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## A New Species of *Phalanger* (Phalangeridae: Marsupialia) from Montane Western Papua New Guinea

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**ABSTRACT.** *Phalanger matanim* n.sp. is a plesiomorphic species of *Phalanger*, thus far known from only three specimens taken in the Telefomin area at altitudes between 1,550 and 2,600 m. Retention of a well-developed preparacrista on M2/, the presence of small simple molars, and having the periotic visible on the external basicranium in *P. matanim* are plesiomorphic features not otherwise seen in combination in the genus *Phalanger*. Although convergent with the other montane *Phalanger* species (*P. vestitus*, *P. carmelitae* and *P. interpositus*) in several external morphological features, *P. matanim* does not appear to be closely related to this group. At the upper limit of its altitudinal range, *Phalanger matanim* is sympatric with *P. vestitus* and *S. leucippus*, and at the lower end with these species and also *P. interpositus* and *P. carmelitae*.

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Between 1984 and 1987 the author conducted a survey of the mammals of southern West Sepik Province, Papua New Guinea (Fig. 1). Previously, the mammal fauna of this region was very poorly sampled, and in the course of the work several undescribed species were encountered. This work is intended as the first in a series of publications dealing with the results of this survey. The first specimen of the new *Phalanger* was collected during the 1985 field season, at a locality where four additional phalangerid species (*Strigocuscus leucippus*, *Phalanger vestitus*, *P. carmelitae* and *P. interpositus*) occur sympatrically. At first, it was thought that the specimen could have been a hybrid between two of these species, but further research and the discovery of two additional specimens has shown that the material indeed represents a distinct and, until now, undescribed species of *Phalanger*.

The taxonomy of the genus *Phalanger* has, until recently, been in a state of confusion. In the past many forms have been named and then synonymised without close examination. The

taxonomy for phalangerid species followed here is that of George (in press), while Flannery *et al.* (in press) is followed for supraspecific groupings.

### Materials and Methods

Colours, where capitalised, follow Ridgeway (1886), and dental nomenclature follows Archer (1976, 1978). AM M is the prefix for Australian Museum mammal specimens, CM is the prefix for Australian National Wildlife Collection specimens, DW is the prefix for Papua New Guinea Division of Wildlife mammal specimens (which will ultimately be housed in the PNG Museum), WSP = West Sepik Province, ESP = East Sepik Province, MBP = Milne Bay Province, NP = Northern Province, CP = Central Province, WHP = Western Highlands Province. Measurements were taken using vernier calipers, and weights and measurements were taken on freshly dead specimens in the field. Appendix 1 lists the phalangerid specimens (other than *P. matanim*) examined during this study.

## SYSTEMATICS

Phalangeridae, Thomas, 1888

Phalangerinae Thomas, 1888

*Phalanger* Storr, 1780*Phalanger matanim* n.sp.

Figs 2–4, Table 1

**Holotype and type locality.** AM M14186, puppet skin with skull and dentaries, with P3–M5 erupted, of a subadult male. Collected by T. Flannery, upper Sol River Valley, Telefomin area, West Sepik Province, Papua New Guinea, 5°06'S 141°42'E, 2,600 m, 1 April 1986. Papua New Guinea topographic survey sheet 1-100,000 series, No. 7282 (Telefomin, see Fig. 1).

**Paratypes.** AM M14702, puppet skin and skull of an adult male, collected by T. Flannery, Nong River Valley, 5°11'S 141°35'E, 1,550 m, 9 July 1985, (Fig. 4). DW 8393, puppet skin and skull of adult female, collected by F. Kinbag & L. Seri, Tifalmin, 5°08'S 141°31'E, 1,600–1,800 m, 18 Aug 1984 (Fig. 4).

**Etymology.** *Matanim* is the Telefomin name for this species. This species is named in honour of the people of the Telefomin Valley, whose unceasing goodwill and assistance allowed me to complete my mammal survey of their homeland.

**Diagnosis.** *Phalanger matanim* n.sp. can be distinguished from all other species of *Phalanger* in possessing the following features: molars smaller and narrower (Figs 2–6); M2/ with well-developed preparacrista that connects with parastyle (occasionally also seen in *P. orientalis*); nasals wedged deeply into frontals in a pattern that is unique within the genus (Figs 2,4); nasals narrower relative to maximum interorbital width than in any other member of the genus (Figs 7–8).

In addition, *P. matanim* differs from its congeners in the following ways: lacking the spotted pelage, and the anterolingual cingulae of the upper molars as seen in *P. lullulae*; C1/ much shorter than that of *P. orientalis* and the sexes are similarly coloured and similar in size; dorsal stripe broader and more ill-

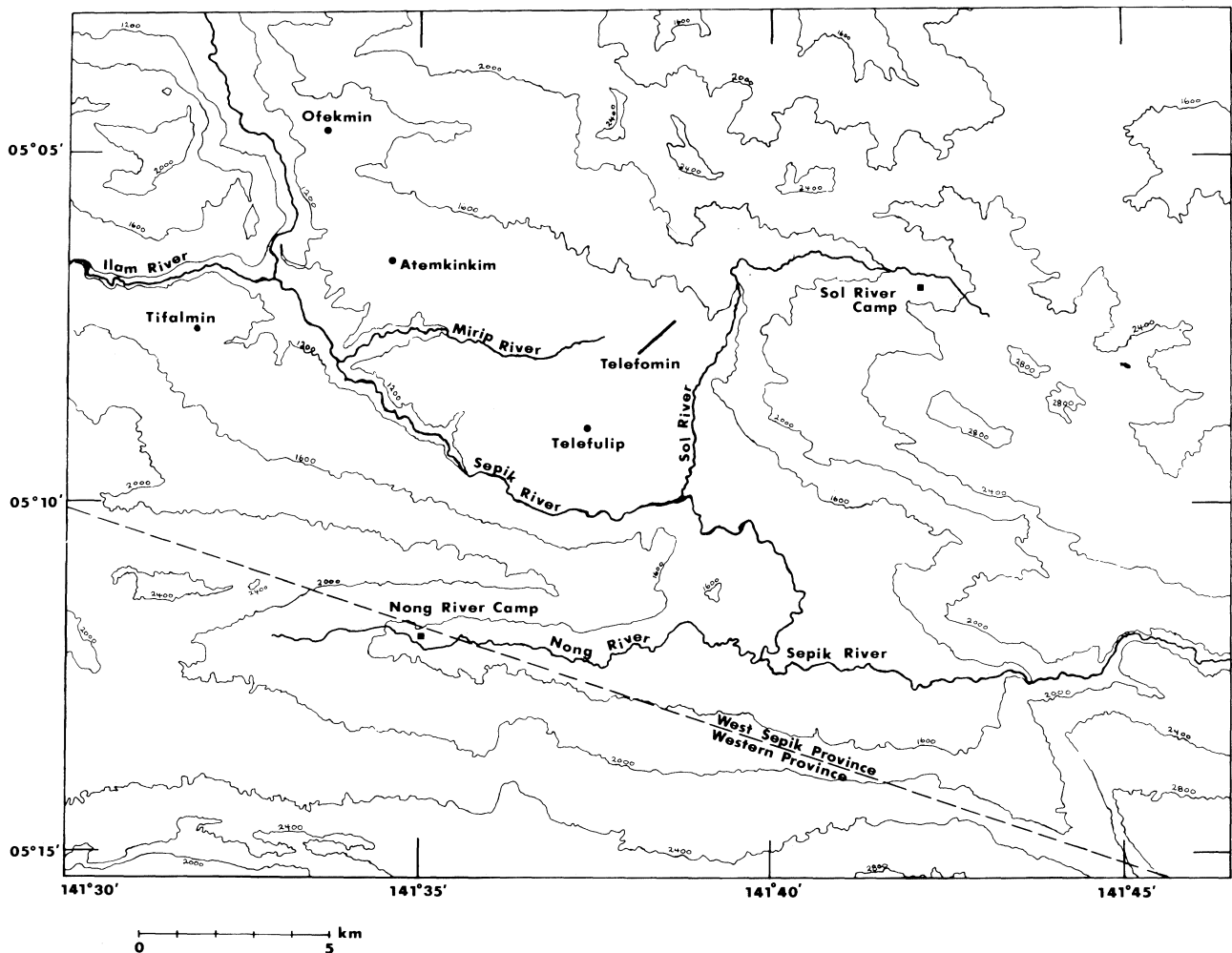


Fig. 1. Map showing the Telefomin Valley and localities where *P. matanim* has been captured.

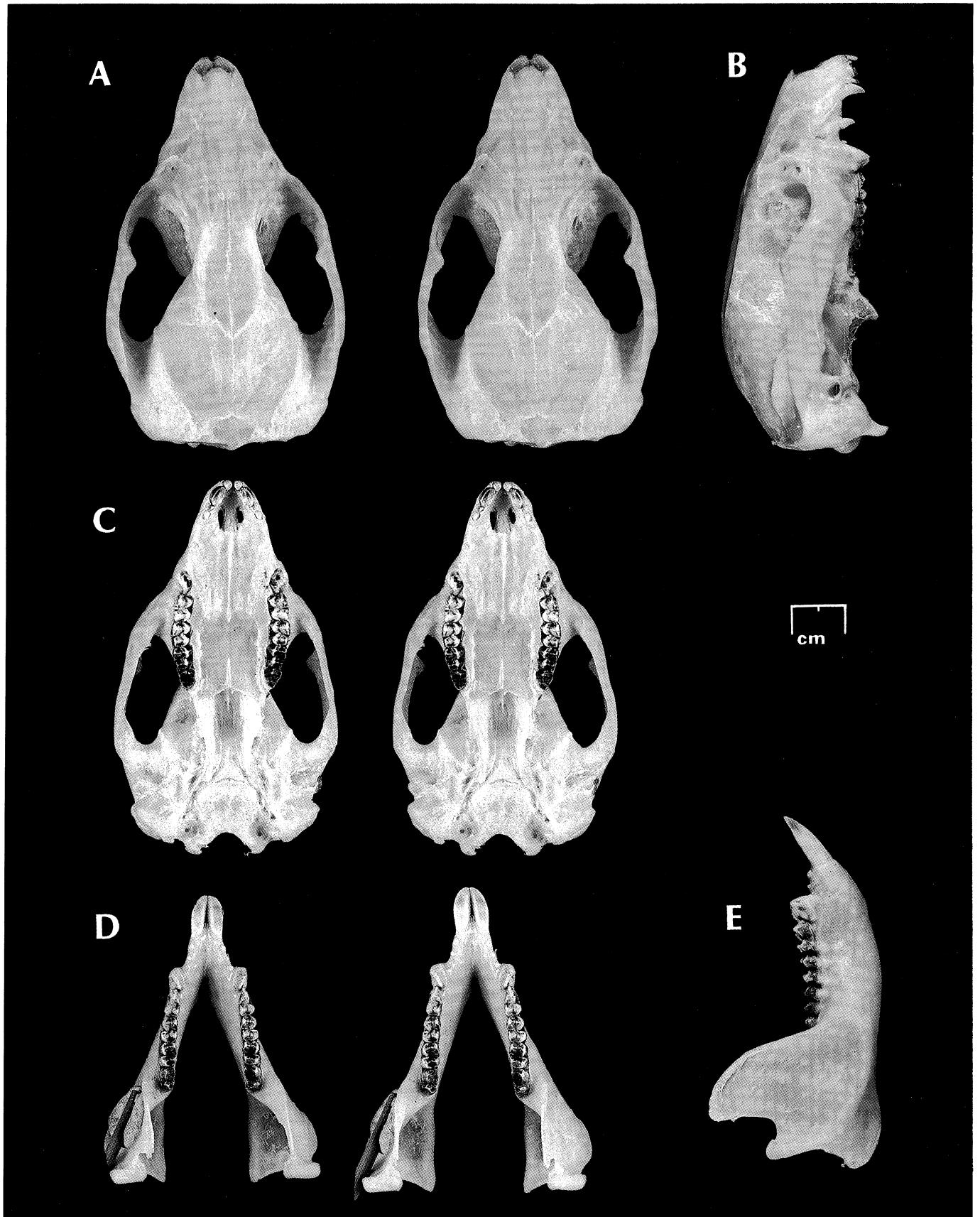


Fig. 2. Skull of the holotype of *Phalanger matanim* (AM M14186) in A, dorsal, B, ventral (both stereopairs) and C, lateral view. D, dentary of above in occlusal (stereopair) and E, lateral view.

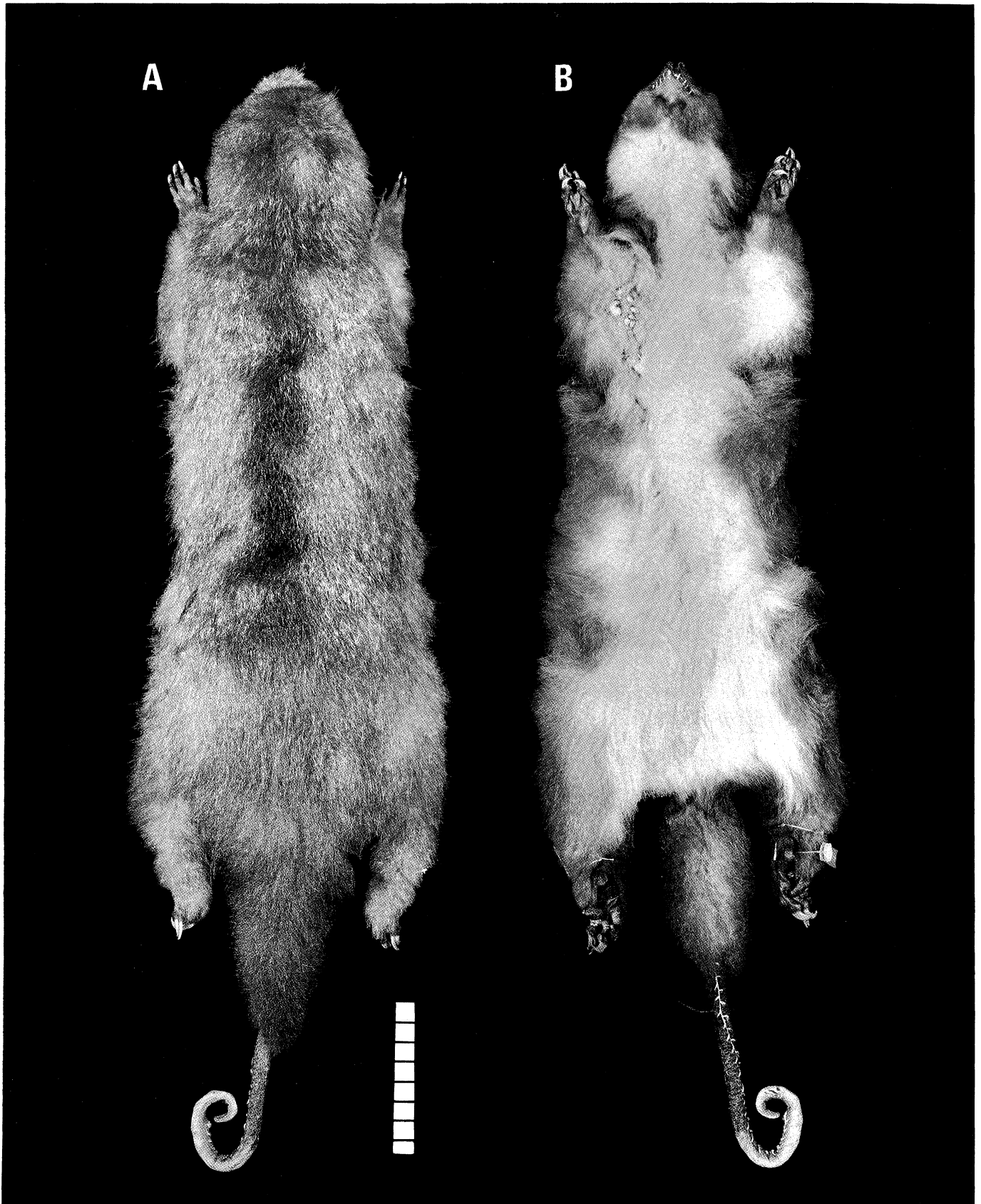


Fig. 3. Puppet skin of the holotype of *Phalanger matanim* (AM M14186) in A, dorsal and B, ventral views.

defined, and fur longer and laxer than in *P. orientalis*; ears much shorter than those of *P. interpositus* and *P. orientalis*; tail much shorter relative to head-body length than in *P. carmelitae* (see Tables 1–2); external surface of ear almost naked, especially around margin, in strong contrast to densely furred ears of *P. vestitus*, *P. carmelitae* and *P. interpositus*; greyish colouration and broad dark dorsal stripe differ markedly from black (dorsum) and white (venter) colouration seen in *P. vestitus* and *P. carmelitae*; basal part of naked portion of tail much more strongly tuberculated in male of *P. matanim* than in *P. vestitus* and *P. interpositus*.

### Description

**Skull and dentition.** Skull of holotype has P3/ and M2–5/ erupted but little worn. Thus, although the animal was not sexually mature, full adult dentition was in place.

I1/ projects below level of I2/ to approximately same extent as does C1/, and differs little in morphology from I1/ in other species of *Phalanger*. I2/ subovate in occlusal outline, and much larger than either I1/ or I3/. I3/ tiny with long axis parallel to that of I2/. C1/ short and abuts I3/; similar in morphology to that of other montane *Phalanger* species. I/1 does not differ in morphology from that of other phalangerids.

P1/ short and caniniform; single rooted but has very slight posterior expansion at its base. P2/ miniscule; situated just anterior and slightly medial to P3/. Long axis of P3/ only slightly deflected outwards relative to long axis of molar row; this orientation being closer to that of a species of *Spilocuscus* than *Phalanger*; subovate in occlusal outline; occlusal edge ornamented by three small cuspules. Anterior, buccal and lingual ridgelets extend towards crown base from anteriormost cuspule, and much shorter buccal and lingual ridgelets extend likewise from the more posteriorly positioned cuspules. Posterolingual face of P3/ planar; sharply delimited from lingual face by a ridge. Posterior portion of occlusal edge slopes towards M2/.

Three evenly spaced, tiny peg-like teeth between I/1 and P/3; anteriormost largest, middle one smallest. Orientation of P/3 as in P3/, but tooth less bulbous than P3/. Three small cuspules ornament occlusal crest, anteriormost tallest with buccal, anterior and lingual ridgelets extending towards crown base from this cuspule. Occlusal crest of tooth slopes gently towards crown base posteriorly.

M2/ a simple, narrow tooth, with very few crenulations. Parastyle of moderate size, connecting to well-developed preparacrista, such as seen in ailuropines and trichosurins. Protoloph divided by

a fissure placed just lingual to protocone. Several ridgelets and cuspules visible between this structure and paracone. Midlink interrupted at its lowest point by a fissure. It is a simple structure, arising from protocone and hypocone apices, the two sections almost meeting in the interloph valley slightly buccal of these conids. Slight kink, suggestive of presence of reduced stylar cusp, in posterior end of postparacrista, and larger stylar cusp immediately posterior to this, blocking buccal end of interloph valley. Slight bulge in premetacrista suggests presence of a third stylar cusp. Hypoloph better developed than protoloph, and is uninterrupted by fissures. Posterior cingulum U-shaped, composed of well-developed posthypocrista and weaker postmetacrista. No evidence of stylar cusp posterior to metacone, a structure usually present in *Phalanger* species. Loph subequal in width.

M3/ differs from M2/ in the following ways: parastyle and all suggestions of stylar cusps absent; preparacrista forms much broader arc, enclosing U-shaped basin similar in morphology to that enclosed by posterior cingulum; protoloph slightly wider than hypoloph.

M4/ differs from M3/ in the following ways: smaller, hypoloph relatively narrower, and basin enclosed by posterior cingulum deeper.

M5/ differs from M4/ in the following ways: no hypoloph, and protoloph poorly developed; small cingulum present at base of posterolingual corner of tooth; M5/ much smaller than M4/; posterior moiety relatively narrower.

M/2 of *P. matanim* a narrow, elongate tooth. Trigonid in particular extremely narrow. Paracristid straight and elongate. Slight change in slope in its anterior section suggests the presence of a paraconid. Poorly developed and lower metaconid lingual to tall protoconid. No sign of protostylid, although slight groove on rear face of trigonid present where the protostylid is separated from the protoconid in other phalangerid species. Cristid obliqua poorly developed with only slight suggestion of a kink anterior to hypoconid. Posterior cingulum encloses a U-shaped basin.

M/3 differs from M/2 in protolophid well developed and similar in shape to the hypolophid; the following ways: no paraconid. Protolophid interrupted in its middle by a fissure. Kink in cristid obliqua much better developed.

M/4 very similar in morphology and size to M/3.

M/4 smaller and has hypolophid and protolophid less well developed than M/5.

Skull of the holotype is of a young animal and most sutures are readily visible. Anterior palatal foramina small, extending from just anterior of I3/ to just posterior to C1/. Posterior palatal foramina large in contrast, extending from level with posterior of M2/ to posterior of M5/. Nasals narrow; no nasal lachrymal contact. Posteriorly, nasals

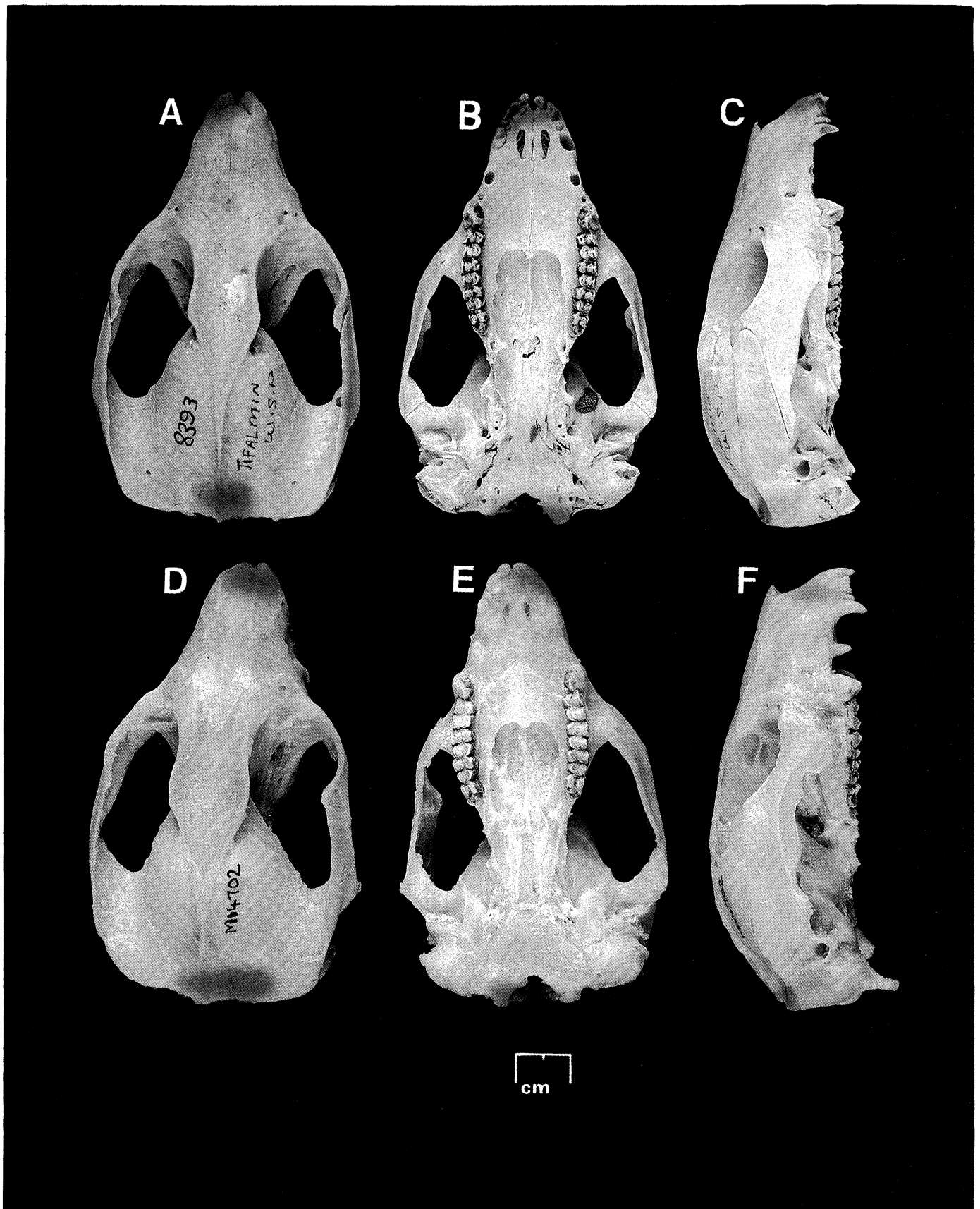


Fig. 4. Skulls of paratypes of *P. matanim*. A, AM M14702 in dorsal view, B, in occlusal view and C, in lateral view. D, DW8393 in occlusal view, E, in dorsal view, and F, in lateral view.

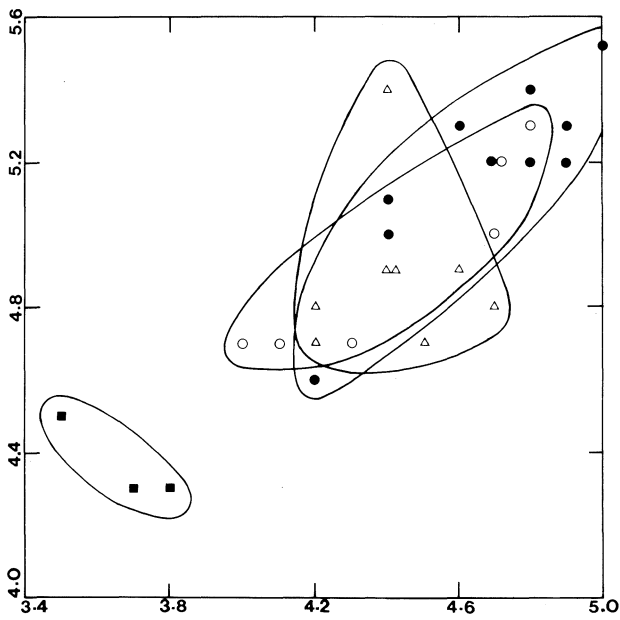


Fig. 5. Bivariate plot of M4/length (vertical axis) against M4/width (horizontal axis) in mm for *Phalanger matanim* (square) *P. vestitus* (filled circle) *P. carmelitae* (open circle) and *P. interpositus* (triangle).

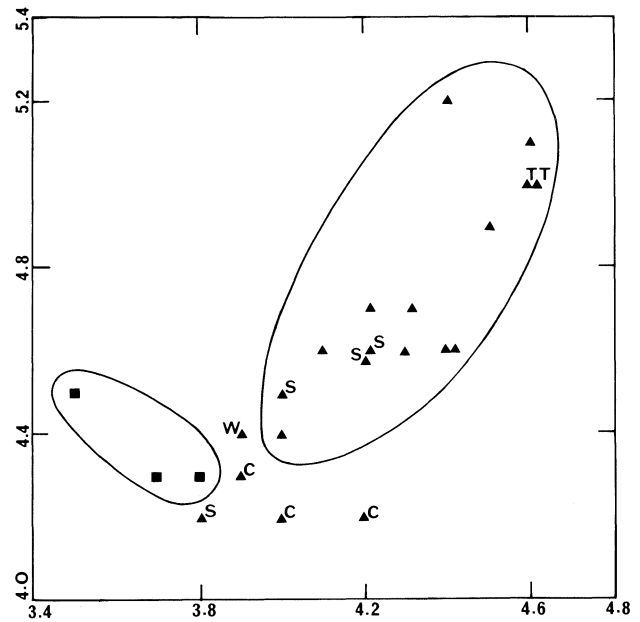


Fig. 6. Bivariate plot of M4/length (vertical axis) against M4/width (horizontal axis) for *P. matanim* (square) and *P. orientalis* (triangle). Unlabelled triangles (within ellipse) are specimens from West Sepik Province, c = specimens from Cape York, s = specimens from Solomon Islands, t = specimens from Timor, w = specimens from Wokeo Island (Schouten Group).

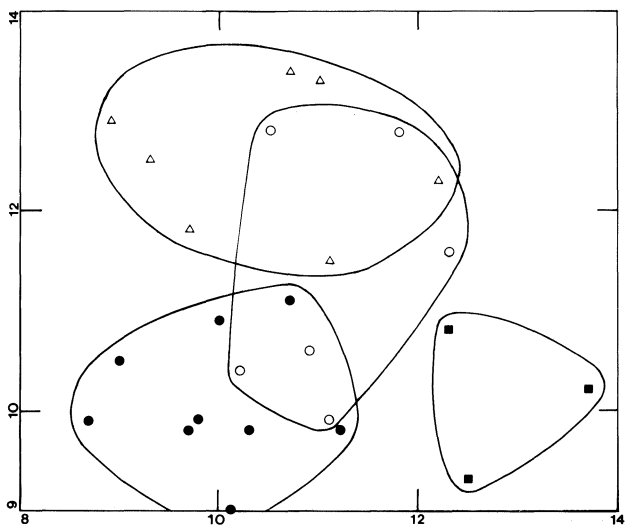


Fig. 7. Bivariate plot of maximum interorbital width opposite the high point of the jugal (vertical axis) against maximum nasal width for *P. matanim*, (squares) *P. vestitus*, (filled circle) *P. carmelitae* (open circle) and *P. interpositus* (triangle).

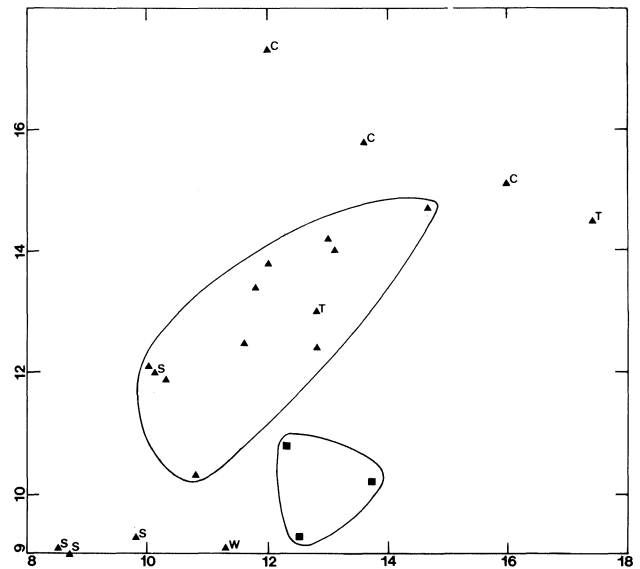


Fig. 8. Bivariate plot of maximum interorbital width opposite the high point of the jugal (vertical axis) against maximum nasal width for *P. matanim* and *P. orientalis* (letters and symbols as in Fig. 6).



wedge deeply into frontals; no noticeable immediate narrowing of nasals where they contact frontals in adults, although some narrowing evident in subadult holotype. In interorbital region, frontals wide (Figs 7–8), reaching their widest point just medial to highest point on jugal. Lachrymal extends well onto face. Maxillary contribution to orbit is low. Ectotympanic contributes to rear face of glenoid fossa along its ventral edge. Mastoid contribution to rear face of cranium restricted to ventrolateral corners of this surface. Alisphenoid roofs the bulla. Sagittal crest not developed. Suprazygomatic foramen large. Paroccipital processes of moderate length. Dentary as in other phalangerids, but small and relatively delicate.

A number of features present on paratype skulls are not apparent on holotype. Skulls of paratypes are from much older animals (both sexually mature) than holotype. The teeth are worn and so do not contribute any additional information. In both specimens, the nasals wedge far more deeply and evenly into the frontals than in the holotype. A low sagittal crest also developed. Both of these features are probably a function of age. Ectotympanic-squamosal suture on postglenoid process difficult to see on paratypes, but it seems that in these specimens the ectotympanic makes up only the ventral-most lip of this structure, whereas it is more extensive dorsally in the holotype. The morphology of this feature could also be a function of age (see Flannery *et al.* in press).

**External morphology.** The overall colour pattern in all three specimens of *Phalanger matanim* is as follows: various shades of grey on the dorsal surface with black- and silver-tipped guard hairs, a broad and dark dorsal stripe (extending from anterior to and between the eyes anteriorly to a level on the dorsal surface equivalent to the cloaca posteriorly), and a pure white venter. Overall the fur is dense and luxurious, being more similar in texture to that of *Phalanger vestitus* than *P. orientalis*. In the adult male the underfur of the dorsal surface is Smoke Grey, while in the female and subadult male the colour is Drab Grey. The black- and silver-tipped guard hairs give a grizzled appearance to the coat. Black-tipped guard hairs are less frequent on the adult male than in the other specimens. The white fur on the ventral surface extends to within 2–3 cm of the lower lip anteriorly and to within 1 cm of the cloaca posteriorly on all specimens. The white fur extends onto the base of the limbs, but not onto the elbow as is common in *P. interpositus*. The scrotum is white in the males, and in the female the pouch is surrounded by Russet hairs. One nipple is enlarged in the pouch of the female. The fur at the tip of the hairy tail is Seal Brown in the female, the same colour as the dorsal coat in the adult male, while the entire tail is Black in the subadult male. There is no suggestion of a white

ear flash on any specimen. The rim of the short ear is very thinly furred. The feet are well furred except on the hallux and distal phalanges, and the hands lack fur on the phalanges. Overall the feet and hands are slightly lighter in colour than the dorsal surface, and in the adult male in life the limbs had a yellowish tinge. This is not obvious on the study skin. The naked skin of the tail in the two males is heavily tuberculated in its ventroproximal portion. In the female the tubercles are barely raised. The distal one half to two thirds of the naked part of the tail is white. All vibrissae are black, and a slight dark eye ring is visible on the subadult male and female.

Overall, the adult male is the lightest specimen, the female a little darker and the subadult darkest. *Phalanger matanim* may therefore lighten with age. The slight constriction of the white underfur visible on the holotype is the result of taxidermy.

## Discussion

**Systematics.** Initially it appeared possible that *P. matanim* may have been related to the poorly-known type specimens of either *P. vestitus* or *P. interpositus*. Mr James Menzies kindly made measurements of these types available to me and it was at once apparent that *P. matanim* differs greatly from them. In M2–5/ length and P3/ width *P. matanim* is much smaller than any of the type series of *P. interpositus* and is clearly distinct from them. (*P. matanim*: M2–5/L;  $\bar{x}$ =18.6, R=18.1–19.0, N=3; P3/W;  $\bar{x}$ =3.7, R=3.6–3.8, N=3. *P. interpositus* type series M2–5/L;  $\bar{x}$ =20.6, R=20.2–20.7, N=4; P3/W;  $\bar{x}$ =4.2, R=4.0–4.3, N=4). The type of *P. vestitus* is a juvenile but M2–3/ length (the only measurement available) is 10.8, larger than it is for *P. matanim* ( $\bar{x}$ =10.0, R=9.8–10.2, N=3).

The precise relationships of *Phalanger matanim* are as yet uncertain and their determination depends to some extent on a comprehensive revision of the interrelationships of all phalangerins. At higher levels, though, some precise statements concerning relationships can be made. *Phalanger matanim* is certainly a phalangerine, as it possesses all 10 synapomorphies listed for the subfamily in Flannery *et al.* (in press), including restriction of the mastoid to the ventral edge of the rear face of the cranium, and presence of an orbital wing of the maxilla. It is also certain that *P. matanim* is not a trichosurin, as it lacks all of the synapomorphies of that tribe (Flannery *et al.*, in press). These data suggest a relationship with the Phalangerini, but *P. matanim* possesses few of the synapomorphies for this group. Of the five phalangerin synapomorphies listed in Flannery *et al.* in press, only one (loss of C1/–I3/ diastema) is present in *P. matanim*. The others (enlargement of the orbital wing of the maxilla, possession of complexly crenulate molars, obscuring of the periotic by alisphenoid/basoccipital fusion, and

reduction of the strength of the M2/ preparacrista) are not seen in this species. However, a further feature, considered a synapomorphy for the genus *Phalanger* (extreme I3/ reduction) is present in *P. matanim*. Clearly a revision of phalangerin relationships is desirable, but such a study is beyond the scope of the present work.

Within the Phalangerini, *Phalanger matanim* shares features with both species of *Spilocuscus* and *Phalanger*. The shape of the nasal-frontal suture in *P. matanim* and *Spilocuscus* species is remarkably similar, and is not seen elsewhere within *Phalanger*. The presence of a dorsal stripe, and extremely reduced I3/, however are features seen in *Phalanger* species but not *Spilocuscus*. The pupil shape in both of these genera is distinctive, so it is particularly unfortunate that the pupil shape in *P. matanim* is not known. At present *P. matanim* is placed in the genus *Phalanger*, as much because of overall similarity as because of the few synapomorphies that suggest this. This is because the cladistic evidence is equivocal. If the species is thus correctly placed, there has been much more convergence during phalangerid evolution than has been previously recognised. This would include the independent acquisition of the four phalangerin synapomorphies not seen in *P. matanim* in the species of *Spilocuscus* and remaining *Phalanger*. Alternatively, reversion to the plesiomorphic state could have occurred in these four features in *P. matanim*, although this seems unlikely. A third possibility, however, exists. *Phalanger matanim* could be a survivor of a lineage that split from the phalangerin line before *Spilocuscus* and *Phalanger* differentiated. This would require convergence in only one feature (extreme reduction in I3/) between the other species of *Phalanger* and *P. matanim*). However, if this is correct, a new genus would need to be erected for *matanim*, a move that I feel is unjustified given the present uncertainty regarding phalangerid interrelationships.

It is clear that *Phalanger matanim* is convergent on the montane *Phalanger* species *P. vestitus*, *P. carmelitae* and *P. interpositus* in a number of features. Like these species, it has luxuriant silky fur, and like *P. vestitus* and *P. carmelitae*, has very short ears. The ears are markedly unlike those of these three species, however, in being very thinly furred, almost naked at the rim, as in *P. orientalis* and *S. leucippus*. In the three other montane species the external surface of the ears is densely furred.

Although *P. matanim* superficially resembles *P. orientalis*, many features argue against a close relationship between these forms. These include the broad and ill defined dorsal stripe, a small C1/, lack of sexual dichromatism and sexual size differences in *P. matanim*, and differences in fur texture and ear length. The consistently well-developed preparacrista on M2/ is a further distinguishing feature as it is seen only very

occasionally in *P. orientalis*. Indeed, most of the similarities shared between *P. matanim* and *P. orientalis* seem to be symplesiomorphies, e.g. small molars.

**Zoogeography.** Extensive collections of phalangerids have now been made throughout most parts of Papua New Guinea, and as far as is known, no further examples of *Phalanger matanim* have been found. These data seem to suggest a real absence of this distinctive species from the eastern half of the island of New Guinea. In contrast, the western half of the island of New Guinea has been poorly sampled for phalangers, and it would not be surprising to find that the range of *P. matanim* extends westwards from the Telefomin area into Irian Jaya.

The occurrence of a small-toothed species of *Phalanger* at altitudes in excess of 2,500 m is surprising. The only other phalangerids that occur at such altitudes in the Telefomin area are *P. vestitus* and *S. leucippus*. The latter, however, is rare. This statement of altitudinal distribution probably holds for most of the island of New Guinea (see Zeigler, 1982). At the lower end of its altitudinal range *P. matanim* is sympatric with *P. vestitus*, *P. carmelitae*, *P. interpositus* and *S. leucippus*, at least at the Nong River collecting station, south of Telefomin (Fig. 1). Indeed, specimens of all five of these species were taken within a few days at the Nong River camp at 1,500–1,600 m. Slightly below this altitude (1,400–1,500 m) is the uppermost limit of the sixth phalangerid species to inhabit the Telefomin Valley, *Phalanger orientalis*.

**Biology.** Little has been learned of the diet, habits and reproduction of *Phalanger matanim*. This species is, however, probably the rarest of the *Phalanger* species to occur in the Telefomin area, as extensive collecting there has resulted in the capture of only three specimens; while many individuals of most other species have been taken. The Telefomin name for *P. matanim*, *Matanim*, is shared with a second biological species, *P. carmelitae*. However, when questioned further most Telefomin respond that there are two kinds of *Matanim*, *Tim Matanim* (a black one identified here as *P. carmelitae*) and the 'true *Matanim*', that is identified here as *P. matanim*. Both species are frequently characterised as having abundant subcutaneous fat.

All that is known of reproduction in *P. matanim* is that a subadult male was collected in March 1986, and a female with one enlarged teat was taken in August 1984.

The holotype of *P. matanim* was reported by the hunter who caught it to have been sleeping in a lair among rocks. Indeed, Telefomin in general believe that *Matanim* are most abundant in rocky areas, and that their lairs are more often found among rocks than in tree hollows.

**Summary**

1) *Phalanger matanim* n.sp. is a rare and plesiomorphic species of *Phalanger*, at present known only from altitudes of 1,550–2,600 m in the Telefomin area of West Sepik Province.

2) This species may be the sister taxon of previously recognised species of *Phalanger* (*sensu* Flannery *et al.*, in press) or may be derived from an even earlier split during phalangerin evolution.

3) There is some evidence that *P. matanim* nests most often in rocky areas, and at the lower end of its altitudinal range is sympatric with *P. vestitus*, *P. carmelitae*, *P. interpositus* and *S. leucippus*.

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NO.	SEX	HB	TV	HB/TV	FW	HF	E	WT	CBL	BZW	MIBW	NL
AM M14186 (Holotype)	♂	344	275	1.25	42.2	40.1	20.0	1,100g	70.6	43.0	12.5	24.5
AM M14702	♂	438	300	1.46	57.5	45.3	21.0	2,000g	77.6	47.4	13.7	29.8
DW8393	♀	410	315	1.30	59.2	41.0	20.6	—	77.3	47.4	12.3	27.3

NO.	SEX	NW	M2-2W	C1-1W	MW	CTL	ML	P3L	P3W	M2L	M2W	M4L	M4W	M5L	M5W
AM M14186	♂	9.3	21.6	12.8	35.9	22.7	18.1	4.8	3.6	5.0	3.7	4.5	3.5	4.1	3.3
AM M14702	♂	10.2	23.5	13.6	40.5	23.3	23.3	5.1	3.6	5.1	3.8	4.3	3.8	4.4	4.3
DW 8393	♀	10.8	24.1	15.2	41.2	23.6	23.6	4.7	3.8	5.2	3.8	4.3	3.7	4.5	3.3

**Table 1.** Measurements in millimetres and grams for all known specimens of *Phalanger matanim*. **HB** = length of head and body, **TV** = tail length, **HB/TV** = head body–tail vent ratio, **FW** = length of dorsal fur wedge into naked tail, **HF** = hindfoot length (s.u.), **E** = ear length, **WT** = weight, **CBL** = condylobasal length, **BZW** = bizygomatic width, **MIBW** = maximum interorbital width opposite high point of jugal, **NL** = nasal length, **M2-2W** = M2-/M2/ external width, **C1-1W** = C1-/C1/ external width, **MW** = Bi-mastoid width, **CTL** = P3-/M5/ length, **ML** = M2-/M5/ length, **P3L** = P3/ length, **P3W** = P3/ width, **M2L** = M2/ length, **M2W** = M2/ width, **M4L** = M4/ length, **M4W** = M4/ width, **M5L** = M5/ length, **M5W** = M5/ width.

	CBL	BZW	MIBW	CTL	ML	M <sup>2</sup> L	M <sup>2</sup> W	M4L	M4W
<i>P. carmelitae</i>									
STD	3.642	1.766	.747	.961	.768	.242	.313	.273	.344
$\bar{x}$	76.3	47.6	11.2	24.4	20.4	5.4	4.4	4.9	4.4
R	71.4-80.9	45.7-50.5	10.4-12.3	23.1-25.7	19.7-21.3	5.2-5.8	4.1-4.7	4.7-5.3	4.0-4.8
N	6	6	6	6	6	6	6	6	6
<i>P. interpositus</i>									
STD	2.883	1.679	1.164	.589	.652	.238	.177	.713	.535
$\bar{x}$	78.6	47.7	10.4	24.4	20.2	5.4	4.5	4.7	4.3
R	72.2-80.6	44.8-49.3	8.9-12.2	23.5-25.2	19.3-21.2	5.0-5.7	4.3-4.7	4.7-5.4	4.2-4.7
N	7	7	7	7	7	8	8	8	8
<i>P. vestitus</i>									
STD	3.534	1.966	1.704	.829	.727	.2875	.888	.253	.268
$\bar{x}$	81.8	50.9	9.2	25.2	21.4	5.7	4.3	5.2	4.7
R	76.2-86.2	48.5-54.8	8.7-10.9	24.0-26.5	20.2-22.2	5.3-6.2	4.0-5.0	4.6-5.5	4.2-5.0
N	10	10	9	10	10	10	10	10	10
<i>P. orientalis</i>									
STD	7.743	3.815	2.766	1.070	.809	.2273	1.044	.299	.247
$\bar{x}$	80.9	53.8	12.3	23.3	19.0	5.1	4.6	4.6	4.2
R	64.2-95.4	48.5-60.7	8.5-17.3	21.2-24.8	17.4-20.3	4.6-5.3	3.7-4.5	4.2-5.2	3.8-4.6
N	19	11	20	9	9	10	10	20	20

**Table 2.** Measurements for five species of Phalangeridae with abbreviations as in Table 1 except for  $\bar{x}$  = mean, **Std** = standard deviation, **R** = range, **N** = number.

R. Attenborough, on which I was an associate investigator. This work was completed at the Australian Museum, Sydney.

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#### APPENDIX

List of specimens used for comparative purposes in this study.

- Phalanger carmelitae*. DW8397, AM M14699, AM M13516, Telefomin area WSP; AM M12862, Mt Albert Edward, CP; AM M9519 Hagen Ra. M9518, Jimi Va., both WHP.
- Phalanger vestitus*. AM M12909, AM M12868-9, AM M12855-7, AM M12863, Mt Albert Edward, CP; AM M14696, AM M13630, AM M15329, Telefomin, WSP.
- Phalanger interpositus*. AM M13517, AM M14699, AM M13479, AM M14703, AM M14701, AM M14700, Telefomin, WSP; CM12234, Opanabu, CM 12355 Agaun, both MBP.
- Phalanger orientalis*. AM M14694, AM M14697, AM M15325-8, Torricelli Mts, WSP; AM M13473, AM M13647, AM M13668, Yapsiei Area, WSP; CM 787-8, Cape York; AM M9099, Wokeo Id, ESP; AM M4288, Mt Lamington, NP; AM M10857-8 Timor; AM M5588, AM M5753, AM M5578, AM M3680, Solomon Islands.

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