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A New Species of Bandicoot in the Genus *Peroryctes* (Marsupialia: Peramelemorphia) from Kwiyawagi, West Baliem Valley of Papua Province, Indonesia

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Abstract. Many bandicoot species occur in New Guinea and surrounding islands. Here, a new species of *Peroryctes* is described from the West Baliem River Valley, western New Guinea (Papua Province, Indonesia). Morphometric analyses, qualitative morphological examination, and formal morphological phylogenetic assessment clearly distinguish this new taxon from the two currently recognized species of *Peroryctes*, *P. raffrayanus* and *P. broadbentii*. Our attempt to recover molecular data for this new taxon recovered poor quality sequences insufficient for analysis. Little is yet known about the basic biology of this new species, but it is rare and may be threatened.

Introduction

New Guinea and its surrounding islands are home to two families (Peroryctidae and Peramelidae) and five genera of peramelemorphians. These include the peroryctid genera *Echymipera* (5 species), *Rhynchomeles* (1 species), *Microperoryctes* (5 species), *Peroryctes* (2 species) and the peramelid genus *Isoodon* (1 species; Warburton & Travouillon, 2016; Travouillon & Phillips, 2018). The taxonomy of many New Guinean taxa remains unresolved, with more species expected to be discovered in ongoing fieldwork, studies of museum material, and through taxonomic revision (Helgen, 2007; Westerman *et al.*, 2012; Warburton & Travouillon, 2016; Travouillon & Phillips, 2018).

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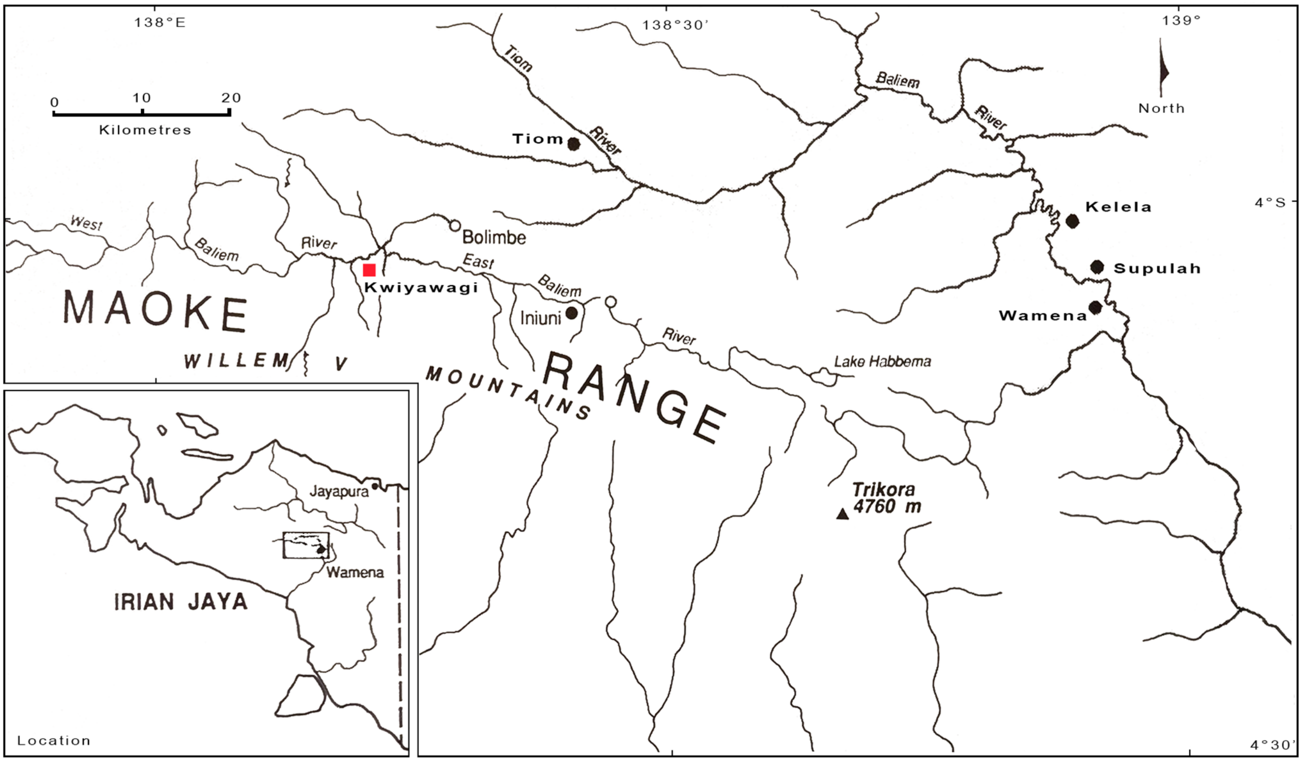

Figure 1. Map of New Guinea showing the location of the Kwiyawagi (red), in the West Baliem Valley in the Central Cordillera of western New Guinea, type locality of *Peroryctes trigonodon* sp. nov. Modified from Hope *et al*. (1993).

In the 1990s, Kwiyawagi (Fig. 1) was the largest human settlement in the West Baliem Valley, Papua Province, Indonesia, comprising around 1,000 Western Dani (Lani) inhabitants. Before TFF's visits (1991–1996), it had been a station for American evangelical missionaries. Located at an elevation of 2,950 m, it lay on a meander of the West Baliem River where the river is crossed by a suspension bridge, one of the only crossing points on the West Baliem River. A search on Google Earth in 2022 revealed that Kwiyawagi had completely transformed. The original mission buildings and the dense settlement of round, thatched hongis of the Western Dani that surrounded them had been replaced by newly constructed buildings, and the grass mission airstrip had been upgraded and enlarged.

The Kwiyawagi area receives an estimated 2,900 mm rainfall per year (Hope *et al.*, 1993). After meandering across the largely flat valley floor for around 50 km, the West Baliem River flows into the East Baliem River just east of Kwiyawagi, the conjoined streams entering Bolimbe (the Baliem Swallet) and flowing underground for several kilometres before re-emerging and joining the Baliem River in the Baliem Valley. We present here the discovery of a new species of *Peroryctes*, collected in 1994 by one of us (TF), during a field trip to the Kwiyawagi area of western New Guinea. We became aware of this new taxon because two of us (KJT and KMH) independently noticed distinctive dental traits that set this species apart from samples of *Peroryctes raffrayanus*, with which this new taxon has heretofore been confused (e.g., Flannery, 1999). The new species of *Peroryctes* we describe here has not yet been found outside the West Baliem Valley.

Materials and methods

Material

The specimens of the new taxon are stored in the mammal collections of the Australian Museum (AMS M), Sydney, Australia, and the Museum Zoologicum Bogoriensis (MZB), Cibinong, Indonesia. They were collected by one of us (TFF), during fieldwork in the Kwiyawagi area (Fig. 1). Logfall traps of local manufacture were the main method of obtaining game in the forest remnants in the area (Flannery, 1997: plate 22, for an example).

Comparative specimens of *Peroryctes broadbentii* and *Peroryctes raffrayanus* were examined from the Australian Museum, Sydney (AMS) (including the type specimen of *P. broadbentii,* AMS A.3238); the American Museum of Natural History (AMNH), New York, USA; Museum national d'Histoire naturelle (MNHN, including the type specimens of *P. raffrayanus,* MNHN ZM MO-1877-2026 to MO-1877-2030), Paris, France; the Natural History Museum (NHMUK), London, United Kingdom; the Australian National Wildlife Collection (ANWC), Canberra, Australia; and the Western Australian Museum (WAM), Perth, Australia.

Morphometric analysis

Specimens of the new taxon were assessed with detailed morphological study, both qualitative and quantitative. The qualitative assessment included a complete description of the skin, skull, and teeth, with comparison with both the type specimens of *Peroryctes broadbentii* and *Peroryctes raffrayanus,* and additional specimens of these taxa. Craniodental terminology follows Travouillon *et al.* (2010, 2013a, 2013b, 2014, 2015, 2018, 2019) and Gurovich *et al.* (2014). The quantitative assessment included cranial and dental measurement (left and right sides), taken using digital callipers, on each adult specimen examined (n = 58). All analyses were done in the software PAST 4.08. Skulls used were mostly intact, but if a measurement couldn't be taken due to damage, missing values were estimated by the software. Cranial and dental measurements follow Aplin *et al.* (2010), Travouillon (2016), and Travouillon *et al.* (2018, 2019). Cranial and dental measurements were summarized using univariate statistics, and then analysed using a Principal Component Analysis (PCA). For the cranial PCA, males and females were indicated by different symbols, but in the dental PCA, sexes were not differentiated. A MANOVA could not be performed due to the low sample size (n = 2) for the new taxon.

Abbreviations

The following abbreviations are used in tables: **aIL**, length of anterior upper incisor series (I1–4), measured at crown bases; **apl**, length of incisive (anterior palatal) foramen; **anw**, combined anterior width of the nasal bones; **apw**, combined width across the paired anterior palatal foramina; **bh**, height of bullae; **bl**, length of bullae; **bw**, width of bullae; **bcl**, condylobasal length; **bol**, length of basioccipital bone; **bsl**, length of basisphenoid bone; **ctl**, length of cheektooth series (premolars + molars); **CV**, Coefficient of variation; **cw**, combined width of occipital condyles; **fs**, length of midline suture of frontal; **IL**, length of entire upper incisor series (I1–5), measured at crown bases; **iow**, width of greatest constriction of orbitotemporal fossa; **jh**, height of jaw measured between m2 and m3; **jl**, length of jaw, from anterior most point of dentary (excluding incisors) to condyle; **lmr**, combined length of lower molar series(m1–4), measured at crowns; **lpl**, combined length of upper premolar series (P1–3), measured at crowns; **lpr**, combined length of lower premolar series (p1–3), measured at crowns; **m1–4L**, length of m1–4, measured at crown; **m1–4AW**, width of m1–4, measured at crown across trigonid; **m1–4PW**, width of m1–4, measured at crown across talonid; **M1–4L**, length of M1–4, measured at crown; **M1–4W**, width of M1–4, measured at crown; **mw**, maximum width across braincase; **nl**, maximum length of nasal bone; **nps**, length of sutural contact between nasal bone and premaxilla; **onl**, greatest length of skull (occipitonasal length or occipitopremaxillary length); **oP3**, palatal width, measured across posterobuccal corner of each P3; **p1–3L**, length of p1–3, measured at crown; **p1–3W**, width of p1–3, measured at crown; **P1–3L**, length of P1–3, measured at crown; **P1–3W**, width of P1–3, measured at crown; **pnw**, combined posterior width of the nasal bones, measured at intersection with maxillofrontal suture; **pow**, width across outside of paroccipital process; **ppl**, length of maxillopalatine fenestra; **ppw**, maximum width across postorbital ridge; **rwc**, anterior rostral width, measured across outer surface of each canine; **rwi**, posterior rostral width, measured across medial surface of each infraorbital foramen; **SD**, standard deviation; **SE**, standard error; **uML**, combined length of M1–3, measured at crowns; **uMR**, combined length of M1–4, measured at crowns; **uPR**, combined length of upper premolar series (P1–3), measured at crowns; **Var**, variance; **zw**, maximum width of cranium, measured across zygomatic arches.

Morphological phylogeny

The morphological matrix from Travouillon *et al.* (2019) was used to assess the morphological relationship of the new taxon. Characters were scored and added to the matrix. Using the software PAUP* 4.0b10 (Swofford, 2002), a maximum parsimony analysis of the matrix was performed. Following Travouillon *et al.* (2019), a 'molecular scaffold' was used as a backbone 'constraint', based on the phylogeny of Westerman *et al.* (2012). A two-step heuristic search was performed comprising of 1,000 replicates, saving ten trees per replicates. The most parsimonious trees were summarized in a strict consensus tree, with bootstrap values calculated using 1,000 replicates, with ten random addition sequence replicates each.

Molecular phylogeny

DNA was extracted from a skin sample taken from the belly of specimen AMS M.30856 (the holotype), to compare with sequences from other peramelemorphians as part of an Oz Mammals Genomics Initiative (Eldridge *et al.,* 2020) phylogenomics project. All samples included in this project were analysed as follows. DNA was extracted using the DNeasy Blood and Tissue Kit (Qiagen), with modifications based on Joseph *et al*. (2016). Dried skin samples were rehydrated overnight in 300 µl PBS (pH 7.4, Thermo Fisher), before transfer to lysis buffer. Samples were digested for 2–6 hours at 56°C with shaking at 800 rpm, in a lysis buffer mix containing 320 µl buffer ATL, 40 µl proteinase K, and 40 µl 1M DTT (Thermo Fisher). Following lysis, 400 µl buffer AL and 3.25 µg carrier RNA (Sigma Aldrich) were added before incubation at room temperature for 30 minutes. 400 µl of ethanol was added to each sample preparation and immediately mixed. Samples were then transferred to DNeasy spin columns in 650 µl aliquots, with each centrifuged for 1 minute at 8000 rpm and supernatant discarded. Ethanol wash steps followed the manufacturer's protocol. DNA was eluted in 200 µl of buffer AE containing 0.05% Tween 20 (Sigma). DNA extraction success was evaluated with the Qubit High Sensitivity DNA kit (Thermo Fisher). To mitigate contamination risks, DNA from historical museum specimens was extracted in a dedicated, physically separated, Trace DNA facility at the Australian National University's Ecogenomics and Bioinformatics Laboratory. Extraction negative controls were included to monitor for contamination.

An exon capture target enrichment library was prepared for each sample, including the AMS M.30856 DNA extraction, using the Meyer and Kircher (2010) protocol, with modifications based on Bi *et al.* (2013) and Roycroft *et al.* (2022). We used a set of custom marsupial exon capture probes (SeqCap EZ Developer Library; Roche NimbleGen) as outlined in Bragg *et al.* (2017). Pooled exon capture libraries were sequenced on an Illumina NovaSeq SP 200 cycle paired end run at the ACRF Biomolecular Resource Facility, Australian National University.

The paired end reads were processed using a containerized workflow (https://hub.docker.com/r/hoohaah/ubuntu) implemented through a virtual machine in the ARDC NeCTAR research cloud running Ubuntu 20.04 LTS (Turakulov, 2001). Locus alignment and subsequent processing steps were modified from the original workflow according to details and scripts provided at https://bitbucket.org/samebu/tccp/src/master (Bertozzi, 2001).

Results

Morphometric analysis

The results of the Principal Component Analysis (PCA), show clear distinctions between the three taxa examined, both in the cranial dataset (Fig. 2A), and the dental dataset (Fig. 2B). In the cranial PCA (Fig. 2A), PC1 accounts for 94.5% of variance and PC2 for 1.3% of variance. In the dental PCA (Fig. 2B), PC1 account for 74.7% of variance, and PC2 for 10.9% of variance. The new taxon is clearly separated from *P. broadbentii* and is closest to *Peroryctes raffrayanus* in size and shape, but is clearly distinguishable in morphometric terms both cranially and dentally.

A similar result is seen in univariate statistics (Tables 1–2, Travouillon *et al.*, 2025a, 2025b), where the mean measurements of the new taxon are closer to *P. raffrayanus,* but are generally smaller in the cranial (Table 1) dataset. The exceptions are skull width (zw), basicranial (bsl, bol, cw, pow, mw), bullae (BH, BL), and upper and lower premolars (ipr, lpr). All measurements are, on average, smaller for the new taxon compared to *P. raffrayanus* in the dental dataset (Table 2).

Morphological phylogeny

In the maximum parsimony analysis (Fig. 3), *Peroryctes,* including the new taxon, is recovered as a well-supported monophyletic clade (bootstrap = 85%). *Peroryctes raffrayanus* is sister to a moderately supported clade containing the new taxon and *P. broadbentii* (bootstrap = 73%).

Molecular phylogeny

The number of on-target reads recovered for AMS M.30856 was very low, resulting in the assembly of less than 7% of the 2168 target loci. The coverage of the assembled loci was also extremely sparse, with no locus recovered fully and only 18 loci with greater than 50% coverage. Further, the analysis workflow did not identify any mitochondrial reads in the captured sequences. Thus this sample was removed from further molecular analyses due to data deficiency. This is likely because the specimen was stored in formalin for a long period of time during transport from Indonesia to Australia, resulting in DNA fragmentation.

Systematics

Order Peramelemorphia Ameghino, 1889
(sensu Kirsch, 1968 and Aplin & Archer, 1987)

Superfamily Perameloidea Gray, 1825

Family Peroryctidae Groves & Flannery, 1990
(sensu Travouillon & Phillips, 2018)

Genus *Peroryctes* Thomas, 1906

Synonym: *Lemdubuoryctes* Kear, Aplin, & Westerman, 2016

Content of the genus *Peroryctes* was formally reviewed most recently by Aplin *et al*. (2010), who recognized two living New Guinea species, by Travouillon *et al.* (2017), who removed the Pliocene Australian species '*Peroryctes*' *tedfordi* Turnbull *et al.,* 2003 to the newly established genus *Silvicultor*, and by Travouillon and Phillips (2018), who showed that the fossil genus *Lemdubuoryctes*, erected by Kear *et al*. (2016) from the Aru Islands, is a synonym of *Peroryctes*.

Two species of *Peroryctes* are extant and endemic to New Guinea: *P. raffrayanus* (Milne-Edwards, 1878), which is widespread and often common in montane habitats across New Guinea (the nominal forms *rothschildi* Förster, 1913 and *mainois* Förster, 1913, are regarded as synonyms), and *P. broadbentii* (Ramsay, 1879), a rare species from lowland habitats in the south-eastern peninsula of New Guinea (Aplin *et al*., 2010). Travouillon and Phillips (2018) assigned the Late Quaternary taxon *aruensis* Kear, Aplin, & Westerman (originally named in the genus *Lemdubuoryctes*) to *Peroryctes* and noted its very strong similarities to *Peroryctes broadbentii*. Here we consider *aruensis* to be a subspecies of *Peroryctes broadbentii* as it is only differentiated by the size of the M4 and slightly longer P2 and p1. Thus, in total we recognize two previously described species of *Peroryctes*, to which we now add a third.

Peroryctes trigonodon sp. nov. Travouillon, Flannery, & Helgen

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Figs 4–6

Holotype. AMS M.30856 (Field No. FU132), adult female, study skin and extracted skull. Collected in traditional deadfall trap on 11 June 1994 by a Dani local. Young (AMS M.30233, Field No. FU133—a paratype) in pouch. Field measurements: head and body length 330 mm, tail length 148 mm, hind foot length 71.7 mm, ear length 31.2 mm, weight 900 g.

Type locality. Ubimu (elevation 2,950 m), Kwiyawagi area (4°01'S 138°07'E) in the West Baliem Valley, in the Central Cordillera of western New Guinea (Papua Province, Indonesia).

Paratypes. AMS M.30817 (Field No. FU116), adult male, skull and skeleton, Kelangurr (elevation 2,950 m), Kwiyawagi area. Caught in traditional snare, on 9 June 1994, rotten when retrieved. Measurements: scrotal width 25.7 mm, head and body 355 mm, tail 151 mm, hind foot 74.5 mm, ear 28 mm, weight 700 g. AMS M.30233 (Field No. FU133), female pouch young. Measurements: head and body 118 mm, tail 63.5 mm, hind foot 36.2 mm, ear 17.9 mm, weight 44 g.

Referred specimen. Field No. FU84, registration number unknown (specimen was assigned to be sent to Museum Zoologi Bogor when the collection was divided in 1994 but this specimen has not been located in a recent search of the collection), subadult male, Kwiyawagi area near Ndangkwilim (elevation 2,712 m). Collected by hand by

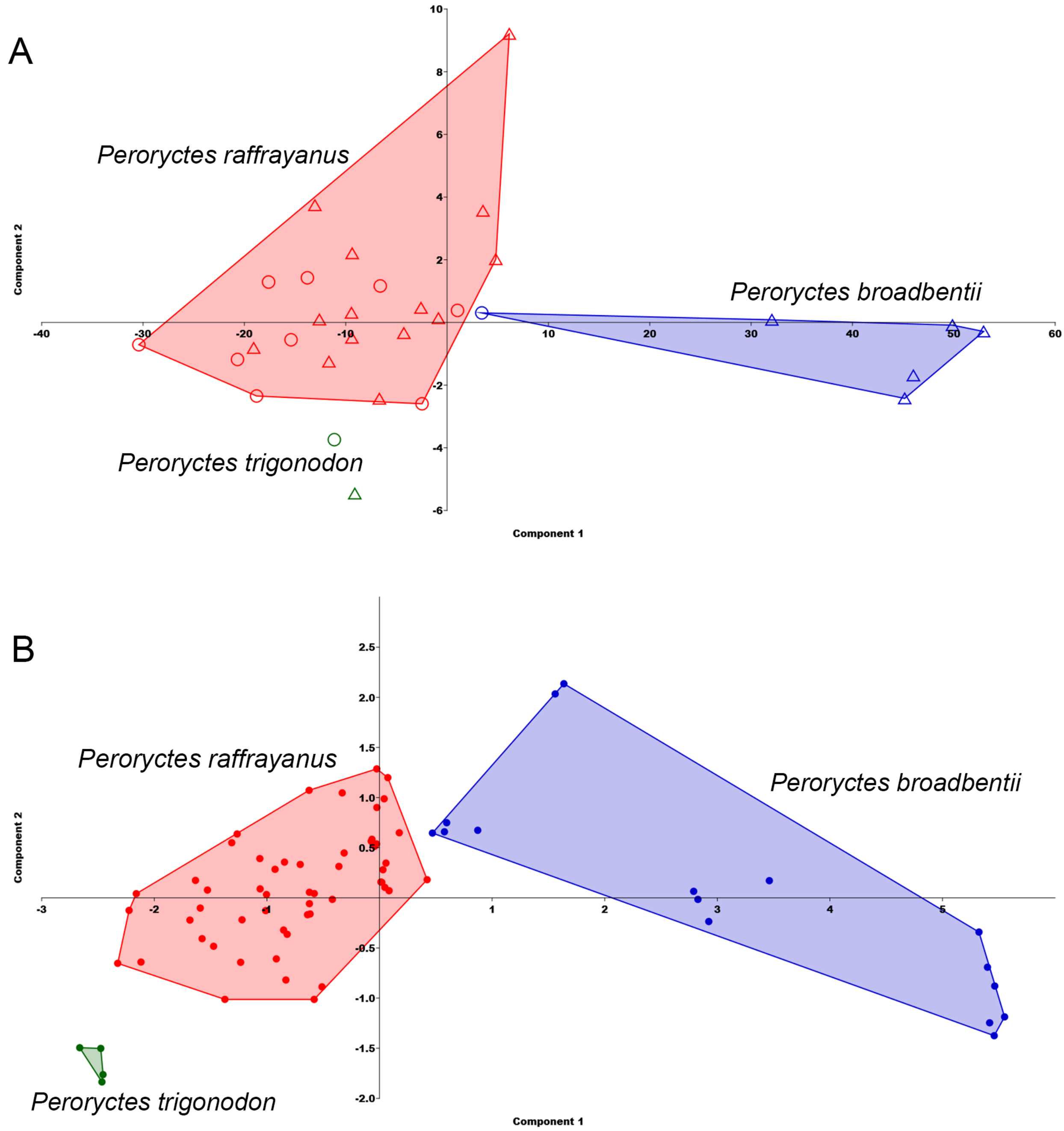

Figure 2. Principal Component Analysis (PCA) of the cranial (*A*) and dental (*B*) measurements, comparing *Peroryctes trigonodon* sp. nov. (dark green), *Peroryctes raffrayanus* (red) and *Peroryctes broadbentii* (dark blue). Open circles are females, open triangles are males.

Dinius on 3 June 1994. Measurements: head and body 263 mm, tail 123.2 mm, hind foot 61.6 mm, ear 30.7 mm, weight 342 g.

Diagnosis. *Peroryctes trigonodon* differs from *P. raffrayanus* in having a shorter infraorbital canal; a larger orbitosphenoid; the primary foramen ovale is not entirely in the alisphenoid, but bordered also by the petrosal; a smaller lingual shelf on P3; StD on M1 is not connected to the stylar crest nor to StB (stylar cusp B); preparacrista on M1 does not connect with the postparacrista; postprotocrista ends on the lingual flank of metacone on M1–3 with no shelf between metaconule and the base of the metacone; StD1 absent on M1–2; stylar crest not present on M2; StB conical on M3; StC and StD1 absent on M3; no anterior cingulum on M4; StB absent on M4; metacone present on M4; diastemata between canine and p1, and p1 and p2 are longer than p1; p1 and p2 having a tall anterior cusp; paraconid-metaconid distance is longer than metaconid-protoconid distance on m2; posthypocristid oblique to tooth row on m3; smaller entoconid on m4; hypoconulid present on m4.

Peroryctes trigonodon differs from *P. broadbentii* in being much smaller, and in having longer and darker pelage. Compared to *P. broadbentii* in craniodental anatomy,

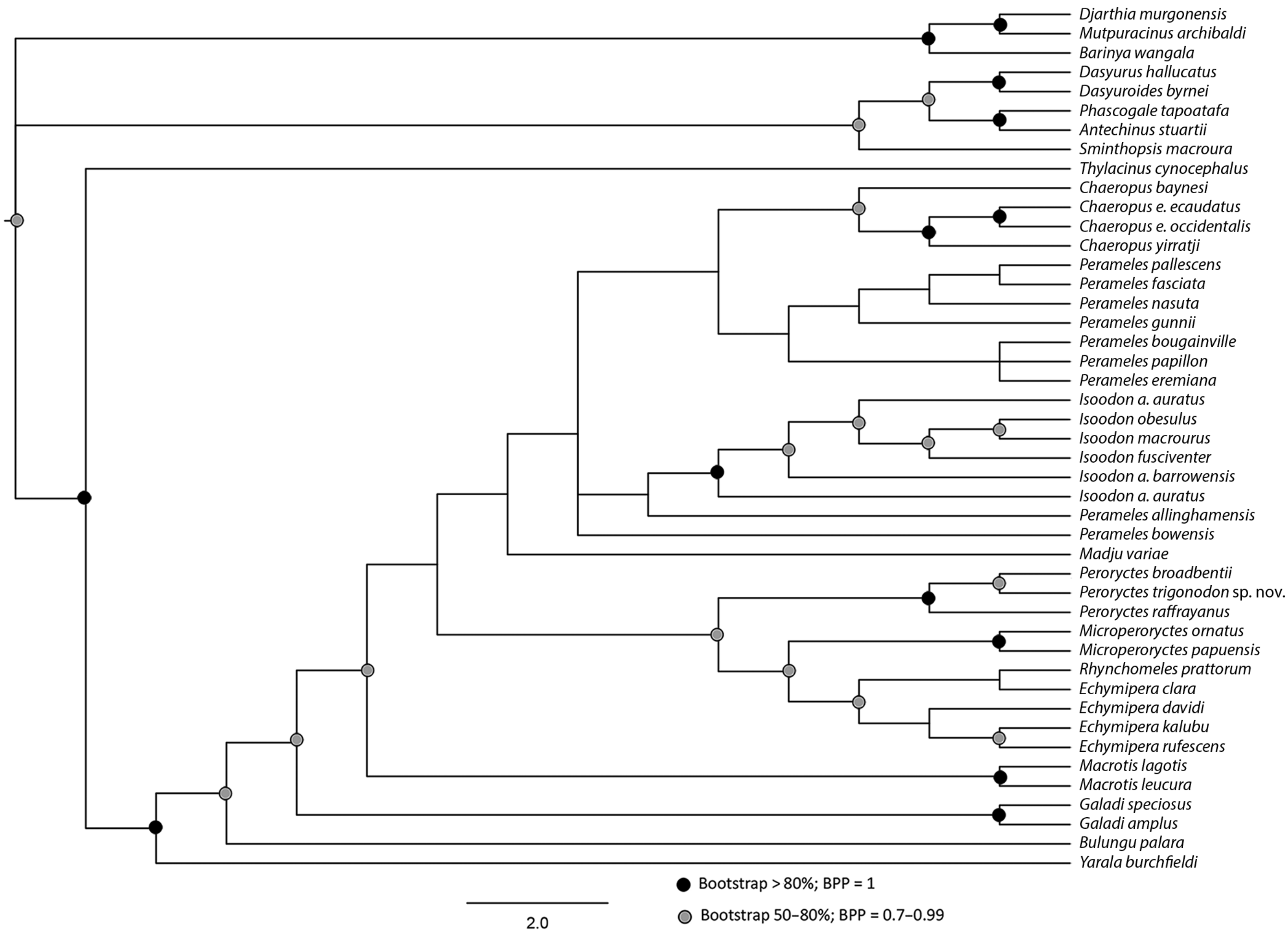

Figure 3. Consensus tree of the constraint Maximum Parsimony analysis of peramelemorphians, including *Peroryctes trigonodon* sp. nov., using morphological data.

P. trigonodon has: a weaker antorbital fossa; a larger orbitosphenoid; a smaller rostral tympanic process; the supraoccipital contributing to the upper margin of foramen magnum; a diastema longer than P1 between P1 and P2; P2 and p2 only just shorter than P3 and p3; P3 not taller than P2 but subequal in height; a smaller major cusp on P3; no shelf between metaconule and the base of the metacone on M1; StD1 absent on M1–2; preparacrista connects to StA on M2; StE smaller on M2; anterior cingulum on M2–3 is not connected to the talon; postparacrista on M3 does not connect to the premetacrista; no anterior cingulum on M4; postparacrista is straight on M4; postprotocrista ends anterior to the most posterior end of the tooth on M4; smaller metacone on M4; diastemata between canine and p1, and p1 and p2 are longer than p1; p2 and p3 having a tall anterior cusp; paraconid directly anterior to metaconid on m1; paraconid-metaconid distance is shorter than metaconid-protoconid distance on m3; smaller entoconid on m4; hypoconulid present on m4.

Etymology. Combination of ‘trigon’ and ‘odon’ meaning triangular tooth in ancient Greek, due to its molars being more triangular than other species of *Peroryctes*.

Common name. *Wablo* (Lani language).

Distribution. Found only in the Kwiyawagi area, in the West Baliem Valley, in the Central Cordillera of western New Guinea (Papua Province, Indonesia), where it has been located at elevations from 2,712 to 2,950 m.

Habitat. The West Baliem Valley has a microclimate that allows particular vegetation communities to survive at a much higher elevation than they do elsewhere in New Guinea. Completely surrounded by high limestone ranges and hills, with the West Baliem River exiting the valley via an enormous sinkhole that permits the river to flow under a range of hills, the valley is very isolated. This isolation is likely of long standing and might have been important to the speciation of *P. trigonodon*. Close to Kwiyawagi the original vegetation has been substantially disturbed by human activity, with *Deschampsia klossii* grasslands, *Cyathea* tree ferns and *Rhododendron* bushes dominating in old gardens and elsewhere where forest has been removed. The valley floor nonetheless supports significant remnants of both upper montane and swamp forest. Stands of *Nothofagus brassii* (which reaches its altitudinal limit at Kwiyawagi) dominate on better soils, while elsewhere species of *Evodiella*, *Syzygium*, *Dacrycarpus* and *Phyllocladus* occur. In areas of impeded drainage, open swamp forests dominated by *Libocedrus papuana* are found. Areas of forest cover remained substantial at the time of TFF’s last visit in 1996. Ubimu (the type locality) was a large patch of remnant upper montane forest. The trees were tall given the elevation (2,950 m), and the forest floor was mossy.

Description. The description is based on the holotype AMS M.30856, an adult female with the skin and skull preserved, and the paratype AMS M.30817, an adult male with the skull preserved.

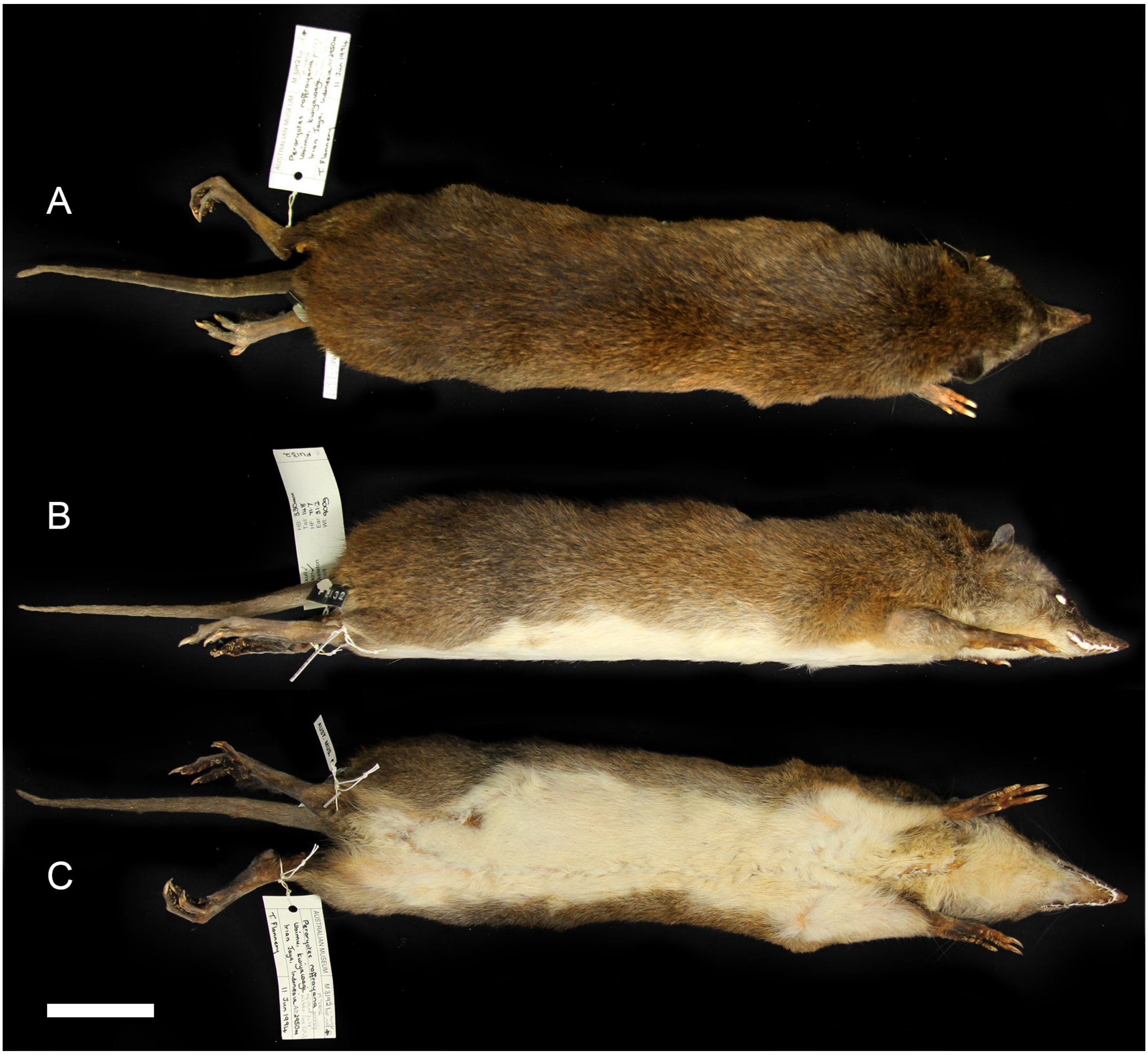

Figure 4. *Peroryctes trigonodon* sp. nov., holotype, AMS M.30856, adult female, study skin in (*A*) dorsal, (*B*) lateral, and (*C*) ventral views. Scale bar = 5 cm.

The pelage of *P. trigonodon* is similar to that of *P. raffrayanus* (Fig. 4). The principal differences are that the hairs extend a few millimetres beyond the tail tip in *P. trigonodon*, not projecting beyond the tail tip in *P. raffrayanus*. Further, scalation on tail appears to be less distinct, and the hairs around the margins of the pedal pads are denser, in *P. trigonodon* compared to *P. raffrayanus*.

The holotype skull is 77.84 mm long and 29.48 mm wide (Fig. 5). The paratype skull is 78.7 mm long and 31.51 mm wide. In dorsal view, the nasals are long and narrow, as in other species of *Peroryctes,* increasing in width posteriorly, before tapering. The frontals are generally flat. The parietals are fused as in all peramelemorphians, but there is no sagittal crest in the male (paratype AMS M.30817), similar to *Peroryctes raffrayanus* but unlike *P. broadbentii.* The lacrimals are smooth, with no evidence of crest development, as in other *Peroryctes* (unlike Australian peramelemorphians). In lateral view, the narial flange of the premaxilla are straight as in other species of *Peroryctes* (wing-like in shape in all other modern peramelemorphians). The infraorbital foramen is located about M2 (above M1 in *P. raffrayanus*), reducing the length of the infraorbital canal. The antorbital fossa is deeper in the paratype than in the holotype, similar in depth to *P. raffrayanus,* but shallower than in *P. broadbentii.* The lacrimal foramen is bordered anteriorly by the maxilla as in all species of *Peroryctes* and *Macrotis* (unlike all other peramelemorphians, contained entirely by the lacrimal). The orbitosphenoid is visible as a large ossification, larger than in other species of *Peroryctes.* In posterior view, the supraoccipital contributes to the dorsal margin of the foramen magnum, unlike in *P. broadbentii.* In ventral view, the palate has two sets of foramina, the incisive foramina, which are similar to those of the other species of *Peroryctes,* and the maxillopalatine fenestrae, which are larger than other species of *Peroryctes,* extending anteriorly to the P3 (to M1 in *P. raffrayanus* and M2 in *P. broadbentii*). The basicranium is, in general, flatter than in other *Peroryctes.* The petrosal is similar in morphology to *P. raffrayanus,* with

Figure 5. *Peroryctes trigonodon* sp. nov., holotype, AMS M.30856 (*A–E*), adult female, skull in (*A*) dorsal, (*B*) ventral, and (*C*) lateral views, dentary in (*D*) lateral, and (*E*) occlusal views. Paratype, AMS M.30817 (*F–J*), adult male, skull in (*F*) dorsal, (*G*) ventral, and (*H*) lateral views, dentary in (*I*) lateral, and (*J*) occlusal views. Scale bar = 2 cm.

a smaller rostral tympanic process than in *P. broadbentii.* The alisphenoid tympanic process (bullae), is flat and short as in *P. broadbentii,* with no tube-like protrusion above the secondary foramen ovale, as in *P. raffrayanus.* The primary foramen ovale is not entirely in the alisphenoid but bordered also by the petrosal as in *P. broadbentii* (entirely within the alisphenoid in *P. raffrayanus*). The dentary is slender and morphologically closer to *P. raffrayanus* than *P. broadbentii,* which is more robust. There are no other distinguishing features on the dentary.

The following description of the teeth is based principally on the holotype, as the paratype is an older individual with very worn teeth, unless stated otherwise (Fig. 6). There are five upper incisors, rhomboidal in shape, except for I5, which is more pointed and more canine-like. I1–3 increase in size posteriorly, and then I4–5 decease in size posteriorly. There is a short diastema between I4 and I5, and a larger one between I5 and C1. The C1 is recurved and unirooted. There are no accessory cusps on the C1. In both the holotype and paratype, the C1 is shorter than the P1, with no evident sexual dimorphism (males of *Isoodon* and *Macrotis* have an enlarged C1). A large diastema, longer than P1, separates C1 and P1, and then P1 and P2. P1–3 are similar in shape, with a tall main cusp, a small posterior cusp, and a smaller anterior cusp. P1–3 increase in length and height posteriorly, except P3 is subequal in height to P2. P3 has a small lingual shelf, similar in size to that of *P. broadbentii*, but smaller than that of *P. raffrayanus*. The P3 in both the holotype and paratype are similar in size, unlike *P. broadbentii*, in which the males have a significantly longer and taller P3. The M1 is the longer molar on the tooth row, but the least wide. StA is the most anterior cusp on the crown, with a short anterior cingulum lingually. The paracone is quite worn, but the preparacrista connects to StB/StC. This crest ends in the interloph valley, and does not connect to StD,

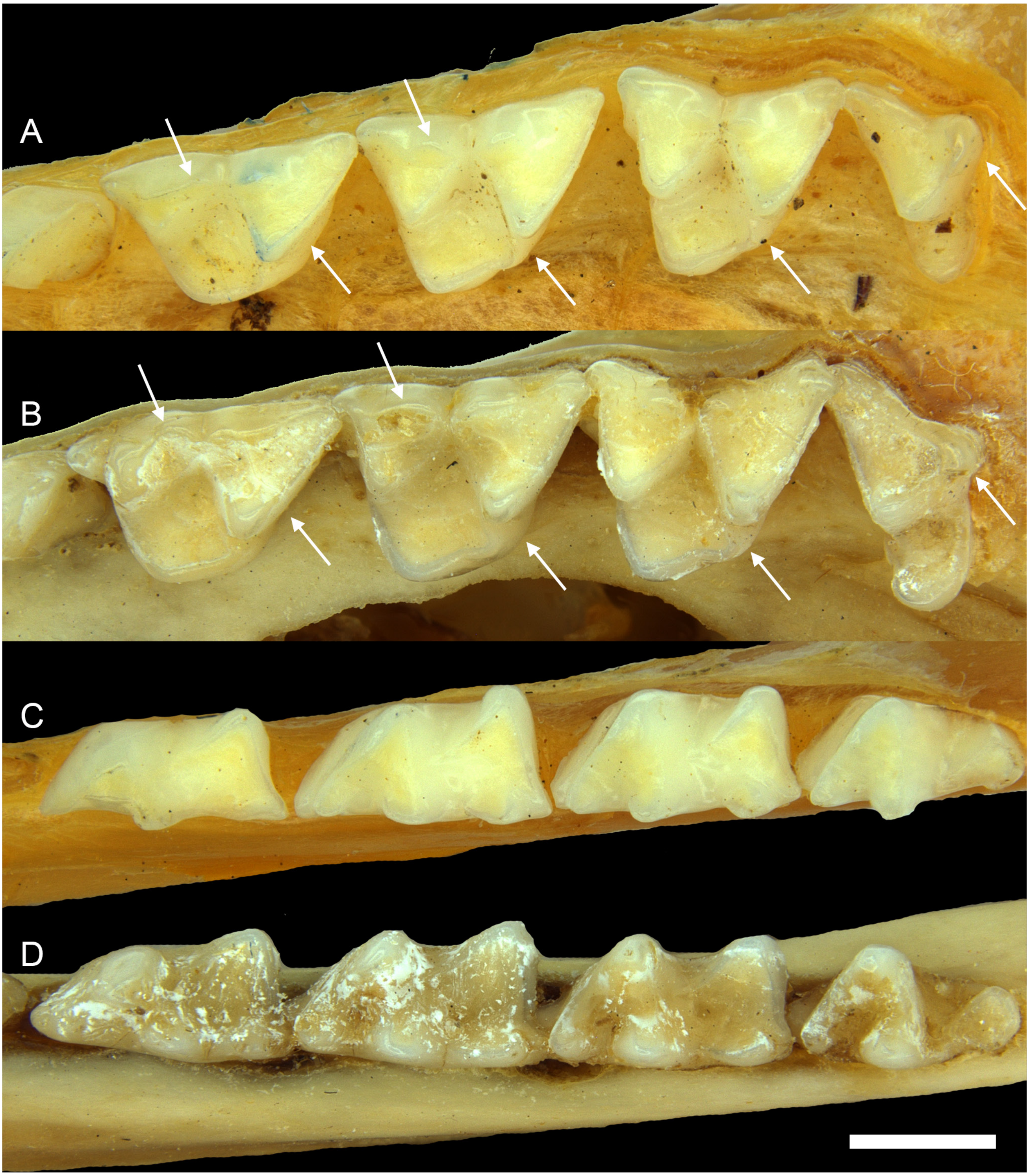

Figure 6. *Peroryctes trigonodon* sp. nov., holotype, AMS M.30856, adult female; (*A*) upper molars, (*C*) lower molars, in occlusal views. *Peroryctes raffrayanus*, WAM M23091, adult female; (*B*) upper molars, (*D*) lower molars, in occlusal views. Arrows point to diagnostic features. Scale bar = 2 mm.

nor to the postparacrista. StD1 is absent. StD is conical, tall and bladed, but it is not connected by a stylar crest posteriorly. StE is small, barely visible just anterior to the metastylar tip. The premetacrista ends at the anterior of StD. The preprotocrista ends at the lingual flank of the paracone, and the postprotocrista ends at the metaconule, at the lingual flank of the metacone. No shelf separates the metaconule from the lingual flank of the metacone. The M2 is similar in morphology to the M1 except that the tooth is shorter but wider. The protocone, paracone, and metacone are larger and more lingual. The parastylar shelf is larger, but StC is absent. StA is taller, and connected to StB by a crest. The anterior cingulum is wider but does not connect to the talon. The stylar crest is absent, and StE is smaller. The M3 is similar to the M2 in morphology but it is shorter in length but wider. StB is conical and does not connect to StA. The preparacrista is more anteriorly directed and connects to StA. The protocone is smaller and more lingual, elongating the preprotocrista and postprotocrista, which are both more buccally orientated. The M4 is very reduced in size, with only the parastylar shelf and talon present. The anterior cingulum, StB, StD, StE, and metaconule are absent. The postparacrista is straight and ends at a remnant of a metacone. The preprotocrista and postprotocrista are short and end on the anterior and posterior flanks of the paracone respectively.

The three lower incisors are flat and bladed, with i3 being bilobed. A short diastema separates i3 to c1. The c1 is strongly recurved, with a small posterior cuspid. The c1 is as tall as the p1. Large diastemata, longer than the length of p1, separate c1 and p1 and p1 and p2. The p1–3 are similar in morphology, with tall anterior and posterior cuspids. The p1–3 gets progressively taller and longer posteriorly, but less recurved. The m1 has a long but narrow trigonid, with no anterior cingulid. The paraconid-metaconid distance is longer than metaconid-protoconid distance. The paraconid is directly anterior to the metaconid as in *P. raffrayanus* (more buccally positioned in *P. broadbentii*). The talonid is wider than the trigonid, but as long. Cristid obliqua is parallel to the paracristid and the posthypocristid is parallel to the metacristid. The entoconid is small, ovoid, with anteriorly directed preentocristid. The smaller hypoconulid is directly posterior to the entoconid. The m2 is similar in morphology to the m1except it is both longer and wider. An anterior cingulid is present. All cuspids are taller and crests elongated. The m3 is similar to the m2 in morphology, except the paraconid-metaconid distance is shorter than the metaconid-protoconid distance. The protoconid is taller, and the talonid is less wide, with all cuspids on the talonid reduced in size. The m4 is similar to the m3 in morphology except the talonid is further reduced, with much smaller hypoconid, entoconid, and hypoconulid present.

Discussion

Peroryctes trigonodon sp. nov. is a distinctive bandicoot, easily distinguished from its congeners by qualitative and morphometric craniodental comparisons. Despite our thorough search through museum collections, we have not found any further specimens of this taxon—all other *Peroryctes* specimens we have encountered in world museum collections represent either *P. raffrayanus* or *P. broadbentii* (Aplin *et al*., 2010). This indicates that *P. trigonodon* is a rare component of the New Guinean fauna and may be much restricted to the high elevation West Baliem Valley. We note that Flannery (1999) reported on a Pleistocene assemblage of small mammal bones from Kelangurr Cave in the Kwiyawagi area, and *Peroryctes trigonodon* is absent from this Late Glacial Maximum assemblage, potentially indicating its rarity; the only peroryctid recorded from the assemblage is a species of *Microperoryctes*, which likely awaits formal description (Helgen, 2007). Insufficient information is yet available for a more formal conservation assessment, but *Peroryctes trigonodon* may be very rare and possibly threatened. Being likely forest dependent, it may be at risk of extinction if clearance of native vegetation is ongoing in the Kwiyawagi area.

The range of *P. trigonodon*, which is restricted to the West Baliem River Valley on the basis of current knowledge, contrasts with the wide geographic range of its highland congener, *P. raffrayanus*, which occurs both to the east and west of the Baliem Valley. *Peroryctes raffrayanus* is most common in eastern New Guinea, where it occurs along the Central Cordillera from the mountains of Milne Bay Province in the far south-east to the Star Mountains in the centre of New Guinea. Records of *P. raffrayanus* are rarer in the western part of the Cordillera, but it is represented in the Idenburg River transect sampled by the Archbold Expeditions (specimens at AMNH) and is known from specimens from the Weyland Range at the western margin of the Cordillera. *Peroryctes raffrayanus* also occurs in most of the well-sampled outlying mountain ranges of New Guinea, including in the Huon Peninsula, North Coast Ranges (Torricelli Mountains), Cyclops Mountains, and the Tamrau and Arfak Mountains in the far west. Though usually found above 500 m, *P. raffrayanus* can be found in some circumstances down to less than 100 m above sea level (Flannery, 1995).

Western New Guinea is a zone of remarkable mammalian endemism (Helgen, 2007). *Peroryctes trigonodon* joins a substantive list of mammal species that are known only from quite small, circumscribed high elevation areas of the western part of the Central Cordillera of New Guinea, including one other bandicoot species, *Microperoryctes murinus* Stein, 1932, known only from the Weyland Range, and the tree-kangaroo *Dendrolagus mbaiso* Flannery, Boeadi, & Szalay, 1995, of the Sudirman Range and vicinity (Flannery, 1995; Flannery *et al*., 1995, 1996; Helgen & Flannery, 2004; Wild & Balke, 2018). This list also includes the rodents *Brassomys albidens* (Tate, 1951), *Pseudohydromys patriciae* Helgen & Helgen, 2009, and *Mallomys gunung* Flannery, Aplin, & Groves, 1989, each known only from the vicinity of Lake Habbema and Mount Trikora (Wilhelmina); *Hydromys hussoni* Musser & Piik, 1982, known only from the Paniai Lakes; and *Macruromys elegans* Stein, 1933 and *Paramelomys steini* (Rümmler, 1935), known only from the Weyland Range (Flannery *et al*. 1989; Menzies, 1996; Musser & Carleton, 2005; Helgen, 2005; Helgen & Helgen, 2009; Musser & Lunde, 2009). Many additional mammal species endemic to western New Guinea uplands are known from mountain ranges outlying the Central Cordillera, including the mountains of Vogelkop and northern ranges such as the Fojas and Cyclops (Helgen, 2007). Continued advances in illumination of mammalian taxonomic patterns and endemism, including new species descriptions, are of potential utility in efforts to delimit important areas for conservation in western New Guinea (Diamond, 1986; Petocz, 1989; Schipper *et al.*, 2008) and remind us of the importance of describing new species to more effectively enable their preservation (Liu *et al.,* 2022).

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