

## Revision of *Denisonia suta* (Serpentes: Elapidae) and the Description of a New Species Closely Related to It

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### Abstract

Variation in *Denisonia suta* is analysed and a new, closely related species (*D. ordensis*) is described from the far north-east of Western Australia and adjacent part of Northern Territory. The genera *Denisonia* and *Rhinoplocephalus* are redefined.

### Introduction

It was recently discovered that *Denisonia suta* was represented in the valley of the Ord River by two variants. Two specimens agreed with material from Central Australia and further south and east. The other twelve specimens were larger and darker, lacked a hood and ocular stripe, and had more numerous ventrals and the nasal widely separated from the preocular. Did the latter represent a new species? If so, was it conspecific with any of the five nominal species synonymized with *D. suta* by Loveridge (1934: 286)?

In order to answer these questions I examined all the material in the Western Australian Museum (specimens prefixed with WAM); South Australian Museum (SAM); National Museum of Victoria (NMV); CSIRO Division of Wildlife, Canberra (ANWC); Australian Museum, Sydney (AM); Queensland Museum (QM); Central Australian Wildlife Collection, Alice Springs (NTM/AS); and Northern Territory Museum, Darwin (NTM).

Three more specimens of the strange variant came to light, extending its known range south to Sturt Creek and east to the Victoria River, but there were no more examples of typical *suta* from that region. However, I was able to satisfy myself that two taxa coexisted on the Ord and that the new species had not been previously named. It now remains to discuss the generic placement of the snakes.

Worrell's dismemberment of *Denisonia* in 1961 was for a long time ignored by systematists. Nevertheless Boulenger's concept of the genus clearly required amendment. In 1970 McDowell established a new genus, *Salomonelaps*, for *D. par* of the Solomon Islands. In 1982 I transferred *D. coronata* and its closest relatives to *Notechis*. The remaining Western Australian species of *Denisonia* (*sensu* Boulenger 1895) can be placed in one or other of two genera, *Denisonia* and *Rhinoplocephalus*, which are now redefined.

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*Denisonia* Krefft, 1869. Type-species: *D. ornata* Krefft, 1869 [= *D. maculata* (Steindachner, 1867)]. Other species: *D. atriceps* (Storr, 1980); *D. devisi* Waite and Longman, 1920; *D. fasciata* Rosén, 1905; *D. ordensis* sp. nov.; *D. pallidiceps* (Günther, 1858); *D. suta* (Peters, 1863). Small to medium-sized elapid snakes with broad depressed head, no canthus rostralis, undivided anal and subcaudals, 15-21 midbody scale rows, pale iris and vertically elliptic pupil. Further distinguishable from *Rhinoplocephalus* by non-opalescent lower surfaces and neck distinctly narrower than head; and from *Notechis* by whitish rather than black concealed skin between dorsals and strongly imbricate scales on sides of body. Confined to Australia, mainly the north and east.

*Rhinoplocephalus* Müller, 1885. Type species: *R. bicolor* Müller, 1885. Other species: *R. dwyeri* (Worrell, 1956); *R. flagellum* (McCoy, 1878); *R. gouldii* (Gray, 1841); *R. monachus* (Storr, 1964); *R. nigriceps* (Günther, 1863); *R. nigrostriatus* (Krefft, 1864); *R. punctatus* (Boulenger, 1896); *R. spectabilis* (Krefft, 1869). [It is thus the *Denisonia gouldii* group of Storr (1981) plus *R. bicolor*; the latter has long been the sole member of *Rhinoplocephalus*, but its only peculiarity is the absence of internasals.] Small elapid snakes with broad depressed head, no canthus rostralis, undivided anal and subcaudals, 15-17 midbody scale rows, dark iris and circular pupil. Further distinguishable from *Denisonia* by; opalescent-white lower surfaces and neck little or not narrower than head; and from *Notechis* by the highly glossed scales and whitish (rather than black) concealed skin between dorsals. Confined to Australia, mainly the south.

## Systematics

### *Denisonia suta* (Peters, 1863)

*Hoplocephalus sutus* Peters, 1863: 234. Buchsfeld, S.A.

*Hoplocephalus frenatus* Peters, 1870: 646. Lake Elphinstone, Qld.

*Hoplocephalus frontalis* Ogilby, 1890: 1027. Narrabri, N.S.W.

*Hoplocephalus stirlingi* Lucas and Frost, 1896: 149. Charlotte Waters, N.T., etc.

*Denisonia frontalis* var. *propinqua* DeVis, 1905: 51. Qld.

*Denisonia Forresti* Boulenger, 1906: 440. [Near Alexandria, N.T., *vide* Boulenger, 1908: 333.]

### Diagnosis

A small slender to large stout *Denisonia* with 19 (rarely 17 or 21) midbody scale rows. Distinguishable from *D. atriceps* by brown (not black) hood and fewer subcaudals (24-42, v. 46-48).

### Description

Snout-vent length (mm): 133-775 (N 420, mean 333.3). Length of tail (% SVL): 10.4-17.7 (N 410, mean 14.4).

Rostral very slightly to much wider than high. Internasals much smaller than prefrontals. Frontal 1.2-2.2 times as long as wide and 1.6-2.6 times as wide as supraoculars; sides usually straight and slightly converging backwards. Nasal a little to much wider than high; in contact with preocular (N 188) or separated (227). Preocular considerably higher than wide; widely

separated from frontal. Postoculars 1 (N 2, when upper fused to supraocular), 2 (339) or 3 (1, when lower divided); lower usually (77.5%) longer and narrower than upper. Temporals 1 + 2 (N 3), 2 + 2 (223), 2 + 3 (16), 3 + 2 (1), 3 + 3 (2) or 3 + 4 (1); primaries considerably larger than secondaries; lower primary usually (65.5%) largest, descending deeply between last two labials but never completely separating them. Upper labials 5 (N 1, when third and fourth partly fused) or 6 (339). Lower labials 7 (N 336) or 8 (1). Dorsals strongly imbricate, much longer than wide. Scale rows at midbody 17 (N 7), 18 (1), 19 (337), 20 (4) or 21 (4); on neck 19 (2), 20 (3), 21 (39), 22 (58), 23 (191), 24 (21) or 25 (15); immediately before vent 12 (3), 13 (200), 14 (40), 15 (84), 16 (1), 17 (2). Ventrals 135-180 (N 331, mean 156.0). Subcaudals 24-42 (N 327, mean 32.2). Ventrals plus subcaudals 165-218 (N 327, mean 188.2).

*Typical coloration.* Top of head and first 5-8 transverse scale rows on neck greyish-brown, tending to become blackish-brown peripherally, i.e. at contact with ocular stripe and with dorsal coloration. Remaining upper surfaces pale greyish-brown, scales finely edged with greyish-brown or blackish-brown. Broad, irregular whitish ocular stripe from internasal to temple. Narrower, irregular, often discontinuous, blackish-brown loreotemporal stripe from top of rostral through top of upper labials and bottom of temporals to side of neck. Lips and lowest dorsals mostly whitish. Mental and chin-shields smudged with greyish-brown. Remaining lower surfaces whitish.

*Darker variants.* Dorsals basally to wholly greyish-brown (in latter case hood may be imperceptible). Pale ocular stripe partly to completely invaded by greyish-brown pigment. Outer tenth to third of ventrals anteriorly edged with greyish-brown. Regionally a greyish-brown mid-ventral stripe and much less frequently a dark vertebral stripe.

### Distribution

Widespread in the warmer and drier parts of northern and eastern Australia: eastern Northern Territory north to the Roper River; Queensland (mainly interior) north to Chillagoe; interior of New South Wales; northern and north-western Victoria; eastern South Australia south to the Murray Mallee; and an apparently isolated population in the extreme north-east of Western Australia (Ord River).

### Geographic Variation

Over its enormous range *D. suta* undergoes much variation, most of which is clinal. It will be seen from Table 1 that snout-vent length and the number of ventrals, subcaudals and dorsal scale rows just before the vent, increase from south to north; whereas frequency of nasal contacting preocular and relative length of tail decrease from south to north. (For comparison, the corresponding data for *D. ordensis* are also tabulated.)

Coloration varies non-clinally. In Central Australia, South Australia, north-western Victoria, western New South Wales and south-western Queensland, most specimens are pale and consequently the hood and facial pattern are moderately to strongly developed. In northern Victoria, eastern New South Wales and south-eastern Queensland, north to Wandoan and west to Glenmorgan, Mungindi, Nyngan, Hillston and Boort, darker variants predominate; here alone, as in the type of *Hoplocephalus frontalis*, a dark mid-ventral stripe

may be present. In northern and central Queensland coloration is highly variable, ranging from pale and well-patterned to dark and almost patternless. Snakes from the north-east of the Northern Territory are similarly variable but dark, almost patternless individuals predominate, at least on the Barkly Tableland (which is also notable for the great length and girth of many specimens).

**Table 1** Mean snout-vent length (mm), relative length of tail (% SVL), number of dorsal scale rows immediately before vent, number of ventrals, number of subcaudals and frequency (%) of nasal in contact with preocular for *D. suta* in six States or regions and for *D. ordensis*; sample size in parentheses.

	SVL	Tail	Dorsals before vent	Ventrals	Subcaudals	Nasal contacting preocular
Victoria (10)	253	15.0	13.2	140.6	29.1	66.7
New South Wales (149)	292	15.0	13.4	147.9	31.6	56.0
South Australia (62)	299	14.4	13.6	153.9	32.1	51.5
Queensland (97)	353	14.4	13.7	159.8	33.2	31.3
Central Australia (61)	355	12.8	13.7	162.7	30.2	52.6
NE of Northern Territory (40)	498	13.9	14.3	167.2	35.0	8.1
<i>ordensis</i> (15)	469	13.6	14.9	175.6	34.1	0.0

## Material

### Western Australia

Kununurra (WAM 20568); Lake Argyle (WAM 58875).

### Northern Territory

Roper Hwy, 52 km E Stuart Hwy (AM 80338); 57-60 km SW Borroloola (ANWC 947-50); 40-48 km W Eva Downs (NTM/AS 1916-7); Anthony Lagoon and vicinity (NTM/AS 504; NTM 4794-6, 4819-20, 5209, 5235); Brunette Downs (ANWC 920; NTM/AS 3224-5); 20 km N Alroy Downs (NTM 8561, 9584, 9687-9, 9700); No. 26 Bore, Alroy Downs (NTM 9522-3, 9719-21, 9728, 9762-4); Alexandria (NTM/AS 576-7); Gallipoli (NTM/AS 520-1); Barkly Hwy (NTM/AS 522); 7 km W Avon Downs (NTM/AS 594); Barkly Hwy at Qld border (NTM/AS 483); Hatches Creek (SAM 3487); Utopia (AM 65230); No. 3 Bore, Woodgreen (NTM/AS 81); 50 km N Alice Springs (NTM 6568); Milton Park (NTM/AS 4156); Kunoth Bore (NTM/AS 90); 10-16 km N Alice Springs (NTM 726-32); Alice Springs (WAM 55423, 70946; SAM 2777, 3145, 13442; NMV D50544; AM 49845, 51946-8; NTM/AS 91-4, 1069, 1397, 1498, 2275, 3226, 3239, 4807, 5893-4; NTM 317, 333, 497, 1868, 1958, 2456-7, 3802); Undoolya (NTM/AS 629); between Alice Springs and Box Hole Crater (SAM 3580); 16 km S Alice Springs (NTM/AS 1080) and 16 km SW (NTM/AS 1498); Ormiston Reserve (NTM/AS 116); Jay Creek (NTM 535); Owen Springs (WAM 20830); Todd River Station (NTM/AS 1396); Ringwood (NTM/AS 95); Hermannsburg (SAM 2323; NTM/AS 96); Mercein (NTM/AS 1024); 29 km S Alice Springs (NTM 739-41) and 51 km S (NTM 498); Reedy Creek (24°18'S, 131°36'E) (NTM/AS 1905); Maryvale (NTM 1958); Idracowra (SAM 3146); Charlotte Waters (NMV D11758, syntype of *Hoplocephalus stirlingi*).

### Queensland

'Cairns district' (AM 80905); Chillagoe (QM 13447); Almaden (AM 10091); Normanton (ANWC 3173); Doomadgee (SAM 3820, 5331); 'Croydon' (QM 32289); St Ronans (QM 31071); Alice River near Townsville (QM 27640); near Townsville (SAM 3811); Ayr (AM 37372); Charters Towers (QM 6265); Hughenden (QM 4376, 13599,

15574); Prora, Nelia (QM 37204); Mt Isa (AM 25983, 26597) and 67 km E (NTM 8797); 12 km SSE Dajarra (AM 75903); Corfield (QM 7610); Winton (QM 26989, 27473); Pathungra (AM 58501); 21-mile Bore, Cazona Downs (QM 21605); Slashers Creek, 80 km E Boulia (QM 37012); Whyrallah (QM 39444); 160 km SW Winton (QM 39482); Longreach (QM 6000, 8915, 22971, 23187, 39291) and 74 km NW (AM 63013), 16 km N (QM 27507), 40 km W (QM 23312) and 77 km S (QM 37151-2); 45 km W Barcardine (AM 65982); Coreena (QM 110); 10 km N Jericho (QM 9557); Clermont (QM 1223); Retro (QM 6117); Capella (QM 5799); Emerald (NMV D8651) and 12 km N (QM 36785), 15 km W (QM 36787) and 51 km E (QM 24143); Emerald Downs (AM 58498-9); 40 km S Blackwater (QM 36786); Rockhampton (ANWC 2699); Sandringham (AM 87744, 92733); Bedourie (NTM 8805); Ruthven, Isisford (QM 6151); 16 km E Emmet (WAM 55876); Castle Creek (QM 4568); Jundah (QM 10581); Cuddapan (ANWC 2803); Birdsville (QM 9896) and 8 km NW (QM 10276); Augathella (QM 7555); Cattle Creek, Wandoan (QM 15338); 'Gundiah' (QM 2287); Jackson (QM 7483, 9111); Roma (QM 28700); Muckadilla (QM 6574); Amby (QM 23184); Quilpie (QM 5091, 28444, 28446); Eromanga (QM 5329); Claverton Park, Wyandra (QM 3811); Glenmorgan (QM 37206); Tara (QM 23164); Jimbour (QM 3874); Macalister (QM 10245); Dalby (QM 8706, 9614); Bowenville (QM 2913-6, 2919); Oakey (QM 2707, 28958); Pampas (QM 2729); St George (QM 34604); Gilruth Plains, Cunnamulla (AM 58500, 64978-9); Binya, Cunnamulla (QM 23196); Cunnamulla (AM 17126); Dynevor Downs (QM 25966); Thargomindah (QM 5048, 26417); Warwick (QM 10243); Byra (ANWC 1784).

### *South Australia*

Near Goyders Lagoon (SAM 22559); Innamincka (SAM 18158; NMV D9198) and 60 km N (SAM 20838), 30 km N (SAM 21006), 25 km NW (NMV D41575), 14 km W (SAM 20534), 38 km W (SAM 16118); Murta Murta Well (SAM 19852); Etadunna (WAM 44941; SAM 16020 *a-b*); Coober Pedy (AM 17183-5); SE of Coward Springs (SAM 11101; ANWC 2546); 26 km W Marree (SAM 18857); 20 km NE Billa Kalina (SAM 20995) and 5 km NW (SAM 20994); Old Moolawatana (SAM 12440); Lyndhurst (SAM 2598); Andamooka (SAM 19843); Wooltana (AM 93434); Leigh Creek (SAM 3147 *a-c*); Moolooloo (SAM 928); N of Blinman (SAM 3916); Pimba (SAM 20544-6) and 11 km S (SAM 20543); Mern Merna (SAM 2628*a*, 2658); Wilpena Pound (SAM 3264); Whittata (SAM 2781); Bookaloo (SAM 1691 *a-c*); south end of Lake Torrens (SAM 3831, 3873); Milang Ruins (SAM 14908); Gordon (AM 19205); Quorn (SAM 130); Nonning (SAM 14727); Port Augusta (SAM 4055; NMV D50543; AM 17180); Mambray Creek (SAM 22552, 23266); Orroroo (SAM 1469); near Point Lowly (SAM 20857); Whyalla (SAM 15172); Port Pirie (SAM 3725); Cowell (SAM 12794); Canegrass (SAM 21527); Copeville (SAM 1339 *a-b*); 'Penong' (SAM 2373); 'Aldgate' (SAM 2257 *a-b*); 'Halletts Cove' (SAM 2382).

### *New South Wales*

Maxland, Mungindi (AM 14899); between Mungindi and Collarenebri (AM 99377); Goodooga (AM 12595); Wombeira, Goodooga (AM 12607); Morce (AM 1125-6, 1140*b*, 1407, 1489-90, 1493, 1623, 1836-7) and 6 km W (AM 93288); Pallamallawa (AM 14665); Delungra (AM 12246); Quantambone (AM 12207); Brewarrina (AM 17908, 18326, 20293) and 7 km E (AM 47345) and 32 km S (47344); Bourke (AM 97145, 97148) and 16 km N (AM 60312) and 80 km W (ANWC 2529); Milparinka (AM 14653, 14656-8, 42726-7); Calindary (ANWC 532, 534, 540); Wonaminta (AM 14654); Lake Bancannia (AM 32783); Peri Lake (AM 49194-5); Louth (NMV D7566; AM 14393); Drildool (AM 12513); Narrabri (AM 8527); Bundarra (AM 2751, 28258); Upper Manilla (AM 13416); Garryowen, Curlewis (AM 13978); Coonamble (AM 75905); Quambone (ANWC 2649; AM 95271) and 22 km SSW (AM 76337); Willie, Macquarie Marshes (ANWC 2629; AM 92389); Warrumbungle Mountains (AM 15623, 18891); Armatree (AM 59923); Spring Ridge (AM 46026); Mootwingee (AM 45539); Wilcannia (SAM 12067-8; AM 37755, 46027-8); Manara, 125 km W Cobar (AM 76554-7); Warrah, Willow Tree (AM 7115, 7190); Gilgandra (AM 26583) and 24 km W (AM 32891-3, 32968-70, 37378-9, 37422, 41160-1, 46025); 15 km NW Warren (QM 37824); Nyngan (AM 65317) and 24 km SE (ANWC 2528); 38 km WNW Nevertire (AM 60310-1) and 29 km WNW (AM 60309), 20 km WNW (AM 60308), 16 km WNW (AM 64279); Dunedoo (AM 79137); Werrana, Merriwa (AM 8996); near Broken Hill (NMV D40131; AM 46034, 46037); Kinchega National Park (AM 32797); Euabalong West (AM 11557); Lake Cargelligo (AM 8849); Hillston (AM 100044); Yandembah (AM 783, 968-71); 32 km S Condobolin (AM 45285-6); Tregalana, Forbes (AM 4230); Lake Cowal (ANWC 106, 139, 1481-2); Woorandara, Booligal (ANWC 1521-30, 2874); Wyalong (AM 98696); Bribbaree, Temora (AM 18949, 18954, 18957); Young (AM 24676); Lake Victoria (NTM 5032); 24 km NNE Wentworth (NMV R13810, D40172); Hay

(AM 15418); Leeton (AM 9744, 12545, 14407a-b, 15691); Glen Era, Darlington Point (AM 7303); Coleambally (AM 95507); Widgiewa (AM 14409); Nyang (NMV D3703); Jerilderie (NMV D13392); Momolong (NMV D15355); Caldwell (NMV D8637; AM 14018-20); Barham (NMV D9258, 54672-3).

*Victoria*

Red Cliffs (NMV D48908); Kulkynne (NMV D55110); 'Mallee' (NMV D4757); Kerang (NMV D15354) and 8 km NE (NMV D57084); Quambatook (AM 11550-1); 13 km W Boort (NMV D14400); Kewell (NMV D3600); Kamerooka (NMV D15353).

*Denisonia ordensis* sp. nov.

**Holotype**

WAM 58877, collected by W.H. Butler on 9 January 1972 at Argyle Downs, W.A., in 16°17'S, 128°47'E.

**Paratypes**

*Western Australia*

Kimberley Research Station (WAM 12344, 22352); Argyle Downs (WAM 58873-6, 58878-9, 76626); Gordon Downs (NTM 314).

*Northern Territory*

Rosewood (WAM 37701-2); Wave Hill (NTM/AS 561-2).

**Diagnosis**

A large *Denisonia*, very like *D. suta*, but with little or no indication of hood or pale ocular stripe and with lower surfaces narrowly cross-banded with greyish-brown and white.

**Description**

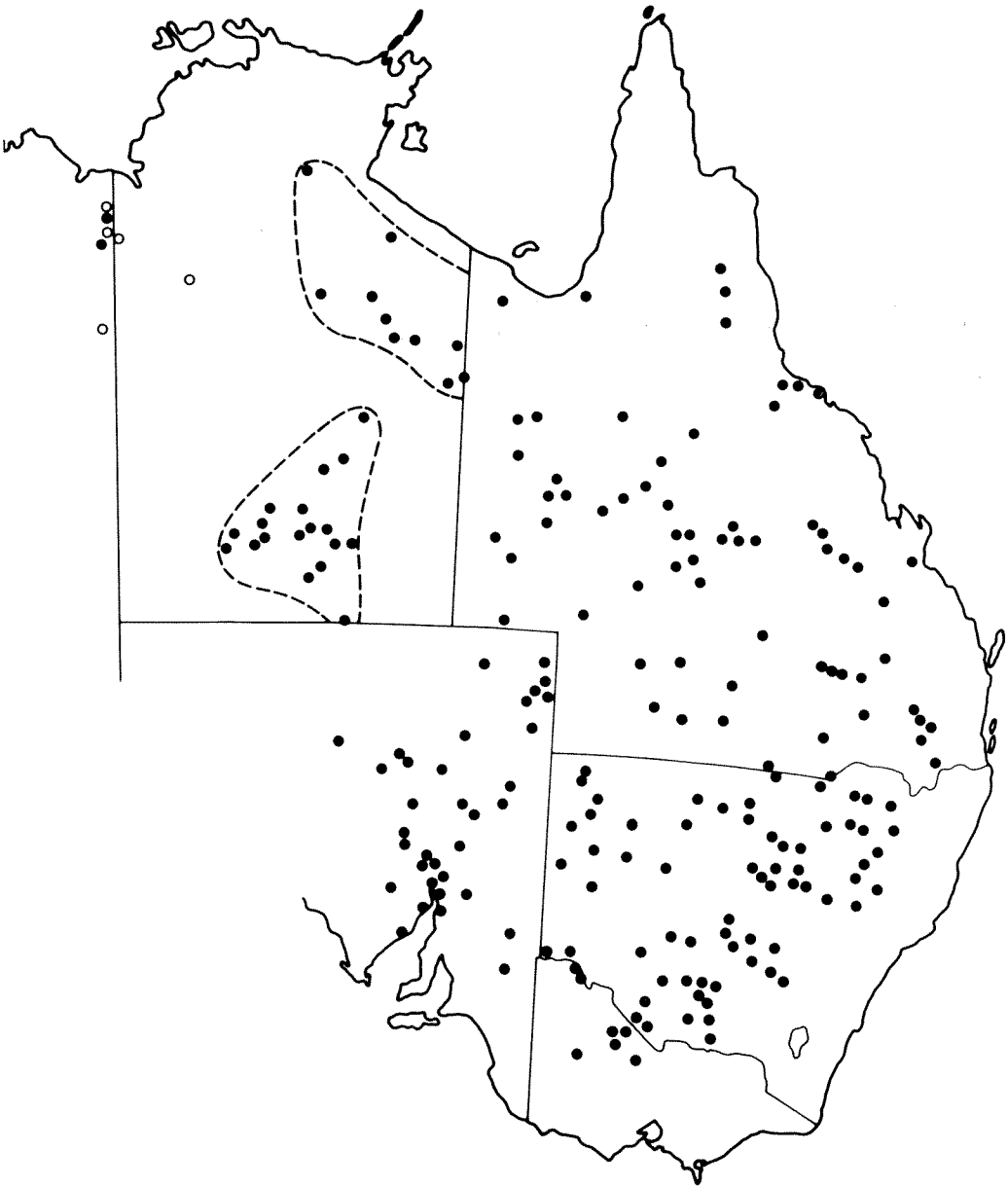
Snout-vent length (mm): 385-662 (N 15, mean 468.9). Length of tail (% SVL): 12.3-15.3 (N 15, mean 13.6).

Rostral wider than high. Internasals much smaller than prefrontals. Frontal 1.3-1.9 times as long as wide and 1.8-2.7 times as wide as supraocular; sides usually straight and converging backwards. Nasal much wider than high and separated from preocular (N 15). Preocular considerably higher than wide; widely separated from frontal. Postoculars 2 (N 15); lower longer and narrower than upper. Temporals 2 + 2 (N 15); primaries considerably larger than secondaries; lower primary largest and descending deeply between last two labials but never completely separating them. Upper labials (N 15). Lower labials 7 (N 15). Dorsals strongly imbricate, much longer than wide. Scale rows at midbody 19 (N 15); on neck 21 (3), 22 (3), 23 (8) or 24 (1); immediately before vent 13 (N 1) or 15 (14). Ventrals 169-181 (N 15, mean 175.6). Subcaudals 30-38 (N 15, mean 34.1). Ventrals plus subcaudals 200-218 (N 15, mean 209.7).

Upper and lateral surfaces greyish-brown except for indistinct pale blotches on lips and less frequently on lores and temples. Lower surfaces whitish except for brownish-grey mental, chin-shields, first three lower labials and anterior half of ventrals and subcaudals.

**Distribution**

Far north-east of Western Australia south to Gordon Downs, and far north-west of Northern Territory south-east to Wave Hill.



**Figure 1** Map of northern and eastern Australia showing location of specimens of *D. sutta* (solid circles) and *D. ordensis* (open circles). The broken lines indicate the limits of the north-eastern Northern Territory populations and Central Australian populations, the presumed ancestors of *ordensis* and Ord River *sutta* respectively.

## Remarks

Before describing this species, I had to be convinced that the two Ord River specimens taken to be *suta* were not in fact part of the variation in *ordensis*. This was especially important in view of the wide and continuous variation in pattern in the geographically nearest populations of *suta*, i.e. those inhabiting the north-east of the Northern Territory. Here, specimens from the periphery of the region (the Roper and McArthur Rivers and the Queensland border) were well-patterned, whereas most specimens from the core of the region (the Barkly Tableland) approached *ordensis* in the feeble development of the hood and ocular stripe. However, in all other respects the material seemed to be uniform, and there was no reason for doubting that only one species occurred in the north-east of the Territory.

The situation was different within the range of *ordensis*. While a few specimens of *ordensis* had some indication of a hood or ocular stripe, none lacked crossbands on the lower surfaces. Variation in pattern was thus not continuous. Moreover the two specimens of *suta* differed from *ordensis* in three scale characters. The nasal in both *suta* was in contact with the preocular; it was separated in all 15 *ordensis*. In both *suta* there were 13 dorsal scale rows immediately before the vent; only one *ordensis* had 13 rows, the rest had 15. The *suta* had 162 and 165 ventrals, compared to 169-181 in *ordensis*. The probability that these correlations were due to chance must be very low.

It seems that the north-east of Western Australia has been colonised by two different stocks of *suta*: one from the Barkly Tableland, the other from Central Australia (see map, Figure 1). The latter migration is presumably the more recent, for there is yet no discernible difference between Ord River and Central Australian specimens. Incidentally, the pathway between these regions, perhaps no longer extant, could have been used by the skink *Ctenotus alacer*.

In isolation *ordensis* has diverged slightly in morphology from its presumed ancestor, the Barkly Tableland population of *suta*. Whether it has acquired reproductive isolation is of course unknown. Nevertheless, if a line is drawn between two species it can only be drawn here, for there is little doubt that the Barkly population is conspecific with *suta*. Distribution and variation are continuous in eastern Australia, and specimens resembling those from the Barkly Tableland have been examined from as far south in Queensland as Longreach and as far east as the Townsville district.

Finally there is the question, how can two such similar species as *ordensis* and *suta* coexist in the valley of the Ord? Presumably they occupy different habitats, but in the absence of label data, one can only make a guess. Mine is that *ordensis* (and the dark variants of *suta*) prefer black-soil plains and flats, and Ord River *suta* (and pale variants elsewhere), lighter soils.

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