

# AUSTRALIAN MUSEUM SCIENTIFIC PUBLICATIONS

Flannery, Tim F.; Seri, Lester, 1990. *Dendrolagus scottae* n.sp. (Marsupialia: Macropodidae): a new tree-kangaroo from Papua New Guinea. *Records of the Australian Museum* 42(3): 237–245. [16 November 1990].

doi:10.3853/j.0067-1975.42.1990.117

ISSN 0067-1975

Published by the Australian Museum, Sydney

nature culture **discover**

Australian Museum science is freely accessible online at  
[www.australianmuseum.net.au/publications/](http://www.australianmuseum.net.au/publications/)  
6 College Street, Sydney NSW 2010, Australia



## ***Dendrolagus scottae* n.sp. (Marsupialia: Macropodidae): a New Tree-kangaroo from Papua New Guinea**

TIM F. FLANNERY<sup>1</sup> & LESTER SERI<sup>2</sup>

<sup>1</sup>Australian Museum,  
PO Box A285, Sydney South, NSW 2000, Australia

<sup>2</sup>Division of Wildlife,  
PO Box 6601, Boroko, Papua New Guinea

ABSTRACT. *Dendrolagus scottae* n.sp. inhabits mossy forest above 1,200 m on the North Coast Range, Papua New Guinea. Its total known habitat area is estimated at about 25-40 km<sup>2</sup>. The species is gravely endangered, and its plight is symptomatic of that of many large mammals in Melanesia. *Dendrolagus scottae* differs from all other tree-kangaroos in its uniform blackish colouration, narrow but long dentary, shallow face, and wide P/3 with a large posterobuccal cusp. The combination of large cheekteeth but small masticatory muscles suggest that *D. scottae* n.sp. has a different feeding strategy to other tree-kangaroos. *Dendrolagus scottae* n.sp. and *D. dorianus* possess a number of features which are unique among near relatives. These include the presence of a greatly reduced superior lachrymal foramen, large cheekteeth, uniformly dark dorsal and ventral colouration, and a very short tail. These derived features indicate that these two species are each other's closest relatives.

FLANNERY, T.F. & L. SERI, 1990. *Dendrolagus scottae* n.sp. (Marsupialia: Macropodidae): a new tree-kangaroo from Papua New Guinea. Records of the Australian Museum 42(3): 237–245.

The tree-kangaroos (genus *Dendrolagus*) are the only arboreal members of the marsupial family Macropodidae, which also includes the more familiar terrestrial kangaroos and wallabies. Tree-kangaroos are restricted to the rainforests of both north-eastern Australia (two species) and New Guinea (seven species). The two Australian species and the New Guinean *Dendrolagus inustus* form a plesiomorphic group (Groves, 1982; Flannery & Szalay, 1982). *Dendrolagus inustus* is the only species previously reported from the North Coast Range. A group of specialised, highly arboreally-adapted species inhabits the New Guinean Central Cordillera and

some outlying ranges (Groves, 1982) (Fig.1). *Dendrolagus dorianus* is the most apomorphic member of this group. It is largely restricted to high-altitude mossy forests along the Central Cordillera, but one subspecies inhabits the Wondiwoi Peninsula of Irian Jaya. *Dendrolagus dorianus*, the largest previously-known species, is almost bear-like in its proportions, with fore- and hindlimbs subequal in length, a domed forehead and a very short tail. In addition to the living species, a very large extinct species (*Dendrolagus noibano*) is known from Pleistocene fossil remains from Chimbu Province Papua New Guinea (Flannery, Mountain & Aplin, 1983). It is dentally and

proportionally very similar to *D. dorianus* and *D. goodfellowi*, and differs from *D. scottae* n.sp. in its robust dentary and relatively narrow P/3.

AMM = Australian Museum mammal specimen; CM = National Wildlife Collection Mammal specimen. All measurements in millimetres and weights are in grams. The Appendix contains the Table referred to in this paper.

**Materials and Methods**

Specimens of *Dendrolagus scottae* n.sp. were compared with the tree-kangaroo specimens held in the Australian and Macleay Museums, Sydney; and the Australian National Wildlife Collection, Canberra. All known species of *Dendrolagus*, as well as the holotypes or lectotypes of *D. dorianus*, *D. spadix* and *D. deltae* are held in these collections. In addition, one of the paralectotypes of *D. ursinus* was borrowed from the Rijksmuseum van Natuurlijke Historie, Leyden, and the holotype of *D. d. mayri* was examined during a visit to the British Museum of Natural History. Examination of the excellent colour plates, skull photographs and descriptions of Rothschild & Dollman (1936) provided data for the types that could not be examined personally. Colours were capitalised follow Smythe (1974). Museum acronyms are:

**Systematics**

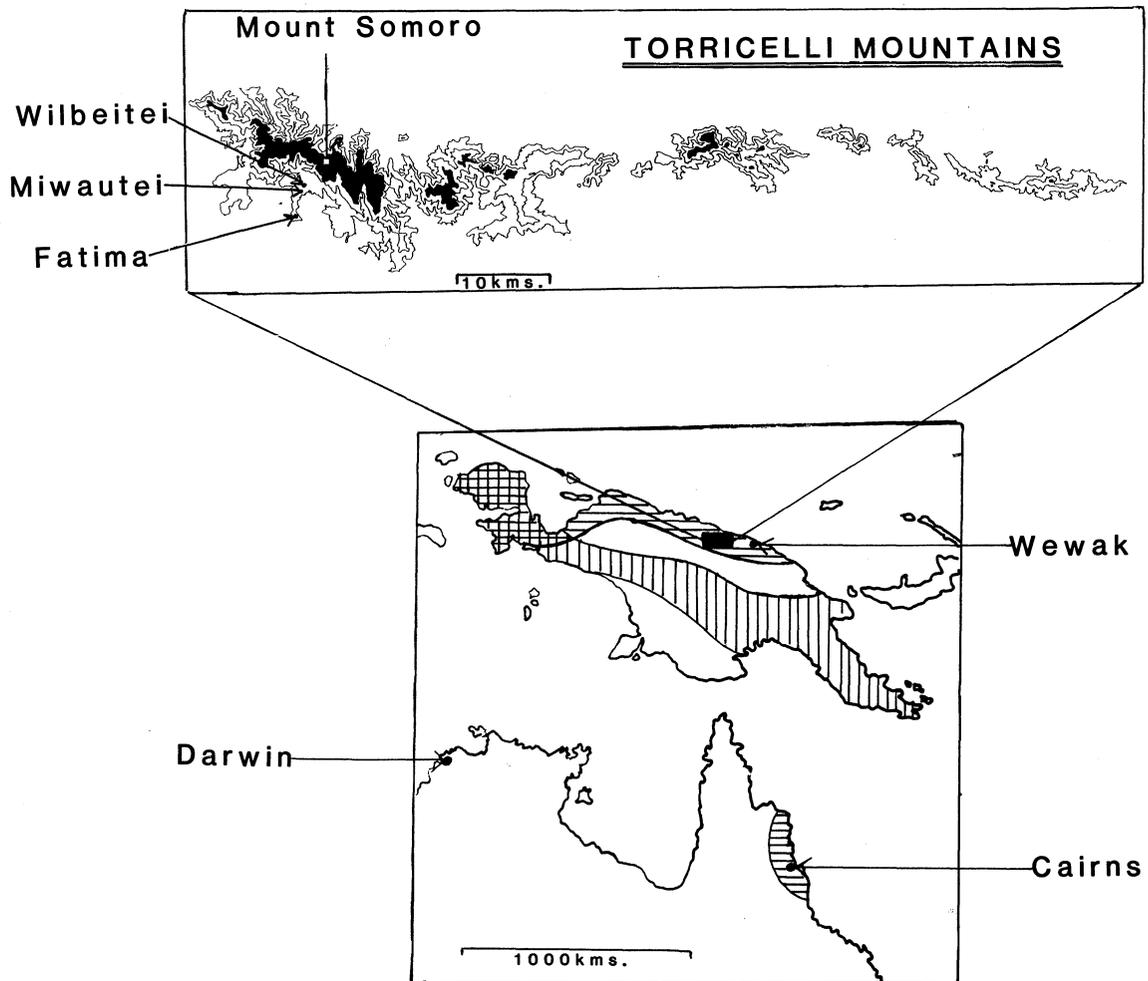
**Macropodidae** Gray, 1821

*Dendrolagus* Müller, 1840

*Dendrolagus scottae* n.sp.

Figs 2–4, Table 1

**Type material.** HOLOTYPE: AMM19481, study skin and skull of a juvenile collected 11 June 1988 at about 1,400 m on Sweipini (3°23'S 142°06'E), a ridge just to the west of the Mount Somoro summit, Torricelli Mountains, West Sepik Province, Papua New Guinea. PARATYPES: AMM19491, adult partial skull and dentaries kept as



**Fig.1.** Map of northern Australia and New Guinea, showing the distribution of tree-kangaroos. Horizontal bars = plesiomorphic species group; vertical bars = derived species group (see text for explanation). Inset: The Torricelli Mountains (showing 800 m and 1,000 m contours), with shaded area being land above 1,200 m, and localities mentioned in the text.

trophies by Olo hunters, and purchased on 21 July 1985 at Wigote Village (3°27'S 142°10'E), Torricelli Mountains. They are taken to represent a single individual as they were bought together and the size and patterns of dental wear match. AMM20948, segment of dorsal fur of adult, extending from neck to base of tail, sex unknown. Collected by Olo hunter in Mount Somoro area in April 1989 and given to Fr P. MacGeaver for transmission to the Australian Museum, Sydney.

**Other specimens.** 14 fragmentary dentaries, including 1 juvenile, purchased at Wigote Village, Torricelli Mountains, on 21 July 1985 and 11 March 1990.

**Diagnosis.** *Dendrolagus scottae* n.sp. differs from all other species of tree-kangaroo in its overall blackish colouration (Fig.2), its small masticatory muscle mass relative to cheektooth size, shallow face (Fig.4), and consistent development of a large posterobuccal cusp on P/3 (Fig.4). It further differs from all other species of *Dendrolagus* except *D. dorianus* in its large size, extremely short tail, minute superior lachrymal foramen and large cheekteeth. It further differs from *D. dorianus*

in that the lower incisors are less procumbent, and P/3 is broader (Figs 4,6), and in that the hair whorl is placed further anteriorly (Fig.2). It further differs from *D. ursinus* in lacking a white throat, tufted ears, and in having the venter dark, not contrasting with the dorsum.

**Description.** The following description is based upon the juvenile holotype, with supplementary references to the fragmentary paratypes where appropriate. Comparisons with *D. dorianus* are given. The dorsum and venter are uniform, and close to Sepia. On the paratype adult skin fragment (which represents most of the back and is 740 mm long and 230 mm wide in the middle) the overall colour is close to Jet Black, being slightly more intensely black than that area of the juvenile. The hair bases are brown, the black effect coming from the black hair tips and long black guard hairs. The fur, particularly on the neck, is coarser in texture than on the juvenile. *Dendrolagus dorianus* differs in that the dorsum is either golden (as in the only known specimen of *D. d. mayri*) or some shade of brown. The darkest specimens are some *D. d. notatus*, where the tail is usually paler than the dorsum or has a generous scattering of pale hairs on a brown background.

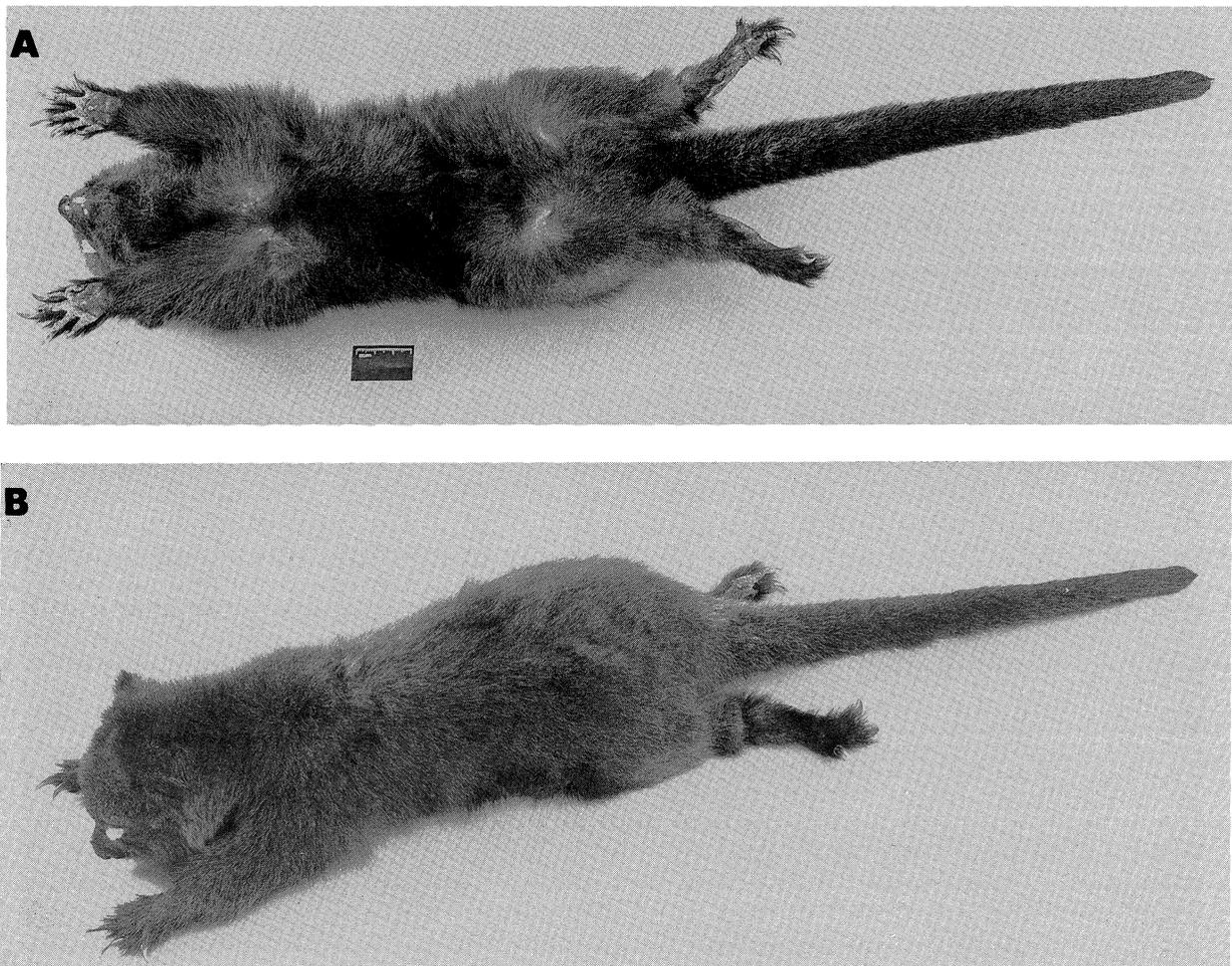


Fig.2. A, ventral and B, dorsal view of the holotype skin of *D. scottae* n.sp. (AMM19481).

On the holotype of *D. scottae* a sharp line, running from ear to ear, divides the Dark Drab face from the Sepia dorsum. Most of the tail, the dorsal surfaces of the hands and feet, and the ears, are Jet Black. By contrast the limbs and tail are paler in *D. dorianus*. A few silvery hairs encircle the tail base, and a small cluster of Yellow Ocher hairs is present anterior to the silver hairs on the dorsal side of the tail base. On the paratype adult skin fragment the patch of light hair at the tail base is relatively large (45 mm x 23 mm), and is pale yellow grading to Yellow Ocher at its centre. On the holotype the dorsal surface of the lower leg is Dark Drab. A distinct hair whorl is positioned in the middle of the back just behind the shoulders. On the paratype the hair whorl is placed well anteriorly (although unfortunately without the limbs it is difficult to say precisely where).

Except for the features noted in the diagnosis, the skull of the juvenile holotype is largely similar in overall shape to that of a similar-aged *D. dorianus*. However, it differs in that the interparietal is broader and anteroposteriorly shorter, and in that the nasals are narrower. Unfortunately, our limited sample of juvenile *D. dorianus* is insufficient to establish whether these are consistent differences between the species.

It is difficult to estimate the adult body weight of *Dendrolagus scottae* n.sp. The species is probably sexually dimorphic in size, as are the other large tree-kangaroos. The only specimen for which we have body weight is a female pouch young. It has only M2 erupted, and weighed 1,500 g. By comparison a male *D. dorianus* (AMM19436) that weighed 1,300 g already has M3 erupted. Two of the three complete adult dentaries of *D. scottae* n.sp. are longer than a wild caught male *D. dorianus* (CM12303) that weighed 20,000 g (the largest weight ever recorded for a tree-kangaroo).

The fragmentary adult crania and dentaries of *D. scottae* n.sp. differ from those of *D. dorianus* in the following ways. The dentary is larger overall, but much more gracile (Fig.4). The inflection of the angle and attachment points for the pterygoid musculature are greatly reduced; so much so that when viewed laterally, the inflected angle does not project posteriorly any further than the condyle (Fig.4). In all *D. dorianus* examined the projection of the inflected angle beyond the condyle is marked. In addition, the ridge below the masseteric foramen that serves for the point of attachment for the superficial layer of the masseters is very small relative to *D. dorianus*. The body

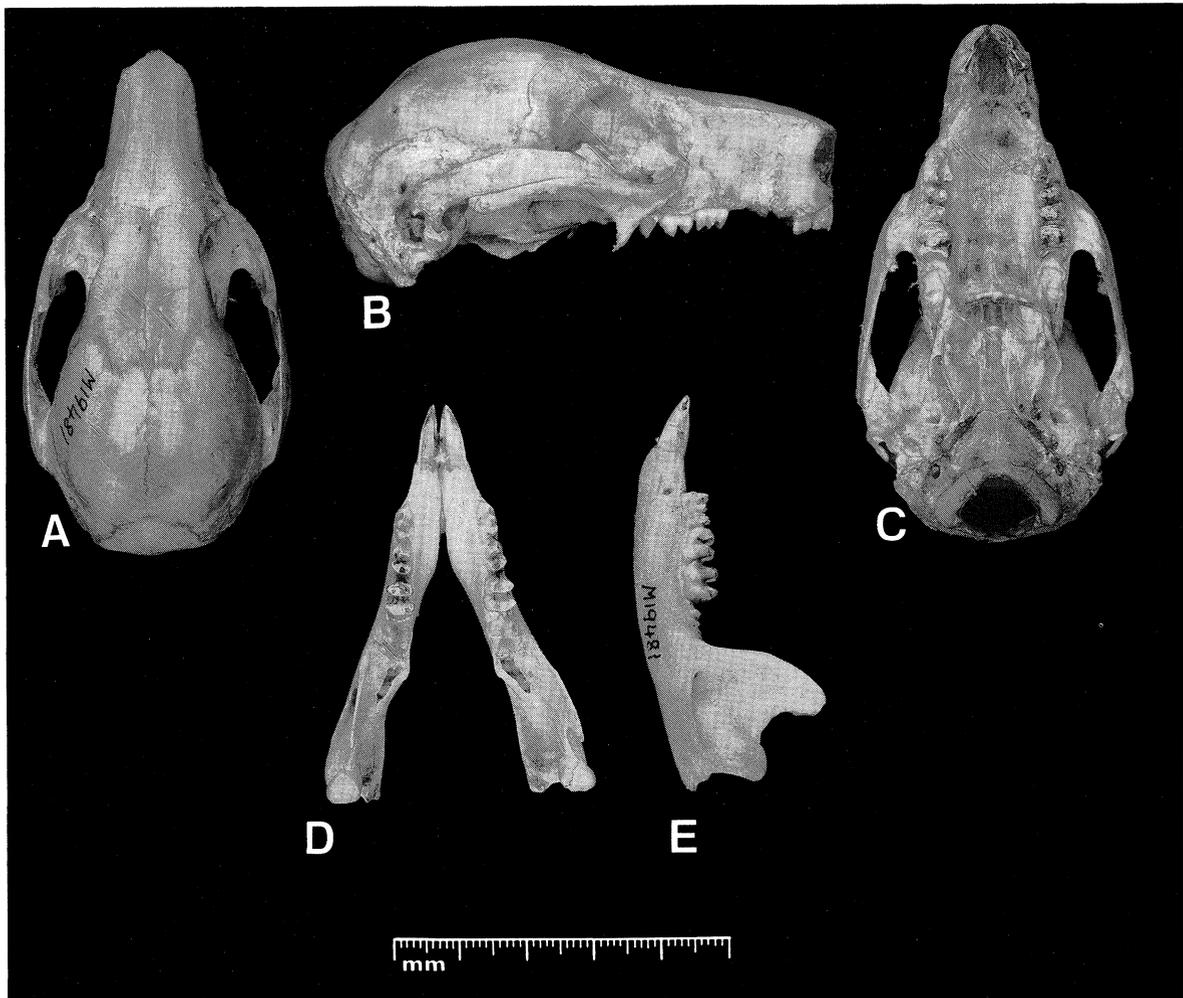
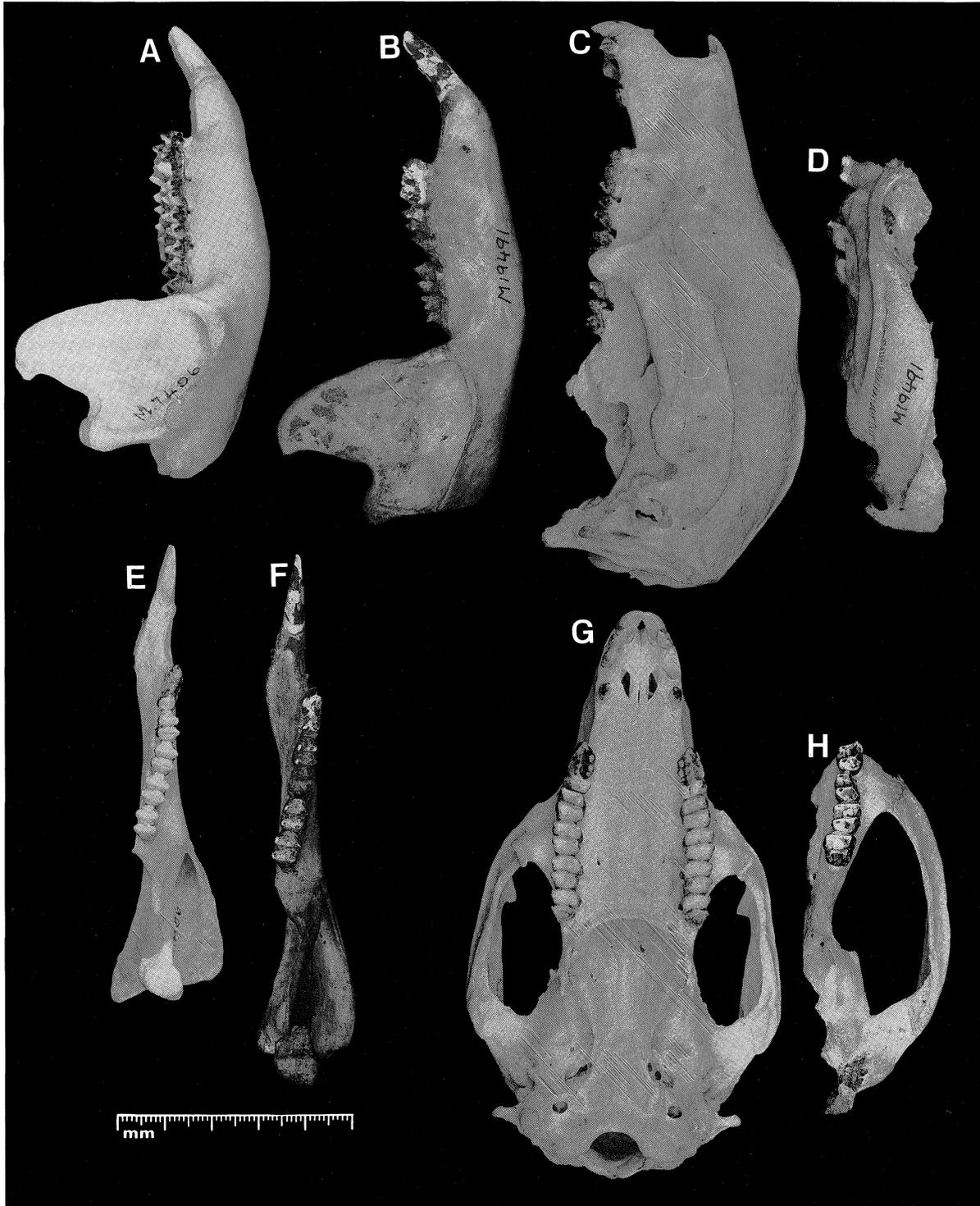


Fig.3. Cranium and dentaries of the holotype of *D. scottae* n.sp. (AMM19481) in A, dorsal, B, lateral, C, ventral, D, occlusal and E, lingual views.

of the dentary itself is more gracile although the teeth are large, and the dentary relatively long (Fig.5). The adult masseteric arch in *D. scottae* n.sp. also differs greatly from that of *D. dorianus*. It is shallow anteriorly in *D. scottae*, with only a trace of a zygomatic process present on the adult paratype (although a modestly developed process is present in the juvenile). Posteriorly, the zygomatic arch is deep, while the

postglenoid process is relatively small. The zygomatic arch is relatively longer than in *D. dorianus*, but the points of attachment for the masseters are relatively very small.

**Etymology.** Named for the late Winifred Violet Scott, an endowment from whose estate has enabled a programme of research and conservation of this species.

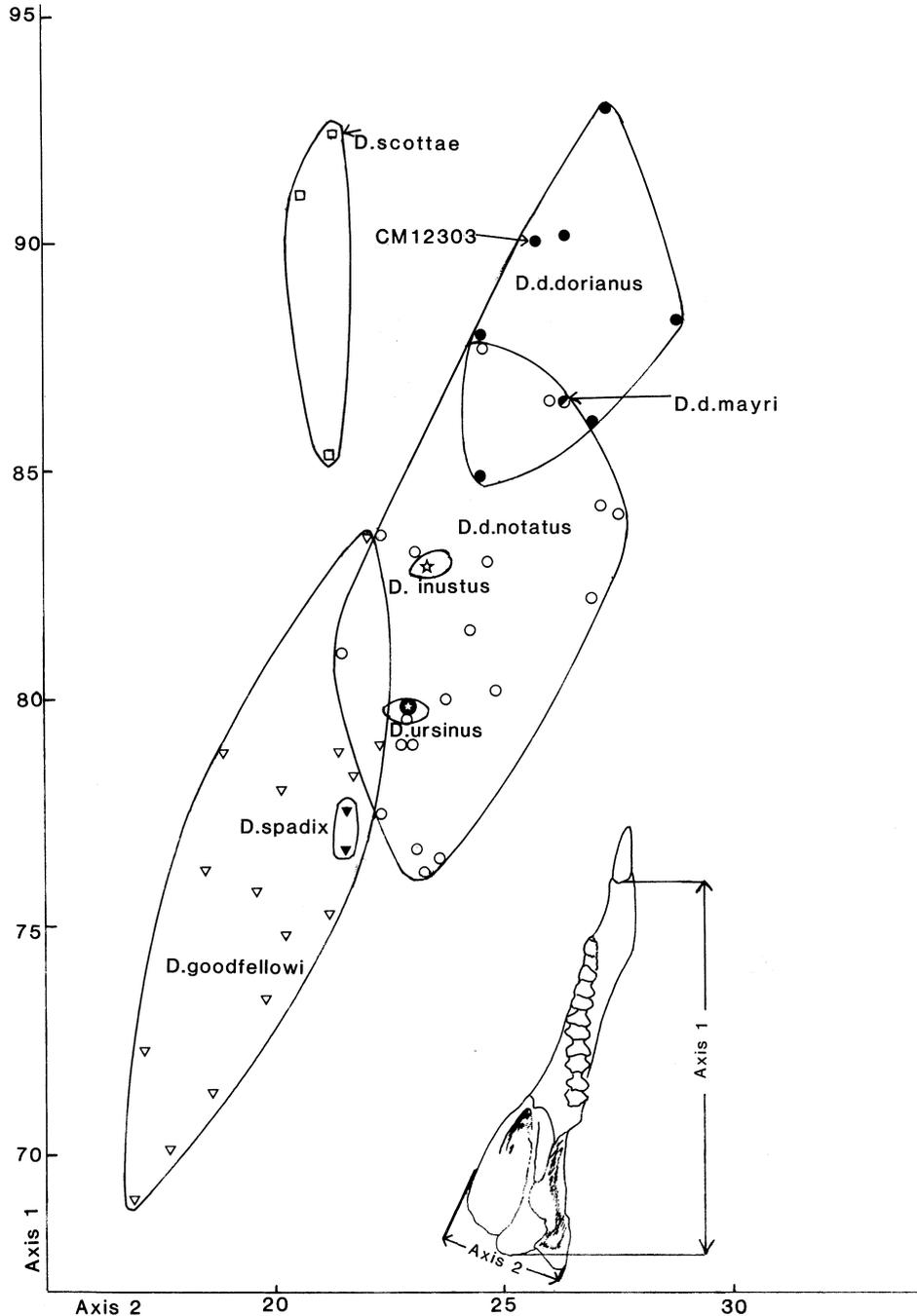


**Fig.4.** Paratype of *D. scottae* n.sp (AMM19491) (B,D,F,H), compared with *D. dorianus* (AMM7406) (A,C,E,G), adult female, Mount Hagen district.

### Discussion

**Relationships.** *Dendrolagus scottae* n.sp. possesses internally furred ears, a distinctively short, broad foot, and a relatively very shortened fourth toe. These are synapomorphic features which Groves (1982) notes are

also present in *D. dorianus*, *D. matschiei* and *D. ursinus*. These features are convincing evidence that these four species form a clade within *Dendrolagus*. Within this clade, *Dendrolagus scottae* n.sp. shares a further suite of derived features with *D. dorianus* which suggest that these species may be sister taxa. These include a reduction in the size of the superior lachrymal foramen



**Fig.5.** Bivariate plot of dentary length (from condyle to I/1 alveolus, vertical axis) over maximum width of the posterior of the dentary (horizontal axis) for *Dendrolagus dorianus dorianus* (dots), *D. d. notatus* (circles), *D. d. mayri* (half filled circle), and *D. scottae* n.sp. (squares), *I. goodfellowi* (inverted hollow triangles), *D. spadix* (inverted solid triangles), *D. inustus* (star), *D. ursinus* (enclosed star).

(unique within *Dendrolagus*, Groves, 1982), large cheekteeth (Groves, 1982; Fig.4), a very short tail (which contrary to Groves, 1982 is relatively longer in *D. ursinus* than *D. dorianus*), and a dark (brown or blackish) ventral and dorsal colouration. This suite of features is persuasive evidence that *D. dorianus* and *D. scottae* n.sp. are each other's nearest relatives.

*Dendrolagus dorianus* and *D. scottae* n.sp. differ however in a number of ways. *Dendrolagus dorianus* possesses a hairwhorl which is placed near the base of the tail. In *D. scottae* n.sp. the hairwhorl is situated just posterior to the shoulders (which is the plesiomorphic condition, Groves, 1982). In *D. ursinus* it is positioned as in *D. scottae* n.sp., while in *D. matschiei* it is placed further posteriorly. Furthermore, the dentition and masticatory apparatus of *D. scottae* n.sp. and *D. dorianus* differ greatly. The P/3 of *D. scottae* n.sp. is relatively broader than in *D. dorianus* (Fig.6). In addition, the dentary is very

large, yet more gracile, with the points of insertion for the masseters, temporals and pterygoids much reduced (Fig.5). These features are consistent with a species, rather than subspecies level difference (they are not seen, for example, between the subspecies of *D. dorianus*), and they seem to indicate a major difference in diet between *D. scottae* n.sp. and all other species of *Dendrolagus* examined.

**Distribution and conservation status.**

*Dendrolagus scottae* n.sp. has one of the smallest distributions of any Melanesian mammal. Thus far it is known only from the Torricelli Mountains of West Sepik Province, Papua New Guinea. Olo speaking hunters from the Mount Somoro area indicate that the species is restricted to the mossy forest near the summit of the Torricelli Mountains. Mossy forest is well developed only above 1,400 m, but we have mapped the potential range

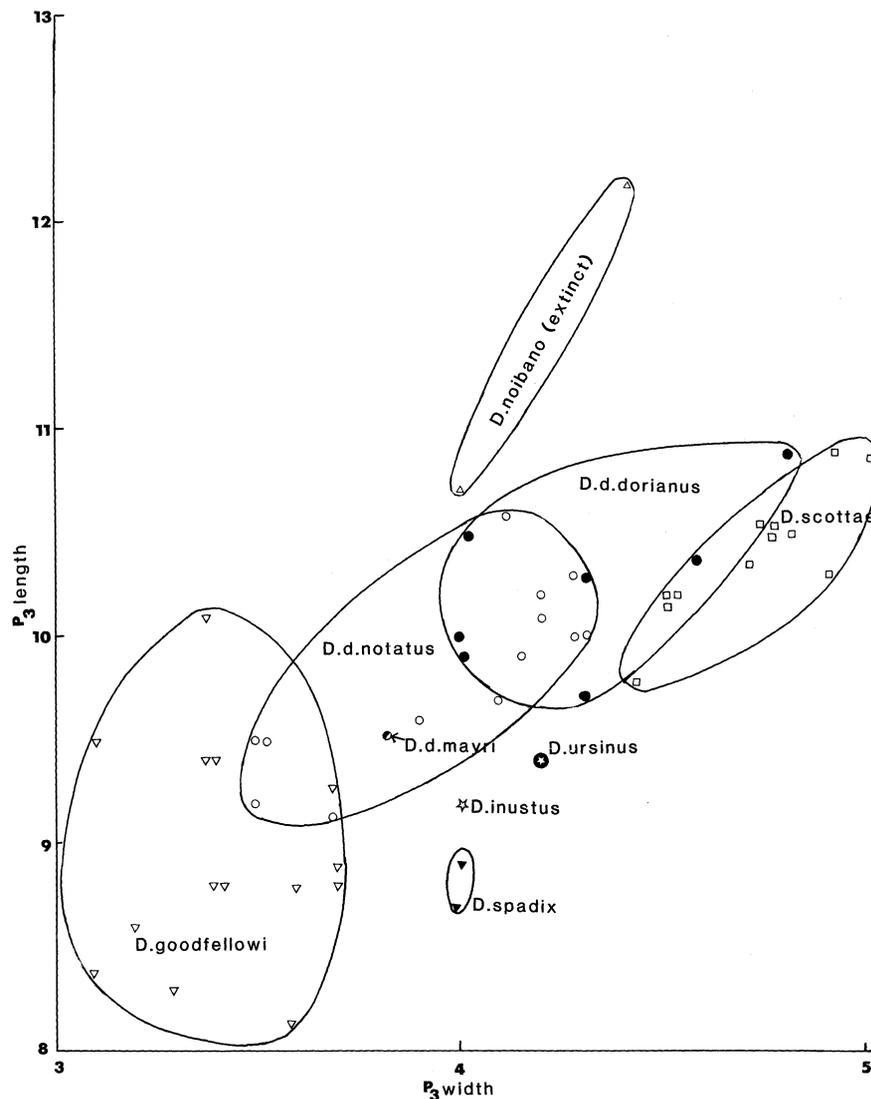


Fig.6. Bivariate plot of P/3 length (vertical axis) over P/3 maximum breadth (horizontal axis) for the New Guinean species of *Dendrolagus*. Symbols as in Figure 5 with the addition that *D. noibano* = triangles.

of *D. scottae* n.sp. as coinciding with the 1,200 m contour, as local topography may allow the species to utilise some of this lower forest (Fig.1). Indeed, experienced Olo tree-kangaroo hunters agreed that *D. scottae* n.sp. spends the wet season on the mountain ridges, and during the dry season shelters in deep gullies on the summit flanks, to avoid the heat. Even given this more generous potential distribution, its potential habitat estimated by this method covers only 39 km<sup>2</sup>. This is, however, fragmented. The largest fragment, which includes Mount Somoro, covers 24 km<sup>2</sup>. The next largest fragment is only 6.8 km<sup>2</sup> in extent and lies 4.7 km to the east, being separated by country as low as 640 m. Two uninvestigated mountain ranges lie to the west of the Torricelli Mountains, and may provide habitat for *D. scottae* n.sp. An unnamed range 31 km to the west, and separated by saddles as low as 640 m, has some 40 km<sup>2</sup> above 1,200 m. Again, however, it is divided into many fragments, the largest being only 27 km<sup>2</sup>. The Bewani Mountains lie 37 km to the west of the unnamed range, and are separated from it by country as low as 500 m. Approximately 45 km<sup>2</sup> of habitat above 1,200 m is present there, and it forms a single large block. It is possible that during Pleistocene glacial maxima, depressed vegetational zonation due to lowered temperatures may have allowed contact between the mossy forests of all of these now separated blocks. If this is so, and no local extinction has taken place, they may well currently provide habitat for *D. scottae* n.sp. We can locate no other potential areas of suitable habitat.

Olo informants considered that three distinct kinds of tree-kangaroos originally inhabited the Torricelli Mountains. The local names for these are Tenkile (= *D. scottae* n.sp.), Yonki (= *D. inustus*) and Weimanke. According to all informants questioned, Weimanke is now extinct in the Torricelli Mountains.

One old man (who appeared to be in his 70's) said that his father had captured a Weimanke in the Mount Somoro area when the informant was a child. Several older men had seen skins of the species retained as "Bilas" (decoration), and all said that its fur was brown, the tail long and mottled, and the facial skin was pink, or as they said, like the face of Europeans. One man who had travelled to Lae said that he had seen the species in a market; the animal he described was almost certainly *D. goodfellowi*. Thus Weimanke may have been *D. goodfellowi* or a related species.

The very small known distribution of such a large animal as *D. scottae* n.sp. is surely indicative of a small population size. There are no studies of tree-kangaroo population densities, so it is difficult at present to estimate the overall population size. However, an estimate based upon densities of other, similar-sized rainforest-dwelling mammals (e.g. *Hyemoschus aquaticus*, see Nowak & Paradiso, 1983) suggests that the total population of *D. scottae* n.sp. in the Torricelli Mountains is in the low hundreds. These data, along with observations of recent human activity in the Torricelli Mountains, suggests that *D. scottae* n.sp. is imperilled. The extinction of *D. goodfellowi* or a near relative in the Torricelli

Mountains, almost certainly through human predation in the last 60 years, bodes ill for *D. scottae* n.sp. Human utilisation of the region is increasing. Moderately high (and growing) human population densities occur throughout the lower and middle slopes of the Torricellis (King & Ranck, 1980), although there is no permanent human settlement in the moss forest zone itself. A road now links Wilbeite Village (altitude 920 m) with the major regional centre of Lumi, and a well-defined foot track crosses the Mount Somoro montane block from Wilbeite to Aitape. The summit of Mount Somoro has been cleared, and a semi-permanent camp erected for workers who will construct a telecommunications repeater station there. Increased human activity in this area already seems to have led to the extirpation of *D. scottae* n.sp. in the middle of its distribution, for we could find no evidence of it persisting there during our 1988 fieldwork. The increased availability of shotguns over the past few decades has doubtless adversely affected the species. Other large Melanesian mammals have similarly been adversely affected by growing human populations and changing technologies (George, 1978).

Recent studies have shown that the mossy forests of the North Coast Range shelter an unusual mammal assemblage. The large, recently described gliding possum *Petaurus abidi* Ziegler, 1981, and the hydromyine murid *Paraleptomys rufilatus* Osgood, 1945 are endemic to the North Coast Range; while a second endemic hydromyine from the Mount Somoro area has recently been recognised by one of us (Flannery, in press). A further striking feature of the mammalian fauna of the mossy forests of the North Coast Range is the absence of otherwise widespread groups. Our 1985 and 1988 fieldwork has confirmed that species of *Rattus* and *Phalanger* (*sensu stricto* e.g. Flannery, Archer & Maynes, 1987) are absent from this habitat. Elsewhere in montane New Guinea these are usually the most species rich genera of the terrestrial and arboreal mammal assemblages respectively, with up to four congeners existing in sympatry (Flannery, 1987; Taylor *et al.*, 1982). These differences in the mammal fauna of the mossy forests of the North Coast Range and the rest of montane New Guinea suggests that the North Coast Range has been long isolated from the Central Cordillera, and that its mammalian assemblage is unique. *Dendrolagus scottae* n.sp. is clearly a part of this unique fauna.

## Summary

*Dendrolagus scottae* n.sp. is restricted to mossy forests on part of the North Coast Range, Papua New Guinea. Its nearest relative is *D. dorianus* of the Central Cordillera, from which it differs in masticatory adaptations, size, colour and morphology. It is endangered, primarily due to high levels of human predation and disturbance over all of its small range.

ACKNOWLEDGMENTS. At the time this paper had gone to press funding for a comprehensive research and conservation programme for *Dendrolagus scottae* n.sp. had been obtained from the estate of the late Winifred Violet Scott. We wish to acknowledge here the generosity of the trustees of the estate in supporting further studies of this endangered species. We wish also to thank Karol Kisokau OBE, Secretary of the P.N.G. Department of Environment and Conservation, and his staff, for their help with this project; for without them this discovery would never have been made. We also wish to thank the Australian Museum Trust for a grant that allowed this fieldwork to be carried out, and Fr Patrick McGeaver and Sr Cecilia Prest of Fatima Catholic Mission for their help in the field. Also, Francis Ulel, Magistrate of Wilbeite Village, is thanked for his help. Ms T. Ennis accompanied us on the 1988 expedition, and drafted the figures for this work. We are grateful to Drs J. Calaby, A. Greer and Mr S. Van Dyck for critically reading this manuscript.

References

Flannery, T.F., 1987. A new species of *Phalanger* (Phalangeridae: Marsupialia) from montane western Papua New Guinea. Records of the Australian Museum 39: 183-193.  
 Flannery, T.F., (in press). *Microhydromys musseri* n.sp., a new murid from the Torricelli Mountains, Papua New Guinea. Proceedings of the Linnean Society of New South Wales.  
 Flannery, T.F. & F.S. Szalay, 1982. *Bohra paulae*, a new giant fossil tree kangaroo (Marsupialia: Macropodidae) from New South Wales, Australia. Australian Mammalogy 5: 83-94  
 Flannery, T.F., M-J. Mountain & K. Aplin, 1983. Quaternary macropodids from Nombe rockshelter, Simbu Province, Papua New Guinea, with comments

on the nature of megafaunal extinction in the New Guinea highlands. Proceedings of the Linnean Society of New South Wales 107: 75-98.  
 Flannery, T.F., M. Archer & G. Maynes 1987. The phylogenetic relationships of the living Phalangeridae (Phalangeroidea: Marsupialia) with a suggested new taxonomy. pp. 477-506. In M. Archer (ed.). Possums and Opossums: Studies in Evolution. Surrey Beatty & Sons and Royal Zoological Society, New South Wales, Sydney.  
 George, G.G., 1978. The status of endangered Papua New Guinea mammals. pp. 93-100. In M. Tyler (ed.). The Status of Endangered Australasian Wildlife. Royal Zoological Society of South Australia, Adelaide.  
 Groves, C.P., 1982. The systematics of tree kangaroos (*Dendrolagus*; Marsupialia, Macropodidae). Australian Mammalogy 5: 157-186  
 King, D. & S. Ranck (eds), 1980. Papua New Guinea Atlas. Robert Brown & Associates, Bathurst.  
 Nowak, R.M. & J.L. Paradiso, 1983. Walker's Mammals of the World. John Hopkins, Baltimore.  
 Osgood, W.H., 1945. A new rodent from Dutch New Guinea. Fieldiana Zoology 31: 1-2.  
 Rothschild, L. & G. Dollman, 1936. The genus *Dendrolagus*. Transactions of the Zoological Society of London 1936: 478-548.  
 Smythe, F.B., 1974. Naturalists Colour Guide. American Museum of Natural History, New York.  
 Strahan R. (ed.), 1983. The Australian Museum Complete Book of Australian Mammals. Angus & Robertson, Sydney.  
 Taylor, M.J., J.H. Calaby & H.M. Van Deusen, 1982. A revision of the genus *Rattus* (Rodentia, Muridae) in the New Guinean region. Bulletin of the American Museum of Natural History 173: 177-336.  
 Ziegler, A., 1981. *Petaurus abidi*, a new species of glider (Marsupialia: Petauridae) from Papua New Guinea. Australian Mammalogy 4: 81-88.

Accepted 8 January 1990

APPENDIX

Table 1. Some measurements for the holotype of *D. scottae* n.sp. and some measurements of the dentary of adults of *D. scottae* n.sp. (all trophy dentaries; including AMM19491: paratype). X = mean, R = range, S = standard deviation, N = sample size).

*D. scottae* n.sp. AMM19481 (holotype)

Head-body length = 322	Tail-vent length = 280
Hindfoot length (s.u.) = 72.8	Ear length (notch) = 44
Weight = 1,500	
condylobasal length = 73.9	bizygomatic width = 42.7
P2-/M1/ length = 10.1	M1/ width = 4.8
posterior nasal width = 13.3	Nasal length = 28.2
interorbital breadth = 14.6	maximum length = 78.5

	P/3-M/5 length	P/3 length	P/3 width	M/4 width	diastema length	dentary depth below M/2
X	37.5	10.4	4.7	5.7	12.3	17.5
R	36.1-38.7	9.8-10.9	4.3-5.0	5.4-5.9	10.6-13.5	15.2-19.0
S	.83	.37	.25	.14	.91	1.17
N	8	8	9	9	10	10