

The Genus *Notechis* (Serpentes: Elapidae) in Western Australia

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Abstract

The concept of *Notechis* Boulenger is expanded to include *Brachyaspis* Boulenger, *Elapognathus* Boulenger, *Drysdalia* Worrell and *Austrelaps* Worrell. In Western Australia it is represented by *N. scutatus* (Peters), *N. curtus* (Schlegel), *N. minor* (Günther), *N. coronatus* (Schlegel) and *N. mastersii* (Krefft).

Introduction

In 1961 Worrell began the dismemberment of the elapid genus *Denisonia* Krefft as delimited by Boulenger (1896). Most of Worrell's new genera were only separated from each other by single characters, many of them of little or no phylogenetic value. *Suta*, for example, was distinguished from *Denisonia* (*sensu* Worrell) by its 19 rather than 17 midbody scale rows, despite the fact that both counts occur in *Denisonia fasciata* Rosén (Smith 1980). Contact between postfrontal and prefrontal bones served Worrell for separating *Cryptophis* from *Parasuta*, resulting in the members of the *Denisonia gouldii* species-group (Storr 1981) being spread over two genera; indeed *Parasuta gouldii* (Gray) and *Cryptophis dwyeri* Worrell were later considered by Cogger (1975) to be one and the same species. Little wonder then that workers generally did not follow Worrell. Klemmer (1963) retained *Denisonia* (*sensu* Boulenger) in his list of the world's elapid snakes, and so did almost all workers until 1975.

Boulenger's concept of *Denisonia* was admittedly unsatisfactory, but its worst feature was rectified by McDowell (1970) when he proposed the genus *Salomone-laps* for the Solomon Island species, *Hoplocephalus par* Boulenger. Among the remainder, i.e. the Australian and Tasmanian *Denisonia*, clusters of closely related species are recognizable, e.g. the recently studied *Denisonia gouldii* species-group (Storr 1981). Another cluster consists of the species grouped by Worrell under *Drysdalia* and *Austrelaps*. However, these species appear to be less closely related to *Denisonia* (*sensu* Worrell) than to certain other snakes, including *Notechis scutatus*, that have never been placed in *Denisonia* (*sensu lato*).

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In formulating the present concept of *Notechis* I have made use of characters not previously employed by students of Australian snakes, viz. the shape of the frontal, postocular and dorsal scales, and the colour of the iris, ventrals and concealed skin between the dorsals. On the other hand I have been less impressed than my predecessors on the value of certain other characters. For example, Boulenger separated *Elapognathus* from its former congeners on the basis of a single character, namely the lack of maxillary teeth behind the fangs. Now the size, shape and number of teeth in snakes is intimately concerned with the capture and ingestion of prey. Consequently dental characters must be interpreted with caution when used in phylogenetic studies.

This revision is based largely on material in the Western Australian Museum (registered numbers cited without prefix). In order to check the validity of *Hoplocephalus temporalis* Günther, I extended my study of *Notechis curtus* to south-eastern Australia, which required the loan of specimens from the South Australian Museum (registered numbers prefixed with SAM), the National Museum of Victoria (NMV) and the Australian Museum (AM). For descriptions of two south-east Australian members of *Notechis*, viz. *N. coronoides* (Günther) and *N. rhodogaster* (Jan), see Coventry and Rawlinson (1980).

Systematics

Genus *Notechis* Boulenger, 1896

Echiopsis Fitzinger, 1843, *Systema reptilium*, p. 28. Type-species (by original designation): *Naja curta* Schlegel. *Nomen oblitum*.

Notechis Boulenger, 1896, *Cat. snakes Brit. Mus. (Nat. Hist.)* 3: 351. Type-species (by monotypy): *Naja (Hamadryas) scutata* Peters.

Brachyaspis Boulenger, 1896, *ibid.*, p. 353. Type-species (by monotypy): *Naja curta* Schlegel. Not *Brachyaspis* Salter 1866 (Trilobita).

Elapognathus Boulenger, 1896, *ibid.*, p. 356. Type-species (by monotypy): *Hoplocephalus minor* Günther.

Drysdalia Worrell, 1961, *West. Aust. Nat.* 8: 25. Type-species (by original designation): *Hoplocephalus coronoides* Günther.

Austrelaps Worrell, 1963, *Aust. Reptile Park Rec. No. 1*: 2. Type-species (by original designation): *Hoplocephalus superbus* Günther.

Diagnosis

Small to moderately large elapid snakes with anal and subcaudals normally undivided; midbody scales in 15-21 rows; frontal concave-sided (except in many *curtus* and most *scutatus*); iris partly orange-yellow (except in *scutatus*); dorsal scales narrow and imbricate along middle of back, becoming juxtaposed and as wide as long towards ventrals; scales matt to slightly glossy in texture; concealed skin between scales black; lower surfaces yellow, orange or red, the base of ventrals edged with black or grey.

Description (based on western species)

Head variable in shape, e.g. deep in *scutatus*, *curtus* and *minor*, moderately deep in *coronatus*, shallow in *mastersii*; snout short in *minor*, moderately long in other species; and head slightly to well marked off from neck. Frontal much longer than wide, usually with anterior corner angular and posterior rounded. Preocular normally in short contact with nasal and widely separated from frontal. Postoculars normally 2, the lower usually longer and narrower than the upper. Temporals normally 2 + 2 (except in *curtus*). Upper labials normally 6. Lower labials normally 7. Dorsal scales smooth or striate, rows increasing on neck (except in many *scutatus*) and reducing before vent.

Distribution

Southern Australia, including Tasmania.

Remarks

Of the available names for this genus, the two oldest (*Notechis* and *Elapognathus*) were published on the same date. I hereby select *Notechis* for this genus, thereby conserving the combination *Notechis scutatus* for its most dangerous member. The affinities of the recently described '*Brachyaspis*' *atriceps* Storr are uncertain, and it is excluded from this paper.

Key to Western Species

- 1 Midbody scale rows 17-21 2
 Midbody scale rows 15 3
- 2 Upper surfaces mostly blackish, with or without narrow
 paler cross-bands; lower surfaces anteriorly bright yellow;
 scales smooth; iris wholly dark *scutatus*
 Upper surfaces olive to reddish-brown (never blackish);
 lower surfaces pale yellow to whitish (never bright yellow);
 scales striate; iris partly yellow *curtus*
- 3 Conspicuous head markings, including white streak on
 upper lips bordered above by black streak; subcaudals 53
 or fewer; ventrals 129 or more 4
 No conspicuous markings on head (only a pale oblique bar
 on side of neck); subcaudals 53 or more; ventrals 129 or
 fewer *minor*
- 4 Usually a black bar across nape; tip of snout rounded in
 profile; dorsal scales smooth *coronatus*
 A pale brown bar across nape; tip of snout obliquely
 truncate (i.e. hog-nosed); dorsal scales striate *mastersii*

Notechis scutatus occidentalis Glauert, 1948

Figure 1

Notechis scutatus occidentalis Glauert, 1948, West. Aust. Nat. 1: 139. Bassendean, W.A.

Diagnosis

A large stout *Notechis* with 17 or 19 midbody scale rows, predominantly blackish above and yellow below (at least anteriorly). Further distinguishable from *N. curtus* by its smooth (rather than striate) scales, more numerous ventrals and subcaudals, fewer and wider temporals, and entirely dark eye.

Description

Snout-vent length (mm): 173-1020 (N 116, mean 599.7). Length of tail (% SVL): 15.5-21.7 (N 109, mean 18.4).

Rostral slightly narrower or slightly wider than high. Internasal from a little less than half to about two-thirds as long as prefrontal. Frontal 1.2-1.7 times as long as wide (N 20, mean 1.44), 1.3-2.1 times as wide as supraocular (N 20, mean 1.59); sides usually straight, but converging anteriorly. Nasal long and low; entire

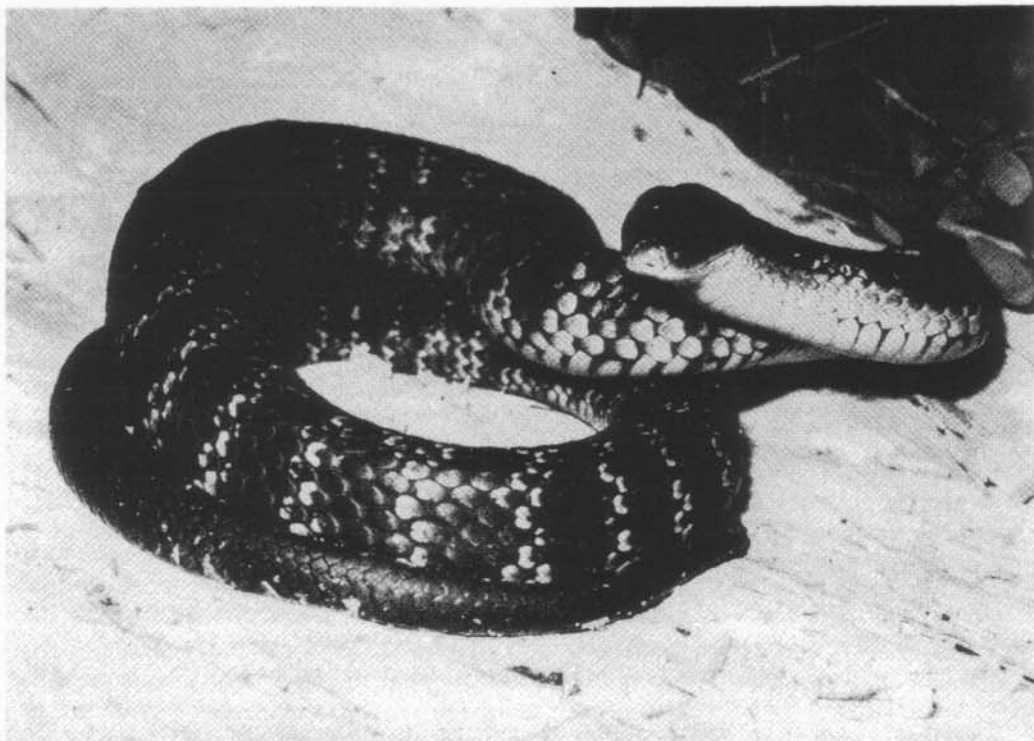


Figure 1 A *Notechis scutatus* from Lake Bambun, W.A., photographed by R.E. Johnstone.

or divided by a shallow groove. Preocular much higher than wide. Diameter of eye a little greater than distance from mouth in juveniles, much smaller than distance from mouth in large adults; pupil circular; iris dark brown. Temporals 2 + 2 (N 22), upper primary much wider than high, lower primary much the largest temporal and occasionally (N 5) reaching lip. Upper labials 5 (N 1), 6 (19), 7 (1). Lower labials 7 (N 19), 8 (2). Scale rows at midbody 17 (N 47) or 19 (28); usually increasing by 2 on neck or not changing, rarely reducing; usually reducing by 2 before vent. Ventrals 140-165 (N 33, mean 152.9). Anal entire (N 31) or divided (2). Subcaudals 36-51 (N 33, mean 45.3), single except occasionally for first. Ventrals plus subcaudals 176-213 (N 32, mean 198.9).

Upper surfaces mostly black, blackish-brown or dark brown; head occasionally dark olive-grey; back often narrowly and indistinctly banded with dark brown, yellowish-brown or brownish-orange (bands usually discontinuous and often confined to anterior half of body; never more than a scale wide and often less). Upper lips pale brownish-grey. Lower 3 rows of dorsals on side of neck yellow, sharply demarcated from upper laterals. Lower 2 or 3 rows of dorsals on side of body partly yellow or orange and partly blackish-brown (dark pigment on distal part of scale). Lower surface anteriorly yellow (occasionally orange-yellow), gradually replaced posteriorly by grey or blackish-grey; ventrals anteriorly edged with black or dark grey. In south, lateral edges of anterior ventrals thickly margined with black, resulting in a zigzagging lateroventral stripe.

Distribution

Subhumid and humid zones of southern Western Australia (mainly about streams and swamps on coastal plains), north to Gingin and east to Israelite Bay. Other subspecies in south-eastern Australia and Tasmania.

Geographic Variation

Southern snakes have more scale rows than northern snakes, e.g. mostly 19 at midbody and 15 before vent, v. mostly 17 and 13. They are also generally darker, including the extent of dark grey on the venter and the development of the black laterodorsal stripe.

Remarks

Mitchell (1951) rightly doubted the criteria on which Glauert based this subspecies. However, Mitchell's own data revealed that ventral counts (154-185, N 36, mean 169.4) were considerably higher in Tasmania and south-eastern Australia than in south-western Australia.

Material

South-West Division (W.A.)

Gingin (8458, 26200-1) and 7 km N (39981); Lake Chandala (59705); Lake Pinjar (20557); Twin Swamps Reserve (59525); Wanneroo (28404, 31208, 31465); Gngangara Lake (1854, 28161, 58936); North Beach (761); Mussel Pool (51563); Beechboro (10599, 21954); Mt

Yokine (34714); Mundaring (19499); Bassendean (659, 5204); Bayswater (5056, 5373, 9761); Maylands (2364, 5090); Mt Lawley (635); Herdsman Lake (654, 3876, 6961, 49286); Wembley (3825); East Perth (4808); Perth (495, 880, 73776); 10 km E Kalamunda (21891); Mosman Park (16908); Cannington (5769); Riverton (14470, 25361, 25860, 34571); Gosnells (5215); Bibra Lake (13922); Jandakot (9255); Carnac I. (4975, 12818, 12827, 14377); Kelmscott (763, 5166, 10456, 13541); Garden I. (12302, 17107); Byford (47849); Mundijong (13811); White Lake (64729); Serpentine (12026, 12791); North Dandalup (5550); Mandurah (3319, 14376, 19122, 20558); Dwellingup (39974); Coolup (22515); Waroona (9096, 25906); Collie (5110, 5113); Noggerup (4973); Capel (5813); Busselton (2377, 5861, 25970); Katanning (21892); Jerramungup (14142); Tambellup (37496); Borden (10217); Pabelup Lake (34347); lower Fitzgerald River (36784); West Mt Barren (59048); Cranbrook (787); Chillinup (26552); Bremer Bay (31954); between the upper reaches of the Tone and Perup Rivers (42547); Manjimup (12422) and 10 km WNW (39731); Carey Brook (28095); Augusta (12831); Pemberton (22981-2); Cape Riche (8744); near Mt Barker (4999); Porongorup Range (46174); Meerup (47874); Chorkerup (6938); Upper Kalgan (23330); Cheyne Beach (36039); Waychinicup River (15099); Walpole (51442); Denmark (5776, 8244, 13764, 73775); Albany (73773); Bornholm (6480).

Eucla Division (W.A.)

16 km W Israelite Bay (31090); Esperance (11362, 12338, 14188, 73774) and 25 km W (37724); Cape LeGrand (42524-6).

Notechis curtus (Schlegel, 1837)

Figure 2

Naja curta Schlegel, 1837, *Essai sur la physionomie des serpens* 2: 486. King George Sound, Western Australia.

Hoplocephalus temporalis Günther, 1862, *Ann. Mag. nat. Hist.* (3) 9: 130. South Australia.

Diagnosis

A moderately small to medium-sized *Notechis* with 17-21 (mostly 19) midbody scale rows. Distinguishable from *N. scutatus* by its partly yellow eye, much paler coloration, striate (rather than smooth) dorsals, fewer ventrals and subcaudals, and more numerous temporals.

Description

Snout-vent length (mm): 110-605 (N 170, mean 276.9). Length of tail (% SVL): 12.6-23.6 (N 161, mean 17.9).

Rostral a little narrower or a little wider than high. Internasal a half to a little more than three-quarters as long as prefrontal. Prefrontals normally 2, occasionally divided longitudinally into 3, 4 or 5 scales. Frontal 1.6-2.6 times as long as wide (N 86, mean 1.89) except when occasionally divided transversely, and 0.9-1.6 times as wide as supraocular (N 85, mean 1.20); sides straight, concave or convex. Nasal long and low; entire, semi-divided by shallow groove upwards from nostral or completely but shallowly divided. Preocular higher than wide. Diameter of eye much greater than distance from mouth in juveniles, slightly less than distance from mouth in large adults; pupil vertically elliptic; iris dark brown

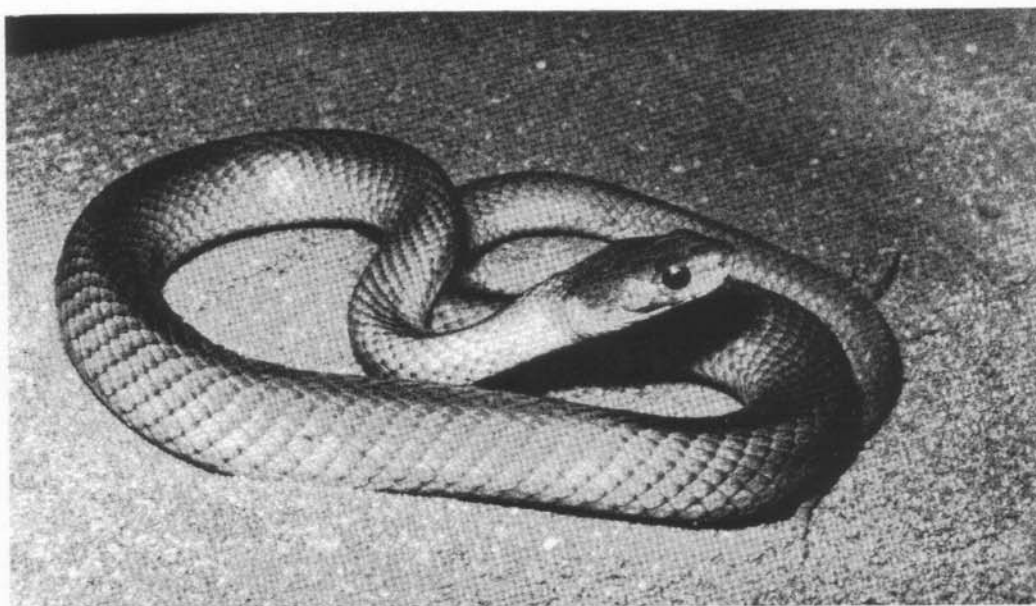


Figure 2 A *Notechis curtus* from Green Head, W.A., photographed by R.E. Johnstone.

except for yellow upper third or quarter and occasionally narrow yellow ring around pupil and yellow flecks in lower two-thirds of eye. Temporals 2 + 2 (N 28), 2 + 3 (30), 3 + 2 (12), 3 + 3 (78), 3 + 4 (1), 4 + 2 (2), 4 + 3 (9), 4 + 4 (1) or 5 + 4 (1), lowest primary largest but not reaching lip. Upper labials 6 (N 90) or 7 (6). Lower labials 6 (N 2) or 7 (100). Scale rows at midbody 17 (N 8), 18 (1), 19 (152), 20 (2) or 21 (1); on neck 19 (N 7), 20 (9), 21 (30), 22 (28), 23 (22), 24 (3) or 25 (2); and before vent 13 (N 28), 14 (11) or 15 (69). Ventrals 121-144 (N 87, mean 129.9). Anal entire (N 89). Subcaudals 27-43 (N 88, mean 34.7), undivided except occasionally for first and rarely for a few pairs towards tip. Ventrals plus subcaudals 152-178 (N 86, mean 164.3).

Upper surface olive-brown, locally becoming darker and greyer on head, except for short, oblique, pale brown streak dorsolaterally on rear of head (somewhat reminiscent of that in *N. minor* but not so well-defined). Rostral, lips, chin and side of throat often dark grey, flecked or dappled with creamy-white. Rest of lower surfaces pale yellow, creamy-white or greyish-white, the ventrals with or without a narrow to moderately wide dark grey base. In an uncommon colour variant upper surface brick-red, lower surface pink.

Distribution

Mid-west coast of Western Australia from the Greenough River south to the Swan River and inland to Yuna, Carnamah, Moora and Caversham; far south of Western Australia north to Mandurah, Highbury and the Narembeen district and

east to the Great Australian Bight; semi-arid zone of South Australia (Eyre Peninsula, Murray Mallee and Upper South-East); south-western New South Wales (Balranald); and semi-arid interior of far western Victoria from the Raak Plain south to the Little Desert.

Geographic Variation

The range of *N. curtus* is broken up into four more or less isolated areas (Figure 3). The populations in each area have developed some peculiarities of their own:

A *Mid-west coast of Western Australia*

Here the tail is longer than elsewhere (15.7-23.6% of SVL, N 50, mean 19.5; v. 12.6-23.3%, N 111, mean 17.2) and the subcaudals are consequently more numerous (32-43, N 21, mean 37.4, v. 27-41, N 67, mean 33.9). Temporals are fewer here than elsewhere, e.g. only 24% of specimens have more than five, v. 69% in area B, 71% in C and 78% in D. In this population alone the head is substantially different in colour to the back, i.e. dark grey rather than olive-brown, and the pale oblique bar on each side of back of head is usually well developed.

B *Southern Western Australia (south of lat. 32° S)*

Snakes from here are larger than elsewhere (SVL 128-605 mm, N 77, mean 305.3; v. 110-460 mm, N 93, mean 253.7). They are also darker, especially those from the south coast, which is by far the wettest part of the species' range.

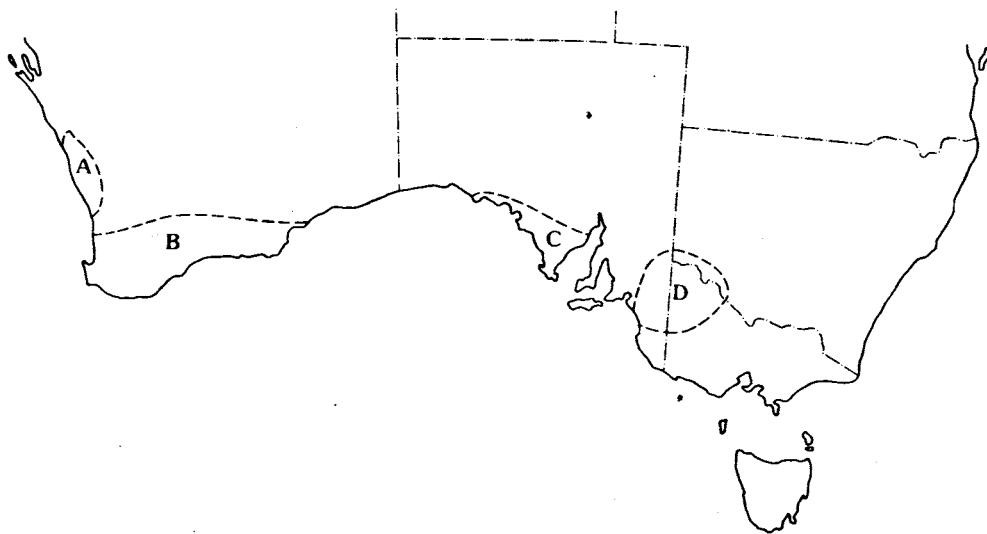


Figure 3 Map of southern Australia, showing range of *Notechis curtus* and areas A, B, C and D.

C *Eyre Peninsula (western South Australia)*

These snakes are in most respects close to the average for the species. They are pale as in area A, but the head is usually the same colour as the back, and the pale streak at rear of head is poorly developed. Their only peculiarity is the somewhat long and narrow frontal (1.8-2.6 times as long as wide, N 15, mean 2.08; v. 1.6-2.4, N 71, mean 1.85 elsewhere).

D *Interior of south-eastern Australia*

Ventral counts are higher here than elsewhere (127-144, N 21, mean 135.9; v. 121-137, N 66, mean 128.0). Longitudinal division of the prefrontals is much more frequent in this population than the others. Complete division of the nasal is also more frequent here than further west (60%, v. 40% on Eyre Peninsula and 14% in Western Australia). Coloration is much the same as on Eyre Peninsula.

Material

South-West Division (W.A.)

20 km SSE Yuna (24859); c. 32 km N Eneabba (53685) and 5 km S (59010); 4 km N Leeman (72972); Carnamah (69490); Green Head (15112, 52145); 4 km NW Mt Peron (49138); 5 km W Padbury (49101-2, 49112-3) and 6 km S (48515); Jurien Bay (12873, 59723, 59725) and 15 km E (46572-3, 47985); Badgingarra (21900, 40011, 60009); Thirsty Point (15091); 24 km E Cervantes (49295); sandplain west of Coomberdale (16907); Moora district (26078); 7 km E Bindoon Hill (28093); Guilderton (31564); Two Rocks (29395); Muchea (452); Bullsbrook (32365, 46251); Wanneroo (13141); Sorrento (32022); Trigg (13046); between Trigg and Scarborough (22892); Scarborough (19231); Morley (8148); Caversham (3853); Guildford (2442); City Beach (13690, 22307, 25971, 26851-2, 28401, 42546); Wembley (28402); Bayswater (1281-2, 6361); Maylands (6475); Mt Lawley (4480); Perth (60485); Gibb Rock, 66 km E Narembeen (47795); Mandurah (15092-6, 25826); Holt Rock (34336); Highbury (37741); North Tarin Rock Reserve (40050, 44446-7); Lake Grace (938); Dumbleyung (20567); Bunbury (48800); Chinocup (47342); Lake Magenta Reserve (39871, 39938); Cape Naturaliste (54468); Dunsborough (34704); Busselton (3760, 9583, 9596, 9603, 34113, 46169, 60437); Hopetoun (7065, 7296, 9181, 12171, 55937, 62731); Jerramungup (46599); Margaret River and vicinity (29691, 34002, 45713, 48173, 71746); Witchcliffe (7968); Tambellup (21281-2); Augusta (45551); Cranbrook (5873, 10975); Bluff Knoll (51765); Doubtful Island Bay (19795-7); Bremer Bay (56838); Cape Riche (9692) and 12 km N (18563); Cheyne Beach (57800); Two Peoples Bay (6822); King River (5614); Walpole (59720); Denmark (2156, 29282, 37469-70); Youngs (5908); Bornholm (5811, 5879, 7925); Little Grove (22963); Albany (9156, 10002, 13802, 14018); Nanarup (22599).

Eucla Division (W.A.)

Toolinna Rock-hole (32°46'S, 124°57'E) (45351); Esperance (8365, 11364, 11430, 13675); Cape LeGrand National Park (41958, 67731-2).

South Australia

Fowlers Bay (NMV R12858); Ceduna (SAM R4290); Streaky Bay (SAM R18134); 25 km NW Poochera (SAM R3850); near Kimba (SAM R4997); 50 km SW Whyalla (SAM R17927); Carapsee Hill (SAM R14318a-b); 40 km N Cowell (SAM R9306); Hincks Conservation Park (SAM R10190); Port Neill (SAM R12750, 13071); Port Lincoln (AM 6634-5, 6637); 'West Coast' (SAM R5020a-c); Danggali Conservation Park (SAM R16062); Waikerie (SAM R53); 13 km S Alawoona (SAM R13050); Kynoch Station, Keith (SAM R9501); Salt Creek, Coorong (SAM R2285).

Victoria

'Mallee' (NMV D4754); 21 km SW Rocket Lake (SAM R9009; NMV D54271); near Chinaman Well (NMV D53492, 53505, 53975, 54421, 54516, 54746, 54798-9, 55069); Kaniva (NMV D33512); Kiata (NMV D10044); Little Desert, 16 km S Kiata (NMV D9836-7, 15343); 2 km S Dimboola (NMV D53538); 'Victoria' (NMV D4560).

Notechis minor (Günther, 1863)

Figure 4

Hoplocephalus minor Günther, 1863, Ann. Mag. nat. Hist. (3) 12: 362. S.W. Australia.

Diagnosis

A small, long-tailed, short-snouted, large-eyed *Notechis* with 15 midbody scale rows and upper surface uniformly dark except for pale oblique bar on side of neck. Further distinguishable from *N. coronatus* by its striated dorsal scales and from *N. mastersii* by its more numerous subcaudals (more than 50).

Description

Snout-vent length (mm): 121-391 (N 15, mean 240.8). Tail (% SVL): 26.9-36.4 (N 13, mean 31.1).

Rostral slightly wider or slightly narrower than high. Internasals from a little more than half to a little more than three-quarters as long as prefrontals. Frontal

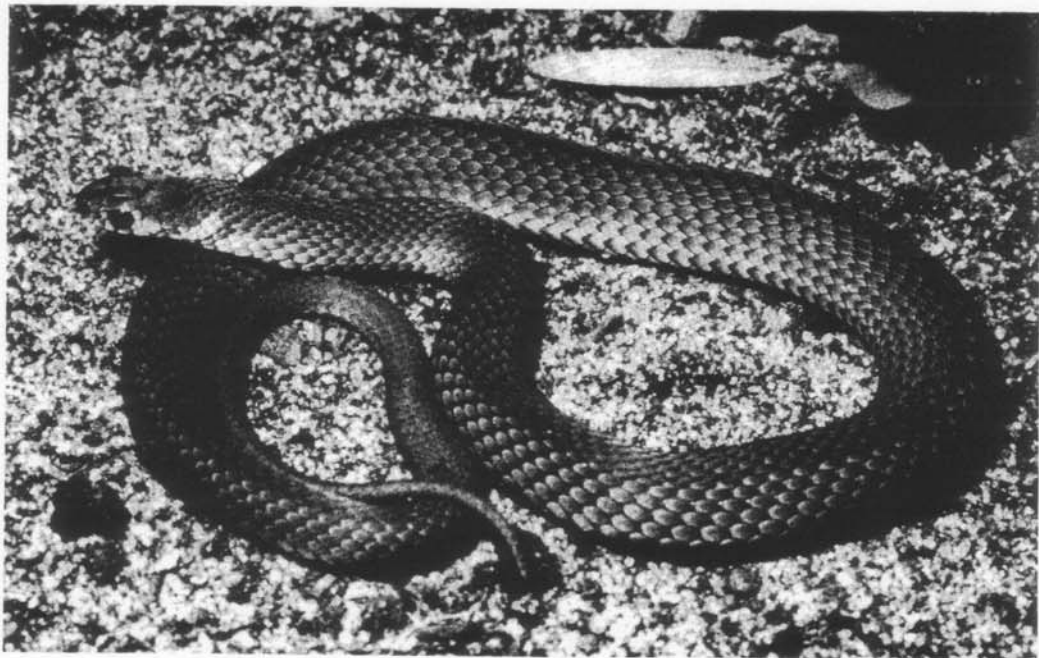


Figure 4 A *Notechis minor* from Albany, W.A., photographed by G. Harold.

1.3-1.8 times as long as wide (N 14, mean 1.60), and 1.2-2.1 times as wide as supraocular (N 14, mean 1.58). Preocular much higher than wide. Eye much longer than distance from mouth; iris blackish except for narrow orange ring around pupil, widest at top. Temporals: primaries 2 (N 12) or 3 (2); secondaries 2 (N 14). Upper labials 6 (N 14). Lower labials 7 (N 14).

Midbody scale rows 15 (N 15), increasing on neck to 17-21, and reducing before vent to 13 (N 14) or 14 (1). Ventrals 116-129 (N 13, mean 123.6). Anal entire (N 14). Subcaudals 53-61 (N 13, mean 56.2), single except occasionally for divided first. Ventrals plus subcaudals 175-183 (N 12, mean 179.2).

Upper surface dark steel-grey usually becoming dull reddish-brown towards tip of tail. Face pale grey. Lower half of rostral and of upper labials usually white, occasionally only a little paler than face. Oblique bar on side of neck orange. Lower surfaces mostly orange-red, anterior and central ventrals with a yellow centre, ventrals and subcaudals usually edged black.

Distribution

Humid coastal plains of deep south-west of Western Australia, north to Busselton and east to Two Peoples Bay.

Material

South-West Division (W.A.)

5 km W Busselton (34112); Karridale (44539); lower Warren River (34°33'S, 115°55'E) (59023); Northcliff (13999); 30 km S Rocky Gully (34°56'S, 116°32'E) (73582); south-east corner of Bröke Inlet (34°56'S, 116°32'E) (68158); 5 km W Walpole (49909); Denmark (8431); Bornholm (6485-6); south-west corner of Princess Royal Harbour (15098); Albany (11886, 13423); mainland opposite Gull Rock, King George Sound (61502); Two Peoples Bay (30952).

Notechis coronatus (Schlegel, 1837)

Figure 5

Elaps coronatus Schlegel, 1837, Essai sur la physionomie des serpens 2: 454. Australia. [Lectotype locality: King George Sound, W.A., *vide* Coventry and Rawlinson 1980: 67.]

Trimesurus olivaceus Gray, 1841, in G. Grey's Journals of two expeditions of discovery in north-west and western Australia . . . 2: 443. Australia.

Diagnosis

A medium-sized *Notechis* with 15 midbody scale rows, a black crown (consisting of a black loreo-temporal streak and black nuchal bar), a white streak through labials and non-striate scales. Further distinguishable from *N. mastersii* by snout rounded (not obliquely truncate) in profile, and from *N. minor* by more numerous ventrals (130 or more) and fewer subcaudals (53 or fewer).

Description

Snout-vent length (mm): 135-543 (N 152, mean 298.6). Length of tail (% SVL): 19.0-26.4 (N 144, mean 22.3).

Rostral slightly wider than high. Internasals half to three-quarters as long as prefrontals. Frontal 1.6-2.4 times as long as wide (N 101, mean 1.95), and 0.9-1.7 times as wide as supraocular (N 101, mean 1.27). Preocular about as high as wide. Eye longer than (juveniles) or as long as (adults) distance from mouth; upper third of iris golden-yellow, remainder dark. Temporals: primaries 1 (N 1), 2 (81), 3 (4) or 4 (1); secondaries 2 (N 80) or 3 (7). Upper labials 6 (N 90) or 7 (4). Lower labials 7 (N 94).

Midbody scale rows 15 (N 150), increasing on neck to 16-20, and reducing before vent to 14 (N 1), 13 (95) or 12 (3). Ventrals 130-153 (N 68, mean 139.0). Anal entire (N 68). Subcaudals 39-53 (N 66, mean 45.8), single except occasionally for divided first and very rarely a few pairs towards tip. Ventrals plus subcaudals 172-201 (N 66, mean 184.8).



Figure 5 A *Notechis coronatus* from Israelite Bay, W.A., photographed by G. Harold.

Top of head grey, olive-grey, olive brown, blackish-grey or black, edged with black, i.e. by (1) a loreo-temporal streak, narrowest on tip of snout and widest immediately in front of and behind eye, usually continuous with (2) a transverse nuchal bar, widest at midline. Rest of upper surface olive-grey, olive-brown or

blackish-grey. Black loreo-temporal streak edged below by a white streak, narrowest at tip of snout and sometimes continuous with a narrow pale brown bar immediately behind black nuchal bar. Lower half of rostral and of anterior upper labials pale yellow, suffused with grey and stippled with black. Lower surfaces yellow, orange or orange-red, partly suffused with grey and peppered with greyish-black; dark pigment on ventrals concentrated along anterior strip of scale, the strip widening on posterior ventrals and in darkest specimens spreading over most of scale.

Distribution

Southern Western Australia (mainly on coastal plains) north to Muchea, east nearly to Point Culver (Great Australian Bight) and inland to Wagin and Pingrup (southern Wheat Belt); also Archipelago of the Recherche.

Geographic Variation

The most distinctive population is that of the Archipelago of the Recherche. Snakes from these islands are notable for their dark coloration, poor development of black nuchal bar (often absent, fragmentary or indistinct), high ventral and subcaudal counts, relatively shorter and wider frontal, and greater size (SVL in four of 18 specimens exceeds 423 mm, compared to only one of 134 mainland specimens).

At first sight the Recherche population might seem to merit subspecific recognition. However, most of its peculiarities can be matched in odd specimens from other regions, and in some respects snakes from the adjacent mainland are intermediate. For example, ventrals plus subcaudals in the Recherche range from 188 to 201 (N 17, mean 193.7), on the mainland of the Eucla Division from 178 to 193 (N 14, mean 184.4) and in the South-West Division from 172 to 186 (N 35, mean 180.7).

Material

South-West Division (W.A.)

Muchea (459); Wanneroo (6346); Bassendean (4734); North Perth (4835); South Belmont (4976, 14485); South Como (6551); Rossmoyne (60877); Riverton (39781); Jandakot (1206, 47649); Banjup (61504); Armadale (13817); Rockingham (6910, 36175); Safety Bay (15072); Serpentine (53737); Mandurah (4349); Waroona (7813); Wagerup (6904, 8986, 9364); Yarloop (6925); Wagin (8370); Bunbury (31196); Pingrup (22489); Busselton (6057, 6196, 9597); Jerramungup (18547); Hopetoun (11100, 59569, 62875); Nannup (56752-3, 56770-1); Witchcliffe (7766, 21965, 36716); Tambellup (2104); lower Fitzgerald River (67807); Mid Mt Barren (36899); 5 km N Fitzgerald Inlet (55936); Boondardup River in 34°13'S, 119°31'E (37217); Scott River (41717); Augusta (5190, 24906); Cape Leeuwin (58797) and 5 km N (25879); Cranbrook (6566, 11333, 53734-6); Doubtful Island Bay (19798-9); Bluff Knoll (51775-6); Bremer Bay (45651); Wellstead (69492); Cape Riche (8384); Upper Kalgan (21368-70); Meerup (47885); Chorkerup (4489, 6069); Many Peaks (14167); Cheyne Beach (15073-4, 31169); King River (4233, 5615, 53733); south-east corner of Broke Inlet (68156-7); Walpole and vicinity (33426, 51472-3, 62237); Nornalup and vicinity (22420, 41773); Kent

River (46544-5); Denmark and vicinity (4993-4, 10098, 17119, 24960-2, 30680); Bornholm (6483-4); West Cape Howe (9160); Albany (7763-4, 8922, 10960, 22488); Two Peoples Bay (37837-8, 44995, 61389, 69498).

Eucla Division (W.A.)

20 km W Point Culver (44973); Israelite Bay (9397, 14205, 67473); Dalyup River (15075); Esperance (8938, 11365, 12338, 13674, 17863, 43864, 58868) and 23 km E (15076, 43884) and 33 km E (21995); Cape LeGrand National Park (29643, 41955-7, 41959, 67730, 67733, 67736, 67746, 67749-51, 67755-60); North Twin Peak I. (53092-4, 54342); Goose I. (9182); Middle I. (41915, 47725); Wilson I. (53142); Mondrain I. (10106-7, 53116, 53119, 54461, 68220, 68226, 68228-9, 68372); Daw I. (76362).

Notechis mastersii (Krefft, 1866)

Figure 6

Hoplocephalus mastersii Krefft, 1866, Proc. zool. Soc. Lond. 1866: 370. 'Flinders Range', S.A.

Diagnosis

A very small *Notechis* with 15 midbody scale rows; top of head wholly or posteriorly black, bordered behind by pale brown nuchal bar and below by black loreo-temporal streak; upper lips white; lower surfaces mostly reddish. Further distinguishable from *N. coronatus* by hog-nosed snout and striate scales; and from *N. minor* by more numerous ventrals (129 or more) and fewer subcaudals (fewer than 45).

Description

Snout-vent length (mm): 121-271 (N 19, mean 230.1). Length of tail (% SVL): 16.8-23.6 (N 19, mean 20.0).

Rostral as wide as high or slightly wider. Internasals a little less or a little more than half as long as prefrontals. Frontal 2.4-3.2 times as long as wide (N 20, mean 2.72), and 0.65-1.0 times as wide as supraocular (N 20, mean 0.83). Preocular usually a little wider than high. Eye a little larger than distance from mouth; upper third of iris and narrow ring around pupil orange-yellow, rest of iris dark. Temporals 2 + 2 (N 19). Upper labials 6 (N 19). Lower labials 7 (N 19).

Midbody scale rows 15 (N 20), increasing on neck to 16-19, and reducing before vent to 13 (N 20). Ventrals 129-145 (N 18, mean 136.7). Anal entire (N 18). Subcaudals 32-44 (N 18, mean 38.3), single except rarely for divided first and for a few pairs towards tip. Ventrals plus subcaudals 169-182 (N 18, mean 175.0).

Top of head dark grey or olive-grey, freckled with black, most densely posteriorly and often becoming wholly black on frontal, supraoculars, parietals and first 2-3 vertebrals; behind last-named an orange-brown or brownish-yellow transverse bar about two scales wide, not sharply defined and often broken in middle. Irregular black streak from nasal back through top of upper labials to side of

neck, bordered below by a white streak. Remaining dorsal surfaces blackish-brown in juveniles, and olive-grey finely freckled with blackish-brown in adults. Rostral, bottom of anterior upper labials, lower labials and gulars pale grey heavily stippled or finely freckled with black. Under neck greenish-yellow. Anterior edge of ventrals and subcaudals suffused or blotched with dark grey; lateral quarter of scales coloured like dorsals; remainder of each scale (central posterior) red in juveniles and orange in adults.

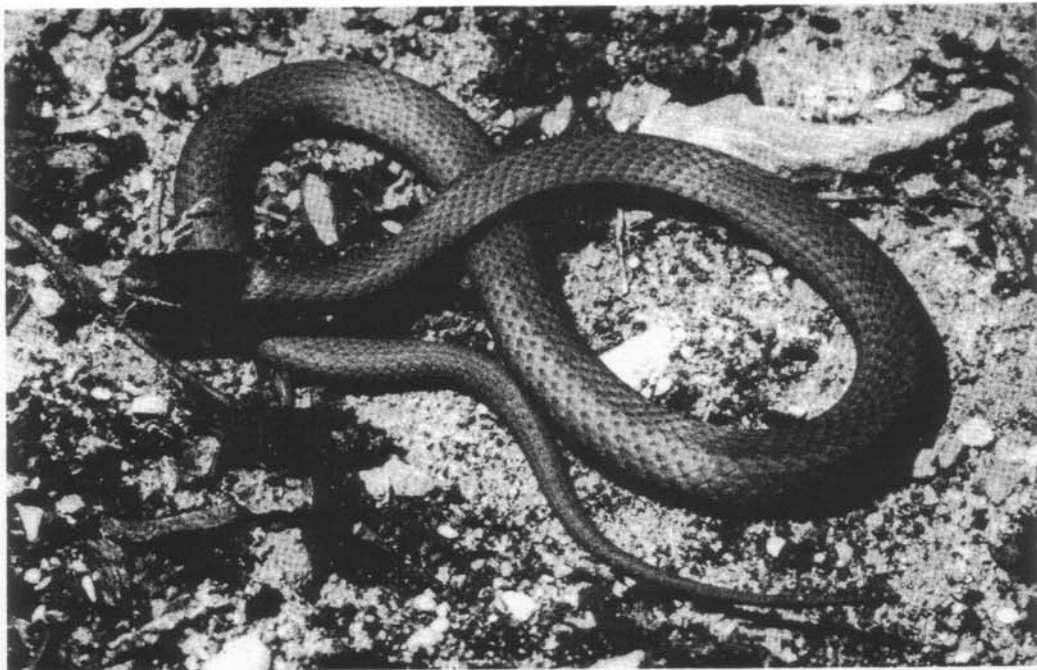


Figure 6 A *Notechis mastersii* from Eucla, W.A., photographed by G. Harold.

Distribution

Coastal areas of south-eastern Western Australia, west nearly to Esperance and inland to Mt Newmont. Also southern South Australia (Eyre and Yorke Peninsulas and south-eastern interior) and Victoria (western interior).

Geographic Variation

The specimens from Esperance (much the wettest part of the species' range in Western Australia) are considerably darker than adults from elsewhere.

Material

Eucla Division (W.A.)

4 km E Eucla (70019-20) and 4 km S (18482, 24644); 40 km SSE Mundrabilla HS (36717); 45 km W Madura (28900) and 43 km S (34417); 8-15 km SSE Cocklebiddy (24668, 27370,

53425-6, 60811, 66775); Eyre (56867, 67260, 67311); 18 km ESE Mt Newmont (32°56'S, 123°12'E) (59916); 32 km ENE Esperance (40009-10).

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