

A taxonomic revision of the colubrinae genera *Zamenis* and *Orthriophis* with the creation of two new genera (Serpentes:Colubridae).

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ABSTRACT

The Colubridae have recently been subject of several major taxonomic revisions.

Molecular studies by Utiger, et. al. 2002 (specific to the Colubridae) led to the erection of two new genera within the *Elaphae* (senso lato) group.

Pyron et. al. (2010) in a global review of the snakes, presented data that highlighted taxonomic inconsistencies in terms of the definition of the genus level for a small percentage of the world's thousands of species of advanced snakes.

Two colubrid genera of snakes, namely; *Zamenis* Wagler, 1830 and *Orthriophis* Utiger et. al., 2002 (both groups commonly known as ratsnakes) have been included in several recent molecular and multivariate studies. They have consistently been found to be paraphyletic at the genus level.

As a result of this unavoidable reality, both groups of snakes are reclassified herein.

In terms of the five species within the nominate genus *Zamenis*, *Zamenis* retains the species *Z. longissimus* and *Z. lineata*, the genus *Callopeltis* Fitzinger, 1834 is resurrected for the species *Z. situla*, while a new genus *Richardwellsus* gen. nov. is formally erected and named to accommodate the species *persica* and *hohenackeri*.

For the four species currently in the genus *Orthriophis*, *O. taeniurus* and *O. moellendorffi*, remain within that genus, while a new genus *Martinekea* gen. nov. is formally erected and named to accommodate the species *O. cantoris* and *O. hodgsoni*.

Keywords: taxonomic revision; taxonomy; new genus; new genera; *Richardwellsus*; *Martinekea*; *Zamenis*; *Callopeltis*; *Orthriophis*; *Elaphe*; *colubridae*; Martinek; Koala; Scam; Richard Wells; taxonomist; systematics; nomenclature; Maryann Martinek; Hoser; snake; *longissimus*; *lineata*; *situla*; *persica*; *hohenackeri*; *taeniurus*; *moellendorffi*; *cantis*; *hodgsoni*.

INTRODUCTION

Ratsnakes are medium to large snakes that usually kill their prey by constriction.

They occur through a great portion of the Holarctic region. They feed primarily on rodents and birds.

With some species exceeding 3 m (10 feet), they can occupy the top level of some food chains as an alpha predator. Due to their tractability with humans, many are kept as pets, with the North American Corn Snake being one of the staples of the global pet trade, known as "Herpetoculture". While some ratsnake species can be skittish and sometimes "aggressive" to handlers, bites are regarded as not being a serious medical issue due to the relatively weak biting force and the lack of any toxic venom.

Until the latter part of the twentieth century most ratsnakes were assigned to the "catch all" genus *Elaphe* Fitzinger 1833.

However as a result of several major studies, old generic names for some species groups have been resurrected. Where none have been available, new names have been proposed and generally moved into acceptance by other herpetologists.

In a landmark study, Utiger, et. al. (2002) inferred phylogenetic relationships of the Holarctic ratsnakes (*Elaphe sensu lato*) after analysing portions of two mitochondrial genes 12S rRNA and COI.

They assigned ten species to *Elaphe* Fitzinger, the (type) species *longissima*, to *Natrix* Laurenti and four western Palearctic species to *Zamenis* Wagler. The west European *Rhinechis scalaris* remained monotypic for that genus and the authors erected a new genus to accommodate the east Asian *Coluber porphyriacus* Cantor, namely *Oreophis*, Utiger et. al. 2002.

Four oriental species were placed into another new genus erected, namely *Orthriophis*, Utiger et. al. 2002.

The authors found the new world ratsnakes and allied genera to be broadly monophyletic. *Coluber flavirufus* Cope 1867 was referred to *Pseudoelaphe* Mertens and Rosenberg 1943. *Pantherophis* Fitzinger 1843 was revalided for *Coluber guttatus* L. (type species) and further Nearctic species (*bairdi*, *obsoletus* and *vulpinus*).

Senticolis triaspis was found to be a sister taxon of New World ratsnakes, including genera *Arizona*, *Bogertophis*, *Lampropeltis*, *Pituophis* and *Rhinocelus*. The East Asian *Coluber conspicillatus* Boie 1826 and *Coluber mandarinus* Cantor 1842, apparently formed a monophyletic group and were referred to *Eupriophis* Fitzinger 1843. Three old world species with *Elaphe sensu lato* *bella*, (s.l.) *frenata* and (s.l.) *prasina* remained unassigned. The various groups of ratsnakes (all within tribe Lampropeltini) showed characteristic hemipenis features.

These results have been revisited by several taxonomists since 2002 and mostly stood up to robust scrutiny. However several studies, including Pyron et. al. (2002) have found the two genera *Zamenis* and *Orthriophis* to be paraphyletic at the genus level based on the molecular data and when the genus level is defined consistently across a broad range of colubrid taxa.

Revisiting the data of Utiger et. al., confirms this position, indicating that the placement of species within the genera *Zamenis* and *Orthriophis* was too conservative, even on the basis of the data they presented in their 2002 paper (refer specifically to figs 3 and 4).

As a result of these results, the position outlined in the abstract above has been taken by myself.

In terms of the five species within the nominate genus *Zamenis*, *Zamenis* retains the species *Z. longissimus* and *Z. lineata*, the genus *Callopeltis* Fitzinger 1834 is resurrected for the species *Z. situla*, while a new genus *Richardwellsus* gen. nov. is formally erected and named to accommodate the species *persica* and *hohenackeri*.

For the four species currently in the genus *Orthriophis*, *O. taeniurus* and *O. moellendorffi*, remain within that genus, while a new genus *Martinekea* gen. nov. is formally erected and named to accommodate the species *O. Cantoris* and *O. hodgsoni*.

GENUS ZAMENIS WAGLER, 1830

These ratsnakes grow to between 60-140 cm in total length as adults and are moderately built snakes. Scalation is 192-255 ventrals, 21-27 dorsal mid body rows, 51-92 subcaudals.

Preferred habitat is dry open woodlands and shrubland, field edges, traditionally cultivated land, stone walls, old buildings and of course broken down old buildings and rubbish dumps. It can be found from sea level to 1,600 metres in altitude.

Zamenis are easily separated from all other *Elaphe sensu lato* by the presence of a distinct basal hook on the hemipenis instead of more or less uniform spines as in *Elaphe*.

These snakes have been extensively studied, in terms of morphology, taxonomy, habits and captivity, with important studies published by Afrasiab et. al. (2011), Bennemann (2007), Beshkov and Nanev (2006), Bezman-Moseyko (2010), Böttger (1880), Burbin and Lawson (2007), Capula, et. al. (2006), Capula, et. al. (2008), Coppen (1995), Dusej (1986), Frynta et. al. (1997), Guiller (2009), Helfenberger (2001), Joger, et. al. (2007), Kammel (2009), König (1985), Krefel (2004), Kwet (2007), Lenk, et. al. (2001), Lenk and Wüster (1999), Mattison (1997), Niebergall (2003), Nilson and Claes (1984), Petrov, et. al. 2006, Pottier, et. al. 2008, Schätti and Baran (1988), Schätti et. al. (2010), Schlüter (2006), Schlüter (2009), Schulz (1996), Schreiber (2009), Schweiger (1994), Sehnal and Schuster (1999), Sigg (1984), Sindaco et. al. (2000), Sos (2008), Stevens (1995), Strödicke and Gerisch (1999), Vaccaro and Turrisi (2007), Utiger, et. al. (2002) and Utiger, et. al. (2005), Venchi and Sindaco (2006), Waitzmann (1993), Werning (2003), Wirth (2009) and Wütschert (1984).

As of early 2012, *Zamenis* currently included four known western Palearctic species.

These are *Natrix longissima* Laurenti 1768 (type species), *Coluber hohenackeri* Strauch 1873, *Callopeltis longissimus* var. *lineata* Camerano 1891 (see also *Coluber romanus* Suckow 1798), *Coluber longissima* var. *persica* Werner 1913 and *Coluber situla* Linnaeus 1758.

The genus as traditionally understood can be easily split three ways on morphological characteristics.

The species taxa *lineatus* and *longissimus* have a bulbous apex of the hemipenis whereas it is subcylindrical in the remaining three species (for detail see fig 5, in Utiger et. al. 2002).

The species taxon *situla* is separated from the other four species by scalation. It has 25-27 dorsal mid body scale rows, versus 21-23 in all other species formerly placed within *Zamenis*. It is herein placed in the genus *Callopeltis* Fitzinger 1834.

Converse to the situation seen in *lineatus* and *longissimus* the apex of the hemipenis is subcylindrical rather than bulbous in the taxa *persica* and *hohenackeri*. They are herein placed in the genus *Richardwellsus* gen. nov.

GENUS RICHARDWELLSUS GEN. NOV.

Type species: *Coluber longissima* var. *persica* Werner, 1913

Diagnosis: Separated from all other ratsnakes formerly placed in the genus *Zamenis* by the following:

Converse to the situation seen in *Z. lineatus* and *Z. longissimus* the apex of the hemipenis is subcylindrical rather than bulbous in the taxa placed in the genus *Richardwellsus* gen. nov., namely *R. persica* and *R. hohenackeri*;

The species taxon *situla* (also formerly of *Zamenis*) is separated from this genus by scalation. It has 25-27 dorsal mid body scale rows, versus 21-23 in all other species; it is herein placed in the genus *Callopeltis* Fitzinger 1834, *C. situla* has similar hemipenial morphology to snakes in the genus *Richardwellsus* gen. nov.;

The preceding diagnosis can also be used as a diagnosis for each of the genera *Zamenis* and *Callopeltis*.

Richardwellsus gen. nov. can be further separated from the genera *Zamenis* and *Callopeltis* by the presence of lower ventral keels.

Callopeltis is usually greyish in body colour with patterning in the form of red blotches, stripes or a combination of both. The blotches are often etched with black.

Richardwellsus gen. nov. and *Zamenis* are variable in colour and various mutations for the given species in captivity add to the variety of phenotypes likely to be seen.

The species *R. persica* is essentially confined to Iran. The species *R. hohenackeri* occurs widely in the middle-east in an area bound by Turkey in the West, Iran in the East, Georgia in the North and Israel in the south.

Callopeltis situla is found in an area broadly bounded by Turkey in the south-west, Ukraine in the North, Poland in the North-west and Italy in the south-west.

Zamenis lineatus is confined to Italy, mainly in the region of Naples, while *Z. longissimus* is found in most parts of continental Europe in an arc spreading south-east to Iran.

Etymology: Named after a well-known Australian taxonomist Richard W. Wells. While he has been lampooned by other so-called herpetologists who have highlighted his many errors, mistakes and blunders, it is the far greater number of things that he got correct in his published studies that will ultimately be his legacy. Many of these were conclusions he made that were well beyond the popular thinking of his time.

I shall also relate some personal experience I had with Richard Wells that will add context to what he's published.

As a high school student in the early 1970's I recall sitting in meetings of the Australian Herpetological Society at the Australian Museum in William Street, Sydney, Australia.

Speakers would attend each month and show countless slides of reptiles of all shape and form from their travels in remote parts of Australia.

By and large, nobody had a clue about many of the smaller and more obscure species. The notable exception was Richard Wells. If the species had a name, he knew it and he was able to identify pretty much everything that was shown and even down to locality.

While his major papers of 1983 and 1985 (Wells and Wellington 1983, Wells and Wellington 1985) have been widely criticised for their extreme brevity of important descriptive and diagnostic information, it would be foolish for critics to assume that this was due to a lack of detailed knowledge by Wells at the time he wrote those papers.

More relevant, is that this detailed expertise of Wells is why

so many of his alleged "guesses" in terms of taxonomy have long since been shown to be "lucky" or correct.

Species in genus *Richardwellsus* gen. nov.

Richardwellsus persica (Common name is Persian Ratsnake)

Richardwellsus hohenackeri (Common name is Transcaucasian Ratsnake)

Species in the genus *Callopeltis* Fitzinger 1834.

Callopeltis situla (Common name is Leopard Snake)

Species remaining in the genus *Zamenis* Wagler, 1830

Zamenis longissimus (Common name is Aesculapian Ratsnake)

Zamenis lineata (Common name is Italian Lined Ratsnake)

GENUS ORTHRIOPHIS UTIGER ET. AL. 2002

Named from the Greek word *orthros* meaning dawn and *ophis*, i.e. snake, with a masculine gender, the genus name relates to the documented early morning activity of members of the species.

The snakes are of medium build with a long and slender head. Scalation ranges from 19-27 dorsal mid-body scale rows, 212-305 ventrals and 222-272 precaudal vertebrae.

Until now the genus has included four species, namely *taeniurus*, *moellendorffi* (the type species "hoc loco" Utiger et. al. 2002, p. 119), *cantoris* and *hodgsoni*, the latter two assigned to the genus *Martinekea* gen. nov. (see below).

Adult size attained is up to 2.3 metres in *taeniurus*. All have bilobed hemipenes without basal hooks.

Studies of Snakes within the genus *Orthriophis* as defined by Utiger et. al. are many, and include the following: Barone (2003), Cox, et. al. (1998), Gumprecht (2003a), Gumprecht (2003b), Gumprecht (2004a), Gumprecht (2004b), Günther (1860), Hobcroft and Schultz (2010), Ji. et. al. (1999), Kramer (1977), Ryabov and Popovskaya (2000), Schultz (1996), Schultz (2010), Wang, et. al. (1999), Zhao and Adler (1993), Zhao and Li (1987) and Ziegler et. al. (2007).

GENUS MARTINEKEA GEN. NOV.

Type species: *Spilotes hodgsonii* Günther 1860

Diagnosis: Separated from all other *Orthriophis* by the following suite of characteristics: the hemipenis of the component species present as relatively narrow at the base, widening significantly towards the lobes, yielding a fairly large "heart shaped" profile; by contrast in the two species remaining in *Orthriophis* the hemipenis is usually more even in thickness from the base to the end of the lobes and while widening as well, it does not present in the more characteristic triangular or heart-shaped profile seen in *Martinekea* gen. nov..

In this genus, the subocular is generally absent, while usually present in the remaining *Orthriophis*.

Scalation in *Martinekea* gen. nov. is smooth with 212-247 ventrals, 65-78 subcaudals and 21-25 dorsal mid-body rows.

The number of subcaudals (78 or less) separates the genus *Martinekea* gen. nov. from *Orthriophis* which always has more than 82 subcaudals.

Habits include a preference for moist areas, especially forests and even jungle. These snakes sometimes occur in dry forests and edges of fields, especially those that are in close proximity to water or wetter habitats..

Martinekea gen. nov. occur at altitudes ranging from 1,000 and 3,200 m. Distribution of the genus includes The Himalayas and nearby hills towards Burma (Myanmar)

including Tibet (China).

The genera *Martinekea* gen. nov. and *Orthriophis* are separated exclusively by distribution and habitat areas where the species may otherwise be sympatric.

Martinekea gen. nov. is unknown from elevations below 1,000 metres, while *Orthriophis* is unknown from elevations above 800 metres.

The distribution of the two genera, while partially overlapping in the east Himalayas and nearby hilly areas, is mainly mutually exclusive, with *Orthriophis* being centred in the region of North Vietnam and China.

Etymology: Named after a retired Australian army major, Maryann Martinek.

In 2009 to 2010 along with myself she played an important role in exposing a scam.

The scam involved corrupt officers within the Victorian Wildlife Department (DSE) and a Country Fire Authority (CFA) employee who contrived to make footage of a male Koala drinking from a bottle in a bushfire zone, falsely claiming the bottle-raised pet was in fact an injured fire victim. The people involved in the scam then unlawfully fleeced several hundred thousand dollars from well-meaning people in the form of "donations" thereby effectively stealing money from worthwhile charities in desperate need of money.

Martinek paid the ultimate price of blowing the whistle against a department and the officials noted for their criminal activities and aggressive hatred of those who expose them. In her case she was harassed by staff who unlawfully tagetted her at home and work.

Then there were the associated "stalkers" and staff who spent most of the time working as internet "trolls" who spread false and defamatory material about her on the internet and through search engine optimisation methods (SEO) ensured that anyone who searched for her by name would be directed to false and defamatory claims. The DSE staff then abused a quazi legal process and with a high-powere team of lawyers, literally outgunned her and financially destroyed her. All this came from a so-caled government wildlife department that was supposed to be protecting the environment and not harassing corruption whistleblowers.

It's therefore fitting that a courageous woman such as Maryann Martinek should be honoured to have a genus of snakes carry her name.

Details of the scam itself were published by Hoser (2010), in a 64-page volume of *Australasian Journal of Herpetology* Issue number 8.

Species in the genus *Martinekea* gen. nov.

Martinekea hodgsonii (common name is Hodgson's Ratsnake)

Martinekea cantor (common name is Cantor's Ratsnake)

Species remaining in the genus *Orthriophis* Utiger et. al. 2002

Orthriophis taeniurus (type species) (common name is Beauty Snake)

Orthriophis moellendorffi (common name is 100 Flower Ratsnake)

SUMMARY

Notwithstanding short-term resistance to any changes in existing taxonomy and nomenclature, the evidence is already clearly in support of the taxonomy and nomenclature within this paper and hence both new genera names are likely to

move into common usage within a short period of time after this publication.

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Many herpetologists in Australia and elsewhere, including the USA and Europe and other people with no direct interest in reptiles have assisted with this and other projects either by direct assistance or in other ways that have enabled my research to be done.

Most have been named previously either at the end of other papers or in the relevant sections of my nine books.

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