

## A division of the South-east Asian Ratsnake genus *Coelognathus* (Serpentes: Colubridae).

RAYMOND T. HOSER

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

Phone: +61 3 9812 3322 Fax: 9812 3355 E-mail: viper007@live.com.au

Received 10 March 2012, Accepted 8 April 2012, Published 30 April 2012.

### ABSTRACT

A number of recent studies of the ratsnake genus *Elaphe sensu lato* have shown it to be a paraphyletic group.

Recent studies published include those of Helfenberger (2001), Utiger et. al. (2002), Utiger et. al. (2005) and Burbin and Lawson (2007).

As a result *Elaphe* has been subdivided into several genera that better reflect that phylogeny of similar species.

Notably and relevant here, is that in 2002, Utiger et. al. resurrected the genus *Coelognathus* Fitzinger, 1843 to accommodate five superficially similar Asiatic ratsnakes.

Further studies since then, including that of Pyron et. al. (2011) have shown that this genus contains a genetically diverse assemblage of snakes of deep historic splits in lineage.

As a result the genus is split three-ways.

The type species *radiatus* (*Coluber radiatus* Boie, 1827) remains within the genus *Coelognathus*. The species *helena* (*Coluber helena* Daudin, 1803) is placed in the herein resurrected genus *Cynophis* Gray, 1849.

For the remaining three species, namely *erythrurus* (*Plagiodon erythrurus* Duméril, Bibron and Duméril, 1854), *subradiatus* (*Coluber subradiatus* Schlegel, 1837) and *flavolineatus* (*Coluber flavolineatus* Schlegel, 1837) there are no available names.

They are therefore herein placed in a new genus, *Euanedwardsserpens* gen. nov, which is formally named and defined in accordance with the Zoological Code.

**Keywords:** Taxonomic revision; new genus; species; *Coelognathus*; *Elaphe*; *Euanedwardsserpens*; systematics; Colubrid; ratsnake; *radiatus*; *helena*; *erythrurus*; *subradiatus*; *flavolineatus*.

### INTRODUCTION

Ratsnakes have been the subject of taxonomic interest in the period 2000-2012 with several reclassifications being made and most generally accepted.

Better-known studies published include those of Helfenberger (2001), Utiger et. al. (2002), Utiger et. al. (2005) and Burbin and Lawson (2007).

As a result, Eurasian species are now classified within the following genera, *Coelognathus*, *Elaphe*, *Euprepiophis*, *Gonyosoma*, *Oocatochus*, *Oreocryptophis*, *Orthriophis* and *Rhadinophis* and *Zamenis*.

A recent reclassification by Hoser (2012) has seen the genera *Orthriopsis* Utiger et. al., 2002 and *Zamenis* Wagler, 1830 subdivided.

In terms of the five species within the nominate genus *Zamenis*, *Zamenis* retained the species *Z. longissimus* and *Z. lineata*, the genus *Callopeltes* Fitzinger, 1834 was resurrected in accordance with the Zoological code (Ride et. al. 1999) for the species *Z. situla*, while a new genus *Richardwellsus* gen. nov. was formally erected and named to accommodate the species *persica* and *hohenackeri*.

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

While the morphological similarities of ratsnakes has resulted in a tendency to lump them within one or a few relatively large genera, an increasing body of published evidence based on studies and even astute captive observations by hobbyists is revealing even more diversity than imagined even a few decades ago.

Such published studies include the following; Burbin and Lawson (2007), Gohil (1983), Helfenberger (2001), Niehaus and Schultz (1987), Metha (2003), Schultz (1996), Smith (1990), Smith (1993), Somaweera (2004), Staszko and Walls (1994), Wall (1913), Whitaker and Captain (2004), Lawson, et. al. (2005) and others.

Molecular studies including the recent study by Pyron et. al. (2011) have continued to consistently show the deep rooted differences between snakes within both *Elaphe sensu lato* and more relevant here, between the snakes of the genus *Coelognathus* as defined by Utiger et. al. in 2005 and more fully by Helfenberger 2001, these diagnoses for this group of snakes being relied upon for the purposes of this paper.

As inferred in the abstract, the genus as currently understood fits within three broad groups.

The Radiated Ratsnake *Coelognathus radiatus* is quite divergent from the rest as is the Trinket Snake *Coelognathus helena*. Both are sufficiently divergent from one another to be placed in separate genera.

The remaining trio, namely the Yellow-stripe Ratsnake *Coelognathus flavolineatus*, Indonesian Ratsnake *Coelognathus subradiatus* and the Phillipines Ratsnake *Coelognathus erythrurus* are similar in most respects and form a natural group.

I should herein note that the wide-ranging species *subradiatus* is in my view a composite assemblage composing more than one easily defined species-level taxa and in need of urgent taxonomic revision.

As a result of these facts, the above-named snakes are herein arranged as follows.

The type species *radiatus* (*Coluber radiatus* Boie, 1827) remains within the genus *Coelognathus*. The species *helena* (*Coluber helena* Daudin, 1803) is placed in the herein resurrected genus *Cynophis* Gray, 1849.

For the remaining three species, namely *erythrurus* (*Plagiodon erythrurus* Duméril, Bibron and Duméril, 1854), *subradiatus* (*Coluber subradiatus* Schlegel, 1837) and *flavolineatus* (*Coluber flavolineatus* Schlegel, 1837) there are no available genus names.

They are therefore placed in a new genus, *Euanedwardsserpens* gen. nov. which is formally named and defined below.

All ratsnakes in the genus *Coelognathus sensu lato* fit the broad definition of large (usually up to about 2 metres in length), somewhat aggressive, diurnally active ratsnakes with a vertically compressed body. All have an ability to flare the neck with air to a considerable extent as part of their threat display which involves the neck being held off the ground in a characteristic "s-shape" or similar. This enables the neck in particular to flare to (sometimes) more than four times as high as wide and often yields bright coloured skin between the scales.

Snakes typically hold their mouth open when in a threat display. All are oviparous.

In order to best define the three relevant genera, it is often easiest to do this by identifying the component species, which in effect defines each genus.

#### GENUS COELOGNATHUS FITZINGER, 1843

Helfenberger (2001) separated *Coelognathus* from the other Eurasian ratsnakes based on anatomical and osteological features as well as electrophoretic loci to diagnose that genus *sensu lato*, including the genera *Euanedwardsserpens* gen. nov. and *Cynophis* as diagnosed and identified below.

These snakes are medium to large and relatively long and slender, have correspondingly high ventral scale and precaudal vertebra counts and have a distinctly long and slender head, which separates them from all other ratsnake genera except *Orthriophis* which physically appear similar.

However snakes of these two genera are easily separated by viewing the head coloration. In *Orthriophis* the post-orbital stripe runs more-or-less parallel with the jawline, whereas in *Coelognathus* it distinctly points downwards towards the back of the jaw, although this may be either broken, or one of two such lines, the other running in an upward direction, but not parallel to the jawline.

The species *C. radiatus* (now the entire content of this genus as defined herein) is separated from all other Asian ratsnakes (including those of genera *Cyanophis* and *Euanedwardsserpens* gen. nov. by having a short interpulmonary bronchus (see plate 1A-D, Fig 4, Tables 1-2 in Utiger et. al. 2005).

*Coelognathus radiatus* also differs from the other relevant taxa (*Cyanophis* and *Euanedwardsserpens* gen. nov.) by the possession of a relatively short and stout hemipenis, versus long-slender and subcylindrical (sometimes tapering distally) (particularly) in the snakes of the genus *Euanedwardsserpens* gen. nov..

Snakes of all three genera (*Coelognathus*, *Cyanophis* and *Euanedwardsserpens* gen.) are also typified by the following traits: no anterior subocular (rarely present in the species *subradiatus*), paravertebral reductions of the dorsal scale rows, single anal plate, the hemipenis bears basal spines, the tracheal lung is either absent or rudimentary and barely vascularized, and the left lung is often absent or small.

#### GENUS CYANOPHIS GRAY, 1849

Snakes of the genera *Coelognathus* and *Euanedwardsserpens* gen. nov. as defined herein always have three supralabials in contact with the eye.

By contrast *Cyanophis helena* does not.

#### GENUS EUANEDWARDSSERPENS GEN. NOV.

**Type species:** *Coluber flavolineatus* Schlegel, 1837 (Known in most contemporary texts as either *Elaphe flavolineatus* or *Coelognathus flavolineatus*).

**Diagnosis:** A group large ratsnakes found in the Southeast Asian region, typified by a vertically compressed body and an angled relatively pointed head and snout.

Often defensive (interpreted commonly as "aggressive") to people when encountered and to a greater degree than most other ratsnake genera, with specimens commonly struggling against the handler if handled.

Helfenberger (2001) separated *Coelognathus* from the other Eurasian ratsnakes based on anatomical and osteological features as well as electrophoretic loci and used this to diagnose that genus *sensu lato*, including (in effect) the genera *Euanedwardsserpens* gen. nov. and *Cynophis* in terms of their common attributes.

This information is relied upon herein as part of this diagnosis as relevant.

These snakes are medium to large and relatively long and slender, have correspondingly high ventral scale and precaudal vertebra counts and have a distinctly long and slender head, which separates them from all other ratsnake genera except *Orthriophis*. However these genera are easily separated by

viewing the head colouration. In *Orthriophis* the post-orbital stripe runs more-or-less parallel with the jawline, whereas in *Coelognathus* it distinctly points downwards towards the back of the jaw, although this may be either broken, or one of two such lines, the other running in an upward direction.

If in any doubt, *Orthriophis* is also separated from the genera *Coelognathus*, *Cyanophis* and *Euanedwardsserpens* gen. nov. by having a divided anal plate as opposed to a single one.

Snakes of the ratsnake genus *Gonyosoma* Wagler, 1828 also have a divided anal.

Separation of the three relevant genera (namely *Coelognathus*, *Cyanophis* and *Euanedwardsserpens* gen. nov.) is done as follows:

The species *Coelognathus radiatus* (now the entire content of that genus as defined herein) is separated from all other Asian ratsnakes (including those of genera *Cyanophis* and *Euanedwardsserpens* gen. nov.) by having a short interpulmonary bronchus (see plate 1A-D, Fig 4, Tables 1-2 in Utiger et al. 2005).

Snakes of the genera *Coelognathus* and *Euanedwardsserpens* gen. nov. as defined herein always have three supralabials in contact with the eye.

By contrast *Cyanophis helena* does not.

*Coelognathus radiatus* also differs from the other relevant taxa (*Cyanophis* and *Euanedwardsserpens* gen. nov.) by the possession of a relatively short and stout hemipenis, versus long-slender and subcylindrical (sometimes tapering distally) (particularly) in the snakes of the genus *Euanedwardsserpens* gen. nov..

If the snake does not identify as being within the genera *Coelognathus* or *Cyanophis* it will be in the genus *Euanedwardsserpens* gen. nov.

**Common name:** Ratsnake.

**Etymology:** Named in honour of Australian-based herpetologist, Euan Edwards. He has worked behind the scenes for many of the better-known names in contemporary herpetology, often doing the so-called "hard work" for which he may not receive any accolades, but without which, we'd all be far worse off.

**SPECIES WITHIN EUANEDWARDSSERPENS GEN. NOV.**

*Euanedwardsserpens flavolineatus* (Schlegel, 1837) (Type species).

**Common name:** Yellow Stripe Ratsnake.

*Euanedwardsserpens erythrurus* (Duméril, Bibron and Duméril, 1854).

**Common name:** Phillipines Ratsnake.

*Euanedwardsserpens subradiatus* (Schlegel, 1837).

**Common name:** Indonesian Ratsnake.

**SPECIES WITHIN CYANOPHIS GRAY, 1849.**

*Cyanophis helena* (Daudin, 1803) (Type species).

**Common name:** Trinket Snake.

**SPECIES WITHIN COELOGNATHUS FITZINGER, 1843.**

*Coelognathus radiatus* (Boie, 1827) (Type species).

**Common name:** Radiated Ratsnake.

**REFERENCES CITED**

- Burbrin, F. T. and Lawson, R. 2007. How and when did Old World ratsnakes disperse into the New World? *Molecular Phylogenetics and Evolution* 43(1):173-189.
- Gohil, K. K. 1983. An Albino Trinket Snake (*Elaphe helena*). *Hamadryad*, Madras 8(1):14.
- Gray, J. E. 1849. Description of three new genera and species of snakes. *Ann. Mag. Nat. Hist.* (2)4:246-248.
- Helfenberger, N. 2001. Phylogenetic relationship of Old World Ratsnakes based on visceral organ topography, osteology, and allozyme variation. *Russ. J. Herpetol.* (Suppl.):1-56.
- Hoser, R. T. 2012. A taxonomic revision of the colubrinae genera *Zamenis* and *Orthriopsis* with the creation of two new genera (Squamata:Colubridae). *Australasian Journal of Herpetology* 11:59-64.
- Lawson, R., Slowinski, J. B., Crowther, B. I. and Burbink, F. T. 2005. Phylogeny of the colubroidea (Serpentes): New evidence from the mitochondrial and nuclear genes. *Molecular phylogenetics and evolution* 37:581-601.
- Niehaus, G. and Schultz, K. 1987. Die hinterasiatischen Klettermattern der Gattung *Elaphe*. Teil XI *Elaphe helena* (Daudin, 1803). *Sauria* 9(4):3-7.
- Metha, R. S. 2003. Prey Handling Behaviour of Hatchling *Elaphe helena* (Colubridae). *Herpetologica* 59(4):469-474.
- Pyron, R. A., et al. 2010. The phylogeny of advanced snakes (Colubroidea), with discovery of a new subfamily and comparison of support methods for likelihood trees. *Mol. Phylogenet. Evol.* 58:329-342.
- Ride, W. D. L. (ed.) et al. (on behalf of the International Commission on Zoological Nomenclature) 1999. *International code of Zoological Nomenclature*. The Natural History Museum - Cromwell Road, London SW7 5BD, UK.
- Schultz, K. 1996. *A Monograph of the Colubrid Snakes of the Genus Elaphe Fitzinger*. Koeltz Scientific Books:439 pp.
- Smith, T. 1990. The Trinket Snake, *Elaphe helena*. *The Herpetile*. 15(1).
- Smith, T. 1993. The Captive Care and Breeding of Two Asiatic Ratsnakes. *The Reptilian* (1):2.
- Somaweera, R. 2004. Guest Article: Sri Lankan Colubrid Snakes. *Sri Lankan Naturalist* 6(3-4):32-46.
- Staszko, R. and Walls, J. G. 1994. *Rat Snakes: A hobbyist's Guide to Elaphe and kin*. TFH Books.
- Utiger, U., Helfenberger, N., Schätti, B., Schmidt, K., Ruf, M. and Ziswiler, V. 2002. Molecular systematics and phylogeny of Old and New World Ratsnakes, *Elaphe*, auct. and related genera (Reptilia, Squamata, Colubridae). *Russian Journal of Herpetology* (9)2:105-124.
- Utiger, U., Schätti, B. and Helfenberger, N. 2005. The Oriental Colubrine Genus *Coelognathus* Fitzinger, 1843 and Classification of Old and New World Racers and Ratsnakes (Reptilia, Squamata, Colubridae, Colubrinae). *Russian Journal of Herpetology* 12(1):39-60.
- Wall, F. 1913. A Popular treatise on the common Indian snakes. Part 19. *Coluber helena*. *J. Bombay nat. hist. Soc.* 22:22-28.
- Whitaker, R. and Captain, A. 2004 *Snakes of India: The Field Guide*. Draco books.

## Australasian Journal of Herpetology

Publishes original research in printed form in relation to reptiles, other fauna and related matters.

It is a peer reviewed printed journal for permanent public scientific record, with a sizeable print run and has a global audience.

Full details at: <http://www.herp.net>

**Published by Kotabi Pty Ltd**  
**PO Box 599**  
**Doncaster, Victoria, 3108.**  
**Australia.**

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

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