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A new species of false antechinus (Marsupialia: Dasyuridae) from the Kimberley, Western Australia

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Abstract

Pseudantechinus ningbing sp. nov., recognised as a species in literature, is herein formally described. It is widely distributed in the Kimberley district, Western Australia.

Introduction

The false antechinusus or Parantechini *sensu* Archer, 1982 were recognised as a distinct group on the basis of isozyme electrophoresis by Baverstock *et al.* (1982), who included within this group the following *Antechinus* species: *A. macdonnellensis* (Spencer, 1896); *A. bilarni* Johnson, 1964 and *A. rosamondae* Ride, 1964. Baverstock *et al.* (1982) suggested that the form referred to as 'ningbing' probably belonged to this group. Archer (1982), using essentially cranial and several external characters, considered that the Parantechini comprised three genera. He recognised, but did not formally describe, the 'ningbing' form as a species and placed it in *Pseudantechinus* Tate, 1947 – which he considered to also include *macdonnellensis*. Woolley (1982), on the basis of phallic morphology, also recognised the 'ningbing' form and placed it in the Parantechini. Cooper and Woolley (1983) examined the electrophoretic mobility of proteins and enzymes of eight species of dasyurid marsupials, including the 'ningbing' form, and concluded that 'ningbing' was probably a species.

Kitchener and Caputi (1988) described the species *Pseudantechinus woolleyae* and also recognised *Pseudantechinus* 'ningbing' as a species. They concluded that *P.* 'ningbing' was sexually dimorphic, it was phenetically closest to *Pseudantechinus macdonnellensis* and *Pseudantechinus bilarni,* and phylogenetically closest to *P. macdonnellensis, P. bilarni* and *P. woolleyae,* but could not resolve the relationships between these *Pseudantechinus* species. A canonical variate analysis that enabled recognition of *P.* 'ningbing' was incorporated in their study.

The 'ningbing' form of false antechinus, first collected by W.H. Butler at Parry Creek, Western Australia, on 31 July 1965, is herein formally described as a new species.

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Materials and methods

Measurements

Description of morphology follows Archer (1981). Tooth number follows Archer (1978). Cranial and external points used for measurements also follow Archer (1981) and Kitchener and Caputi (1988). Nineteen measurements of skull and dental characters, five of external body characters (in mm) and weight (in gms) were recorded from adult specimens. Abbreviation for these measurements are as follows: MAXL, maximum skull length; BASCRANL, basicranial length; MSKH, maximum skull height; MSKW, width across zygoma; OBUL, outside bullae distance; INBUL, inside bullae distance; BULTOT, length of tympanic wing of alisphenoid and periotic, from posterior lacerate foramen to anterior edge of alisphenoid wing; BULPER, length of periotic tympanic wing from lacerate foramen to contact point with alisphenoid tympanic wing, measured in the same line as for BULTOT; C^1-M^5, M^2-M^5, I_1-M_5, M_2-M_5 crown lengths; RM^4-LM^4, width outside crowns; INORB, minimum interorbital width; MAXVAC, maximum length of maxillary palatal vacuity; NASL, nasal length; DC-I_1 dentary condyle to I_1; ANGCON, tip of angular process to articular condyle; CONRAM, articular condyle to anterior border of ascending ramus; NV, tip of rhinarium to vent length; TV, tail tip to vent length; HF, hind foot length; EAR, ear height from notch; TRAG supratragus width; WT, weight.

Institutional origin of specimens is denoted by prefixing their catalogue numbers as follows: JM, Queensland Museum, Brisbane; WAM, Western Australian Museum, Perth; and FMNH, Field Museum of Natural History, Chicago.

Systematics

Pseudantechinus ningbing sp. nov.

Table 1, Figure 1

Holotype

Western Australian Museum catalogue number M15787, adult male, skull removed, body fixed in 10 per cent formalin and preserved in 75 per cent ethanol. Trapped by L. Keller on 24 October 1976.

Type locality

Mitchell Plateau, Kimberley region, Western Australia (14°53′40″S, 125°45′20″E) at an altitude of *ca.* 220 m, in a vegetation of mixed low woodland with *Acacia* spp. prominent over *Triodia* sp. hummock grass on rugged sandstone.

Paratypes

Specimens as (all have skulls removed): S, skin; P, postcranial skeleton; FA, bodies fixed in 10 per cent formalin and preserved in 75 per cent ethanol. All specimens are adult unless otherwise stated.

Western Australia. Kalumburu, 14°18′00″S, 126°38′00″E, 2 ♂, WAM M7124 (S, FA), WAM M71261 (S, FA); Mitchell Plateau, 14°53′25″S, 125°44′35″E, 1 ♂, WAM M21719 (FA);

Mitchell Plateau, 14°53'30"S, 125°45 20"E, 1 ♀, WAM M22035 (FA); near Ningbing, 14°58' 10"S, 128°35'30"E, 1 ♀, FMNH120549 (FA); Ningbing Bore, 15°14'30"S, 128°40'30"E, 1 ♂, 3 ♀, WAM M7130 (FA), WAM M7129 (FA), WAM M7125 (S, P), WAM M7131 (S); near Ningbing, 15°15'00"S, 128°40'00"E, 1 ♂, 4 ♀, JM2315 (FA), JM2325 (FA), JM1480, JM1477, WAM M24505.001 (2 pouch young WAM M24505.002-.003) (FA); near Ningbing, 15°17' 00"S, 128°40'00"E, 2 ♀, JM1208 (FA), JM1481; South Heywood Is, 15°20'00"S, 124°20' 00"E, 1 ♀, WAM M9252 (FA); Prince Regent River Reserve, 15°26'12"S, 125°36'42"E, 1 ♂, WAM M12334 (FA); 44.5 km N Kununurra, 15°28'00"S, 128°45'00"E, 1 ♂, JM2314 (FA); Prince Regent River Reserve, 15°37'32"S, 128°18'04"E, 1 ♀, WAM M12368 (FA); Parry Creek, 15°40'00"S, 128°15'00"E, 1 ♀, WAM M7132 (S, P); Ord River, 16°07'15"S, 128°44'40"E, 1 ♂, WAM M11952 (FA); Elgee Cliffs, 16°35'00"S, 127°43'00"E, 1 ♀, WAM M15933 (S, FA); Beverley Springs, 16°44'40"S, 125°22'30"E, 1 ♀, WAM M15931 (S, FA); Napier Downs Hst., 17°15'00"S, 124°44'00"E, 1 ♀, FMNH119802 (FA); Brooking Springs, 18°01'05"S, 125°32' 40"E, 1 ♀, WAM M15932 (FA); near Brooking Springs, 18°01'20"S, 125°32'20"E, 1 ♀, FMNH 119800 (S).

Diagnosis

Pseudantechinus ningbing is diagnosed against the other *Pseudantechinus* species recognised by Kitchener and Caputi (1988); skull, dental, tooth measurements of these other species are presented in Kitchener and Caputi (1988). All measurements are in mm.

Pseudantechinus ningbing differs from *Pseudantechinus bilarni* in being slightly smaller in most characters measured except for having generally longer maxillary palatal vacuities 3.6 (2.4-4.3) v. 2.8 (2.2-3.8) and generally longer periotic tympanic bulla 3.0 (2.5-3.5) v. 2.7 (2.3-2.9); ratio of periotic tympanic to alisphenoid tympanic bulla length also larger 0.506 (0.439-0.545) v. 0.450 (0.418-0.466); tail approximately subequal to, rather than longer than head and body length; P^3 crown area small, less than half rather than more than three-quarters that of P^2; P_3 usually absent rather than always present; stylar cusp B (StB) on M^2 usually absent or low rather than usually moderate and occasionally tall; squamosal and frontal usually in contact rather than not close; tail usually incrassate rather than not incrassate; pes shorter 14.3 (13.0-15.4) v. 16.6 (14.8-18.4) and females with four rather than six teats.

It differs from *Pseudantechinus macdonnellensis* in having smaller bullae: BULTOT 5.9 (5.5-6.5) v. 6.5 (6.0-7.0), OBUL 11.1 (10.5-11.9) v. 11.61 (10.8-12.3), INBUL 5.5 (5.0-6.2) v. 5.2 (4.6-5.7); periotic slightly more inflated; P^3 crown area usually more than one-quarter that of P^2; P^3 usually two roots, occasionally one, rather than usually one root or occasionally absent; tail length generally subequal to rather than less than head to vent length; penile appendage absent and females with four rather than six teats.

It differs from *Pseudantechinus woolleyae* in being generally smaller in all skull and dental measurements (except distance between bullae, INBUL), having: bullae smaller 3.0 (2.5-3.5) v. 3.8 (3.3-4.3), BULTOT 5.9 (5.5-6.5) v. 7.6 (7.1-8.2); periotic less inflated; P^3 crown area less than one-half, rather than more than three-quarters that of P^2; P_3 usually absent rather than usually present; squamosal and frontal in contact or close; M^2 StB very low or absent rather than

Table 1 Sample size (N), mean ($\bar{X}$), standard deviation (SD), minimum and maximum values for measurements (mm) and weight (gms) of male and female *Pseudantechinus ningbing*. Explanation of character codes in Methods.

		MAXL	BASCRANL	MSKH	MSKW	BULPER	BULTOT	OBUL	INBUL	C^1-M^3	M^2-M^3	RM^1-LM^1	INORB	MAXVAC	NASL	DC-I_1	I_1-M_2	M_2-M_2	ANGCON	CONRAM	NV	TV	HF	EAR	TRAG	WT
♀♀	N	18	19	19	18	19	19	19	19	19	19	19	19	19	19	19	19	19	18	19	10	10	10	9	9	14
	$\bar{x}$	27.0	24.8	6.6	15.5	3.0	5.9	11.1	3.1	10.2	6.2	8.7	5.4	3.7	10.1	19.5	12.2	7.0	5.1	4.9	80.7	83.1	14.23	18.1	4.0	19.5
	SD	0.77	0.73	0.22	0.45	0.20	0.25	0.40	0.28	0.34	0.26	0.27	0.32	0.40	0.38	0.57	0.37	0.28	0.30	0.23	5.60	6.04	0.77	1.34	0.39	5.11
	min	25.5	23.3	6.3	14.7	2.7	5.5	10.5	2.8	9.5	5.9	8.2	5.0	3.1	9.3	18.5	11.6	6.5	4.6	4.4	72.5	73.8	13.0	16.4	3.4	10.0
	max	28.4	26.4	7.0	16.0	3.5	6.5	11.9	3.8	10.9	6.8	9.4	6.2	4.3	10.6	20.4	13.0	7.4	6.0	5.2	89.5	91.5	15.4	20.8	4.6	30.0
♂♂	N	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	7	6	7	6	5	9
	$\bar{x}$	27.4	25.1	6.8	15.8	3.0	5.9	11.2	3.2	10.3	6.2	8.8	5.5	3.3	10.5	19.8	12.3	6.9	5.1	5.1	84.5	87.5	14.5	17.9	4.2	20.5
	SD	0.74	1.00	0.23	0.66	0.29	0.26	0.30	0.22	0.29	0.20	0.29	0.20	0.52	0.54	0.80	0.44	0.34	0.33	0.32	5.31	5.81	0.46	0.65	0.16	7.81
	min	26.6	24.2	6.4	14.6	2.5	5.7	10.8	2.9	9.9	5.8	8.4	5.3	2.4	9.8	18.8	11.6	6.3	4.5	4.6	75.6	77.5	13.9	17.1	4.0	11.0
	max	29.1	27.1	7.1	17.0	3.3	6.4	11.7	3.5	10.6	6.5	9.4	5.9	4.1	11.2	21.5	12.9	7.4	5.4	5.5	93.0	93.7	15.1	18.5	4.4	33.0

moderate; M_4 entonocid absent rather than moderate or large; tail longer or subequal to snout to vent length, not incrassate; tail slightly less heavily furred; female with four rather than six teats.

Description

Skull and dentary

Skull moderately large but not especially robust, cranium and lambdoidal crest low and sagittal crest and postorbital swellings absent; nasal length moderate; nasals usually slightly flared proximally, occasionally unflared or moderately flared; squamosal and frontal usually in contact or close, occasionally not close; maxillary palatal vacuities moderate, normally located between a line drawn from M^4 metacone and M^2 metacone; premaxillary palatal vacuities do not extend posterior to a line joining C^1 posterior edge; palatine vacuities usually small, occasionally absent or moderate; alisphenoid tympanic bulla usually moderate, occasionally large and moderately inflated, almost covers ectotympanic wing, in wide contact with periotic tympanic wing. Dentary with distance between tip of angular process and articular condyle subequal to that between articular condyle and tip of ascending ramus.

Dentition

I^1 tallest of upper incisors separated from I^2 by diastema which approximates I^1 thickness; I^2, I^3 and I^4 approximately same height and crown area, occasionally I^2 shorter than I^4; I^4 separated from C^1 by substantial diastama; C^1 with slight buccal antero – and posterolingual cingula, slight to moderate posterior cingular cuspule; C^1 crown height about twice that of P^2; usually slight diastema between C^1 and P^1 and between upper premolars; crown height $P^2 > P^1 > P^3$ (when present); P^1 and P^2 with antero – and posterobasal cingular cuspules, encircled by moderate cingula; P^3 varies from having a morphology similar to P^1 and P^2, to a short stump without cuspules or cingula; crown area of P^3 between one-quarter to one half P^2; P^3 usually with two roots, occasionally one; metacone taller than StD on M^2, taller or subequal on M^3 and M^4; StD taller than StB on M^2 and M^3 but subequal on M^4; StB shorter than paracone on M^2 and M^3 but subequal on M^4; StB on M^2 usually low or absent, occasionally moderate; preprotocrista forms wide contact with anterior cingular shelf on M^2, terminates at anterior base of paracone on M^{3-4}; preparacrista M^{2-4} connects StB directly to paracone; post-protocrista M^{2-4} connects to posterolingual base of metacone; posterior lingual and buccal cingula absent M^2 to M^5; on M^2 preparacrista subequal to postparacrista, which is half length of premetacrista, which is about half length of postmetacristaa; on M^3 preparacrista almost twice length of postparacrista, which is half length of premetacrista, which is just less than half length of postmetacrista; on M^4 preparacrista almost three times longer than postparacrista, which is half length of premetacrista, which is about half length of postmetacrista; on M^5 metacone absent, protocone (usually uncompressed) and

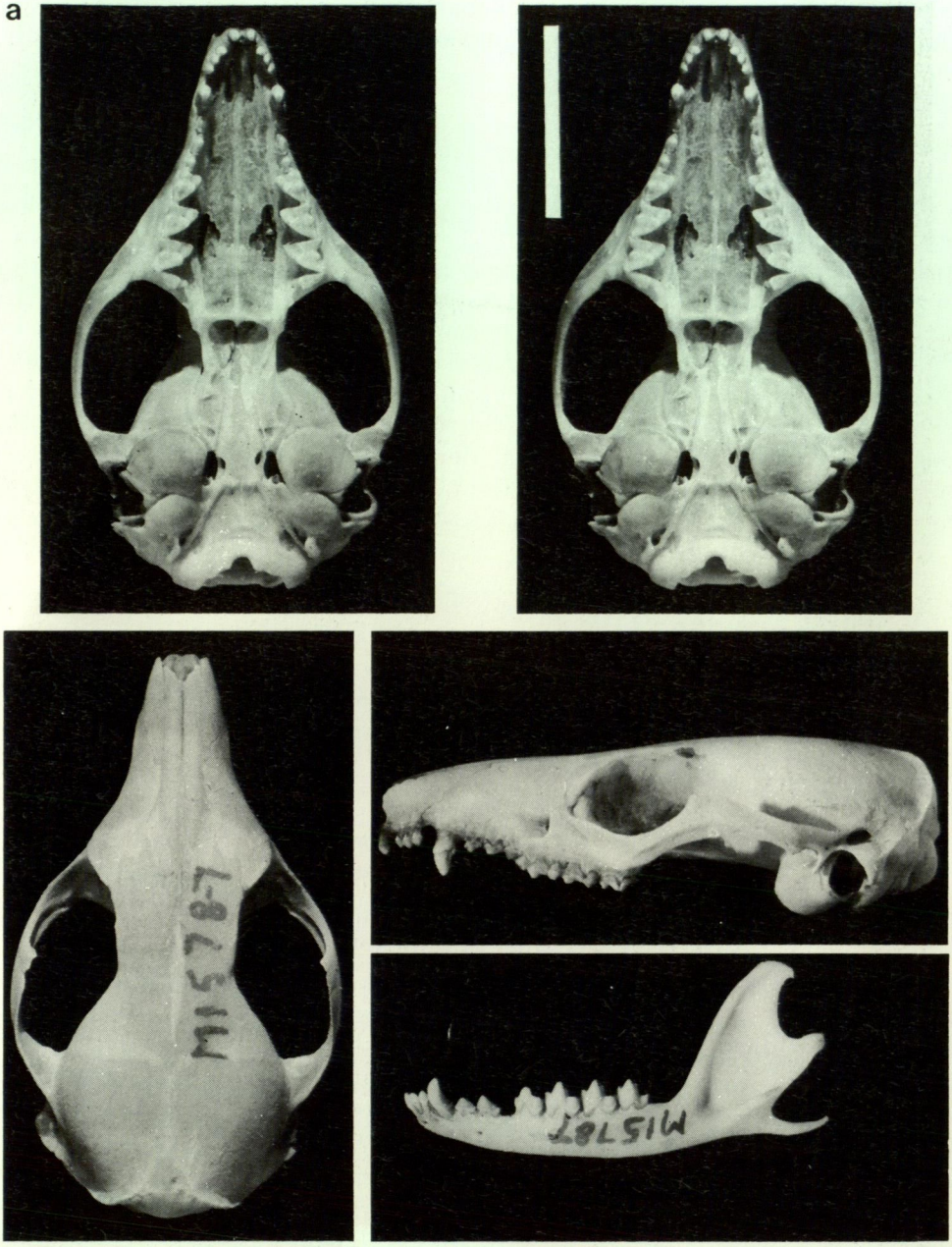
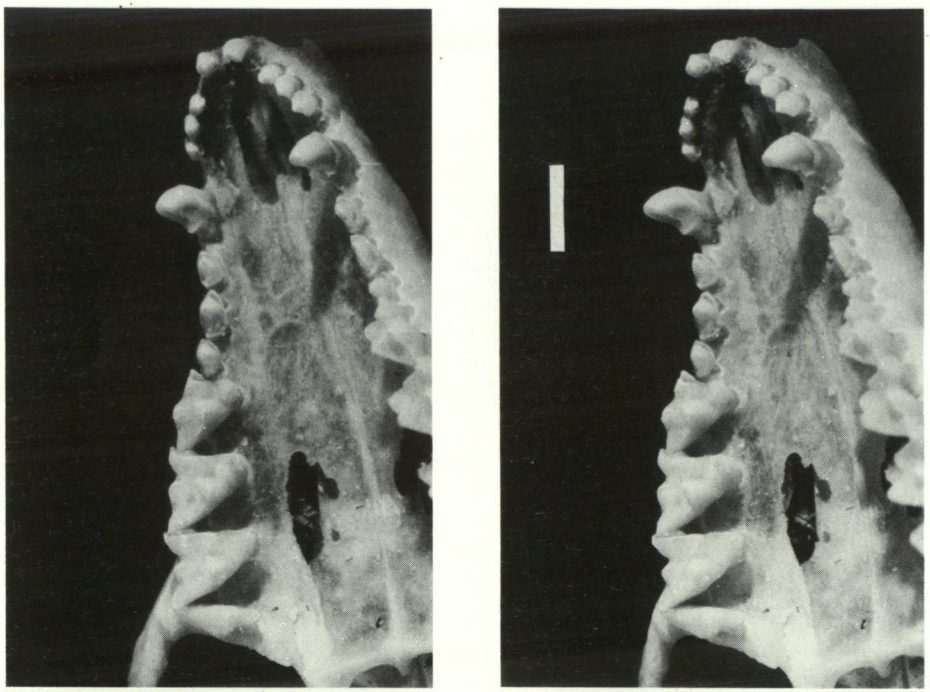


Figure 1 (a) Skull and dentary of *Pseudantechinus ningbing* holotype. Ventral aspect of skull as stereopairs. Scale line 10 mm. Oblique view of (b) upper and (c) lower RHS toothrows as stereopairs. Scale line 2 mm.

b



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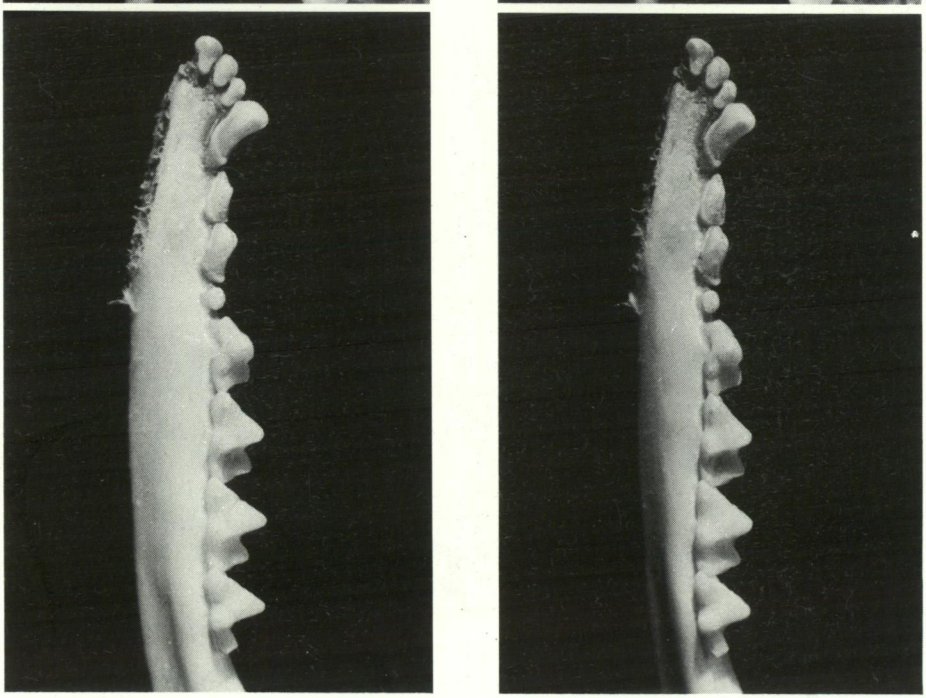

paracone very reduced, preparacrista about twice length of postparacrista; M^5 usually narrower than M^4, occasionally subequal or wider.

I_1 taller crowned than I_2 which is subequal in length to 1_3; I_1 to I_3 with low posterior cingular cuspule; I_3 also with smaller posterobuccal cuspule, such that the notch separating these posterior cuspules accommodates C_1 anterior edge; C_1 tall, twice height of P_2, slight lingual cingulum and occasional small posterior cingular cuspule; crown area P_1 and P_2 subequal; P_3 absent in all but two specimens; P_1 and P_2 have narrow encircling cingula, usually very narrow in buccal aspect above anterior root; P_2 and M_2 separated by short diastema; on M_2 protoconid much taller than metaconid, (paraconid absent or rudimentary), which is shorter than hypoconid, hypoconulid rudimentary, entoconid absent; on M_3 and M_4 protoconid much taller than metaconid which is taller than paraconid, which is taller than hypoconid, which is taller than hypoconulid; entoconid (when present) small; M_5 similar in shape to M_3 and M_4 except that talonid reduced to a rudimentary hypoconid and hypoconulid; crista obliqua contacts metacrista at base of central notch in M_5 but moves progressively closer to protoconid in M_4 to M_2; on M_2 paracristid longer than metacristid which is subequal in length to crista obliqua and hypocristid; on M_3 paracristid longer than metacristid and hypocristid, which are much longer than crista obliqua; on M_4 paracristid longer than metacristid, which is longer than hypocristid which is longer than crista obliqua; on M_5 paracristid longer than metacristid, which is much longer than crista obliqua; M_2 to M_4 have anterior and posterior cingula but no lingual or buccal cingula.

Externals

Pelage and skin colour

Described following Ridgway's (1912) colour standards from eight 'puppet' skins WAM (M7124-6, M7131-2, M15931 and M15933) FMNH 119800.

Overall fur colour dorsally Buffy Brown, ventrally Cartridge Buff. Hairs posterior to base of ear up to 6 mm, Pallid Neutral Gray at base, distal 4 mm Pinkish Cinnamon. Hairs on shoulder, back and flanks up to 9.5 mm, base of hairs Neutral Gray, distal 3.5 mm Pinkish Buff lightly tipped with Warm Sepia. Hairs on forehead, rostrum and sides of face shorter (up to 2.5 mm), base of hairs Warm Sepia, distal 1.5 mm Pinkish Buff tipped with Warm Sepia. Ears lightly furred with 1 mm long hairs, these Cinnamon Buff lightly tipped with Mikado Brown on both the inner and outer surfaces. Hairs on inner ear surface of the anterobasal helix, central antihelix and general antitragal area are thicker, longer (up to 3 mm), these Warm Sepia at base, distal 2 mm Pinkish Buff. Guard hairs on dorsum numerous up to 9.5 mm long, Warm Sepia. Hairs on ventral surface of body and throat up to 6.5 mm long, base of hairs Light Neutral Gray, distal 2.5 mm Cartridge Buff. Hair on chin, sides of mouth, manus and pes up to 2.5 mm long, these Warm Sepia at base, distal 1 mm Pale Pinkish Buff.

Tail moderately well furred. On dorsal surface of tail, hairs up to 3.5 mm long, basal 0.5 mm Warm Sepia, central 1.5 mm Pinkish Cinnamon, distal 1.5 mm

Warm Sepia; this distal region of the hairs appreciably thinner than at the base. On ventral surface, hairs up to 3 mm long, base Warm Sepia, distal 2 mm Light Pinkish Cinnamon. Hairs at tail tip up to 5 mm long, Verona Brown, extending slightly beyond tip but not forming obvious tuft. Up to 30 mystacial vibrissae, posteriorly these are up to 37 mm long, Warm Sepia at base through Cinnamon to Pale Pinkish Buff distally. On edge of lips shorter (up to 7 mm long), Pale Pinkish Buff. One or two supraorbital vibrissae up to 20 mm long and six to eight genal vibrissae up to 25 mm long, the colouration as for that of the posterior mystacial vibrissae. Five submental vibrissae, up to 5 mm long and two interramal vibrissae, up to 11 mm long, Pale Pinkish Buff. Up to six ulnar carpal vibrissae, Pale Pinkish Buff, up to 11 mm long. Two to three vibrissae between the anconeal and medial antebrachial regions of the foreleg, Cinnamon at base becoming Pale Pinkish Buff distally, up to 10 mm long.

Skin of pes and manus Pinkish Buff. Skin of ear Mikado Brown.

Pes

Terminal digital pads small, smooth; the three interdigital pads large, elongate, separate from each other; hallucal pads elongate, approximately half size of interdigital pads; metatarsal and post hallucal pads subequal in size to interdigital pads. All pads, except the terminal ones, heavily striate.

Distribution

Pseudantechinus ningbing is known only from the Kimberley region of Western Australia where it is widely distributed (Figure 2) in each of Beard's (1980) botanical districts of the region (Gardner, Fitzgerald, Dampier and Hall). These districts have from dry hot tropical to semi-arid climates with precipitation ranging from 250-800 mm.

Habitat

At Mitchell Plateau and Prince Regent River National Park *Pseudantechinus ningbing* was collected in low open eucalypt woodland with *Owenia vernicosa*, *Ficus* spp. and *Acacia* spp. common. These trees were over a sparse shrub layer above a moderately dense ground cover of spinifex hummock grass with 'sorghum' grass variously present (Kitchener *et al.* 1981, McKenzie *et al.* 1975). At other localities in the west Kimberley, locality data recorded by L. Keller show that most specimens were captured in riparian situations, usually in a low open woodland over low open shrubland over moderately dense spinifex hummock grassland on sandstone and limestone. At Ningbing, W.H. Butler collected specimens along limestone ridges and L. Keller on a sandstone outcrop with low open shrubs over a ground cover of mixed grass with shrub and tree emergents.

Reproduction

Mr W.H. Butler collected three females with tiny pouch young (2, 4 and 4) at Ningbing on 7 August 1965 and one female with pouch young (4) at Parry Creek on 31 August 1965. L. Keller collected two females with pouch young (2 and 4)

on 30 September 1976 near Brooking Springs which had crown to rump length of *ca.* 27 mm and one near Cliffs Outcrop, west Kimberley on 16 November 1976 which was lactating. These observations indicate that young are born in mid winter and are weaned by late spring.

Etymology

The 'ningbing' form has been recognised as a species in literature for some time. Ningbing, north-eastern Kimberley, is the locality from which this form was first recognised. Although the distribution of this species is much wider within the Kimberley region, the name *ningbing* is retained because of its current usage.

Remarks

Skulls of *Pseudantechinus ningbing* may be difficult to distinguish from *P. macdonnellensis* and to a lesser degree *P. bilarni.* They may be separated from these species by the use of the canonical discriminant analysis in Kitchener and Caputi (1988: Table 5, Figure 5).

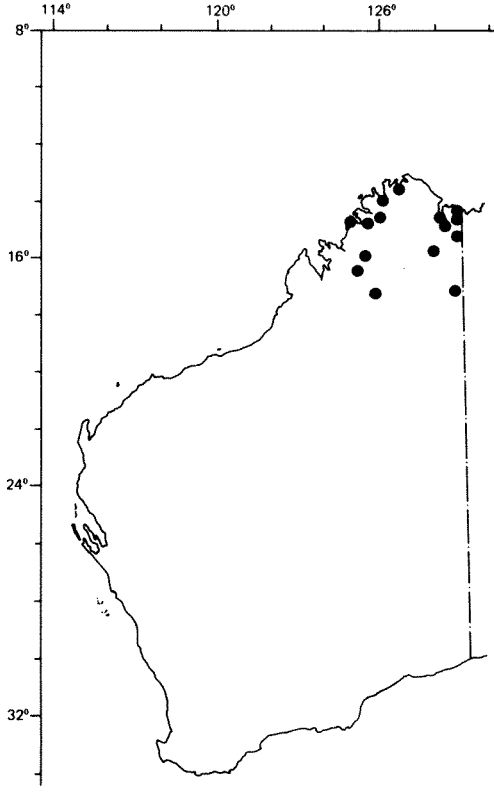

Figure 2 Distribution of *Pseudantechinus ningbing.*

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