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Cover image: *Charlespiersonserpens punctulatus* from Brisbane, Qld, Australia.
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Stopping the shuffle between families: Six new Colubroid snake families named.

RAYMOND T. HOSER

488 Park Road, Park Orchards, Victoria, 3134, Australia.

Phone: +61 3 9812 3322 Fax: 9812 3355 E-mail: snakeman@snakeman.com.au

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ABSTRACT

Recent molecular studies have effectively resolved the phylogeny of most of the modern snakes. Notwithstanding this, the taxonomy at the family level is seen to be inconsistent between major clades, with family level groups of similar divergence times being classified by single authors variously as genera, subfamilies and families within single given papers.

To correct the inconsistencies, some of the lower ranked groups are elevated to match the others already accorded family status.

This also brings the taxonomy and nomenclature of the snakes more into line with other vertebrate groups, including most notably the birds and placental mammals.

For the majority of affected clades there are already available names and each simply converts from subfamily to family.

However, four well-established groups until now have not been formally named. Instead they have been shunted between other family-level groups, sometimes in placements that do not match the evidence. In view of recently published phylogenies which clearly show that these taxa should be placed separately, regardless of their very ancient affinities, they are named herein according to the Zoological Code (Ride *et al.* 1999). A further two groups, until now classified as being within the Pseudoxenodontinae and Colubrinae, both of which are now elevated to family status are removed from these and placed within their own families due to their early divergence.

One of these in turn is divided into two newly named tribes.

Keywords: Taxonomy; Snakes; Colubroidea; new families; Charlespiersonserpeniidae; Micrelapiidae; Oxyrhabdiumiidae; Psammodynastiidae; Swileserpeniidae; Thermophiidae; new tribes; Charlespiersonserpenini; Chrysopelini.

INTRODUCTION

The currently recognized taxonomy of the extant snakes is a synthesis of countless studies over the past two centuries.

Studies of morphology and habits have been complimented by the magnificent new technology of gene sequencing and the like.

With all this information at hand, there have been numerous taxonomies proposed and more recently ever more detailed phylogenies produced using supermatrix generating computer programs.

Over the past decade numerous phylogenies have been produced that have established the relationships of the lesser-known snake genera to other better known genera and computer-generated applications calibrated with known events have been able to accurately establish common ancestry time-lines and the like.

Unfortunately the taxonomy and nomenclature have not kept up with the results produced by molecular biologists, due in part to the relative speed and ease with which large amounts of genetic material can be processed.

A good example of this lag was seen in the paper of Pyron *et al.* 2011, (Fig 2) where most of the major family-level groups of Colubroidea were shown as diverging from the main Colubroidea lineage at similar times and with similar speciation profiles, and yet just three well-known groups were listed as families. These were Elapidae, Viperidae and Homalopsidae.

The remaining 16 groups were listed as subfamilies within two other large family groups, namely Lamprophiidae, and Colubridae.

However the evidence of Pyron *et al.* (2011) showed quite clearly that on the basis of consistency, either the Elapidae should have been subsumed within Lamprophiidae to be consistent with the Colubridae, or

alternatively the rest should have been treated as full families alongside the Elapidae.

Also notable was that Pyron *et al.* (2011) did not recognize the well defined subgroups within the Elapidae as subfamilies, as had been done for the mega-families Lamprophiidae and Colubridae.

Now in fairness to the authors, a detailed taxonomy was not their objective, however it is raised here as argument for the need to have a consistent taxonomy and nomenclature that other herpetologists can use.

In summary, I see it as preferable to elevate the approximately 22 groups of snakes with family level divergences to full family level in nomenclature rather than the subsuming of the majority into what could well be just two or three super-families.

This preference is also noted in view of the fact that increasing numbers of taxonomists are also using the tribe level of nomenclature to identify groups of like genera, thereby in effect allowing for a little used level of grouping between genus and family to further clarify phylogenetic affinities.

In terms of what was seen in Pyron *et al.* (2011), I hereby elevate all subfamilies within their Fig 1, to full family status.

None of these families, as defined as subfamilies in Pyron *et al.* (2011) are formally defined herein.

Instead I rely on the originally published subfamily diagnoses for these same groups by the original authors to in effect become the new diagnosis for each separate family as stated herein.

In the event that none of the 28 listed families below (excluding the six newly named) have not been previously listed as such (in other words only as subfamilies previously), then this paper should be treated as the first formal recognition of these groups as family level taxon groups.

In terms of formal diagnosis within this paper, each family is diagnosed and defined as consisting of all species within the family name genus group that share common ancestry with these species as far back as the family level, including those genera listed within each group as defined as subfamilies by Pyron *et al.* (2011).

Previously named subfamilies within the Elapidae (as listed by Smith *et al.* (1997) and others), not listed or identified by Pyron *et al.* (2011) are also recognized by myself and have been previously defined by the relevant authors at dates preceding this paper's publication in 2013.

Added to the families identified above is another, namely Homoroselapidae from Africa, described by Hoser (2012a) and six others described below.

Thus the complete list of families within the Colubroidea is given below.

Hence I now formally use, resurrect or for the first time ever, erect the following families within the Colubroidea.

These are below.

FAMILIES WITHIN COLUBROIDEA

Aparallactidae

Atractaspidae

Azemiopidae

Calamariidae

Charlespiersonserpeniidae *fam. nov.* (this paper, description below)

Colubridae

Crotalidae

Dipsadidae

Elapidae

Grayiidae

Homalopsidae

Homoroselapidae

Micrelapiidae *fam. nov.* (this paper, description below)

Lamprophiidae

Natricidae

Oxyrhabdiumiidae *fam. nov.* (this paper, description below)

Pareatidae

Prosymnidae

Psammodynastiidae *fam. nov.* (this paper, description below)

Psammophiidae

Pseudaspidae

Pseudoxenodontidae

Pseudoxyrhopiidae

Sibynophiidae

Swileserpeniidae *fam. nov.* (this paper, description below)

Thermophiidae *fam. nov.* (this paper, description below)

Xenodermatidae

Viperidae

With the exception of those six family groups listed above as new, all other groups have at some stage been previously designated as family level groupings by one or more previous author.

In terms of the two families, Charlespiersonserpeniidae *fam. nov.* and Thermophiidae *fam. nov.* I make the following additional comments.

Based on most existing taxonomy's Charlespiersonserpeniidae as defined in this paper (consisting four named genera) would probably be placed as a subfamily within the Colubridae.

However, it is clear from the phylogenies recently produced that this clade diverged from the rest of the Colubridae very early in the piece and in a time period similar to that for other well-defined and accepted families (see for example Fig 1, in Pyron *et al.* 2011 for the relevant family-level relativities).

On that basis I believe it appropriate that this group be accorded family group recognition.

In terms of the Colubridae as now recognized, the next major divergent group in terms of antiquity of divergence was almost certainly the tribe Oligodonini, that is clearly also widely divergent of the rest, both morphologically and genetically.

However it did diverge considerably more recently than the Charlespiersonserpeniidae as defined in this paper,

and so sits outside what I believe should be the antiquity required for full family-level recognition.

The taxonomic recognition of the tribe Oligodonini Hoser, 2012, does in my view give an accurate view of where the group lies in the Linnaean system and therefore I leave the numerous genera within that tribe as defined by Hoser (2012d) as is.

The genus *Thermophis* Malnate, 1953, has been variously placed within either Dipsadidae or Pseudoxenodontidae, and clearly has affinities with both. However the divergence from other members of both is in my view sufficiently archaic as to warrant this genus being placed within its own family.

If any of the new families are later downgraded by other authors to the level of subfamily, the diagnosis for each will remain the same and the diagnosis for family-level groups herein should also be treated as being definitions of subfamily groups as well, to accommodate for the possibility of unaccounted for extinct forms or undiscovered ones.

Hence each diagnosis within this paper should be treated as two; that is one for family and one for subfamily (inae).

As mentioned already the body of evidence relied upon to resolve the current taxonomy of the Colubroidea is immense. However some of the key published studies and relevant papers include the following: Alfaro *et al.* (2008), Cadle (1984, 1985), Chen *et al.* (2013), Collins (2006), Cope (1893), De Queiroz (2006), Dowling (1978), Dowling and Deullman (1978), Günther (1858), Huang *et al.* (2009), Jan (1863), Keller *et al.* (2003), Kelly *et al.* (2003, 2009), Keogh (1998), Laurenti (1768), Lawson *et al.* (2005), Leviton (1968), Liem *et al.* (1971), Nixon *et al.* (2003), Pinau *et al.* (2004), Pyron and Burbrink (2009, 2012), Pyron *et al.* (2011, 2013), Rannala *et al.* (1998), Romer (1956), Vidal *et al.* (2007, 2008, 2009, 2010), Vitt and Caldwell (2009), Wiens (2003), Wiens and Moen (2008), Zaher (1999), Zaher *et al.* (2009, 2012), Zhao and Adler (1993), Zug *et al.* (2001), Zwickl and Hillis (2002), and the sources cited therein, which includes relevant papers not necessarily themselves about snake taxonomy or phylogenetics, but yet deal with other vertebrates in relevant matters.

I have no doubt that in the immediate term, there will be howls of protest from the usual quarters in terms of this new classification for the Colubroidea.

Examples of this type of protest are seen in the numerous blogs posted in *Herpetological Review* (e.g. Burbrink *et al.* 2007 and Kaiser *et al.* 2013) or alternatively see Crother *et al.* (2008, 2012), the latter from 2008 rebutted by Pauly *et al.* (2009).

However I also have no doubt that as the various branches of zoological classification become more consistent across classes of vertebrate, that the taxonomy formally proposed herein will become widely adopted as the most sensible choice.

As a matter of formality, each family defined herein is also redefined as a subfamily, in order to account for fossil taxa that may be found, to enable the nominate subfamilial groups to be properly identified from this point in time as well.

CHARLESPIERSONSERPENIIDAE FAM. NOV.

(Terminal Taxon: *Leptophis punctulatus* Gray, 1826)

Now generally known as *Charlespiersonserpens punctulatus* (Gray, 1826) or previously as *Dendrelaphis punctulatus* (Gray, 1826).

Diagnosis: As a family they are found in the South-east Asian region and adjacent places including the Indian subcontinent and a sizeable part of Australasia.

The family is best diagnosed and separated from others by a diagnosis of the four component genera.

Thus the family is defined as being one or other of the following four:

1/ The genus *Dendrelaphis* Boulenger, 1890 are the so-called tree snakes or Bronzebacks.

All are similar in build and habits, being generally slender, slightly laterally compressed with long-whip-like tails, head barely distinct from the neck, large eye with a round pupil. The ventrals exhibit a sharp ridge running down either side presenting an "arch-shape" in cross section which enables traction when climbing trees and the like.

Color varies strongly between species and within wide-ranging species also varies depending on locality.

There is a variable dorsal colour, slightly lighter laterally, but all lack longitudinal black stripes on all or most of their body, labials and throat pale, 13 dorsal mid-body rows, all smooth with apical pits, and arranged obliquely, 156-221 ventrals, divided anal, 118-160 divided subcaudals, loreal present, 8-9 supralabials, with only the fourth supralabial makes contact with the eye, 1 pre-ocular, 2 or 3 postoculars and have a hemipenis that extends past the fifteenth subcaudal.

Note that for *Dendrelaphis*, only the fourth supralabial makes contact with the eye, with numbers 5 and 6 merely coming close, the latter being the configuration for *Charlespiersonserpens* Hoser, 2012.

When threatened, snakes will puff up their neck and fore body, swelling it vertically, often yielding different colored skin between the now parted scales.

The type species, the Striped Bronzeback *Dendrelaphis caudolineatus* (Gray, 1834) is physically quite different from seven Australia/New Guinea species, being of obviously thinner build and glossier scalation, moved to the genus *Charlespiersonserpens* Hoser, 2012 (see below), or:

2/ The diagnosis for the genus *Charlespiersonserpens* Hoser, 2012 is as follows: A group of snakes separated from other *Dendrelaphis* by their generally heavier build (like-for-like) and slightly less glossy dorsal body shields (at same point of shedding cycle).

The following suite of characters identifies this genus: Variable dorsal colour, slightly lighter laterally, but all lack longitudinal black stripes on all or most of their body, labials and throat pale, 13 dorsal mid-body rows, all smooth and arranged obliquely, 156-221 ventrals, divided anal, 118-160 divided subcaudals, loreal present, 8-9 supralabials, with fourth and fifth or fifth and sixth in contact with the eye, 1 pre-ocular, 2 or 3 postoculars and have a medium or short hemipenis that doesn't extend past the fifteenth subcaudal.

Snakes within the genus *Dendrelaphis* have a higher average ventral count than seen in the genus *Charlespiersonserpens* Hoser, 2012.

Furthermore for snakes within the genus *Dendrelaphis* only the fourth supralabial makes contact with the eye, with numbers 5 and 6 merely coming close, as opposed to the configuration given above for *Charlespiersonserpens* Hoser, 2012.

Noteworthy is that two species within this genus, namely *papuenis* (Boulenger, 1895) and *salomonis* (Günther, 1872) were in 1984 resurrected from synonymy with *punctulatus* and/or *calligastrea* by McDowell in 1984, and again by Wells and Wellington in 1985, which has been upheld by later studies, or:

3/ The genus *Chrysopelea* Boie, 1826 is diagnosed as follows:

All are long and slender in build, head wider than the neck. The head shape is spatulate and with a depressed snout. The eyes are large and the pupil is round. There are 9 supralabials with the fourth, fifth and sixth touching the eyes. There are 17 mid-body scale rows and the dorsal scales are smooth, except in the species *taprobanica* where they are keeled (subgenus *Wellsiserpens* Hoser, 2013). There are 198-234 ventrals, 107-138 subcaudals and the ventral and subcaudal scales have distinctive lateral keels; 20-22 maxillary teeth, 3 and 4 being partly grooved.

The so-called flying snakes from southern Asia are a distinctive group of usually brightly coloured snakes. An individual snake will glide by using its ridge scales along its belly, pushing against rough bark surfaces of tree trunks, allowing it to move vertically up a tree. Upon reaching the end of a tree's branch, the snake continues moving until its tail dangles from the branch's end. It then makes a J-shape bend, leans forward to select the level of inclination it wishes to travel to control its flight path, as well as selecting a desired landing area. Once it decides on a destination, it propels itself by thrusting its body up and away from the tree, sucking in its stomach, flaring out its ribs to turn its body in a "pseudo concave wing" while simultaneously making a continual swaying movement of lateral undulation more-or-less parallel to the ground to stabilize its direction in midair flight so as to safely land. The combination of sucking in its stomach and making a motion of lateral undulation in the air allows the snake to glide in the air, where it also manages to save energy compared to travel by crawling on the ground and to potentially avoid terrestrial predators. The concave wing that a snake creates in sucking its stomach, flattens its body to up to twice its width from back of the head to the anal vent, which is close to the end of the snake's tail, causes the cross section of the snake's body to resemble the cross section of a flying disc. The cross sectional concavity causes increased air resistance under the centre of the snake, causing lift for the snake to glide (or "fly"). The snake continuously moves in lateral undulation to create an enhanced effect of increased air pressure underneath its arched body to glide. While the ultimate destination of the snake is best predicted by ballistics they do have some control over where they go and land, determined by in air movement. These snakes are mildly venomous colubrids, not

regarded as dangerous to humans.

Five species from the genus have been described, although one of these is only known from a single specimen, or:

4/ The genus *Ahaetulla* Link, 1807, is diagnosed as follows: All are characterized by thin, elongated bodies, with extremely long tails and a sharply triangular shaped head. They are primarily green in color, but can vary quite a bit to include or be yellows, oranges, greys and browns. They may have black and/or white patterning, or can be solid in color. Their eyes are apparently unique in the reptile world, having keen binocular vision and very distinctive keyhole shaped pupils.

The genus *Ahaetulla* is further diagnosed and separated from other genera as follows: Maxillary teeth 12 to 15, one or two in the middle much enlarged, fang-like, and followed by an interspace, after which the teeth are very small; one or two posterior grooved fangs, situated below the posterior border of the eye; mandibular teeth increasing in length to the third or fourth, which is very large, fang-like; the posterior small. Head elongate, distinct from neck, with strong canthus rostralis and concave lores; eye rather large, with horizontal pupil; nostril in the posterior part of a single nasal; frontal narrow, more or less bell-shaped. Body much elongate and compressed; scales smooth, without apical pits, in 15 rows, disposed obliquely, vertebral row slightly enlarged; ventrals rounded. Tail long; subcaudals in two rows (Boulenger, 1896).

Comments: Previously published accounts for the genera *Charlespiersonserpens* Hoser, 2012 and *Dendrelaphis* Boulenger, 1890 include those listed by Hoser (2012c) and sources cited therein.

These include: Anderson (1871), Auffenberg (1980), Auliya (2006), Baier (2005), Bergman (1955), Boie (1827), Boulenger (1886, 1888, 1890, 1894a, 1895a, 1895b, 1897), Bourret (1935), Cohn (1905), Das (1999), Das and De Silva (2005), Daudin (1803), David and Vogel (1996), de Lang and Vogel (2005), de Rooij (1917), Deuve (1970), Devan-Song and Brown (2012), Doria (1817), Duméril *et al.* (1854), Flower (1897, 1899), Frith (1977), Gadow (1909), Garman (1901), Gray (1825, 1826, 1835, 1841, 1842), Grismer *et al.* (2008), Günther (1867, 1872), How and Kitchner (1997), How *et al.* (1996), Iskandar and Colijn (2002), Janzen *et al.* (2007), Koch (2011), Kuhl (1820), Lazell (2002), Lazell and Wu (1990), Leviton (1970), Lidth De Jeude (1911), Lim and Cheong (2011), Lim and Lim (1992), Lim and Ng (1999), Loveridge (1948), Macleay (1875, 1877, 1878, 1884), Malkmus *et al.* (2002), Manthey and Grossmann (1997), McCoy (2006), McDowell (1984), McKay (2006), Meise and Hennig (1932), Mertens (1926, 1927, 1930), Obst (1977), Schmidt (1932), Sharma (2004), Smith (1943), Stejneger (1933), Sudasinghe (2010), Taylor (1950), Thompson and Thompson (2008), Tiwari and Biswass (1973), Tweedie (1983), van Rooijen and van Rooijen (2007), van Rooijen and Vogel (2008a, 2008b, 2008c, 2009, 2010), Vijayakumar and David (2006), Vogel (1995, 2010), Vogel and van Rooijen (2007, 2008, 2011a, 2011b, 2011c), Wall (1908c, 1910c, 1913, 1921a, 1921b), Wells and Wellington (1985), Werner (1893), Whitaker *et al.* (1982), Zhao and Adler (1993), Ziegler and Vogel (1999).

Previously published accounts for the genus *Chrysopelea* Boie, 1826 include those listed by Hoser (2013) and sources cited therein and include: Auliya (2006), Boie (1827), Boistel *et al.* (2001), Bong Heang (1987), Boulenger (1890, 1894a), Brongersma (1933), Brown *et al.* (1996), Bulian (1997), Chanard *et al.* (1999), Cox *et al.* (1998), David and Vogel (1996), de Lang and Vogel (2005), Devan-Song and Brown (2012), Dowling and Jenner (1998), Duméril *et al.* (1854), Ferner *et al.* (2000), Fischer (1880), Gaulke (1986, 1994, 2011, 2012), Geissler *et al.* (2001), Grismer, *et al.* (2002, 2007, 2008, 2010), Grossmann and Schäfer (2001), Grossmann and Tillack (2001a, 2001b, 2004), Ingle (2010) Iskander and Erdelen (2006), Kannan (2006), Karunarathna Suranjan and Thasun Amarasinghe (2011), Kopstein (1926), Leviton (1964a), Lim and Ng (1999), Linnaeus (1758), Mahony *et al.* (2009), Malkmus (1985), Malkmus *et al.* (2002), Manthey and Grossmann (1997), Murthy (2010), Pauwels *et al.* (2000, 2003), Purkayastha *et al.* (2011), Pyron *et al.* (2011, 2013), Quah *et al.* (2011), Sang *et al.* (2009), Schmidt (2012), Sharma (2004), Shaw (1802), Smith (1943), Stuart and Emmett (2006), Taylor (1965), Teo and Rajathurai (1997), Thompson (1913), Tillack (2006), Tweedie (1950, 1954), van Rooijen and van Rooijen (2007), Vyas (2007), Wall (1907a, 1908d, 1921a) Wanger *et al.* (2011), Werner (1925), Whitaker and Captain (2004), Zhao and Adler (1993), Ziegler *et al.* (2007) and Zug *et al.* (1998).

Previously published accounts for the genus *Ahaetulla* Link, 1807 include the following: Avadhani (2005), Bergman (1956), Boie (1827), Bonnaterre (1790), Boulenger (1890, 1896a, 1896b, 1897), Cochran (1930), Cox *et al.* (1998), Das and De Silva (2005), David and Dubois (2005), Dowling and Jenner (1988), Duméril *et al.* (1854), Fischer (1885a), Gaulke (1994, 2011), Golder (1989), Grismer *et al.* (2008), Günther (1858, 1859, 1864), Hien *et al.* (2001), ICZN (1987, 2005), Janzen *et al.* (2007), Karunarathna and Amarasinghe (2009), Lacepède (1789), Link (1807), Linnaeus (1758), Manthey and Grossmann (1997), Khaire and Khaire (1993), Midtgaard (2011), Miralles and David (2010), Nabhitabhata *et al.* (2000), Neumann-Denzau and Neumann-Denzau (2010), Sajdak (2010), Sang *et al.* (2009), Schlegel (1837), Sharma (2004), Smedley (1932), Smith (1930, 1943), Stejneger (1933), Taylor (1953, 1965), Tweedie (1950), van Rooijen and van Rooijen (2002), Venkatraman *et al.* (1997), Wall (1905a, 1905b, 1905c, 1906, 1908a, 1908b, 1910a, 1910b, 1921a), Whitaker and Captain (2004), and sources cited therein.

There is a strong case both phylogenetically and morphologically to divide *Ahaetulla* Link, 1807 three ways, either into three genera or alternatively, three subgenera. There are already available names for the phylogenetic groups.

The genera *Charlespiersonserpens* Hoser, 2012 and *Dendrelaphis* Boulenger, 1890 are herein placed in a new tribe, Charlespiersonini, using the same diagnosis as given here for the two genera.

The genera *Chrysopelea* Boie, 1826 and *Ahaetulla* Link, 1807 are herein placed in a new tribe, Ahaetulliini, using the same diagnosis as given here for the two genera.

Content: *Charlespiersonserpens* Hoser, 2012;

Dendrelaphis Boulenger, 1890; *Chrysopelea* Boie, 1826; *Ahaetulla* Link, 1807.

CHARLESPIERSONSERPENIINAE SUBFAM. NOV.

(Terminal Taxon: *Leptophis punctulatus* Gray, 1826)

Now generally known as *Charlespiersonserpens punctulatus* (Gray, 1826) or previously as *Dendrelaphis punctulatus* (Gray, 1826).

Diagnosis: As for the family Charlespiersonserpiidae as defined in this paper.

Content: *Charlespiersonserpens* Hoser, 2012; *Dendrelaphis* Boulenger, 1890; *Chrysopelea* Boie, 1826; *Ahaetulla* Link, 1807.

CHARLESPIERSONSERPENINI TRIBE NOV.

(Terminal Taxon: *Leptophis punctulatus* Gray, 1826)

Now generally known as *Charlespiersonserpens punctulatus* (Gray, 1826) or previously as *Dendrelaphis punctulatus* (Gray, 1826).

Diagnosis: The new tribe Charlespiersonini *tribe nov.* is best diagnosed by a diagnosis of the two component genera.

Thus the tribe is defined and separated from others as being one or other of the following two:

1/ The genus *Dendrelaphis* Boulenger, 1890 are the so-called tree snakes or Bronzebacks.

All are similar in build and habits, being generally slender, slightly laterally compressed with long-whip-like tails, head barely distinct from the neck, large eye with a round pupil. The ventrals exhibit a sharp ridge running down either side presenting an "arch-shape" in cross section which enables traction when climbing trees and the like.

Color varies strongly between species and within wide-ranging species also varies depending on locality.

There is a variable dorsal colour, slightly lighter laterally, but all lack longitudinal black stripes on all or most of their body, labials and throat pale, 13 dorsal mid-body rows, all smooth with apical pits, and arranged obliquely, 156-221 ventrals, divided anal, 118-160 divided subcaudals, loreal present, 8-9 supralabials, with only the fourth supralabial makes contact with the eye, 1 pre-ocular, 2 or 3 postoculars and have a hemipenis that extends past the fifteenth subcaudal.

Note that for *Dendrelaphis*, only the fourth supralabial makes contact with the eye, with numbers 5 and 6 merely coming close, the latter being the configuration for *Charlespiersonserpens* Hoser, 2012.

When threatened, snakes will puff up their neck and fore body, swelling it vertically, often yielding different colored skin between the now parted scales.

The type species, the Striped Bronzeback *Dendrelaphis caudolineatus* (Gray, 1834) is physically quite different from seven Australia/New Guinea species, being of obviously thinner build and glossier scalation, moved to the genus *Charlespiersonserpens* Hoser, 2012 (see below), or:

2/ The diagnosis for the genus *Charlespiersonserpens* Hoser, 2012 is as follows: A group of snakes separated from other *Dendrelaphis* by their generally heavier build (like-for-like) and slightly less glossy dorsal body shields (at same point of shedding cycle).

The following suite of characters identifies this genus: Variable dorsal colour, slightly lighter laterally, but all lack longitudinal black stripes on all or most of their body, labials and throat pale, 13 dorsal mid-body rows, all smooth and arranged obliquely, 156-221 ventrals, divided anal, 118-160 divided subcaudals, loreal present, 8-9 supralabials, with fourth and fifth or fifth and sixth in contact with the eye, 1 pre-ocular, 2 or 3 postoculars and have a medium or short hemipenis that doesn't extend past the fifteenth subcaudal.

Snakes within the genus *Dendrelaphis* have a higher average ventral count than seen in the genus *Charlespiersonserpens* Hoser, 2012.

Furthermore for snakes within the genus *Dendrelaphis* only the fourth supralabial makes contact with the eye, with numbers 5 and 6 merely coming close, as opposed to the configuration given above for *Charlespiersonserpens* Hoser, 2012.

Noteworthy is that two species within this genus, namely *papuenis* (Boulenger, 1895) and *salomonis* (Günther, 1872) were in 1984 resurrected from synonymy with *punctulatus* and/or *calligastra* by McDowell in 1984, and again by Wells and Wellington in 1985, which has been upheld by later studies.

The tribe is distributed within southern Asia and Australasia.

Content: *Charlespiersonserpens* Hoser, 2012; *Dendrelaphis* Boulenger, 1890.

TRIBE AHAETULLIINI TRIBE NOV.

(Terminal Taxon: *Coluber mycterizans* Linnaeus, 1758)

Currently most widely known as *Ahaetulla mycterizans* (Linnaeus, 1758).

Diagnosis: Tribe Ahaetulliini is best diagnosed by defining the two component genera.

That is the tribe is herein defined and separated from other snakes as one or other of:

1/ The genus *Ahaetulla* Link, 1807, is diagnosed as follows: All are characterized by thin, elongated bodies, with extremely long tails and a sharply triangular shaped head. They are primarily green in color, but can vary quite a bit to include or be yellows, oranges, greys and browns. They may have black and/or white patterning, or can be solid in color. Their eyes are apparently unique in the reptile world, having keen binocular vision and very distinctive keyhole shaped pupils.

The genus *Ahaetulla* is further diagnosed and separated from other snake genera as follows: Maxillary teeth 12 to 15, one or two in the middle much enlarged, fang-like, and followed by an interspace, after which the teeth are very small; one or two posterior grooved fangs, situated below the posterior border of the eye; mandibular teeth increasing in length to the third or fourth, which is very large, fang-like; the posterior small. Head elongate, distinct from neck, with strong canthus rostralis and concave lores; eye rather large, with horizontal pupil; nostril in the posterior part of a single nasal; frontal narrow, more or less bell-shaped. Body much elongate and compressed; scales smooth, without apical pits, in 15 rows, disposed obliquely, vertebral row slightly enlarged; ventrals rounded. Tail long; subcaudals in two rows (Boulenger, 1896), or:

2/ The genus *Chrysopelea* Boie, 1826 is diagnosed as follows:

All are long and slender in build, head wider than the neck. The head shape is spatulate and with a depressed snout. The eyes are large and the pupil is round. There are 9 supralabials with the fourth, fifth and sixth touching the eyes. There are 17 mid-body scale rows and the dorsal scales are smooth, except in the species *taprobanica* where they are keeled (subgenus *Wellsserpens* Hoser, 2013). There are 198-234 ventrals, 107-138 subcaudals and the ventral and subcaudal scales have distinctive lateral keels. 20-22 maxillary teeth, 3 and 4 being partly grooved.

The so-called flying snakes from southern Asia are a distinctive group of usually brightly coloured snakes. An individual snake will glide by using its ridge scales along its belly, pushing against rough bark surfaces of tree trunks, allowing it to move vertically up a tree. Upon reaching the end of a tree's branch, the snake continues moving until its tail dangles from the branch's end. It then makes a J-shape bend, leans forward to select the level of inclination it wishes to travel to control its flight path, as well as selecting a desired landing area. Once it decides on a destination, it propels itself by thrusting its body up and away from the tree, sucking in its stomach, flaring out its ribs to turn its body in a "pseudo concave wing" while simultaneously making a continual swaying movement of lateral undulation more-or-less parallel to the ground to stabilize its direction in midair flight so as to safely land. The combination of sucking in its stomach and making a motion of lateral undulation in the air allows the snake to glide in the air, where it also manages to save energy compared to travel by crawling on the ground and to potentially avoid terrestrial predators. The concave wing that a snake creates in sucking its stomach, flattens its body to up to twice its width from back of the head to the anal vent, which is close to the end of the snake's tail, causes the cross section of the snake's body to resemble the cross section of a flying disc. The cross sectional concavity causes increased air resistance under the centre of the snake, causing lift for the snake to glide (or "fly"). The snake continuously moves in lateral undulation to create an enhanced effect of increased air pressure underneath its arched body to glide. While the ultimate destination of the snake is best predicted by ballistics they do have some control over where they go and land, determined by in air movement. These snakes are mildly venomous colubrids, not regarded as dangerous to humans.

Five species from the genus have been described, although one of these is only known from a single specimen.

The tribe is distributed within southern Asia

Content: *Ahaetulla* Link, 1807; *Chrysopelea* Boie, 1826.

MICRELAPIIDAE FAM. NOV.

(Terminal taxon: *Micrelaps muelleri* Boettger, 1880).

Diagnosis: At the present time, this family as defined, is monotypic for the genus *Micrelaps* Boettger, 1880. Therefore the family diagnosis is the same as for the genus as presently recognized.

The family is herein defined and separated from others as follows: maxillary very short, with two or three teeth

followed, after an interspace, by one [two] very large grooved fang[s] situated below the eye; anterior mandibular teeth longest. Head small, not distinct from neck; eye minute, with round or vertically subelliptic pupil; nostril in a single nasal; no loreal [very rarely 1], no preocular; prefrontal entering the eye.

Body cylindrical; scales smooth, without apical pits, in 15 rows; ventrals rounded. Tail short; subcaudals in two rows. An elongated venom gland has been reported in at least one specimen (Greene 1997).

These snakes occur in the Middle-East and Africa.

Comments: In his study of African colubrids Bogert (1940) associated *Micrelaps* with *Xenocalamus* Günther 1868, *Chilorhinophis* Werner, 1907 and *Macrelaps* Boulenger, 1896 all opisthogyphous genera lacking hypapophyses on the posterior vertebrae and having undivided hemipenes in which the sulcus spermaticus is also undivided.

Parker (1949) noticed that *Micrelaps muelleri* and *M. boettgeri* had deeply bifurcated hemipenes and thought that the genus should rather be placed in Bogert's (1940) Group VII, being most comparable with *Calamelaps* Günther 1866 (= *Amblyodipsas* Peters 1856).

In a recent treatment of Atractaspididae (Underwood and Kochva 1993) *Micrelaps* was considered the sister group of *Brachyophis* Mocquard 1888 from Somalia.

Notwithstanding these findings, Vidal *et al.* (2007) placed *Micrelaps* within the Elapoidea, but sufficiently divergent from the rest to be placed in its own family, although these authors did not make any such designation.

There is a considerable body of published studies relating to the genus *Micrelaps* Boettger, 1880. Important publications include: Angel (1925), Amr *et al.* (1997), Bar and Haimovitch (2012), Bischoff and Schmidtler (1997), Boettger (1880, 1893), Bogert (1940), Boulenger (1896b), Broadley (1993), Broadley and Howell (1991), de Witte and Laurent (1947), Disi (1885), Disi *et al.* (2001), Hraoui-Bloquet *et al.* (2002), Lanza (1983, 1990), Largen and Rasmussen (1993), Loveridge (1956), Mocquard (1888), Pyron *et al.* (2013), Rasmussen (2002, 2003), Spawls *et al.* (2001), Sternfeld (1908, 1910), Underwood and Kochva (1993), Venchi and Sindaco (2006), Vidal *et al.* (2007), Werner *et al.* (2006) and the sources cited therein.

There is a strong case both phylogenetically and morphologically to divide the genus *Micrelaps* Boettger, 1880 two ways, either into two genera or alternatively, two subgenera. There are already available names for the phylogenetic groups.

Until now, most authors have placed the genus *Micrelaps* Boettger, 1880 within the Atractaspididae, however the divergence from the nominate genus for the family is archaic and therefore warrants a family level division.

Content: *Micrelaps* Boettger, 1880.

MICRELAPIINAE SUBFAM. NOV.

(Terminal taxon: *Micrelaps muelleri* Boettger, 1880).

Diagnosis: As for the preceding family description.

These snakes occur in the Middle-East and Africa.

Content: *Micrelaps* Boettger, 1880.

OXYRHABDIUMIIDAE FAM. NOV.

(Terminal taxon: *Sténognathe modestus* Duméril, 1853).

Generally known as *Oxyrhabdium modestum* (Duméril, 1853).

Diagnosis: This family is diagnosed and separated from other snake families by the following suite of characters: Maxillary teeth 30 to 35, small, equal; mandibular teeth equal. Head is not very distinct from the neck; eye small, with vertically subelliptic pupil; nostril pierced between two small nasals; a pair of small internasals; no praeocular; loreal and prefrontal entering the eye. Body cylindrical; scales smooth, in 15 rows, without apical pits; ventrals rounded. Tail moderate, subcaudals divided. Hypapophyses developed throughout the vertebral column (Boulenger 1893). Hemipenes are deeply forked and spinose.

The family is known only from two species, both found in the Philippine Islands and both assigned to the genus *Oxyrhabdium* Boulenger, 1893.

Comments: Many molecular studies, including that of Pyron *et al.* (2011) were effectively unable to place *Oxyrhabdium* within any existing families.

Leviton (1964b) wrote: "The presence of hypapophyses, deeply forked hemipenes, and numerous subequal maxillary teeth leads me to conclude that *Oxyrhabdium* is unrelated to any genus of

burrowing or semi-burrowing colubrid snakes presently known from either Indonesia or the Malay Peninsula. I believe the similarities in the arrangement of head shields, smoothness of scales, reduction in length of the tail, and reduction in the size of the eye, shared in part with other genera of Indo-Malayan burrowing snakes (e.g. *Agrophis*, *Brachyorrhus*, *Oreoculamus*, and *Rabdion*) must be attributed to convergence among, otherwise, unrelated but morphologically adapted groups."

Notable published reports on the genus include: Bauer *et al.* (1995), Beukema (2011), Boulenger (1893), Brown *et al.* (2000), Duméril (1853), Duméril *et al.* (1854), Fischer (1885b), Gaulke (2001), Gaulke and Operiano (2006), Günther (1858, 1873), Hallermann (2007), Leviton (1964b), Peters (1872), Smith (1993), and sources cited therein.

Content: *Oxyrhabdium* Boulenger, 1893.

OXYRHABDIUMIINAE SUBFAM. NOV.

(Terminal taxon: *Sténognathe modestus* Duméril, 1853).

Generally known as *Oxyrhabdium modestum* (Duméril, 1853).

Diagnosis: As for the preceding family description.

The subfamily is known only from two species, both found in the Philippine Islands and both assigned to the genus *Oxyrhabdium* Boulenger, 1893.

Content: *Oxyrhabdium* Boulenger, 1893.

PSAMMODYNASTIIDAE FAM. NOV.

(Terminal taxon *Psammophis pulverulenta*, Boie, 1827)

Generally known as *Psammodynastes pulverulentus* (Boie, 1827)

Diagnosis: Separated from other snake families by the following suite of characters: Maxillary teeth 10-15, two anterior and last two posterior abruptly and strongly enlarged, the posteriormost grooved; anterior mandibular teeth strongly enlarged; head distinct from neck; canthus rostralis distinct, angular, eye large, pupil vertically elliptic; frontal narrow, elongate; nasal single, nostril small; body cylindrical; scales smooth, in 17 longitudinal rows at midbody; ventrals rounded, without keel; tail moderate; subcaudals paired; hypapophyses present throughout vertebral column; hemipenes forked, spinose throughout (Leviton 1983).

Monotypic for two species in the genus *Psammodynastes* Günther, 1858. Found in South-east Asia.

Comments: Leviton (1983) noted consistent differences between the two species within the single genus *Psammodynastes* Günther, 1858 as well as strong regional variation within the more widespread species *Psammodynastes pulverulentus*.

Published studies on both species within the genus namely, *Psammodynastes pulverulentus* Boie, 1827 and *Psammodynastes pictus* Günther, 1858 include, Auliya (2006), Beukema (2011), Boie (1827), Boulenger (1894b, 1896a, 1897, 1890, 1905), Brown *et al.* (2000), Bulian (1999), Cantor (1839), Chanard *et al.* (1999), Cox *et al.* (1998), Das *et al.* (2009), Das and Palden (2000), David and Vogel (1996), de Lang and Vogel (2005), Dowling and Jenner (1998), Duméril *et al.* (1854), Ferner *et al.* (2000), Gaulke (2001, 2006, 2011), Geissler (2012), Geissler *et al.* (2011), Grismer *et al.* (2007, 2008, 2010), Günther (1858), Haile (1958), Hein *et al.* (2001), Jackson and Fritts (1996), Kopstein (1938), Lim and Ng (1999), Malkmus *et al.* (2002), Manthey (1983), Manthey and Grossmann (1997), Mertens (1930), Ota (1991), Pauwels *et al.* (2003), Peters (1868), Rasmussen (1975), Rosén (1905), Saint Girons (1972), Sharma (2004), Smedley (1931), Smith (1993), Smith (1943), Steindachner (1867), Stejneger (1907, 1910), Stuart and Emmett (2006), Suyanto (1996), Taylor (1965), Teo and Rajathurai (1997), van Rooijen and van Rooijen (2002), Venning (1910), Wall (1907c, 1908c), Wanger *et al.* (2011), Zhao (1995, 1997), Ziegler (2002), Ziegler *et al.* (2007) and the sources cited therein.

Content: *Psammodynastes* Günther, 1858.

PSAMMODYNASTIIDAE SUBFAM. NOV.

(Terminal taxon *Psammophis pulverulenta*, Boie, 1827)

Generally known as *Psammodynastes pulverulentus* (Boie, 1827)

Diagnosis: As for the preceding family description.

Monotypic for two species within the genus *Psammodynastes* Günther, 1858.

Found in South-east Asia.

Content: *Psammodynastes* Günther, 1858.

SWILESERPENIIDAE FAM. NOV.

(Terminal taxon *Tropidonotus depressiceps* Werner, 1897)

Currently known as *Swileserpens depressiceps* Werner, 1897

From 1997 to 2012 known as *Buhoma depressiceps* Werner, 1897.

Diagnosis: The separation of this family, consisting the two genera of *Swileserpens* Hoser, 2012 and *Buhoma* Ziegler *et al.*, 1997 from all other African colubrid snake genera is possible by combination of (a) the presence of hypapophyses on the posterior vertebrae, (b) grooved posterior maxillary teeth, (c) the sulcus spermaticus is forked. Furthermore this family is distinguishable from the morphologically similar *Geodipsas* (within the family Pseudoxyrhopiidae), by deep bifurcation of the sulcus spermaticus, and by the combination of configuration of (a) sublinguals and (b) temporals as explained below. This is 3-4 infralabials contact the sublinguals in *Swileserpeniidae* versus 5-6 infralabials contact the first sublinguals in Malagasy *Geodipsas* and *Alluaudina* (Pseudoxyrhopiidae).

The configuration of the sublingual scales can be used to separate most African specimens of *Swileserpeniidae* from the morphologically convergent Malagasy taxa. In most there are three regular pairs of longish sublingual scales; behind these the ventral scales immediately begin, although occasionally large scales are irregularly interposed between the two pairs of large sublinguals. In contrast, the Malagasy *Geodipsas* have only two large pairs of sublinguals, and a varying number of small irregular scales are interposed between these and the beginning of the ventrals. A similar situation is also found in the Malagasy genera *Brygophis* and *Alluaudina* (Pseudoxyrhopiidae).

Comments: Key references in terms of the two genera within the family, namely *Swileserpens* Hoser, 2012 and *Buhoma* Ziegler *et al.*, 1997, include the following, Andersson (1901), Broadley and Howell (1991), Chifundera (1990), Chirio and Lebreton (2007), Derlyn (1978), Hoser (2012d), Hughes (1983), Loveridge (1922), Menegon *et al.* (2008), Pauwels and Vande weghe (2008), Pauwels *et al.* (2002), Rasmussen (1981), Rasmussen *et al.* (1995), Schmidt (1923), Spawls *et al.* (2001), Sternfeld (1917), Trape (1985), Trape and Roux-Esteve (1995), Tornier (1902), Werner (1897, 1899), Ziegler *et al.* (1997) and sources cited therein.

The family is confined to southern Africa.

Kaiser *et al.* (2013) (p. 20) have stated an intention to breach the Zoological Code (Ride *et al.* 1999) and rename the genus *Swileserpens* Hoser, 2012 and many hundreds of other properly named species and genera.

Their plan breaches the three critical rules of:

1/ Homonymy (Principal 5, Article 52 and elsewhere),
2/ Priority (Principal 3, Article 23 and elsewhere),
3/ Stability (Principal 4, Articles 23, 65 and elsewhere),
as well as the ethics of the Code (Appendix A).

Content: *Swileserpens* Hoser, 2012; *Buhoma* Ziegler *et al.*, 1997.

SWILESERPENIINAE SUBFAM. NOV.

(Terminal taxon *Tropidonotus depressiceps* Werner, 1897)

Currently known as *Swileserpens depressiceps* Werner, 1897

From 1997 to 2012 known as *Buhoma depressiceps* Werner, 1897.

Diagnosis: As for the preceding family description.

The family is confined to southern Africa.

Content: *Swileserpens* Hoser, 2012; *Buroma* Ziegler *et al.*, 1997.

THERMOPHIIDAE FAM. NOV.

(Terminal taxon *Tropidonotus baileyi* Wall, 1907)

Currently known as *Thermophis baileyi* (Wall, 1907)

Diagnosis: The family is monotypic for the genus *Thermophis* Malnate, 1953.

Hence the diagnosis for the family is the same as for the genus.

This is as follows: Rostral, touches 6 shields, of which the anterior nasals make much the largest sutures, 4 or 5 times the length of the internasals, which are much the shortest. A pair of internasals the suture between them is two thirds to three quarters that between the prefrontal follows; two thirds to three quarters the internaso-prae-frontal suture. A pair of prae-frontals; the suture between them a quarter greater than the prae-fronto-frontal suture; in contact with internasal, postnasal, loreal, praeocular, supraocular, and frontal. Frontal, touches 6 shields, of which the supraoculars make the largest sutures, about one third larger than the parietals.

Supraocular, length is subequal to frontal; breadth three quarters that of the frontal. Nasal is divided, in contact with the first and second supralabials. One loreal, the length exceeds the height. Two praeoculars, the upper larger, not touching the frontal, the lower is above the level of the supralabials. Eye has a round pupil. Three postoculars, Three temporals, the lowest smallest, and touching the 6th and 7th supralabials; the median touching the 7th supralabial. There are 8 supralabials the 4th and 5th touching the eye. Anterior sublinguals, larger than the posterior. Posterior sublinguals are quite separated, in some specimens subdivided into two, in contact with the 5th and 6th infralabials (4th and 5th on right side in some larger specimens). Six infralabials, the 6th largest, and rather broader than the posterior sublinguals. In terms of scale rows on the body they are 19 at 2 heads lengths, behind the head; midbody 19; and 2 heads lengths before vent 17 (19:19:17). All dorsals are keeled except the last row. Double apical facets are very indistinct, but are present. 201-221 ventrals; not angulate. Anal, divided. Subcaudals, 91-111, mainly divided.

Dorsally, the colour is olive green, with five series of indistinct spots dorsally, most pronounced in the fore body, and sometimes fading behind, except the vertebral series which remains quite evident. Last 3 rows with dusky mesial lines and the last row bordered above and below with whitish. There is a dusky postocular streak, and dusky posterior edges to the labials. Belly bluish-grey, each ventral black basally. Younger specimens are darker than adults and the body is very laterally depressed.

The family is confined to China (Tibet = Xizang, Lhasa region), 3000-4000 m elevation or higher, including Litang County, Suchuan, China, elevation 3700 m.

Comment: Currently only known from two species within a single genus and a confined geographical region. It is possible that other isolated populations exist and may include one or more other (similar) species. Key references in terms of these snakes include Conant (1999), Dorge *et al.* (2007), Guo and Chen (2000), Guo

et al. (2008, 2009), Hofmann (2012), Hofmann *et al.* (2012), Huang *et al.* (2009), Liu and Zhao (2004), Malnate (1953), Sun *et al.* (2011), Wall (1907b), Zhao and Adler (1993) and sources cited therein.

Content: *Thermophis* Malnate, 1953.

THERMOPHIINAE SUBFAM. NOV.

(Terminal taxon *Tropidonotus baileyi* Wall, 1907)

Currently known as *Thermophis baileyi* (Wall, 1907)

Diagnosis: As for the preceding family description.

The subfamily is confined to China (Tibet = Xizang, Lhasa region), 3000-4000 m elevation or higher, including Litang County, Suchuan, China, elevation 3700 m.

Content: *Thermophis* Malnate, 1953.

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A reassessment of the Tropicodphiidae, including the creation of two new tribes and the division of *Tropicodphis* Bibron, 1840 into six genera, and a revisiting of the Ungaliophiinae to create two subspecies within *Ungaliophis panamensis* Schmidt, 1933.

RAYMOND T. HOSER

488 Park Road, Park Orchards, Victoria, 3134, Australia.

Phone: +61 3 9812 3322 Fax: 9812 3355 E-mail: snakeman@snakeman.com.au

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ABSTRACT

Until now, Tropicodphiidae have consisted two well-defined groups, recognized as distinct at the genus level. *Trachyboa* Peters, 1860 consists of just two described species. The genus *Tropicodphis* Bibron, 1840 contains about 32 currently recognized species, plus numerous subspecies. Within this group, six well-defined species groups have been known for some time. In the wake of recent molecular studies confirming divergence between these groups as well-defined clades, easily separated morphologically, the species groups are formally recognized in this paper for the first time by division into six genera. Due to the lack of available names for four, these are diagnosed and named according to the Zoological Code.

Three genera are further subdivided into subgenera, one into four and two into three, all named according to the Zoological Code.

Furthermore the two main groups within the family, namely *Trachyboa* as the first group and then the rest of the genera as the second group, are formally placed in new tribes, named according to the Zoological Code. The South American species formerly placed in *Tropicodphis* are herein placed in a new subtribe.

The species *Ungaliophis panamensis* Schmidt, 1933, is herein divided into three subspecies, one named herein for the first time.

Keywords: Taxonomy; family; Tropicodphiidae; new tribes: Tropicodphiini; Trachybooiini; News tribes; Adelynhoserboaiina; Tropicodphiinina; Genus; *Tropicodphis*; *Leionotus*; new genera; *Adelynhoserboa*; *Jackyhoserboa*; *Wellsboa*; *Wellingtonboa*; new subgenera; *Pattersonboa*; *Merceicaboa*; *Eseraboa*; *Robertbullboa*; *Rodwellboa*; *Wittboa*; *Tonylsilvaboa*; *Ungaliophis panamensis*; New subspecies; *lovelinayi*.

INTRODUCTION

The Tropicodphiidae or dwarf boas, are a family of snakes from the Caribbean and South America.

The small to medium sized fossorial snakes have been subject of recent taxonomic interest at the species level, (e.g. Curcio *et al.* 2012 and papers cited therein) with new species being described frequently in the last half century.

The greatest diversity of described species is in Cuba, which has roughly the same number of described taxa as all other places combined. Most species spend their day hiding underground or concealed under vegetation, appearing in the open only at night or when it rains. Some species are arboreal and are often seen hiding in bromeliads in trees. They can change color from light (when they are active at night) to dark (inactive in the

day). This color change is brought about by the movement of dark pigment granules and seen in other reptiles such as geckos and also many frogs. When threatened, they coil up into a tight ball, another common defensive trait of smallish reptiles. A more peculiar defensive behavior noted is the ability to bleed voluntarily from the eyes, mouth, and nostrils.

At the genus level, there has been little if any interest in the group for decades.

Until now, Tropicodphiidae have consisted two well-defined groups, recognized as distinct at the genus level. *Trachyboa* Peters, 1860 consists of just two described species. The genus *Tropicodphis* Bibron, 1840 contains about 32 currently recognized species,

plus numerous subspecies. Within this group, six well-defined species groups have been known for some time, only one other of which has an available name, that being dated 1840 and effectively synonymised with *Tropidophis* ever since.

While all species within *Tropidophis* as recognized to date are morphologically similar, published studies have increasingly pointed to the fact that these similarities owe a lot to convergence in evolution, rather than particularly close relationships.

Numerous studies, including for example Chakrabarty (2006), who in turn cites numerous geological studies, have shown that the non-marine faunal elements of the greater Antilles have been separated from one another at the main island level for considerable time periods and that there has been little, if any faunal interchange since then.

By way of example, the faunas of Cuba and Hispaniola have been separated for about 25 million years, with Jamaica separating even earlier.

Recent studies of *Anolis* including that of Alfoldi *et al.* also show divergence of species groups is considerably more ancient than morphology alone may imply.

With molecular and other studies increasingly rejecting the dispersal model for extant distributions of many terrestrial vertebrate animal species in favour of vicariance as the dominant force, it is important that a biologically significant group such as *Tropidophis* has its taxonomy revisited in light of this new information, with nomenclature to reflect the phylogenetic histories of each of the main clades.

Hedges (2002) and Wilcox *et al.* (2002) in particular sets the basis for this long overdue reclassification of the *Tropidophis* as set out in this paper, noting in particular that later authors and their published results have in effect validated the main conclusions of Hedges (2002), but without incorporating these findings at the genus level of taxonomy or higher.

With lizard taxonomy of the Antilles being rearranged in recent times, in particular the genus *Anolis sensu lato*; see for example Burnell and Hedges (1990), Cannatella and de Queiroz (1989), Etheridge (1960), Guyer and Savage (1986, 1992), Hass *et al.* (1993), Nicholson *et al.* (2012), Poe (1998, 2004), Savage and Guyer (1989, 1991), Savage and Talbot (1978), (although not without controversy), it is necessary to bring the classification of the *Tropidophis* up to date in line of the recently available evidence and according to the current Zoological Code (Ride *et al.* 1999).

Key publications in relation to the taxonomy of *Tropidophis* include: Boulenger (1983), Brongersma (1951), Burger (2004), Cochran (1941), Cope (1879), Crutchfield and Potts (2011), Curcio *et al.* (2012), Fischer (1888), Garman (1887), Hedges (2002), Hedges and Garrido (1992, 2002), Hedges *et al.* (1989), Henderson and Schwartz (1984), Mattison (2007), McDiarmid *et al.* (1999), Mehrtens (1987), Powell and Incháustegui (2009), Schwartz (1975), Schwartz and Marsh (1960), Schwartz and Henderson (1991), Stull (1928, 1935), Tolson and Henderson (1993), Underwood (1967, 1976) and sources cited within.

This paper does not seek to rehash the volumes of data

within these papers, but instead relies on this evidence to produce a relevant and new taxonomy for the Tropidophiidae that reflects our current understanding of these snakes and in accordance with the currently in force Zoological Code (Ride *et al.* 1999).

I also note that *Tropidophis* as first proposed and used for most of the period from 1840 to 2013 was done so as a genus within the Boidae. This is now not known to be the case and so Tropidophiidae has in effect been elevated to the family level. While the genus name remains valid for the nominate form, it is clear that the well defined species groups are sufficiently divergent from one another to warrant divisions below the family level and including genus level splits, forming the basis for the rationale behind what is done within this paper.

In summary what I have proposed herein is in line with classification systems engaged for reptile groups as diverse as pythons (Pythonidae), Boas (Boidae), Elapids (Elapidae) and so on. The extinct genus *Messelophis* Baszio, 2004 from the Eocene of Messel is ignored in terms of this reclassification due to the lack of relevant information for the taxon.

The family Ungaliophiidae (sometimes treated by authors as Ungaliophiinae) (a group closely associated with the Tropidophiidae) as currently recognized includes two recognized genera, namely, the very distinct and monotypic species *Exiliboa placata* Bogert, 1968 (Bogert 1968b) and two species within the genus *Ungaliophis* Müller, 1888. These are *Ungaliophis continentalis* Müller, 1888 and *Ungaliophis panamensis* Schmidt, 1933.

In a review of the genus, *Ungaliophis*, Bogert (1968a) subsumed the species *Ungaliophis danieli* Prado, 1940 into *Ungaliophis panamensis* Schmidt, 1933.

This was on the basis that he regarded the variation between specimens as clinal between populations as opposed to specific differences, although he noted that it was a tenable alternative to do the reverse.

Revisiting this data, and to a lesser extent that of other authors including: Conant (1966), Dunn and Bailey (1939), Nemuras (1967), Prado (1940), Schmidt (1933), Taylor (1951) and Werner (1921) one sees that the primary differentiation between the two recognized species as recognized by Bogert was the dorsal pattern (ovoid paravertebral blotches versus angular) and not other variable characters such as mid-body scale rows, which Bogert asserted was clinal in variation.

The same view was taken by Bogert in terms of other regionally variable characteristics such as ventral and subcaudal counts as well as differences in head scalation.

Noting the rarity of *Ungaliophis panamensis* Schmidt, 1933 based on specimens lodged in Museums and the fact that the three known disjunct populations sampled are unlikely to connect with one another, I regard taxonomic recognition of each quite different population as important.

As the southernmost known population can take the subspecific name, *danieli* Prado, 1940, it is only the northern Nicaraguan population that requires a name.

It is herein formally described according to the Zoological Code as *Ungaliophis panamensis lovelinayi* subsp. nov. in the latter part of this paper.

FAMILY TROPIDOPHIIDAE**(Terminal taxon: *Boa melanura* Schlegel, 1837)****(Now generally known as *Tropidophis melanurus* (Schlegel, 1837))**

Diagnosis: This is essentially adapted from Brongersma (1951). The family Tropidophiidae may be characterized as Boid snakes in which only the right lung and a tracheal lung are present; the kidneys are not lobed and they are placed more posteriorly than in other Boidae. The supraorbital bone is present as in the Boinae, and they show the Boine type (Beddard, 1908, p. 143) of intercostal arteries. In connection with the disappearance of the left lung, the left pulmonary artery has been reduced to a mere rudiment that is functional only in the embryo as forming part of the ductus arteriosus Botalli. The postcaval vein and the portal vein are placed close to one another in the region of the liver.

Ungaliophis (Family: Ungaliophiidae) differs from Tropidophiidae in the presence of one large azygous prefrontal instead of one or two pairs of prefrontals. *Epicrates* Wagler, 1830 (Family Boidae) the only other boid-like genus found in the West Indies, differs in the presence of extremely long anterior teeth on both jaws, which is the same situation for the other true Boas (Boidae) of South and Central America.

Type genus of the family is *Tropidophis* Bibron, 1843.

Distribution: Known mainly from the West Indies but including Central America and northern South America.

Content: *Tropidophis* Bibron, 1843; *Leionotus* Bibron, 1840; *Trachyboa* Peters, 1860; *Adelynhoserboa gen. nov.* (this paper); *Jackyhoserboa gen. nov.* (this paper); *Wellingtonboa gen. nov.* (this paper); *Wellsboa gen. nov.* (this paper).

NEW TRIBE TROPIDOPHIININI TRIBE NOV.**(Terminal taxon: *Boa melanura* Schlegel, 1837)****(Now generally known as *Tropidophis melanurus* (Schlegel, 1837))**

Diagnosis: Adapted largely from Stull (1928) as given for what she recognized as the genus *Tropidophis* Bibron, 1843 (*sensu lato*) as split herein to include all genera within the family Tropidophiidae excluding the genus *Trachyboa* Peters, 1860.

The tribe Tropidophiini is defined herein as boid-like snakes with the head distinct from the neck and covered with shields; viz., a pair of internasals, 1 or 2 pairs of prefrontals, 1 frontal, 1 pair of parietals, 1 pair of supraoculars, 1 or 2 pairs of preoculars, 2 or 3 pairs of postoculars, no loreal. The nostril is between the two nasals.

The eye has a vertical pupil. The body is cylindrical or compressed, tapering at the ends. A short prehensile tail.

The anal plate is undivided and the subcaudals are single. The teeth are larger anteriorly, decreasing in size posteriorly. Premaxillary teeth are lacking. The hemipenes are bifurcate and laminate, or quadrifurcate and falcated.

Ungaliophis (Family: Ungaliophiidae) differs from Tropidophiidae (including this tribe) in the presence of one large azygous prefrontal instead of one or two pairs of prefrontals. *Epicrates* Wagler, 1830 (Family Boidae) the only other boid-like genus found in the West Indies,

differs in the presence of extremely long anterior teeth on both jaws, which is the same situation for the other true Boas (Boidae) of South and Central America.

Trachyboa the sole member of the tribe *Trachyboaiini* tribe nov. resembles *Exiliboa* in having the nostril in an undivided nasal, and it possesses comparable numbers of ventrals and subcaudals. Most of the cephalic plates have been replaced by scales on *Trachyboa*, and it has 29 to 31 rows of scales at midbody; moreover, well-developed hypapophyses are present on all vertebrae of *Trachyboa*; *Trachyboa* is an extremely rugose snake, adaptively specialized to forage on the surface (Bogert, 1968a), unlike the comparatively slender, smooth-scaled dwarf boas of genus *Tropidophis*, which at best are only slightly to moderately rugose.

Distribution: Cuba, Jamaica, Hispaniola, Navassa, Inagua, Andros, New Providence, and Great Abaco, in the East Indies; Ecuador, Peru, and Brazil.

Content: *Tropidophis* Bibron, 1843 (type genus); *Leionotus* Bibron, 1840; *Adelynhoserboa gen. nov.* (this paper); *Jackyhoserboa gen. nov.* (this paper); *Wellingtonboa gen. nov.* (this paper); *Wellsboa gen. nov.* (this paper).

NEW SUBTRIBE ADELYNHOSERBOAINA SUBTRIBE NOV.**(Terminal taxon: *Ungalia taczanowskyi* Steindachner, 1880)****Currently most widely known as *Tropidophis taczanowskyi* (Steindachner, 1880)**

Diagnosis: The diagnosis for this subtribe is as for the genus *Adelynhoserboa gen. nov.*

It can also be reversed to apply as a diagnosis for the other subtribe Tropidphiinina subtribe nov.

The venters of *Adelynhoserboaiina* Subtribe nov. consist of black and yellow spots and bands (Stull, 1928). Such a pattern does not occur in any specimens within the subtribe Tropidphiinina Subtribe nov. (Hedges 2002).

Distribution: South America.

Content: *Adelynhoserboa gen. nov.* (this paper).

Etymology: Named in recognition of my daughter, Adelyn Hoser, aged 13 at the time of publishing this paper for numerous services to wildlife conservation and herpetology.

NEW GENUS ADELYNHOSERBOA GEN. NOV.**Type species: *Ungalia taczanowskyi* Steindachner, 1880****Currently most widely known as *Tropidophis taczanowskyi* (Steindachner, 1880)**

Diagnosis: The diagnosis for this genus is as for the subtribe *Adelynhoserboaiina* tribe nov.

It can also be reversed to apply as a diagnosis for the other subtribe Tropidphiinina subtribe nov.

The venters of *Adelynhoserboa gen. nov.* consist of a pattern of black and yellow spots and bands (Stull, 1928). Such a pattern does not occur in any specimens within the subtribe Tropidphiinina Subtribe nov. (Hedges 2002).

Distribution: South America.

Content: *Adelynhoserboa taczanowskyi* (Steindachner, 1880) (Type species); *A. battersbyi* (Laurent, 1949), *A. grapiuna* (Curcio et al. 2012); *A. paucisquamis* (Müller,

1901); *A. preciosus* (Curcio *et al.* 2012).

Etymology: Named in recognition of my daughter, Adelyn Hoser, aged 13 at the time of publishing this paper for numerous services to wildlife conservation, wildlife rescue and herpetology.

NEW SUBGENUS ADELYNHOSERBOA SUBGEN. NOV.

Type species: *Ungalia taczanowskyi* Steindachner, 1880

Currently most widely known as *Tropidophis taczanowskyi* (Steindachner, 1880)

Diagnosis: The monotypic subgenus containing the species *Adelynhoserboa taczanowskyi* is separated from all other subgenera by the following suite of characters: (1) 146-160 ventrals (vs. 164-183 in *A. paucisquamis*; 200 in *A. battersbyi*, and 196-203 in *A. preciosus*); (2) 23 dorsal scales at midbody (vs. dorsals at midbody usually 21 or 23, rarely 25 in *A. paucisquamis*); (3) vertebral scale row not distinctly enlarged in size relative to remaining dorsals (vs. vertebral row of dorsals usually enlarged, wider than long, at least on part of the trunk in *A. paucisquamis* and *A. preciosus*); (4) dorsals distinctively keeled except for the first five rows on anterior two-thirds of trunk and the first three rows on the posterior one-third of trunk (vs. dorsals smooth or feebly keeled in *A. paucisquamis* and smooth in *A. battersbyi* and *A. preciosus*); (5) inter- parietals usually present, well developed (vs. interparietals usually absent in *A. paucisquamis*; absent in *A. preciosus*); (6) parietals usually in slight contact or fully separated by interparietals (vs. parietals in full contact along the middorsal line of head in *A. paucisquamis* and *A. preciosus*); (7) up to 20 maxillary teeth (vs. 12 in *A. battersbyi*); (8) eight spot rows around body, six on dorsum and two on venter (vs. six spot rows around the body, four on dorsum and two on venter in *T. battersbyi*); and (9) body spotted, dorsal spots usually no larger than one or two dorsals in diameter on paravertebral rows, sometimes becoming longer on flanks resulting in interrupted lateral stripes (vs. body spotted without any tendency to form stripes in all other mainland species) (Curcio *et al.* 2012).

In comparisons with other mainland *Adelynhoserboa* *gen. nov.* segmental counts and head scaling of *A. taczanowskyi* are rather similar to those of *A. grapiuna*. In addition, both have distinctively keeled dorsals, although the keels of *A. taczanowskyi* are noticeably stronger. However, besides the difference in general dorsal pattern, the conspicuous light occipital spots of *A. grapiuna* allow its immediate distinction from *A. taczanowskyi* that has occipital spots being small and irregular in shape (see Fig. 24A, C, D in Curcio *et al.* 2012).

Distribution: Peru, Ecuador, east of the Andes in South America.

Etymology: Named in recognition of my daughter, Adelyn Hoser, aged 13 at the time of publishing this paper for numerous services to wildlife conservation, wildlife rescue and herpetology.

NEW SUBGENUS PATTERSONBOA SUBGEN. NOV.

Type species: *Tropidophis battersbyi* Laurent, 1949.

Diagnosis: The monotypic subgenus containing the

species *Adelynhoserboa battersbyi* Laurent, 1949 is separated from all other cogeners (subgenera) by the following suite of characters: (1) up to 200 ventrals (vs. 164-183 in *A. paucisquamis* and 146-160 in *A. taczanowskyi*); (2) 23 dorsals at midbody (vs. dorsals at midbody usually 21 or 23, rarely 25 in *A. paucisquamis*); (3) vertebral scale row not distinctly enlarged in size relative to remaining dorsals (vs. vertebral row usually enlarged in *A. paucisquamis*); (4) dorsals smooth (vs. dorsals sometimes feebly keeled in *A. paucisquamis* and strongly keeled in *A. taczanowskyi*); (5) interparietals present and well developed (vs. interparietals usually lacking, or small in size when present in *A. paucisquamis*); (6) parietals fully separated by interparietals (vs. parietals always in contact, even when interparietals are present in *A. paucisquamis*); (7) 12 maxillary teeth (vs. 15-19 in *A. paucisquamis* and 16-20 in *A. taczanowskyi*); (8) body spotted, dorsal spots large, rounded or elliptical, up to four scales in diameter (vs. dorsal spots diameter of approximately two dorsal scales in *A. paucisquamis* and *A. taczanowskyi*); and (9) six spot rows around the body, four on dorsum and two on venter (vs. eight spot rows around the body, six on dorsum and two on venter in *A. paucisquamis* and *A. taczanowskyi*) (Curcio *et al.* 2012).

Comparisons with other mainland *Adelynhoserboa*: The color pattern of *A. battersbyi*, with four dorsal rows of large and dark spots, is unique among all South American congeners. Ventral and subcaudal counts (200 and 41, respectively) are also distinctly high among mainland species, although *A. paucisquamis* may show comparable values for subcaudals. Finally, the original description mentions twelve maxillary teeth, a number that is considerably lower than those of all other mainland *Adelynhoserboa* (which is usually greater than sixteen) (Curcio *et al.* 2012).

Distribution: Ecuador in South America.

Etymology: Named in honour of Todd Patterson of near Ipswich in Queensland, Australia in recognition for many years of considerable effort and help behind the scenes doing herpetological research in Australia, including the largely unacknowledged assistance and fieldwork collecting specimens that has helped both myself and many Museum employees across Australia.

SUBGENUS MERCEICABOA SUBGEN. NOV.

Type species: *Ungalia paucisquamis* Müller, 1901.

Currently most widely known as *Tropidophis paucisquamis* (Müller, 1901).

Diagnosis: *Merceicabo* *subgen. nov.* are separated from all other cogeners by having 21-23 mid body rows instead of 25-29 mid body rows in the others.

Also separated by the large number of maxillary teeth of around 19, as opposed to 12-15 in other species within the genus.

Distribution: Brazil in South America only.

Etymology: Named in honor of David Merceica, originally of Hillside and Bacchus Marsh in Victoria and more recently of the Sunshine Coast hinterland in Queensland, Australia in recognition of a lifetime spent working with reptiles in Australia.

Besides amassing a magnificent collection of live reptiles, Merceica has helped many others in their own

interests in reptiles, including the collecting, keeping and studying of the animals. Merceica's expertise has been relied upon by many authors of some of the best contemporary books on Australian reptiles and frogs.

Merceica is well-known here in Australia for putting a ratbag (former) Victorian wildlife officer Tony ("seize it") Zidarich in his place, when during a heavily armed raid by wildlife officers on the Merceica residence, David Mercieca punched Zirarich in the head and knocked him out.

Merceica's actions were totally justified in the circumstances and as a result of the incident, he now has a cult status among many victims of corrupt wildlife officers, these victims being innocent people with a love for animals who have been raided at the behest of business rivals who have an improper relationship with corrupt wildlife officers, a situation that is endemic in Australia, including Merceica's home state of Victoria.

NEW SUBTRIBE TROPIDOPHIININA SUBTRIBE NOV.
(Terminal taxon: *Boa melanura* Schlegel, 1837)

Currently most widely known as *Tropidophis melanurus* (Schlegel, 1837)

Diagnosis: The venters of *Adelynhoserboaiina Subtribe nov.* consist of black and yellow spots and bands (Stull, 1928). Such a pattern does not occur in any specimens within the subtribe *Tropidophiina Subtribe nov.* (Hedges 2002).

Distribution: The region of the West Indies.

Content: *Tropidophis* Bibron, 1843; *Leionotus* Bibron, 1840; *Jackyhoserboa gen. nov.* (this paper); *Wellingtonboa gen. nov.* (this paper); *Wellsboa gen. nov.* (this paper).

GENUS TROPIDOPHIS BIBRON, 1840

Type species: *Boa melanura* Schlegel, 1837.

Currently most widely known as *Tropidophis melanurus* (Schlegel, 1837)

Diagnosis: The genus *Tropidophis* Bibron, 1840 is separated from all other genera described within the subtribe *Tropidophiina Subtribe nov.* by the following suite of characters: 178-224 ventrals and 4-12 rows of paramedian blotches, which may at times be somewhat indistinct.

Distribution: Cuba, Bahamas, Grand Cayman, Little Cayman, Cayman Brac, Navassa Island.

Content: *Tropidophis melanurus* (Schlegel, 1837) (type species); *T. bucculentus* (Cope, 1868); *T. canus* (Cope, 1868); *T. caymanensis* Battersby, 1938; *T. curtus* (Garman, 1887); *T. parkeri* Grant, 1941; *T. schwartzi* Thomas, 1963.

SUBGENUS TROPIDOPHIS BIBRON 1840.

Type species: *Boa melanura* Schlegel, 1837.

Currently most widely known as *Tropidophis melanurus* (Schlegel, 1837)

Diagnosis: The genus *Tropidophis* Bibron, 1840 is separated from all other genera described within the subtribe *Tropidophiina Subtribe nov.* by the following suite of characters: 188-217 ventrals and 4-12 rows of paramedian blotches, which, depending on the species, may appear to be joined to form indistinct lines; the presence of 25-29 mid body rows, a dorsal color

including 4-12 paramedian blotches that may or may not be slightly enlarged on a tan to yellow ground color, but not distinctly pale, thus giving the snakes a either a prominently spotted pattern (*celiae*) or alternatively indistinct stripes made of discoloured scales (*melanurus*); the venter usually has a stippling pattern (*melanurus*) or none (*celiae*); and these snakes are further separated from some species in other subgenera in build in that these snakes are of a robust build (*celiae*) or slightly laterally compressed (*melanurus*).

Distribution: Cuba only.

Content: *Tropidophis (Tropidophis) melanurus* (Schlegel, 1837); *T. (Tropidophis) celiae* Hedges, Estrada, and Díaz, 1999.

NEW SUBGENUS ESERABOA SUBGEN. NOV.

Type species: *Ungalia cana* Cope, 1868.

Currently most widely known as *Tropidophis canus* (Schlegel, 1837)

Diagnosis: The subgenus *Eseraboa subgen. nov.* is separated from all other subgenera described within by the following suite of characters/ Median dorsals keeled, 170-190 ventrals, 6-8 rows of dorsal body blotches, 9/9 or 10/10 supralabials, 9/9 to 12/12 supralabials, 22-37 subcaudals, parietal contact is usually absent post oculars either 2/2, 2/3 or 3/3.

These two species within this subgenus, are further separated from all others within the genus by the presence of an anteriolateral (face and neck) stripe.

Distribution: Bahamas.

Comment: Currently two species are recognized within the subgenus, but there are a number of described subspecies within *Tropidophis (Eseraboa) canus* which may ultimately be elevated to full species status (Hedges 2002).

Etymology: Named in honour of the Esera family, including Patricia, Tolu, Dinah, Princefa and Andrew for their stellar work in wildlife conservation in Australia. Natives of the Pacific Island of Samoa, they have in the period leading up to 2013 established a thriving business chopping down feral Pine Trees *Pinus radiata* Don, 1836 in the city of Manningham, Victoria, Australia.

These non-native trees from North America are an invasive weed that have caused havoc and destruction to the local ecosystem on a massive scale.

With the express support of local, state and federal governments in Australia these trees have invaded pristine habitats and caused massive local extinctions of wildlife.

The Esera family, have done a spectacular job of ridding many areas of these invasive feral weeds in a bid to restore the original natural beauty to Australia, including the many native species who cannot survive in the dense dark pine forests they have now actively removed from a sizeable area. The hands-on model of wildlife conservation and habitat restoration by the Esera family has been an inspiration for many.

It also shows how the supposedly uncivilized natives from the Pacific Islands have been able to show the supposedly civilized Anglo-Saxons in Australia how to repair the environmental destruction they have caused in the last 2 centuries.

Content: *Tropidophis (Eseraboa) canus* (Cope, 1868)(type species); *T. (Eseraboa) curtus* (Garman, 1887).

NEW SUBGENUS ROBERTULLBOA SUBGEN. NOV.

Type species: *Tropidophis caymanensis* Battersby, 1938.

Diagnosis: Separated from the other subgenera by the following suite of characters: 191-212 ventrals, median dorsals keeled, dorsal body blotches in 4-12 rows, with the paramedian rows enlarged, 25-27 mid-body rows, supralabials 10/10, infralabials 12/12 or 13/13, preoculars 1/1, postoculars 3/3; the dorsal cephalic colour is a trapezoidal dark figure that is invaded by light stippling or broken into 2 or 3 disjunct shapes. There is a brown interocular bar and a dark brown lateral head stripe. The dorsal ground colour is light gray to orange tan, changing to cream below the sixth scale row. Dorsal spots average about 54-61 and are dark brown to black. The venter is cream uniform or with heavy irregular dark mottling or has small black spots over most of the undersurface. The tail tip is yellow to light green. The pattern is very sharp in juveniles, becoming obscure in adults.

Distribution: Grand Cayman, Little Cayman, Cayman Brac, (Cayman Islands).

Etymology: Named in honour of Robert Bull for his stellar work in wildlife conservation in Australia. One of the better Anglo Saxons in Australia, he is a rare breed with a strong conservation ethic.

Like the Esera family above, he too has worked to rid Victoria of feral non-native Pine Trees *Pinus radiata* Don, 1836.

In his case, he has done this for a period in excess of 20 years doing most of his work either alone or with only one or two others.

The non-native trees from North America are an invasive weed that have caused havoc and destruction to the local ecosystem on a massive scale.

With the express support of local, state and federal governments in Australia these trees have invaded pristine habitats and caused massive local extinctions of wildlife.

Robert Bull has done a spectacular job of ridding many areas of these invasive feral weeds in a bid to restore the original natural beauty to Australia, including the many native species who cannot survive in the dense dark pine forests they have now actively removed from a sizeable area.

The hands-on model of wildlife conservation and habitat restoration by Robert Bull has been an inspiration for many.

Content: *Tropidophis (Robertullboa) caymanensis* Battersby, 1938; *T. (Robertullboa) parkeri* Grant, 1941; *T. (Robertullboa) schwartzi* Thomas, 1963.

NEW SUBGENUS RODWELLBOA SUBGEN. NOV.

Type species: *Ungalia bucculenta* Cope, 1868.

Currently most widely known as *Tropidophis bucculentus* (Cope, 1868).

Diagnosis: Separated from all other subgenera by the following suite of characters: 183-186 ventrals, and the

venter with some spotting but not conspicuously so posteriorly. In all other obvious respects the monotypic subgenus would key out as *Tropidophis (Tropidophis) melanurus* (Schlegel, 1837)(see for subgenus *Tropidophis* above), a species it would be matter-of-fact identified as, were it not for the lower ventral count (no overlap) and the location where the species is known from.

Distribution: Known only from the USA controlled Navassa Island, which is overrun with marauding herds of goats. Four specimens of *T. (Rodwellboa) bucculentus* are known from this small island between Hispaniola and Jamaica, but apparently no snakes have been seen in over 100 years and thus the species is considered extinct (Powell, 1999).

Etymology: Named in honor of Aaron Rodwell, for his excellent work involving the sustainable use of wildlife in the Northern Territory, Australia including using unwanted crocodile meat for re-sale after being discarded by Crocodile breeding and treatment skin enterprises, and other uses of wildlife product for human benefit that would otherwise go to waste.

Content: *T. (Rodwellboa) bucculentus* (Cope, 1868).

GENUS LEIONOTUS BIBRON, 1840.

Type species: *Leionotus maculatus* Bibron, 1843.

Diagnosis: *Leionotus* are separated from all other genera within the tribe Tropidophiini by one or other of the four following suites of characters:

Dorsal body with 17-26 saddles on a pale ground colour and 217-235 ventrals, or:

Dorsal surface with 2 rows of small blotches on a pale ground color, vertebral stripe often present, 201-223 ventrals, 21-25 midbody scale rows, 34-41 subcaudals, slender build with a head distinct from the neck, or:

Dorsum of head without occipital spots, conspicuous dorsal pattern with small blotches in 8-10 rows, 189-208 ventrals, 23-27 midbody rows, or:

It has a buff ground color with 6 rows bold brown spots fused to form narrow zebra-like bands, especially around the mid-body, with a total of 38-39 body spots, 4-8 extra spots on the tail and a robust build. 32 midbody rows, 198-199 ventrals, spots on the venter.

Distribution: Cuba.

Content: *Leionotus maculatus* Bibron, 1843 (type species); *L. feicki* (Schwartz, 1957)

L. morenoi (Hedges, Garrido, and Díaz, 2001); *L. semicinctus* (Gundlach and Peters, 1864).

NEW GENUS WELLSBOA GEN. NOV.

Type species: *Boa pardalis* Gundlach, 1840.

Currently most widely known as *Tropidophis pardalis* (Gundlach, 1840).

Diagnosis: *Wellsboa gen. nov.* are separated from all other snakes in the tribe Tropidophiini by one of the following four suites of characters:

Dorsal scales in 23 (usually) or rarely 25 midbody rows, 136-172 ventrals, 23-34 subcaudals, postoculars 2/2 or 3/3; parietal scales may or may not contact; 6-8 rows of small dorsal body blotches, totalling about 25-46 blotches, dorsum of head may or may not have occipital spots; the venter has blotches (subgenus *Wellsboa*

subgen. nov.), or:

23-27 midbody rows, 160-185 ventrals, 1-2 preoculars, dorsum of head with occipital spots that may be fused to form a white collar, or otherwise may be faint, but present in one form or other; head may or may not be distinct from the neck; dorsal pattern may or may not be particularly conspicuous, and blotches are small and in 8-10 rows (subgenus *Wittboa subgen. nov.*), or:

21-25 midbody rows, 193-222 ventrals, 36-45 subcaudals, no vertebral stripe, small dorsal blotches in four rows on a pale ground color, slender body with a head distinct from the neck (subgenus *Wittboa subgen. nov.*), or:

25 midbody rows, 23 anterior scale rows, 19 posterior scale rows, around 190 ventrals, about 33 subcaudals, labials 10/10, scales 4 and 5 in contact with the eye, infralabials 11/11, preoculars 1/1, postoculars 3/3, separated parietal scales (by one scale); adult size usually under 30 cm, 10 rows of dorsal spots, numbering 48-52 body spots in total, with the mid dorsal ones in contact with one another, a blunt snout, lacking a dark stripe on side of head, and almost completely lacking ventral pigmentation, the belly being without blotches, body robust, head slightly expanded laterally and slightly distinct from the neck, dorsal scales are generally smooth with weak keeling slightly anterior to the vent, middorsal scale row is not enlarged, except for a few scales at posterior end of body and on tail (subgenus *Tonysilvaboa subgen. nov.*).

Distribution: Cuba.

Etymology: Named in honor of Australian reptile taxonomist Richard Wells, who's recent publications include a 361 page thesis on the Australian skink genus *Lerista* in 2012 (Wells 2012).

In response to this landmark publication, a bunch of nine truth haters, namely Hinrich Kaiser, Mark O'Shea, Wolfgang Wüster, Wulf Schleip, Paulo Passos, Hidetoshi Ota, Luca Luiselli, Brian Crother and Christopher Kelly, published a hate rant in a journal one of them edits (*Herpetological Review*), falsely claiming that the Wells paper and all his others were "unscientific" and "without evidence". Rather than arguing the merits of the paper which they have since admitted they have not even read (Schleip 2013a, 2013b), they called upon other herpetologists to "boycott" all the Wells papers and taxonomic judgements and then to steal his work and rename the species themselves (Hoser 2012, Kaiser 2012a, 2012b, Kaiser *et al.* 2013, Schleip *et al.* 2013a, 2013b and others).

Kaiser *et al.* (2013) also called for a similar boycott of all Hoser and Wells papers from 2000 to 2012 in violation of the zoological Code (Ride *et al.* 1999).

Their unethical and dishonest actions by these men who have also engaged in serious criminal conduct internationally are a direct breach of the rules of zoological nomenclature, often called "the Code" and breach the critically important rules of 1/ Homonymy (Principal 5, Article 52 and elsewhere), 2/ Priority (Principal 3, Article 23 and elsewhere) and 3/ Stability (Principal 4, Articles 23, 65 and elsewhere) as well as the ethics of the code in the Appendix.

To add to their contemptuous actions, Kaiser *et al.* did

themselves make hundreds of taxonomic changes and without presenting a shred of evidence to support their actions in the same so-called paper.

Many of the actions were reckless including for example their claim that *Costinisauria couperi* Wells was a *Lampropholis* species, when it was in fact a northern population of *Eulamprus kosciuskoi* (the original description makes it clear that the species was described from within what others consider *Eulamprus kosciuskoi*). For readers, like Kaiser *et al.* (2013) totally unfamiliar with these Australian species *Lampropholis* and *Eulamprus* belong to separate tribal groupings within the family Scincidae, Kaiser *et al.* have demonstrated by this evidence free taxonomic act that they have no idea what they are talking about when it comes to making an assignation of an Australian skink to the wrong tribe; *Cyrtodactylus abrae* is not a synonym of *Cyrtodactylus tuberculatus* as alleged by Kaiser *et al.* (this matter was dealt with by Shea in 2011, when designation of a neotype made the species a direct synonym of *Cyrtodactylus pulchellus*)

Zeusius sternfeldi is not a synonym of *Cyclodomorphus casuarinae*, as stated by Kaiser *et al.* but is most similar to *Cyclodomorphus venustus* (the population named *sternfeldi* was considered part of *venustus* when Shea described that species).

See Shea (2013a).

Schleip, Wüster and Crother are serial offenders when it comes to committing acts of grievous taxonomic misconduct in so-called journals they control and/or edit, through their many acts and publications engaging in mass-renaming of valid taxa in breach of the zoological rules and without a shred of evidence as a basis to do so. In terms of the gang of nine truth haters, the following points should be made:

- Hinrich Kaiser and eight other renegades, namely Mark O'Shea, Wolfgang Wüster, Wulf Schleip, Paulo Passos, Hidetoshi Ota, Luca Luiselli, Brian Crother and Christopher Kelly, herein cited as Kaiser *et al.* (2013) have made numerous demonstrably false claims about myself Raymond Hoser and Richard Wells.

- The claim by Kaiser *et al.* (2013) that Hoser's and Well's descriptions of taxa are unsupported by evidence is refuted by their other claims that Hoser and Wells had engaged in "harvesting of clades from published phylogenetic studies for description as new genera or subgenera" and used evidence "lifted from others".

- The papers and taxonomic decisions by Hoser and Wells are based on robust cited evidence and comply with the established rules of Zoological Nomenclature (Ride *et al.* 1999) of homonymy, priority and stability.

- Four of the authors, namely Kaiser, O'Shea, Wüster and Schleip have been exposed as serial liars (Hoser 2012).

- Schleip and Wüster have both been exposed for "Grievous taxonomic misconduct" by knowingly publishing descriptions of invalid taxa or junior synonyms and falsifying data (Hoser 2012).

- O'Shea, Wüster and Schleip have for 15 years engaged in a cynical destabilization of taxonomy and

nomenclature in breach of the rules, motivated by a deep personal hatred of Raymond Hoser and Richard Wells (Hoser 2012).

- Over time, Hoser and Wells taxonomic and nomenclatural judgments have been accepted as correct by other herpetologists as confirmed by molecular studies and their names widely used (millions of times)(e.g. *Broghammerus*, *Antaresia*).
- O'Shea, Wüster and Schleip have repeatedly committed the crime of plagiarism (Hoser 2012, Hoser 2009).
- Kaiser *et al.* have repeatedly misrepresented and misquoted the Zoological Code.
- Kaiser *et al.* have several times made an open call for others to act in breach of the numerous sections of the Rules of Zoological nomenclature including 1/ Homonymy (Principal 5, Article 52 and elsewhere), 2/ Priority (Principal 3, Article 23 and elsewhere) and 3/ Stability (Principal 4, Articles 23, 65 and elsewhere) and the ethics of the Code (Section A).
- Kaiser *et al.* seek to rename hundreds of validly named taxa in breach of the Zoological Rules, with no restriction on other authors or names they may later deem "unscientific" in order to rename taxa properly named by others.
- In an act of "taxonomic vandalism" and "evidence free taxonomy", as co-author of Kaiser *et al.*, Brian Crother did in 2012, change the names of over 100 species of lizard, none of which had ever been the subject of a phylogenetic study. In 2008, serial offender, Brian Crother did a mass renaming of valid taxa without a shred of evidence in a list he published (as sole listed author) and had the audacity to title as an "official list".
- The proposals of Kaiser *et al.* if acted upon would irreparably destabilize Zoological nomenclature.
- The proposals of Kaiser *et al.* (2013) if copied by others (as they suggested on page 20) would create general taxonomic and nomenclatural chaos and effectively destroy the rules of zoology.
- The proposals of Kaiser *et al.* if acted upon would potentially put lives at risk through misidentification of venomous taxa, including through excessive numbers of newly created invalid junior synonyms.
- The loophole within the Zoological rules proposed by Kaiser *et al.*, by which they see a means to rename hundreds of species and genera by alleged "reversal of priority" is flawed. This is because they misquoted the relevant section of Code omitting the key line, that relating to date of first descriptions usage needing to be prior to 1899, rendering the scheme "clearly ridiculous and unworkable" (Shea 2013b, 2013c).
- The use of the alleged loophole within the Zoological Rules proposed by Kaiser *et al.*, to unlawfully rename validly named taxa, subsequent to deliberate boycott of the correct names has been attempted before and failed. This included by Sprackland, Smith and Strimple (1997) (ICZN case 3043) and their scheme failed. The illegal attempt to reverse priority was emphatically rejected by the ICZN in their judgment, Opinion 1970. *Bulletin of Zoological Nomenclature* 58(1), 30 March 2001 in Volume 58 (ICZN 2001).

· Claims of support for Kaiser *et al.* by the authors of the paper have been shown to be false (Shea 2013b, 2013c).

· On the basis of the preceding, the assault on the established rules of zoological nomenclature by Kaiser *et al.* (2013) via an attack on eminent herpetologist Richard Wells (and myself) must be rejected by herpetologists. The gang of nine must be condemned for their gross misconduct.

· It is therefore fitting that a herpetologist who has spent a lifetime's work cataloguing and classifying Australia's reptiles, in the form of Richard Wells, now being unlawfully attacked by Kaiser *et al.* should have a genus of snakes named in his honor, especially when it is clear that the gang of nine thieves seek to steal his work and attempt to pretend that he never contributed anything to herpetology.

Content: *Wellsboa fuscus* (Hedges and Garrido, 1992); *W. galacelidus* (Schwartz and Garrido, 1975); *W. hardyi* (Schwartz and Garrido, 1975); *W. hendersoni* (Hedges and Garrido, 2002); *W. nigriventris* (Bailey, 1937); *W. pardalis* (Gundlach, 1840); *W. pilsbryi* (Bailey, 1937); *W. spiritus* (Hedges and Garrido, 1999); *W. wrighti* (Stull, 1928); *W. xanthogaster* (Dominguez, Moreno and Hedges, 2006).

NEW SUBGENUS WELLSBOA SUBGEN NOV.

Type species: *Boa pardalis* Gundlach, 1840.

Currently most widely known as *Tropidophis pardalis* (Gundlach, 1840).

Diagnosis: *Wellsboa subgen. nov.* are separated from all other snakes in the tribe Tropidophiini by the following suite of characters:

Dorsal scales in 23 (usually) or rarely 25 midbody rows, 136-172 ventrals, 23-34 subcaudals, postoculars 2/2 or 3/3; parietal scales may or may not contact; 6-8 rows of small dorsal body blotches, totalling about 25-46 blotches, dorsum of head may or may not have occipital spots; the venter has blotches.

Wellsboa subgen. nov. are separated from the other subgenera within the genus *Wellsboa gen. nov.* by one or other of the following three suites of characters:

23-27 midbody rows, 160-185 ventrals, 1-2 preoculars, dorsum of head with occipital spots that may be fused to form a white collar, or otherwise may be faint, but present in one form or other; head may or may not be distinct from the neck; dorsal pattern may or may not be particularly conspicuous, and blotches are small and in 8-10 rows (subgenus *Wittboa subgen. nov.*), or:

21-25 midbody rows, 193-222 ventrals, 36-45 subcaudals, no vertebral stripe, small dorsal blotches in four rows on a pale ground color, slender body with a head distinct from the neck (subgenus *Wittboa subgen. nov.*), or:

25 midbody rows, 23 anterior scale rows, 19 posterior scale rows, around 190 ventrals, about 33 subcaudals, labials 10/10, scales 4 and 5 in contact with the eye, infralabials 11/11, preoculars 1/1, postoculars 3/3, separated parietal scales (by one scale); adult size usually under 30 cm, 10 rows of dorsal spots, numbering 48-52 body spots in total, with the mid dorsal ones in contact with one another, a blunt snout, lacking a dark

stripe on side of head, and almost completely lacking ventral pigmentation, the belly being without blotches, body robust, head slightly expanded laterally and slightly distinct from the neck, dorsal scales are generally smooth with weak keeling slightly anterior to the vent, middorsal scale row is not enlarged, except for a few scales at posterior end of body and on tail (subgenus *Tonysilvaboa subgen. nov.*).

Distribution: Cuba.

Etymology: Named in honor of Australian reptile taxonomist Richard Wells. For detail, see the genus description above.

Content: *W. (Wellsboa) pardalis* (Gundlach, 1840)(type species); *W. (Wellsboa) galacelidus* (Schwartz and Garrido, 1975); *W. (Wellsboa) hardyi* (Schwartz and Garrido, 1975); *W. (Wellsboa) nigriventris* (Bailey, 1937); *W. (Wellsboa) spiritus* (Hedges and Garrido, 1999); *W. (Wellsboa) xanthogaster* (Dominguez, Moreno and Hedges, 2006).

NEW SUBGENUS WITTBOA SUBGEN. NOV.

Type species: *Tropidophis wrighti* Stull, 1928.

Diagnosis: *Wittboa subgen. nov.* are separated from other subgenera within *Wellsboa subgen. nov.* by the following suite of characters:

One or other of:

23-27 midbody rows, 160-185 ventrals, 1-2 preoculars, dorsum of head with occipital spots that may be fused to form a white collar, or otherwise may be faint, but present in one form or other; head may or may not be distinct from the neck; dorsal pattern may or may not be particularly conspicuous, and blotches are small and in 8-10 rows, or:

21-25 midbody rows, 193-222 ventrals, 36-45 subcaudals, no vertebral stripe, small dorsal blotches in four rows on a pale ground color, slender body with a head distinct from the neck.

Wittboa subgen. nov. are separated from the other subgenera within *Wellsboa subgen. nov.* by the following suites of characters:

One or other of:

Dorsal scales in 23 (usually) or rarely 25 midbody rows, 136-172 ventrals, 23-34 subcaudals, postoculars 2/2 or 3/3; parietal scales may or may not contact; 6-8 rows of small dorsal body blotches, totalling about 25-46 blotches, dorsum of head may or may not have occipital spots; the venter has blotches (subgenus *Wellsboa subgen. nov.*), or:

25 midbody rows, 23 anterior scale rows, 19 posterior scale rows, around 190 ventrals, about 33 subcaudals, labials 10/10, scales 4 and 5 in contact with the eye, infralabials 11/11, preoculars 1/1, postoculars 3/3, separated parietal scales (by one scale); adult size usually under 30 cm, 10 rows of dorsal spots, numbering 48-52 body spots in total, with the mid dorsal ones in contact with one another, a blunt snout, lacking a dark stripe on side of head, and almost completely lacking ventral pigmentation, the belly being without blotches, body robust, head slightly expanded laterally and slightly distinct from the neck, dorsal scales are generally smooth with weak keeling slightly anterior to the vent, middorsal scale row is not enlarged, except for a few scales at

posterior end of body and on tail (subgenus *Tonysilvaboa subgen. nov.*).

Distribution: Cuba.

Etymology: Named in honour of Sue and Robin Witt, Great Dane breeders of Heathcote, Victoria, Australia for their contributions to animal welfare in Australia spanning many decades.

Content: *W. (Wittboa) wrighti* (Stull, 1928)(type species); *W. (Wittboa) fuscus* (Hedges and Garrido, 1992); *W. (Wittboa) pilsbryi* (Bailey, 1937).

NEW SUBGENUS TONYLSILVABOA SUBGEN. NOV.

Type species: *Tropidophis hendersoni* Hedges and Garrido, 2002.

Diagnosis: *Tonysilvaboa subgen. nov.* are separated from the other subgenera within *Wellsboa* by the following suite of characters:

25 midbody rows, 23 anterior scale rows, 19 posterior scale rows, around 190 ventrals, about 33 subcaudals, labials 10/10, scales 4 and 5 in contact with the eye, infralabials 11/11, preoculars 1/1, postoculars 3/3, separated parietal scales (by one scale); adult size usually under 30 cm, 10 rows of dorsal spots, numbering 48-52 body spots in total, with the mid dorsal ones in contact with one another, a blunt snout, lacking a dark stripe on side of head, and almost completely lacking ventral pigmentation, the belly being without blotches, body robust, head slightly expanded laterally and slightly distinct from the neck, dorsal scales are generally smooth with weak keeling slightly anterior to the vent, middorsal scale row is not enlarged, except for a few scales at posterior end of body and on tail.

The other subgenera within *Wellsboa subgen. nov.* are separated from *Tonysilvaboa subgen. nov.* by the following character suites, being one or other of any of the three following suites:

Dorsal scales in 23 (usually) or rarely 25 midbody rows, 136-172 ventrals, 23-34 subcaudals, postoculars 2/2 or 3/3; parietal scales may or may not contact; 6-8 rows of small dorsal body blotches, totalling about 25-46 blotches, dorsum of head may or may not have occipital spots; the venter has blotches (subgenus *Wellsboa subgen. nov.*), or:

23-27 midbody rows, 160-185 ventrals, 1-2 preoculars, dorsum of head with occipital spots that may be fused to form a white collar, or otherwise may be faint, but present in one form or other; head may or may not be distinct from the neck; dorsal pattern may or may not be particularly conspicuous, and blotches are small and in 8-10 rows (subgenus *Wittboa subgen. nov.*), or:

21-25 midbody rows, 193-222 ventrals, 36-45 subcaudals, no vertebral stripe, small dorsal blotches in four rows on a pale ground color, slender body with a head distinct from the neck (subgenus *Wittboa subgen. nov.*).

Distribution: Cuba.

Etymology: Named in honour of Aviculture expert Tony Silva, wrongly jailed in the United States of America on trumped up charges.

Content: *Wellsboa (Tonysilvaboa) hendersoni* (Hedges and Garrido, 2002).

NEW GENUS JACKYHOSERBOA GEN. NOV.

Type species: *Ungualia* [sic] *haetiana* Cope, 1879

Widely known as of 2013 as *Tropidophis haetiana* (Cope, 1879)

Diagnosis: *Jackyhoserboa* gen. nov. are separated from all other Tropidophiini by the following suite of characters being one or other of the following:

25-27 midbody rows, 156-165 ventrals, 26-29 subcaudals, 9-10/9-10 supralabials, 9-12/9-12 infralabials, 1/1 preoculars; 2/2, 2/3 or 3/3 postoculars, parietals in contact; small dorsal body blotches in 8-10 rows, 27-49 in total and the snake has smooth dorsal scales, venter off-white to brown (*J. greenwayi*), or: 25-29 midbody rows, 166-194 ventrals, 30-39 subcaudals, parietal scales in contact or not, supralabials 9-10:9-10, infralabials 10-11:10-11, preoculars 1/1, postoculars 3/3; dorsal scales smooth or keeled, head or without a pair of occipital spots or blotches, dorsal colour is pale tan with small dorsal body blotches in 8-10 rows numbering 44-57 in total; these may fuse somewhat near the mid-body; the lowermost row of blotches may be reduced or absent; the upper surface of the head is brown and either unmarked or with an obscure rectangular figure; there's a sharp demarcation between head color and very pale supralabials; ventrals may be anything from white, yellow, tan or even dark brown, suffused with darker color; the chin and throat is whitish to brownish and either stippled or marked brownish (*J. haetiana*), noting however that taxa within the genus *Wellingtonboa* gen. nov. (below) would also key as this taxon (*J. haetiana*), but can in turn be separated by the following characters:

one of three of:

25 midbody rows, smooth dorsal scales, 167-181 ventrals, 9-10 supralabials, 9-11 infralabials, mid dorsal stripe absent, 10 rows of dorsal blotches at midbody on a chocolate brown ground color (*W. jamaicensis*), or:

25 midbody rows, dorsal scales smooth, 166-170 ventrals, 9-10 supralabials and 10 infralabials, mid dorsal stripe present, 10 longitudinal rows of obsolescent dorsal blotches on a consistently pale tan ground color; square-shaped head (*W. stullae*), or:

27 midbody rows, dorsal scales keeled, 182-190 ventrals, 10 supralabials, 11 infralabials, mid dorsal stripe present, 10 midbody rows of blotches on a slate yellowish-grey ground colour, with a pointed head (*W. stejnegeri*).

Distribution: Hispaniola (*J. haetiana*) and Caicos Islands (*J. greenwayi*).

Etymology: Named in honor of my younger daughter, Jacky Hoser, in recognition of a lifetime's work with wildlife and education of others about wildlife, reptiles in particular, the science and conservation of these animals, including by giving accurate and factual information.

This is particularly important in the present time as there is a huge amount of factually incorrect information being peddled by so-called wildlife and reptile educators, as well as by people masquerading as scientists both in Australia and elsewhere, some of which even puts lives at risk.

Content: *Jackyhoserboa haetiana* (Cope, 1879) (type species), *J. greenwayi* (Barbour and Shreve, 1935).

NEW GENUS WELLINGTONBOA GEN. NOV.

Type species: *Tropidophis haetianus jamaicensis* Stull, 1928.

Currently generally known as *Tropidophis jamaicensis* Stull, 1928.

Diagnosis: The snakes in the genus *Wellingtonboa* gen. nov. would normally key out as *Jackyhoserboa haetiana* (Cope, 1879), but are separated from this taxon by the following suite of characters, being one or other of the three following:

25 midbody rows, smooth dorsal scales, 167-181 ventrals, 9-10 supralabials, 9-11 infralabials, mid dorsal stripe absent, 10 rows of dorsal blotches at midbody on a chocolate brown ground color (*W. jamaicensis*), or:

25 midbody rows, dorsal scales smooth, 166-170 ventrals, 9-10 supralabials and 10 infralabials, mid dorsal stripe present, 10 longitudinal rows of obsolescent dorsal blotches on a consistently pale tan ground color; square-shaped head (*W. stullae*), or:

27 midbody rows, dorsal scales keeled, 182-190 ventrals, 10 supralabials, 11 infralabials, mid dorsal stripe present, 10 midbody rows of blotches on a slate yellowish-grey ground colour, with a pointed head (*W. stejnegeri*).

In turn *Jackyhoserboa haetiana* (Cope, 1869) is separated from all other snakes in the tribe Tropidophiini by the following suite of characters: 25-29 midbody rows, 166-194 ventrals, 30-39 subcaudals, parietal scales in contact or not, supralabials 9-10:9-10, infralabials 10-11:10-11, preoculars 1/1, postoculars 3/3.; dorsal scales smooth or keeled, head or without a pair of occipital spots or blotches, dorsal colour is pale tan with small dorsal body blotches in 8-10 rows numbering 44-57 in total; these may fuse somewhat near the mid-body; the lowermost row of blotches may be reduced or absent; the upper surface of the head is brown and either unmarked or with an obscure rectangular figure; there's a sharp demarcation between head color and very pale supralabials; ventrals may be anything from white, yellow, tan or even dark brown, suffused with darker color; the chin and throat is whitish to brownish and either stippled or marked brownish.

A middorsal stripe is present in *T. stejnegeri* and *T. stullae* but absent in *T. jamaicensis*. The head of *T. stejnegeri* is pointed but that of *T. stullae* is distinctly squared-shaped.

Distribution: Hispaniola and Caicos Islands.

Etymology: Named in honor of one of Australia's most knowledgeable reptile experts, Cliff Ross Wellington, now of Woy Woy in New South Wales, Australia.

He is best known for co-authoring several reptile landmark taxonomy publications with Richard Wells (see above) in the 1980's.

However Ross has been actively involved in herpetological research and education continuously for the periods both predating and postdating those publications and remains active in many areas of herpetology. He has also been pivotal in enacting educational programs for schools in terms of assisting biodiversity conservation.

Content: *Wellingtonboa jamaicensis* (Stull, 1928) (type species), *W. stejnegeri* (Grant, 1940), *T. stullae* (Grant, 1940).

NEW TRIBE TRACHYBOAINI TRIBE NOV.**(Terminal taxon: *Trachyboa gularis* Peters, 1860)**

Diagnosis: *Trachyboa* resembles *Exiliboa* in having the nostril in an undivided nasal, and it possesses comparable numbers of ventrals and subcaudals. Most of the cephalic plates have been replaced by scales on *Trachyboa*, and it has 29 to 31 rows of scales at midbody. Moreover, well-developed hypapophyses are present on all vertebrae of *Trachyboa*; *Trachyboa* is an extremely rugose snake, adaptively specialized to forage on the surface (Bogert, 1968b), unlike the comparatively slender, smooth-scaled dwarf boas of genus *Tropidophis*, which at best are only slightly to moderately rugose.

Distribution: *Trachyboa* is an inhabitant of lowland forests in northern South America and Central America, in the area from Panama to Ecuador.

Content: *Trachyboa* Peters, 1860.

FAMILY UNGALIOPHIIDAE**(Terminal taxon: *Ungaliophis continentalis* Müller, 1888)**

Diagnosis: See below for the diagnosis for the genus *Ungaliophis* Müller, 1888 which diagnoses both genera within the family and therefore doubles as a family description.

Distribution: Central America and the far north of South America.

Content: *Ungaliophis* Müller, 1888; *Exiliboa* Bogert, 1968.

GENUS UNGALIOPHIS MÜLLER, 1888**Type species:** *Ungaliophis continentalis* Müller, 1888

Diagnosis: The following is adapted from Bogert (1968a, 1968b).

These snakes are relatively small boid-like snakes superficially similar to members of the family Boidae. *Ungaliophis* are known to attain maximum over-all dimensions (length) of 760 mm., with short prehensile tails comprising 0.85 to 0.95 per cent of total length. Trunk and tail are slightly compressed, head distinct from neck, spurs restricted to males. Diameter of eye greater than its distance from lip, pupil elliptical. Rostral either wider than high and separated from prefrontal by internasals, or nearly as high as wide and in contact with large, azygous prefrontal. Frontal smaller than prefrontal, bordered on each side by a preocular and a supraocular. Parietals vestigial or indistinguishable from dorsal scales. Two nasals; nostril invariably in anterior nasal. Loreal single; one preocular; two or three postoculars. From eight to 10 supralabials, two or three reaching eye, first two reaching postnasal. Tubercles present on all cephalic shields. Infralabials nine to 11, first pair in broad contact behind a moderately large mental, followed posteriorly by two or three pairs of chin shields.

Dorsal scales smooth, except for minute tubercles; midbody scale rows from 19 to 25, with reductions to 17 or 15 at vent. Addition and suppression of scale rows occurring between third and eighth rows anteriorly, by loss of paravertebral rows toward base of tail. Ventrals ranging from 204 to 258; anal plate undivided, from 39 to 46 single subcaudals; tail terminating in blunt spine. Hemipenes relatively long, bilobed; plicae on basal portion, calyces lacking crenate edges on lobes; sulcus spermaticus bifurcating near base, each branch of sulcus extending through plicate portion and calyces to terminus of lobe.

Premaxilla with an ascending process, without teeth.

Maxillary teeth 12 to 15, those at anterior end of bone larger and stouter than those behind them, which are progressively shorter posteriorly; palatine, five to eight; pterygoid teeth, 11 to 15; teeth on dentary, 13 to 15.

Ungaliophis (within the family: Ungaliophiidae) differs from Tropidophiidae in the presence of one large azygous prefrontal instead of one or two pairs of prefrontals. *Epicrates* Wagler, 1830 (Family Boidae) the only other boid-like genus found in the West Indies, differs in the presence of extremely long anterior teeth on both jaws, which is the same situation for the other true Boas (Boidae) of South and Central America.

Bogert (1968b) defined the genus *Exiliboa* as follows: A small, nearly unicolored, prehensile tailed boa, characterized by its possession of a large azygous internasal in broad contact with the rostral, and flanked on each side by a single nasal. This peculiar configuration of the scales readily distinguishes *Exiliboa* from *Ungaliophis* and from *Tropidophis*, all members of which have paired internasals and divided nasal plates. *Exiliboa* retains a pair of prefrontals in contrast to the azygous prefrontal of *Ungaliophis*, and the two pairs of prefrontals normally present on *Tropidophis*. The loreal is retained by *Exiliboa*, whereas it is absent from, or fused with the anterior prefrontal of, *Tropidophis*. The mental groove of *Exiliboa* is bordered by only three pairs of shields, but the groove is bordered by four scales in *Ungaliophis* and by four or five in *Tropidophis*. Furthermore, the female of *Exiliboa* differs from that of other dwarf boas in its retention of external vestiges of limbs.

In this description of *Exiliboa*, *Tropidophis* is treated as *sensu lato* and as recognized at the time (1968), therefore including all genera within the tribe Tropidophiini is defined herein.

Content: *Ungaliophis continentalis* Müller, 1888; *Ungaliophis panamensis* Schmidt, 1933.

UNGALIOPHIS PANAMENSIS LOVELINAYI SUBSP. NOV.

Holotype: A specimen from extreme south-western Nicaragua, Rio Misterioso, 17 kilometers inland from San Juan del Norte ("Greytown") on the Atlantic coast. at the United States National Museum of the Smithsonian Institution (USNM) specimen number No. 29215).

The United States National Museum of the Smithsonian Institution (USNM) is a government owned facility that allows its specimens to be examined by bona-fide scientists.

Diagnosis: *Ungaliophis panamensis lovelinayi* subsp. nov. is separated from the nominate form *Ungaliophis panamensis panamensis* by having 23 scale rows (as in the holotype) and rarely 25 as seen in at least one other specimen (Bogert, 1968a), whereas 21 are present in *Ungaliophis panamensis panamensis* and just 19 in the subspecies *Ungaliophis panamensis danieli* Prado, 1940. *Ungaliophis panamensis lovelinayi* subsp. nov. is further separated from both other subspecies by having 3-3 postoculars versus 2-2 in each of the other subspecies. *Ungaliophis panamensis* is separated from the similar species *Ungaliophis continentalis* by having angular as opposed to ovoid paravertebral blotches.

Ungaliophis panamensis is further separated from the similar species *Ungaliophis continentalis* by having internasals that meet on the suture behind the rostral, separating it from the prefrontal, whereas in *Ungaliophis*

continentalis the internasals are widely separated by broad contact of the rostral and azygous prefrontal.

Distribution: The three subspecies of *Ungaliophis panamensis* are also separated by distribution, with *Ungaliophis panamensis lovelinayi* subsp. nov. known from Nicaragua and northern Costa Rica, *Ungaliophis panamensis panamensis* from Panama and *Ungaliophis panamensis danieli* from Colombia.

Etymology: Named in honor of Tony Love-Linay of Taylor's Lakes Melbourne, Australia owner of Reconnect Communications from Albury/Wodonga in Australia and nearby areas in recognition of various services to wildlife conservation in Australia, through provision of telecommunication services, mechanical repairs and other logistical assistance's to the Snakebusters wildlife rescue and education business as well as similar logistic services to numerous other zoologists and wildlife rescue groups in south-eastern Australia.

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CONFLICT OF INTEREST

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

In praise of subgenera, with ethics and within the rules of Zoology: taxonomic status of the snake genera *Calliophis* Gray, 1835, *Liophidium* Boulenger, 1896 and *Liopholidophis* Mocquard, 1904 (Serpentes).

RAYMOND T. HOSER

Snakebusters: 488 Park Road, Park Orchards, Victoria, 3134, Australia.
Phone: +61 3 9812 3322 Fax: 9812 3355 E-mail: snakeman@snakeman.com.au
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ABSTRACT

The use of subgenera to define well defined clades within genera has been little used by herpetologists in recent years.

Against that trend, in March 2009 Hoser reclassified Rattlesnakes (Crotalidae:Crotalini) and made substantial use of subgenera to define various groups. Quite properly, Hoser applied the rules of the Zoological Code (Ride *et al.* 1999) when he resurrected available names to define appropriate groups.

Also in March 2009, Hoser reclassified the True Cobras.

The following September, Wallach, Wüster and Broadley (2009), used the same concept to define a group of True Cobras, taking a leaf from Hoser's book and defining a subgenus.

However, they openly plagiarized Hoser's earlier paper and then unethically proposed a name in violation of the rules of Zoology.

The later authors renamed a Hoser genus as a subgenus, knowing full-well that Hoser had erected a valid name six months earlier.

The improper action of Wallach, Wüster and Broadley was justified with the obviously false claim that the original Hoser publication hadn't been published according to the Zoological Code.

Co-author Van Wallach had committed the same offence against other herpetologists twice previously, renaming genera properly named by the earlier authors (Fitzinger and Wells and Wellington).

More serious, were the later calls by Wolfgang Wüster and 8 others in 2013 in *Journal of Herpetology* (Kaiser *et al.* 2013) to other herpetologists to do the same thing for names they knew were valid according to the Zoological Code. Their reckless actions have now threatened the entire science of zoology.

This paper reviews the taxonomic status of the snake genera *Calliophis* Gray, 1834, *Liophidium* Boulenger, 1896 and *Liopholidophis* Mocquard, 1904 and makes use of subgenera to define obvious morphological and phylogenetic groups.

However unlike the actions of Wüster and his associate Van Wallach, who continually break the rules to rename validly named taxa, this reclassification is ethical and within the rules. Therefore when a pre-existing name is available for a given group of species, it is in fact used in accordance with the zoological code.

Where no names are available, names are properly proposed and defined according to the Zoological Rules. In terms of the relevant genera, existing available names are used and five subgeneric group names are also formally defined for the first time.

Keywords: Taxonomy; Snakes; Genus; *Calliophis*; *Liophidium*; *Liopholidophis*; Subgenus: *Doliophis*; *Swilea*; *Paulstokesus*; *Benmooreus*; *Mattborgus*; *Chrisnewmanus*.

INTRODUCTION

The use of subgenera to define well defined clades within genera has been little used by herpetologists in recent years.

While there is little agreement among herpetologists as to what defines a subgenus, most herpetologists who use the taxonomic level, define it along the lines of a group of species that are alike and yet clearly distinct from others in the same genus.

Usually, but not always, subgenera consist of more than one species, or alternatively, the nominate genus group will instead, even when the subgenus is removed.

As an exception to this, subgenera are sometimes defined for single species when they are quite divergent from others, or even one other in the genus, but the divergence does not quite make the level of genus level division according to the general criteria applied.

Subgenus may be applied when the divergence sits at the very borderline of where a genus would normally be defined, or the so-called "line in the sand".

The three genera *Calliophis* Gray, 1834, *Liophidium* Boulenger, 1896 and *Liopholidophis* Mocquard, 1904 as recognized at start 2013 all contain a number of species.

Within each genus are distinctive species groups, defined both morphologically and genetically.

Recent phylogenetic studies have confirmed the relationships between component species within the genera to show that the given species groups sit on the very cusp of what herpetologists would normally define as genera.

Noting the inertia of many herpetologists to so-called new taxonomy, these groups are defined within this paper for the first time ever as subgenera.

This allows for the given species groups to have proper taxonomic recognition according to the Zoological Code (Ride *et al.* 2009) and at the same time maintain stability for those herpetologists accustomed to calling these species by their currently known names.

Each of the three genera are dealt with separately below.

CALLIOPHIS GRAY, 1835.

Calliophis Gray, 1835 is a genus with a checkered taxonomic history.

These snakes are generally known as Asian Coral snakes and are within the family Elapidae.

For many years, two or more species were placed in the genus *Maticora* Gray, 1834, which was according to Boulenger (1896) a nomen nudem.

Generally known as the long-glanded Coral Snakes, a distinctive feature of these particular snakes was the extremely elongated venom gland in two species that stretched way beyond the skull of the snake. *Maticora lineata* Gray, 1834 is the type species of the genus *Maticora* Gray, 1834, although that species was later synonymised with the species *Aspis intestinalis* Laurenti, 1768, better known as *Calliophis intestinalis* Laurenti, 1768.

Until the early 1900's many names were either proposed or in use for the Asian Coral Snakes, including of course *Calliophis* Gray, 1835 or *Maticora* Gray, 1834, as well as other names, the rest invariably being used for other taxa

and in turn split off from this genus, although a number of authors used the name *Doliophis* Girard, 1857 for the snakes assigned to *Maticora* (Boulenger 1896).

By the late 1900's, *Calliophis* had become restricted to about a dozen known species and *Maticora*, (in common usage) just two.

In 2001, Slowinski *et al.* published a phylogenetic assessment of the Asian Coral snakes resulting in a reclassification of the group as then known.

They split off north-east Asian species and placed them in a new genus, *Sinomicrurus*. That genus was later split in 2012, by Hoser to include a new genus *Funkelapidus* for a small number of species (Hoser 2012b).

In 2001, Slowinski *et al.* also merged *Calliophis* and *Doliophis/Maticora* into the single genus *Calliophis*. They also removed the Phillipine species *Elaps calligaster* Wiegmann, 1834 from the genus and placed it in the available genus *Hemibungarus* Peters, 1862, effectively made monotypic.

Excluding the 2012 removal of species to the genus *Funkelapidus*, the Slowinski *et al.* taxonomy has been little changed in the period since 2001.

Notwithstanding this, further studies of both morphology, habits and molecular phylogenies produced, have all indicated that *Calliophis* as recognized at the genus level is effectively paraphyletic.

Taking a conservative position, the various species groups within *Calliophis* as recognized at the start of 2013 are herein accorded taxonomic recognition at the subgenus level for the first time.

There are of course five well defined species groups within the genus *Calliophis* as defined by Slowinski *et al.* (2001) as defined by previous authors including Boulenger (1896), McDowell (1986), Slowinski *et al.* (2001) and Smith *et al.* (2008, 2012).

Furthermore I note herein that further studies may well result in these subgenera being elevated to full genus-level groups at a later date, in line with the potentially too conservative position taken within this paper.

In accordance with the Zoological Code (Ride *et al.* 1999), I am bound by the critically important rules of 1/ Homonymy (Principal 5, Article 52 and elsewhere), 2/ Priority (Principal 3, Article 23 and elsewhere) and 3/ Stability (Principal 4, Articles 23, 65 and elsewhere) and the ethics of the Code (Section A).

This means that I must use (resurrect) available names for given taxa, if accorded the relevant recognition at levels above that of species. That is, if I intend moving them out of the genus *Calliophis* Gray, 1834, and another genus name is available, I must use it.

As a result and acting with proper ethics, I hereby transfer two species to the genus *Doliophis* Girard, 1857.

While the name *Doliophis* Girard, 1857 is a junior synonym of *Maticora* Gray, 1834, Gray did not provide a diagnosis for the genus and therefore the first name (*Maticora*) is invalid (see Boulenger 1896).

For the other three species groups, there are no available names, so in accordance with the Zoological Code, I hereby assign names to each of them, namely, *Paulstokesus* subgen. nov., *Benmooreus* subgen. nov. and *Swilea* subgen. nov..

This in effect means that the genus *Calliophis* Gray, 1834, has been effectively divided five ways.

As a result, I hereby redefine the genus as a whole and then formally describe the five component subgenera.

Important published studies on *Calliophis* as as defined by most authors to 2013 (including *Maticora* and *Hemibungarus*) include, Auliya (2006), Bahir (1999), Beddome (1864), Bernhard-Meyer (1869), Blackburn (1993), Bleeker (1959), Boie (1827), Bong Heang (1987), Boulenger (1890, 1894, 1896), Brongersma (1948), Castoe *et al.* (2007), Chan-ard *et al.* (1999), Cox *et al.* (1998), Daan and Hillenius (1966), D'Abreu (1913), Das and De Silva (2005), David and Vogel (1996), Deepak *et al.* (2010), Deraniyagala (1951), Duméril and Bibron (1835), Duméril *et al.* (1854), Fischer (1886), Gaulke (1994, 1999), Grandison (1972), Gray (1835), Grismer *et al.* (2010), Günther (1859a, 1862), Guptha and Rajasekhar (2011), Hien *et al.* (2001), Hoser (2012b), Jacobson (1937), Jan (1858), Kannan (2006), Kopstein (1938), Laurenti (1768), Leviton (1964), Leviton *et al.* (2003), Lim and Ng (1999), Lobo (2006), Phipson (1887), Pyron *et al.* (2011, 2013), Loveridge (1944), Malkmus (1985), Malkmus *et al.* (2002), Manthey (1983), Manthey and Grossmann (1997), McDowell (1986), Mirza and Ahmed (2009), Mirza and Pal (2010), Murthy (2010), Nguyen and Ziegler (2010), Orlov *et al.* (2003, 2009), Peters (1881), Sang *et al.* (2009), Sharma (2004), Shaw (1802), Shine and Nameer (2012), Slowinski *et al.* (2001), Smedley (1931), Smith (1993), Smith (1943), Smith *et al.* (2008, 2012), Somaweera (2006), Suranjan Karunarathna and Thasun Amarasinghe (2011), Taylor (1922, 1950, 1965), Teo and Rajathurai (1997), Tiedemann and Grillitsch (1999), Tweedie (1950), van Rooijen and van Rooijen (2004, 2007), Vogel and Freed (2006), Vyas (1998, 2007), Wall (1906, 1913, 1928), Whitaker and Captain (2004), and sources cited therein.

Hoser (2012b) provides a list of definitive references in terms of the genera *Sinomicrurus* and *Funkelapidus*.

GENUS CALLIOPHIS GRAY, 1834.

Type species: *Calliophis gracilis* Gray, 1835.

Diagnosis: Snakes of the genus *Calliophis* are separated from all other elapid snakes by the following suite of characters: Maxillary extends forwards beyond the palatine, with a pair of large grooved poison-fangs, but no other obvious teeth; mandibular teeth are subequal. Praefrontal bones in contact with each other on the median line. Head is small and not distinct from the neck. Eye is small with a round pupil; nostril is between two nasals; no loreal. Body cylindrical and very elongate. Scales are smooth, without pits in 13 midbody rows. Ventrals are rounded. The tail is short and the subcaudals are divided.

The Asian genera *Sinomicrurus* Slowinski *et al.* 2001 and *Funkelapidus* Hoser, 2012 are separated from *Calliophis* by the following: A well-developed medial fold bordering the basal pocket of the hemipenis and protruberant sclerified tail tip used defensively. Further distinguished from *Calliophis* by lacking the postorbital bone, having a bipartite AES muscle origin (dorsal origin on parietal bone and ventral origin on anterior venom gland), and a strongly bifurcated hemipenis ornamented only with spines and possessing the basal pocket.

The Phillipine species within the genus *Hemibungarus* (*H. calligaster*, being monotypic for the genus) is separated from *Calliophis* by the following: 1/1 temporal formula; a raised sixth supralabial; colouration generally characterized by black dyads set on a red ground colour, commonly obscured by melanism; *Hemibungarus* is the only Asian Coral Snake characterised by a pattern of black bands or rings occurring in pairs.

The nominate subgenus *Calliophis*, is monotypic for the type species *Calliophis gracilis* Gray, 1835 and is readily separated from all other subgenera by the higher ventral count, being over 303, versus less than 293 for all other species.

The subgenus of *Calliophis*, subgenus *Doliophis*, consisting of the species *Calliophis (Doliophis) intestinalis* (Laurenti, 1768), and *Calliophis (Doliophis) bivirgata* (Boie, 1827), the type species, are readily separated from all other *Calliophis* by the nature of the development of their venom glands.

Instead of being confined to the temporal region, they extend along each side of the body for about one fifth of its length, gradually thickening and terminating in front of the heart with club-shaped ends. The presence of these glands may be easily detected without dissection by feeling the thickening and rigidity of the cardiac region in the beginning of the second fifth to third of the body, the heart being shifted back somewhat as compared to other snakes due to the extreme extensions of the venom glands.

The subgenus *Swilea subgen. nov.* is most readily separated from all other *Calliophis* by by the ventral count always being lower than 203, versus 212 or more in the rest.

The subgenus *Swilea subgen. nov.* is further separated from all other *Calliophis* by the following suite of characters: Body scales in 13 parallel longitudinal rows, not obliquely disposed; middorsal (vertebral) scales not enlarged; preocular in contact with nasal; males 174-186 ventrals, females 189-203 ventrals; males 25-31 subcaudals, females 21-25 subcaudals; 7 supralabials, anal divided, body above is brown to reddish brown, with black spots, the latter arranged longitudinally along each side of the back; head and nape black with some yellow markings including a yellow spot on each side of the occiput; upper labials yellow; tail, below, pale blue or gray. Total length 1300 mm; tail length 150 mm (Leviton *et al.* 2003, Slowinski *et al.* 2001).

The hemipenes in this subgenus are different to those of other *Calliophis*. In *Swilea*, the hemipenis is relatively longer and narrower than that of other *Calliophis*.

Unlike other *Calliophis*, the hemipenis of *Swilea* is characterized by having no terminal furcation of the sulcus, a plush of fine spinules on the tip of the organ and longitudinal zigzag plicae proximal to this distal plush of spinules.

Paulstokesus subgen. nov. are separated from all other *Calliophis* by having a small and spinous hemipenis with only slight terminal bilobation, short *sulcus* furcation, and no associated basal pocket.

Paulstokesus subgen. nov. are further separated from all other *Calliophis* by the following suite of characters: Rostral broader than deep, frontal as long as its distance

from the end of the snout and much shorter than the parietals; one praeocular and two postoculars; a single temporal; seven (rarely 8) upper labials, six lower labials, third and fourth entering the eye; anterior chin-shields as long as the posterior or a bit shorter, in contact with four labials. 13 mid-body rows, 218-254 ventrals; anal usually divided; 33-53 divided subcaudals.

Colouration may be one or other of three of the following:

1/ various colour varieties which are connected by insensible gradations; head and nape usually black, with an oblique yellow band, sometimes broken up into spots on each side from the parietals to behind the angle of the mouth. Upper lip yellow in front of and behind the eye; lower parts uniform red or orangeish (*Calliophis (Paulstokesus) nigrescens* (Günther, 1862)), or alternatively:

2/ having unicolored and dark body and tail dorsa, an orange head band, a salmon color to scarlet body and tail underside, no dark pigmentation on the last supralabial, and a wide post-temporal band (*Calliophis (Paulstokesus) castoe* Smith, Ogale, Deepak and Giri, 2012), or:

Dark purplish brown or blackish brown on the back with three or five longitudinal series of black light-edged spots (*Calliophis (Paulstokesus) beddomei* Smith, 1943).

Paulstokesus subgen. nov. is separated from *Benmoreus* subgen. nov. by the fact that the posterior levator anguli oris ends on the venom gland, versus ending on the jaw in *Benmoreus* subgen. nov.

Benmoreus subgen. nov. is separated from *Paulstokesus* subgen. nov. by the presence of a bluish ventral tail color and melanized tail base muscles and associated tissues.

Distribution: Southern Asia.

Content: *Calliophis intestinalis* (Laurenti, 1768) (Type species); *Calliophis beddomei* Smith, 1943; *Calliophis bibroni* (Jan, 1858); *Calliophis bivirgata* (Boie, 1827); *Calliophis castoe* Smith, Ogale, Deepak and Giri, 2012; *Calliophis gracilis* Gray, 1835; *Calliophis haematoetron* Smith, Manamendra-Arachchi and Somaweera, 2008; *Calliophis maculiceps* (Günther, 1858); *Calliophis melanurus* (Shaw, 1802); *Calliophis nigrescens* (Günther, 1862).

SUBGENUS CALLIOPHIS GRAY, 1834

Type species: *Calliophis gracilis* Gray, 1835.

Diagnosis: The nominate subgenus *Calliophis*, is monotypic for the type species *Calliophis gracilis* Gray, 1835 and is readily separated from all other subgenera by the higher ventral count, being over 303, versus less than 293 for all other species.

The subgenus of *Calliophis*, subgenus *Doliophis*, consisting of the species *Calliophis (Doliophis) intestinalis* (Laurenti, 1768), the type species and *Calliophis (Doliophis) bivirgata* (Boie, 1827), are readily separated from all other *Calliophis* by the nature of the development of their venom glands.

Instead of being confined to the temporal region, they extend along each side of the body for about one fifth of its length, gradually thickening and terminating in front of the heart with club-shaped ends. The presence of these glands may be easily detected without dissection by feeling the thickening and rigidity of the cardiac region in

the beginning of the second fifth to third of the body, the heart being shifted back somewhat as compared to other snakes due to the extreme extensions of the venom glands.

The subgenus *Swilea* subgen. nov. is most readily separated from all other *Calliophis* by the ventral count always being lower than 203, versus 212 or more in the rest.

The subgenus *Swilea* subgen. nov. is further separated from all other *Calliophis* by the following suite of characters: Body scales in 13 parallel longitudinal rows, not obliquely disposed; middorsal (vertebral) scales not enlarged; preocular in contact with nasal; males 174-186 ventrals, females 189-203 ventrals; males 25-31 subcaudals, females 21-25 subcaudals; 7 supralabials, anal divided, body above is brown to reddish brown, with black spots, the latter arranged longitudinally along each side of the back; head and nape black with some yellow markings including a yellow spot on each side of the occiput; upper labials yellow; tail, below, pale blue or gray. Total length 1300 mm; tail length 150 mm (Leviton *et al.* 2003, Slowinski *et al.* 2001).

The hemipenes in this subgenus are different to those of other *Calliophis*. In *Swilea*, the hemipenis is relatively longer and narrower than that of other *Calliophis*.

Unlike other *Calliophis*, the hemipenis of *Swilea* is characterized by having no terminal furcation of the sulcus, a plush of fine spinules on the tip of the organ and longitudinal zigzag plicae proximal to this distal plush of spinules.

Paulstokesus subgen. nov. are separated from all other *Calliophis* by having a small and spinous hemipenis with only slight terminal bilobation, short *sulcus* furcation, and no associated basal pocket.

Paulstokesus subgen. nov. are further separated from all other *Calliophis* by the following suite of characters: Rostral broader than deep, frontal as long as its distance from the end of the snout and much shorter than the parietals; one praeocular and two postoculars; a single temporal; seven (rarely 8) upper labials, six lower labials, third and fourth entering the eye; anterior chin-shields as long as the posterior or a bit shorter, in contact with four labials. 13 mid-body rows, 218-254 ventrals; anal usually divided; 33-53 divided subcaudals.

Colouration may be one or other of three of the following:

1/ various colour varieties which are connected by insensible gradations; head and nape usually black, with an oblique yellow band, sometimes broken up into spots on each side from the parietals to behind the angle of the mouth. Upper lip yellow in front of and behind the eye; lower parts uniform red or orangeish (*Calliophis (Paulstokesus) nigrescens* (Günther, 1862)), or alternatively:

2/ having unicolored and dark body and tail dorsa, an orange head band, a salmon color to scarlet body and tail underside, no dark pigmentation on the last supralabial, and a wide post-temporal band (*Calliophis (Paulstokesus) castoe* Smith, Ogale, Deepak and Giri, 2012), or:

Dark purplish brown or blackish brown on the back with three or five longitudinal series of black light-edged spots

(*Calliophis (Paulstokesus) beddomei* Smith, 1943).

Paulstokesus subgen. nov. is separated from *Benmoreus subgen. nov.* by the fact that the posterior levator anguli oris ends on the venom gland, versus ending on the jaw in *Benmoreus subgen. nov.*

Benmoreus subgen. nov. is separated from *Paulstokesus subgen. nov.* by the presence of a bluish ventral tail color and melanized tail base muscles and associated tissues.

Snakes of the genus *Calliophis* are separated from all other elapid snakes by the following suite of characters: Maxillary extends forwards beyond the palatine, with a pair of large grooved poison-fangs, but no other obvious teeth; mandibular teeth are subequal. Praefrontal bones in contact with each other on the median line. Head is small and not distinct from the neck. Eye is small with a round pupil; nostril is between two nasals; no loreal. Body cylindrical and very elongate. Scales are smooth, without pits in 13 midbody rows. Ventrals are rounded. The tail is short and the subcaudals are divided.

The Asian genera *Sinomicrurus* Slowinski *et al.* 2001 and *Funkelapidus* Hoser, 2012 are separated from *Calliophis* by the following: A well-developed medial fold bordering the basal pocket of the hemipenis and protruberant sclerified tail tip used defensively. Further distinguished from *Calliophis* by lacking the postorbital bone, having a bipartite AES muscle origin (dorsal origin on parietal bone and ventral origin on anterior venom gland), and a strongly bifurcated hemipenis ornamented only with spines and possessing the basal pocket.

The Phillipine species within the genus *Hemibungarus* (*H. calligaster*, being monotypic for the genus) is separated from *Calliophis* by the following: 1/1 temporal formula; a raised sixth supralabial; colouration generally characterized by black dyads set on a red ground colour, commonly obscured by melanism; *Hemibungarus* is the only Asian Coral Snake characterised by a pattern of black bands or rings occurring in pairs.

Content: *Calliophis intestinalis* (Laurenti, 1768) monotypic for the subgenus.

SUBGENUS DOLIOPHIS GIRARD, 1857

Type species: *Doliophis flaviceps* Girard, 1857.

Currently most widely known as: *Calliophis bivirgata* (Boie, 1827).

Diagnosis: The subgenus *Doliophis*, consisting of the species *Calliophis (Doliophis) intestinalis* (Laurenti, 1768) and *Calliophis (Doliophis) bivirgata* (Boie, 1827), the type species, are readily separated from all other *Calliophis* by the nature of the development of their venom glands.

Instead of being confined to the temporal region, they extend along each side of the body for about one fifth of its length, gradually thickening and terminating in front of the heart with club-shaped ends. The presence of these glands may be easily detected without dissection by feeling the thickening and rigidity of the cardiac region in the beginning of the second fifth to third of the body, the heart being shifted back somewhat as compared to other snakes due to the extreme extensions of the venom glands.

The nominate subgenus *Calliophis*, is monotypic for the type species *Calliophis gracilis* Gray, 1835 and is readily separated from all other subgenera by the higher ventral

count, being over 303, versus less than 293 for all other species.

The subgenus *Swilea subgen. nov.* is most readily separated from all other *Calliophis* by the ventral count always being lower than 203, versus 212 or more in the rest.

The subgenus *Swilea subgen. nov.* is further separated from all other *Calliophis* by the following suite of characters: Body scales in 13 parallel longitudinal rows, not obliquely disposed; middorsal (vertebral) scales not enlarged; preocular in contact with nasal; males 174-186 ventrals, females 189-203 ventrals; males 25-31 subcaudals, females 21-25 subcaudals; 7 supralabials, anal divided, body above is brown to reddish brown, with black spots, the latter arranged longitudinally along each side of the back; head and nape black with some yellow markings including a yellow spot on each side of the occiput; upper labials yellow; tail, below, pale blue or gray. Total length 1300 mm; tail length 150 mm (Leviton *et al.* 2003, Slowinski *et al.* 2001).

The hemipenes in this subgenus are different to those of other *Calliophis*. In *Swilea*, the hemipenis is relatively longer and narrower than that of other *Calliophis*.

Unlike other *Calliophis*, the hemipenis of *Swilea* is characterized by having no terminal furcation of the sulcus, a plush of fine spinules on the tip of the organ and longitudinal zigzag plicae proximal to this distal plush of spinules.

Paulstokesus subgen. nov. are separated from all other *Calliophis* by having a small and spinous hemipenis with only slight terminal bilobation, short *sulcus* furcation, and no associated basal pocket.

Paulstokesus subgen. nov. are further separated from all other *Calliophis* by the following suite of characters: Rostral broader than deep, frontal as long as its distance from the end of the snout and much shorter than the parietals; one preocular and two postoculars; a single temporal; seven (rarely 8) upper labials, six lower labials, third and fourth entering the eye; anterior chin-shields as long as the posterior or a bit shorter, in contact with four labials. 13 mid-body rows, 218-254 ventrals; anal usually divided; 33-53 divided subcaudals.

Colouration may be one or other of three of the following: 1/ various colour varieties which are connected by insensible gradations; head and nape usually black, with an oblique yellow band, sometimes broken up into spots on each side from the parietals to behind the angle of the mouth. Upper lip yellow in front of and behind the eye; lower parts uniform red or orangeish (*Calliophis (Paulstokesus) nigrescens* (Günther, 1862)), or alternatively:

2/ having unicolored and dark body and tail dorsa, an orange head band, a salmon color to scarlet body and tail underside, no dark pigmentation on the last supralabial, and a wide post-temporal band (*Calliophis (Paulstokesus) castoe* Smith, Ogale, Deepak and Giri, 2012), or:

Dark purplish brown or blackish brown on the back with three or five longitudinal series of black light-edged spots (*Calliophis (Paulstokesus) beddomei* Smith, 1943).

Paulstokesus subgen. nov. is separated from *Benmoreus*

subgen. nov. by the fact that the posterior levitor anguli oris ends on the venom gland, versus ending on the jaw in *Benmoreus subgen. nov.*

Benmoreus subgen. nov. is separated from *Paulstokesus subgen. nov.* by the presence of a bluish ventral tail color and melanized tail base muscles and associated tissues.

Snakes of the genus *Calliophis* are separated from all other elapid snakes by the following suite of characters: Maxillary extends forwards beyond the palatine, with a pair of large grooved poison-fangs, but no other obvious teeth; mandibular teeth are subequal. Praefrontal bones in contact with each other on the median line. Head is small and not distinct from the neck. Eye is small with a round pupil; nostril is between two nasals; no loreal. Body cylindrical and very elongate. Scales are smooth, without pits in 13 midbody rows. Ventrals are rounded. The tail is short and the subcaudals are divided.

The Asian genera *Sinomicrurus* Slowinski *et al.* 2001 and *Funkelapidus* Hoser, 2012 are separated from *Calliophis* by the following: A well-developed medial fold bordering the basal pocket of the hemipenis and protruberant sclerified tail tip used defensively. Further distinguished from *Calliophis* by lacking the postorbital bone, having a bipartite AES muscle origin (dorsal origin on parietal bone and ventral origin on anterior venom gland), and a strongly bifurcated hemipenis ornamented only with spines and possessing the basal pocket.

The Phillipine species within the genus *Hemibungarus* (*H. calligaster*, being monotypic for the genus) is separated from *Calliophis* by the following: 1/1 temporal formula; a raised sixth supralabial; colouration generally characterized by black dyads set on a red ground colour, commonly obscured by melanism; *Hemibungarus* is the only Asian Coral Snake characterised by a pattern of black bands or rings occurring in pairs.

Distribution: South-east Asia, not including China or the Indian subcontinent.

Content: *Calliophis (Doliophis) intestinalis* (Laurenti, 1768)(Type species); *Calliophis (Doliophis) bivirgata* (Boie, 1827).

SUBGENUS SWILEA SUBGEN. NOV.

Type species: *Elaps maculiceps* Günther, 1858.

Currently most widely known as: *Calliophis maculiceps* (Günther, 1858).

Diagnosis: The subgenus *Swilea subgen. nov.* is most readily separated from all other *Calliophis* by the ventral count always being lower than 203, versus 212 or more in the rest.

The subgenus *Swilea subgen. nov.* is further separated from all other *Calliophis* by the following suite of characters: Body scales in 13 parallel longitudinal rows, not obliquely disposed; middorsal (vertebral) scales not enlarged; preocular in contact with nasal; males 174-186 ventrals, females 189-203 ventrals; males 25-31 subcaudals, females 21-25 subcaudals; 7 supralabials, anal divided, body above is brown to reddish brown, with black spots, the latter arranged longitudinally along each side of the back; head and nape black with some yellow markings including a yellow spot on each side of the occiput; upper labials yellow; tail, below, pale blue or gray. Total length 1300 mm; tail length 150 mm (Leviton

et al. 2003, Slowinski *et al.* 2001).

The hemipenes in this subgenus are different to those of other *Calliophis*. In *Swilea*, the hemipenis is relatively longer and narrower than that of other *Calliophis*.

Unlike other *Calliophis*, the hemipenis of *Swilea* is characterized by having no terminal furcation of the sulcus, a plush of fine spinules on the tip of the organ and longitudinal zigzag plicae proximal to this distal plush of spinules.

The subgenus *Doliophis*, consisting of the species *Calliophis (Doliophis) intestinalis* (Laurenti, 1768), and *Calliophis (Doliophis) bivirgata* (Boie, 1827), the type species, are readily separated from all other *Calliophis* by the nature of the development of their venom glands.

Instead of being confined to the temporal region, they extend along each side of the body for about one fifth of its length, gradually thickening and terminating in front of the heart with club-shaped ends. The presence of these glands may be easily detected without dissection by feeling the thickening and rigidity of the cardiac region in the beginning of the second fifth to third of the body, the heart being shifted back somewhat as compared to other snakes due to the extreme extensions of the venom glands.

The nominate subgenus *Calliophis*, is monotypic for the type species *Calliophis gracilis* Gray, 1835 and is readily separated from all other subgenera by the higher ventral count, being over 303, versus less than 293 for all other species.

Paulstokesus subgen. nov. are separated from all other *Calliophis* by having a small and spinous hemipenis with only slight terminal bilobation, short *sulcus* furcation, and no associated basal pocket.

Paulstokesus subgen. nov. are further separated from all other *Calliophis* by the following suite of characters: Rostral broader than deep, frontal as long as its distance from the end of the snout and much shorter than the parietals; one preocular and two postoculars; a single temporal; seven (rarely 8) upper labials, six lower labials, third and fourth entering the eye; anterior chin-shields as long as the posterior or a bit shorter, in contact with four labials. 13 mid-body rows, 218-254 ventrals; anal usually divided; 33-53 divided subcaudals.

Colouration may be one or other of three of the following:

1/ various colour varieties which are connected by insensible gradations; head and nape usually black, with an oblique yellow band, sometimes broken up into spots on each side from the parietals to behind the angle of the mouth. Upper lip yellow in front of and behind the eye; lower parts uniform red or orangeish (*Calliophis (Paulstokesus) nigrescens* (Günther, 1862)), or alternatively:

2/ having unicolored and dark body and tail dorsa, an orange head band, a salmon color to scarlet body and tail underside, no dark pigmentation on the last supralabial, and a wide post-temporal band (*Calliophis (Paulstokesus) castoe* Smith, Ogale, Deepak and Giri, 2012), or:

Dark purplish brown or blackish brown on the back with three or five longitudinal series of black light-edged spots (*Calliophis (Paulstokesus) beddomei* Smith, 1943).

Paulstokesus subgen. nov. is separated from *Benmoreus subgen. nov.* by the fact that the posterior levitor anguli oris ends on the venom gland, versus ending on the jaw in *Benmoreus subgen. nov.*

Benmoreus subgen. nov. is separated from *Paulstokesus subgen. nov.* by the presence of a bluish ventral tail color and melanized tail base muscles and associated tissues.

Snakes of the genus *Calliophis* are separated from all other elapid snakes by the following suite of characters: Maxillary extends forwards beyond the palatine, with a pair of large grooved poison-fangs, but no other obvious teeth; mandibular teeth are subequal. Praefrontal bones in contact with each other on the median line. Head is small and not distinct from the neck. Eye is small with a round pupil; nostril is between two nasals; no loreal. Body cylindrical and very elongate. Scales are smooth, without pits in 13 midbody rows. Ventrals are rounded. The tail is short and the subcaudals are divided.

The Asian genera *Sinomicrurus* Slowinski *et al.* 2001 and *Funkelapidus* Hoser, 2012 are separated from *Calliophis* by the following: A well-developed medial fold bordering the basal pocket of the hemipenis and protruberant sclerified tail tip used defensively. Further distinguished from *Calliophis* by lacking the postorbital bone, having a bipartite AES muscle origin (dorsal origin on parietal bone and ventral origin on anterior venom gland), and a strongly bifurcated hemipenis ornamented only with spines and possessing the basal pocket.

The Phillipine species within the genus *Hemibungarus* (*H. calligaster*, being monotypic for the genus) is separated from *Calliophis* by the following: 1/1 temporal formula; a raised sixth supralabial; colouration generally characterized by black dyads set on a red ground colour, commonly obscured by melanism; *Hemibungarus* is the only Asian Coral Snake characterised by a pattern of black bands or rings occurring in pairs.

Distribution: Mainland south-east Asia.

Etymology: Named in honour of Verona (Vona) Swile, of Athlone, Cape Town, South Africa, for various contributions to African herpetology.

Swile is an African word meaning "hairy feet".

Content: *Calliophis (Swilea) maculiceps* Günther, 1858 (monotypic for the subgenus).

SUBGENUS PAULSTOKESUS SUBGEN. NOV.

Type species: *Calliophis nigrescens* Günther, 1862.

Currently generally known as *Calliophis nigrescens* (Günther, 1862).

Diagnosis: *Paulstokesus subgen. nov.* are separated from all other *Calliophis* by having a small and spinous hemipenis with only slight terminal bilobation, short sulcus furcation, and no associated basal pocket.

Paulstokesus subgen. nov. are further separated from all other *Calliophis* by the following suite of characters:

Rostral broader than deep, frontal as long as its distance from the end of the snout and much shorter than the parietals; one praeocular and two postoculars; a single temporal; seven (rarely 8) upper labials, six lower labials, third and fourth entering the eye; anterior chin-shields as long as the posterior or a bit shorter, in contact with four labials. 13 mid-body rows, 218-254 ventrals; anal usually divided; 33-53 divided subcaudals.

Colouration may be one or other of three of the following:
1/ various colour varieties which are connected by insensible gradations; head and nape usually black, with an oblique yellow band, sometimes broken up into spots on each side from the parietals to behind the angle of the mouth. Upper lip yellow in front of and behind the eye; lower parts uniform red or orangeish (*Calliophis (Paulstokesus) nigrescens* (Günther, 1862)), or alternatively:

2/ having unicolored and dark body and tail dorsa, an orange head band, a salmon color to scarlet body and tail underside, no dark pigmentation on the last supralabial, and a wide post-temporal band (*Calliophis (Paulstokesus) castoe* Smith, Ogale, Deepak and Giri, 2012), or:

Dark purplish brown or blackish brown on the back with three or five longitudinal series of black light-edged spots (*Calliophis (Paulstokesus) beddomei* Smith, 1943).

Paulstokesus subgen. nov. is separated from *Benmoreus subgen. nov.* by the fact that the posterior levitor anguli oris ends on the venom gland, versus ending on the jaw in *Benmoreus subgen. nov.*

Benmoreus subgen. nov. is separated from *Paulstokesus subgen. nov.* by the presence of a bluish ventral tail color and melanized tail base muscles and associated tissues.

The subgenus *Swilea subgen. nov.* is most readily separated from all other *Calliophis* by the ventral count always being lower than 203, versus 212 or more in the rest.

The subgenus *Swilea subgen. nov.* is further separated from all other *Calliophis* by the following suite of characters: Body scales in 13 parallel longitudinal rows, not obliquely disposed; middorsal (vertebral) scales not enlarged; preocular in contact with nasal; males 174-186 ventrals, females 189-203 ventrals; males 25-31 subcaudals, females 21-25 subcaudals; 7 supralabials, anal divided, body above is brown to reddish brown, with black spots, the latter arranged longitudinally along each side of the back; head and nape black with some yellow markings including a yellow spot on each side of the occiput; upper labials yellow; tail, below, pale blue or gray. Total length 1300 mm; tail length 150 mm (Leviton *et al.* 2003, Slowinski *et al.* 2001).

The hemipenes in this subgenus are different to those of other *Calliophis*. In *Swilea*, the hemipenis is relatively longer and narrower than that of other *Calliophis*.

Unlike other *Calliophis*, the hemipenis of *Swilea* is characterized by having no terminal furcation of the sulcus, a plush of fine spinules on the tip of the organ and longitudinal zigzag plicae proximal to this distal plush of spinules.

The subgenus *Doliophis*, consisting of the species *Calliophis (Doliophis) intestinalis* (Laurenti, 1768), and *Calliophis (Doliophis) bivirgata* (Boie, 1827), the type species, are readily separated from all other *Calliophis* by the nature of the development of their venom glands.

Instead of being confined to the temporal region, they extend along each side of the body for about one fifth of its length, gradually thickening and terminating in front of the heart with club-shaped ends. The presence of these glands may be easily detected without dissection by

feeling the thickening and rigidity of the cardiac region in the beginning of the second fifth to third of the body, the heart being shifted back somewhat as compared to other snakes due to the extreme extensions of the venom glands.

The nominate subgenus *Calliophis*, is monotypic for the type species *Calliophis gracilis* Gray, 1835 and is readily separated from all other subgenera by the higher ventral count, being over 303, versus less than 293 for all other species.

Snakes of the genus *Calliophis* are separated from all other elapid snakes by the following suite of characters: Maxillary extends forwards beyond the palatine, with a pair of large grooved poison-fangs, but no other obvious teeth; mandibular teeth are subequal. Praefrontal bones in contact with each other on the median line. Head is small and not distinct from the neck. Eye is small with a round pupil; nostril is between two nasals; no loreal. Body cylindrical and very elongate. Scales are smooth, without pits in 13 midbody rows. Ventrals are rounded. The tail is short and the subcaudals are divided.

The Asian genera *Sinomicrurus* Slowinski *et al.* 2001 and *Funkelapidus* Hoser, 2012 are separated from *Calliophis* by the following: A well-developed medial fold bordering the basal pocket of the hemipenis and protruberant sclerified tail tip used defensively. Further distinguished from *Calliophis* by lacking the postorbital bone, having a bipartite AES muscle origin (dorsal origin on parietal bone and ventral origin on anterior venom gland), and a strongly bifurcated hemipenis ornamented only with spines and possessing the basal pocket.

The Phillipine species within the genus *Hemibungarus* (*H. calligaster*, being monotypic for the genus) is separated from *Calliophis* by the following: 1/1 temporal formula; a raised sixth supralabial; colouration generally characterized by black dyads set on a red ground colour, commonly obscured by melanism; *Hemibungarus* is the only Asian Coral Snake characterised by a pattern of black bands or rings occurring in pairs.

Distribution: Indian subcontinent.

Etymology: Named in honour of Paul Stokes, owner of reptile supplies retail outlet, "Amazing Amazon" of Springvale Road, Glen Waverley, Melbourne, Victoria, Australia, in recognition for his many valuable contributions to herpetoculture in Australia.

Content: *Calliophis (Paulstokesus) nigrescens* (Günther, 1862)(Type species); *Calliophis (Paulstokesus) beddomei* Smith, 1943; *Calliophis (Paulstokesus) castoe* Smith, Ogale, Deepak and Giri, 2012.

SUBGENUS BENMOOREUS SUBGEN. NOV.

Type species: *Elaps bibroni* Jan, 1858.

Currently generally known as *Calliophis bibroni* (Jan, 1858).

Diagnosis: *Benmoreus subgen. nov.* is best diagnosed by the process of eliminating all other subgenera via identification of them.

Benmoreus subgen. nov. is separated from *Paulstokesus subgen. nov.* by the presence of a bluish ventral tail color and melanized tail base muscles and associated tissues.

Paulstokesus subgen. nov. is separated from *Benmoreus subgen. nov.* by the fact that the posterior levitor anguli

oris ends on the venom gland, versus ending on the jaw in *Benmoreus subgen. nov.*

Paulstokesus subgen. nov. are separated from all other *Calliophis* by having a small and spinous hemipenis with only slight terminal bilobation, short *sulcus* furcation, and no associated basal pocket.

Paulstokesus subgen. nov. are further separated from all other *Calliophis* by the following suite of characters: Rostral broader than deep, frontal as long as its distance from the end of the snout and much shorter than the parietals; one praeocular and two postoculars; a single temporal; seven (rarely 8) upper labials, six lower labials, third and fourth entering the eye; anterior chin-shields as long as the posterior or a bit shorter, in contact with four labials. 13 mid-body rows, 218-254 ventrals; anal usually divided; 33-53 divided subcaudals.

Colouration may be one or other of three of the following:

1/ various colour varieties which are connected by insensible gradations; head and nape usually black, with an oblique yellow band, sometimes broken up into spots on each side from the parietals to behind the angle of the mouth. Upper lip yellow in front of and behind the eye; lower parts uniform red or orangeish (*Calliophis (Paulstokesus) nigrescens* (Günther, 1862)), or alternatively:

2/ having unicolored and dark body and tail dorsa, an orange head band, a salmon color to scarlet body and tail underside, no dark pigmentation on the last supralabial, and a wide post-temporal band (*Calliophis (Paulstokesus) castoe* Smith, Ogale, Deepak and Giri, 2012), or:

Dark purplish brown or blackish brown on the back with three or five longitudinal series of black light-edged spots (*Calliophis (Paulstokesus) beddomei* Smith, 1943).

The subgenus *Swilea subgen. nov.* is most readily separated from all other *Calliophis* by the ventral count always being lower than 203, versus 212 or more in the rest.

The subgenus *Swilea subgen. nov.* is further separated from all other *Calliophis* by the following suite of characters: Body scales in 13 parallel longitudinal rows, not obliquely disposed; middorsal (vertebral) scales not enlarged; preocular in contact with nasal; males 174-186 ventrals, females 189-203 ventrals; males 25-31 subcaudals, females 21-25 subcaudals; 7 supralabials, anal divided, body above is brown to reddish brown, with black spots, the latter arranged longitudinally along each side of the back; head and nape black with some yellow markings including a yellow spot on each side of the occiput; upper labials yellow; tail, below, pale blue or gray. Total length 1300 mm; tail length 150 mm (Leviton *et al.* 2003, Slowinski *et al.* 2001).

The hemipenes in this subgenus are different to those of other *Calliophis*. In *Swilea*, the hemipenis is relatively longer and narrower than that of other *Calliophis*.

Unlike other *Calliophis*, the hemipenis of *Swilea* is characterized by having no terminal furcation of the *sulcus*, a plush of fine spinules on the tip of the organ and longitudinal zigzag plicae proximal to this distal plush of spinules.

The subgenus *Doliophis*, consisting of the species

Calliophis (Doliophis) intestinalis (Laurenti, 1768), and *Calliophis (Doliophis) bivirgata* (Boie, 1827), the type species, are readily separated from all other *Calliophis* by the nature of the development of their venom glands.

Instead of being confined to the temporal region, they extend along each side of the body for about one fifth of its length, gradually thickening and terminating in front of the heart with club-shaped ends. The presence of these glands may be easily detected without dissection by feeling the thickening and rigidity of the cardiac region in the beginning of the second fifth to third of the body, the heart being shifted back somewhat as compared to other snakes due to the extreme extensions of the venom glands.

The nominate subgenus *Calliophis*, is monotypic for the type species *Calliophis gracilis* Gray, 1835 and is readily separated from all other subgenera by the higher ventral count, being over 303, versus less than 293 for all other species.

Snakes of the genus *Calliophis* are separated from all other elapid snakes by the following suite of characters: Maxillary extends forwards beyond the palatine, with a pair of large grooved poison-fangs, but no other obvious teeth; mandibular teeth are subequal. Praefrontal bones in contact with each other on the median line. Head is small and not distinct from the neck. Eye is small with a round pupil; nostril is between two nasals; no loreal. Body cylindrical and very elongate. Scales are smooth, without pits in 13 midbody rows. Ventrals are rounded. The tail is short and the subcaudals are divided.

The Asian genera *Sinomicrurus* Slowinski *et al.* 2001 and *Funkelapidus* Hoser, 2012 are separated from *Calliophis* by the following: A well-developed medial fold bordering the basal pocket of the hemipenis and protruberant sclerified tail tip used defensively. Further distinguished from *Calliophis* by lacking the postorbital bone, having a bipartite AES muscle origin (dorsal origin on parietal bone and ventral origin on anterior venom gland), and a strongly bifurcated hemipenis ornamented only with spines and possessing the basal pocket.

The Phillipine species within the genus *Hemibungarus* (*H. calligaster*, being monotypic for the genus) is separated from *Calliophis* by the following: 1/1 temporal formula; a raised sixth supralabial; colouration generally characterized by black dyads set on a red ground colour, commonly obscured by melanism; *Hemibungarus* is the only Asian Coral Snake characterised by a pattern of black bands or rings occurring in pairs.

Distribution: Indian subcontinent.

Etymology: Named in honour of Ben Moore, manager of reptile supplies retail outlet, "Amazing Amazon" of Springvale Road, Glen Waverley, Melbourne, Victoria, Australia, in recognition for his many valuable contributions to herpetoculture in Australia, including his own breeding projects for many taxa including Ant-hill Pythons (*Antaresia (Rawlingspython) perthensis*).

Content: *Calliophis (Benmoreus) bibroni* (Jan, 1858)(Type species); *Calliophis (Benmoreus) haematoetron* Smith, Manamendra-Arachchi and Somaweera, 2008; *Calliophis (Benmoreus) melanurus* (Shaw, 1802).

LIOPHIDIUM BOULENGER, 1896.

The genus was created by Boulenger to accommodate the species, *L. trilineatum* Boulenger, 1896, from Madagascar.

As of 2013 there are ten described and generally recognized species, although it is clear that there are also more undescribed forms yet to be formally named.

Within the genus as recognized are at least three distinctive species groups, one in particular apparently quite divergent from the rest.

This is the clade including the species *Liophidium rhodogaster* (Schlegel, 1837) and the more recently described taxon *Liophidium pattoni* Vieites, Ratsovaina, Randrianiaina, Nagy, Glaw and Vences, 2010.

Besides obvious morphological divergence from the rest of the genus *Liophidium*, these two species have considerable molecular divergence from the rest.

Therefore they are herein formally placed in a new subgenus named for the first time, according to the Zoological Code (Ride *et al.* 1999).

Important published studies on *Liophidium* Boulenger, 1896 as defined by most authors to 2013 include, Andersson (1910), Andreone *et al.* (2000, 2003), Barbour (1918), Bauer *et al.* (1995), Beolens *et al.* (2011), Boulenger (1888, 1893, 1896), D'Cruze *et al.* (2007, 2008, 2009), Domergue (1984), Durkin *et al.* (2011), Franzen *et al.* (2009), Gehring *et al.* (2010), Glaw and Vences (1994), Guibé (1958), Günther (1859b), Jan (1856), Kreutz (1989), Labanowski and Lowin (2011), Leviton and Munsterman (1956), Nagy *et al.* (2012), Peters (1874), Pyron *et al.* (2011), Schlegel (1837), Underwood (1967), Van Beest (2004), Vieites *et al.* (2010), Zaher *et al.* (2012), Ziegler *et al.* (1996) and sources cited therein.

GENUS LIOPHIDIUM BOULENGER, 1896.

Type species: *Liophidium trilineatum* Boulenger, 1896.

Diagnosis: *Liophidium* Boulenger, 1896 is diagnosed by the following suite of characters: About 25 small maxillary teeth, closely set with the rear three slightly enlarged; the dentary bone is completely detached from the articular posteriorly; head is small, not distinct from the neck; eye is small and with a round pupil; nostril between two nasals and the internasal. Body is cylindrical; scales smooth without pits and 17 mid-body scale rows; ventrals are rounded. The tail is short, subcaudals divided. Hypapophyses developed throughout the vertebral column.

Distribution: Madagascar.

Content: *Liophidium trilineatum* Boulenger, 1896 (Type species); *Liophidium apperti* Domergue, 1984; *Liophidium chabaudi* Domergue, 1984; *Liophidium maintikibo* Franzen, Jones, Raselimanana, D'Cruze, Glaw and Vences, 2009; *Liophidium mayottensis* (Peters, 1874); *Liophidium pattoni* Vieites, Ratsovaina, Randrianiaina, Nagy, Glaw and Vences, 2010; *Liophidium rhodogaster* (Schlegel, 1837); *Liophidium therezieni* Domergue, 1984; *Liophidium torquatum* (Boulenger, 1888);

Liophidium vaillanti (Mocquard, 1901).

SUBGENUS MATTBORGUS SUBGEN. NOV.

Type species: *Herpetodryas rhodogaster* Schlegel, 1837.

Generally currently known as *Liophidium rhodogaster* (Schlegel, 1837).

Diagnosis: The subgenus *Mattborgus subgen. nov.* is separated from the nominate subgenus *Liophidium* by the presence of a pinkish colour on the ventral side of the tail, although this colouration

extends to the ventrals in *L. rhodogaster* while these are bright yellow in *L. pattoni*. There are 60-92 ventrals and 54-81 subcaudals.

The subgenus consists of two described species.

Liophidium pattoni differs from its sister taxon (defined according to molecular data of Vietes *et al.* 2010), *Liophidium rhodogaster*, in exhibiting fewer ventral scales (160 versus 181-192) and fewer subcaudals (54 versus 61-81).

The two species also differ significantly in dorsal colour pattern, with *Liophidium rhodogaster* having a brown dorsum with a lateral dark brown thin line and a wide blackish dorsal band, and the *Liophidium pattoni* showing four very conspicuous bright pink-red discontinuous stripes, which change to blue-grey at mid-body, on a black ground colour. The head colouration also differs among both species, with a dark brown head with few whitish scales behind the eye in *Liophidium rhodogaster*, and a black and bright yellow pattern in *Liophidium pattoni* consisting of bright yellow supralabials, a black stripe reaching from the nasal scale through the eye and towards the posterior border of the head, and bright yellow upper postocular and temporal scales. From the snout to the supraocular scales, *Liophidium pattoni* shows a variable amount of bright yellow colour with small black patches.

Poor quality preserved hemipenes of both *Liophidium pattoni* and *Liophidium rhodogaster* and apparently show the hemipenes to be different in form to other *Liophidium* species and also to a limited extent, one another, (see Vietes *et al.* 2010 and Ziegler *et al.* 1996 for the details).

Liophidium Boulenger, 1896 is diagnosed by the following suite of characters: About 25 small maxillary teeth, closely set with the rear three slightly enlarged; the dentary bone is completely detached from the articular posteriorly; head is small, not distinct from the neck; eye is small and with a round pupil; nostril between two nasals and the internasal. Body is cylindrical; scales smooth without pits and 17 mid-body scale rows; ventrals are rounded.

The tail is short, subcaudals divided. Hypapophyses developed throughout the vertebral column.

Distribution: Madagascar.

Etymology: Named in honour of Matt Borg of Mount Cottrell, on the edge of western Melbourne, Victoria, Australia for numerous services to herpetology, herpetoculture and wildlife education in Australia

Content: *Liophidium (Mattborgus) rhodogaster* (Schlegel, 1837)(Type species); *Liophidium (Mattborgus) pattoni* Vieites, Ratsoavina, Randrianiaina, Nagy, Glaw and Vences, 2010.

LIOPHOLIDOPHIS MOCQUARD, 1904.

Liopholidophis grandidieri Mocquard, 1904 was placed in the new genus *Liopholidophis* created by Mocquard at the same time.

Three species described in the preceding period had been assigned to other genera and were subsequently re-assigned to this genus. Two more species were described in 1996 and 2007, both of which are also the most divergent members of the genus.

While the taxonomy of *Liopholidophis* has been relatively stable in the period preceding 2013, molecular studies of Vieites *et al.* (2010), Pyron *et al.* (2011) and Nagy *et al.* (2012) have confirmed the divergence of two described species from the rest of the genus.

The molecular results also mirror important morphological differences between the species groups.

Notwithstanding the fact that there are at least two other undescribed species in this divergent group, it is important that these snakes be given taxonomic recognition.

Taking the conservative position, I herein describe a new subgenus for these divergent species according to the Zoological Code (Ride *et al.* 1999).

Important published studies on *Liopholidophis* Mocquard, 1904 as defined by most authors to 2013 include, Barbour (1918), Boulenger (1893), Cadle (1996, 1998), D'Cruze *et al.* (2008), Fischer (1884), Glaw and Vences (1994), Glaw *et al.* (2007), Günther (1882), Mocquard (1904), Parker (1925), Peracca (1892), Pyron *et al.* (2011), Thomas *et al.* (2001), Werning and Wolf (2007), Williams and Wallach (1989), Nagy *et al.* (2012), and sources cited therein.

GENUS LIOPHOLIDOPHIS MOCQUARD, 1904.

Type species: *Liopholidophis grandidieri* Mocquard, 1904.

Diagnosis: The genus *Liopholidophis* is defined as follows: Eye small. Rostral nearly as deep as broad, visible from above; internasals broader than long, as long as or a little shorter than the praefrontals; frontal one and two thirds to one and three quarters as long as broad, longer than its distance from the end of the snout, shorter than the parietals; loreal as long as deep or deeper than long; one (rarely two) praecoculars and two postoculars; temporals 1+2; eight supralabials, fourth and fifth entering the eye; four infralabials in contact with the anterior chin shields, which are shorter than the posterior. Scales smooth in 17 midbody rows, 143-157 ventrals, anal divided with about 72 subcaudals in females and about 152 for males. The tail of the male is nearly half the body length, while the female's tail is two seventh's of the total body length. Colouration is olive-brown above, darker on the vertebral region; a dark brown or black lateral band from the end of the snout, through the eye to the angle of the mouth; two other more or less distinct lateral streaks on each side, one above and one below, the latter bordering the ventrals; upper lip yellowish; lower parts yellowish, uniform or black-spotted.

Distribution: Madagascar.

Content: *Liopholidophis grandidieri* Mocquard, 1904 (Type species); *Liopholidophis dimorphus* Glaw, Nagy, Franzen and Vences, 2007; *Liopholidophis dolicoercus*

(Peracca, 1892); *Liopholidophis grandidieri* Mocquard, 1904; *Liopholidophis rhadinaea* Cadle, 1996; *Liopholidophis sexlineatus* (Günther, 1882); *Liopholidophis varius* (Fischer, 1884).

SUBGENUS *CHRISNEWMANUS* SUBGEN. NOV.

Type species: *Liopholidophis rhadinaea* Cadle, 1996

Diagnosis: Separated from the nominate subgenus by one or other of the following suites of characters: pink ventral side, as well as light nape spots and extreme sexual dimorphism of tail lengths (*Liopholidophis rhadinaea* Cadle, 1996) or:

an immaculate whitish venter (versus black in subgenus *Liopholidophis*) (*Liopholidophis dimorphus* Glaw, Nagy, Franzen and Vences, 2007).

Distribution: Madagascar.

Etymology: Named in honour of Chris Newman of the United Kingdom, former editor and publisher of several important wildlife and reptile journals, including *Reptilian* and *Ophidia Review*, for his long term commitment and service to the science of herpetology and wildlife conservation in general.

Content: *Liopholidophis rhadinaea* Cadle, 1996 (Type species); *Liopholidophis dimorphus* Glaw, Nagy, Franzen and Vences, 2007.

THE DEFINING OF GENERA AND SUBGENERA WITHOUT ETHICS

Here I deal with examples of creating subgenera and genera without ethics and other issues of note.

On 21 September 2009 (or thereabouts), in an audacious move, Wales-based snake enthusiast Wolfgang Wüster and two friends (Van Wallach and Donald Broadley) falsely claimed in an online paper (Wallach, Wüster and Broadley 2009), published at: <http://www.mapress.com/zootaxa/2009/ft/zt02236p036.pdf>

that seven earlier (2009) print publications by Raymond Hoser (this author), were not validly published under the ICZN rules, known as "the Code" (Ride *et al.* 1999). They simultaneously attempted to steal naming rights for the Spitting Cobras (genus *Spracklandus* Hoser 2009), published in one of these publications (Hoser, 2009b) renaming the genus *Afronaja* (as a subgenus) in their own online paper (Wallach, Wüster and Broadley 2009).

The authors went further and actively invited others to rename the Rattlesnake genera named by Hoser (2009a).

To the credit of other herpetologists globally, no one took up this invitation in the period to March 2013.

The detail of the above fraud was exposed by Hoser (2012a).

Put simply it was an audacious case of academic theft by the later authors who effectively bootlegged this author's work to try to steal naming rights for a genus of snakes, facilitated by a series of false claims against the original publication.

The falsity of the Wallach, Wüster and Broadley claim of non-publication of the Hoser papers was seen via receipts for the publications from places such as *Zoological Record*, which Wallach, Wüster and Broadley had deliberately and fraudulently chosen to overlook (Hoser 2012a).

In passing I note that Wüster's close friend, the notorious Van Wallach, has tried the stunt of renaming validly named taxa in breach of the Zoological Code's three critical rules of, 1/ Homonymy (Principal 5, Article 52 and elsewhere), 2/ Priority (Principal 3, Article 23 and elsewhere) and 3/ Stability (Principal 4, Articles 23, 65 and elsewhere) several times. He did this in 2006, when erecting the genus *Austrotyphlops* to usurp the properly named genus *Sivadictus* Wells and Wellington 1985, using the same type species (Wallach 2006).

Coauthoring with Donald Broadley (of Wallach, Wüster and Broadley 2009 fame) in 2009, Wallach created the genus name *Afrotyphlops* to retrospectively usurp the valid Fitzinger 1843 name *Aspidorhynchus* for the same type species (Hoser 2012d, Wallach and Broadley 2009).

In 2013, Kaiser *et al.* (including Wüster as the main party promoting the publication), published a blog calling for the total destruction of the Zoological Code (Ride *et al.* 1999), by boycotting valid names of their choice for the purposes of them coining new names for the same taxa. They had published a similar blog the year earlier (Kaiser 2012a, 2012b), that was rebutted and discredited in total by Hoser (2012c).

This unethical creation of subgenera and genera by this band of renegades threatens to destroy much of the progress in the science of Zoology over the past two centuries and must not be allowed to happen.

The authors of Kaiser *et al.* (2013) should be condemned for their reckless conduct.

As a summary of that paper and in rebuttal of the various false claims made within, the following key points are noted:

- Hinrich Kaiser and eight other renegades, namely Mark O'Shea, Wolfgang Wüster, Wulf Schleip, Paulo Passos, Hidetoshi Ota, Luca Luiselli, Brian Crother and Christopher Kelly, herein cited as Kaiser *et al.* (2013) made numerous demonstrably false claims about Hoser and another herpetologist Richard Wells to justify their plans to attack the rules of the Zoological Code.

- A claim by Kaiser *et al.* (2013) that Hoser's descriptions of taxa from 2000 to 2012 were unsupported by evidence was effectively refuted by their other claims that Hoser had engaged in "harvesting of clades from published phylogenetic studies for description as new genera or subgenera" and used evidence "lifted from others".

- The papers and taxonomic decisions by Hoser (and Wells) were based on robust cited evidence and comply with the established rules of Zoological Nomenclature (Ride *et al.* 1999) of homonymy, priority and stability.

- Kaiser, O'Shea, Wüster and Schleip have been exposed many times as serial liars.

- Schleip, Crother and Wüster have all been exposed previously for "Grievous taxonomic misconduct" by knowingly publishing descriptions of invalid taxa or junior synonyms and falsifying data.

- O'Shea, Wüster and Schleip have for 15 years engaged in a cynical destabilization of taxonomy and nomenclature in breach of the rules, motivated by a deep personal hatred of Raymond Hoser.

- Over time, Hoser and Wells taxonomic and nomenclatural judgments have been accepted as correct by other herpetologists as confirmed by molecular studies and their names widely used (millions of times)(e.g. *Brogghammerus*, *Antaresia*).
- O'Shea, Wüster and Schleip have repeatedly committed the morally repugnant crime of plagiarization, that is the theft of another person's research without correct attribution.
- Kaiser *et al.* have repeatedly misrepresented and misquoted the Zoological Code to further their defective arguments.
- Kaiser *et al.* have several times made an open call for others to act in breach of the numerous sections of the Rules of Zoological nomenclature including 1/ Homonymy (Principal 5, Article 52 and elsewhere), 2/ Priority (Principal 3, Article 23 and elsewhere) and 3/ Stability (Principal 4, Articles 23, 65 and elsewhere) and the ethics of the Code (Section A).
- Kaiser *et al.* seek to coin new names for hundreds of validly named taxa in breach of the Zoological Rules, with no restriction on other authors or names they may later deem "unscientific" in order to rename taxa properly named by others.
- The term "unscientific" is in effect a code word of Kaiser, Wüster and the other renegades for those works of people they take a hatred to, or alternatively otherwise seek to rename taxa that has been properly named previously.
- In an act of "taxonomic vandalism" and "evidence free taxonomy", as co-author of Kaiser *et al.*, Brian Crother did in 2012, change the names of over 100 species of lizard, none of which had ever been the subject of a phylogenetic study. In 2008 Brian Crother engaged in another act of evidence free taxonomy to improperly reassign names to dozens of north American taxa (Pauly *et al.* 2009).
- The proposals of Kaiser *et al.* were designed to irreparably destabilize Zoological nomenclature.
- The proposals of Kaiser *et al.* (2013) if copied by others (as they suggested on page 20) and elsewhere would create general taxonomic and nomenclatural chaos and effectively destroy the rules of zoology.
- The proposals of Kaiser *et al.* if acted upon would potentially put lives at risk through misidentification of venomous taxa, including through excessive numbers of invalid junior synonyms resulting from their mass renaming exercise.
- An alleged loophole within the Zoological Code proposed by Kaiser *et al.*, by which they see a means to rename hundreds of species and genera by alleged "reversal of priority" is flawed. This was because they misquoted the relevant section of Code omitting the key line, that relating to date of first descriptions usage needing to be prior to 1899, rendering the scheme "clearly ridiculous and unworkable" (Shea 2013).
- The use of the alleged loophole within the Zoological Rules proposed by Kaiser *et al.*, to unlawfully rename validly named taxa, subsequent to deliberate boycott of the correct names has been attempted before and failed. This included by Sprackland, Smith and

Strimple (1997) (ICZN case 3043) and their scheme failed. The illegal attempt to reverse priority was emphatically rejected by the ICZN in their judgment, Opinion 1970. *Bulletin of Zoological Nomenclature* 58(1), 30 March 2001 in Volume 58.

- Claims by Kaiser *et al.* of widespread support for their position was fabricated and false. In fact the only support they got from most other herpetologists was for a proposition that taxonomy should be evidence based and subject to peer review. However it is in fact Kaiser *et al.* who break both "rules" by engaging in evidence free taxonomy and in the absence of effective peer review.
- Contrary to the published claims of Kaiser *et al.* (2013), they did not have support of the Australian Society of Herpetologists to boycott Hoser names and illegally coin names for those taxa themselves (ASH 2013).
- On the basis of the preceding, the assault on the established rules of zoological nomenclature by Kaiser *et al.* (2013) should as a matter of course be rejected by herpetologists. The gang of nine must be condemned for their gross misconduct.
- In summary genera and subgenera of reptiles should be named on the basis of evidence, within the rules, and ethically.

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CONFLICT OF INTEREST

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

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An overdue new taxonomy for the Rhinophiidae (Uropeltidae).

RAYMOND T. HOSER

488 Park Road, Park Orchards, Victoria, 3134, Australia.

Phone: +61 3 9812 3322 Fax: 9812 3355 E-mail: snakeman@snakeman.com.au

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ABSTRACT

This paper resolves issues of taxonomy and nomenclature for the small burrowing shield-tailed snakes of the family Uropeltidae as they are generally known in early 2013.

These snakes of primitive form from Southern India and Sri Lanka have been subject of detailed taxonomic analysis for over 20 years. While 8 genera are currently recognized, it has long been known that some of these are composite.

Revisiting existing data, the allied genera *Rhinophis* Hemprich, 1820 and *Uropeltis* Cuvier, 1829 as presently recognized are both merged.

In summary these two names are only now used for the Sri Lankan species and a small number of others, with the latter now being treated as a subgenus within the former. As a result the family name reverts back to *Rhinophiidae*, Fitzinger, 1843.

Crealia Gray, 1858 is resurrected as a subgenus for some Sri Lankan species of within *Rhinophis*, while *Pseudotyphlops* Schlegel, 1839 remains, but also as a subgenus within *Rhinophis*.

Indian species formerly within *Rhinophis* Hemprich, 1820 and *Uropeltis* Cuvier, 1829 are herein placed in two new genera, each with subgenera and formally named for the first time according to the Zoological Code.

Pseudoplectrurus Boulenger, 1890 is resurrected to accommodate the species *Silybura canarica* Beddome, 1870, currently placed in the genus *Plectrurus* Duméril, 1851.

The other remaining genera, *Brachyophidium* Wall, 1921, *Melanophidium*, Günther, 1864, *Platyplectrurus* Günther, 1868, *Plectrurus*, Duméril, 1851 and *Teretrurus* Beddome, 1886 are retained unchanged save for the fact that *Pseudoplectrurus* Boulenger, 1890 is resurrected to accommodate the species *Silybura canarica* Beddome, 1870, currently placed in the genus *Plectrurus* Duméril, 1851.

The family *Rhinophiidae* is subdivided into five tribes, namely Rhinophiini, Oxyserpeniini, Brachyophidiini, Melanophidiini and Plectruriini.

Keywords: Taxonomy; Uropeltidae; new; family; Rhinophiidae; tribe; Rhinophiini; Oxyserpeniini; Brachyophidiini; Melanophidiini; Plectruriini; genus; *Rhinophis*; *Uropeltis*; *Pseudoplectrurus*; *Oxyserpens*; *Crottyserpens*; subgenus; *Jealousserpens*; *Ackyserpens*.

INTRODUCTION

The Shield-tailed snakes are a family of non-venomous burrowing snakes endemic to southern India and Sri Lanka.

These snakes have a large keratinous shield at the tip of the tail.

These smallish snakes attain from 20 and 75 cm in length. They are adapted to a fossorial existence as seen via their anatomy. The skull is primitive and inflexible, with a short vertical quadrate bone and rigid jaws; the coronoid bone is still present in the lower jaw. The orbital bones are absent, the supratemporal is vestigial and the eyes are small and degenerate, not covered by a brille, but by large polygonal shields. Notwithstanding this, the pelvis and hind limbs, the presence of which is also considered a primitive trait, have disappeared in this family.

The tail is characteristic, ending in one or other of either an enlarged rigid scale with two points, or more often an upper surface with a subcircular area covered with thickened spiny scales, or alternatively a much enlarged spiny plate.

The ventral scales are much reduced in size. The body is cylindrical and covered with smooth scales.

At beginning 2013, there were eight widely recognized genera, with a small number of names treated as synonyms (Uetz 2013, McDairmid *et al.* 1999).

There have been a number of studies done in attempts to resolve the phylogeny or taxonomy of the group, with perhaps the most important one being that of Cadle *et al.* (1990).

Other most relevant phylogenetic studies have included Gower (2003), Olori and Bell (2012), Pyron *et al.* (2013) and others cited by Olori and Bell (2012).

All have convincingly shown that the current taxonomy of the family is outdated and in urgent need of revision, as well as recent comprehensive publications on the group by McDairmid *et al.* (1999), Gower *et al.* (2008), Gans (1966), Rieppel and Zaher (2002) and Comeaux *et al.* (2010).

By way of example, Cadle *et al.* (1990) found a divergence of at least 10-15 million years of the species *Rhinophis travancoricus* Boulenger, 1893 from the Sri Lankan members of the same genus.

Olori and Bell (2012) and Pyron *et al.* (2013) found a similar result, with the Indian species within *Uropeltis* as presently defined, namely *U. liura* Günther, 1875 having an even greater time frame for divergence than that of *Rhinophis travancoricus* Boulenger, 1893.

Clearly it is not tenable on that data to retain either species within the same genera as the Sri Lankan species. In the case of both the genera, *Rhinophis* Hemprich, 1820 and *Uropeltis* Cuvier, 1829, the holotype species come from Sri Lanka and phylogenetically are in the same cluster of species as in the same well-defined clade.

Thus revisiting existing data, of Cadle *et al.* (1990) as corroborated by Pyron *et al.* (2013) the allied genera *Rhinophis* Hemprich, 1820 and *Uropeltis* Cuvier, 1829 as presently recognized are both merged.

In summary these two names are only now mainly used for the Sri Lankan species, with the latter now being treated as a subgenus within the former, due to its date priority according to the Rules of Zoological Nomenclature (Ride *et al.* 1999). As a result the family name reverts back to Rhinophiidae, Fitzinger, 1843, although I note that the actual name Rhinophiidae (spelt Rhinophidae) was first used by Cope in 1900 (McDiarmid *et al.* 1999), whereas Fitzinger first proposed the family using the name "Rhinophes".

Crealia Gray, 1858 is resurrected as a subgenus for some Sri Lankan species of within *Rhinophis*, while *Pseudotyphlops* Schlegel, 1839 remains, but also as a subgenus within *Rhinophis*.

Indian species formerly within *Rhinophis* Hemprich, 1820 and *Uropeltis* Cuvier, 1829 are herein placed in new genera formally named for the first time according to the Zoological Code. The three species taken from *Rhinophis* Hemprich, 1820, now placed in the genus *Crottyserpens* *gen. nov.* are further subdivided into subgenera.

The other remaining genera, *Brachyophidium* Wall, 1921, *Melanophidium*, Günther, 1864, *Platyplectrurus* Günther, 1868, *Plectrurus*, Duméril, 1851 and *Teretrurus* Beddome, 1886 are retained unchanged save for the fact that *Pseudoplectrurus* Boulenger, 1890 is resurrected to accommodate the species *Silybura canarica* Beddome, 1870, currently placed in the genus *Plectrurus* Duméril, 1851.

In order to have the taxonomy of the family Rhinophiidae to reflect the phylogeny, the family is herein subdivided into five tribes, namely Rhinophiini, Oxyserpeniini, Brachyophidiini, Melanophidiini and Plectruriini.

The literature dealing with these snakes (usually treated as "Uropeltidae") is extensive and includes the following key references: Baumeister (1908), Beddome (1867), Bossuyt *et al.* (2004), Boulenger (1893), Cadle *et al.* (1990), Comeaux *et al.* (2010), Gans (1973, 1976, 1986), Gans *et al.* (1978), Gower (2003), Gower *et al.* (2008), Greene and McDairmid (2005), Mahendra (1984), Olori (2010), Olori and Bell (2012), Parker and Grandison (1977), Peters (1861), Rajendran (1978, 1979, 1985), Rieppel (1988), Taylor (1953), Tinkle and Gibbons (1977), Underwood (1967), Wickramasinge *et al.* (2009), Williams (1959), as well as the sources cited therein.

FAMILY RHINOPHIIDAE FITZINGER, 1843

(Terminal taxon: *Anguis oxyrynchus* Schneider, 1801).

Currently known as *Rhinophis oxyrynchus* (Schneider, 1801).

Diagnosis: The family is defined by having the cranial bones solidly united, transpalatine present; pterygoid not extending to quadrate or mandible; no supratemporal; quadrate very small; praefrontals in contact with nasals. Mandible with coronoid bone. Both jaws toothed. Teeth are small and few. Palate is usually toothless; although in *Melanophidium*, Günther, 1864 and *Platyplectrurus* Günther, 1868 a few palatine teeth are sometimes present.

The Shield-tailed snakes are a family of non-venomous burrowing snakes endemic to southern India and Sri Lanka.

These snakes have a large keratinous shield at the tip of the tail. These smallish snakes attain from 20 and 75 cm in length. They are adapted to a fossorial existence as seen via their anatomy. The skull is primitive and inflexible, with a short vertical quadrate bone and rigid jaws; the coronoid bone is still present in the lower jaw. The orbital bones are absent, the supratemporal is vestigial and the eyes are small and degenerate, not covered by a brille, but by large polygonal shields. Notwithstanding this, the pelvis and hind limbs, the presence of which is also considered a primitive trait, have disappeared in this family.

The tail is characteristic, ending in one or other of either an enlarged rigid scale with two points, or more often an upper surface with a subcircular area covered with thickened spiny scales, or alternatively a much enlarged spiny plate.

The ventral scales are much reduced in size. The body is cylindrical and covered with smooth scales.

Comment: In effect the family has had a "name change" from Uropeltidae to Rhinophiidae. While the Zoological Code has stability as its aim, this stability is based on the three critical rules of, 1/ Homonymy (Principal 5, Article 52 and elsewhere), 2/ Priority (Principal 3, Article 23 and elsewhere) and 3/ Stability (Principal 4, Articles 23, 65 and elsewhere), derived from the earlier ones.

The relevant sections read:

"23.1. Statement of the Principle of Priority. The valid name of a taxon is the oldest available name applied to it";

and at 23.2 it says:

"Principle of Priority is to be used to promote stability".

Noting that both generic names *Rhinophis* and *Uropeltis* have been widely used and known and both the relevant family names have been used previously, I see no benefit in continuing the incorrect usage of the name *Uropeltidae* to describe this family of snakes.

Distribution: Sri Lanka and southern India.

Content: *Rhinophis* Hemprich, 1820; *Brachyophidium* Wall, 1921; *Crottyserpens* *gen. nov.* (this paper); *Melanophidium*, Günther, 1864; *Oxyserpens* *gen. nov.* (this paper); *Platyplectrurus* Günther, 1868; *Plectrurus*, Duméril, 1851; *Pseudoplectrurus* Boulenger, 1890; *Teretrurus* Beddome, 1886; *Uropeltis* Cuvier, 1829.

NEW TRIBE MELANOPHIDIINI TRIBE NOV.

(Terminal taxon: *Plectrurus wynaundensis* Beddome, 1863).

Currently known as *Melanophidium wynaundensis* (Beddome, 1863)

Diagnosis: Within the diagnosis of the family, given as part of this diagnosis below, this tribe, monotypic for the genus *Melanophidium*, Günther, 1864 is separated from other Rhinophiidae by the following suite of characters: Eye in the ocular shield; a median groove along the chin; no supraocular; no temporal; tail is cylindrical or slightly compressed; the terminal spine is pointed or with one or two terminal ridges; the snake has palatine teeth.

The family Rhinophiidae as a whole is defined by having the cranial bones solidly united, transpalatine present; pterygoid not extending to quadrate or mandible; no supratemporal; quadrate very small; praefrontals in contact with nasals. Mandible with coronoid bone. Both jaws toothed. Teeth are small and few. Palate is usually toothless; although in *Melanophidium*, Günther, 1864 and *Platyplectrurus* Günther, 1868 a few palatine teeth are sometimes present.

Distribution: Southern India: Peermede (Kerala) and Anamali Hills (Tamil Nadu) (McDiarmid *et al.* 1999).

Content: *Melanophidium*, Günther, 1864.

NEW TRIBE BRACHYOPHIDIINI TRIBE NOV.

(Terminal taxon: *Brachyophidium rhodogaster* Wall, 1921).

Diagnosis: Within the diagnosis of the family, given as part of this diagnosis below, this tribe, monotypic for the genus *Brachyophidium* Wall, 1921 is separated from other Rhinophiidae by the following suite of characters: Body short, of considerably greater calibre posteriorly than anteriorly, cylindrical, smooth. Head small. Snout narrowly rounded. Eye in an ocular shield. Nostril in the anterior part of the nasal. Eye more than half the length of the ocular. No mental groove. The rostral is deeper than broad, portion visible above equal to the suture between the nasals. Nasals are large and in contact behind the rostral. Praefrontals are long, nearly as long as the frontal, in contact with the nasal, 2nd and 3rd supralabials, and ocular.

Neck not constricted. Tail short, strongly and increasingly more compressed from base to apex.

Nasals are meeting behind the rostral. Internasals are absent; praefrontals are in a pair. Supraoculars are absent. Praeocular is absent. Ocular is present. Postocular is absent. Temporal is present. Supralabials are a four on each side as are the infralabials. Sublinguals absent.

The frontal is as long as the snout, much longer than broad, equal to the parietals; the ocular sutures about one third the parietal sutures. The temporal is shorter than the ocular, about half the parietals.

Four supralabials of which the fourth is longest. Infralabials, three, the first in contact behind the mental. At two head lengths behind the head there are 13 rows of dorsal scales, 15 at midbody and also 15 at two head-lengths before the vent. The 4th row of dorsal shields divides about four and a half head-lengths behind the head. There are about 143 ventrals and 7 pairs of divided subcaudals.

The maxilla has roughly 10 teeth.

The colouration is with a head that is blackish-brown above. Body dorsally uniform blackish-brown. An ill-defined and rather obscure pale spot on the neck is behind each parietal shield. Ventrally roseate from chin to vent, including the ultimate row of costals. There is usually a median pink subcaudal stripe. There are 13 dorsal mid body rows anteriorly, in 15 rows at midbody to the vent. Scales are smooth. Last row enlarged at about three-fourths the breadth of the ventrals. Supracaudals are smooth. The terminal shield is small and compressed, ending as a single point.

The ventrals are moderately developed, anal is divided and about twice the breadth of the last ventral.

The family Rhinophiidae as a whole is defined by having the cranial bones solidly united, transpalatine present; pterygoid not extending to quadrate or mandible; no supratemporal; quadrate very small; praefrontals in contact with nasals. Mandible with coronoid bone. Both jaws toothed. Teeth are small and few. Palate is usually toothless; although in *Melanophidium*, Günther, 1864 and *Platyplectrurus* Günther, 1868 a few palatine teeth are sometimes present.

Distribution: Southern India: Palni Hills (McDiarmid *et al.* 1999).

Content: *Brachyophidium* Wall, 1921.

NEW TRIBE PLECTRURIINI TRIBE NOV.

(Terminal taxon: *Plectrurus perrotetii* Duméril, 1851).

Diagnosis: Within the diagnosis of the family, given as part of this diagnosis below, this tribe, is separated from other Rhinophiidae by defining each of the genera groups within the tribe.

The tribe is therefore diagnosed as being one or other of the three of:

Eye distinct from the neighbouring shields of moderate size. A supraocular and a temporal. Tail is cylindrical and slightly compressed. The terminal scute is pointed and with a transverse ridge (*Platyplectrurus* Günther, 1868 and *Teretrurus* Beddome, 1886) or:

Eye small in the ocular; no supraocular; tail compressed with a terminal scute compressed and with two superimposed simple or bifid points (*Pseudoplectrurus* Boulenger, 1890) or:

Eye in the ocular shield; no mental groove; a supraocular; no temporal; tail compressed; a terminal scute compressed and with two superimposed, simple, bifid or trifid points (*Plectrurus*, Duméril, 1851).

Teretrurus Beddome, 1886 is separated from *Platyplectrurus* Günther, 1868 by having an obtuse snout as opposed to one that is broadly rounded. *Teretrurus* Beddome, 1886 is further separated from *Platyplectrurus* Günther, 1868 by having supraoculars that are shorter than the praefrontals as opposed to as long or longer in the species of *Platyplectrurus* Günther, 1868.

Teretrurus Beddome, 1886 is also further separated by having 120-149 ventrals versus 150-174 in *Platyplectrurus* Günther, 1868

The family Rhinophiidae as a whole is defined by having the cranial bones solidly united, transpalatine present; pterygoid not extending to quadrate or mandible; no supratemporal; quadrate very small; praefrontals in contact with nasals. Mandible with coronoid bone. Both jaws toothed. Teeth are small and few. Palate is usually toothless; although in *Melanophidium*, Günther, 1864 and *Platyplectrurus* Günther, 1868 a few palatine teeth are sometimes present.

Distribution: Southern India and Sri Lanka.

Content: *Platyplectrurus* Günther, 1868; *Plectrurus*, Duméril, 1851; *Pseudoplectrurus* Boulenger, 1890; and *Teretrurus* Beddome, 1886.

NEW TRIBE OXYSERPENIINI TRIBE NOV.

(Terminal taxon: *Silybura liura* Günther, 1875)

Currently widely known as *Uropeltis liura* (Günther, 1875).

Diagnosis: Within the diagnosis of the family, given as part of this diagnosis below, this tribe, is separated from other Rhinophiidae by defining the single genus within the tribe.

The diagnosis for the tribe is therefore the same as for the genus *Oxyserpens* *gen. nov.* (formally described below) because it is monotypic for the genus and is as follows:

This genus *Oxyserpens* *gen. nov.*, formerly placed within *Uropeltis* Cuvier, 1829, shares with that genus the following characters: Eye in the ocular shield, no supraocular or temporal; no mental groove; tail is conical or obliquely truncated terminating in a small scute which is square at the end or bicuspid, with the points side by side or alternatively ending in a large circular, oval or flat shield.

For specimens with 15 mid body rows they are diagnosed as being within *Oxyserpens* *gen. nov.* by this fact alone and the additional characters of: 128-140 ventrals and a body diameter of 24-29 times in the length, or:

For specimens with 17 mid body rows, they are diagnosed as being within *Oxyserpens* *gen. nov.* by the additional character suite of: Nasals in contact behind the rostral; eye not half the length of the ocular shield; the portion of the rostral seen from above is as long as its distance from the frontal, or shorter; snout obtuse. Tail round or slightly compressed. Upper caudal scales smooth or faintly keeled; terminal scute very small or bicuspid. Eye is less than half the length of the ocular, or:

For specimens with 19 mid body rows, they are diagnosed as being within *Oxyserpens gen. nov.* by the additional characters of: the upper surface of the tail is convex, or with a flat disk of strongly keeled scales.

This genus would formerly have been diagnosed as being within *Uropeltis* Cuvier, 1829 or *Rhinophis* Hemprich, 1820 from which it is separated by the above suite of characters.

The family Rhinophiidae as a whole is defined by having the cranial bones solidly united, transpalatine present; pterygoid not extending to quadrate or mandible; no supratemporal; quadrate very small; praefrontals in contact with nasals. Mandible with coronoid bone. Both jaws toothed. Teeth are small and few. Palate is usually toothless; although in *Melanophidium*, Günther, 1864 and *Platyplectrurus* Günther, 1868 a few palatine teeth are sometimes present.

Distribution: Southern India.

Etymology: Named in honour of the family's now deceased Great Dane Dog (Oxy), a name short for "Oxyuranus", as in a large elapid snake genus. The dog loyally guarded the Snakebusters research facility for about 8 years.

Content: *Oxyserpens gen. nov.* (this paper).

NEW GENUS *OXYSERPENS* GEN. NOV.

Type species: *Silybura liura* Günther, 1875

Currently widely known as *Uropeltis liura* (Günther, 1875).

Diagnosis: Within the diagnosis of the family, given as part of this diagnosis below, this genus is separated from other Rhinophiidae as follows:

This genus *Oxyserpens gen. nov.*, formerly placed within *Uropeltis* Cuvier, 1829, shares with that genus the following characters: Eye in the ocular shield, no supraocular or temporal; no mental groove; tail is conical or obliquely truncated terminating in a small scute which is square at the end or bicuspid, with the points side by side or alternatively ending in a large circular, oval or flat shield.

For specimens with 15 mid body rows they are diagnosed as being within *Oxyserpens gen. nov.* by this fact alone and the additional characters of: 128-140 ventrals and a body diameter of 24-29 times in the length, or:

For specimens with 17 mid body rows, they are diagnosed as being within *Oxyserpens gen. nov.* by the additional character suite of: Nasals in contact behind the rostral; eye not half the length of the ocular shield; the portion of the rostral seen from above is as long as its distance from the frontal, or shorter; snout obtuse. Tail round or slightly compressed. Upper caudal scales smooth or faintly keeled; terminal scute very small or bicuspid. Eye is less than half the length of the ocular, or:

For specimens with 19 mid body rows, they are diagnosed as being within *Oxyserpens gen. nov.* by the additional characters of: the upper surface of the tail is convex, or with a flat disk of strongly keeled scales.

This genus (monotypic for its tribe) would formerly have been diagnosed as being within *Uropeltis* Cuvier, 1829 or *Rhinophis* Hemprich, 1820 from which it is separated by the above suite of characters.

The family Rhinophiidae as a whole is defined by having the cranial bones solidly united, transpalatine present; pterygoid not extending to quadrate or mandible; no supratemporal; quadrate very small; praefrontals in contact with nasals. Mandible with coronoid bone. Both jaws toothed. Teeth are small and few. Palate is usually toothless; although in *Melanophidium*, Günther, 1864 and *Platyplectrurus* Günther, 1868 a few palatine teeth are sometimes present.

Distribution: Southern India.

Etymology: Named in honour of the family's now deceased Great Dane Dog (Oxy), a name short for "Oxyuranus", as in a large elapid snake genus. The dog guarded the Snakebusters research facility for about 8 years.

Content: *Oxyserpens liura* (Günther, 1875) (type species); *O. Arcticeps* (Günther, 1875); *O. beddomii* (Günther, 1862); *O. broughami* (Beddome, 1878); *O. dindigalensis* (Beddome, 1877); *O. ellioti* (Gray, 1858); *O. grandis* (Beddome, 1867), *O. macrohyncha* (Beddome, 1877); *O. maculata* (Beddome, 1878); *O. myhendrae* (Beddome, 1886); *O. Nitilda* (Beddome, 1878); *O. Occellata* (Beddome, 1863); *O. Petersi* (Beddome, 1878); *O. phipsonii* (Mason, 1888); *O. rubrolineata* (Günther, 1875); *O. rubromaculata* (Beddome, 1867); *O. smithi* (Gans, 1966); *O. woodmasoni* (Theobald, 1876).

NEW SUBGENUS *JEALOUSERPENS* SUBGEN. NOV.

Type species: *Silybura broughami* Beddome, 1878.

Currently widely known as *Uropeltis broughami* (Beddome, 1878)

Diagnosis: The species within this subgenus are separated from other *Oxyserpens gen. nov.* by the following suite of characters: 19 mid-body scale rows, the upper surface of the tail is either convex or with a flat disk of strongly keeled scales; 198-230 ventrals and the diameter of the body is 30-40 times in the total length.

This genus *Oxyserpens gen. nov.*, formerly placed within *Uropeltis* Cuvier, 1829, shares with that genus the following characters: Eye in the ocular shield, no supraocular or temporal; no mental groove; tail is conical or obliquely truncated terminating in a small scute which is square at the end or bicuspid, with the points side by side or alternatively ending in a large circular, oval or flat shield.

For specimens with 15 mid body rows they are diagnosed as being within *Oxyserpens gen. nov.* by this fact alone and the additional characters of: 128-140 ventrals and a body diameter of 24-29 times in the length, or:

For specimens with 17 mid body rows, they are diagnosed as being within *Oxyserpens gen. nov.* by the additional character suite of: Nasals in contact behind the rostral; eye not half the length of the ocular shield; the portion of the rostral seen from above is as long as its distance from the frontal, or shorter; snout obtuse. Tail round or slightly compressed. Upper caudal scales smooth or faintly keeled; terminal scute very small or bicuspid. Eye is less than half the length of the ocular, or:

For specimens with 19 mid body rows, they are diagnosed as being within *Oxyserpens gen. nov.* by the additional characters of: the upper surface of the tail is convex, or with a flat disk of strongly keeled scales.

This genus would formerly have been diagnosed as being within *Uropeltis* Cuvier, 1829 or *Rhinophis* Hemprich, 1820 from which it is separated by the above suite of characters.

The family Rhinophiidae as a whole is defined by having the cranial bones solidly united, transpalatine present; pterygoid not extending to quadrate or mandible; no supratemporal; quadrate very small; praefrontals in contact with nasals. Mandible with coronoid bone. Both jaws toothed. Teeth are small and few. Palate is usually toothless; although in *Melanophidium*, Günther, 1864 and *Platyplectrurus* Günther, 1868 a few palatine teeth are sometimes present.

Distribution: Southern India.

Etymology: Named in honour of Rob Jealous a herpetologist of Bendigo Victoria, Australia in recognition of a lifetime's work with reptiles.

Content: *Oxyserpens (Jealouserpens) broughami* (Beddome, 1878) (type species); *O. (Jealouserpens) grandis* (Beddome, 1867).

NEW SUBGENUS *OXYSERPENS* SUBGEN. NOV.

Type species: *Silybura liura* Günther, 1875

Currently widely known as *Uropeltis liura* (Günther, 1875).

Diagnosis: The species within the subgenus *Jealouserpens gen. nov.* are separated from other *Oxyserpens* subgen. nov. (the nominate subgenus) by the following suite of characters: 19

mid-body scale rows, the upper surface of the tail is either convex or with a flat disk of strongly keeled scales; 198-230 ventrals and the diameter of the body is 30-40 times in the total length.

This genus *Oxyserpens gen. nov.*, formerly placed within *Uropeltis* Cuvier, 1829, shares with that genus the following characters: Eye in the ocular shield, no supraocular or temporal; no mental groove; tail is conical or obliquely truncated terminating in a small scute which is square at the end or bicuspid, with the points side by side or alternatively ending in a large circular, oval or flat shield.

For specimens with 15 mid body rows they are diagnosed as being within *Oxyserpens gen. nov.* by this fact alone and the additional characters of: 128-140 ventrals and a body diameter of 24-29 times in the length, or:

For specimens with 17 mid body rows, they are diagnosed as being within *Oxyserpens gen. nov.* by the additional character suite of: Nasals in contact behind the rostral; eye not half the length of the ocular shield; the portion of the rostral seen from above is as long as its distance from the frontal, or shorter; snout obtuse. Tail round or slightly compressed. Upper caudal scales smooth or faintly keeled; terminal scute very small or bicuspid. Eye is less than half the length of the ocular, or:

For specimens with 19 mid body rows, they are diagnosed as being within *Oxyserpens gen. nov.* by the additional characters of: the upper surface of the tail is convex, or with a flat disk of strongly keeled scales.

This genus would formerly have been diagnosed as being within *Uropeltis* Cuvier, 1829 or *Rhinophis* Hemprich, 1820 from which it is separated by the above suite of characters.

The family Rhinophiidae as a whole is defined by having the cranial bones solidly united, transpalatine present; pterygoid not extending to quadrate or mandible; no supratemporal; quadrate very small; praefrontals in contact with nasals. Mandible with coronoid bone. Both jaws toothed. Teeth are small and few. Palate is usually toothless; although in *Melanophidium*, Günther, 1864 and *Platyplectrurus* Günther, 1868 a few palatine teeth are sometimes present.

Distribution: Southern India.

Etymology: As for genus.

Content: *Oxyserpens liura* (Günther, 1875) (type species); *O. (Oxyserpens) arcticeps* (Günther, 1875); *O. (Oxyserpens) beddomii* (Günther, 1862); *O. (Oxyserpens) dindigalensis* (Beddome, 1877); *O. (Oxyserpens) ellioti* (Gray, 1858); *O. (Oxyserpens) macrohyncha* (Beddome, 1877); *O. (Oxyserpens) maculata* (Beddome, 1878); *O. (Oxyserpens) myhendrae* (Beddome, 1886); *O. (Oxyserpens) nitilda* (Beddome, 1878); *O. (Oxyserpens) occellata* (Beddome, 1863); *O. (Oxyserpens) petersi* (Beddome, 1878); *O. (Oxyserpens) phipsonii* (Mason, 1888); *O. (Oxyserpens) rubrolineata* (Günther, 1875); *O. (Oxyserpens) rubromaculata* (Beddome, 1867); *O. (Oxyserpens) smithi* (Gans, 1966); *O. (Oxyserpens) woodmasoni* (Theobald, 1876).

NEW TRIBE RHINOPHIINI TRIBE NOV.

(Terminal taxon: *Anguis oxyrynchus* Schneider, 1801).

Currently known as *Rhinophis oxyrynchus* (Schneider, 1801).

Diagnosis: This tribe Rhinophiini *tribe nov.* is diagnosed and separated from others within the family Rhinophiidae by the following suite of characters: Eye in the ocular shield, no supraocular or temporal; no mental groove; tail is one or other of the following 1/ conical or obliquely truncated terminating in a small scute which is square at the end or bicuspid, with the points side by side or 2/ ending in a large circular, oval or flat shield, or 3/ ending in a large convex, rugose shield which is neither truncated or spinose at the end. The nasals may or may not be separated by the rostral.

The family is defined by having the cranial bones solidly united,

transpalatine present; pterygoid not extending to quadrate or mandible; no supratemporal; quadrate very small; praefrontals in contact with nasals. Mandible with coronoid bone. Both jaws toothed. Teeth are small and few. Palate is usually toothless; although in *Melanophidium*, Günther, 1864 and *Platyplectrurus* Günther, 1868 a few palatine teeth are sometimes present.

The specimens within the genus *Oxyserpens gen. nov.* and herein placed in a separate tribe, are separated from this tribe by the following suite of characters:

One or other of the following three:

For specimens with 15 mid body rows they are diagnosed as being within *Oxyserpens gen. nov.* by this fact alone and the additional characters of: 128-140 ventrals and a body diameter of 24-29 times in the length, or:

For specimens with 17 mid body rows, they are diagnosed as being within *Oxyserpens gen. nov.* by the additional character suite of: Nasals in contact behind the rostral; eye not half the length of the ocular shield; the portion of the rostral seen from above is as long as its distance from the frontal, or shorter; snout obtuse. Tail round or slightly compressed. Upper caudal scales smooth or faintly keeled; terminal scute very small or bicuspid. Eye is less than half the length of the ocular, or:

For specimens with 19 mid body rows, they are diagnosed as being within *Oxyserpens gen. nov.* by the additional characters of: the upper surface of the tail is convex, or with a flat disk of strongly keeled scales.

This genus *Oxyserpens gen. nov.* would formerly have been diagnosed as being within *Uropeltis* Cuvier, 1829 or *Rhinophis* Hemprich, 1820 from which it is separated by the above suite of characters.

The new genus within this tribe, *Crottyserpens gen. nov.* described below, includes three Indian species formerly placed within the genus *Rhinophis* Hemprich, 1820.

Species within the genus *Crottyserpens gen. nov.* are separated from species within the genera *Rhinophis* Hemprich, 1820 and *Uropeltis* Cuvier, 1829, (the others in this tribe) by the following suite of characters:

Eye in the ocular shield, no supraocular or temporal; no mental groove; tail ends in a large convex, rugose shield which is neither truncated or spinose at the end. The nasals are always separated by the rostral. The caudal shield is as long as or a little shorter than the shielded part of the head, the rostral is one third the length of the shielded part of the head; 15 or 17 mid-body rows.

Distribution: Southern India and Sri Lanka.

Content: *Rhinophis* Hemprich, 1820; *Crottyserpens gen. nov.* (this paper); *Uropeltis* Cuvier, 1829.

NEW GENUS CROTTYSERPENS GEN. NOV.

Type species: *Rhinophis travancoricus* Boulenger, 1893.

Diagnosis: Species within the genus *Crottyserpens gen. nov.* are separated from species within the genera *Rhinophis* Hemprich, 1820 and *Uropeltis* Cuvier, 1829, by the following suite of characters:

Eye in the ocular shield, no supraocular or temporal; no mental groove; tail ends in a large convex, rugose shield which is neither truncated or spinose at the end. The nasals are always separated by the rostral. The caudal shield is as long as or a little shorter than the shielded part of the head, the rostral is one third the length of the shielded part of the head; 15 or 17 mid-body rows.

The species in the subgenus *Ackyserpens subgen. nov.* are separated from the nominate subgenus by ventral and mid-body scale row counts and these are included as part of the genus diagnosis for *Crottyserpens gen. nov.*

The species from the nominate subgenus *Crottyserpens*, namely *travancoricus* has 136-146 ventrals and 17 mid-body rows. The two described and recognized species within the

subgenus *Ackyserpens subgen. nov.* (formally described below) have 180-218 ventrals and 15 mid-body rows. The species from within the subgenus *Ackyserpens subgen. nov.* have yellow markings on the body and tail, whereas the species from the subgenus *Crottyserpens* only has yellow markings on the tail.

Distribution: Southern India.

Etymology: Named in honour of the family's now deceased Great Dane cross Rottweiler Dog (Crotty), a name short for "Crotalus", as in a large pitviper snake genus. The dog guarded the Snakebusters research facility for almost 13 years.

Content: *Crottyserpens travancoricus* (Boulenger, 1893) (type species); *C. fergusonianus* (Boulenger, 1896); *C. sanguineus* (Beddome, 1863).

NEW SUBGENUS ACKYSERPENS SUBGEN. NOV.

Type species: *Rhinophis sanguineus* Beddome, 1863.

Diagnosis: The species in the subgenus *Ackyserpens subgen. nov.* are separated from the nominate subgenus by ventral and mid-body scale row counts. The species from the nominate subgenus *Crottyserpens*, namely *travancoricus* has 136-146 ventrals and 17 mid-body rows. The two species within the subgenus *Ackyserpens subgen. nov.* have 180-218 ventrals and 15 mid-body rows. The species from within the subgenus *Ackyserpens subgen. nov.* have yellow markings on the body and tail, whereas the species from the subgenus *Crottyserpens* only has yellow markings on the tail.

Distribution: Southern India.

Etymology: Named in honour of the family's now deceased Akita Dog (Acky), a name short for "Acanthophis", as in a drop-dead gorgeous elapid snake genus from Australasia. The dog guarded the Snakebusters research facility for just two years before his life was cut short after injuries sustained by an attack by burglars. It turned out the thieves were employees of the local Manningham Council, seeking revenge after one of their officers named Mike Clark was adversely named in the book *Victoria Police Corruption - 2* (Hoser, 1999). Clark was caught out red-handed committing perjury in legal proceedings (lying under oath) after police made sworn statements contrary to that of Clark, noting that the police had been forced to change their

earlier written evidence in legal proceedings after the phone company Optus, provided evidence against them.

Content: *Crottyserpens (Ackyserpens) sanguineus* (Beddome, 1863) (type species); *C. (Ackyserpens) fergusonianus* (Boulenger, 1896).

NEW SUBGENUS CROTTYSERPENS SUBGEN. NOV.

Type species: *Rhinophis travancoricus* Boulenger, 1893.

Diagnosis: The species in the subgenus *Ackyserpens subgen. nov.* are separated from the nominate subgenus *Crottyserpens subgen. nov.* by ventral and mid-body scale row counts. The species from the nominate subgenus *Crottyserpens*, namely *travancoricus* has 136-146 ventrals and 17 mid-body rows. The two species within the subgenus *Ackyserpens subgen. nov.* have 180-218 ventrals and 15 mid-body rows. The species from within the subgenus *Ackyserpens subgen. nov.* have yellow markings on the body and tail, whereas the species from the subgenus *Crottyserpens* only has yellow markings on the tail.

Distribution: Southern India.

Etymology: As for genus.

Content: *Crottyserpens (Crottyserpens) travancoricus* (Boulenger, 1893) (type species).

FIRST REVISOR NOTES

In the event that a later author finds a conflict in names for taxa involving names proposed herein, then the order of preference of use should be as follows:

For tribes: Rhinophiini; Oxyserpeniini; Melanophidiini; Brachyophidiini; Plectruriini; for new genera: *Oxyserpens*; *Crottyserpens*; then subgenus; *Ackyserpens*.

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CONFLICT OF INTEREST

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

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New tribes and sub-tribes of Vipers and elapid snakes and two new species of snake (Squamata: Serpentes).

RAYMOND T. HOSER

488 Park Road, Park Orchards, Victoria, 3134, Australia.

Phone: +61 3 9812 3322 Fax: 9812 3355 E-mail: snakeman@snakeman.com.au

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ABSTRACT

Some recently published papers in *Australasian Journal of Herpetology* issues 10-15 contained descriptions that in the publishing process contained errors that made the descriptions potentially invalid under the Zoological Code (Ride *et al.* 1999).

This included for descriptions at tribe, subtribe and species levels.

As a result descriptions of the same taxa are published herein that are fully compliant with the Zoological Code as new descriptions, in order to establish available names for the relevant taxon groups and including two relevant species taxa. This will stabilize the nomenclature for the taxa making the names available for other scientists.

Keywords: Taxonomy; Nomenclature; Zoological Code; new tribe; new subtribe; new species; Hoser; Viperini; Maxhoserviperina; Montiviperina; Viperina; Calloselasmaiini; Adelynhoserserpenini; Porthidiumina; Cerrophodionina; Adelynhoserserpenina; Crotalina; Piersonina; Jackyhoserini; Bothropina; Bothropoidina; Rhinocerophiina; Jackyhoserina; Bothrocophiina; Hulimkini; *Charlespiersonserpens*; *Macmillanus*; *jackyhoserae*; *Gerrhopilus*; *carolinehoserae*.

INTRODUCTION

Some recently published papers in *Australasian Journal of Herpetology* contained descriptions that in the publishing process contained errors that made the descriptions potentially invalid under the Zoological code, including in Hoser 2012a, 2012b and 2012c.

In the paper Hoser (2012a), a series of descriptions of Viperine tribes were published.

One of the tribes identified and named wasn't spelt correctly, so that the name of the tribe matched that of an existing genus.

This is not allowed under the ICZN rules of homonymity (see Ride *et al.* 1999), thereby making the description of the tribe invalid under the code.

To rectify this situation, a description of the tribe is published herein as new in order to correct the error.

In terms of other viper tribes and subtribes, there was potential for the names to be unavailable as the type genera may have been published later (by pagination criteria and the like). As those genera have been validly described for some time, (since 2012, see citations at the end of this paper for the details), it is now possible to formally describe and name the said tribes and subtribes in order to fully comply with the code and make the names available. This is done herein. See Hoser 2012e-i for relevant papers.

The same applies for an elapid tribe, herein described, see Hoser 2012j-k, for the relevant papers.

Two descriptions of snake species were published, one in Hoser (2012b) and the other Hoser (2012c) that were generally compliant with the code (Ride *et al.* 1999), but in the publishing

process the specimen numbers of the holotype specimens were inadvertently omitted from the final hard copy, errors not picked up by the peer or other reviewers or in the final pre-publication checks.

While the holotype numbers could be readily inferred from the publications via the named lodgement institutions and references to the holotypes by specimen number in the cited references, the failure to explicitly state and identify them (due to inadvertent omission) would also potentially render the descriptions invalid under the Zoological Code.

Rather than have such a situation arise or to have time wasted by arguments of validity, I have decided to publish descriptions of the same taxa as new and with the relevant specimen numbers identified under the holotype headings.

This will make the new names within this publication available for use under the code and stabilize the nomenclature of the said taxa.

There have been false claims by Wu'ster and others that papers published in *Australasian Journal of Herpetology* in 2009 were not validly published according to the Code (see for example Wu'ster and Bérnils 2011). These claims were shown to be false by Hoser (2012d), which also cites the various Wu'ster claims and gives proof as to why they were false and provides reference details for all relevant publications. As a result, taxa described that year are cited as being from that year (2009), although in order to stabilize the nomenclature and remove doubts as to correct names, all the same taxa were described as new in several papers by Hoser in 2012, within parts of *Australasian Journal of Herpetology*, Issues 10-14 for the

purpose of compliance with the objectives of the ICZN's code in terms of maintaining stability of nomenclature.

Should there be doubts as to the validity of publication of the 2009 issues by later authors, then the cited 2009 dates below should be treated as reading "2012" in order to render this publication as fully compliant with the ICZN rules.

Tribe Viperini Laurenti, 1768.

(Terminal Taxon: *Coluber aspis* Linnaeus, 1758)

Currently generally known as *Vipera aspis* (Linnaeus, 1758)

Diagnosis: Separated from other true vipers by the following suite of characters: pupil is elliptical, adults of the snakes are generally small (subtribes Viperina and Montiviperina) to medium or large (subtribe Maxhoserviperina, description below) and more or less stoutly built. The head is distinct from the neck, of triangular shape, and covered with small scales in many species, although some have a few small plates on top. The dorsal scales are strongly keeled, the anal plate is divided, as are the subcaudals. Importantly this group are defined by the characteristic zig-zag pattern running down their back, more-or-less along the dorsal midbody line, this pattern sometimes becoming a series of blotches or spots running longitudinally along the body (as in the genus *Daboia*).

All are viviparous (live bearing).

They are distributed in Eurasia and adjacent parts of North Africa.

Content: *Daboia* Gray 1842; *Maxhoservipera* Hoser, 2012 (see Hoser 2012e); *Macrovipera* Reuss, 1927; *Montivipera* Nilson *et al.*, 1999; *Vipera* Laurenti 1768.

Subtribe Maxhoserviperina Subtribe nov.

(Terminal Taxon: *Vipera palaestinae* Werner, 1938)

Generally currently most widely known as *Maxhoservipera palaestinae* (Werner, 1938)

Diagnosis: Separated from other subtribes by the following suite of characters: Medium to large size as adults, a lack of horns, raised scales or similar projections above the eye or snout.

Separated from the other subtribes by the fact that the snout or nose is noticeably more blunt in appearance, hence their occasional common name, "blunt nosed vipers".

The head is broad, flat, and very distinct from the neck.

The subtribe Viperina are separated from other true vipers by the following suite of characters: as adults these snakes are small and more or less stoutly built. The head is distinct from the neck, of triangular shape, and covered with small scales in many species, although some have a few small plates on top. The dorsal scales are strongly keeled, the anal plate is divided, as are the subcaudals. Importantly this subtribe is defined by the characteristic zig-zag pattern running down their back, more-or-less along the dorsal midbody line, this pattern only being obscured in some melanistic specimens or other aberrant mutations.

Found in North Africa, the Middle-east and Southern Asia.

Content: *Daboia* Gray, 1842; *Maxhoservipera* Hoser, 2012 (see Hoser 2012e).

Subtribe Montiviperina Subtribe nov.

(Terminal Taxon: *Daboia xanthina* Gray, 1849)

Generally currently known as (*Montivipera xanthina* Gray, 1849)

Diagnosis: Separated from Viperina by the lack of medium to large scales above the eye. In this subtribe the relevant scales are small.

Separated from the subtribes Maxhoserviperina and Viperina by the fact that in this subtribe the majority of snakes invariably have small horns or raised scales above the eye or snout, not seen in the other subtribes.

Maxhoserviperina is separated from the other subtribes (including Montiviperina) by the fact that the snout or nose is noticeably more blunt in appearance, hence their occasional

common name, "blunt nosed vipers".

The subtribe Viperina are separated from other true vipers by the following suite of characters: as adults these snakes are small and more or less stoutly built. The head is distinct from the neck, of triangular shape, and covered with small scales in many species, although some have a few small plates on top. The dorsal scales are strongly keeled, the anal plate is divided, as are the subcaudals. Importantly this subtribe is defined by the characteristic zig-zag pattern running down their back, more-or-less along the dorsal midbody line, this pattern only being obscured in some melanistic specimens or other aberrant mutations.

Found in Eurasia and the Middle-East

Content: *Macrovipera* Reuss, 1927; *Montivipera* Nilson *et al.*, 1999.

Subtribe Viperina Laurenti, 1768.

(Terminal Taxon: *Coluber aspis* Linnaeus, 1758)

Generally currently known as (*Vipera aspis* Linnaeus, 1758)

Diagnosis: The subtribe Viperina are separated from other true vipers by the following suite of characters: as adults these snakes are small and more or less stoutly built. The head is distinct from the neck, of triangular shape, and covered with small scales in many species, although some have a few small plates on top. The dorsal scales are strongly keeled, the anal plate is divided, as are the subcaudals. Importantly this subtribe is defined by the characteristic zig-zag pattern running down their back, more-or-less along the dorsal midbody line, this pattern only being obscured in some melanistic specimens or other aberrant mutations.

The snout is not particularly blunt as seen in the subtribe Maxhoserviperina.

This tribe is separated from specimens within the subtribe Montiviperina by the lack of any horns or projections above the eye and the presence of medium sized scales above the eye.

They are distributed in Eurasia only.

Content: *Vipera* Laurenti, 1768.

Tribe Calloselasmaiini Tribe nov.

(Terminal taxon: *Trigonocephalus rhodostoma* Kuhl, 1824)

Generally currently known as *Calloselasma rhodostoma* (Kuhl, 1824)

Diagnosis: This tribe within the Viperidae, subfamily Crotalinae, consists of two distinct genera and they are defined herein separately as a composite diagnosis for the tribe and its contents.

The species taxon, *Calloselasma rhodostoma*, monotypic for the genus is the only Asian pit viper with large crown scales and smooth dorsal scales.

There are three species within the genus *Hypnale*. All are readily identified by their more-or-less upturned snouts that produce a sort of hump-nosed effect (hence the common name "Humprosed Vipers"). This separates them from all other vipers.

All taxon within this group are moderately stout snakes.

The Malayan Pitviper, *Calloselasma rhodostoma* is found in Southeast Asia from Thailand to northern Malaysia and on the island of Java. Attains an average total body length of 76 cm, with females being slightly larger than males. The largest recorded length is 91 cm. The species is oviparous (lays eggs).

The three species of *Hypnale* occur in South-west India and island Sri Lanka. Members of this genus grow to a maximum total length of 55 cm (for *H. hypnale*). The tail length accounts for 14-18% of the total body length in males, 11-16% in females.

The snout is more or less upturned, with two species having a wart-like protuberance at the tip that is covered with tiny scales.

The anterior head shields are strongly fragmented, but the frontal scale, supraoculars and parietals are complete and quite large. The nasal scale is single, but it may have a groove that extends towards its upper edge. There are two preoculars and 2-

4 postoculars.

The loreal scale is single, but extends across the canthus rostralis so that it can be seen from above.

The supralabials and sublabials both number 7-9. Bordering the supralabials are 3-4 enlarged temporal scales, above which are 3-5 irregular rows of temporal scales. There is one pair of chin shields, each of which is slightly longer than it is wide.

There are 17 dorsal mid-body scale rows, which are weakly keeled. Apical pits are present, but very difficult to see. The keels are lacking or may be entirely absent on the first two scale rows bordering the ventrals. There are 120-158 ventrals and 28-48 mainly divided subcaudals.

Content: *Calloselasma* Cope, 1860; *Hypnale* Fitzinger, 1843.

Tribe Adelynhoserserpenini Tribe nov.

(Terminal Taxon: *Atropos nummifer* Ruppell, 1845)

Currently generally known as *Adelynhoserserpenae nummifer* (Ruppell, 1845)

Diagnosis: Separated from all other pitvipers in the Western hemisphere by the following suite of characters: The tail does not terminate in a rattle or button, the tail is not strongly prehensile, the distal portion is not curving strongly down in life or preservative, there is no conspicuous supraocular spine or horn, the distal subcaudals are single or paired, usually fewer than 200 ventrals and 31 dorsal mid-body rows, most or all subcaudals are undivided, the head is not covered with about nine large plates (and occasionally a few smaller scales as well).

Content: *Adelynhoserserpenae* Hoser, 2012 (see Hoser 2012a); *Atropoides* Werman, 1992; *Cerrophodion* Campbell and Lamar, 1992; *Porthidium* Cope, 1871.

Subtribe Porthidiumina Subtribe nov.

(Terminal Taxon: *Bothrops ophryomegas* Bocourt, 1868)

Generally currently known as *Porthidium ophryomegas* (Bocourt, 1868)

Diagnosis: Separated from all other pitvipers in the Western hemisphere by the following suite of characters: The tail does not terminate in a rattle or button, the tail is not strongly prehensile, the distal portion is not curving strongly down in life or preservative, there is no conspicuous supraocular spine or horn, the distal subcaudals are single or paired, usually fewer than 200 ventrals and 31 dorsal mid-body rows, most or all subcaudals are undivided, the chinshields and prefrontals are separated by only 2-3 gulars (as opposed to four or more), the dorsal pattern of a pale mid dorsal line offset by alternate or opposite blotches on either side (rarely pattenless); rostral usually distinctly higher than wide; snout may or may not be elevated (Genus *Porthidium*).

Content: *Porthidium* Cope, 1871.

Subtribe Cerrophodionina Subtribe nov.

(Terminal Taxon: *Bothriechis godmani* Gunther, 1863)

Currently generally known as *Cerrophodion godmani* (Gunther, 1863)

Diagnosis: The diagnosis for the tribe is incorporated here as a diagnosis for both subtribes *Adelynhoserserpenina subtribe nov.* and *Cerrophodionina subtribe nov.* as it separates all of the component genera in the single diagnosis.

Separated from all other pitvipers in the Western hemisphere by the following suite of characters: The tail does not terminate in a rattle or button, the tail is not strongly prehensile, the distal portion is not curving strongly down in life or preservative, there is no conspicuous supraocular spine or horn, the distal subcaudals are single or paired, usually fewer than 200 ventrals and 31 dorsal mid-body rows, most or all subcaudals are undivided.

If the chinshields and prefrontals are separated by only 2-3 gulars (as opposed to four or more), the dorsal pattern is of a pale mid-dorsal line offset by alternate or opposite blotches on either side (rarely pattenless); rostral usually distinctly higher

than wide; snout may or may not be elevated the snake is in the genus *Porthidium* and subtribe Porthidiumina. To be within this tribe (*Cerrophodionina*) the chinshields and prefrontals are separated by 4 or more gulars, the dorsal pattern is of mid-dorsal blotches or crossbands (sometimes only extending to the mid-dorsum, but no pale mid-dorsal line present), rostral variable, usually broader than high or only slightly higher than wide, snout unelevated, the head is not covered with about nine large plates (sometimes with a few smaller scales as well), if there are more than 138 ventrals the snake is in this subtribe (*Cerrophodionina*). If there are less than 138 ventrals the snake is in the subtribe *Adelynhoserserpenina Subtribe nov.*

Content: *Cerrophodion* Campbell and Lamar, 1992; *Atropoides* Werman, 1992.

Subtribe Adelynhoserserpenina Subtribe nov.

(Terminal Taxon: *Atropos nummifer* Ruppell, 1845)

Currently generally known as *Adelynhoserserpenae nummifer* (Ruppell, 1845)

Diagnosis: The diagnosis for this tribe is incorporated here as a diagnosis for all both subtribes *Adelynhoserserpenina subtribe nov.* and *Cerrophodionina subtribe nov.* as it separates all of the component genera in the single diagnosis.

Separated from all other pitvipers in the Western hemisphere by the following suite of characters: The tail does not terminate in a rattle or button, the tail is not strongly prehensile, the distal portion is not curving strongly down in life or preservative, there is no conspicuous supraocular spine or horn, the distal subcaudals are single or paired, usually fewer than 200 ventrals and 31 dorsal mid-body rows, most or all subcaudals are undivided.

If the chinshields and prefrontals are separated by only 2-3 gulars (as opposed to four or more), the dorsal pattern is of a pale mid dorsal line offset by alternate or opposite blotches on either side (rarely pattenless); rostral usually distinctly higher than wide; snout may or may not be elevated the snake is in the genus *Porthidium* and subtribe Porthidiumina.

To be within this tribe the chinshields and prefrontals are separated by 4 or more gulars, dorsal pattern of mid-dorsal blotches or crossbands (sometimes only extending to the mid-dorsum, but no pale mid-dorsal line present), rostral variable, usually broader than high or only slightly higher than wide, snout unelevated, the head is not covered with about nine large plates (sometimes with a few smaller scales as well), if there are more than 138 ventrals the snake is in the subtribe *Cerrophodionina*. If there are less than 138 ventrals the snake is in the subtribe *Adelynhoserserpenina subtribe nov.*

Content: *Adelynhoserserpenae* Hoser, 2012 (See Hoser 2012a).

Tribe Crotalini Gray, 1825

(Terminal Taxon *Crotalus horridus* Linnaeus, 1758)

Diagnosis: Separated from all other snakes on the planet, including other vipers, by the possession of a rattle on an unbroken tail, or in the case of one species and neonates an obvious pre-button.

They are generally medium to large species with strongly keeled scales, stout build and a large head distinct from the neck.

This tribe is herein restricted to include only the true Rattlesnakes and no other pit vipers.

Content: *Aechmophrys* Coues, 1875; *Caudisona* Laurenti, 1768; *Crotalus* Linnaeus, 1758; *Cummingea*, Hoser 2009; *Hoserea* Hoser, 2009; *Mattea* Hoser, 2009; *Piersonus* Hoser, 2009; *Sistrurus* Garman, 1883; *Uropsophus* Wagler, 1830.

Note: There are now also 8 additional named and defined subgenera within this group (see Hoser 2012b). These are: *Cottonus* Hoser, 2009; *Crutchfieldus* Hoser, 2009; *Edwardsus* Hoser, 2009; *Mullinsus* Hoser, 2009; *Pillotus* Hoser, 2009; *Rattlewellsus* Hoser, 2012; *Sayersus* Hoser, 2009; *Smythus* Hoser, 2009.

Subtribe *Crotalina* *Subtribe* nov.**(Terminal Taxon *Crotalus horridus* Linnaeus, 1758)****Diagnosis:** Includes all rattlesnake taxa excluding *Piersonus ravus*, which is placed in the monotypic subtribe *Piersonina*.*Piersonus* (subtribe *Piersonina subtribe* nov.) is separated from all other rattlesnakes (this tribe) by the following suite of characteristics. In common with the two species in the genus *Sistrurus*, it has nine (usually) large head plates. The other rattlesnakes all have smaller and irregular head shields.*Piersonina* is separated from the the genus *Sistrurus* by the fact that the upper preocular is not in contact with the postnasal, the rostral is curved over the snout; canthus rostralis is rounded, dorsal body blotches are longer than wide unless the snake is melanistic (black) and often in distinct diamond shapes; body pattern commences from the neck; by contrast in *Sistrurus*, the upper preocular is in contact with the postnasal; rostral is not curved over the snout; the canthus rostralis is sharply angled and the dorsal body blotches are square or wider than long, body pattern commences from the head proper.In all rattlesnakes of the genus *Sistrurus* (the two species being *S. catenatus* and *S. milliaris*), the hemipenis has a gradual transition from spines to calyces. However in all other rattlesnakes including in the subtribe *Piersonina* the hemipenis has an abrupt transition from spines to fringes at the point of bifurcation of the lobes.**Content:** *Aechmophrys* Coues, 1875; *Caudisona* Laurenti, 1768; *Crotalus* Linnaeus, 1758; *Cummingea*, Hoser 2009; *Hoserea* Hoser, 2009; *Mattea* Hoser, 2009; *Sistrurus* Garman, 1883; *Uropsophus* Wagler, 1830.**Note:** There are now also 8 additional named and defined subgenera within this group (see Hoser 2012b). These are: *Cottonus* Hoser, 2009; *Crutchfieldus* Hoser, 2009; *Edwardsus* Hoser, 2009; *Mullinsus* Hoser, 2009; *Pillotus* Hoser, 2009; *Rattlewellsus* Hoser, 2012; *Sayersus* Hoser, 2009; *Smythus* Hoser, 2009.**Subtribe *Piersonina* *Subtribe* nov.****(Terminal Taxon *Crotalus ravus* Cope, 1865)**Currently generally known as *Piersonus ravus* (Cope, 1865)**Diagnosis:** This subtribe is monotypic for the genus and species *Piersonus ravus*.This species within is separated from all other rattlesnakes by the following suite of characteristics. In common with the two species in the genus *Sistrurus*, it has (usually) nine large head plates. The other rattlesnakes all have smaller and irregular head shields.*Piersonina* is separated from the genus *Sistrurus* by the fact that the upper preocular is not in contact with the postnasal, the rostral is curved over the snout; canthus rostralis is rounded, dorsal body blotches are longer than wide unless the snake is melanistic (black) and often in distinct diamond shapes; body pattern commences from the neck; by contrast in *Sistrurus*, the upper preocular is in contact with the postnasal; rostral is not curved over the snout; the canthus rostralis is sharply angled and the dorsal body blotches are square or wider than long, body pattern commences from the head proper.In all rattlesnakes of the genus *Sistrurus* (the two species being *S. catenatus* and *S. milliaris*), the hemipenis has a gradual transition from spines to calyces. However in all other rattlesnakes including in the subtribe *Piersonina* the hemipenis has an abrupt transition from spines to fringes at the point of bifurcation of the lobes.*Piersonus ravus* is only found in the mountains of central and southern Mexico, including the highlands of Morelos, Puebla and Oaxaca. Vertical distribution is estimated between 1500 – 3000m above sea level. Rarely does it exceed 70 cm in total body length.*P. ravus* inhabits primarily forests of the temperate zones, especially pine-oak forests. They can also be found in temperate grasslands, cloud forest, high altitude thorn scrub and tropical

deciduous forest.

Its common name is the Mexican Pygmy Rattlesnake.

Content: *Piersonus* Hoser, 2009.**Tribe *Jackyhoserini* *Tribe* nov.****(Terminal Taxon: *Lachesis picta* Tschudi, 1845)**Currently generally known as *Jackyhoserea pictus* (Tschudi, 1845)**Diagnosis:** A large tribe of live-bearing pitvipers found in the New World whose centre of distribution is South America.

Separated from all other pitvipers by the following suite of characteristics: Live bearing. No rattle or similar unbroken pre-button on the end of the unbroken tail. The tail is not prehensile, the rostral is wider than high, the supracephalic scales are either small and keeled although in some species there may be some smallish plate-like scales, no supraocular spines, the supracephalic scales may be either mostly flat, with small keels or sometimes strongly keeled, the rostral is wider than high to slightly higher than wide, 21-29 dorsal mid-body rows, 124-254 ventrals, 30-91 usually divided subcaudals, tail may or may not be prehensile, the tail spine is relatively long, the body may be slender to moderately stout, the distal portion of the heimpenes have proximal calyces, papillate or spinulate, usually smooth distally.

Content: *Bothriopsis* Peters, 1861; *Bothrocophias* Cutberlet and Cambell, 2001; *Bothropoides* Fenwick, et al., 2009; *Bothrops* Wagler, 1824; *Jackyhoserea* Hoser, 2012 (See Hoser 2012c); *Rhinocerophis* Garman, 1881.**Subtribe *Bothropina* *Subtribe* nov.****(Terminal Taxon: *Coluber lanceolatus* Bonnatere, 1790)**Currently generally known as *Bothrops lanceolatus* (Bonnaterre, 1790)**Diagnosis:** Separated from all other pitvipers in the tribe *Jackyhoserini* *tribe* nov. and all other pitvipers in the Western Hemisphere by the following suite of characters: Tail does not terminate in a button or rattle; if the tail is strongly prehensile, the distal portion curves strongly downward in life or preservative, with a relatively long tail spine and usually divided subcaudals (Genus *Bothriopsis*): if the tail is not prehensile, the distal portion does not curve strongly downward in life or preservative, there is no conspicuous supraocular spine or horn, the distal subcaudals are either single or paired, there are usually fewer than 200 ventrals and 31 dorsal mid-body scale rows; most or all subcaudals are divided, there's no distinct series of pale spots or bars on the infralabials; dorsals are often strongly keeled but not tubercular; intersupraoculars are usually keeled, skull narrow, distance across frontal bones are less than the width of the skull at the anterior end of the supratemporals; Dorsal pattern consisting of dark vertebral rhomboids bordered by paler lines (genus *Bothrops*); *Jackyhoserina* *Subtribe* nov. (see below) are separated from all species within the genus *Bothrops* (defined above and forming a part of this description), by the following suite of characters: The canthus does not curve upwards, there is a dorsal pattern of small blotches, many of which are located mid-dorsally or fused to form a zig-zag stripe, occasionally trapezoidal or triangular that alternate or meet mid-dorsally; 3-10 intersupraoculars; 8-11 supralabials with the second, third or none fused with the prelacanal; 10-12 infralabials; 21-25 (usually 23) dorsal mid body rows, 157-186 ventrals in males, 165-186 ventrals in females, 37-63 all divided subcaudals in males and 33-58 all or mostly divided subcaudals in females.**Content:** *Bothriopsis* Peters, 1861; *Bothrops* Wagler, 1824.**Subtribe *Bothropoidina* *Subtribe* nov.****(Terminal Taxon: *Bothrops neuwiedi* Wagler, 1824)**Currently generally known as *Bothropoides neuwiedi* (Wagler, 1824)**Diagnosis:** Separated from all other pitvipers in the tribe *Jackyhoserini* *tribe* nov. and all other pitvipers in the Western

Hemisphere by the following suite of characters: Tail does not terminate in a button or rattle; if the tail is strongly prehensile, the distal portion curves strongly downward in life or preservative, with a relatively long tail spine and usually divided subcaudals (Genus *Bothriopsis*) (see above subtribe Bothropina); if the tail is not prehensile, the distal portion does not curve strongly downward in life or preservative, there is no conspicuous supraocular spine or horn, the distal subcaudals are either single or paired, there are usually fewer than 200 ventrals and 31 dorsal mid-body scale rows; most or all subcaudals are divided, there's no distinct series of pale spots or bars on the infralabials; dorsals are often strongly keeled but not tubercular; intersupraoculars are usually keeled, skull narrow, distance across frontal bones are less than the width of the skull at the anterior end of the supratemporals; Dorsal pattern not consisting of dark kidney-shapes, Dorsal head lacking a well-defined pattern (*Bothropoides*).

Content: *Bothropoides* Fenwick, et al. 2009.

Subtribe Rhinocerophiina Subtribe nov.

(Terminal Taxon: *Bothrops ammodytoides* Leybold, 1873)

Currently generally known as *Rhinocerophis ammodytoides* (Leybold, 1873)

Diagnosis: Separated from all other pitvipers in the tribe Jackyhoserini *tribe nov.* and all other pitvipers in the Western Hemisphere by the following suite of characters: Tail does not terminate in a button or rattle; if the tail is strongly prehensile, the distal portion curves strongly downward in life or preservative, with a relatively long tail spine and usually divided subcaudals (Genus *Bothriopsis*) (see above subtribe Bothropina); if the tail is not prehensile, the distal portion does not curve strongly downward in life or preservative, there is no conspicuous supraocular spine or horn, the distal subcaudals are either single or paired, there are usually fewer than 200 ventrals and 31 dorsal mid-body scale rows; most or all subcaudals are divided, there's no distinct series of pale spots or bars on the infralabials; dorsals are often strongly keeled but not tubercular; intersupraoculars are usually keeled, skull narrow, distance across frontal bones are less than the width of the skull at the anterior end of the supratemporals; Dorsal pattern consisting of large brown kidney-shapes; Dorsal head with well-defined pattern. Mostly dark with four or five large brown patches separated by very thin pale lines (Genus: *Rhinocerophis*).

Content: *Rhinocerophis* Garman, 1881.

Subtribe Jackyhoserina Subtribe nov.

(Terminal Taxon: *Lachesis picta* Tschudi, 1845)

Currently generally known as *Jackyhoserea pictus* (Tschudi, 1845)

Diagnosis: Separated from all other pitvipers in the tribe Jackyhoserini *tribe nov.* and all other pitvipers in the Western Hemisphere by the following suite of characters: Tail does not terminate in a button or rattle; if the tail is strongly prehensile, the distal portion curves strongly downward in life or preservative, with a relatively long tail spine and usually divided subcaudals (Genus *Bothriopsis*) (see above subtribe Bothropina); if the tail is not prehensile, the distal portion does not curve strongly downward in life or preservative, there is no conspicuous supraocular spine or horn, the distal subcaudals are either single or paired, there are usually fewer than 200 ventrals and 31 dorsal mid-body scale rows; most or all subcaudals are divided, there's no distinct series of pale spots or bars on the infralabials; dorsals are often strongly keeled but not tubercular; intersupraoculars are usually keeled, skull narrow, distance across frontal bones are less than the width of the skull at the anterior end of the supratemporals; Dorsal pattern consisting of dark vertebral rhomboids bordered by paler lines (genus *Bothrops*); Jackyhoserina *Subtribe nov.* are separated from all species within the genus *Bothrops* (defined above and forming a part of this description), by the following suite of characters: The canthus does not curve upwards, there is a dorsal pattern of small blotches, many of which are located

mid-dorsally or fused to form a zig-zag stripe, occasionally trapezoidal or triangular that alternate or meet mid-dorsally; 3-10 intersupraoculars; 8-11 supralabials with the second, third or none fused with the prelacanul; 10-12 infralabials; 21-25 (usually 23) dorsal mid body rows, 157-186 ventrals in males, 165-186 ventrals in females, 37-63 all divided subcaudals in males and 33-58 all or mostly divided subcaudals in females.

Content: *Jackyhoserea* Hoser, 2012 (See Hoser 2012c).

Genus content: *J. pictus* (type species), *J. andianus*, *J. barnetti*, *J. lojanus*, *J. roedingeri*.

Note: Subgenus *Daraninus* Hoser 2012 is monotypic for the species taxon, *J. andianus*.

Subtribe Bothrocophiina Subtribe nov.

(Terminal Taxon: *Bothrops hyopora* Amaral, 1935)

Currently generally known as *Bothrocophias hyopora* (Amaral, 1935)

Diagnosis: Separated from all other pitvipers in the tribe Jackyhoserini *tribe nov.* and all other pitvipers in the Western Hemisphere by the following suite of characters: Tail does not terminate in a button or rattle; if the tail is strongly prehensile, the distal portion curves strongly downward in life or preservative, with a relatively long tail spine and usually divided subcaudals (Genus *Bothriopsis*) (see above subtribe Bothropina); if the tail is not prehensile, the distal portion does not curve strongly downward in life or preservative, there is no conspicuous supraocular spine or horn, the distal subcaudals are either single or paired, there are usually fewer than 200 ventrals and 31 dorsal mid-body scale rows; most or all subcaudals are divided, there is a distinct series of pale spots or bars on the infralabials; dorsal keels are tubercular; intersupraoculars are smooth or keeled, skull is broad, distance across the frontal bones equals the width of the skull at the anterior end of the supratemporals (Genus: *Bothrocophias*).

Content: *Bothrocophias* Cutberlet and Cambell, 2001.

Tribe Hulimkini Tribe nov.

(Terminal taxon: *Hulimkai fasciata*)

Diagnosis: Separated from all other Australasian and Melanesian land dwelling (non-sea snake) elapids by the following suite of characters: No suboculars or curved tail spine at the end of the tail; the scalation is smooth and shiny with 17 (rarely 19) mid body rows; 140-185 ventrals that are not in any way keeled or notched; no suboculars; frontal longer than broad and more than one and half times as broad as the supraocular; no barring of the labials; internasals present; 20-40 all single subcaudals, single anal; 3-7 small solid maxillary teeth follow the fang; eye is of a medium size, the latter trait separating this snake from all other species of the genera (*Cryptophis* Worrell 1961, *Parasuta* Worrell 1961, *Rhinoplocephalus* Müller 1885, *Suta* Worrell 1961, *Unechis* Worrell 1961) (known herein as Tribe Sutini Hoser, 2012) (refer to elsewhere in Hoser 2012k); further separated from snakes within Tribe Sutini Hoser, 2012 by the fact that snakes (one species only) within this tribe have a well-defined dorsal pattern consisting of dark (near black) and lighter (usually brown) blotches on the dorsal surface forming a general patterned appearance not seen in the species within Tribe Sutini Hoser, 2012 (Hoser, 2012k).

A western Australian endemic, it is further separated from Tribe Sutini Hoser, 2012 (Hoser, 2012k) snakes by its proportionately longer body.

Note the relevant taxon identified here is seen in most texts under the name *Suta fasciata* (e.g. Cogger 2000) or *Denisonia fasciata* (e.g. Shine 1985), but was placed in a new genus *Hulimkai* Hoser 2012 in a paper published by Hoser (2012j).

Content: *Hulimkai* Hoser, 2012

CHARLESPIERSONSERPENS (MACMILLANUS) JACKYHOSERAE SP. NOV.

Holotype: A male specimen lodged at the National Museum of Natural History, Smithsonian Institution, USNM, specimen number: 119505 from Gusiko, Huon Peninsula, New Guinea.

The relevant Museum is a government owned public facility that allows researchers access to their collections and the holotype specimen is already lodged with and belongs to this facility.

Diagnosis: Separated from the species *Charlespiersonserpens lorentzi* by the following suite of characters:

Charlespiersonserpens jackyhoserae sp. nov. has 181 ventrals versus a range of 156-173 in *Charlespiersonserpens lorentzi*; *Charlespiersonserpens lorentzi* has 8 supralabials (rarely nine on one side), versus 9 supralabials on both sides in *Charlespiersonserpens jackyhoserae* sp. nov.

Furthermore *Charlespiersonserpens jackyhoserae* sp. nov. is the only species within any *Charlespiersonserpens* or *Dendrelaphis* with the entire supraoccipital covered by the axial musculature.

Charlespiersonserpens jackyhoserae sp. nov. also differs from *Charlespiersonserpens lorentzi* in hemipenal morphology.

In this species the hemipenis extends to subcaudal 13, with longitudinal rows of small spines (each about one sixth of a subcaudal long), the rows of spines nearly to the tip and well distal to the rightward angulation of the sulcus at subcaudal 9; an apical awn, about three subcaudals long and with numerous tiny spinules; no crossfold on the organ, but lips of sulcus raised as a pair of prominent folds. The structure of the hemipenis in *Charlespiersonserpens jackyhoserae* sp. nov. shares traits with *Charlespiersonserpens lorentzi* including the black spotting on top of the head that looks like calligraphic penciling, but differs in that the apical awn is longer, being only 1-2 subcaudals in *lorentzi*.

Charlespiersonserpens jackyhoserae sp. nov. is known only from the holotype. It is therefore currently only known from the Huon Peninsula, New Guinea, but presumably also occurs in nearby parts of New Guinea north of the Central Cordillera.

Until proven otherwise, the taxon, *Charlespiersonserpens lorentzi* should be regarded as confined to the region south of the Central Cordillera of island New Guinea in the general vicinity of the type locality in southern Irian Jaya in the general vicinity of the Lorentz and Mimika Rivers.

Etymology: Named in honor of my daughter Jacky Hoser who has spent the first 11 years of her life educating others about reptiles in Australia in the face of incredible adversity, including attacks from inexperienced business competitors motivated solely by a desire to extract money from people on false pretexts aided and abetted by corrupt wildlife officers who happen to be their friends. These wildlife officers and agents acting on their behalf have unlawfully assaulted and attacked Jacky both at school (on 10 August 2011) and even in her bedroom at home on 17 August 2011.

Her courage in dealing with these attacks and in continuing to educate others about reptiles with correct factual information deserves more than one great honor and recognition.

GERRHOPILUS CAROLINEHOSERAE SP. NOV.

Holotype: A specimen collected from the Talaud Archipelago, Indonesia, lodged at the Museum Zoologicum Bogoriense (MZB), Java, Indonesia, specimen number: MZB 3227.

This Museum is a government owned facility that allows researchers access to their collection.

Diagnosis: This species would normally be identified as *G. hedraeus* (Savage, 1950) from which it is easily separated by the following suite of characters: 255 ventrals, 13 or 14 subcaudals; the eye is restricted to the ocular scale not reaching the suture to the preocular; a subocular is absent (in contrast to *G. ater* from Sulawesi, the Moluccas and New Guinea). *G. carolinehoserae* sp. nov. has two preoculars (versus one in *G. hedraeus*) and the latter is not smaller than the ocular. The upper jaw is not visible laterally. This species (*G.*

carolinehoserae sp. nov.) appears to be most closely *G. hedraeus* which is found on several Philippine Islands including Mindanao, Luzon and Negros, the type locality.

Distribution: *G. carolinehoserae* sp. nov. is known only from the type locality, the Talaud Archipelago, Indonesia, which lies between the biogeographic realms of Sulawesi, the Philippines, and the Moluccas.

Etymology: Named in honor of Caroline Hoser of London in the UK, who spent considerable time with myself doing herpetological fieldwork on Death Adders (*Acanthophis antarcticus*) from West Head, NSW, Australia and who also spent considerable time working with me on python taxonomy in the early 1980's.

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CONFLICT OF INTEREST

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

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