

The Rough-scaled Snakes, Genus: *Tropidechis* (Serpentes:Elapidae), including the description of a new species from far north Queensland, Australia.

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ABSTRACT

Tropidechis has long been regarded by most herpetologists as a monotypic genus. A lengthy study of both live and dead specimens from the two known and geographically disjunct populations has shown that there are in fact two separate taxa involved. The species *Tropidechis carinatus* (Krefft, 1863) is herein restricted to north-east New South Wales and south-east Queensland. A new species name, *Tropidechis sadlieri* sp. nov. has been assigned to north-east Queensland specimens formerly regarded as *Tropidechis carinatus*.

INTRODUCTION

The Rough-scaled Snakes (Genus *Tropidechis*) are endemic to Australia. They are thick-set and robust medium sized snakes. The adults usually measure just under a metre in total length.

As their name suggests, these snakes have strongly keeled scales, which separates them from most other Australian elapids (see later).

They have a yellowish-brown or greyish-brown ground colour dorsally, which may or may not be traversed by a number of irregular darker bands, which extend from the nape for various distances along the body, fading posteriorly (Wilson and Knowles 1988). Ventrally they are lighter (creamish or yellow usually) with or without darker blotches and darkening towards the posterior end of the tail.

These snakes are commonly confused with the non-venomous Keelback (*Tropinodopsis mairii*), but can readily be separated from the latter species by their higher mid-body scale row count (23 versus 15 or 17) and lack of a loreal scale (present in *Tropinodopsis mairii*).

Tropidechis are usually found in wet forested habitats, usually near water. By day they are usually found sheltering in dense vegetation or under cover, although specimens are also sometimes found active. By night they are regularly seen crossing roads in suitable areas when the weather is warm to hot.

They are generally pugnacious when cornered in the wild state, although they usually tend to settle down somewhat in captivity. These snakes are dangerously venomous and deaths have been reported. They produce from 5-15 live young, with an average of 10 (Shine 1991), measuring an average of 16 cm (snout-vent)

(Shine 1991) in late summer and autumn (Wilson and Knowles 1988).

Rough-scaled Snakes have been successfully bred in captivity (see Fitzgerald 1989).

It has been known for many years that there are two main populations of *Tropidechis* which appear to be widely separated by a straight-line distance of just over 700 km (Reilly 1963, Ingram and Raven 1991). Also refer to the map published on page 172 of Hoser (1989) for the known distribution of *Tropidechis* in New South Wales and Queensland, including a clear delineation of the area between the two main known populations, from where no specimens are known.

In the late 1970's and early 1980's a number of private keepers remarked to this author on the "fact" that the north Queensland *Tropidechis* are somewhat different to those from southern Queensland and New South Wales, but no one actually identified or quantified these differences.

In the intervening period from then until the time of publishing this paper (in 2002), this author has inspected a sizeable number of live *Tropidechis* specimens as well as the limited samples available at the Queensland Museum, Australian Museum and the National Museum of Victoria. The alleged differences were real and able to be quantified and some of these are used to define the new North Queensland species as described in this paper.

MATERIALS AND METHODS

In 1983, this author inspected a number of live specimens of *Tropidechis* from the general area of Cairns in North Queensland. This was followed up by the inspection of a large number of live specimens from around Brisbane, Queensland in early 1987.

In 2001, this author made a cursory inspection of specimens held at the Queensland Museum but took no written notes. This was followed up with more detailed inspections at the National Museum of Victoria and finally the Australian Museum in Sydney.

While there was a general shortage of specimens from the North Queensland area as compared to the southern populations, enough live and dead specimens were eventually inspected to confirm the diagnosis of the North Queensland population as being specifically distinct. Specimens were generally observed (both live and dead) and a number of key measurements were taken of body scales in terms of numbers and size and shape, from which general differences were able to be ascertained.

GENUS *TROPIDECHIS* GUNTHER 1863

A dangerously venomous genus of snakes (Gow 1983, Trinca, Graydon, Covacevich and Limpus 1971). The venom is not only strongly neurotoxic, but it also affects the blood and causes severe muscle damage (Gow 1983).

It is generally separated from all other Australian elapids by its strongly keeled scales along all or most of its body (Cogger 2000). Unlike Death Adders (Genus *Acanthopis* which may sometimes have strongly keeled scales (particularly on the head and forebody) this species does not have a tail that terminates in a well-defined spine.

Attaining an average adult length (total) of between .75 and 1 metre, more than one death has been attributed to

Tropidechis, including the case of a 59 year old man dying within 5 minutes after being bitten 3 times on the hand.

The natural history of the species is discussed by Beard (1979).

Male combat has not been recorded in *Tropidechis* to date. However based on the fact that adults are of similar size (Shine (1991) reported a sample of males being on average a miniscule amount longer than a similar sample of females), the possibility of male combat in *Tropidechis* should not be discounted.

SOUTHERN ROUGH-SCALED SNAKE *TROPIDECHIS CARINATUS* (KREFFT 1863)

The species is accurately described above in the description for the genus.

The holotype for the species "*carinatus*" is believed to be lost (Cogger, Cameron and Cogger 1983) although it is thought to have originally come from Grafton in New South Wales, thereby making the northern New South Wales/Southern Queensland *Tropidechis*, the type species "*carinatus*"

The species also has a creamish to yellow or olive-green ventral surface, which may or may not have some darker blotches.

There are 23 mid-body rows, 160-185 ventrals, single anal, and 50-60 subcaudals.

There are usually 3-5 small maxillary teeth following the fang.

The species *Tropidechis carinatus* is readily separated from the Northern Rough-scaled Snake (*Tropidechis sadlieri* sp. nov.) by numerous characteristics.

However perhaps the simplest way to separate the two species (and in the absence of good locality data) is by a cursory look at the frontal scale. In *Tropidechis carinatus* this scale is always widest at the front point where it joins the supraoculars (on each side) at the point where the front border of the supraocular runs towards the sides of the head and borders the prefrontals. For *Tropidechis sadlieri* sp. nov. the frontal shield is widest where it joins the supraoculars at the point where the supraoculars join the parietal shields. Rarely, in *Tropidechis sadlieri* sp. nov., these two measurements are more-or-less the same, but still the front point is not distinctly wider as in *Tropidechis carinatus*.

Tropidechis carinatus is also separated from *Tropidechis sadlieri* sp. nov. by the nasal scale's properties. In *Tropidechis sadlieri* this scale is generally more circular in form and lacks a distinct bulging back as in *Tropidechis carinatus*. The nasal in *Tropidechis sadlieri* sp. nov. still has a raised surface posterior to the nostril. The two species of *Tropidechis* can also be readily separated by distribution as already stated in this paper or comparative DNA analysis.

While there have been numerous studies into the properties of the venom of *Tropidechis*, including Morrison (1987), this author is unaware of comparative studies between northern and southern populations (the two species).

NORTHERN ROUGH-SCALED SNAKE *TROPIDECHIS SADLIERI* SP. NOV.

Holotype:

A specimen at the Australian Museum in Sydney,

specimen number: R17031. It is a subadult female. It was collected by W. C. Wilhoph on 12 February 1960 and had a tag on it labeling it in error as "*Notechis scutatus*". The origin of the specimen was 5 miles north of Innisfail, Queensland (Lat. 17°31' S, Long. 146°1'E) The snout-vent length is approximately 461 mm, and the tail length is 20 mm, giving a total of about 545 mm. The head length (straight line from snout tip to back of skull, down the median line of the snake), was 20 mm. The snake was missing the very end of its tail, giving a relatively shorter tail to snout-vent ratio, as is typical for the species.

Due to the specimen's state of preservation some outer surfaces of scales were found to be flaking off (as of 2002).

The colouration of the preserved snake is relatively dark and the cross-bands on the back of the snake as typical for the species are in this specimen fairly indistinct. The ground colour is darkish grey-olive-brown.

The snake is lighter ventrally, but becomes darker towards the rear of the tail (common to all *Tropidechis*). The frontal shield is 4.5 mm wide at the point where it joins the supra-oculars and they in turn join the parietals. The frontal shield is 3.5 mm at the point where it joins the supraoculars and they in turn join the prefrontals. These comparative statistics are relevant to the species diagnosis (below).

Other scalation for the snake is as follows: 7 supralabials, 6 infralabials (right) (last 2 (from front) fused), on left side there are six infralabials (numbers 3-4 (from front) are fused), 2 prefrontals, 2 internasals, 2 postoculars, 1 supraocular (each side), single anal, 23 mid body rows, 39 (all single) subcaudals (missing end of tail), 181 ventrals.

Paratype:

A specimen at the Australian Museum in Sydney, specimen number: R15213. It consisted of a head and neck only and was poorly preserved. It was from Cairns, Queensland (Lat. 16°55'S, Long. 145°46'E).

Measurements of the head were taken and the specimen was photographed, (see some data for this specimen later in this paper).

Diagnosis:

Tropidechis sadlieri sp. nov. is the North Queensland Rough-scaled Snake.

It is separated from the south-east Queensland/Northern New South Wales population of *Tropidechis carinatus* by distribution. There is a gap in excess of 700 km in straight line measurement between the two known populations. This gap runs more-or-less from about Fraser Island and the nearby coast in South-east Queensland to about Mount Spec, near Townsville in far north Queensland.

The known distribution of *Tropidechis sadlieri* sp. nov. runs from about Mount Spec, north through the wetter regions to about Thornton Peak on Cape York and including the Atherton Tableland area and nearby coastal region.

In the absence of reliable locality data, the simplest way to separate the two species (*carinatus* and *sadlieri* sp. nov.) is by a cursory look at the frontal scale. In

Tropidechis carinatus this scale is always widest at the front point where it joins the supraoculars (on each side) at the point where the front border of the supraocular runs towards the sides of the head and borders the prefrontals. For *Tropidechis sadleri* sp. nov. the frontal shield is widest where it joins the supraoculars at the point where the supraoculars join the parietal shields. Rarely, in *Tropidechis sadleri* sp. nov., these two measurements are more-or-less the same, but still the front point is not distinctly wider as in *Tropidechis carinatus*.

The best way to see this (in the first instance) is by comparative observation of the relevant head shields of specimens of both species, or by looking at photos of the same.

Tropidechis carinatus is also separated from *Tropidechis sadleri* sp. nov. by the nasal scale's properties. In *Tropidechis sadleri* this scale is generally more circular in form and lacks a distinct bulging back as in *Tropidechis carinatus*. The nasal in *Tropidechis sadleri* sp. nov. still has a raised surface posterior to the nostril. Once again, the best way to see this (in the first instance) is by comparative observation of the relevant head shields of specimens of both species, or by looking at photos of the same.

The two species of *Tropidechis* can also be separated by comparative DNA analysis.

Tropidechis are separated from other Australian elapids by their strongly keeled scales. The only genus likely to be confused with them is *Acanthophis* (some of which may also have keeled scales), which can be readily separated by the possession of a tail which terminates in a distinct upward pointing spine.

Captivity:

In common with *Tropidechis carinatus*, *Tropidechis sadleri* sp. nov. is generally regarded as an easy species to maintain in reptile collections.

While generally feeding on frogs in the wild state, captives appear to readily switch to rodents when keepers seek to do this.

Barnett (1981) managed to get captive *Tropidechis* to feed on fish, which is something he tested with success for many Australian species of snake.

Numerous captive set-ups have been employed with success for this species including bare cages with minimal or paper substrate and also naturalistic vivaria. Most important for the success in keeping this species is a heat source and heat gradient within the cage.

Etymology:

Named in honor of Sydney-based herpetologist, Ross Sadler for his immense contribution to herpetology in Australia, the south-west Pacific region and elsewhere spanning some decades.

COMPARISON OF FRONTAL SHIELD WIDTHS AT FRONT AND BACK "WIDE POINTS" IN AUSTRALIAN MUSEUM TROPIDECHIS

(These are where the frontal joins the supraoculars and the supraoculars in turn join the prefrontals at the anterior and the parietals at the posterior)

Tropidechis sadleri sp. nov. R15213 (Cairns, North Queensland)
Frontal: Front: 3.5 mm, Back: 3.5 mm

Eye: 2.95 mm wide, Post ocular (lower) 1.95 mm

Tropidechis sadleri sp. nov. R15213 (Cairns, North Queensland)

Frontal: Front: 3.5 mm, Back: 3.5 mm

Eye: 2.6 mm, Post ocular (lower) 1.8 mm

Tropidechis carinatus R14691 (Clarence River, New South Wales)

Frontal: Front: 5.0 mm, Back: 4.5 mm

Eye: 4.05 mm, post ocular (lower) 2 mm

Tropidechis carinatus R16125 (Ben Lomond, New South Wales)

Frontal: Front: 4.5 mm, Back: 4 mm

Eye: 3.6 mm, Post ocular: 1.6 mm

Tropidechis carinatus R15326 (North Coast, New South Wales)

Frontal: Front: 4.5 mm, Back: 3.5 mm

Eye: 3.2 mm, post ocular (lower) 2 mm, post ocular (upper) 2.2 mm

CONSERVATION

Studies by myself and corroborated by Shine and Charles (1982) and others, confirm that *Tropidechis* are predominantly frog feeders in the wild. This spells potential conservation problems for both species of *Tropidechis*.

Relevant parts of Queensland have been invaded and overrun by the introduced Cane Toad (*Bufo marinus*) (Hoser 1987), and have no doubt contributed to a sharp decline of *Tropidechis* in many areas. There is no compelling evidence yet to suggest that these snakes can:

- A/ Feed on these toads and survive,
- B/ Know to avoid feeding on them in preference to other species
- C/ Generally avoid predation by toads as juveniles,
- D/ Generally survive in areas that have been overrun by toads where all or most other frogs have been wiped out.

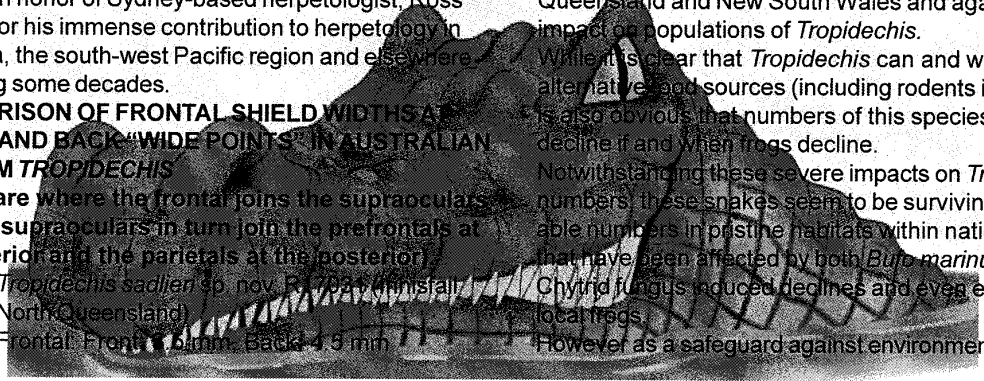
Notwithstanding the above (and in partial contradiction of it), there does appear to remain sizeable and healthy populations of *Tropidechis* in north-east and south-east Queensland in the more pristine habitats that are generally avoided by the toads.

Another potential threat to *Tropidechis* in the wild state has been the global decline in frogs, including that resulting from the Chytrid fungus. This has been identified as the cause of decline of frogs in relevant parts of Queensland and New South Wales and again must impact on populations of *Tropidechis*.

While it is clear that *Tropidechis* can and will exploit alternative food sources (including rodents in captivity), it is also obvious that numbers of this species must decline if and when frogs decline.

Notwithstanding these severe impacts on *Tropidechis* numbers, these snakes seem to be surviving in reasonable numbers in pristine habitats within national parks that have been affected by both *Bufo marinus* and Chytrid fungus induced declines and even extinction's of local frogs.

However as a safeguard against environmental catastro-



phe in the wild state, this author suggests that sizeable numbers of both *Tropidechis* be maintained (in pure-breeding groups) in large self-sustaining captive populations.

This goal is easier said than done, as *Tropidechis* are not popular with private keepers or fauna parks for several reasons.

The snakes are not terribly large or colourful and therefore not pleasing as exhibits. They are dangerously venomous and often pugnacious and hence not a commonly sought after captive.

Added to this is the reluctance of Queensland and New South Wales wildlife authorities to issue licenses to collect or keep *Tropidechis*. Thus the desired goal of having large self-sustaining captive populations of *Tropidechis* may in fact never materialize.

FINAL NOTE

Colour photos of both species of *Tropidechis*, including the holotype and paratype of *Tropidechis sadleri* sp. nov. and comparative head-shots between this species and a number of *Tropidechis carinatus* can be found on the website <http://www.smuggled.com/trosad1.htm> and/or links from that site within a week of the publication of the hard-copy of this paper in this journal.

These photos readily show the differences in head scalation between the two species of *Tropidechis* as outlined in this paper.

TROPIDECHIS MATERIAL EXAMINED FOR WHICH SCALE AND OTHER DATA WAS RECORDED (Captive specimens not listed)

National Museum of Victoria:

D4815 large adult; D4804 adult; D8578 Lowood, Q, adult; D8634 North Coast, NSW, adult; D8916 adult; D12318 large adult; D15318 Upper Allyn Mill, NSW, adult female; D15322 Upper Allyn Mill, NSW, Juvenile; D15323 Upper Allyn Mill, NSW, Juvenile; D15328 Brisbane, Q, Small adult Male; D51872 Coffs Harbour, NSW, adult.

Australian Museum (Sydney):

R14691 Clarence River, NSW, adult male; R15213 Cairns, Q, head and neck only from smallish adult; R15326 NSW North Coast, adult male; R16125 Ben Lomond, NSW, adult female; R17031 near Innisfail, Q.

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The people who have assisted this author over the years have been too numerous to name here. However included among this group (with specific relevance to *Tropidechis*) include Queensland-based private keepers Mike Cermac and Neil Charles who allowed this author unfettered access to live specimens.

As always the relevant museum curators also allowed this author similar access to snakes in their custody, the relevant curators being Patrick Couper and Jeanette Covacevich at the Queensland Museum, Diane Bray at the National Museum of Victoria, and Ross Sadler and Allen Greer at the Australian Museum in New South Wales.

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