

**THE MONITOR LIZARDS
(GENUS *VARANUS* MERREM, 1820)
OF WESTERN AUSTRALIA**

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ABSTRACT

The 19 species and subspecies of *Varanus* inhabiting Western Australia are defined and keyed: *V. acanthurus* Boulenger, *V. brevicauda* Boulenger, *V. caudolineatus* Boulenger, *V. eremius* Lucas & Frost, *V. giganteus* (Gray), *V. gilleni* Lucas & Frost, *V. glauerti* Mertens, *V. glebopalma* Mitchell, *V. gouldii* (Gray), *V. kingorum* nov., *V. mertensi* Glauert, *V. mitchelli* Mertens, *V. panoptes panoptes* nov., *V. panoptes rubidus* nov., *V. pilbarensis* nov., *V. rosenbergi* Mertens, *V. storri ocreatus* nov., *V. timorensis scalaris* Mertens and *V. tristis tristis* (Schlegel).

INTRODUCTION

Thanks largely to the efforts of the late Professor Robert Mertens the alpha taxonomy of Australian varanids is soundly based. However, Mertens' sub-generic classification of *Varanus* is not standing up so well to the scrutiny of modern investigators. For example, *Varanus mitchelli*, placed by Mertens (1953) in the subgenus *Varanus*, has the same karyotype and lactate dehydrogenase isozyme as members of the subgenus *Odatria* (Holmes, King & King, 1975). It seems that the laterally compressed tail of *V. mitchelli* is not homologous with that of the large monitors. In the latter it probably serves as a weapon of defence; in *V. mitchelli* it is doubtless an adaptation for swimming.

Because it is still uncertain how best to divide *Varanus* into subgenera and species-groups, I herein deal with the western taxa in alphabetic order. This revision is based on material in the Western Australian Museum and the collection of the British Joint Services Expedition to Central Australia (specimen numbers prefixed with JSE).

I am grateful to Mrs Ariadna Neumann for her painstaking translation of much of Professor Mertens' work.

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KEY

1. Tail (except base) markedly laterally compressed with a low two-keeled crest; lateral caudals small, weakly keeled, not spinose or mucronate; length of head plus body up to 70 cm—"subgenus *Varanus*" 2
 Tail not or slightly laterally compressed, usually without a two-keeled crest; lateral caudals moderately large, weakly to strongly keeled, with or without a spine or mucron; length of head plus body up to 36 cm—"subgenus *Odatria*" 8

2. Tail extremely compressed; nostril small, located on swollen canthus rostralis (i.e. laterodorsal or dorsolateral in position); dorsally olive with scattered very small, black-edged, whitish spots on back and limbs *V. mertensi*
 Tail strongly compressed; nostril moderately large, located below weak to moderately strong canthus rostralis (i.e. lateral in position); dorsal coloration not as above 3

3. Canthus rostralis very strong; nostril about twice as far from orbit as tip of snout; anterior part of head strongly concave in plan (so that snout is narrow with sides almost parallel); a fine dark reticulum underneath; midbody scale rows 265-287 *V. giganteus*
 Canthus rostralis weak to moderately strong; nostril not much further from orbit than tip of snout; side of head not strongly concave in plan; underneath spotted, banded or coarsely reticulated; midbody scale rows 103-242 4

4. Throat, breast, belly and under legs and tail *narrowly* cross-banded with grey; length of head plus body up to 25 cm; midbody scale rows 103-130 *V. mitchelli*

Ventrally spotted, reticulated or <i>widely</i> cross-banded; length of head plus body up to 66 cm; midbody scale rows 132-242	...	...	...	...	...	...	...	...	...	5
5. Dorsal pattern consisting of transverse rows of large dark spots alternating with rows of small pale spots; small dark spots on venter aligned with large dark spots on back	...	...	...	...	...	...	...	...	...	6
No large dark spots on back; venter immaculate, banded or spotted (spots not aligned transversely)	...	...	...	...	...	...	...	...	...	7
6. Dorsal ground colour brown; tail entirely banded	...	...	...	...	...	...	...	...	...	<i>V. panoptes panoptes</i>
Dorsal ground colour reddish; end of tail pale, unbanded	...	...	...	...	...	...	...	...	...	<i>V. panoptes rubidus</i>
7. End of tail yellow; neck not banded; venter in adults spotted with dark brown	...	...	...	...	...	...	...	...	...	<i>V. gouldii</i>
End of tail banded or uniformly dark; 3 or 4 black cross-bands on neck curving down and forwards on sides; venter coarsely reticulated or cross-banded with grey	...	...	...	...	...	...	...	...	...	<i>V. rosenbergi</i>
8. Tail distally with dark longitudinal stripes or lines	...	...	...	...	...	...	...	...	...	9
Tail without dark longitudinal stripes or lines (i.e. pattern, if any, entirely transverse)	...	...	...	...	...	...	...	...	...	11
9. Scales on top of head obtusely keeled; tail with a low two-keeled crest; nails long, slender and slightly curved; throat streaked with grey	...	...	...	...	...	...	...	...	...	<i>V. eremius</i>
Head scales smooth; tail without a two-keeled crest; nails short, thick and strongly curved; throat freckled with brown	...	...	...	...	...	...	...	...	...	10
10. Head, neck and back spotted with dark brown	...	...	...	...	...	...	...	...	...	<i>V. caudolineatus</i>
Head streaked and back narrowly cross-banded with dark brown	...	...	...	...	...	...	...	...	...	<i>V. gilleni</i>
11. All but base of tail encircled by bold black and white bands	...	...	...	...	...	...	...	...	...	<i>V. glauerti</i>
Tail not so	...	...	...	...	...	...	...	...	...	12

12. Distal two-fifths of tail whitish, unbanded *V. glebopalma*
 Tail not so 13
13. Caudal scales strongly spinose 14
 Caudal scales not strongly spinose 15
14. Neck with longitudinal stripes; back with pale spots; midbody scale rows 88-112; length of head plus body up to 24 cm *V. acanthurus*
 Neck not striped; back without pale spots; midbody scale rows 70-84; length of head plus body up to 13 cm *V. storri ocreatus*
15. Coloration predominantly black, brown and grey; dorsal pattern (if any) consisting of large pale spots; length of head plus body up to 28 cm 16
 Coloration predominantly reddish brown; dorsal pattern consisting of small dark spots; length of head plus body up to 17 cm 17
16. Ventrolaterally on tail a squarish or circular cluster of black or black-and-white spinose scales much larger than adjacent scales and well separated from cloaca by small scales; supraorbitals much smaller than interorbitals and sharply differentiated from them; midbody scale rows 119-152 *V. tristis tristis*
 Lateroventrally on tail in males several rows of small narrow white pointed or spinose scales immediately behind cloaca; supraorbitals much smaller than interorbitals and gradually merging with them; midbody scale rows 98-124 *V. timorensis scalaris*
17. Scales on top of head very weakly keeled; length of head plus body up to 12 cm; tail less than 1.2 times as long as head plus body; lamellae under fourth toe 12-16 *V. brevicauda*
 Head scales smooth; length of head plus body up to 17 cm; tail more than 1.7 times as long as head plus body; lamellae under fourth toe 19-25 18
18. Four to six curving rows of narrow pale spinose scales on each side of tail immediately behind

cloaca; dorsal and lateral caudal scales weakly keeled	... ..	<i>V. pilbarensis</i>
No cluster of spinose scales behind cloaca; dorsal and lateral caudals sharply keeled	... ..	<i>V. kingorum</i>

SPECIES AND SUBSPECIES

Varanus acanthurus

(Plate 1; Fig. 1)

Varanus acanthurus Boulenger, 1885, Catalogue of the lizards in the British Museum (Natural History) 2: 324. "N.W. Australia."

Varanus acanthurus brachyurus Sternfeld, 1919, Senckenbergiana 1: 78. Hermannsburg, N.T.



Plate 1: A *Varanus acanthurus* from Nullagine. Photographed by R.E. Johnstone.

Diagnosis

A medium-sized monitor (up to 63 cm long) with strongly spinose tail. Distinguishable from both subspecies of *V. storri* by more numerous midbody scale rows and transverse rows of ventrals, greater size and stronger colour pattern (usually including pale stripes on neck, pale spots on back and pale rings on tail).

Distribution

Tropical Western Australia, south to beyond North West Cape (Yardie Creek), the Hamersley Range, the vicinity of Lake Disappointment (Durba Springs) and the Gibson Desert (64 km N of Windy Corner); also offshore from Sir Graham Moore I. south-west to South Muiron I. Also the Northern Territory (from Katherine south to the Kintore and Macdonnell Ranges) and north-west Queensland.

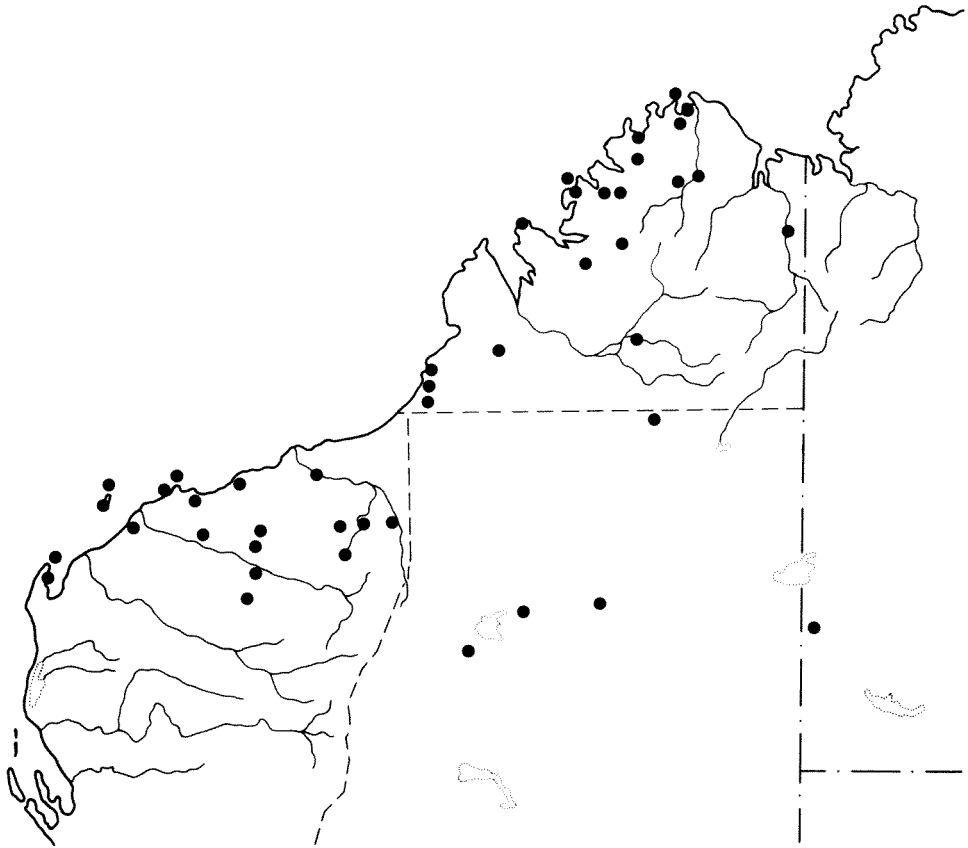


Fig. 1: Map of northern Western Australia showing location of specimens of *Varanus acanthurus*.

Description

Snout-vent length (mm): 65-237 (N 111, mean 150.6). Length of appendages (% SVL): foreleg 23-30 (N 96, mean 27.1), hindleg 30-45 (N 99, mean 36.3), tail 136-228 (N 86, mean 176.7). Midbody scale rows 88-112 (N 89, mean 98.8). Lamellae under fourth toe 15-23 (N 97, mean 18.5).

Head scales small, smooth; interorbitals largest, supraorbitals smallest and moderately well differentiated. Canthus rostralis weak. Nostril lateral, a little nearer to tip of snout than orbit. Nails moderately long and slender, strongly curved.

Upper surfaces strongly patterned with dark and pale markings; former varying from black through blackish brown to dark reddish brown; latter from mid reddish brown through pale reddish brown and pale brown to brownish or yellowish white. Dark markings on head tending to be elongate spots or short stripes; on nape longitudinal stripes alternating with whitish stripes or rows of spots; on back a fine or coarse reticulum enclosing large to moderately large pale spots, usually with a dark central dot; and on tail indistinct cross-bands (1-2 scales wide) alternating with pale cross-bands (one scale wide); but, as described under geographic variation, pale markings may be greatly reduced in north. Upper surface of limbs dark with pale spots. Facial pattern consisting mainly of a dark loreotemporal stripe bordered above and below by a more or less distinct pale line. Sides of body patterned like back or with alternating dark and pale vertical stripes. Underneath brownish white (under tail dark grey in north), spotted with brown on throat, venter, hindlegs (rarely forelegs) and base of tail; spots largest on side of throat and tending to coalesce into short oblique stripes; spots on abdomen occupying whole of scale.

Geographic variation

Apart from slightly peculiar populations on some islands (e.g. Barrow and South Muiron), geographic variation is clinal and generally overshadowed by the wide range of individual variation.

From north to south coloration becomes on average paler and redder. Overall pallor increases southwards despite the fact that the pale elements of the pattern are actually becoming darker, i.e. changing from predominantly brownish white in the north to predominantly reddish in the south. In the north, especially in subhumid north-west Kimberley, the blackish reticulum is so thick as to leave on the back only small rosettes of pale pigment, and on the tail the blackish pigment is often relieved only by the pale spines on some of the proximal caudals. Southwards the reticulum becomes dark reddish brown

and finer, the enclosed ocelli larger, and the pale caudal rings more numerous and complete.

As can be seen in the following table, relative length of tail and hindleg and number of lamellae under fourth toe decrease from north to south.

latitude		14-17°S	17-20°S	20-24°S
hindleg	N	35	19	45
	range	34-45	34-44	30-40
	mean	37.8	36.8	34.8
tail	N	29	17	40
	range	158-228	156-219	136-187
	mean	194.4	181.0	163.3
lamellae	N	34	18	45
	range	18-23	17-22	15-20
	mean	19.8	18.4	17.5

Remarks

Distribution and variation seem too continuous in this species to permit its division into northern and southern subspecies.

Until the taxonomic status of *insulanicus* Mertens of Groote Eylandt is clarified I refer to *V. acanthurus* binomially.

Material

Kimberley Division (W.A.): Sir Graham Moore I. (44057); Pago (953a-b); Kalumburu (28034, 58773, 59024); Port Warrender (56366); Surveyors Pool, Mitchell Plateau (14°40'S, 125°44'E) (43134); Mitchell Plateau (14°52'S, 125°50'E) (43165, 43201, 43320); Drysdale River National Park in 15°16'S, 126°43'E (50690); Old Doongan (50988); Augustus I. (41301, 42965); Kunmunya (40475); Prince Regent River Reserve in 15°28'S, 125°29'E (46688, 46991-3, 47275) and 15°28'S, 125°40'E (46972); Lake Argyle (58769-71, 59976); Wotjulum (11203-4, 11825-32, 12334-5); Beverley Springs (13665); Mt Hart (24067-8, 24080-2, 24736); Fossil Downs (21222); near McHugh Bore, Dampier Downs (54151, 54160-1); Lagrange (46435, 58772, 58774); Frazier Downs (40674); Mt Phire (28019-20); Mannerie Swamp, Nita (59977).

North-west Division (W.A.): Mulyie (58992); Mundabullangana (14903-5, 29061); Legendre I., Dampier Archipelago (14363); West Lewis I., Dampier Archipelago (37339-40); Hermite I., Montebello Is (37442); Lowendall I.

(12897); Barrow I. (56703, 58764-8); Roebourne (12130); Braeside (14590); Meentheena (46175); Mt Edgar (14902, 14906); Mardie (22936); Mt Herbert (20003-4, 58949-50); South Muiroon I. (37245); Exmouth (31414); Yardie Creek (28021-2, 51026, 53325); Woodstock (13803, 31210, 58775, 59025); White Springs (36592); Nullagine and 5 km E (37982, 51714); Wittenoom Gorge (29121); Marandoo (52711).

Eastern Division (W.A.): S of Lake Betty (19°35'S, 126°22'E) (51215); 64 km N of Windy Corner (26927); 33 km E of Well 24, Canning Stock Route (27018); Durba Springs (51944).

Northern Territory: Katherine (26345); 32 km N of Larrimah (23802) and 16 km N (23803); between Wave Hill and Inverway (13718); 23 km N of Wauchope (24295); 36 km W of Alice Springs (20824); Mt Leisler (45205).

Queensland: 45 km NE of Mt Isa (55451).

Varanus brevicauda

(Plate 2; Fig. 2)

Varanus brevicauda Boulenger, 1898, Proc. zool. Soc. Lond. 1898: 920.
Sherlock River, W.A.

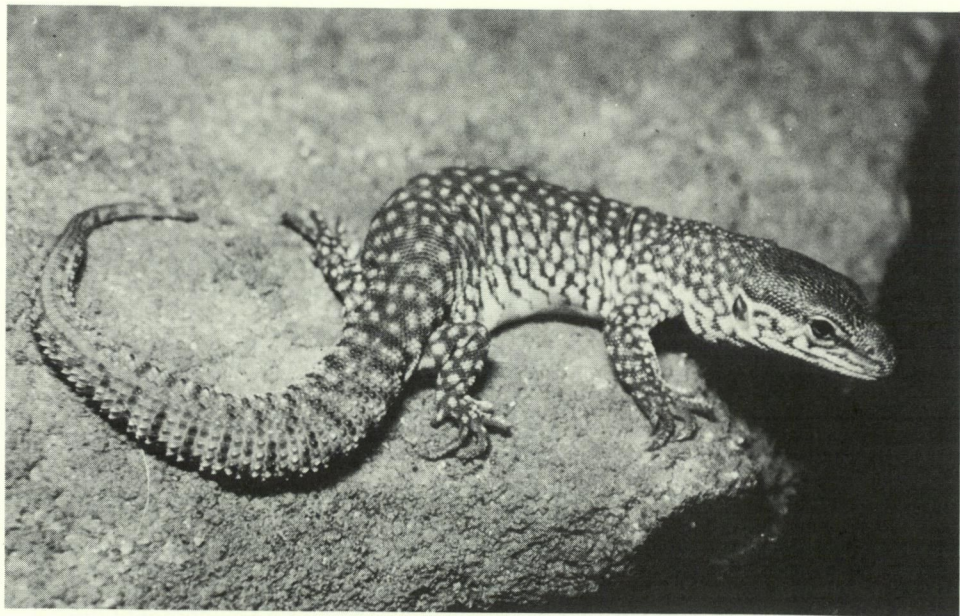


Plate 2: A *Varanus brevicauda* from Marandoo. Photographed by R.E. Johnstone.

Diagnosis

A very small monitor (up to 23 cm long) with short snout, limbs, toes and tail; tail basally constricted and depressed, distally circular in section; dorsal and lateral caudal scales strongly keeled but not spinose or mucronate.

Distribution

Arid and semiarid north-western Western Australia from King Sound south to the Carnarvon and Wiluna districts. Also Northern Territory (Tanami Desert).

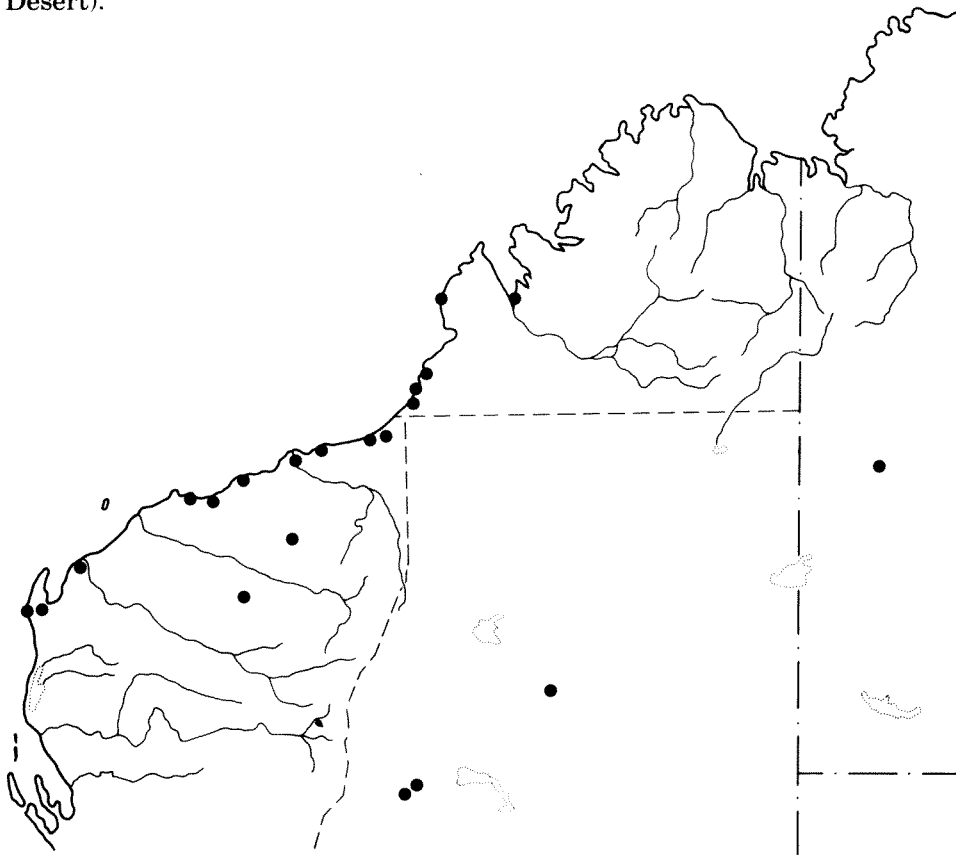


Fig. 2: Map of northern Western Australia showing location of specimens of *Varanus brevicauda*, including those listed in Pianka (1970a).

Description

Snout-vent length (mm): 39-118 (N 21, mean 86.9). Length of appendages (% SVL): foreleg 17-24 (N 18, mean 21.6), hindleg 19-29 (N 17, mean 24.9), tail

87-116 (N 20, mean 97.7). Midbody scale rows 74-92 (N 16, mean 82.8). Lamellae under fourth toe 12-16 (N 16, mean 14.0).

Head scales small, very weakly keeled; supraorbitals much smaller than interorbitals but not sharply differentiated from them. Canthus rostralis weak. Nostril lateral, a little nearer to tip of snout than orbit. Cluster of spines at each side of base of tail slightly behind cloaca. Nails moderately short, slender and curved.

Dorsal and lateral surfaces pale to dark reddish brown. Back and tail spotted or flecked with dark brown, and occasionally flecked with brownish white; dark markings sometimes forming a reticulum on back and narrow vertical bars on flanks. Occasionally an indistinct dark loreotemporal streak and a pale narrow stripe from bottom of ear aperture to top of foreleg. Underneath brownish or reddish white, throat occasionally and venter rarely with small greyish brown spots.

Remarks

For notes on its distribution, habitat preferences, reproduction and diet, see Pianka (1970a).

Material

Kimberley Division (W.A.): 32 km S of Derby (20350); Coulomb Point (40273-4, 44329); Lagrange (28029); Anna Plains (46168).

North-west Division (W.A.): 34 km W of Sandfire Flat Roadhouse (51301); Wallal (1023-5, 45806-7); 16 km ENE of Pardoo (60433); De Grey (2124); Mundabullangana (14915); Roebourne (29118, 41058); Abydos (12622); 16 km SE of Urala (29768); Ningaloo (16876) and 29 km E (16884); Marandoo (54347).

Eastern Division (W.A.): 24 km E of Mt Madley (24°30'S, 124°15'E) (40616).

Varanus caudolineatus

(Plate 3; Fig. 3)

Varanus caudolineatus Boulenger, 1885, Catalogue of the lizards in the British Museum (Natural History) 2: 324. Champion Bay, W.A.

Diagnosis

A small arboreal monitor (up to 32 cm long) with tail circular in section and longitudinally striped. Very similar to *V. gilleni* but head and back spotted

rather than streaked and cross-banded. Distinguishable from *V. eremius* by smooth (rather than keeled) head scales.



Plate 3: A *Varanus caudolineatus* from Wilroy. Photographed by R.E. Johnstone.

Distribution

Western half of arid and semiarid zones of Western Australia from the southern Pilbara and far south of Great Sandy Desert south to the northern Wheat Belt and Eastern Goldfields.

Description

Snout-vent length (mm): 57-132 (N 110, mean 93.8). Length of appendages (% SVL): foreleg 19-29 (N 84, mean 25.1), hindleg 29-39 (N 76, mean 33.4), tail 109-149 (N 82, mean 127.7). Midbody scale rows 80-109 (N 71, mean 92.0). Lamellae under fourth toe 16-25 (N 78, mean 20.0).

Head scales small, smooth; supraorbitals smallest, not sharply differentiated from interorbitals. No canthus rostralis. Nostril lateral, a little nearer to orbit than tip of snout. Dorsal and lateral caudal scales strongly keeled but not spinose or mucronate. Nails short, thick and strongly curved.

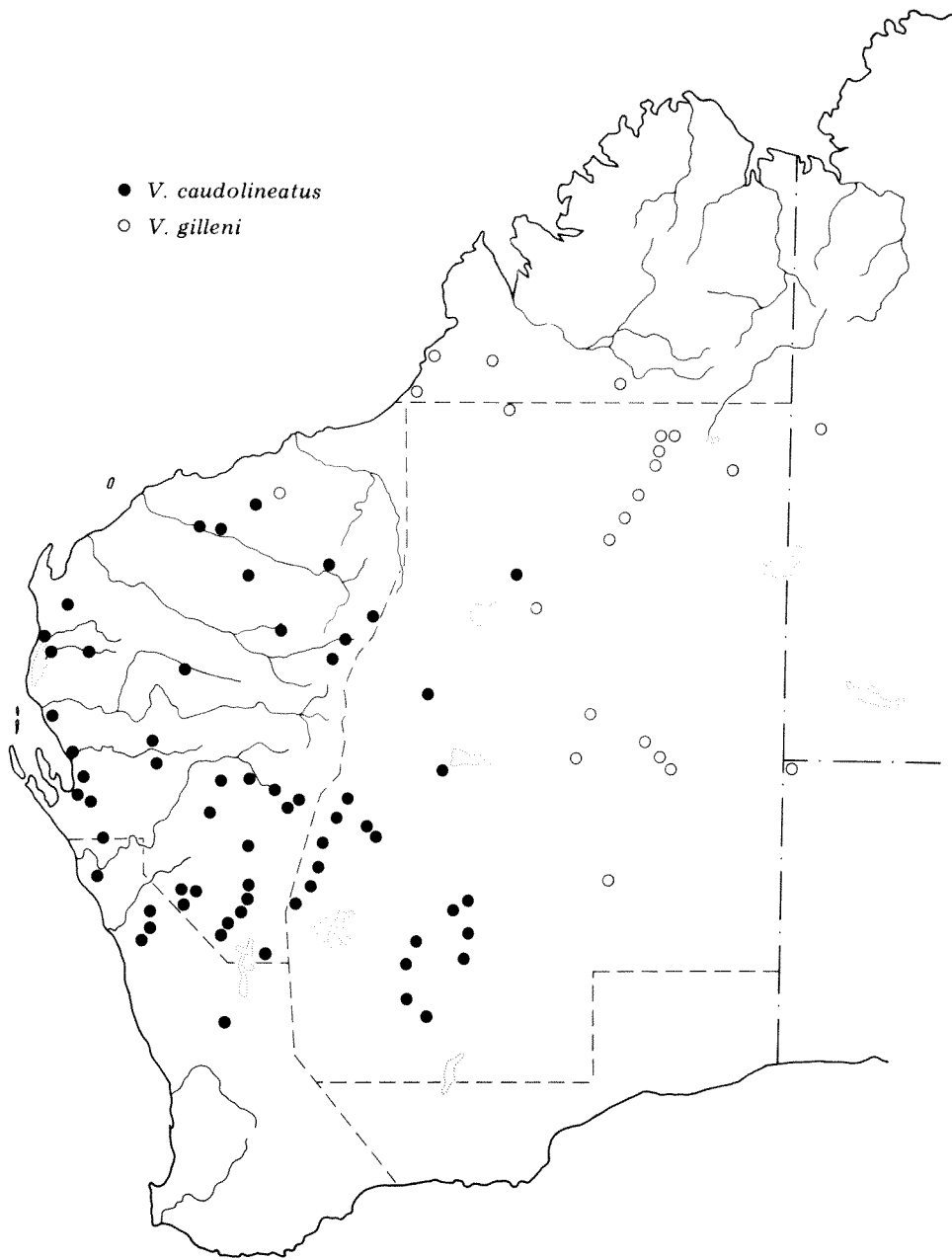


Fig. 3: Map of Western Australia showing location of specimens of *Varanus caudolineatus* and *V. gilleni*, including those listed in Pianka (1969).

Dorsal ground coloration usually reddish brown, brightest and palest on tail; often greyish brown, sometimes tinged on back with red and on tail with yellowish brown. Head, neck, back and base of tail sparsely or densely covered with small dark reddish brown or blackish brown spots; spots on back commonly surrounded by a circular area slightly paler than ground colour (each of these paler areas enclosed by a barely discernible, fine, dark ring). Distal 65-75% of tail with 4 or 5 longitudinal dark reddish brown or blackish brown stripes (a dorsolateral, midlateral and commonly a vertebral). Dark streak from eye reaching backwards and slightly upwards to above ear aperture. Underneath greyish white, brownish white or buffy white, freckled with brown on chin and throat and occasionally on venter and under legs and base of tail.

Geographic variation

Specimens from north of the Ashburton are larger (SVL 85-132, N 10, mean 115.0; *vs* 57-115, 100, 91.7) and have more numerous midbody scale rows (91-109, N 10, mean 99.3; *vs* 80-107, 61, 90.8) and a tendency for dark spots on base of tail to align transversely. In each of these characters the northernmost population of *V. caudolineatus* shows an approach to its close relative and near neighbour *V. gilleni*.

Remarks

For notes on its distribution, habitat preferences, diet and reproduction, see Pianka (1969).

Material

North-west Division (W.A.): near Kangiangi (20241); Tambrey (4288); Marandoo (54230, 56834); 27 km E of Marillana (14917); Marrilla (5048); Jiggalong (13362, 26068-70); Warroora (8167-8); 3 km SE of Turee Creek (25149); Mundiwindi (12278); 30 km SE of Bulloo Downs (47793); Mt Augustus (52893-6); Minilya (10611); Callagiddy (34563-4, 39765); Coordewandy (28394, 28955-6); Wooramel (54595); Woodleigh (44529, 49943, 57377-8); Byro (47347); Belele (7378-9); Mileura (15785-9, 47630); Overlander Roadhouse, Shark Bay turnoff (13137, 13711); 15 km E of Hamelin Pool (54594); 20 km ENE of Meadow (26°39'S, 114°48'E) (59607); Murchison Downs (4934); Quinns, via Nannine (10812); Kalli (41793); 34 km SSE of Nerren Nerren (27°19'S, 114°51'E) (59620); 11 km S of Cue (14918); Marloo (3818); Yalgoo (22870); Gullewa (4732-3); 16 km S of Mt Magnet (48152) and 32 km S (29111); 5 km NW of Kirkalocka (48151); Fields Find (22652); Warriedar (1191) and 5 km S (51157); 64 km N of Beacon (34685).

Eastern Division (W.A.): Well 29, Canning Stock Route (3903); The Weld Spring (28028); 32 km NE of Yelma (21100); 24 km SW of Wiluna (21137) and 70 km SW (21138-9); Albion Downs (19789-90, 28290, 30967-9); Kathleen Valley (12407, 19771, 27231); 35 km N of Sandstone (21149); Cosmo Newberry (13857, 19600); Sandstone (47374) and 51 km SW (21150); Youanmi (39043, 60130) and 11 km SW (21178-81); Laverton (3415-6, 3423, 23908-10); Mt Margaret (17681); Linden (46621); 60 km S of Leonora (51092); 14 km S of Menzies (31681); Yarri (46618); Ora Banda (51189).

South-west Division (W.A.): Ajana (22995, 25883); Wilroy Reserve, 19 km S of Mullewa (49992-3); 35 km NE of Mingenew (31381-5).

Varanus eremius

(Fig. 4)

Varanus eremius Lucas & Frost, 1895, Proc. R. Soc. Vict. (new ser.) 7: 267.
Central Australia [= Idracowra and Charlotte Waters, N.T.].

Diagnosis

A moderately small ground monitor (up to 46 cm long) with tail triangular in section and longitudinally striped. Distinguishable from *V. caudolineatus* and *V. gilleni* by keeled head scales, dark streaks on throat and long slender nails.

Distribution

Arid and semiarid zones of Western Australia from the Pilbara and Great Sandy and Tanami Deserts south to the far north of the Wheat Belt and to the Great Victoria Desert. Also southern Northern Territory and north-western South Australia.

Description

Snout-vent length (mm): 57-164 (N 36, mean 127.7). Length of appendages (% SVL): foreleg 22-30 (N 35, mean 25.9), hindleg 36-44 (N 35, mean 39.7), tail 155-209 (N 32, mean 183.6). Midbody scale rows 87-110 (N 26, mean 97.1). Lamellae under fourth toe 19-28 (N 33, mean 23.7).

Head scales small, obtusely keeled; interorbitals largest, supraorbitals much smaller than interorbitals but not sharply differentiated from them. Canthus rostralis weak to moderately strong. Nostril very large, midway between orbit

and tip of snout or slightly nearer to orbit. Face concave ("hollow-cheeked") between canthus rostralis and loreal crease, below which it is convex ("swollen"). Tail with a two-keeled crest. Dorsal and lateral caudal scales with a high keel tipped with a small mucron. Nails very long and slender, only slightly curved.

Dorsally reddish brown or greyish brown, rarely yellowish brown. Head with or without short longitudinal or oblique blackish brown streaks. Neck, back, limbs and base of tail usually covered with small blackish brown spots and frequently also pale brown spots (usually dark-edged) or pale flecks. Tail with 4 blackish brown longitudinal stripes (dorsolateral and midlateral). Dark streak from lores through top of orbit to above ear aperture. Whitish line from lips to arm, bordered above by a dark streak. Ventrolateral surfaces of body grey, occasionally bisected by a whitish stripe. Underneath whitish; pinkish under tail. Chin, throat and under neck finely or coarsely marked with grey: a median streak and usually two oblique lateral streaks on throat, all confluent on chin (thus forming an arrowhead); lateral streaks extending back (parallel to median streak) discontinuously to under hindneck, which may be broadly grey.

Remarks

For notes on its distribution, habitat preferences, behaviour, diet and breeding season, see Pianka (1968).

Material

North-west Division (W.A.): 5 km E of Roebourne (17081); Tambrey (20083-4); White Springs (109 km N of Wittenuom) (36593); Booloogooro (28015, 60406-8); Callagiddy (40677); 16 km S of Gascoyne Junction (56859); Peron HS (55167); 14 km ENE of Meadow (59621).

Eastern Division (W.A.): 48 km W of Balgo Hill (40873); Well 38, Canning Stock Route (45261); 58 km E of Jupiter Well (45126); Well 26, C.S.R. (39144); Well 12, C.S.R. (42307); 145 km N of Carnegie (40603, 40614); Well 7, C.S.R. (28023); SE Carnarvon Range (40749); Warburton Range (14658, 22001, 22020) and 93 km E (34145); Wanjarri (27230, 40529); Maloora Rock-hole (14916).

South-west Division (W.A.): Lockwood Spring, Kalbarri National Park (37570-1); 29 km N of Ajana (33597); Janja Thicket, Kalbarri N.P. (37637); 44 km NE of Yuna (56971); East Yuna Reserve, 30 km ESE of Yuna (48117); 32 km E of Mullewa (11353).

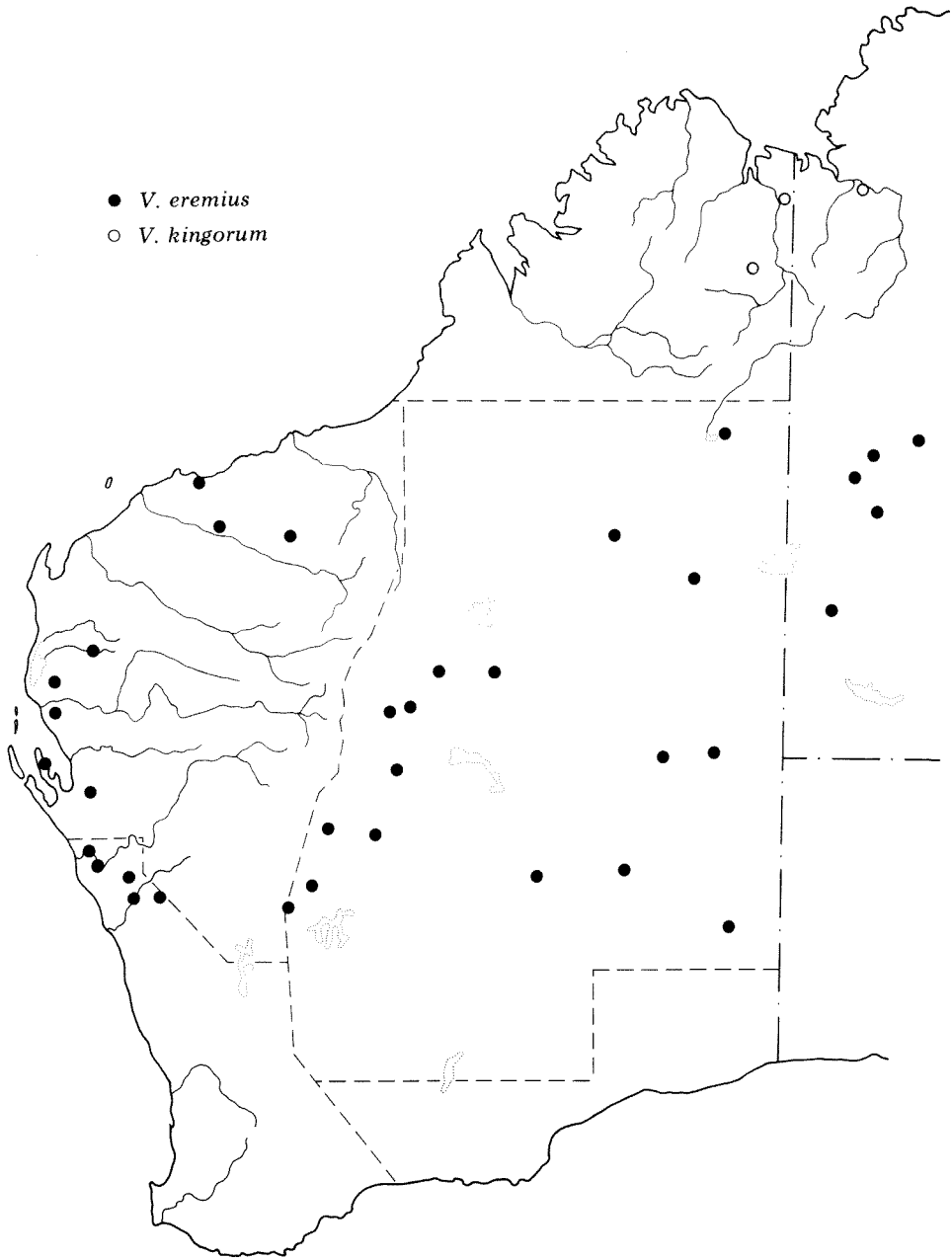


Fig. 4: Map of Western Australia and adjacent part of Northern Territory showing location of specimens of *Varanus eremius* (including those listed in Pianka, 1968) and *V. kingorum*.

Varanus giganteus

(Fig. 5)

Hydrosaurus giganteus Gray, 1845, Catalogue of the specimens of lizards in the collection of the British Museum, p.13. North coast of New Holland [= Barrow I., W.A.*].

Diagnosis

A very large ground monitor (up to 2 m long) with tail strongly compressed, back with transverse rows of large pale spots, and under surface with a dark reticulum. Further distinguishable from *V. gouldii*, *V. panoptes* and *V. rosenbergi* by the narrow parallel-sided snout, nostril about twice as far from orbit as snout, and more numerous midbody scale rows and subdigital lamellae.

Distribution

Rocky country in the arid zone of Western Australia from the Pilbara south to Yalgoo and the Menzies district and east to the Gibson and Great Victoria Deserts. Also southern Northern Territory, far western Queensland and northern South Australia.

Description

Snout-vent length (mm): 158-700 (N 11, mean 374.2). Length of appendages (% SVL): foreleg 29-35 (N 9, mean 32.2), hindleg 39-50 (N 9, mean 43.9), tail 147-192 (N 9, mean 166.6). Midbody scale rows 265-287 (N 4, mean 279.7). Lamellae under fourth toe 33-36 (N 4, mean 34.7).

Head scales smooth, very small; interorbitals largest, supraorbitals smallest and well differentiated. Canthus rostralis strong. Supraciliary ridge very strong and jutting out over eye. Nostril lateral, much nearer to tip of snout than orbit. Face sunken between canthus rostralis and strong loreal crease. Tail proximally subcircular in section, distally strongly compressed with low two-keeled crest. Lateral caudal scales very small with low weak keels not spinose or mucronate.

Dorsally dark brown to black, finely stippled in adults with yellow. Head with small irregular whitish or yellowish spots (creamy white in juveniles). Back, limbs and tail with transverse rows of brownish yellow spots (creamy

*Stokes (1846: 210) wrote of "two iguanas, measuring seven feet in length" that were killed on Barrow Island in September 1840.

white in juveniles). Spots on back largest, usually black-centred and black-edged. Spots on neck posteriorly circular and yellowish but not black-centred; anteriorly greyish, elongate and coalescing into wavy-edged stripes extending forwards and downwards on side of neck and merging with reticulum of under surface. Spots on tail circular and black-centred at base, but becoming smaller and longitudinally elongate distally. Side of head whitish, reticulated or vertically barred with dark grey or greyish brown. Underneath whitish,

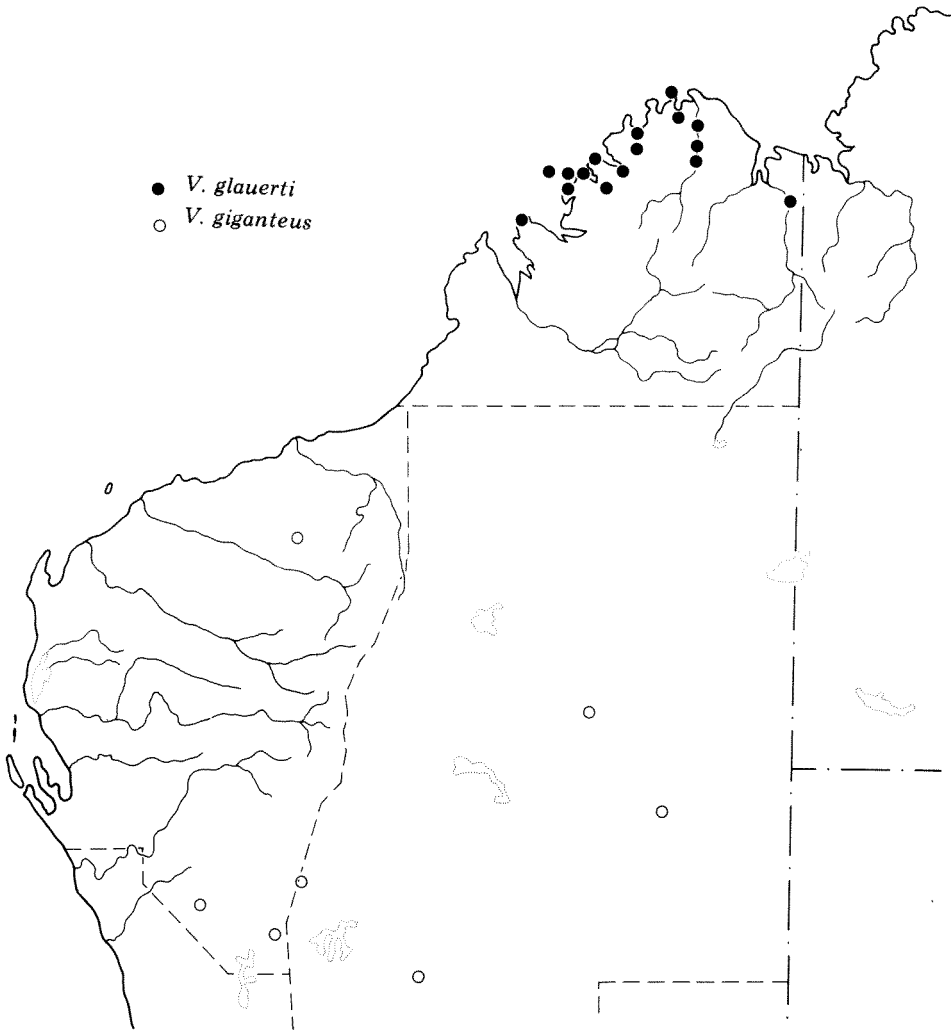


Fig. 5: Map of northern Western Australia showing location of specimens of *Varanus giganteus* and *V. glauerti*.

reticulated with black, dark grey or dark brownish grey; reticulum fine anteriorly and usually reduced on chin (and lips) to transverse bars; reticulum thicker on venter, which could be better described as dark grey with alternating transverse rows of large and small whitish spots that tend to merge with each other (when spots completely confluent the abdomen is, in effect, whitish with hollow grey transverse bands, like those of *V. rosenbergi*). Pattern under hindlegs similar to that of abdomen, but whitish spots aligned and confluent longitudinally.

Material

North-west Division (W.A.): Barrow I. (28005); Woodstock (13454, 52114, 60128); near Exmouth (31441); Tantabiddi Well, Yardie Creek (28004); Yalgoo (12923); Mt Wardiaco (60 km NE of Paynes Find) (13708); locality unknown (12637).

Eastern Division (W.A.): Charles Knob (53596); 5 km ESE of Miss Gibson Hill (48729); Anketell (756); 10 km ENE of Comet Vale (65660).

Varanus gilleni

(Plate 4; Fig. 3)

Varanus gilleni Lucas & Frost, 1895, Proc. R. Soc. Vict. (new ser.) 7: 266.

Central Australia [= between Glen Edith and Deering Creek, and Charlotte Waters, N.T.]

Diagnosis

A small arboreal monitor (up to 38 cm long) with tail circular in section and longitudinally striped. Very similar to *V. caudolineatus*, but head streaked and back banded rather than spotted. Distinguishable from *V. eremius* by smooth (rather than keeled) head scales.

Distribution

Northern and eastern arid zones of Western Australia, from the far south of the Kimberley south and south-east through the Great Sandy, Gibson and Great Victoria Deserts to the vicinity of Neale Junction. Also one record from the Pilbara: specimen from Pilgangoora Well in South Australian Museum, examined by Pianka (1969). Also in southern Northern Territory and northern South Australia.

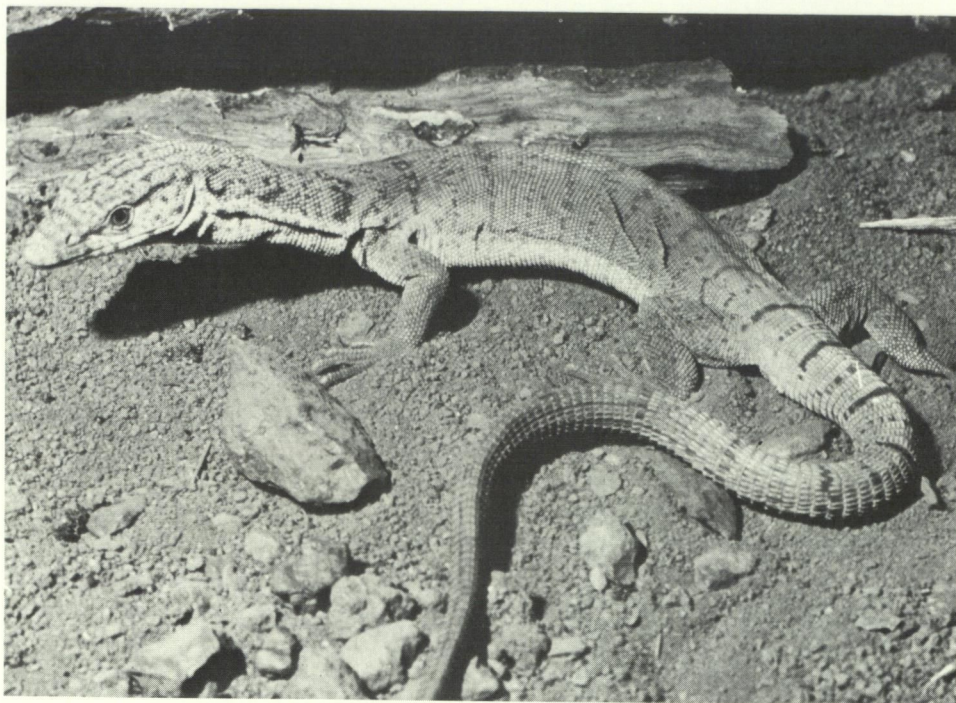


Plate 4: A *Varanus gilleni*. Photographed by G. Harold.

Description

Snout-vent length (mm): 58-159 (N 47, mean 111.6). Length of appendages (% SVL): foreleg 21-31 (N 42, mean 24.8), hindleg 26-38 (N 41, mean 31.5), tail 111-166 (N 40, mean 135.0). Midbody scale rows 95-120 (N 36, mean 107.7). Lamellae under fourth toe 18-25 (N 37, mean 21.7).

Head scales small, smooth; supraorbitals smallest, not sharply differentiated from interorbitals. No canthus rostralis. Nostril dorsolateral, a little nearer to orbit than tip of snout. Nails short, thick and strongly curved.

Dorsally reddish brown, greyish brown with a slight reddish tinge or (rarely) yellowish brown; marked with blackish brown or dark reddish brown as follows: streaks on head and foreneck (transverse on snout, reticulate on crown, and longitudinal on neck), narrow cross-bands on body and proximal 30-40% of tail, and 5 more or less continuous longitudinal lines on distal 50-60% of tail (vertebral, laterodorsal and midlateral); commonly small dark spots between dorsal bands, usually arranged in single transverse rows; dorsal bands occasionally flecked with white, legs spotted or finely banded with dark reddish brown or unmarked. Temporal streak from eye to above ear aperture,

occasionally continuous with outermost of longitudinal streaks on neck. Underneath whitish, freckled with reddish brown on throat and commonly also on venter.

Geographic variation

Northern specimens have longer appendages than southern. North of 22°S relative length of tail ranges from 128 to 166 (N 15, mean 145.3; *vs* 111-145, 25, 128.8), foreleg 24-31 (N 15, mean 25.9; *vs* 21-27, 27, 24.2) and hindleg 29-38 (N 14, mean 32.6; *vs* 26-35, 27, 31.0). Number of midbody scale rows and subdigital lamellae also decrease slightly from north to south, e.g. lamellae north of 22°S range from 20 to 25 (N 15, mean 22.9; *vs* 18-24, 22, 20.9).

Remarks

For notes on its distribution, habitat preferences, diet and reproduction, see Pianka (1969).

Material

Kimberley Division (W.A.): no locality but presumably south-west Kimberley (26714); Injudinah Creek, Lagrange (28027, 60135); Anna Plains (46165-7); Edgar Ranges Reserve in 18°49'S, 123°17'E (54125) and in 18°55'S, 123°15'E (54073); 32 km SW of Christmas Creek HS (46123).

Eastern Division (W.A.): McLarty Hills (57302-4); Well 49, Canning Stock Route (3995); Mt Romilly (40887); Point Massie (47674); 30 km NNE of Stretch Range (57047); Well 43, C.S.R. (8715); Well 40, C.S.R. (45262); Well 37, C.S.R. (3970); 96 km E of Well 24, C.S.R. (47674); 14 km NW of Mt Beadell (28814) and 77 km SW (28864); 45 km NW of Warburton Range (14657) and 8 km NNW (15179); Warburton Range (14653-6, 19598-9, 20608, 22021-2, 22211-2) and 10 km SE (21000-1) and 32 km SE (15706-8).

Northern Territory: near Alice Springs (45768-9, 53787-9) and 50 km SSE (24437).

Varanus glauerti

(Plate 5; Fig. 5)

Varanus (Odatria) timorensis glauerti Mertens, 1957, West. Aust. Nat. 5: 183.
Wotjulum, W.A. [16°11'S, 123°37'E].

Diagnosis

A smooth, slender, flat-headed, long-tailed, long-limbed, medium-sized rock monitor (up to 79 cm long) with tail slightly compressed; coloration distinctive

(head, neck and usually foreback dark and unpatterned; back blackish with transverse rows of blue-grey ocelli; and tail boldly banded with black and white).

Distribution

North Kimberley, south to Yampi Sound and the Kununurra district; also offshore from Sir Graham Moore I. south-west to Byam Martin I.



Plate 5: A *Varanus glauerti* from the Carson Escarpment. Photographed by R.E. Johnstone.

Description

Snout-vent length (mm): 70-227 (N 34, mean 183.7). Length of appendages (% SVL): foreleg 26-33 (N 29, mean 29.9), hindleg 35-44 (N 27, mean 40.3), tail 183-268 (N 23, mean 231.1). Midbody scale rows 122-151 (N 23, mean 140.1). Lamellae under fourth toe 22-29 (N 29, mean 25.2).

Head scales small, smooth; interorbitals largest, supraorbitals smallest. No canthus rostralis. Nostril lateral or dorsolateral, a little nearer to tip of snout

than orbit. Tail slightly depressed proximally, elliptic in section distally. Dorsal and lateral caudal scales proximally smooth; distally with very low keels, not spinose or mucronate. In males 2 or 3 vertical rows of enlarged raised scales ventrolaterally at base of tail, well separated from cloaca by small scales. Subdigital lamellae bearing 1-3 (mostly 2) blackish brown, round, flat tubercles; similar tubercles on palmars and plantars (increasing in size toward heel). Nails short, thick, well-curved.

Scales on top of head greyish white with a black centre. Neck, foreback (usually) and upper surface of forelegs dark grey or bluish grey, without pattern (except in occasional specimens with faint ocelli on foreback). Rest of back, upper surface of hindleg and base of tail with a complete or broken black or dark greyish brown reticulum, enclosing smoky blue-grey or greyish white ocelli, each with a central dark spot or cluster of dots. Tail proximally speckled more or less regularly with black and white, pattern becoming more regular distally until it consists of alternating black and white bands encircling tail. Side of head grey except for blackish streak from lores to temples, posteriorly bordered below by a whitish streak (yellow in life), below which a blackish streak extends from postocular upper labials to ear aperture. On side of body dark reticulum tending to form vertical stripes much narrower than grey interspaces. Underneath whitish, abdomen (especially sides) and hindlegs sometimes indistinctly banded with bluish grey.

Material

Kimberley Division (W.A.): Sir Graham Moore I. (44076); Kalumburu (13790); 20 km SSE of Barton Plains Outcamp (57144); South-west Osborne I. (44122); Crystal Creek (43044); Port Warrender (43325); Mitchell Plateau in 14°41'S, 125°52'E (56234); Surveyors Pool, Mitchell Plateau (14°40'S, 125°44'E) (43140); Drysdale River National Park in 14°40'S, 127°00'E (50773-4), in 14°44'S, 126°56'E (50603), in 14°46'S, 127°05'E (50571), in 15°02'S, 126°49'E (50887), in 15°03'S, 126°45'E (50532); Careening Bay (44016); Uwins I. (44137); Champagny I. (41505); Byam Martin I. (44149); Augustus I. (40448, 41302-4); Kuri Bay (41510); St Andrew I. (44139); Prince Regent River Reserve in 15°07'S, 125°33'E (46872), in 15°20'S, 124°56'E (46811-3, 46835), in 15°32'S, 125°14'E (46858); Wotjulum (11207, 12337 holotype); Carlton Reach Bore (13470).

Varanus glebopalma

(Fig. 6)

Varanus (Odatria) glebopalma Mitchell, 1955, Rec. S. Aust. Mus. 11: 389.
Lake Hubert, N.T.

Diagnosis

A moderately large, dark, rock monitor (up to 102 cm long) with tail not strongly compressed; subdigital, palmar and plantar tubercles large and black; upper surfaces usually dark with little pattern. Distinguishable from *V. glauerti* by having distal two-fifths of tail unbanded whitish (rather than most of tail boldly banded with black and white).

Distribution

Sandstone hills, plateaux and islands of north-west Kimberley from Kalumburu south-west to Yampi Sound (including Koolan I.); with an apparently isolated population at Mt Anderson (lower Fitzroy). Also far north of Northern Territory.

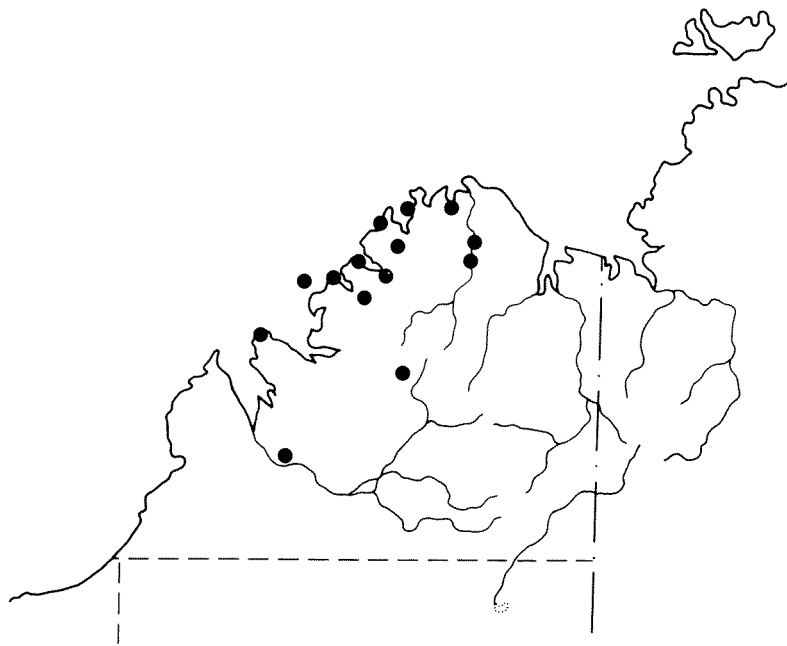


Fig. 6: Map of Kimberley Division showing location of specimens of *Varanus glebopalma*.

Description

Snout-vent length (mm): 158-355 (N 30, mean 261.5). Length of appendages (% SVL): foreleg 26-33 (N 27, mean 28.6), hindleg 38-47 (N 27, mean 42.0), tail

179-246 (N 19, mean 209.6). Midbody scale rows 132-157 (N 14, mean 146.9). Lamellae under fourth toe 19-23 (N 24, mean 20.8).

Head scales small, very smooth; interorbitals largest, supraorbitals much the smallest but not sharply differentiated. Canthus rostralis weak to moderately strong. Supraciliary ridge very strong and jutting out over eye. Nostril lateral to dorsolateral, about midway between tip of snout and orbit. "Cheeks hollow," i.e. face sunken between canthus rostralis and loreal crease. Tail slightly depressed proximally; moderately compressed distally, without a crest. Dorsal and lateral caudal scales fairly small, with a low, weakly mucronate keel. Subdigital lamellae with two low blackish brown tubercles; similar tubercles on palms and soles, small distally, large proximally. Nails short, thick and strongly curved.

Dorsally blackish grey, brownish grey or olive grey, except for brownish white or pale yellowish brown distal two-fifths of tail; scales of head, neck and back black-centred; toes and sometimes legs dotted white. In palest specimens some dorsal and lateral pattern discernible, e.g. (1) blackish grey cross-bands on back as wide as olive grey interspaces; (2) neck and back grey with a vague black reticulum, and rump with narrow black cross-bands separating rows of grey, black-centred ocelli; (3) head to base of tail pale olive grey with black variegations on head, black flecks on neck and foreback, a vague black reticulum on hindback, and black transverse bars on base of tail; and (4) side of head pale (especially lips and supraciliary ridge), vertically barred with black and brown. Underneath mostly brownish white, chin coarsely barred and throat and breast coarsely reticulated with dark grey; abdomen, legs and base of tail often clouded with grey; palms and soles dark.

Material

Kimberley Division (W.A.): Kalumburu (28036-7); South-west Osborne I. (44121); Katers I. (41487); Surveyors Pool, Mitchell Plateau (14°40'S, 125°44'E) (43121); Drysdale River National Park in 14°44'S, 126°56'E (50599), in 15°01'S, 126°39'E (50450-1) and 15°03'S, 126°45'E (50545-7); Uwins I. (44134-5); Boongaree I. (44106); Byam Martin I. (44148); Prince Regent River Reserve in 15°07'S, 125°33'E (46874), in 15°19'S, 125°35'E (47032), in 15°28'S, 125°29'E (47036-7), in 15°32'S, 125°14'E (46843-5) and in 15°32'S, 125°19'E (47034); Koolan I. (29586); Manning Creek (16°34'S, 126°56'E) (32242); Wotjulum (11841); Mt Anderson (32086).

Northern Territory: Oenpelli (32214-5); Katherine (19905).

Varanus gouldii

(Plates 6 & 7; Fig. 7)

Hydrosaurus gouldii Gray, 1838, Ann. nat. Hist. 1: 394. Australia.

Varanus (Varanus) gouldii flavirufus Mertens, 1958, Senckenb. biol. 39: 250.

Bat Caves, S of Alice Springs, N.T.

Diagnosis

A large ground monitor (up to 160 cm long) with strongly compressed tail. Distinguishable from *V. p. panoptes* and *V. rosenbergi* by yellowish end of tail, from *V. p. rubidus* by absence of dark spots on back, and from *V. giganteus* by pale-edged dark temporal stripe and spotted rather than reticulated lower surfaces.

Distribution

Greater part of Western Australia, but not hilly interior of Kimberley (stronghold of *V. p. panoptes*) or far south (stronghold of *V. rosenbergi*). Also eastern Australia.

Description

Snout-vent length (mm): 67-655 (N 147, mean 241.2). Length of appendages (% SVL): foreleg 24-32 (N 108, mean 28.5), hindleg 36-46 (N 105, mean 41.7), tail 133-185 (N 124, mean 158.8). Midbody scale rows 132-189 (N 67, mean 167.3). Lamellae under fourth toe 20-33 (N 94, mean 27.3).

Head scales smooth, very small; interorbitals only a little larger than supraorbitals. Canthus rostralis weak to moderately strong. Nostril lateral, a little nearer to tip of snout than orbit. Loreal crease weak or absent. Tail basally subcircular; distally strongly compressed with a slight two-keeled crest. Dorsal and lateral caudal scales small, with low keels not spinose or mucronate. Nails long, slender and moderately curved.

Southern coloration. Head and neck blackish brown or dark olive brown, peppered with yellowish brown. Back with alternating dark and pale transverse zones: dark zones black and dotted, vermiculated or spotted with yellow; pale zones packed with small, more or less distinct, dark-edged yellowish spots. Tail proximally and centrally blackish brown, narrowly banded with yellowish brown or brownish white; tail distally unbanded yellowish white or brownish white. Broad black stripe from anterior tip of orbit backwards and slightly upwards to above ear aperture, edged above and below with creamy white (margins coinciding with free edges of eyelids). Blackish brown stripe along

upper lip, edged above and below with creamy white, reappearing indistinctly on side of neck. Ear aperture margined with creamy white. Underneath whitish, marked with a grey arrowhead (rarely a chevron) on chin, grey streaks or clouding on throat, and small grey, brown or black spots on venter. Juveniles more strongly spotted above and less strongly spotted below than adults: dorsally brown to blackish brown with transverse rows of yellowish or brownish white spots (largest medially) on back; tip of tail often dark brown; ventrally often immaculate.

North-western coloration. Head and neck reddish brown. Back with alternating dark and pale zones: dark zones black, blackish brown or very dark reddish brown, with pale vermiculations or small spots; pale zones packed with reddish brown or yellowish brown, more or less distinct, dark-centred spots; occasionally dorsal pattern very vague, there being (as in Kimberley) little evidence of zoning. Underneath as in south, but chin and throat sometimes spotted (as in Kimberley) rather than marked with arrowhead.

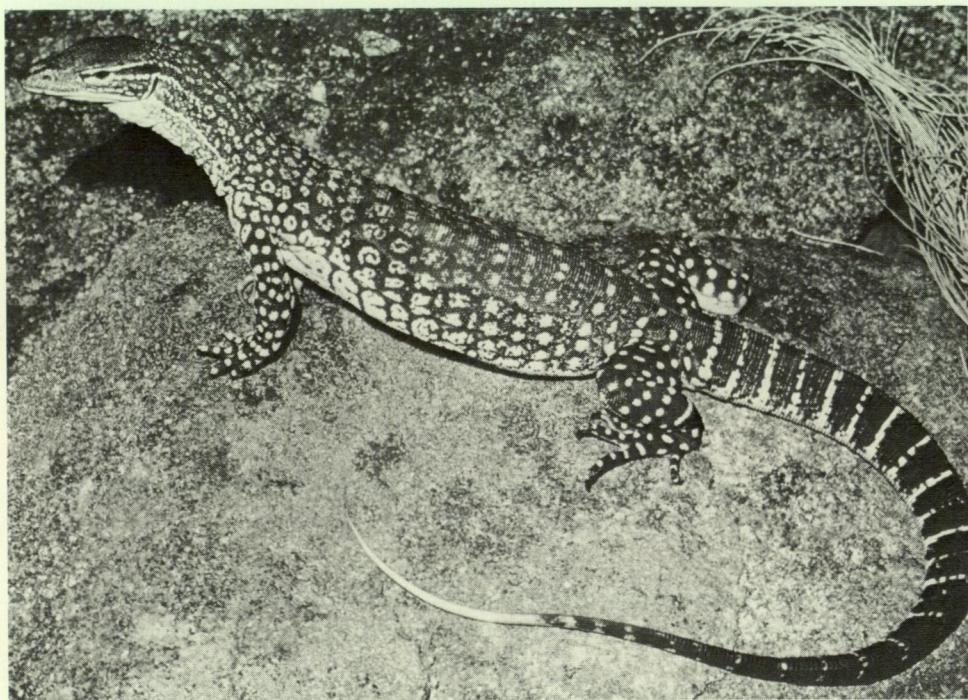


Plate 6: A southern variant of *Varanus gouldii* from Mt Dale. Photographed by G. Harold.

Desert coloration: Generally similar to north-western but brighter. Dorsal dark zones tending to be black bars in juveniles and black reticula in adults

(enclosing reddish, dark-centred blotches). Dorsal pale zones usually unspotted reddish brown, with or without yellow or pale reddish brown vermiculations or flecks. Dark caudal bands tending to be split into two and not much wider than pale bands. Tail distally yellow.

Kimberley coloration: Generally darker and less patterned than in north-west and desert. Reddish brown above, heavily flecked with black. Dull pale spots on back fairly large and sparse. Tail distally pale. Heavily spotted with blackish brown from snout to abdomen, i.e. no arrowhead mark on chin.



Plate 7: A desert variant of *Varanus gouldii* from Yamarna. Photographed by R.E. Johnstone.

Geographic variation

In proportions and meristics there is little variation. The tail is relatively little longer in the Kimberley and North-west Divisions than elsewhere (143-185, N 29, mean 165.0; vs 133-180, 95, 157.1). Midbody scale rows are a little more numerous in the Eastern Division than elsewhere (159-189, N 14, mean 174.7; vs 132-182, 53, 165.3).

In coloration there is a good deal of geographic variation; but, except in the Kimberley, the colour variants intergrade with each other. The southern variant extends north to about the mulga-eucalypt line. Specimens from

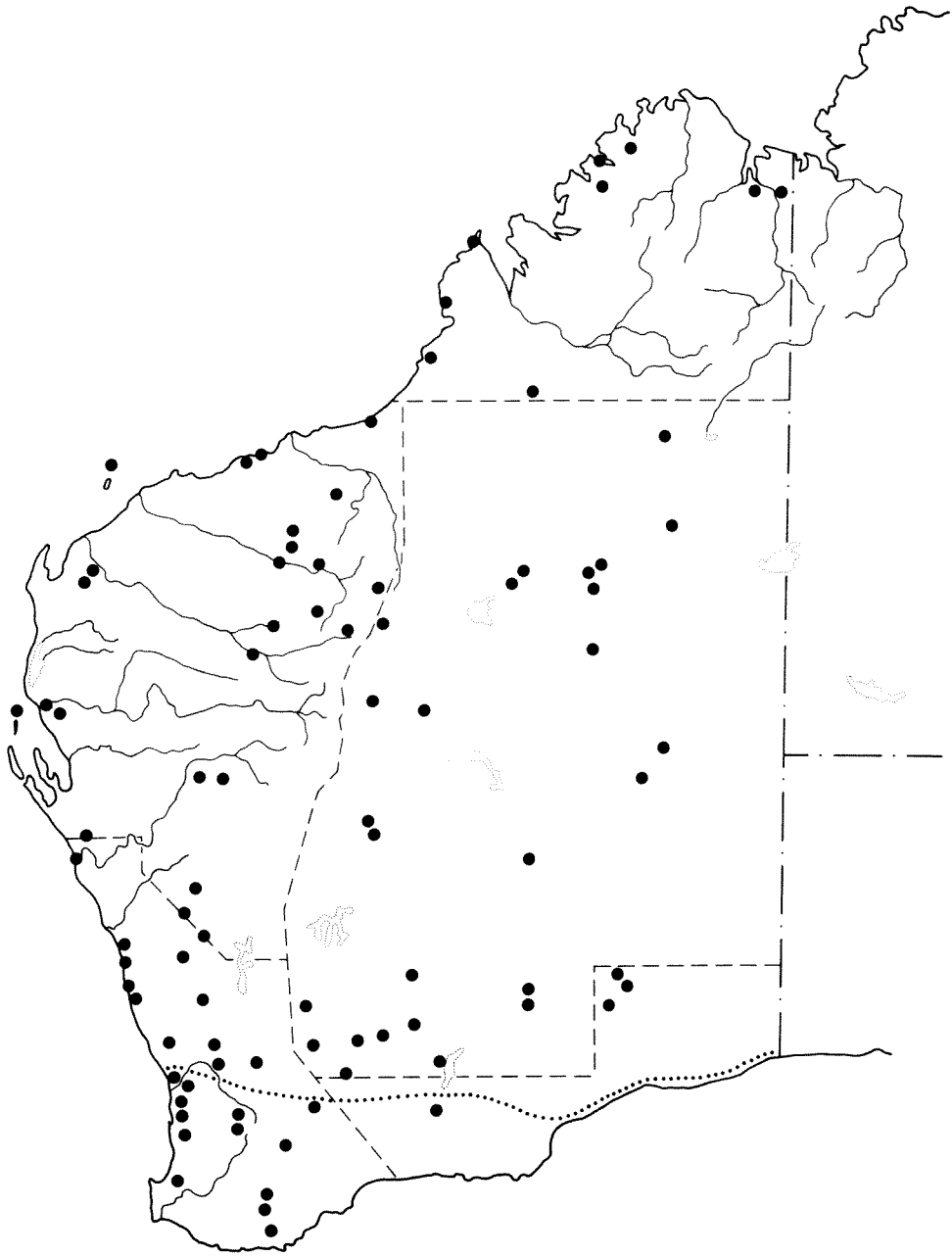


Fig. 7: Map of Western Australia showing location of specimens of *Varanus gouldii*. Dotted line indicates northern limit of *V. rosenbergi*.

Bernier I., Nerren Nerren, Cundeelee and the Nullarbor Plain are predominantly southern in coloration but the head is becoming reddish.

The desert variant ("*flavirufus*") occurs in the deserts of Western Australia, the Northern Territory (north at least to Tennant Creek) and northern South Australia. In Western Australia it reaches the sandy coastal plains between southern Dampier Land and Exmouth Gulf. Where the eastern deserts contact the western plateaux (as at the Carnarvon Range) coloration is intermediate between the desert and north-western variants.

On Dampier Land (the peninsula south-west of King Sound, west Kimberley) the desert variant extends north to at least 24 km beyond Broome, and the Kimberley variant is found southwards at least as far as Martins Well, where it is unaffected by the proximity of the desert variant. Thus while it does not seem possible to recognise *flavirufus*, a Kimberley subspecies may prove separable.

Remarks

For notes on the biology of the desert population see Pianka (1970 *b*).

Material

Kimberley Division (W.A.): Mitchell Plateau in 14°52'S, 125°44'E (43477); presumably Wyndham (24811); Parry Creek (28007); Kimberley Research Station, N of Kununurra (11249); Boongaree I. (44138); Prince Regent River Reserve (46864); Martins Well (16°34'S, 122°57'E) (58541); 24 km N of Broome (31207); 8 km NE of Lagrange turnoff (58531); 42 km ENE of McLarty Hills (46517).

North-west Division (W.A.): Wallal (56149); Monte Bello Is (24744); mouth of Turner River (14882); 20 km ENE of Mundabullangana (17079) and 25 km E (14883); Bamboo Creek (33421); Woodstock (13081, 13379 and presumably 13078-9); northern part of Chichester Range (31146); Koordarrie (12636); Yanrey (14885); 32 km ESE of Wittenoom (14666) and 129 km ESE (29149); 48 km W of Talawana (39141); Newman (30918); 3 km SE of Turee Creek (25148); New Mundiwindi (14886); Mt Vernon (17695); presumably Carnarvon (21942); Bernier I. (13260, 13527 and possibly 51616, 60281-2); Callagiddy (39769); Nookawarra (15783-4); Mileura (15782); 18 km S of Nerren Nerren (18602) and 27 km S (18603); Yalgoo (4949).

Eastern Division (W.A.): Well 49 or 50, Canning Stock Route (3999); 48 km NW of Wilson Cliffs (*ca* 21°45'S, 126°45'E) (57049); 7 km S of Gary Junction (26995); 7 km SE of Kidson Camp (26939); Well 26, C.S.R. (39142); Well 24, C.S.R. (27051); 19 km SE of Jiggalong (42297); 50 km N of Windy Corner (45231) and 35 km N (45252); 110 km N of Charles Knob (26918); Carnarvon

Range (51924); Imbin Rock-hole, 23 km NE of Earraheedy (28133); 19 km N of Warburton Range (53587); Warburton Range (14661, 21206 and presumably 22023); Winduldarra Rock-hole (26°31'S, 126°01'E) (48730); Albion Downs (30970-1); Kathleen Valley (12406); 2 km N of Yamarna (52125) and 10 km E (53584); 5 km S of Goongarrie (28884); Queen Victoria Spring (58701); Cundelee (12997); Walyahmoning Rock (30°38'S, 118°45'E) (41191); Coolgardie (19147); Woolgangie (12722); 61 km E of Southern Cross (30689); 13 km W of Moorine Rock (17650); 64 km N of Norseman (31148); Split Rocks, 29 km N of Mt Holland (37813).

South-west Division (W.A.): Kalbarri (37639, 37725) and 7 km E (33512, 33537); Hawks Head Lookout, Kalbarri National Park (33849); Mellenbye (3965); Lochada (45696); Irwin River (8930); Cliff Head (13449); presumably Caron (60137-8); Green Head (47081, 47800); 12 km E of Jurien Bay (30506); 43 and 56 km N of Beacon (48383-4); 5 km S of Pithara (18582); 10 km N of Goomalling (14892); 32 km NNW of Gingin (30322); Kellerberrin (7191-2); Seabrook (3770); Gnangara (25984); Nollamara (12701); Dianella (24735); Mt Lawley (10437); North Perth (5519); City Beach (29397); Kings Park (10239, 14893, 28329, 31071); Nedlands (45741); Swanbourne (9732); Mosman Park (5815); Rivervale (7975); Cloverdale (14134, 23834); Kalamunda (17854); Lesmurdie (14908-13, 18583); East Cannington (13425); North Lake (21850); Byford (18480); Keysbrook (39084); 10 km E of Pingelly (13437); Hyden (25824); Yornaning (19751); Samson Dam, Waroona (14895); Yarloop (19230); 11 km SE Capel (67382); Tarin Rock Reserve (46317-8); 8 km W of Kukerin (52632); Woodanilling (16894); Woodlands, Tambellup (1869); Cranbrook (60260); Yellanup, via Narrikup (11436).

Eucla Division (W.A.): 112 km N of Rawlinna (34569) and 80 km NNE (41227); Seemore Downs (14900); 45 km S of Norseman (14899).

Northern Territory: Tennant Creek (34013); 19 km E of Mt Olga (34246); 32 km W of Victory Downs (24475); Kulgera (13792).

South Australia: Coward Springs (60145); 10 km NE of Port Pirie (45777).

Varanus kingorum sp. nov.

(Fig. 4)

Holotype

R60374 in Western Australian Museum, collected on 9 June 1978 by Dr Max King beneath rock slabs at 10 km WNW of Timber Creek, Northern Territory, in 15°37'S, 130°23'E.

Diagnosis

A small reddish dark-spotted rock monitor, differing from *V. caudolineatus*, *V. gilleni* and *V. eremius* in tail much longer and not longitudinally striped. Further distinguishable from *V. eremius* by smooth head scales and short, thicker and more strongly curved nails. Distinguishable from *V. storri* by much longer and smoother tail.

Distribution

East Kimberley (far northeast of Western Australia) and adjacent part of Northern Territory.

Description

Snout-vent length (mm): 67-114 (N 5, mean 98.4). Length of appendages (% SVL): foreleg 25-27 (N 5, mean 25.8), hindleg 33-37 (N 5, mean 35.4), tail 200-270 (N 4, mean 228.0). Midbody scale rows 97-108 (N 5, mean 105.0). Lamellae under fourth toe 17-22 (N 5, mean 19.2), each with two dark brown tubercles, the outer series larger.

Head scales small, smooth; interorbitals largest, supraorbitals smallest but not sharply differentiated. Canthus rostralis weak. Nostril dorsolateral, midway between snout and orbit. Loreal crease strong. Tail slightly depressed proximally, subtriangular in section centrally, and elliptic distally. Dorsal and lateral caudal scales large, with low moderately sharp keels ending in a small mucron. Plantar scales tuberculate. Nails short, moderately thick and strongly curved.

Dorsally and laterally dull reddish brown (brighter in adult males) with small blackish spots on face, temples, neck, back, flanks, legs and proximal three-quarters of tail (black markings forming a reticulum on back of smallest specimen). Underneath buffy white, dotted blackish brown on venter and lateral surfaces of throat.

Remarks

This species is named after Drs Max King and Dennis King in appreciation of their contributions to the phylogeny of the Varanidae. I am grateful to Mr G.F. Gow of the Northern Territory Museum for the loan and donation of specimens from east Kimberley.

Paratypes

Kimberley Division (W.A.): Kununurra (formerly NTM R6955, now WAM R63341); Turkey Creek (NTM R6954, 6681-2; last specimen now WAM R63340).

Varanus mertensi

(Fig. 8)

Varanus mertensi Glauert, 1951, West. Aust. Nat. 3: 14. Moola Bulla, W.A.
[18°12'S, 127°30'E].

Diagnosis

A large dark water monitor (up to 113 cm long), all but base of tail extremely strongly compressed, with a two-keeled crest. Further distinguishable from *V. mitchelli* by more numerous midbody scale rows and dorsal pattern of small black-edged pale spots, immaculate throat and usually immaculate under surface of tail (pale yellowish brown, sharply demarcated from dark brown of lateral surfaces).

Distribution

Kimberley Division, south to the May and Mary Rivers. Also far north of Northern Territory.

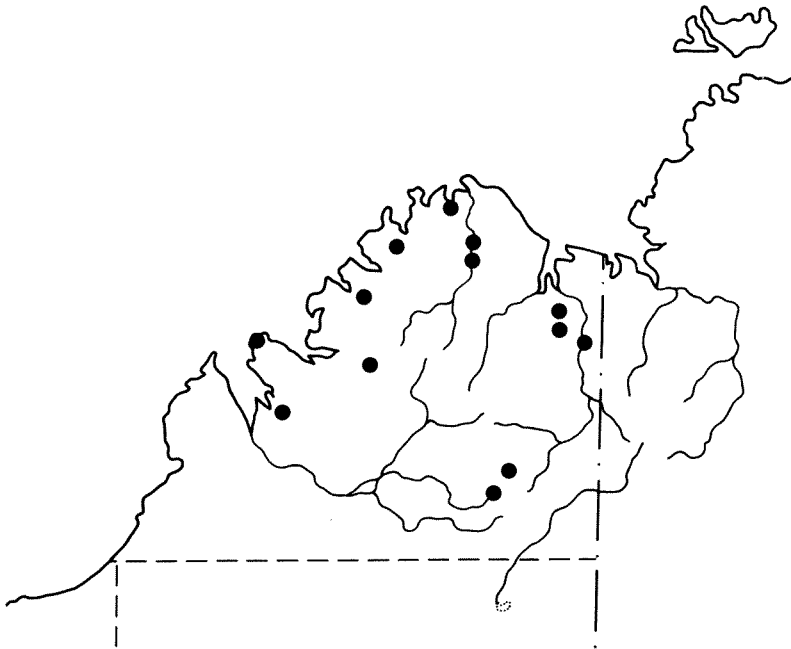


Fig. 8: Map of Kimberley Division showing location of specimens of *Varanus mertensi*.

Description

Snout-vent length (mm): 65-475 (N 33, mean 288.8). Length of appendages (% SVL): foreleg 24-30 (N 25, mean 26.3), hindleg 33-41 (N 26, mean 37.9), tail 136-183 (N 26, mean 153.2). Midbody scale rows 150-180 (N 16, mean 165.5). Lamellae under fourth toe 27-36 (N 25, mean 31.2).

Head scales smooth, small (but somewhat larger than in congeners); supra-orbitals not well differentiated from interorbitals. No canthus rostralis. Nostril laterodorsal or dorsolateral, nearer to tip of snout than orbit. Nails black, moderately long and slender, slightly curved.

Head olive brown, centre of scales blackish brown. Back, sides of body, upper surfaces of limbs and base of tail medium to dark olive grey or olive brown, sparsely covered with very small, black-edged, greyish white or yellowish white spots; spots arranged in no pattern, except on base of tail where they tend to align transversely. Whitish ring around ear aperture, joined at top to whitish streak from orbit. Upper and lower lips barred with dark grey and brownish white. Sides of tail dull olive brown, occasionally tinged with reddish brown, and indistinctly flecked with buff and blackish brown. Under surfaces brownish white or yellowish white; abdomen, hindlegs and base of tail with irregular or broken bars, spots or a reticulum of grey or brownish grey.

Material

Kimberley Division (W.A.): Kalumburu (28030); Surveyors Pool, Mitchell Plateau (14°40'S, 125°44'E) (43120); Drysdale River National Park in 14°44'S, 126°56'E (50602), in 15°02'S, 126°49'E (50974), in 15°03'S, 126°45'E (50548); Prince Regent River Reserve in 15°34'S, 125°25'E (47039), in 15°38'S, 125°00'E (47035), in 15°49'S, 125°38'E (47018-9); Beverley Springs (51615); Wotjulum (11815, 11817, 11819-23, 12333); May River (28090); Soda Creek, near Wyndham (26781); Saw Range, 35 km WSW of Kununurra (60131); Ord Dam, Lake Argyle (60112-4); Moola Bulla (5819 holotype); Mary River at Great Northern Highway (46518); no locality (60124-5).

Northern Territory: Yirrkala (13526); Katherine (21933-4, 24938, 60126).

Varanus mitchelli

(Fig. 9)

Varanus (Varanus) mitchelli Mertens, 1958, Senckenb. biol. **39**: 256. 8 km W of Oenpelli, N.T.

Diagnosis

A smooth medium-sized aquatic monitor (up to 69 cm long), all but base of tail strongly compressed. Distinguishable from *V. mertensi* by lesser size, tail

not so strongly compressed, fewer midbody scale rows (less than 130, *vs* more than 140), and darker coloration underneath, including heavily barred throat and dark under tail (both whitish in *mertensi*).

Distribution

Northern Kimberley, south to the King Leopold Ranges and Lake Argyle. Also north of Northern Territory.

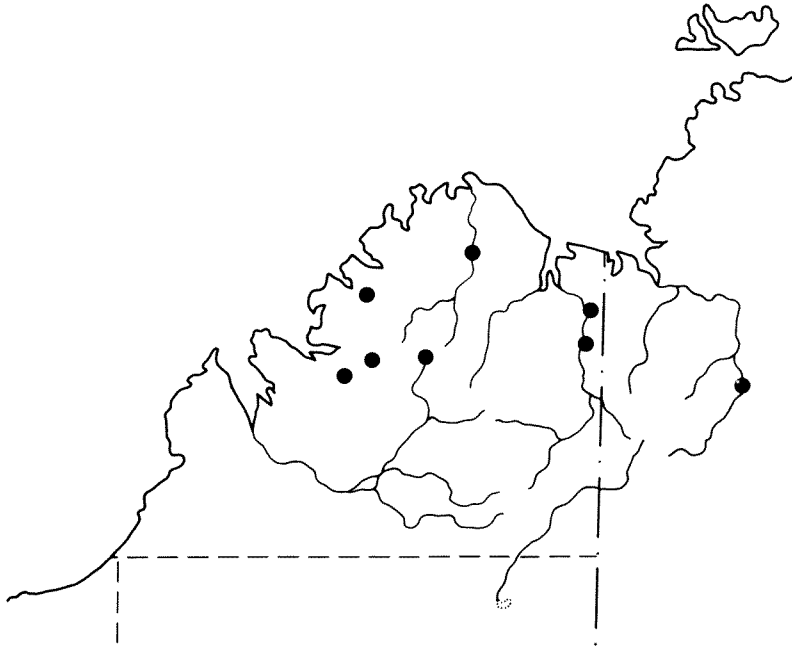


Fig. 9: Map of Kimberley Division showing location of specimens of *Varanus mitchelli*.

Description

Snout-vent length (mm): 113-247 (N 15, mean 181.2). Length of appendages (% SVL): foreleg 24-29 (N 15, mean 26.5), hindleg 33-41 (N 15, mean 36.9), tail 173-210 (N 13, mean 187.5). Midbody scale rows 103-130 (N 12, mean 111.9). Lamellae under fourth toe 27-31 (N 15, mean 29.3).

Head scales smooth (in fact polished), small (but somewhat larger than in congeners); supraorbitals smallest, not well differentiated from interorbitals. Canthus rostralis weak or absent. Nostril lateral to dorsolateral, about midway between tip of snout and orbit. Tail circular in section proximally, becoming strongly compressed distally with a low two-keeled crest. Dorsal and

lateral caudal scales moderately small, with low keels (not spinose or mucronate). Nails long, slender, well-curved.

Dorsally dark grey, blackish grey or dark olive grey, variably marked with black and white. In Kimberley small dark spots on foreback and side of neck, and white dots invariably on limbs and hindback and often on neck and foreback. In Northern Territory markings on back tending to be indistinct pale black-centred ocelli alternating transversely with irregular black bands, and on legs small white spots. Throat, breast, belly, under legs and under base of tail whitish with narrow blackish grey or pale grey cross-bands, often broken medially on throat and breast. Under tail mostly dark greyish brown.

Material

Kimberley Division (W.A.): Drysdale River National Park in 15°03'S, 126°45'E (50544) and 15°16'S, 126°43'E (50678); Prince Regent River Reserve in 15°47'S, 125°20'E (46959); Hann River, 14 km SW of Gibb River HS (32309); Plain Creek (16°43'S, 125°23'E) (56459, 56462); Mt Hart HS (24060) and 15 km NW (56468); Kununurra (58848, 60110); Behn River, 3 km from its confluence with the Ord (60111).

Northern Territory: Oenpelli (32250); Katherine (26344); ca 50 km S of Victoria River Downs (60132, 60139).

Varanus panoptes panoptes subsp. nov.

(Fig. 10)

Holotype

R44792 in Western Australian Museum, collected on 9 January 1972 by Mr L.A. Smith at Lake Argyle, Western Australia, in 16°03'S, 128°47'E.

Diagnosis

A large ground monitor (up to 120 cm long) with strongly compressed tail. Generally similar to *V. gouldii* but differing in its strongly spotted dorsum (transverse rows of large dark spots alternating with rows of small pale spots), banded tail-tip, small dark ventral spots aligned with large dark spots of back and flanks, more numerous midbody scale rows, and smaller interorbital scales. Differing from *V. p. rubidus* mainly in its brown rather than reddish dorsal ground colour.

Distribution

Subhumid and semiarid zones of the Kimberley Division, south to Mt Anderson and Old Lissadell. Also far north of Northern Territory.

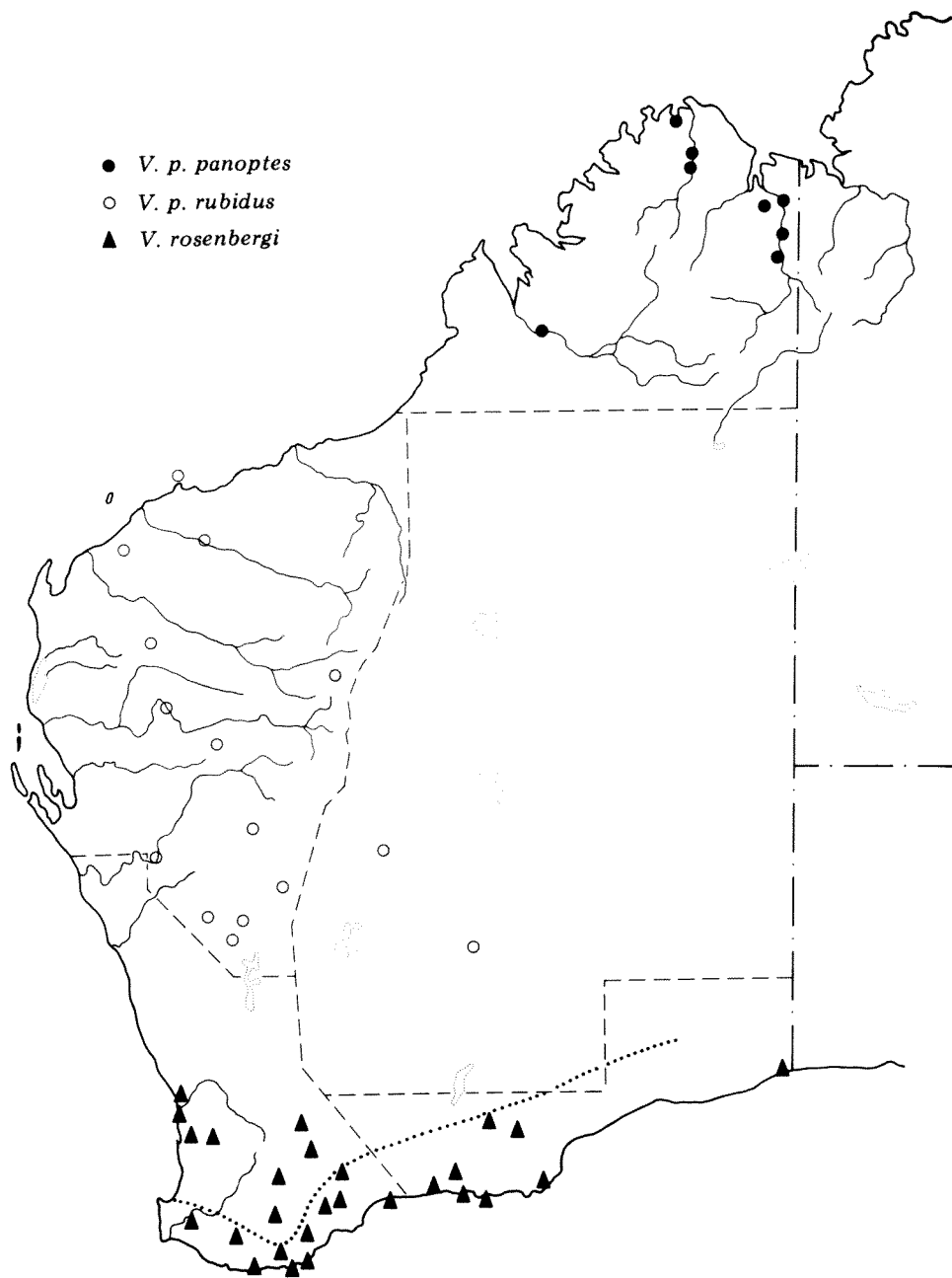


Fig. 10: Map of Western Australia showing location of specimens of *Varanus panoptes panoptes*, *V. panoptes rubidus* and *V. rosenbergi*. Dotted line indicates southern limit of *V. gouldii*.

Description

Snout-vent length (mm): 132-470 (N 18, mean 248.7). Length of appendages (% SVL): foreleg 28-33 (N 12, mean 29.4), hindleg 40-45 (N 11, mean 41.7), tail 142-175 (N 13, mean 157.5). Midbody scale rows 192-242 (N 13, mean 221.3). Lamellae under fourth toe 23-27 (N 13, mean 25.5).

Head scales small, smooth; interorbitals largest but not well differentiated from small adjacent supraorbitals; central supraorbitals slightly to considerably larger than outer. Canthus rostralis moderately strong. Nostril lateral, a little nearer to tip of snout than orbit. Tail subcircular basally; strongly compressed distally, with a low two-keeled crest. Dorsal and lateral caudal scales very small, weakly keeled or smooth. Nails moderately long, slender and curved.

Dorsally blackish brown, dark brown or dull reddish brown, darkest on head, palest on tail. Back and base of tail with alternating transverse rows of black or blackish brown spots and pale yellow or yellowish white spots; dark spots much larger and occasionally edged with pale greyish brown; pale spots small and edged with dark brown. Upper surface of legs densely covered with small yellowish white spots, with or without a black or dark brown edge. Proximal third of tail with vertical rows of dark brown or blackish spots alternating with vertical rows of yellow brown spots, the dark spots coalescing into continuous bands in middle of tail. Distal part of tail with alternating bands of dark brown and pale brown or brownish white. On side of head two wide white-edged black or blackish brown stripes, the upper through top of orbit, the lower along upper lip; both stripes extending backwards and slightly upwards almost to level of foreleg; below and parallel to these stripes 2-3 rows of moderately large longitudinally elongate dark spots on ventrolateral surface of neck. Side of body vermiculated and spotted with blackish or dark brown, the spots moderately large, vertically elongate and aligned with dark dorsal spots. Underneath whitish, except for small dark spots on hind throat and venter, latter aligning with dark dorsal and lateral spots. In old specimens dark dorsal spots tending to merge with ground colour, but pale spots on back and terminal bands on tail persistent.

Remarks

Named after Argus Panoptes, hundred-eyed guardian of Princess Io.

Paratypes

Kimberley Division (W.A.): Kalumburu (28033, 28035); Drysdale River National Park in 14°48'S, 126°57'E (50492) and 15°03'S, 126°45'E (50549);

Grotto Creek (26782); Kimberley Research Station, N of Kununurra (22368); Lake Argyle (44793-6, 60217-8); 3 km S of Old Lissadell (47717); Mt Anderson (28009, 28017, 32173).

Northern Territory: East Point, Darwin (23450).

Varanus panoptes rubidus subsp. nov.

(Plate 8; Fig. 10)

Holotype

R19132 in Western Australian Museum, collected on 6 March 1963 by Miss M. Helen Williams at Wilgie Mia, 60 km NNW of Cue, Western Australia, in 26°06'S, 117°42'E.

Diagnosis

A large ground monitor (up to 137 cm long) with strongly compressed tail. Generally similar to *V. gouldii* but differing in more numerous midbody scale rows, in having at all ages a strongly spotted dorsum (transverse rows of large dark spots alternating with rows of small pale spots), and in small dark spots of venter aligned with large dark spots of flanks and back (rather than distributed randomly). Differing from *V. p. panoptes* mainly in reddish rather than brown dorsal ground colour.

Distribution

Arid western plateaux of Western Australia from the southern Pilbara south to Fields Find and Mt Linden; also Dolphin I. (Dampier Archipelago).

Description

Snout-vent length (mm): 137-500 (N 17, mean 372.9). Length of appendages (% SVL): foreleg 28-33 (N 8, mean 29.9), hindleg 42-47 (N 6, mean 44.5), tail 150-189 (N 14, mean 170.0). Midbody scale rows 176-223 (only the Dolphin I. specimen has fewer than 195; N 11, mean 212.3). Lamellae under fourth toe 27-31 (N 11, mean 28.7). Head scales etc. as in *V. p. panoptes*.

Dorsally bright, pale to moderately dark reddish brown, darkest on head. Back and base of tail with alternating rows of blackish brown and reddish white spots: dark spots much the larger and tending to be elliptic (long axis

transverse); pale spots edged with blackish brown or dark reddish brown. On proximal part of tail vertical rows of blackish or dark brown spots alternating with brownish yellow or brownish white spots, dark spots distally coalescing into more or less continuous bands. Distal part of tail with bands of dark or pale brown alternating with brownish white or yellowish white bands. Limbs, side of head and neck and venter as in *V. p. panoptes*. With age dark, as well as pale, dorsal spots persistent, but end of tail becoming completely yellowish (as in *V. gouldii*).



Plate 8: A *Varanus panoptes rubidus* from Mt Linden. Photographed by G. Harold.

Paratypes

North-west Division (W.A.): Dolphin I. (14331); Peedamulla (51614); 52 km W of Tambrey (14884); 11 km E of Wittenoom (26261); Ullawarra (13307); Yinnietharra (53508); 35 km N of Ilgarri Creek (51524); Errabiddy (53689); Billabalong (14890); New Forest (13975); 37 km E of Mt Magnet (14889); Nalbarra (13975a); 11 and 16 km S of Yalgoo (30912, 53507); Fields Find (12907).

Eastern Division (W.A.): Wanjarri (21233); near Mt Linden (65958-60).

Varanus pilbarensis sp. nov.

(Plate 9; Fig. 11)

Holotype

R39782 in Western Australian Museum, collected on 7 April 1971 by Mr J.C. Wombey in the Chichester Range, Western Australia, in 22°03'S, 118°48'E.

Diagnosis

A small reddish rock monitor (up to 47 cm long) with tail circular in section and comb-like clusters of pointed scales on each side of base of tail. Further distinguishable from *V. tristis* and *V. timorensis* by smoother tail, shorter toes and superior position of nostril.

Distribution

Pilbara region of north-western Western Australia.

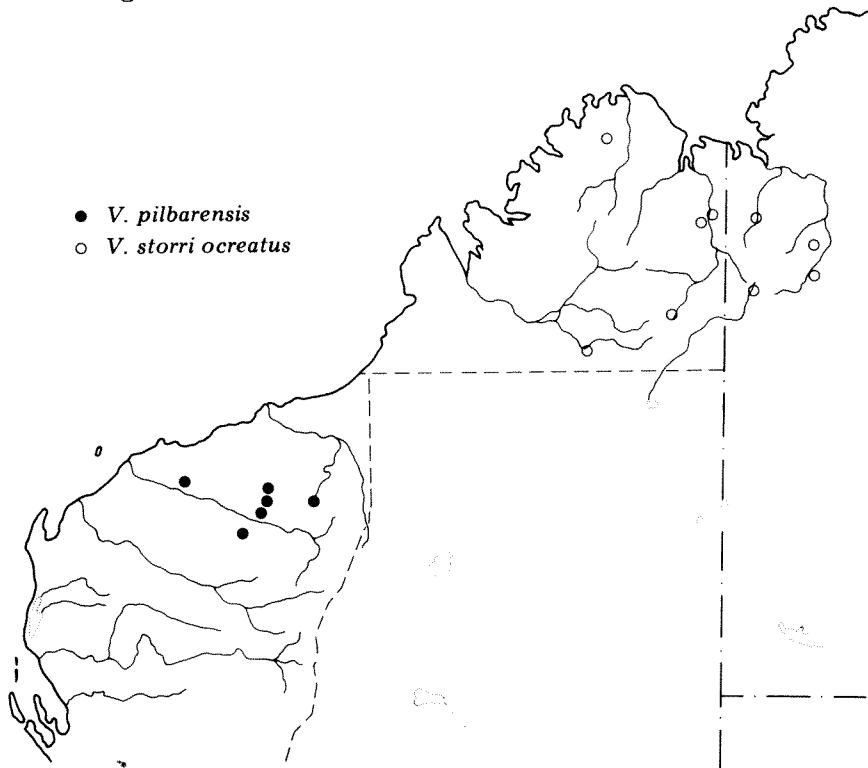


Fig. 11: Map of northern Western Australia and adjacent part of Northern Territory showing location of specimens of *Varanus pilbarensis* and *V. storri ocreatus*.

Description

Snout-vent length (mm): 110-169 (N 9, mean 140.0; a gravid female is 118). Length of appendages (% SVL): foreleg 30-34 (N 7, mean 31.6), hindleg 43-46 (N 6, mean 44.3), tail 175-205 (N 8, mean 192.0). Midbody scale rows 113-134 (N 7, mean 125.9). Lamellae under fourth toe 19-25 (N 9, mean 20.8), each usually with two moderately large, polished brown tubercles.

Head scales small, smooth; supraorbitals much smaller than interorbitals but not sharply differentiated from them. No canthus rostralis. Nostril latero-dorsal, about midway between tip of snout and orbit. Tail slightly depressed proximally, circular in section centrally and elliptic distally. Keels of dorsal and lateral caudal scales low, with a small mucron. Lateroventrally 4-6 curving rows of long, narrow, pointed, white (occasionally reddish brown) scales immediately behind cloaca, scales increasing in size, elevation and spininess outwards from cloaca. Nails very short and thick, strongly curved.

Dorsally pale (occasionally moderately dark) reddish brown, tinged with olive on neck and back, palest on snout and tail. Head dotted or flecked with dark reddish brown. Neck flecked with dark reddish brown, flecks sometimes



Plate 9: A *Varanus pilbarensis* from Carawine Gorge. Photographed by R.E. Johnstone.

coalescing into narrow wavy cross-bands. Back and base of tail with small blackish brown or very dark reddish brown spots aligned in short variable transverse bars, between which are barely discernible greyish spots transversely confluent and aligned. Dark caudal rings distally grouped in couplets; towards end of tail members of each couplet usually merging to form wide dark reddish brown bands. Limbs with irregular pale grey or whitish spots, sometimes dark-edged or dark-centred. Side of head pale reddish brown, marked with reddish brown vertical bars on lips, oblique bars on temples, and occasionally a narrow streak from front of orbit backwards and upwards to above temples. Throat and venter greyish white, irregularly and indistinctly cross-banded or clouded with grey. Under limbs greyish white with an indistinct grey reticulum on hindlegs and occasionally also on forelegs.

Paratypes

North-west Division (W.A.): Black Hill Pool (21°19'S, 117°15'E) (20017); Abydos (10811); Woodstock (13082, 28011-2, 60432); Nullagine (39158); rim of Dales Gorge (14901).

Varanus rosenbergi

(Plate 10; Fig. 10)

Varanus gouldii rosenbergi Mertens, 1957, Zool. Anz. 159: 17. Monigup Pass, Stirling Range, W.A.

Diagnosis

A large ground monitor (up to 103 cm long) with strongly compressed tail. Generally similar to *V. gouldii*, and differing mainly in coloration, especially black bands on neck and back, dark tail-tip and dark reticulation or banding of under surfaces.

Distribution

Far south of Western Australia, north to beyond Perth (Mussel Pool), nearly to Mt Cooke, Bending, nearly to Norseman, nearly to Balladonia, and Eucla. Also southern South Australia.

Description

Snout-vent length (mm): 67-395 (N 46, mean 247.1). Length of appendages (% SVL): foreleg 25-30 (N 39, mean 28.7), hindleg 36-45 (N 39, mean 40.0), tail

132-179 (N 38, mean 156.3). Midbody scale rows 165-209 (N 22, mean 185.1). Lamellae under fourth toe 21-27 (N 31, mean 24.2).

Head scales small, smooth; interorbitals largest, supraorbitals smallest and not sharply differentiated. Canthus rostralis weak. Nostril lateral, nearer to snout than orbit. Tail proximally subcircular, distally strongly compressed. Dorsal and lateral caudal scales small, with low keels (not spinose or mucronate). Nails long, slender and moderately curved; uppermost scales surrounding their base usually small and dark.



Plate 10: A *Varanus rosenbergi* from the Stirling Range. Photographed by R.E. Johnstone.

Head black, with or without a peppering of yellowish white or greyish white. Ground colour of neck and back black (rarely bluish grey), peppered with sulphur yellow, greenish yellow, yellowish white or greyish white, dots on back and base of tail sometimes clustering to form small spots. Neck with 3 or 4 narrow black bands curving downwards and forwards on sides, the anterior-most parallel to temporal stripe. Back with *ca* 12 narrow black cross-bands, a little narrower or wider than interspaces. Tail proximally black, ringed with dull yellow; distally blackish brown, narrowly banded with yellowish brown

(tip of tail sometimes uniformly dark). Legs and toes black with dots and small spots of brownish or yellowish white. Side of head blackish except for yellowish spots on upper lips and margins of temporal stripe. Underneath yellowish or whitish, usually with a black or grey reticulum from chin to abdomen and occasionally under legs; reticulum thickest on throat and under neck, finest on venter; longitudinal elements of reticulum commonly missing on chin, leaving cross-bars extending to lips; occasionally bars on chin broken medially; more rarely bars restricted to lips and replaced in middle of throat by a chevron; reticulum on venter sometimes faint, absent or replaced by hollow bands aligned with dorsal bands; dark caudal bands occasionally extending to lower surface, where hollow.

Geographic variation

The Kangaroo Island specimens differ from the Western Australian in their greater size (they are the only specimens with SVL greater than 369 mm), darker coloration (dorsally they are similar to the darkest western specimens, and they have considerable black flecking under neck and some on abdomen), and more numerous midbody scales (the only specimens with more than 199 rows).

Remarks

Hitherto *V. rosenbergi* has been treated as a subspecies of *V. gouldii*; but there is no hybridisation between these taxa, despite their considerable sympatry on the Swan Coastal Plain and in the southern Wheat Belt.

Material

South-west Division (W.A.): Mussel Pool (51559); North Fremantle (5381-8); Keysbrook (419); 21 km NNW of Bannister (36455) and 6 km NNW (19251); 8 km NE of Bending (51102); 32 km N of Lake Grace (34543); Kuender (28148); Dumbleyung (12298); 23 km SE of Newdegate (21732) and 44 km SE (21733); Chinocup Reserve (41072-3); Hopetoun (18483-4); near Jerramungup (13043); Needilup (22534); Woodlands, Tambellup (1870); 11 km S of Nannup (60129); 20 km W of Rocky Gully (42964, 60348); Moir Pass (821); Bluff Knoll (58818); 15 km S of Mt Barker (58869); Kent River (44662); Two Peoples Bay (36349); 11 km SW of Albany (14896).

Eucla Division (W.A.): Eucla (18481); 6 km NE of Clear Streak Well, i.e. 68 km ESE of Norseman (58086); ca 70 km SSW of Balladonia Hotel (60375); Scaddan (9581); Young River (14898); Esperance (52112-3); Hellfire Bay, Cape LeGrand National Park (42528); 13 km SW of Israelite Bay (17626).

South Australia: Kangaroo I. (52115-7).

Varanus storri ocreatus subsp. nov.

(Plate 11; Fig. 11)

Holotype

R42717 in Western Australian Museum, collected on 11 October 1971 by Dr D.J. Kitchener at Argyle Downs airstrip, Western Australia, in 16°20'S, 128°46'E, now submerged by Lake Argyle.

Diagnosis

A small reddish monitor (up to 35 cm long) with strongly spinose tail. The species *V. storri* (Mertens, 1966) is very like *V. acanthurus* but is smaller (SVL up to 134 mm) and has fewer midbody scale rows (up to 91), fewer transverse rows of ventrals (up to 58) and much weaker colour pattern (e.g. the neck is never boldly striped). *V. storri* differs from *V. primordius* of far north of Northern Territory (Storr, 1968) in its more numerous midbody scale rows (70-91, *vs* 60-66), keels of dorsal and lateral caudals strongly spinose rather than merely mucronate, and prevailing reddish brown rather than olive grey coloration. *V. s. ocreatus* differs from *V. s. storri* mainly in the enlarged scales under distal part of hindleg; it also has a longer tail and limbs and fewer midbody scale rows and transverse rows of ventrals.

Distribution

Far north of Western Australia (i.e. Kimberley Division east of long. 126°E) and adjacent parts of Northern Territory.

Description

Snout-vent length (mm): 49-132 (N 10, mean 107.1). Length of appendages (% SVL): foreleg 26-32 (N 10, mean 27.8), hindleg 35-41 (N 9, mean 37.6), tail 157-187 (N 9, mean 168.6). Midbody scale rows 70-84 (N 10, mean 79.3). Transverse rows of ventrals 45-48 (N 10, 46.6).

Head scales small, smooth; supraorbitals smallest, not sharply differentiated. Nostril dorsolateral, i.e. located on swollen canthus rostralis. Tail basally slightly depressed; distally rounded triangular in section, with a two-keeled crest. Dorsal and lateral caudal scales forming perfect whorls with subcaudals. Scales under legs becoming juxtaposed and much enlarged towards foot. Subdigital lamellae bearing two dark (pale in juveniles), circular, flat tubercles; similar tubercles on plantars.

Dorsally reddish brown. Head usually flecked with blackish brown (dark pigment confined to tubercles). Dorsal and upper lateral surfaces of body and

upper surfaces of limbs with a complete (rarely) or broken blackish brown reticulum, the enclosed spots sometimes paler than ground colour; reticulum occasionally reduced to flecks (coincident with keels of dorsals). Sides of head, body and limbs (anterior face only) usually spotted with blackish brown, spots on lips and temples tending to form irregular vertical bars. Occasionally a narrow brownish white midlateral stripe from ear aperture to level of foreleg, finely margined above and below with blackish brown. One specimen, much smaller than others, is devoid of dark pigment; it is pale reddish brown above and white below, the back covered with small white rosettes.



Plate 11: A *Varanus storri ocreatus* from Gordon Creek, N.T. Photographed by G. Barron.

Paratypes of V. s. ocreatus

Kimberley Division (W.A.): Old Theda (57244); 28 km SW of Argyle Downs (42764); 30 km SE of Halls Creek (60041); Bull Flat Bore, Christmas Creek Station (51266).

Northern Territory: Kildurk (40998); Gordon Creek, 48 and 49 km S of Victoria River Downs (60043-4); Wave Hill Police Station (60042); Inverway (13720).

Specimens of V. s. storri

Queensland: Charters Towers (55487) and 32 km ENE (57342) and 120 km S (53764-5).

Specimens of V. primordius

Northern Territory: Berry Springs (48820-1); 60 km S of Adelaide River (23779-80).

Varanus timorensis scalaris

(Fig. 12)

Varanus timorensis scalaris Mertens, 1941, Senckenbergiana **23**: 266. Beagle Bay, W.A.

Varanus (Odatria) timorensis similis Mertens, 1958, Senckenb. biol. **39**: 239. Groote Eylandt, N.T.

Diagnosis

A medium-sized arboreal monitor (up to 59 cm long) with uncompressed tail, caudal scales strongly keeled and mucronate, and in males several rows of

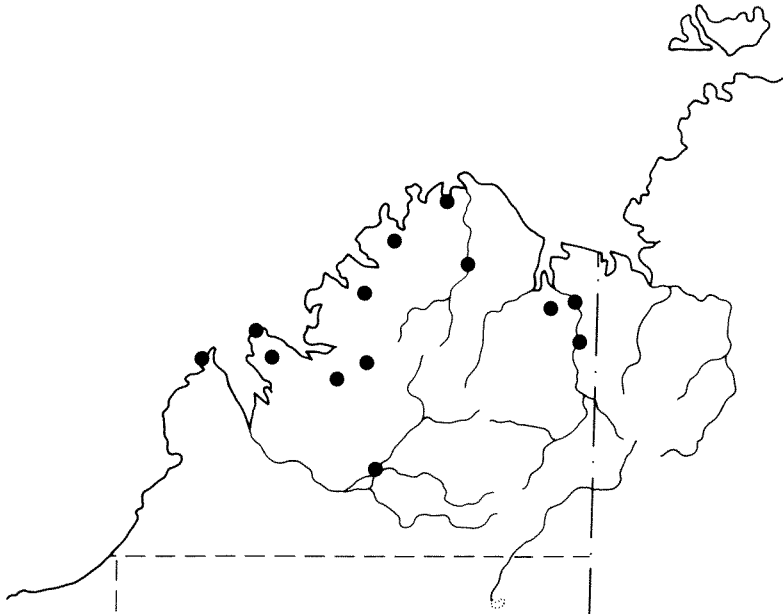


Fig. 12: Map of Kimberley Division showing location of specimens of *Varanus timorensis scalaris*.

small narrow spinose white scales on lateroventral surface of tail immediately behind cloaca. Further distinguishable from *V. tristis* by shorter snout and deeper head (giving it a seal-like profile), sides of head and neck and often top of head spotted, shorter appendages, fewer midbody scale rows, and supra-orbitals not so well differentiated from interorbitals.

Distribution

Kimberley Division of Western Australia, south to northern Dampier Land, Fitzroy Crossing and Lake Argyle. Also north of Northern Territory, north Queensland, Torres Strait islands and New Guinea (Mertens, 1950).

Description

Snout-vent length (mm): 71-253 (N 69, mean 155.0). Length of appendages (% SVL): foreleg 22-29 (N 60, mean 25.9), hindleg 31-41 (N 54, mean 35.3), tail 132-166 (N 46, mean 155.0). Midbody scale rows 98-124 (N 53, mean 111.0). Lamellae under fourth toe 20-30 (N 59, mean 24.9), each with 2 or 3 tubercles.

Head scales small, smooth; interorbitals largest, supraorbitals much the smallest but not sharply differentiated. Canthus rostralis weak or absent. Nostril lateral, about midway between tip of snout and orbit. Usually a small but distinct dorsolateral fold on body. Tail proximally subcircular in section, centrally rounded triangular, distally elliptic. Dorsal and lateral caudal scales moderately small, with a low keel ending in a mucron. Lateroventrally immediately behind cloaca, 10-30 small narrow white scales in 3-5 longitudinal rows, raised and terminating in a small spine in males. Nails moderately short and thick, strongly curved.

Dorsally brownish grey to black, palest on head and tail, darkest on neck and back. Head usually spotted, stippled or vermiculated with blackish brown, and often vermiculated or flecked with pale grey or greyish white. Neck anteriorly with pale vermiculations or flecks, markings gradually changing posteriorly into spots like those of back. Back black with transverse rows of well-separated greyish-white black-centred spots; spots taking form of a thick ring, often broken on one or both sides, especially on flanks. Between dorsal spots often rows of greyish white dots or dashes. Occasionally pale dorsal spots so reduced that back is covered (as in holotype) with transverse bands of black alternating with bands of grey flecked with white. Tail (at least proximal half) ringed with brownish white or greyish white. Face dotted with dark brown (centre of scales). Lips vertically barred and side of neck spotted with greyish brown. Underneath whitish, usually with small greyish brown spots on throat (especially sides); clouded with greyish brown under legs and tail).

Remarks

When Mertens proposed *V. t. similis* for the Northern Territory and Queensland populations, he believed that the cross-banded dorsal pattern of the holotype of *V. t. scalaris* (see photograph, Mertens, 1942: 89, Fig. 32) was characteristic of the Western Australian populations. However this colour variant is uncommon (at least in immatures and young adults), and most Kimberley specimens are indistinguishable from those of the Northern Territory or the Thursday Island specimen photographed by Mertens (*ibid.*, Fig. 31).

I recognise *V. t. scalaris* for the Australian populations. According to Mertens they differ from the nominate race of Timor, Samao, Savu and Rotti in having spinose postanal scales. Furthermore they seem to differ in colour pattern; at any rate I cannot match Mertens' photograph (*ibid.*, Fig. 30) of a specimen from Kupang with any Australian specimen.

Material

Kimberley Division (W.A.): Napier Broome Bay (60487); Kalumburu (13566, 13580*a-b*, 13663, 28032, 60143, 60474); Mitchell Plateau at Surveyors Pool (58315) and in 14°52'S, 125°50'E (43180); Drysdale River National Park in 15°16'S, 126°43'E (50697-8) and 15°16'S, 127°12'E (50570); Prince Regent River Reserve in 15°47'S, 125°20'E (46931); ca 40km from Wyndham (26783); Ivanhoe (10278); Lake Argyle (42830-1, 42852-3, 60117-21, 60409); Wotjulum (11205, 11833-4); Martins Well (16°34'S, 122°51'E) (58528); Stewart River (16°36'S, 123°31'E) (51833); Kimbolton Spring (16°38'S, 123°43'E) (51203); Beverley Springs (11839, 13364); Mt Hart (24033, 24062-4, 24072, 24083); Fitzroy Crossing (47670); "Kimberley" (1738).

Northern Territory: Cape Don (26677); Yirrkala (13520 *a-d*, 13521 *a-c*, 13522 *a-e*); Oenpelli (32252-3); Darwin (26227, 34115); Edith River (47597); Katherine (13953, 13955, 16511-2, 19904, 23890, 29758); Kildurk (40999).

Varanus tristis tristis

(Plate 12; Fig. 13)

Odatia punctata Gray, 1832, Ann. nat. Hist. 1: 394. "Shark's Bay" [= Swan River, W.A.]. Not *Varanus punctatus* Merrem [= *V. bengalensis* (Daudin)].

Monitor tristis Schlegel, 1839, Abbildungen neuer oder unvollständig bekannter Amphibien..., p.73. Swan River, W.A.

Varanus (Odatia) tristis centralis Mertens, 1957, West Aust. Nat. 5: 185. Hermannsburg, N.T.



Plate 12: A *Varanus tristis* from Armadale. Photographed by R.E. Johnstone.

Diagnosis

A medium-sized arboreal monitor (up to 75 cm long) with tail not strongly compressed, caudal scales strongly keeled and mucronate, and a circular or squarish cluster of large black or black-and-white scales on each ventrolateral surface of base of tail (smaller and less spiny in females and young males). Further distinguishable from *V. timorensis* by longer snout, flatter unspotted head, pale caudal rings not extending for more than half-way down tail (and usually for much less), longer appendages, more numerous midbody scale rows, and supraorbital scales sharply differentiated from interorbitals.

Distribution

Throughout the State, except far south, i.e. south of Perth, Kelmscott, Wickepin, Narembeen, Kalgoorlie and the Great Victoria Desert. Also the Northern Territory and north-western South Australia.

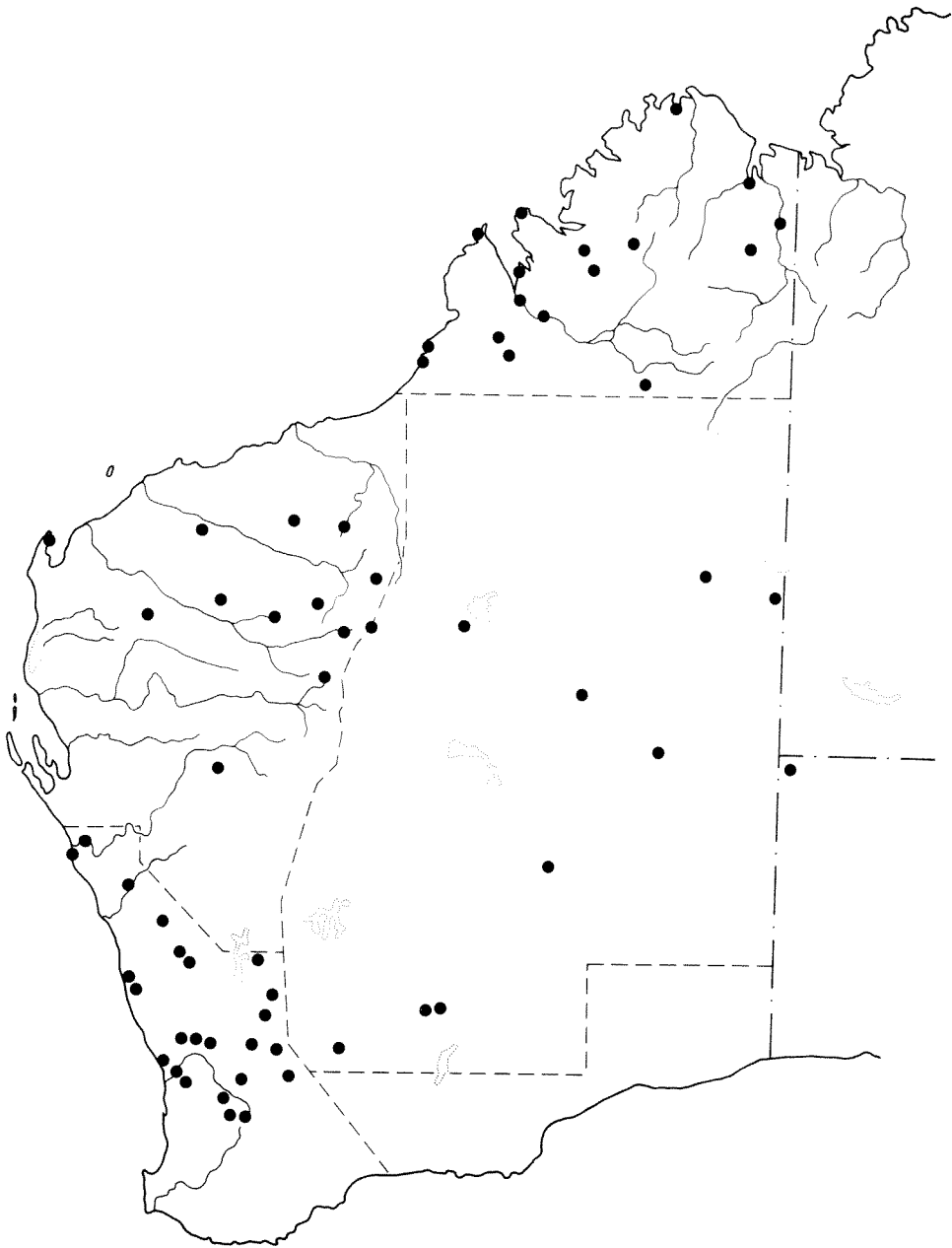


Fig. 13: Map of Western Australia showing location of specimens of *Varanus tristis tristis*.

Description

Snout-vent length (mm): 67-280 (N 110, mean 168.1). Length of appendages (% SVL): foreleg 26-33 (N 90, mean 28.6), hindleg 34-44 (N 88, mean 39.6), tail 151-226 (N 88, mean 187.9). Midbody scale rows 119-152 (N 53, mean 133.2). Lamellae under fourth toe 22-30 (N 77, mean 25.9); each with 2-4 (mostly 3) dark tubercles, the outermost largest.

Head scales small, smooth; interorbitals largest, supraorbitals smallest and sharply differentiated. Canthus rostralis weak or absent. Nostril lateral, about midway between tip of snout and orbit. Cheeks slightly hollow. Usually a small but distinct dorsolateral fold. Tail slightly depressed proximally, slightly compressed distally. Dorsal and lateral caudal scales moderately large, with a low sharp keel ending in a mucron or short spine. Nails moderately short and thick, strongly curved.

Juvenile coloration in south. Head and neck medium to dark brownish grey. Back dark grey with transverse rows of densely packed, longitudinally elongate, dark-centred pale spots, which are often laterally confluent and thus forming pale transverse bands, narrower or wider than dark interspaces. Tail medium to dark brownish grey, proximally ringed with pale grey. Underneath pale grey, spotted or clouded on throat with dark brownish grey or blackish grey, and narrowly cross-banded on venter and limbs with dark brownish grey (bands often wavy and sometimes broken medially).

Juvenile coloration in north (including the Pilbara and Central Australia). As in south, but head paler and tinged with olive brown, pale dorsal spots often extending on to neck, and venter usually spotted, rather than banded, with brownish grey.

Adult and subadult coloration in south. Head, neck, forelegs and most of tail black. Back in subadults covered by a moderately fine black reticulum, enclosing angular black-centred grey spots longer than wide; with age grey dorsal spots reducing to pale grey and dark grey flecks, finally disappearing and leaving back entirely black. Tail in subadults proximally ringed with greyish white flecks, which with age tend to disappear, leaving tail entirely black. Hindleg in subadults black, spotted with greyish white, proximal spots largest and black-centred; pale spots disappearing with age, leaving leg entirely black. Venter and under limbs in subadults greyish white or grey, flecked with dark grey, dark greyish brown or black (flecks sometimes roughly aligned transversely); with age becoming uniformly dark grey. Chin dark brown. Remaining under surfaces blackish.

Adult and subadult coloration in north. Northwards there is a general paling. In the North-west, south Kimberley, eastern deserts and Central

Australia, head, neck and most of tail usually blackish brown; grey of dorsal spots and caudal rings often replaced with reddish brown; under neck and tail medium to dark brownish grey; venter, under legs and under base of tail usually pale grey, mottled or spotted with grey (occasionally whitish, with or without sparse greyish spots). In the Kimberley proper (i.e. north of the Fitzroy) head still paler (olive brown); neck, as well as back, often covered with black-centred pale spots; whitish flecks sometimes predominating over blackish at base of tail; rings of pale caudal flecks usually extending to middle of tail; underneath greyish white, with or without sparse greyish brown spots.

Geographic variation

In the western part of its range (Western Australia, Northern Territory and South Australia) variation is slight and continuous. As we have seen, adult coloration becomes paler from south to north. There is also a slight increase in relative length of tail from south to north (e.g. 151-216 in South-west Division, N 41, mean 179.9; *vs* 174-226 in North-west and Kimberley Divisions, N 33, mean 197.3). In other respects all these western populations are much alike and clearly comprise a single taxon.

Our two specimens of *V. tristis* from Queensland, viz. a juvenile from 29 km W of Einasleigh (55896) and an adult from the Burra Range between Pentland and Hughendon (55897), are somewhat different in coloration and scutellation from all western specimens. I therefore tentatively recognise *V. tristis orientalis* Fry for the east Australian populations.

Remarks

For notes on its diet, seasonality of activity etc., see Pianka (1971).

Material

Kimberley Division (W.A.): Kalumburu (13567, 13791, 28018, 60140-2); Wyndham (13563); Wotjulum (11836-8); Lake Argyle (60116); 7 km NNE of Cape Borda (58529-30); Manning Creek (32340); Mt Hart (24061); 21 km N of Turkey Creek (58615); Mt Bell (32270); Derby (46173); 7 km SE of Willare Bridge (58675); Mt Anderson (28016); Injudinah Creek, Lagrange (28014); Frazier Downs (28013); Edgar Ranges Reserve in 18°21'S, 123°03'E (54005) and 18°55'S, 123°27'E (53935); Wattle Creek Spring (19°13'S, 126°07'E) (51282).

North-west Division (W.A.): Exmouth (31415); Millstream (20001); 5 km E of Mt Ulric (20000); Woodstock (13308); Nullagine (12308); Balfour Downs (39140); Neelaluna Claypan, 40 km S of Jiggalong (24015); Mt Newman

(13666, 26525); Paraburdoo (56140); Ullawarra (23919); Turee Creek (17691, 22750); Mundiwindi (12279); Kumarina (23984); Mileura (44959).

Eastern Division (W.A.): Pollock Hills (45234); 8 km W of Mt Tietkens, Buck Hills (45233); Durba Springs (23°45'S, 122°31'E) (51926); Charles Knob (25°04'S, 124°59'E) (53600); Warburton Range (22183); 16 km ESE of Point Sunday (53563); Kalgoorlie (10417) and 28 km E (4170); 29 km S of Yellowdine (37939).

South-west Division (W.A.): Wittecarra Gully, S of Kalbarri (18589); Lockwood Spring, 32 km ESE of Kalbarri (33471); East Yuna (4787); 16 km N of Morawa (12925); Bunjil (1736 *a-b*); Maya (4358); 51 km N of Beacon (48394); 11 km E of Green Head (48488); Mt Lesueur (49121); 3 km E of Wialki (24875); Mukinbudin (33400); 32 km S of New Norcia (60133-4); Bolgart (8992) and 13 km W (28010, 60431); Goomalling (22985); Merredin (8578); 32 km N of Kellerberrin (26469); Neerabup National Park (59347); Wyalunga Pool (12926); Gidgiegannup (19863, 40235); Wanneroo (48801); Millendon (8085); Sorrento (28393); Wembley Downs (22922); Floreat Park (24882); Midland (6921); Darlington (40702-3); Mt Helena (408); Quairading (1352); Wadderin Hill (2778); Lesmurdie (14914); Bickley (11756); Gosnells (34072); Kelmscott (51696); Brookton (28154); Pingelly (8564); Popanyinning (9659); 25 km E of Yornaning (51310); locality uncertain (3332, 60127, 60136).

Northern Territory: Yirrkala (13504, 13519); Katherine (16514, 24937); Willie Rock-hole (23°16'S, 129°45'E) (JSE 325-6); Owen Springs (20849); Hull River (JSE 148); Ruined Ramparts, Petermann Ranges (JSE 162); Chirnside Creek (20785); Shaw Creek (JSE 135).

South Australia: 18 km S of Mt Davies Camp (31708).

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