ELSEVIER

Mammalian Biology
Zeitschrift für Säugetierkunde

www.elsevier.de/mammbiol

Original investigation

A new species of murid rodent (genus *Mayermys*) from south-eastern New Guinea

By K. M. HELGEN

School of Earth and Environmental Sciences, University of Adelaide, and South Australian Museum, North Terrace, Adelaide, Australia

Receipt of Ms. 09. 12. 2003
Acceptance of Ms. 17. 02. 2004

Abstract

Mayermys is the only muroid genus with a single molar in each quadrant of the jaw. This distinctive genus is restricted to montane New Guinea and has previously been considered monotypic. Here a second species of *Mayermys* is described from the mountains of far south-eastern Papua New Guinea. The dentition of this new species is more reduced than that of any other species of rodent, living or fossil.

Key words: Murinae, Muridae, Papua New Guinea, taxonomy

Introduction

On the basis of data derived from studies of skulls and teeth, reproductive systems, and immunological distances, the amphibious water-rats and small-bodied shrew-rats of New Guinea and Australia are generally thought to comprise a monophyletic group (TATE 1951; LAURIE and HILL 1954; LIDICKER 1968; MENZIES and DENNIS 1979; MUSSER and HEANEY 1992; WATTS and BAVERSTOCK 1994; FLANNERY 1995; BREED and APLIN 1995) characterized by, among other traits, basin-shaped molars and/or reduced or absent third molars ($M^3/_3$). This group, often classified as the murid subfamily Hydromyinae or (now more commonly) the murine tribe Hydromyini (WATTS and BAVERSTOCK 1994; FLANNERY 1995) includes the murid genera *Hydromys* E. Geoffroy, 1804, *Parahydromys* Poche, 1906, *Crossomys* Thomas, 1907, *Microhydromys* Tate and Archbold, 1941, *Paraleptomys* Tate and Archbold, 1941, *Xeromys* Thomas, 1889, *Leptomys* Thomas, 1897, *Pseudohydromys* Rümmler, 1934, *Neohydromys* Laurie, 1952, and *Mayermys* Laurie and Hill, 1954 (WATTS et al. 1992; BREED 1997; reviewed by MUSSER and CARLETON 2004) (however, both the integrity of this large grouping and the boundaries and interrelationships of certain genera remain to be firmly established; see MUSSER and CARLETON 2004). Of these genera, one of the most phenetically distinctive is *Mayermys*, diagnosed by possession of only a single molar in each quadrant of the jaw (i. e. with only eight teeth in total – four incisors and four molars, fewer

than any other rodent). Until now *Mayermys* has been considered a monotypic genus, with the single species *M. ellermani* Laurie and Hill, 1954 (LAURIE and HILL 1954; MENZIES and DENNIS 1979; FLANNERY 1995; MUSSER and CARLETON 2004). A second, morphologically distinctive species is described here, based upon a newly-obtained specimen of *Mayermys* from far south-eastern New Guinea.

Material and methods

Specimens discussed here are deposited in the collections of the Australian Museum, Sydney (AM); the American Museum of Natural History, New York (AMNH); the Bernice P. Bishop Museum, Honolulu (BBM); the Natural History Museum, London (BMNH); and the Museum of Vertebrate Zoology, Berkeley, California (MVZ). Craniodental variables were measured with digital callipers to the nearest 0.01 mm; external variables were recorded by the original collector in the field. Linear measurements are given in millimetres, weights in grams.

Results

Mayermys germani new species

Holotype: The holotype of *germani* is AM M29245, adult male, skull and study skin, from Munimun Village (09°53′ S, 149°23′ E), 1 300 m, near Agaun (Milne Bay Province, Papua New Guinea), collected 11 August 1992 by P. GERMAN (field number FR341). The holotype – an adult male with large testes, snap-trapped on the ground – is the only known specimen.

Diagnosis: A rat with only one molar ($M^1/_1$) in each quadrant of the jaw (a trait shared only with *Mayermys ellermani*); body and cranial size larger than *M. ellermani* (Tab. 1); ear dark grey (vs. pale grey in *M. ellermani*); tail sparsely haired, with very short hairs (more heavily haired, with longer hairs in *M. ellermani*); molars markedly reduced relative to *M. ellermani* (Fig. 4), upper incisors proodont but less strongly procumbent than in *M. ellermani* (Fig. 3).

Distribution: *M. germani* is known only from the type locality (Fig. 1) at approximately 1 300 m. The holotype is the only specimen of the genus *Mayermys* collected from the south-eastern peninsula of New Guinea.

Its sister species, *M. ellermani*, is recorded throughout the Central Cordillera of New Guinea from the Snow Mountains (in Papua Province, Indonesia) to the vicinity of Wau (in Morobe Province, Papua New Guinea), at elevations between 1 400 and 2 800 m (Fig. 1, Tab. 2).

Etymology: The specific epithet honours PAVEL GERMAN, collector of the holotype

Table 1. Selected measurements for *Mayermys ellermani* and the holotype of *M. germani*. Values are means ± SD, with ranges below, with sample size in parentheses.

	M. ellermani	*M. germani*
Weight	17.6 ± 2.93 13–21.3 (16)	29.5
Head-body length	96.2 ± 5.39 88.5–103 (23)	105
Tail length	102.3 ± 5.47 90–113 (23)	103
Hindfoot length	21.6 ± 1.03 19–23 (23)	21
Ear length	10.9 ± 1.08 7–12 (23)	12.6
Condylobasal length	23.3 ± 1.23 21.7–24.9 (9)	25.5
Zygomatic breadth	10.8 ± 0.18 10.6–11.1 (9)	11.7
Interorbital breadth	4.2 ± 0.22 3.9–4.6 (10)	4.9
M^1 length	0.93 ± 0.13 0.80–1.10 (11)	0.68
M^1 width	0.58 ± 0.05 0.50–0.66 (11)	0.44
M_1 length	0.83 ± 0.15 0.66–1.13 (7)	0.61
M_1 width	0.56 ± 0.05 0.47–0.60 (7)	0.44
Mandible length	12.9 ± 0.39 12.3–13.7 (9)	13.7

Fig. 1. Distribution of *Mayermys ellermani* (filled dots; Central Cordillera) and *M. germani* (filled triangle; SE New Guinea).

Table 2. Comprehensive list of vouchered collection localities (and elevations) for *Mayermys ellermani*.

Morobe Province, Papua New Guinea Edie Creek (7°21′ S, 146°40′ E), 7 000 ft [= 2 135 m] (MVZ 129794–129796, 129798) Summit of Mt. Kaindi (7°21′ S, 146°41′ E), 2 255–2 350 m (AM M14399, PNGM 24661) Wau (7°20′ S, 146°43′ E), no altitude (PNGM 24667) Mt. Missim (7°13′ S, 146°49′ E), 1 980 m (BBM-NG 160959, 161196)
Eastern Highlands Province, Papua New Guinea Purosa (6°40′ S, 145°34′ E), Okapa area, 1 970 m (AMNH 191424) Mt. Erimbari (6°12′ S, 145°10′ E), no altitude recorded (AM M24312)
Chimbu Province, Papua New Guinea Mt. Wilhelm (5°49′ S, 144°57′ E): N slopes, 8 000 ft [= 2 440 m] (BMNH 53.277); Pengagl Creek, altitude uncertain (AMNH 191423) E face of lower Mt. Karimui (6°35′ S, 144°49′ E), 1550 m (AM M14827, 15324)
Western Highlands Province, Papua New Guinea Welya (5°41′ S, 144°08′ E), 8 000–9 000 ft [2 440–2 745 m] (BMNH 53.278, 53.279)
Southern Highlands Province N slopes Mt. Giluwe (6°06′ S, 143°18′ E), 8 000–9 000 ft [2 440–2 745 m] (BMNH 53.280), 2 800 m (BBM-NG 91734) NNW slopes Mt. Bosavi (6°33′ S, 142°50′ E), 2 100 m (BBM-NG 103485)
West Sepik (Sandaun) Province, Papua New Guinea 5 km S Bafunmin (ca. 5°06′ S, 141°26′ E), 1 600–2 300 m (BBM-NG 107905, 108176) Feramin (5°11′ S, 141°38′ E), 5 miles SE Telefomin, 1 400 m (BBM-NG 100357)
Papua Province, Indonesia Porokma (4°00′ S, 138°43′ E), Lake Habbema area, 2 800 m (AM M26984, 26987)

and of many other important mammal specimens from throughout the Melanesian region.

Description: The morphology of this new species agrees in most aspects with *M. ellermani* as described by LAURIE and HILL (1954), LIDICKER and ZIEGLER (1968), and MUSSER and HEANEY (1992), but differs strikingly in the following traits. The pelage is soft, dense, and dark smoky-grey above, and slightly lighter grey on the shoulders and venter (which is uniformly coloured, lacking a white chest flash), as in *M. ellermani*. However, the ear is dark grey in *M. germani*, whereas it is flesh-coloured and contrasts with colouration of the dorsum in *M. ellermani* (see photographs in FLANNERY 1995 and NOWAK 1999). The dorsal surfaces of the manus and pes are white (generally pale greyish-white in *M. ellermani*), and the dorsal pelage of the rump is flecked with white. The tail is not irregularly mottled and has a conspicuous cream-coloured tail-tip (21.5 mm long on the dry skin) more prominent than in most specimens of *M. ellermani*. Dimensions of tail and hindfoot are similar in *M. germani* and *M. ellermani*, but *M. germani* is larger-bodied (the holotype of *M. germani* is 38% heavier than AM M15324, the heaviest known specimen of *M. ellermani*), chunkier (Fig. 2), and has a longer ear (Tab. 1). The tail is much less hairy than that of *M. ellermani*, with tail hairs more sparsely distributed and each hair less than or subequal to the length of each tail scale ring (longer than the scale rings in *M. ellermani*) – a striking difference between the two species. There are 17–18 rings per cm in the mid-section of the tail, in agreement with the 15–18 reported for *M. ellermani* (LAURIE and HILL 1954; LIDICKER and ZIEGLER 1968).

The skulls of both species of *Mayermys* agree in general conformation and profile (Fig. 3). Both species have an elongate braincase that is distinctly constricted laterally posterior to the squamosal roots of the zygoma, and similarly tiny, rounded, double-rooted molars – two derived traits absent in other New Guinean shrew-mice, including the closely-related genera *Pseudohydromys* and *Neohydromys*. The skull of *M. germani* is larger (and more robust in essentially all aspects) than that of *M. ellermani*, the rostrum is not so dorso-ventrally tapered as in that species (Fig. 3), and there

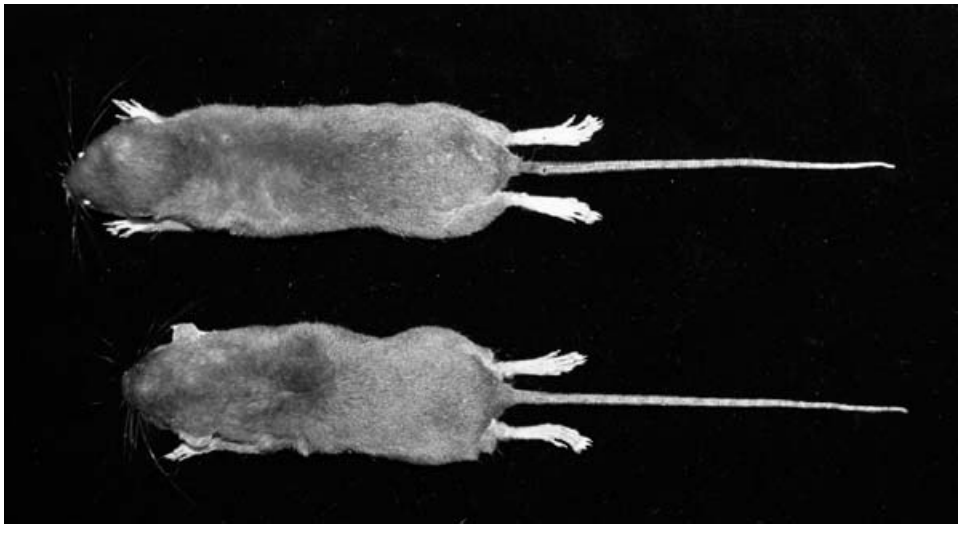

Fig. 2. Study skins of *Mayermys ellermani* (below, AM M26987, adult male, Lake Habbema area) and *M. germani* (above, AM M29245, adult male, Agaun area).

Fig. 3. Skulls of *Mayermys ellermani* (above, AM M15324, adult male, Mt. Karimui, 1 550 m) and *M. germani* (below, AM M29245, adult male, Agaun area).

are striking dental differences between the species. In particular, in *M. germani* the solitary molars are absolutely and relatively smaller than in *M. ellermani*; the trend toward dental simplification seen in hydromyin rodents (Misonne 1969) thus reaches its greatest development in *M. germani*. Additionally, the upper incisors of *M. germani*, though proodont, are not so distinctively procumbent as in series of *M. ellermani* (Fig. 3); the latter species shares this trait with *Neohydromys fuscus* Laurie, 1952 and *Xeromys myoides* Thomas, 1889. The mandible is not as gracile as in *M. ellermani* (Fig. 3), and the lower incisors are long and considerably more upcurved, more like shrew-mice of the genera *Pseudohydromys* or *Neohydromys* (cf. photographs in Laurie and Hill 1954) than *M. ellermani*. Upper and lower incisors are ungrooved, as in *M. ellermani*.

Discussion

Little can yet be said of this new species' basic biology, as it is thus far known by a single specimen. Its sister species, *M. ellermani*, also little-known, is primarily an inhabitant of high-elevation moss forest (Lidicker and Ziegler 1968; Flannery 1995) and is omnivorous – taking insects, plant material, and fungi (Jackson and Woolley 1993). The single specimen of *M. germani* was collected at a lower elevation (about 1 300 m) than the altitudinal range of *M. ellermani* as documented by museum specimens (1 400–2 800 m; 16 trapping localities – see Tab. 2).

Throughout much of the Tertiary, south-eastern New Guinea was an island separated from the rest of New Guinea (Dow 1977; Flannery 1995). Relative to other parts of the modern-day island, the south-eastern peninsula of New Guinea thus has a partially independent geological and faunal history, and today the mountain ranges of south-eastern New Guinea (especially the far south-east) are a notable centre of mammalian endemism. In addition to *Mayermys germani*, mammals species endemic to these south-eastern mountains include the dasyure *Murexia* (*Paramurexia*) *rothschildi* Tate, 1938, the bandicoot *Microperoryctes papuensis* (Laurie, 1952), the tree-mouse *Chiruromys lamia* (Thomas, 1897), and the soft-furred rat *Rattus vandeuseni* Taylor and Calaby, 1983 (Flannery 1995; Van Dyck 2002), as well as undescribed species of the marsupial genus *Phalanger* Storr, 1780 (Flannery, pers. comm.) and the murine genera *Coccymys* Menzies, 1990 and *Leptomys* (Musser and Lunde, in litt.). Additional montane endemics in the south-east include distinctive subspecies of echidna (*Zaglossus bartoni smeenki* Flannery and Groves, 1998), tree kangaroo (*Dendrolagus dorianus dorianus* Ramsay, 1883), and ringtail possum (*Pseudochirulus forbesi forbesi* [Thomas, 1887]) (Flannery 1995; Flannery and Groves 1998). Several additional mammal taxa, including *Peroryctes broadbenti* (Ramsay, 1879), *Spilocuscus maculatus goldiei* (Ramsay, 1876), *Dor-*

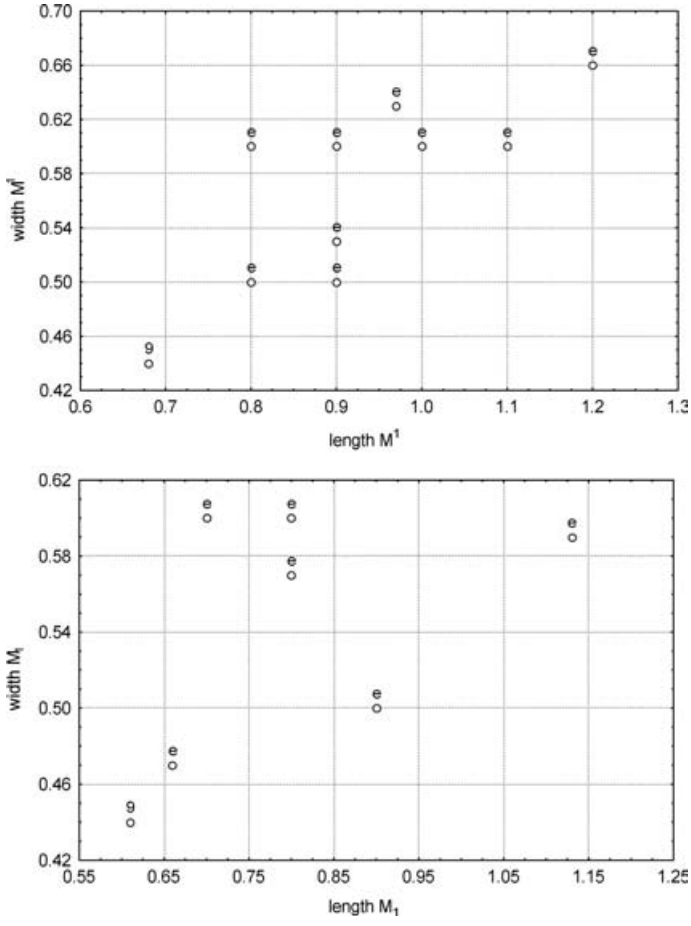

Fig. 4. Dimensions of the upper and lower molars in *M. ellermani* (e) and *M. germani* (g).

copsis luctuosa luctuosa (D'Albertis, 1874), and *Chiruromys forbesi forbesi* Thomas, 1888, are also distinctive south-eastern New Guinean endemics, but are restricted to lowland habitats (such as lowland forests and grasslands), rather than montane forests.

Acknowledgements

For access to specimens and other assistance during museum visits, I thank SANDY INGLEBY and TISH ENNIS (AM), PAULA JENKINS, RICHARD HARBORD, and DAPHNE HILLS (BMNH), CARLA KISHINAMI, ALLEN ALLISON, FRED KRAUS, and NEAL EVENHUIS (BBM), DARRIN LUNDE (AMNH), and JIM PATTON and CHRISTOPHER CONROY (MVZ). I thank GUY MUSSER for an insightful review of this study, TIM FLANNERY, DON WILSON, and STEVE RICHARDS for ongoing assistance and advice, PAVEL GERMAN for important discussions, and LAUREN JOHNSTON for producing the map. My research has been supported by fellowships and grants from the Australian-American Fulbright Commission, the National Science Foundation (Graduate Research Fellowship), the Smithsonian Institution (Short-Term Visitor Program), and the South Australian Museum.

Zusammenfassung

Eine neue Muriden-Art (Gattung *Mayermys*) aus dem Südosten von Neuguinea

Mayermys ist die einzige Nagetier-Gattung mit nur einem einzigen Molaren in jedem Kieferast. Diese markante Gattung ist auf Gebirge in Neuguinea beschränkt und gilt bisher als monotypisch. Hier wird eine zweite Art von *Mayermys* aus dem äußersten Südosten der Insel beschrieben. Die Bezahnung dieser neuen Art ist stärker reduziert als die irgendeiner anderen lebenden oder fossilen Nagetier-Art.

References

Breed, W. G. (1997): Evolution of the spermatozoon in Australasian rodents. Aust. J. Zool. **45**, 459–478.

Breed, W. G.; Aplin, K. P. (1995): Sperm morphology of murid rodents from New Guinea and the Solomon Islands: phylogenetic implications. Aust. J. Zool. **43**, 17–30.

Dow, D. B. (1977): A geological synthesis of Papua New Guinea. Aust. Bur. Min. Res. Geol. Geophys. Publ. **201**, 1–41.

Flannery, T. F. (1995): Mammals of New Guinea. (Revised ed). Ithaca, New York: Cornell University Press.

Flannery, T. F.; Groves, C. P. (1998): A revision of the genus *Zaglossus* (Monotremata, Tachyglossidae), with description of new species and subspecies. Mammalia **62**, 367–396.

Jackson, K. L.; Woolley, P. A. (1993): The diet of five species of New Guinean rodents. Sci. New Guinea **19**, 77–86.

Laurie, E. M. O.; Hill, J. E. (1954): List of Land Mammals of New Guinea, Celebes, and Adjacent Islands, 1758–1952. London, UK: British Mus. (Nat. Hist.).

Lidicker, W. Z., Jr. (1968): A phylogeny of New Guinea rodent genera based on phallic morphology. J. Mammalogy **49**, 609–643.

Lidicker, W. Z., Jr.; Ziegler, A. C. (1968): Report on a collection of mammals from eastern New Guinea, including species keys for fourteen genera. Univ. California Publ. Zool. **87**, 1–64.

Menzies, J. I.; Dennis, E. (1979): Handbook of New Guinea Rodents. Wau, Papua New Guinea: Wau Ecology Institute (Handbook 6).

Misonne, X. (1969): African and Indo-Australian Muridae: evolutionary trends. Ann. Mus. Roy. Afr. Cent. (Tervuren, Belgium), ser. IN-8°, **172**, 1–219.

Musser, G. G.; Carleton, M. D. (2004): Family Muridae. In: Mammal Species of the World: a Taxonomic and Geographic Reference, third edition. Ed. by D. E. Wilson and D. R. Reeder. Washington, D.C.: Smithsonian Institution Press (in press).

Musser, G. G.; Heaney, L. R. (1992): Philippine rodents: definitions of *Tarsomys* and *Limnomys* plus a preliminary assessment of phylogenetic patterns among native Philippine murines (Murinae, Muridae). Bull. Amer. Mus. Nat. Hist. **211**, 1–138.

Nowak, R. M. (1999): Walker's Mammals of the World. Sixth ed, 2 vols. Baltimore, Maryland: Johns Hopkins University Press.

Tate, G. H. H. (1951): Results of the Archbold Expeditions. No. 65. The rodents of Australia and New Guinea. Bull. Amer. Mus. Nat. Hist. **97**, 183–430.

Van Dyck, S. (2002): Morphology-based revision of *Murexia* and *Antechinus* (Marsupialia: Dasyuridae). Mem. Queensland Mus. **48**, 239–330.

Watts, C. H. S.; Baverstock, P. R. (1994): Evolution in New Guinean Muridae (Rodentia) assessed by microcomplement fixation of albumin. Aust. J. Zool. **42**, 295–306.

Watts, C. H. S.; Baverstock, P. R.; Birrell, J.; Krieg, M. (1992): Phylogeny of the Australian rodents (Muridae): a molecular approach using microcomplement fixation of albumin. Aust. J. Zool. **40**, 81–90.

Author's address:

Kristofer M. Helgen, South Australian Museum, North Terrace, Adelaide SA 5000, Australia (e-mail: kristofer.helgen@adelaide.edu.au)