollen, the nostril lying below an angular canthal ridge; pores fewer than 15; nostril is slit-like or narrowly elliptical.

Specimens within the genus *Pseudoctenophorus gen. nov.* are separated from all other *Ctenophorus* Fitzinger, 1843, the genus they were placed in previously, by the following suite of characters, being one or other of the following three:

1/ Tympanum exposed; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Pseudoctenophorus subgen. nov.*), or:

2/ Tympanum hidden; covered by skin; body scales are strongly heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Chapmanagama subgen. nov.*), or:

3/ Tympanum hidden; covered by skin; body scales are strongly heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; no series of enlarged, spinose scales on either side of the base of the tail (subgenus *Turnbullagama subgen. nov.*).

Notactenophorus gen. nov. is readily separated from all other members of the genus *Ctenophorus* (where it has been placed until now, as defined in Cogger 2014) and *Pseudoctenophorus gen. nov.*, by the following unique suite of characters: Tympanum is hidden being covered by skin, the body scales are smooth, mostly small, homogenous, with scattered larger but small, flat scales, not keeled or spinose, with a dorsal pattern of a longitudinal dorso-lateral series of five or six large black spots on either side.

Distribution: Drier parts of Australia except for the far south.

Etymology: Named in reflection of the stout build of the relevant species and that they are agamid lizards.

Content: *Ctenophorus (Valenagama) reticulatus* (Gray, 1845) (type species); *C. (Valenagama) nuchalis* (De Vis, 1884);

SUBGENUS AURANTICOAGAMA SUBGEN. NOV.

Type species: *Grammatophora isolepis* Fischer, 1881.

Diagnosis: *Phthanodon* Wells and Wellington, 1984 as defined by those authors, included species within this subgenus (*Aurantiacoagama subgen. nov.*). It is clearly the contention here, based on published molecular and morphological data as already cited herein, that the species within *Aurantiacoagama subgen. nov.* are sufficiently different and divergent as to qualify to be placed in their own taxonomic group and hence the erection of this subgenus, which is different to *Phthanodon* Wells and Wellington, 1984 as effectively redescribed above.

Specimens within the subgenus *Aurantiacoagama subgen. nov.* are separated from all other *Ctenophorus* Fitzinger, 1843, the genus they remain a part of, by the following suite of characters, these being one or other of:

1/ Tympanum exposed; no series of enlarged, spinose scales on either side of the base of the tail; hindlimb usually reaching to eye or beyond when adpressed; tail usually much more than 1.5 times as long as the head and body; canthus rostralis angular or moderately swollen, but nostrils when viewed from above, face outwards (as opposed to upwards in the species *Ctenophorus (Tachyon) caudicinctus*); a distinct nuchal crest; a series of differentiated small or enlarged keeled scales form a distinct vertebral series along at least the anterior two-thirds of the body; dorsal, caudal and hindlimb scales homogeneous; a dark brown zig zag dorso-lateral streak along each side of the tail which is never banded (species *mckenziei* and *scutulatus*), or:

2/ Tympanum exposed; no series of enlarged, spinose scales on either side of the base of the tail; hindlimb usually reaching to eye or beyond when adpressed; tail usually much more than 1.5 times as long as the head and body; canthus rostralis angular or moderately swollen, but nostrils when viewed from above, face outwards (as opposed to upwards in the species *Ctenophorus (Tachyon) caudicinctus*); at most a few enlarged keeled scales on the nape; a series of enlarged vertebral scales, if present, forming a distinct linear series only to about the level of the forelimbs; dorsal and even small dorso-lateral scales with distinct sharp central keels forming continuous ridges running obliquely towards the vertebral line; scales on the chest strongly keeled; pores more than 32 and extending more than halfway along the thigh; black on throat at least in the males; pre-anal pores arching forward to an apex on the midline; a single broad, undivided throat marking in males and black on the chest of males extends back to the abdomen (species *isolepis* and *rubens*).

Ctenophorus as defined until now (Cogger 2014) is defined by the following definition, modified to take into account the new genera as defined herein. *Ctenophorus* is defined as an Australian agamid genus characterised by small dorsal scales, homogenous or with at most slightly enlarged tubercles; a few species with distinct rows of paravertebral or dorsolateral spinose scales; a row of enlarged scales from below the eye to above the ear; tympanum exposed (not exposed in *Notactenophorus gen. nov.* and most *Pseudoctenophorus gen. nov.*); tail long, ranging from slightly to much longer than the head and body; femoral and preanal pores present in males; adult males usually with distinctive black or dark grey markings on the throat and/or chest. The genus *Paractenophorus gen. nov.* is separated from *Ctenophorus*, *Notactenophorus gen. nov.* and *Pseudoctenophorus gen. nov.* by the following suite of characters: tympanum exposed; no series of

enlarged, spinose scales on either side of the base of the tail; hindlimb reaching no further than the tympanum when adpressed; tail usually less than 1.5 times as long as the head and body; nasal region is not swollen, the nostril lying below an angular canthal ridge; pores fewer than 15; nostril is slit-like or narrowly elliptical.

Specimens within the genus *Pseudoctenophorus gen. nov.* are separated from all other *Ctenophorus* Fitzinger, 1843, the genus they were placed in previously, by the following suite of characters, being one or other of the following three:

1/ Tympanum exposed; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Pseudoctenophorus subgen. nov.*), or:

2/ Tympanum hidden; covered by skin; body scales are strongly heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Chapmanagama subgen. nov.*), or:

3/ Tympanum hidden; covered by skin; body scales are strongly heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; no series of enlarged, spinose scales on either side of the base of the tail (subgenus *Turnbullagama subgen. nov.*).

Notactenophorus gen. nov. is readily separated from all other members of the genus *Ctenophorus* (where it has been placed until now, as defined in Cogger 2014) and *Pseudoctenophorus gen. nov.*, by the following unique suite of characters: Tympanum is hidden being covered by skin, the body scales are smooth, mostly small, homogenous, with scattered larger but small, flat scales, not keeled or spinose, with a dorsal pattern of a longitudinal dorso-lateral series of five or six large black spots on either side.

Distribution: Drier parts of the western two thirds of Australia south of the tropical zone.

Etymology: Named in reflection of the orangeish colouration of most specimens and the fact that they are an agamid.

Content: *Ctenophorus (Aurantiacoagama) isolepis* (Fischer, 1881) (type species); *C. (Aurantiacoagama) mckenziei* (Storr, 1981); *C. (Aurantiacoagama) rubens* (Storr, 1965); *C. (Aurantiacoagama) scutulatus* (Stirling and Zietz, 1893).

SUBGENUS MEMBRUMVARIEGATAGAMA SUBGEN. NOV.

Type species: *Amphibolurus pictus* Peters, 1866.

Diagnosis: Specimens within the subgenus *Membrumvariegatagama subgen. nov.* are separated from all other *Ctenophorus* Fitzinger, 1843, the genus they remain a part of, by the following suite of characters:

Tympanum exposed, no series of enlarged, spinose scales on either side of the base of the tail; hindlimb usually reaching no further than the tympanum when adpressed; tail is usually less than 1.5 times as long as the head and body; nasal region not swollen, the nostril lying below and angular canthal ridge; pores more than 25; nostril is round in shape and facing outward in an enlarged nasal scale below the canthal ridge; no linear series of dark spots or blotches along each side of the tail; dorsal scalation is homogenous, without scattered enlarged scales on the back and sides.

Ctenophorus as defined until now (Cogger 2014) is defined by the following definition, modified to take into account the new genera as defined herein. *Ctenophorus* is defined as an Australian agamid genus characterised by small dorsal scales, homogenous or with at most slightly enlarged tubercles; a few species with distinct rows of paravertebral or dorsolateral spinose scales; a row of enlarged scales from below the eye to above the ear; tympanum exposed (not exposed in *Notactenophorus gen. nov.* and most *Pseudoctenophorus gen. nov.*); tail long, ranging from slightly to much longer than the head and body; femoral and preanal pores present in males; adult males usually with distinctive black or dark grey markings on the throat and/or chest.

The genus *Paractenophorus gen. nov.* is separated from *Ctenophorus*, *Notactenophorus gen. nov.* and *Pseudoctenophorus gen. nov.* by the following suite of characters: tympanum exposed; no series of enlarged, spinose scales on either side of the base of the tail; hindlimb reaching no further than the tympanum when adpressed; tail usually less than 1.5 times as long as the head and body; nasal region is not swollen, the nostril lying below an angular canthal ridge; pores fewer than 15; nostril is slit-like or narrowly elliptical.

Specimens within the genus *Pseudoctenophorus gen. nov.* are separated from all other *Ctenophorus* Fitzinger, 1843, the genus they

were placed in previously, by the following suite of characters, being one or other of the following three:

1/ Tympanum exposed; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Pseudoctenophorus subgen. nov.*), or:

2/ Tympanum hidden; covered by skin; body scales are strongly heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; a series of enlarged, spinose scales on either side of the base of the tail (subgenus *Chapmanagama subgen. nov.*), or:

3/ Tympanum hidden; covered by skin; body scales are strongly heterogeneous, many of the larger scales on the body and head keeled or moderately spinose; no series of enlarged, spinose scales on either side of the base of the tail (subgenus *Turnbullagama subgen. nov.*).

Notactenophorus gen. nov. is readily separated from all other members of the genus *Ctenophorus* (where it has been placed until now, as defined in Cogger 2014) and *Pseudoctenophorus gen. nov.*, by the following unique suite of characters: Tympanum is hidden being covered by skin, the body scales are smooth, mostly small, homogenous, with scattered larger but small, flat scales, not keeled or spinose, with a dorsal pattern of a longitudinal dorso-lateral series of five or six large black spots on either side.

Distribution: Drier parts of southern Australia within an area not including the red centre and regions anywhere near the west or east coasts.

Etymology: Named in reflection of the variegated patterning on the limbs and that they are an agamid group of lizards.

Content: *Ctenophorus (Membrumvariegatagama) pictus* (Peters, 1866) (type species); *C. (Membrumvariegatagama) dudleyi* (Wells and Wellington, 1985).

GENUS RANKINIA WELLS AND WELLINGTON, 1984.

Type species: *Grammatophora diemensis muricatus* Gray, 1841.

Diagnosis: Noting that Wells and Wellington were widely lampooned at the time they erected the genus, it is significant to note the test of time and new molecular technology not available to the pair in 1984, has validated their good judgement.

However the genus as conceived by the pair in 1984, has been modified by most authors since, to be monotypic for the species *Rankinia diemensis* Gray, 1841.

Dissenting again from that consensus has been Wells and Wellington, who in 1984, formally named the taxon *Rankinia boylani* to separate the Blue Mountains of NSW population from that of Tasmania (the nominate form of *diemensis*).

The published results of Ng *et al.* (2014) with supporting molecular data, not only supported the Wells and Wellington contention that their *Rankinia boylani* was in fact a valid species, but further that there were in fact four more valid species level taxa within the *Rankinia diemensis* species complex.

With names unavailable for four of these species, all six are formally defined herein, and separated from one another in the text that follows.

The genus *Rankinia* Wells and Wellington, 1984, is separated from all other Australian agamids by the following suite of characters:

Body is without very large conical spines or a spiny nuchal hump; no large skin frill around the neck; tail is not compressed and with a lateral keel, it does not have a strongly differentiated dorsal keel; a vertebral series of enlarged scales present or absent on the back; if present, three or more femoral pores present on each side; femoral pores present; a single row of spinose scales on sides of the base of the tail; lower edge of supralabials straight or at most slightly curved, forming a more or less straight or even edge to the upper lip; no row of enlarged scales from below eye to above ear; dorsal scales of body heterogeneous, but with either distinctive vertebral and paravertebral rows of enlarged, keeled or spinose scales and with a poorly developed nuchal crest (that varies in development between species), no dorsal crest and sometimes a distinct vertebral ridge; tympanum distinct; enlarged spinose scales along each side of the base of the tail.

Within the genus *Rankinia*, each of the six morphologically similar species are identified and separated from one another as follows: *Rankinia diemensis* (Gray, 1841), herein restricted to Tasmania and main Bass Strait Islands, is separated from the other five species by the following characters: the lateral spines running on each side from

the base of the tail are smaller than the lateral spines along the sides of the body; the lighter dorso-linear blotches above the lateral flanks are of even curvature when viewed from above; there are distinct white-tipped spines on the posterior lateral edge of the back legs; the spines of the nuchal crest are distinctive in that they are easily noticed. *Rankinia boylani* Wells and Wellington, 1984, herein restricted to NSW in the vicinity of the Sydney basin, including the Blue Mountains, as far west at Mount Victoria (the type locality), but presumed to include most other specimens of *Rankinia* from New South Wales north of Goulburn, is separated from the other five species by the following characters: the lateral spines running on each side from the base of the tail are considerably larger than the lateral spines along the sides of the body; the lighter dorso-linear blotches above the lateral flanks are not of even curvature when viewed from above, these being larger at the posterior edge; there are no distinct white-tipped spines on the posterior lateral edge of the back legs; the spines of the nuchal crest are not distinctive in that they are easily not noticed.

Rankinia neildaviei sp. nov. herein confined to the Grampians in south-western Victoria, is separated from the other five species by the following characters: the dorsal spines on the anterior part of the tail are large; there are no distinct white-tipped spines on the posterior lateral edge of the back legs; the lighter dorso-linear blotches above the lateral flanks are all or mostly of even curvature when viewed from above; the banding on the hind limbs is distinct (as opposed to obvious banding that is indistinct in some other species in the genus, including *R. diemensis* and *R. boylani*).

Rankinia hoserae sp. nov. is the taxon found around Anglesea on the central Victorian coast and the highlands of central Victoria in scattered locations including Kinglake National Park and Wombat State Forest. It is separated from the other five species by the following characters: the hind legs have no obvious banding; exceptionally large spines on the upper body and in particular between the rear legs; some of the scale spines on the rear of the hind legs are either white or yellowish in colour; scales forming the nuchal crest are small, distinct and apart.

Rankinia jameswhybrowi sp. nov. is the species found in the hills just east of Lake Eildon, Victoria and in the ranges to the north of there. It is separated from the other five species by the following characters: the lighter dorso-linear blotches above the lateral flanks are of even curvature when viewed from above and noticeably elongate in shape and to an extent not seen in any of the other species; the tail is strongly banded, versus indistinctly banded in the other species; the nuchal crest is so poorly developed as to appear absent.

Rankinia fergussonae sp. nov. from Goonoo National Park, NSW is defined and separated from the other five species in the genus by the following: It is similar in most respects to *R. boylani*, from which it is differentiated by its more prominent nuchal crest scales (prominent versus very hard to see) and the presence of a well-developed white line along the lower lateral flank of the body on either side, which is indistinct in *R. boylani* and usually not white in colour, but light greyish instead or if whitish in *R. boylani*, is invariably broken.

Distribution: Uplands of south-eastern Australia, including suitable habitat on and near the coast, usually being rocky hills, or stony and sandy areas on associated plateaus. This includes eastern NSW from areas north of Sydney, through Victoria as far west as the Grampians, including Bass Strait islands and most of Tasmania, particularly the eastern half. The population from north-east of Dubbo in NSW (*Rankinia fergussonae sp. nov.*) appears to be an outlier population.

Content: *Rankinia diemensis* (Gray, 1841) (type species); *R. boylani* Wells and Wellington, 1984; *R. fergussonae sp. nov.*; *R. hoserae sp. nov.*; *R. jameswhybrowi sp. nov.*; *R. neildaviei sp. nov.*.

SPECIES RANKINIA DIEMENSIS (GRAY, 1841).

See for genus (above).

SPECIES RANKINIA BOYLANI WELLS AND WELLINGTON, 1984.

See for genus above.

SPECIES RANKINIA HOSERAE SP. NOV.

Holotype: Preserved specimen number D71911 held at the National Museum of Victoria in Melbourne, Australia, collected in 2004 at Anglesea, Victoria, Australia, Latitude -38.42, Longitude 144.18. This is a government owned facility that allows access to its holdings of specimens.

Paratype: A preserved specimen held at the Australian National Wildlife Collection (ANWC), in Canberra, ACT, Australia, specimen number: R02212 collected at Anglesea, Victoria, Australia, Latitude -

38.42, Longitude 144.18. This is a government owned facility that allows access to its holdings of specimens.

Diagnosis: Within the genus *Rankinia*, each of the six morphologically similar species are identified and separated from one another as follows:

Rankinia hoserae sp. nov. is the taxon found around Anglesea on the central Victorian coast and the highlands of central Victoria in scattered locations including Kinglake National Park and Wombat State Forest. It is separated from the other five species in *Rankinia* Wells and Wellington, 1984 by the following characters: the hind legs have no obvious banding; exceptionally large spines on the upper body and in particular between the rear legs; some of the scale spines on the rear of the hind legs are either white or yellowish in colour; scales forming the nuchal crest are small, distinct and apart.

Rankinia jameswhybrowi sp. nov. is the species found in the hills just east of Lake Eildon, Victoria and in the ranges to the north of there. It is separated from the other five species of *Rankinia* Wells and Wellington, 1984 by the following characters: the lighter dorso-linear blotches above the lateral flanks are of even curvature when viewed from above and noticeably elongate in shape and to an extent not seen in any of the other species; the tail is strongly banded, versus indistinctly banded in the other species; the nuchal crest is so poorly developed as to appear absent.

Rankinia diemensis (Gray, 1841), herein restricted to Tasmania and Bass Strait Islands, is separated from the other five species in *Rankinia* Wells and Wellington, 1984 by the following characters: the lateral spines running on each side from the base of the tail are smaller than the lateral spines along the sides of the body; the lighter dorso-linear blotches above the lateral flanks are of even curvature when viewed from above; there are distinct white-tipped spines on the posterior lateral edge of the back legs; the spines of the nuchal crest are distinctive in that they are easily noticed.

Rankinia boylani Wells and Wellington, 1984, herein restricted to NSW in the vicinity of the Sydney basin, including the Blue Mountains, as far west as Mount Victoria (the type locality), but presumed to include most other specimens of *Rankinia* from New South Wales north of Goulburn, is separated from the other five species in *Rankinia* Wells and Wellington, 1984 by the following characters: the lateral spines running on each side from the base of the tail are considerably larger than the lateral spines along the sides of the body; the lighter dorso-linear blotches above the lateral flanks are not of even curvature when viewed from above, these being larger at the posterior edge; there are no distinct white-tipped spines on the posterior lateral edge of the back legs; the spines of the nuchal crest are not distinctive in that they are easily not noticed.

Rankinia neildaviei sp. nov. herein confined to the Grampians in south-western Victoria, is separated from the other five species in *Rankinia* Wells and Wellington, 1984 by the following characters: the dorsal spines on the anterior part of the tail are large; there are no distinct white-tipped spines on the posterior lateral edge of the back legs; the lighter dorso-linear blotches above the lateral flanks are all or mostly of even curvature when viewed from above; the banding on the hind limbs is distinct (as opposed to obvious banding that is indistinct in some other species in the genus, including *R. diemensis* and *R. boylani*).

Rankinia fergussonae sp. nov. from Goonoo National Park, NSW is defined and separated from the other five species in the genus *Rankinia* Wells and Wellington, 1984 by the following: It is similar in most respects to *R. boylani*, from which it is differentiated by its more prominent nuchal crest scales (prominent versus very hard to see) and the presence of a well-developed white line along the lower lateral flank of the body on either side, which is indistinct in *R. boylani* and usually not white in colour, but light greyish instead or if whitish in *R. boylani*, is invariably broken.

The genus *Rankinia* Wells and Wellington, 1984, is separated from all other Australian agamids by the following suite of characters:

Body is without very large conical spines or a spiny nuchal hump; no large skin frill around the neck; tail is not compressed and with a lateral keel, it does not have a strongly differentiated dorsal keel; a vertebral series of enlarged scales present or absent on the back; if present, three or more femoral pores present on each side; femoral pores present; a single row of spinose scales on sides of the base of the tail; lower edge of supralabials straight or at most slightly curved, forming a more or less straight or even edge to the upper lip; no row of enlarged scales from below eye to above ear; dorsal scales of body

heterogeneous, but with either distinctive vertebral and paravertebral rows of enlarged, keeled or spinose scales and with a poorly developed nuchal crest (that varies in development between species), no dorsal crest and sometimes a distinct vertebral ridge; tympanum distinct; enlarged spinose scales along each side of the base of the tail.

Distribution: Central Victoria, in scattered locations of suitable habitat in conservation reserves, including near Anglesea to the south-west of Melbourne, Wombat State Forest, near Bacchus Marsh, about 50 km west, north-west of Melbourne and Kinglake National Park about 50 km north, north-east of Melbourne, the three locations each representing significantly different climatic zones.

Etymology: Named in honour of my wife, Shireen Hoser in recognition of her massive contribution to herpetology on a global scale over nearly two decades.

SPECIES RANKINIA JAMESWHYBROWI SP. NOV.

Holotype: A female preserved specimen number: D71904 collected in 2004 at the Big River State Forest, Victoria, 200 metres south of the confluence of Taponga River and White Creek, Latitude -37.37, Longitude 146.05, held at the National Museum of Victoria in Melbourne, Australia.

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

Diagnosis: Within the genus *Rankinia*, each of the six morphologically similar species are identified and separated from one another as follows:

Rankinia jameswhybrowi sp. nov. is the species found in the hills just east of Lake Eildon, Victoria and in the ranges to the north of there. It is separated from the other five species of *Rankinia* Wells and Wellington, 1984 by the following characters: the lighter dorso-linear blotches above the lateral flanks are of even curvature when viewed from above and noticeably elongate in shape and to an extent not seen in any of the other species; the tail is strongly banded, versus indistinctly banded in the other species; the nuchal crest is so poorly developed as to appear absent.

Rankinia diemensis (Gray, 1841), herein restricted to Tasmania and Bass Strait Islands, is separated from the other five species by the following characters: the lateral spines running on each side from the base of the tail are smaller than the lateral spines along the sides of the body; the lighter dorso-linear blotches above the lateral flanks are of even curvature when viewed from above; there are distinct white-tipped spines on the posterior lateral edge of the back legs; the spines of the nuchal crest are distinctive in that they are easily noticed.

Rankinia boylani Wells and Wellington, 1984, herein restricted to NSW in the vicinity of the Sydney basin, including the Blue Mountains, as far west as Mount Victoria (the type locality), but presumed to include most other specimens of *Rankinia* from New South Wales north of Goulburn, is separated from the other five species by the following characters: the lateral spines running on each side from the base of the tail are considerably larger than the lateral spines along the sides of the body; the lighter dorso-linear blotches above the lateral flanks are not of even curvature when viewed from above, these being larger at the posterior edge; there are no distinct white-tipped spines on the posterior lateral edge of the back legs; the spines of the nuchal crest are not distinctive in that they are easily not noticed.

Rankinia neildaviei sp. nov. herein confined to the Grampians in south-western Victoria, is separated from the other five species by the following characters: the dorsal spines on the anterior part of the tail are large; there are no distinct white-tipped spines on the posterior lateral edge of the back legs; the lighter dorso-linear blotches above the lateral flanks are all or mostly of even curvature when viewed from above; the banding on the hind limbs is distinct (as opposed to obvious banding that is indistinct in some other species in the genus, including *R. diemensis* and *R. boylani*).

Rankinia hoserae sp. nov. is the taxon found around Anglesea on the central Victorian coast and the highlands of central Victoria in scattered locations including Kinglake National Park and Wombat State Forest. It is separated from the other five species by the following characters: the hind legs have no obvious banding; exceptionally large spines on the upper body and in particular between the rear legs; some of the scale spines on the rear of the hind legs are either white or yellowish in colour; scales forming the nuchal crest are small, distinct and apart.

Rankinia fergussonae sp. nov. from Goonoo National Park, NSW is defined and separated from the other five species in the genus by the

following: It is similar in most respects to *R. boylani*, from which it is differentiated by its more prominent nuchal crest scales (prominent versus very hard to see) and the presence of a well-developed white line along the lower lateral flank of the body on either side, which is indistinct in *R. boylani* and usually not white in colour, but light greyish instead or if whitish in *R. boylani*, is invariably broken.

The genus *Rankinia* Wells and Wellington, 1984, is separated from all other Australian agamids by the following suite of characters:

Body is without very large conical spines or a spiny nuchal hump; no large skin frill around the neck; tail is not compressed and with a lateral keel, it does not have a strongly differentiated dorsal keel; a vertebral series of enlarged scales present or absent on the back; if present, three or more femoral pores present on each side; femoral pores present; a single row of spinose scales on sides of the base of the tail; lower edge of supralabials straight or at most slightly curved, forming a more or less straight or even edge to the upper lip; no row of enlarged scales from below eye to above ear; dorsal scales of body heterogeneous, but with either distinctive vertebral and paravertebral rows of enlarged, keeled or spinose scales and with a poorly developed nuchal crest (that varies in development between species), no dorsal crest and sometimes a distinct vertebral ridge; tympanum distinct; enlarged spinose scales along each side of the base of the tail.

Distribution: Known from the ranges east of Lake Eildon and north-east of there, presumably to or beyond the NSW border, where pockets of suitable habitat exists.

Etymology: Named in honour of James Whybrow, aged 10 in 2015, son of Pete Whybrow and Judy Fergusson of Taggerty, Victoria, Australia in recognition to his already significant contributions to herpetology and the music industry. In spite of his youth, James plays concerts with various instruments in pubs, clubs and hotels on a regular basis to an ever expanding fan base and forever advocating the causes of animal welfare and wildlife conservation, proving that it is possible to achieve stardom in Australia without having to attack and torment animals in unspeakable acts of cruelty for TV audiences and at the same time yell "crikey" so done by the Irwin family of Queensland.

SPECIES RANKINIA NEILDAVIEI SP. NOV.

Holotype: A preserved specimen at the South Australian Museum, Adelaide, Australia, specimen number: R3190, collected at Mount William in the Grampians, Victoria, Latitude -37.30, Longitude 142.60. The South Australian Museum in Adelaide, Australia is a government owned facility that allows access to its specimens.

Diagnosis: Within the genus *Rankinia*, each of the six morphologically similar species are identified and separated from one another as follows:

Rankinia neildaviei sp. nov. herein confined to the Grampians in south-western Victoria, is separated from the other five species in *Rankinia* Wells and Wellington, 1984 by the following characters: the dorsal spines on the anterior part of the tail are large; there are no distinct white-tipped spines on the posterior lateral edge of the back legs; the lighter dorso-linear blotches above the lateral flanks are all or mostly of even curvature when viewed from above; the banding on the hind limbs is distinct (as opposed to obvious banding that is indistinct in some other species in the genus, including *R. diemensis* and *R. boylani*).

Rankinia hoseri sp. nov. is the taxon found around Anglesea on the central Victorian coast and the highlands of central Victoria in scattered locations including Kinglake National Park and Wombat State Forest. It is separated from the other five species in *Rankinia* Wells and Wellington, 1984 by the following characters: the hind legs have no obvious banding; exceptionally large spines on the upper body and in particular between the rear legs; some of the scale spines on the rear of the hind legs are either white or yellowish in colour; scales forming the nuchal crest are small, distinct and apart.

Rankinia jameswhybrowi sp. nov. is the species found in the hills just east of Lake Eildon, Victoria and in the ranges to the north of there. It is separated from the other five species of *Rankinia* Wells and Wellington, 1984 by the following characters: the lighter dorso-linear blotches above the lateral flanks are of even curvature when viewed from above and noticeably elongate in shape and to an extent not seen in any of the other species; the tail is strongly banded, versus indistinctly banded in the other species; the nuchal crest is so poorly developed as to appear absent.

Rankinia diemensis (Gray, 1841), herein restricted to Tasmania and

Bass Strait Islands, is separated from the other five species in *Rankinia* Wells and Wellington, 1984 by the following characters: the lateral spines running on each side from the base of the tail are smaller than the lateral spines along the sides of the body; the lighter dorso-linear blotches above the lateral flanks are of even curvature when viewed from above; there are distinct white-tipped spines on the posterior lateral edge of the back legs; the spines of the nuchal crest are distinctive in that they are easily noticed.

Rankinia boylani Wells and Wellington, 1984, herein restricted to NSW in the vicinity of the Sydney basin, including the Blue Mountains, as far west as Mount Victoria (the type locality), but presumed to include most other specimens of *Rankinia* from New South Wales north of Goulburn, is separated from the other five species in *Rankinia* Wells and Wellington, 1984 by the following characters: the lateral spines running on each side from the base of the tail are considerably larger than the lateral spines along the sides of the body; the lighter dorso-linear blotches above the lateral flanks are not of even curvature when viewed from above, these being larger at the posterior edge; there are no distinct white-tipped spines on the posterior lateral edge of the back legs; the spines of the nuchal crest are not distinctive in that they are easily not noticed.

Rankinia fergussonae sp. nov. from Goonoo National Park, NSW is defined and separated from the other five species in the genus *Rankinia* Wells and Wellington, 1984 by the following: It is similar in most respects to *R. boylani*, from which it is differentiated by its more prominent nuchal crest scales (prominent versus very hard to see) and the presence of a well-developed white line along the lower lateral flank of the body on either side, which is indistinct in *R. boylani* and usually not white in colour, but light greyish instead or if whitish in *R. boylani*, is invariably broken.

The genus *Rankinia* Wells and Wellington, 1984, is separated from all other Australian agamids by the following suite of characters:

Body is without very large conical spines or a spiny nuchal hump; no large skin frill around the neck; tail is not compressed and with a lateral keel, it does not have a strongly differentiated dorsal keel; a vertebral series of enlarged scales present or absent on the back; if present, three or more femoral pores present on each side; femoral pores present; a single row of spinose scales on sides of the base of the tail; lower edge of supralabials straight or at most slightly curved, forming a more or less straight or even edge to the upper lip; no row of enlarged scales from below eye to above ear; dorsal scales of body heterogeneous, but with either distinctive vertebral and paravertebral rows of enlarged, keeled or spinose scales and with a poorly developed nuchal crest (that varies in development between species), no dorsal crest and sometimes a distinct vertebral ridge; tympanum distinct; enlarged spinose scales along each side of the base of the tail.

Distribution: Believed to only occur in the Grampians of Western Victoria. The area is a conservation national park and so the population is believed to be safe. It is however effectively surrounded by agricultural land. Furthermore the ability of the government wildlife department of Victoria to kill wildlife is legendary and with the current administration, few, if any species of reptile with limited distribution in Victoria could be deemed safe.

Etymology: Named in honour of Neil Davie, deceased in late June or early July 2015, who died suddenly at his home at Lara (near Geelong) in Victoria, Australia at age 61 (or thereabouts), for services to herpetology. He founded the Victorian Association of Amateur Herpetologists (VAAH) in the 1990's at a time when private herpetologists were under siege from the business entity called Melbourne Zoo, part of a larger outfit known now as "Zoos Victoria", a dysfunctional government-run business enterprise.

This business was in turn owned and controlled by the State Wildlife Department which has undergone no less than nine separate name changes (rebranding) over the previous two decades.

In order to remove any business or person they saw as a potential competitor to their business, the wildlife department sought to outlaw private reptile keeping in Victoria, private businesses doing wildlife displays in schools and the like.

The business "Zoos Victoria" wanted (and as of 2015 still does seek) to be the only business in Victoria allowed to work with wildlife in any way and so have a government backed monopoly on their business, including wildlife display tourism, school wildlife incursions or excursions and even doing children's birthday parties with wildlife. Neil Davie and through his aggressive mobilization of others through

the VAAH successfully stopped the plans of the State Wildlife Department so that as of 2015, herpetologists in Victoria outside of the government octopus can still work with their reptiles, albeit under ever changing licensing conditions.

The over 10,000 private reptile keepers in Victoria who remain allowed to keep and study their pet snakes, lizards and other reptiles owe a debt of gratitude to Neil Davie and so it is fitting that a Victorian species of reptile be named in his honour.

It should also be added that the knock-on effect of his actions in other states have also greatly assisted the wildlife conservation and research effort far beyond the boundaries of Victoria, Australia.

SPECIES RANKINIA FERGUSSONAE SP. NOV.

Holotype: A preserved specimen number R151561 at the Australian Museum in Sydney, NSW, Australia, collected at Goonoo State Forest, near Samuels Dam, Latitude -32.05, Longitude 148.90. This is a location near Dubbo, central western, NSW, Australia.

The Australian Museum in Sydney, NSW, Australia is a government-owned facility that allows inspection of its holdings.

Diagnosis: Within the genus *Rankinia*, each of the six morphologically similar species are identified and separated from one another as follows:

Rankinia fergussonae sp. nov. from Goonoo National Park, NSW is defined and separated from the other five species in the genus *Rankinia* Wells and Wellington, 1984 by the following: It is similar in most respects to *R. boylani*, (see below), which it would otherwise key as using the information herein, however it is differentiated from *R. boylani* by its more prominent nuchal crest scales (prominent versus very hard to see) and the presence of a well-developed white line along the lower lateral flank of the body on either side, which is indistinct in *R. boylani* and usually not white in colour, but light greyish instead or if whitish in *R. boylani*, is invariably broken.

Rankinia neildaviei sp. nov. herein confined to the Grampians in south-western Victoria, is separated from the other five species in *Rankinia* Wells and Wellington, 1984 by the following characters: the dorsal spines on the anterior part of the tail are large; there are no distinct white-tipped spines on the posterior lateral edge of the back legs; the lighter dorso-linear blotches above the lateral flanks are all or mostly of even curvature when viewed from above; the banding on the hind limbs is distinct (as opposed to obvious banding that is indistinct in some other species in the genus, including *R. diemensis* and *R. boylani*).

Rankinia hoserae sp. nov. is the taxon found around Anglesea on the central Victorian coast and the highlands of central Victoria in scattered locations including Kinglake National Park and Wombat State Forest. It is separated from the other five species in *Rankinia* Wells and Wellington, 1984 by the following characters: the hind legs have no obvious banding; exceptionally large spines on the upper body and in particular between the rear legs; some of the scale spines on the rear of the hind legs are either white or yellowish in colour; scales forming the nuchal crest are small, distinct and apart.

Rankinia jameswhybrowi sp. nov. is the species found in the hills just east of Lake Eildon, Victoria and in the ranges to the north of there. It is separated from the other five species of *Rankinia* Wells and Wellington, 1984 by the following characters: the lighter dorso-linear blotches above the lateral flanks are of even curvature when viewed from above and noticeably elongate in shape and to an extent not seen in any of the other species; the tail is strongly banded, versus indistinctly banded in the other species; the nuchal crest is so poorly developed as to appear absent.

Rankinia diemensis (Gray, 1841), herein restricted to Tasmania and Bass Strait Islands, is separated from the other five species in *Rankinia* Wells and Wellington, 1984 by the following characters: the lateral spines running on each side from the base of the tail are smaller than the lateral spines along the sides of the body; the lighter dorso-linear blotches above the lateral flanks are of even curvature when viewed from above; there are distinct white-tipped spines on the posterior lateral edge of the back legs; the spines of the nuchal crest are distinctive in that they are easily noticed.

Rankinia boylani Wells and Wellington, 1984, herein restricted to NSW in the vicinity of the Sydney basin, including the Blue Mountains, as far west as Mount Victoria (the type locality), but presumed to include most other specimens of *Rankinia* from New South Wales north of Goulburn, is separated from the other five species in *Rankinia* Wells and Wellington, 1984 by the following characters: the lateral spines running on each side from the base of the tail are considerably

larger than the lateral spines along the sides of the body; the lighter dorso-linear blotches above the lateral flanks are not of even curvature when viewed from above, these being larger at the posterior edge; there are no distinct white-tipped spines on the posterior lateral edge of the back legs; the spines of the nuchal crest are not distinctive in that they are easily not noticed.

See also for *Rankinia fergussonae* sp. nov. above in terms of separating the morphologically similar *Rankinia boylani* Wells and Wellington, 1984 and *Rankinia fergussonae* sp. nov..

The genus *Rankinia* Wells and Wellington, 1984, is separated from all other Australian agamids by the following suite of characters:

Body is without very large conical spines or a spiny nuchal hump; no large skin frill around the neck; tail is not compressed and with a lateral keel, it does not have a strongly differentiated dorsal keel; a vertebral series of enlarged scales present or absent on the back; if present, three or more femoral pores present on each side; femoral pores present; a single row of spinose scales on sides of the base of the tail; lower edge of supralabials straight or at most slightly curved, forming a more or less straight or even edge to the upper lip; no row of enlarged scales from below eye to above ear; dorsal scales of body heterogeneous, but with either distinctive vertebral and paravertebral rows of enlarged, keeled or spinose scales and with a poorly developed nuchal crest (that varies in development between species), no dorsal crest and sometimes a distinct vertebral ridge; tympanum distinct; enlarged spinose scales along each side of the base of the tail.

Distribution: So far this taxon is known only from Goonoo State Forest, near Samuels Dam, Latitude -2.05, Longitude 148.90. This is a location near Dubbo, central western, NSW, Australia.

Etymology: Named in honour of Judy Fergusson, long term defacto wife of Peter Whybrow and mother (and father) of James Whybrow (see above), of Taggerty, Victoria, Australia in recognition of a huge contribution to herpetology over some decades. She has also done vital work in the fields of wildlife rescue and rehabilitation, including for rare and endangered species and in the face of enormous government-imposed obstacles.

GENUS DIPORIPHORA GRAY, 1842.

Type species: *Diporiphora bilineata* Gray, 1842.

Diagnosis: The genus *Diporiphora* Gray, 1842 is defined and separated from all other Australian lizard genera by the following suite of characters: Body is without large conical spines or a spiny nuchal hump; there is no large frill around the neck; femoral and/or preanal pores are present, at least in males; the tail is not strongly compressed and lacks a strongly differentiated dorsal keel; there is usually no vertebral series of enlarged scales on the back, but if present there are only 0-2 femoral pores on each side.

Jackyhosersaur Hoser, 2013, monotypic for the species originally described as "*Diporiphora superba* Storr, 1974" and until recently included within the genus *Diporiphora* as just described above, is readily separated from all *Diporiphora* Gray, 1842, on the basis of the following suite of characters: Keels of the dorsal scales are parallel to the vertebral line; gular and ventral scales (excluding chin shields) are weakly to strongly keeled; no gular fold; no indication of spines or a fold behind the ear; usually greenish or greenish yellow above, yellow below and without pale dorsolateral stripes; there is sometimes a brown vertebral stripe present; the adpressed hind limb reaches about the eye; the hindlimb is about 70-100 per cent of the snout-vent length, the tail about 300 to 400 percent of the snout-vent length; there are four preanal pores.

Cogger (2014) claims 21 species in the genus *Diporiphora* (including the species "*Diporiphora superba*" treated by him as a species of *Diporiphora*), but he notes that the total number given is less than the actual diversity.

Wells and Wellington (1984 and 1985) dissected the genus along obvious phylogenetic lines using existing nomenclature or erecting names for groups that lacked any.

While their classification has been effectively unused since published, as the size of the genus expands, it is appropriate that subgenera be named and recognized, to identify obvious phyletic groups.

The only remaining taxon within *Diporiphora* as recognized herein not appropriately placed in any subgenus is the species *Diporiphora reginae* Glauert, 1959 and it is placed in a newly named subgenus herein called *Pailsagama* gen. nov..

Of the 21 species of *Diporiphora* claimed by Cogger (2014), widely

recognized in herpetology in Australia as of 2015, only three are relevant to this paper in terms of the species descriptions herein. These are:

Diporiphora bilineata Gray, 1842; *D. lalliae* Storr, 1974 and *D. magna* Storr, 1974.

These are defined within this paper within the context of the descriptions of the other newly named taxa and that resurrected from synonymy to enable readers to be able to identify and diagnose the relevant species.

SUBGENUS *PAILSAGAMA* SUBGEN. NOV.

Type species: *Diporiphora reginae* Glauert, 1959.

Diagnosis: The subgenus *Pailsagama* subgen. nov. is readily separated from all other *Diporiphora* by the following unique suite of characters:

Keels of dorsal scales on posterior part of body parallel to the vertebral line; gular and ventral scales (excluding chin shields) are strongly keeled; the chin shields are smooth; gular fold is present; dorsal scales are homogeneous being more or less equal in size; posterior lateral (flank) scales in rows which are aligned upwards and backwards, converging on the dorsals; usually little or no indication of post-auricular fold or spines; a femoral pore on each side.

Preanal pores may or may not be present.

This subgenus is within the genus *Diporiphora* Gray, 1842.

The genus *Diporiphora* is defined and separated from all other Australian lizard genera by the following suite of characters: Body is without large conical spines or a spiny nuchal hump; there is no large frill around the neck; femoral and/or preanal pores are present, at least in males; the tail is not strongly compressed and lacks a strongly differentiated dorsal keel; there is usually no vertebral series of enlarged scales on the back, but if present there are only 0-2 femoral pores on each side.

Jackyhosersaur Hoser, 2013, monotypic for the species originally described as "*Diporiphora superba* Storr, 1974" and until recently included within the genus *Diporiphora* as just described above, is readily separated from all *Diporiphora* Gray, 1842, on the basis of the following suite of characters: Keels of the dorsal scales are parallel to the vertebral line; gular and ventral scales (excluding chin shields) are weakly to strongly keeled; no gular fold; no indication of spines or a fold behind the ear; usually greenish or greenish yellow above, yellow below and without pale dorsolateral stripes; there is sometimes a brown vertebral stripe present; the adpressed hind limb reaches about the eye; the hindlimb is about 70-100 per cent of the snout-vent length, the tail about 300 to 400 percent of the snout-vent length; there are four preanal pores.

Cogger (2014) claims 21 species in the genus *Diporiphora* (including the species "*Diporiphora superba*" treated by him as a species of *Diporiphora*), but he notes that the total number given is less than the actual diversity.

Wells and Wellington (1984 and 1985) dissected the genus along obvious phylogenetic lines using existing nomenclature or erecting names for groups that lacked any.

While their classification has been effectively unused since published, as the size of the genus expands, it is appropriate that subgenera be named and recognized, to identify obvious phyletic groups.

Distribution: Southern interior of Western Australia, Australia.

Etymology: Named in honour of Roy Pails of Ballarat, Victoria, Australia in recognition of services to herpetology spanning some decades.

SPECIES *DIPORIPHORA BILINEATA* GRAY, 1842.

Diagnosis: The species *Diporiphora bilineata* Gray, 1842 and *Diporiphora jugularis* (Macleay, 1877) are separated from all others in the genus by the following unique suite of characters:

Keels of dorsal scales on posterior part of body parallel to the vertebral line; gular and ventral scales (excluding chin shields) are weakly to strongly keeled; gular fold absent; at most a very short weak fold behind the ear; one or occasionally more, short, whitish spines behind the ear; some indication of a dorsolateral row of slightly enlarged, keeled scales.

The species *Diporiphora bilineata* Gray, 1842 is separated from *Diporiphora jugularis* (Macleay, 1877) by the fact that the nuchal crest is prominent in males, versus small in the latter species. *D. bilineata* occurs in the north of the Northern Territory while *D. jugularis* occurs in drier parts of the lower western side of Cape York Peninsula Queensland.

The species *Diporiphora magna* Storr, 1974 and taxa formerly treated as being a part of the species, namely *D. melvilleae* sp. nov., *D. smithae* sp. nov., *D. shooi* sp. nov., *D. harmoni* sp. nov. and *D. garrodi* sp. nov. are separated from all others in the genus by the following unique suite of characters:

Keels of dorsal scales on posterior part of body parallel to the vertebral line; gular and ventral scales (excluding chin shields) are weakly to strongly keeled; gular fold absent; a long strong fold behind the ear, or if the fold is short or weak, the species group are identified by the following unique suite of characters being: at most a very short weak fold behind the ear; one or occasionally more, short, whitish spines behind the ear; dorsal scales are homogeneous, without any indication of a dorso-lateral row of slightly enlarged keeled scales.

The species *D. melvilleae* sp. nov. from dry tropical parts of Western Queensland is readily separated from the other four species by the fact that males have a small relatively indistinct nuchal crest.

They are further defined and separated from the other species by their dorsolateral lines which are grey in colour.

The species *D. harmoni* sp. nov. from the North West Kimberley Coast, Western Australia is readily separated from the other four species by the strongly developed nuchal crest in males and a very strong body patterning in both sexes.

Both *D. smithae* sp. nov. and *D. shooi* sp. nov. from the Northern Territory are characterised by a relatively indistinct level of patterning on the body and tail and usually orange dorsolateral lines, versus a distinct patterning in the other forms. *D. smithae* sp. nov. and *D. shooi* sp. nov. also have different body patterns from one another. Included in this is the fact that the species *D. shooi* sp. nov. from the central west of the upper Northern Territory is characterised and separated from *D. smithae* sp. nov. of the central east of the upper Northern Territory by the presence of a dark blackish temporal streak running through the eye to the snout.

Adult male *D. shooi* sp. nov. are characterised by a very strong yellow colouration on the venter, versus light yellow or absent in *D. smithae* sp. nov.

Nominate *D. bilineata* from the central and East Kimberley in Western Australia and the Victoria River region of the Northern Territory is characterised by (in life) yellow dorsolateral lines which have none or little other colouration visible on the lines running down the body (proper). The phenotypically similar specimens from western Queensland, herein described as *D. melvilleae* sp. nov. by contrast (in life) have obvious colouration running through the dorsolateral lines, this being the other body markings.

These lines are also greyish in *D. melvilleae* sp. nov.

Male *D. bilineata* are further defined and separated from the other species in the group by the fact that the blackish region above the front leg extends to cover almost the entire upper arm, giving it a distinctive black appearance.

D. garrodi sp. nov. from the Tunnel Creek National Park of the southern Kimberley region in Western Australia, while similar in most respects to *D. harmoni* sp. nov., is readily separated from the other species by a partially developed gular fold which runs as a fold between the region behind the ear to the top of the leg, then slightly further, but not as a full gular fold that would be seen meeting in the middle of the gular region, as well as a small number distinctive dark flecks on the lower gular region (just above where the fold would otherwise be), as opposed to a smudge-like appearance (of darkish pigment) in the lower gular region as seen in others in the species group.

Adult male *D. garrodi* sp. nov. are characterized and separated from the other species (in life) by their colouration, which includes a yellow wash through the upper labial region, prominent but unusually thin, dorsolateral-stripes being white anterior to past the dark blotch above the front legs, then rapidly turning yellow for the rest of the body length to the pelvis (versus yellow for the entire length in *D. magna*), whereupon the stripes stop and then reform along the tail as a broken grey line, with the rest of the tail being a bright light orange flush in colour. Any markings on the tail are so indistinct as to appear absent and there are little if any ventral markings, or if present are indistinct.

D. garrodi sp. nov. is only known from the type locality being the Tunnel Creek National Park, which sits about 100 km south of the main part of the Kimberley Ranges, the relevant part being the King Leopold Ranges.

The species *Diporiphora lalliae* Storr, Storr, 1974 and *Diporiphora nolani* sp. nov. are separated from all others in the genus by the

following suite of characters: Keels of dorsal scales on posterior part of body parallel to the vertebral line; gular and ventral scales (excluding chin shields) are weakly to strongly keeled; gular fold present; dorsal scales are homogeneous and more or less equal in size; posterior lateral (flank) scales in rows which are aligned more or less parallel to the dorsals; no femoral pores.

The species *Diporiphora lalliae* Storr, Storr, 1974 is readily separated from *Diporiphora nolani* sp. nov. by the presence of only a weak postauricular fold. By contrast *D. nolani* sp. nov. has a strong and spiny postauricular fold. Furthermore the dorsal patterning in *D. nolani* sp. nov. is well defined and the dark brown squarish blotches running down the back are also well defined.

By contrast in *D. lalliae* the dorsal pattern, while similar, is generally poorly defined. The same applies for the tail, in that the lighter and darker sections are indistinct, whereas in *D. nolani* sp. nov. it is well defined with alternating dark reddish brown and light grey sections presented in a ring-like manner, the darker ones being larger and largest ventrally (with dark and light appearing as triangles when the tail is viewed side on).

Distribution: *D. bilineata* is restricted to the central area of the top end of the Northern Territory, Australia.

SPECIES DIPORIPHORA JUGULARIS (MACLEAY, 1877).

Diagnosis: See the description for *D. bilineata* Gray, 1842 above.

Distribution: Lower west of Cape York, Queensland, Australia.

SPECIES DIPORIPHORA MAGNA STORR, 1974.

Diagnosis: See the description for *D. bilineata* Gray, 1842 above.

Distribution: Lower west of Cape York, Queensland, Australia.

SPECIES DIPORIPHORA LALLIAE STORR, 1974.

Diagnosis: See the description for *D. bilineata* Gray, 1842 above.

Distribution: Southern Kimberley region of Western Australia.

SPECIES DIPORIPHORA MELVILLEAE SP. NOV.

Holotype: A specimen at the National Museum of Victoria, in Melbourne, Australia, specimen number: D74063 collected from the Bourke and Wills Roadhouse, Northwest Queensland, Australia.

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

Paratypes: Specimens at the National Museum of Victoria, in Melbourne, Australia, specimen numbers: D74064, D74066 and D74065 collected from the Bourke and Wills Roadhouse, Northwest Queensland, Australia.

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

Diagnosis: The species *Diporiphora bilineata* Gray, 1842 and *Diporiphora jugularis* (Macleay, 1877) are separated from all others in the genus by the following unique suite of characters:

Keels of dorsal scales on posterior part of body parallel to the vertebral line; gular and ventral scales (excluding chin shields) are weakly to strongly keeled; gular fold absent; at most a very short weak fold behind the ear; one or occasionally more, short, whitish spines behind the ear; some indication of a dorsolateral row of slightly enlarged, keeled scales.

The species *Diporiphora bilineata* Gray, 1842 is separated from *Diporiphora jugularis* (Macleay, 1877) by the fact that the nuchal crest is prominent in males, versus small in the latter species. *D. bilineata* occurs in the north of the Northern Territory while *D. jugularis* occurs in drier parts of the lower western side of Cape York Peninsula Queensland.

The species *Diporiphora magna* Storr, 1974 and taxa formerly treated as being a part of the species, namely *D. melvilleae* sp. nov., *D. smithae* sp. nov., *D. shooi* sp. nov., *D. harmoni* sp. nov. and *D. garrodi* sp. nov. are separated from all others in the genus by the following unique suite of characters:

Keels of dorsal scales on posterior part of body parallel to the vertebral line; gular and ventral scales (excluding chin shields) are weakly to strongly keeled; gular fold absent; a long strong fold behind the ear, or if the fold is short or weak, the species group are identified by the following unique suite of characters being: at most a very short weak fold behind the ear; one or occasionally more, short, whitish spines behind the ear; dorsal scales are homogeneous, without any indication of a dorso-lateral row of slightly enlarged keeled scales.

The species *D. melvilleae* sp. nov. from dry tropical parts of Western Queensland is readily separated from the other four species by the fact that males have a small relatively indistinct nuchal crest.

They are further defined and separated from the other species by their dorsolateral lines which are grey in colour.

The species *D. harmoni* sp. nov. from the North West Kimberley Coast, Western Australia is readily separated from the other four species by the strongly developed nuchal crest in males and a very strong body patterning in both sexes.

Both *D. smithae* sp. nov. and *D. shooi* sp. nov. from the Northern Territory are characterised by a relatively indistinct level of patterning on the body and tail and usually orange dorsolateral lines, versus a distinct patterning in the other forms. *D. smithae* sp. nov. and *D. shooi* sp. nov. also have different body patterns from one another. Included in this is the fact that the species *D. shooi* sp. nov. from the central west of the upper Northern Territory is characterised and separated from *D. smithae* sp. nov. of the central east of the upper Northern Territory by the presence of a dark blackish temporal streak running through the eye to the snout. This is not the case in *D. smithae* sp. nov..

Adult male *D. shooi* sp. nov. are characterised by a very strong yellow colouration on the venter, versus light yellow or absent in *D. smithae* sp. nov..

Nominate *D. bilineata* from the central and East Kimberley in Western Australia and the Victoria River region of the Northern Territory is characterised by (in life) yellow dorsolateral lines which have none or little other colouration visible on the lines running down the body (proper). The phenotypically similar specimens from western Queensland, herein described as *D. melvilleae* sp. nov. by contrast (in life) have obvious colouration running through the dorsolateral lines, this being the other body markings.

These lines are also greyish in *D. melvilleae* sp. nov..

Male *D. bilineata* are further defined and separated from the other species in the group by the fact that the blackish region above the front leg extends to cover almost the entire upper arm, giving it a distinctive black appearance.

D. garrodi sp. nov. from the Tunnel Creek National Park of the southern Kimberley region in Western Australia, while similar in most respects to *D. harmoni* sp. nov., is readily separated from the other species by a partially developed gular fold which runs as a fold between the region behind the ear to the top of the leg, then slightly further, but not as a full gular fold that would be seen meeting in the middle of the gular region, as well as a small number distinctive dark flecks on the lower gular region (just above where the fold would otherwise be), as opposed to a smudge-like appearance (of darkish pigment) in the lower gular region as seen in others in the species group.

Adult male *D. garrodi* sp. nov. are characterized and separated from the other species (in life) by their colouration, which includes a yellow wash through the upper labial region, prominent but unusually thin, dorsolateral-stripes being white anterior to past the dark blotch above the front legs, then rapidly turning yellow for the rest of the body length to the pelvis (versus yellow for the entire length in *D. magna*), whereupon the stripes stop and then reform along the tail as a broken grey line, with the rest of the tail being a bright light orange flush in colour. Any markings on the tail are so indistinct as to appear absent and there are little if any ventral markings, or if present are indistinct.

D. garrodi sp. nov. is only known from the type locality being the Tunnel Creek National Park, which sits about 100 km south of the main part of the Kimberley Ranges, the relevant part being the King Leopold Ranges.

The species *Diporiphora lalliae* Storr, Storr, 1974 and *Diporiphora nolani* sp. nov. are separated from all others in the genus by the following suite of characters: Keels of dorsal scales on posterior part of body parallel to the vertebral line; gular and ventral scales (excluding chin shields) are weakly to strongly keeled; gular fold present; dorsal scales are homogeneous and more or less equal in size; posterior lateral (flank) scales in rows which are aligned more or less parallel to the dorsals; no femoral pores.

The species *Diporiphora lalliae* Storr, Storr, 1974 is readily separated from *Diporiphora nolani* sp. nov. by the presence of only a weak postauricular fold. By contrast *D. nolani* sp. nov. has a strong and spiny postauricular fold. Furthermore the dorsal patterning in *D. nolani* sp. nov. is well defined and the dark brown squarish blotches running down the back are also well defined.

By contrast in *D. lalliae* the dorsal pattern, while similar, is generally poorly defined. The same applies for the tail, in that the lighter and darker sections are indistinct, whereas in *D. nolani* sp. nov. it is well

defined with alternating dark reddish brown and light grey sections presented in a ring-like manner, the darker ones being larger and largest ventrally (with dark and light appearing as triangles when the tail is viewed side on).

Distribution: Known only from Queensland, Australia in the savannah region west of Mount Isa, Queensland, northwards to the Gulf of Carpentaria and including range areas within.

Etymology: The species is named in honour of Jane Melville, currently of Melbourne, Australia in recognition of her work on the very species subject of this paper.

SPECIES DIPORIPHORA SMITHAE SP. NOV.

Holotype: A specimen at the National Museum of Victoria, in Melbourne, Australia, specimen number: D74015 collected from Larrimah, Northern Territory, Australia.

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

Paratypes: Specimens at the National Museum of Victoria, in Melbourne, Australia, specimen numbers: D74010, 74019, 74020 and D D74016 collected from Larrimah, Northern Territory, Australia.

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

Diagnosis: The species *Diporiphora bilineata* Gray, 1842 and *Diporiphora jugularis* (Macleay, 1877) are separated from all others in the genus by the following unique suite of characters:

Keels of dorsal scales on posterior part of body parallel to the vertebral line; gular and ventral scales (excluding chin shields) are weakly to strongly keeled; gular fold absent; at most a very short weak fold behind the ear; one or occasionally more, short, whitish spines behind the ear; some indication of a dorsolateral row of slightly enlarged, keeled scales.

The species *Diporiphora bilineata* Gray, 1842 is separated from *Diporiphora jugularis* (Macleay, 1877) by the fact that the nuchal crest is prominent in males, versus small in the latter species. *D. bilineata* occurs in the north of the Northern Territory while *D. jugularis* occurs in drier parts of the lower western side of Cape York Peninsula Queensland.

The species *Diporiphora magna* Storr, 1974 and taxa formerly treated as being a part of the species, namely *D. melvilleae* sp. nov., *D. smithae* sp. nov., *D. shooi* sp. nov., *D. harmoni* sp. nov. and *D. garrodi* sp. nov. are separated from all others in the genus by the following unique suite of characters:

Keels of dorsal scales on posterior part of body parallel to the vertebral line; gular and ventral scales (excluding chin shields) are weakly to strongly keeled; gular fold absent; a long strong fold behind the ear, or if the fold is short or weak, the species group are identified by the following unique suite of characters being: at most a very short weak fold behind the ear; one or occasionally more, short, whitish spines behind the ear; dorsal scales are homogeneous, without any indication of a dorso-lateral row of slightly enlarged keeled scales.

The species *D. melvilleae* sp. nov. from dry tropical parts of Western Queensland is readily separated from the other four species by the fact that males have a small relatively indistinct nuchal crest.

They are further defined and separated from the other species by their dorsolateral lines which are grey in colour.

The species *D. harmoni* sp. nov. from the North West Kimberley Coast, Western Australia is readily separated from the other four species by the strongly developed nuchal crest in males and a very strong body patterning in both sexes.

Both *D. smithae* sp. nov. and *D. shooi* sp. nov. from the Northern Territory are characterised by a relatively indistinct level of patterning on the body and tail and usually orange dorsolateral lines, versus a distinct patterning in the other forms. *D. smithae* sp. nov. and *D. shooi* sp. nov. also have different body patterns from one another. Included in this is the fact that the species *D. shooi* sp. nov. from the central west of the upper Northern Territory is characterised and separated from *D. smithae* sp. nov. of the central east of the upper Northern Territory by the presence of a dark blackish temporal streak running through the eye to the snout. This is not the case in *D. smithae* sp. nov.

Adult male *D. shooi* sp. nov. are characterised by a very strong yellow colouration on the venter, versus light yellow or absent in *D. smithae* sp. nov.

Nominate *D. bilineata* from the central and East Kimberley in Western Australia and the Victoria River region of the Northern Territory is

characterised by (in life) yellow dorsolateral lines which have none or little other colouration visible on the lines running down the body (proper). The phenotypically similar specimens from western Queensland, herein described as *D. melvilleae* sp. nov. by contrast (in life) have obvious colouration running through the dorsolateral lines, this being the other body markings.

These lines are also greyish in *D. melvilleae* sp. nov..

Male *D. bilineata* are further defined and separated from the other species in the group by the fact that the blackish region above the front leg extends to cover almost the entire upper arm, giving it a distinctive black appearance.

D. garrodi sp. nov. from the Tunnel Creek National Park of the southern Kimberley region in Western Australia, while similar in most respects to *D. harmoni* sp. nov., is readily separated from the other species by a partially developed gular fold which runs as a fold between the region behind the ear to the top of the leg, then slightly further, but not as a full gular fold that would be seen meeting in the middle of the gular region, as well as a small number distinctive dark flecks on the lower gular region (just above where the fold would otherwise be), as opposed to a smudge-like appearance (of darkish pigment) in the lower gular region as seen in others in the species group.

Adult male *D. garrodi* sp. nov. are characterized and separated from the other species (in life) by their colouration, which includes a yellow wash through the upper labial region, prominent but unusually thin, dorsolateral-stripes being white anterior to past the dark blotch above the front legs, then rapidly turning yellow for the rest of the body length to the pelvis (versus yellow for the entire length in *D. magna*), whereupon the stripes stop and then reform along the tail as a broken grey line, with the rest of the tail being a bright light orange flush in colour. Any markings on the tail are so indistinct as to appear absent and there are little if any ventral markings, or if present are indistinct.

D. garrodi sp. nov. is only known from the type locality being the Tunnel Creek National Park, which sits about 100 km south of the main part of the Kimberley Ranges, the relevant part being the King Leopold Ranges.

The species *Diporiphora lalliae* Storr, Storr, 1974 and *Diporiphora nolani* sp. nov. are separated from all others in the genus by the following suite of characters: Keels of dorsal scales on posterior part of body parallel to the vertebral line; gular and ventral scales (excluding chin shields) are weakly to strongly keeled; gular fold present; dorsal scales are homogeneous and more or less equal in size; posterior lateral (flank) scales in rows which are aligned more or less parallel to the dorsals; no femoral pores.

The species *Diporiphora lalliae* Storr, Storr, 1974 is readily separated from *Diporiphora nolani* sp. nov. by the presence of only a weak postauricular fold. By contrast *D. nolani* sp. nov. has a strong and spiny postauricular fold. Furthermore the dorsal patterning in *D. nolani* sp. nov. is well defined and the dark brown squarish blotches running down the back are also well defined.

By contrast in *D. lalliae* the dorsal pattern, while similar, is generally poorly defined. The same applies for the tail, in that the lighter and darker sections are indistinct, whereas in *D. nolani* sp. nov. it is well defined with alternating dark reddish brown and light grey sections presented in a ring-like manner, the darker ones being larger and largest ventrally (with dark and light appearing as triangles when the tail is viewed side on).

Distribution: The Northern Territory side of the Gulf of Carpentaria, including nearby areas such as the northern Barkly Tableland, across to the central part of the Northern Territory.

Etymology: The species is named in honour of Kate Smith, currently of Melbourne, Australia in recognition of her work on the very species subject of this paper.

SPECIES DIPORIPHORA SHOOI SP. NOV.

Holotype: A specimen at the National Museum of Victoria, in Melbourne, Australia, specimen number: D72674 collected from Top Springs, Northern Territory, Australia.

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

Paratypes: Specimens at the National Museum of Victoria, in Melbourne, Australia, specimen numbers: D72681, D72676 and D72722 collected from Top Springs, Northern Territory, Australia.

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

Diagnosis: The species *Diporiphora bilineata* Gray, 1842 and *Diporiphora jugularis* (Macleay, 1877) are separated from all others in the genus by the following unique suite of characters:

Keels of dorsal scales on posterior part of body parallel to the vertebral line; gular and ventral scales (excluding chin shields) are weakly to strongly keeled; gular fold absent; at most a very short weak fold behind the ear; one or occasionally more, short, whitish spines behind the ear; some indication of a dorsolateral row of slightly enlarged, keeled scales.

The species *Diporiphora bilineata* Gray, 1842 is separated from *Diporiphora jugularis* (Macleay, 1877) by the fact that the nuchal crest is prominent in males, versus small in the latter species. *D. bilineata* occurs in the north of the Northern Territory while *D. jugularis* occurs in drier parts of the lower western side of Cape York Peninsula Queensland.

The species *Diporiphora magna* Storr, 1974 and taxa formerly treated as being a part of the species, namely *D. melvilleae* sp. nov., *D. smithae* sp. nov., *D. shooi* sp. nov., *D. harmoni* sp. nov. and *D. garrodi* sp. nov. are separated from all others in the genus by the following unique suite of characters:

Keels of dorsal scales on posterior part of body parallel to the vertebral line; gular and ventral scales (excluding chin shields) are weakly to strongly keeled; gular fold absent; a long strong fold behind the ear, or if the fold is short or weak, the species group are identified by the following unique suite of characters being: at most a very short weak fold behind the ear; one or occasionally more, short, whitish spines behind the ear; dorsal scales are homogeneous, without any indication of a dorso-lateral row of slightly enlarged keeled scales.

The species *D. melvilleae* sp. nov. from dry tropical parts of Western Queensland is readily separated from the other four species by the fact that males have a small relatively indistinct nuchal crest.

They are further defined and separated from the other species by their dosolateral lines which are grey in colour.

The species *D. harmoni* sp. nov. from the North West Kimberley Coast, Western Australia is readily separated from the other four species by the strongly developed nuchal crest in males and a very strong body patterning in both sexes.

Both *D. smithae* sp. nov. and *D. shooi* sp. nov. from the Northern Territory are characterised by a relatively indistinct level of patterning on the body and tail and usually orange dorsolateral lines, versus a distinct patterning in the other forms. *D. smithae* sp. nov. and *D. shooi* sp. nov. also have different body patterns from one another. Included in this is the fact that the species *D. shooi* sp. nov. from the central west of the upper Northern Territory is characterised and separated from *D. smithae* sp. nov. of the central east of the upper Northern Territory by the presence of a dark blackish temporal streak running through the eye to the snout. This is not the case in *D. smithae* sp. nov..

Adult male *D. shooi* sp. nov. are characterised by a very strong yellow colouration on the venter, versus light yellow or absent in *D. smithae* sp. nov..

Nominate *D. bilineata* from the central and East Kimberley in Western Australia and the Victoria River region of the Northern Territory is characterised by (in life) yellow dorsolateral lines which have none or little other colouration visible on the lines running down the body (proper). The phenotypically similar specimens from western Queensland, herein described as *D. melvilleae* sp. nov. by contrast (in life) have obvious colouration running through the dorsolateral lines, this being the other body markings.

These lines are also greyish in *D. melvilleae* sp. nov..

Male *D. bilineata* are further defined and separated from the other species in the group by the fact that the blackish region above the front leg extends to cover almost the entire upper arm, giving it a distinctive black appearance.

D. garrodi sp. nov. from the Tunnel Creek National Park of the southern Kimberley region in Western Australia, while similar in most respects to *D. harmoni* sp. nov., is readily separated from the other species by a partially developed gular fold which runs as a fold between the region behind the ear to the top of the leg, then slightly further, but not as a full gular fold that would be seen meeting in the middle of the gular region, as well as a small number distinctive dark flecks on the lower gular region (just above where the fold would otherwise be), as opposed to a smudge-like appearance (of darkish pigment) in the lower gular region as seen in others in the species group.

Adult male *D. garrodi* sp. nov. are characterized and separated from the other species (in life) by their colouration, which includes a yellow wash through the upper labial region, prominent but unusually thin, dorsolateral-stripes being white anterior to past the dark blotch above the front legs, then rapidly turning yellow for the rest of the body length to the pelvis (versus yellow for the entire length in *D. magna*), whereupon the stripes stop and then reform along the tail as a broken grey line, with the rest of the tail being a bright light orange flush in colour. Any markings on the tail are so indistinct as to appear absent and there are little if any ventral markings, or if present are indistinct.

D. garrodi sp. nov. is only known from the type locality being the Tunnel Creek National Park, which sits about 100 km south of the main part of the Kimberley Ranges, the relevant part being the King Leopold Ranges.

The species *Diporiphora lalliae* Storr, Storr, 1974 and *Diporiphora nolani* sp. nov. are separated from all others in the genus by the following suite of characters: Keels of dorsal scales on posterior part of body parallel to the vertebral line; gular and ventral scales (excluding chin shields) are weakly to strongly keeled; gular fold present; dorsal scales are homogeneous and more or less equal in size; posterior lateral (flank) scales in rows which are aligned more or less parallel to the dorsals; no femoral pores.

The species *Diporiphora lalliae* Storr, Storr, 1974 is readily separated from *Diporiphora nolani* sp. nov. by the presence of only a weak postauricular fold. By contrast *D. nolani* sp. nov. has a strong and spiny postauricular fold. Furthermore the dorsal patterning in *D. nolani* sp. nov. is well defined and the dark brown squarish blotches running down the back are also well defined.

By contrast in *D. lalliae* the dorsal pattern, while similar, is generally poorly defined. The same applies for the tail, in that the lighter and darker sections are indistinct, whereas in *D. nolani* sp. nov. it is well defined with alternating dark reddish brown and light grey sections presented in a ring-like manner, the darker ones being larger and largest ventrally (with dark and light appearing as triangles when the tail is viewed side on).

Distribution: Inland parts of the Northern Territory Australia in the savannah zone north of the arid zone and south of the tropical region, in an area generally triangular in shape and bound by Pine Creek in the North, Top Springs in the south-east and Jasper Gorge in the West, all of where specimens have been taken.

Etymology: The species is named in honour of Luke Shoo, currently of Brisbane, Queensland, Australia in recognition of his work on the very species subject of this paper.

SPECIES DIPORIPHORA HARMONI SP. NOV.

Holotype: A specimen at the National Museum of Victoria, in Melbourne, Australia, specimen number: D73822 collected from Mitchell Plateau Road, Western Australia, Australia.

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

Paratypes: Specimens at the National Museum of Victoria, in Melbourne, Australia, specimen numbers: D73821, D73823, D71874, D71875 and D71876 all collected from Mitchell Plateau Road, Western Australia, Australia.

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

Diagnosis: The species *Diporiphora bilineata* Gray, 1842 and *Diporiphora jugularis* (Macleay, 1877) are separated from all others in the genus by the following unique suite of characters:

Keels of dorsal scales on posterior part of body parallel to the vertebral line; gular and ventral scales (excluding chin shields) are weakly to strongly keeled; gular fold absent; at most a very short weak fold behind the ear; one or occasionally more, short, whitish spines behind the ear; some indication of a dorsolateral row of slightly enlarged, keeled scales.

The species *Diporiphora bilineata* Gray, 1842 is separated from *Diporiphora jugularis* (Macleay, 1877) by the fact that the nuchal crest is prominent in males, versus small in the latter species. *D. bilineata* occurs in the north of the Northern Territory while *D. jugularis* occurs in drier parts of the lower western side of Cape York Peninsula Queensland.

The species *Diporiphora magna* Storr, 1974 and taxa formerly treated as being a part of the species, namely *D. melvilleae* sp. nov., *D. smithae* sp. nov., *D. shooi* sp. nov., *D. harmoni* sp. nov. and *D. garrodi* sp. nov. are separated from all others in the genus by the following

unique suite of characters:

Keels of dorsal scales on posterior part of body parallel to the vertebral line; gular and ventral scales (excluding chin shields) are weakly to strongly keeled; gular fold absent; a long strong fold behind the ear, or if the fold is short or weak, the species group are identified by the following unique suite of characters being: at most a very short weak fold behind the ear; one or occasionally more, short, whitish spines behind the ear; dorsal scales are homogeneous, without any indication of a dorso-lateral row of slightly enlarged keeled scales.

The species *D. melvilleae* sp. nov. from dry tropical parts of Western Queensland is readily separated from the other four species by the fact that males have a small relatively indistinct nuchal crest.

They are further defined and separated from the other species by their dorsolateral lines which are grey in colour.

The species *D. harmoni* sp. nov. from the North West Kimberley Coast, Western Australia is readily separated from the other four species by the strongly developed nuchal crest in males and a very strong body patterning in both sexes.

Both *D. smithae* sp. nov. and *D. shooi* sp. nov. from the Northern Territory are characterised by a relatively indistinct level of patterning on the body and tail and usually orange dorsolateral lines, versus a distinct patterning in the other forms. *D. smithae* sp. nov. and *D. shooi* sp. nov. also have different body patterns from one another. Included in this is the fact that the species *D. shooi* sp. nov. from the central west of the upper Northern Territory is characterised and separated from *D. smithae* sp. nov. of the central east of the upper Northern Territory by the presence of a dark blackish temporal streak running through the eye to the snout.

Adult male *D. shooi* sp. nov. are characterised by a very strong yellow colouration on the venter, versus light yellow or absent in *D. smithae* sp. nov.

Nominate *D. bilineata* from the central and East Kimberley in Western Australia and the Victoria River region of the Northern Territory is characterised by (in life) yellow dorsolateral lines which have none or little other colouration visible on the lines running down the body (proper). The phenotypically similar specimens from western Queensland, herein described as *D. melvilleae* sp. nov. by contrast (in life) have obvious colouration running through the dorsolateral lines, this being the other body markings.

These lines are also greyish in *D. melvilleae* sp. nov.

Male *D. bilineata* are further defined and separated from the other species in the group by the fact that the blackish region above the front leg extends to cover almost the entire upper arm, giving it a distinctive black appearance.

D. garrodi sp. nov. from the Tunnel Creek National Park of the southern Kimberley region in Western Australia, while similar in most respects to *D. harmoni* sp. nov., is readily separated from the other species by a partially developed gular fold which runs as a fold between the region behind the ear to the top of the leg, then slightly further, but not as a full gular fold that would be seen meeting in the middle of the gular region, as well as a small number distinctive dark flecks on the lower gular region (just above where the fold would otherwise be), as opposed to a smudge-like appearance (of darkish pigment) in the lower gular region as seen in others in the species group.

Adult male *D. garrodi* sp. nov. are characterized and separated from the other species (in life) by their colouration, which includes a yellow wash through the upper labial region, prominent but unusually thin, dorsolateral-stripes being white anterior to past the dark blotch above the front legs, then rapidly turning yellow for the rest of the body length to the pelvis (versus yellow for the entire length in *D. magna*), whereupon the stripes stop and then reform along the tail as a broken grey line, with the rest of the tail being a bright light orange flush in colour. Any markings on the tail are so indistinct as to appear absent and there are little if any ventral markings, or if present are indistinct.

D. garrodi sp. nov. is only known from the type locality being the Tunnel Creek National Park, which sits about 100 km south of the main part of the Kimberley Ranges, the relevant part being the King Leopold Ranges.

The species *Diporiphora lalliae* Storr, Storr, 1974 and *Diporiphora nolani* sp. nov. are separated from all others in the genus by the following suite of characters: Keels of dorsal scales on posterior part of body parallel to the vertebral line; gular and ventral scales (excluding chin shields) are weakly to strongly keeled; gular fold present; dorsal scales are homogeneous and more or less equal in

size; posterior lateral (flank) scales in rows which are aligned more or less parallel to the dorsals; no femoral pores.

The species *Diporiphora lalliae* Storr, Storr, 1974 is readily separated from *Diporiphora nolani* sp. nov. by the presence of only a weak postauricular fold. By contrast *D. nolani* sp. nov. has a strong and spiny postauricular fold. Furthermore the dorsal patterning in *D. nolani* sp. nov. is well defined and the dark brown squarish blotches running down the back are also well defined.

By contrast in *D. lalliae* the dorsal pattern, while similar, is generally poorly defined. The same applies for the tail, in that the lighter and darker sections are indistinct, whereas in *D. nolani* sp. nov. it is well defined with alternating dark reddish brown and light grey sections presented in a ring-like manner, the darker ones being larger and largest ventrally (with dark and light appearing as triangles when the tail is viewed side on).

Distribution: *Diporiphora harmoni* sp. nov. is only known from a restricted area in the north east Kimberley Ranges, Western Australia, in an area bounded by Kalumburu in the north and Mitchell Plateau in the south.

The species *Diporiphora magna* Storr, 1974 as now recognized herein is known only from the drier East Kimberley region of Western Australia and inland parts of the main range area, south to the King Leopold Ranges in the main escarpment, eastwards to the Victoria River District in the west of the Northern Territory, Australia.

Etymology: The species is named in honour of Luke Harmon of Idaho, USA in recognition of his work on the very species subject of this paper.

SPECIES DIPORIPHORA NOLANI SP. NOV.

Holotype: A specimen at the National Museum of Victoria, in Melbourne, Australia, specimen number: D72673 collected from Hooper Creek Road, 80 km South of Karkaringi, Northern Territory, Australia.

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

Paratype: A specimen at the National Museum of Victoria, in Melbourne, Australia, specimen number: D73909 collected at Cherribin Station Road, Western Australia, Australia.

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

Diagnosis: The species *Diporiphora lalliae* Storr, Storr, 1974 and *Diporiphora nolani* sp. nov. are separated from all others in the genus by the following suite of characters: Keels of dorsal scales on posterior part of body parallel to the vertebral line; gular and ventral scales (excluding chin shields) are weakly to strongly keeled; gular fold present; dorsal scales are homogeneous and more or less equal in size; posterior lateral (flank) scales in rows which are aligned more or less parallel to the dorsals; no femoral pores.

The species *Diporiphora lalliae* Storr, Storr, 1974 is readily separated from *Diporiphora nolani* sp. nov. by the presence of only a weak postauricular fold. By contrast *D. nolani* sp. nov. has a strong and spiny postauricular fold. Furthermore the dorsal patterning in *D. nolani* sp. nov. is well defined and the dark brown squarish blotches running down the back are also well defined.

By contrast in *D. lalliae* the dorsal pattern, while similar, is generally poorly defined. The same applies for the tail, in that the lighter and darker sections are indistinct, whereas in *D. nolani* sp. nov. it is well defined with alternating dark reddish brown and light grey sections presented in a ring-like manner, the darker ones being larger and largest ventrally (with dark and light appearing as triangles when the tail is viewed side on).

The species *Diporiphora bilineata* Gray, 1842 and *Diporiphora jugularis* (Macleay, 1877) are separated from all others in the genus by the following unique suite of characters:

Keels of dorsal scales on posterior part of body parallel to the vertebral line; gular and ventral scales (excluding chin shields) are weakly to strongly keeled; gular fold absent; at most a very short weak fold behind the ear; one or occasionally more, short, whitish spines behind the ear; some indication of a dorsolateral row of slightly enlarged, keeled scales.

The species *Diporiphora bilineata* Gray, 1842 is separated from *Diporiphora jugularis* (Macleay, 1877) by the fact that the nuchal crest is prominent in males, versus small in the latter species. *D. bilineata* occurs in the north of the Northern Territory while *D. jugularis* occurs in drier parts of the lower western side of Cape York Peninsula

Queensland.

The species *Diporiphora magna* Storr, 1974 and taxa formerly treated as being a part of the species, namely *D. melvilleae* sp. nov., *D. smithae* sp. nov., *D. shooi* sp. nov., *D. harmoni* sp. nov. and *D. garrodi* sp. nov. are separated from all others in the genus by the following unique suite of characters:

Keels of dorsal scales on posterior part of body parallel to the vertebral line; gular and ventral scales (excluding chin shields) are weakly to strongly keeled; gular fold absent; a long strong fold behind the ear, or if the fold is short or weak, the species group are identified by the following unique suite of characters being: at most a very short weak fold behind the ear; one or occasionally more, short, whitish spines behind the ear; dorsal scales are homogeneous, without any indication of a dorso-lateral row of slightly enlarged keeled scales.

The species *D. melvilleae* sp. nov. from dry tropical parts of Western Queensland is readily separated from the other four species by the fact that males have a small relatively indistinct nuchal crest.

They are further defined and separated from the other species by their dosolateral lines which are grey in colour.

The species *D. harmoni* sp. nov. from the North West Kimberley Coast, Western Australia is readily separated from the other four species by the strongly developed nuchal crest in males and a very strong body patterning in both sexes.

Both *D. smithae* sp. nov. and *D. shooi* sp. nov. from the Northern Territory are characterised by a relatively indistinct level of patterning on the body and tail and usually orange dorsolateral lines, versus a distinct patterning in the other forms. *D. smithae* sp. nov. and *D. shooi* sp. nov. also have different body patterns from one another. Included in this is the fact that the species *D. shooi* sp. nov. from the central west of the upper Northern Territory is characterised and separated from *D. smithae* sp. nov. of the central east of the upper Northern Territory by the presence of a dark blackish temporal streak running through the eye to the snout.

Adult male *D. shooi* sp. nov. are characterised by a very strong yellow colouration on the venter, versus light yellow or absent in *D. smithae* sp. nov..

Nominate *D. bilineata* from the central and East Kimberley in Western Australia and the Victoria River region of the Northern Territory is characterised by (in life) yellow dorsolateral lines which have none or little other colouration visible on the lines running down the body (proper). The phenotypically similar specimens from western Queensland, herein described as *D. melvilleae* sp. nov. by contrast (in life) have obvious colouration running through the dorsolateral lines, this being the other body markings.

These lines are also greyish in *D. melvilleae* sp. nov..

Male *D. bilineata* are further defined and separated from the other species in the group by the fact that the blackish region above the front leg extends to cover almost the entire upper arm, giving it a distinctive black appearance.

D. garrodi sp. nov. from the Tunnel Creek National Park of the southern Kimberley region in Western Australia, while similar in most respects to *D. harmoni* sp. nov., is readily separated from the other species by a partially developed gular fold which runs as a fold between the region behind the ear to the top of the leg, then slightly further, but not as a full gular fold that would be seen meeting in the middle of the gular region, as well as a small number distinctive dark flecks on the lower gular region (just above where the fold would otherwise be), as opposed to a smudge-like appearance (of darkish pigment) in the lower gular region as seen in others in the species group.

Adult male *D. garrodi* sp. nov. are characterized and separated from the other species (in life) by their colouration, which includes a yellow wash through the upper labial region, prominent but unusually thin, dorsolateral-stripes being white anterior to past the dark blotch above the front legs, then rapidly turning yellow for the rest of the body length to the pelvis (versus yellow for the entire length in *D. magna*), whereupon the stripes stop and then reform along the tail as a broken grey line, with the rest of the tail being a bright light orange flush in colour. Any markings on the tail are so indistinct as to appear absent and there are little if any ventral markings, or if present are indistinct.

D. garrodi sp. nov. is only known from the type locality being the Tunnel Creek National Park, which sits about 100 km south of the main part of the Kimberley Ranges, the relevant part being the King Leopold Ranges.

Distribution: *Diporiphora nolani* sp. nov. is known from the arid zone in a strip about 150 km wide from

Great Northern Highway, Western Australia in the west to Barkly Homestead, Tablelands Highway, eastern Northern Territory, Australia.

Etymology: The species is named in honour of Ross Nolan of Ringwood, Victoria, Australia in recognition for his services to herpetology and to the science of aviation in Australia.

Nolan has also made an immense contribution to the cause of human rights and has made substantial personal sacrifices to help stop human rights abuses in Australia.

SPECIES *DIPORIPHORA GARRODI* SP. NOV.

Holotype: A specimen at the National Museum of Victoria, in Melbourne, Australia, specimen number: D73901 collected from Tunnel Creek Road, Western Australia, Australia.

The National Museum of Victoria is a government-owned facility that allows access to its holdings by others.

Paratype: A specimen at the National Museum of Victoria, in Melbourne, Australia, specimen number: D73905 collected from Tunnel Creek Road, Western Australia, Australia.

The National Museum of Victoria is a government-owned facility that allows access to its holdings by others.

Diagnosis: The species *Diporiphora lalliae* Storr, Storr, 1974 and *Diporiphora nolani* sp. nov. are separated from all others in the genus by the following suite of characters: Keels of dorsal scales on posterior part of body parallel to the vertebral line; gular and ventral scales (excluding chin shields) are weakly to strongly keeled; gular fold present; dorsal scales are homogeneous and more or less equal in size; posterior lateral (flank) scales in rows which are aligned more or less parallel to the dorsals; no femoral pores.

The species *Diporiphora lalliae* Storr, Storr, 1974 is readily separated from *Diporiphora nolani* sp. nov. by the presence of only a weak postauricular fold. By contrast *D. nolani* sp. nov. has a strong and spiny postauricular fold. Furthermore the dorsal patterning in *D. nolani* sp. nov. is well defined and the dark brown squarish blotches running down the back are also well defined.

By contrast in *D. lalliae* the dorsal pattern, while similar, is generally poorly defined. The same applies for the tail, in that the lighter and darker sections are indistinct, whereas in *D. nolani* sp. nov. it is well defined with alternating dark reddish brown and light grey sections presented in a ring-like manner, the darker ones being larger and largest ventrally (with dark and light appearing as triangles when the tail is viewed side on).

The species *Diporiphora bilineata* Gray, 1842 and *Diporiphora jugularis* (Macleay, 1877) are separated from all others in the genus by the following unique suite of characters:

Keels of dorsal scales on posterior part of body parallel to the vertebral line; gular and ventral scales (excluding chin shields) are weakly to strongly keeled; gular fold absent; at most a very short weak fold behind the ear; one or occasionally more, short, whitish spines behind the ear; some indication of a dorsolateral row of slightly enlarged, keeled scales.

The species *Diporiphora bilineata* Gray, 1842 is separated from *Diporiphora jugularis* (Macleay, 1877) by the fact that the nuchal crest is prominent in males, versus small in the latter species. *D. bilineata* occurs in the north of the Northern Territory while *D. jugularis* occurs in drier parts of the lower western side of Cape York Peninsula Queensland.

The species *Diporiphora magna* Storr, 1974 and taxa formerly treated as being a part of the species, namely *D. melvilleae* sp. nov., *D. smithae* sp. nov., *D. shooi* sp. nov., *D. harmoni* sp. nov. and *D. garrodi* sp. nov. are separated from all others in the genus by the following unique suite of characters:

Keels of dorsal scales on posterior part of body parallel to the vertebral line; gular and ventral scales (excluding chin shields) are weakly to strongly keeled; gular fold absent; a long strong fold behind the ear, or if the fold is short or weak, the species group are identified by the following unique suite of characters being: at most a very short weak fold behind the ear; one or occasionally more, short, whitish spines behind the ear; dorsal scales are homogeneous, without any indication of a dorso-lateral row of slightly enlarged keeled scales.

The species *D. melvilleae* sp. nov. from dry tropical parts of Western Queensland is readily separated from the other four species by the fact that males have a small relatively indistinct nuchal crest.

They are further defined and separated from the other species by their

dorsolateral lines which are grey in colour.

The species *D. harmoni* sp. nov. from the North West Kimberley Coast, Western Australia is readily separated from the other four species by the strongly developed nuchal crest in males and a very strong body patterning in both sexes.

Both *D. smithae* sp. nov. and *D. shooi* sp. nov. from the Northern Territory are characterised by a relatively indistinct level of patterning on the body and tail and usually orange dorsolateral lines, versus a distinct patterning in the other forms. *D. smithae* sp. nov. and *D. shooi* sp. nov. also have different body patterns from one another. Included in this is the fact that the species *D. shooi* sp. nov. from the central west of the upper Northern Territory is characterised and separated from *D. smithae* sp. nov. of the central east of the upper Northern Territory by the presence of a dark blackish temporal streak running through the eye to the snout.

Adult male *D. shooi* sp. nov. are characterised by a very strong yellow colouration on the venter, versus light yellow or absent in *D. smithae* sp. nov.

Nominate *D. bilineata* from the central and East Kimberley in Western Australia and the Victoria River region of the Northern Territory is characterised by (in life) yellow dorsolateral lines which have none or little other colouration visible on the lines running down the body (proper). The phenotypically similar specimens from western Queensland, herein described as *D. melvilleae* sp. nov. by contrast (in life) have obvious colouration running through the dorsolateral lines, this being the other body markings.

These lines are also greyish in *D. melvilleae* sp. nov.

Male *D. bilineata* are further defined and separated from the other species in the group by the fact that the blackish region above the front leg extends to cover almost the entire upper arm, giving it a distinctive black appearance.

D. garrodi sp. nov. from the Tunnel Creek National Park of the southern Kimberley region in Western Australia, while similar in most respects to *D. harmoni* sp. nov., is readily separated from the other species by a partially developed gular fold which runs as a fold between the region behind the ear to the top of the leg, then slightly further, but not as a full gular fold that would be seen meeting in the middle of the gular region, as well as a small number distinctive dark flecks on the lower gular region (just above where the fold would otherwise be), as opposed to a smudge-like appearance (of darkish pigment) in the lower gular region as seen in others in the species group.

Adult male *D. garrodi* sp. nov. are characterized and separated from the other species (in life) by their colouration, which includes a yellow wash through the upper labial region, prominent but unusually thin, dorsolateral-stripes being white anterior to past the dark blotch above the front legs, then rapidly turning yellow for the rest of the body length to the pelvis (versus yellow for the entire length in *D. magna*), whereupon the stripes stop and then reform along the tail as a broken grey line, with the rest of the tail being a bright light orange flush in colour. Any markings on the tail are so indistinct as to appear absent and there are little if any ventral markings, or if present are indistinct.

D. garrodi sp. nov. is only known from the type locality being the Tunnel Creek National Park, which sits about 100 km south of the higher main part of the Kimberley Ranges, the relevant part being the King Leopold Ranges.

Distribution: *Diporiphora garrodi* sp. nov. is known only from the area of the type locality, that being the Tunnel Creek Conservation Park area of northwestern Western Australia, Australia.

Etymology: The species is named in honour of Nathan Garrod, deceased in 2014.

He lived in Toowoomba, Queensland, Australia and I pay tribute to his services to herpetology.

His death by suicide was in large part caused by non-stop harassment by police-protected criminals operating in the Queensland "reptile business" who like Garrod ran a travelling reptile show.

Among other things, they initiated illegal armed raids by wildlife officers on his private home in an attempt to destroy his rival education business and improperly steal his clients.

There is no doubt that the actions of Tony Harrison of the Gold Coast and Mike Cermak of Cairns directly contributed to his premature death.

These actions included harassing phone calls, online trolling and abuse, as well as bogus complaints to government authorities to

initiate raids on him.

Scandalously, both Cermak and Harrison are corruptly protected from prosecution by people in a government wildlife department.

SPECIES TYMPANOCRYPTIS BOTTOMI SP. NOV.

Holotype: A preserved specimen in the South Australian Museum, Adelaide, South Australia, Australia, specimen number R42933 from 20 km south of Eromanga, Queensland, Australia. Lat. -26.85, Long. 143.25.

The South Australian Museum is a government-owned facility that allows access to its holdings by others.

Diagnosis: This taxon has until now been treated as a variant of *T. intima* Mitchell, 1948. However *T. bottomi* sp. nov. is separated from *T. intima* by the presence of distinct barring on the upper labials, versus indistinct in *T. intima* and in males smallish raised tubercles on the upper dorsal surfaces of the body, versus medium to large ones in *T. intima*.

Male *T. bottomi* sp. nov. have a triangular dark blackish flush posterior to the front limb on the flank, versus an elongate flush in *T. intima*.

Distribution: Known only from slightly elevated gibber plains and sandy areas of far western Queensland and separated from the South Australian populations of *T. intima* by the black soil riverine drainages of the Lake Eyre basin.

Etymology: Named in honour of Bob (Robert) Bottom, investigative journalist and publisher based in Sydney Australia and more recently, south-east Queensland. He broke numerous public interest news stories on wildlife smuggling, corruption and institutionalised crime and corruption in Victoria.

SPECIES TYMPANOCRYPTIS MARKTEESI SP. NOV.

Holotype: A preserved specimen at the Queensland Museum, Brisbane, Queensland, specimen number, J77690 from Peak Downs, Queensland, Australia, Lat. -22.68, Long. 147.67.

The Queensland Museum is a government-owned facility that allows access to its holdings by others.

Diagnosis: *Tympanocryptis markteesi* sp. nov. has until now been treated as a variant of *T. lineata* Peters, 1863. However *T. markteesi* sp. nov. can be separated from *T. lineata* by its generally greyish colour versus orangeish in *T. lineata*. Furthermore *T. lineata* is characterised by two more-or-less vertical thick creamy bars on the upper labials beneath the eye, whereas *T. markteesi* sp. nov. is characterised by one only (the rear one) and the equivalent front bar being reduced to a largeish spot. In *T. lineata* the light barring of the forelimbs is distinct, versus indistinct or non-existent in *T. markteesi* sp. nov. and the similar species *T. karumba* Wells and Wellington, 1985, treated (improperly) by most authors as merely *T. lineata*.

T. karumba is characterised by semi-circular blotches on the dorsolateral surface, versus squareish in *T. markteesi* sp. nov.. Like *T. lineata*, *T. karumba* is characterised by two more-or-less vertical thick creamy bars on the upper labials beneath the eye, whereas *T. markteesi* sp. nov. is characterised by one only (the rear one) and the equivalent front bar being reduced to a largeish spot.

Tympanocryptis alexteesi sp. nov. described below, is readily separated from *Tympanocryptis markteesi* sp. nov., *T. karumba* Wells and Wellington, 1985, and nominate *T. lineata* Peters, 1863 by the fact that the dark dorsal blotches are orange-brown as opposed to greyish as well as the deep reddish orange lighter background colour of the dorsal surfaces. *Tympanocryptis alexteesi* sp. nov. is also readily separated from the other three taxa by the considerable whitish yellow peppering on the lower neck region as well as a relative lack of white bars or spots on the upper labials, this being no more than two obvious ones.

Distribution: *Tympanocryptis markteesi* sp. nov. is known only from grassland areas in the vicinity of the tropic of Capricorn, just west of the Dividing Range in Eastern Queensland, and nearby areas immediately south.

Etymology: Named in honour of Mark Tees of Brunswick, Victoria, formerly of Bondi, New South Wales, in recognition of various logistical services to herpetology in Australia.

SPECIES TYMPANOCRYPTIS ALEXTEESI SP. NOV.

Holotype: A preserved specimen at the South Australian Museum, Adelaide, South Australia, specimen number: R44707 being a female specimen collected from 4 km south of the Eucalyptus Waterhole on the Douglas Dam Track, South Australia. Lat. -27.6128, Long. 134.59.

The South Australian Museum is a government-owned facility that allows access to its holdings by others.

Diagnosis: *Tympanocryptis alexteesi* sp. nov. is readily separated from *Tympanocryptis markteesi* sp. nov. described above, *T. karumba* Wells and Wellington, 1985, and nominate *T. lineata* Peters, 1863 by the fact that the dark dorsal blotches are orange-brown as opposed to greyish as well as the deep reddish orange lighter background colour of the dorsal surfaces. *Tympanocryptis alexteesi* sp. nov. is also readily separated from the other three taxa by the considerable whitish yellow peppering on the lower neck region as well as a relative lack of white bars or spots on the upper labials, this being no more than two obvious ones.

Distribution: Known only from various dry habitats in the northern parts of South Australia, mainly west of the main Cooper's Creek drainage system.

Etymology: Named in honour of Alex Tees, lawyer of Bondi, New South Wales, in recognition of various logistical services to herpetology in Australia, including being instrumental in successfully defending legal action to ban the best-selling book *Smuggled-2: Wildlife Trafficking, Crime and Corruption in Australia*, when published at end 1996 (Hoser, 1996).

This he did no less than three times!

It was following the third unsuccessful attempt to ban this book in 1996, that the New South Wales government was forced to allow the legal private ownership of reptiles in New South Wales, this being for the first time in 23 years and action that had implications for keepers in all other Australian states, where similar bans were either in force or about to be re-enacted.

All the current generation of New South Wales herpetologists and those in all other Australian states, as well as anyone else who owns pet reptiles or handles them at travelling wildlife shows owe Mr. Tees a debt of gratitude for his role in getting them the rights they now take for granted, noting most people in Australia in 2015 are now unaware that there was an over 20 year battle to regain those rights.

FIRST REVISOR'S INSTRUCTIONS

Unless mandatory under the rules of zoological nomenclature of the time, no new scientific names are to have spellings altered in any way. The spellings of the new scientific names, in some cases lacking the usual suffixes attached to such names or otherwise correct name formations, are deliberate on the part of the author.

Should a reviser decide that more than one described species herein are of the same taxon, then name priority is given to the taxon named first, as in by page priority in this paper.

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