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ON FIVE NEW RATS OF THE GENUS *PSEUDOMYS*.

By

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Since the late Oldfield Thomas defined the four subgenera and described three species in 1910, only three additional forms of *Pseudomys* have been recorded. The inference is either that but few races of this interesting genus remain undiscovered, or that individual forms have been accorded far too extensive ranges in the past. For example, two distinct species from Central Australia relegated to coastal forms by Waite, are shown herein to belong to entirely different subgenera and are described as new.

There could be no more definite proof of the value of field work than that a review of the Australian Museum *Pseudomys*, comprising the "old collection", and recent material gained under the inadequate collecting resources now available, revealed interesting and new forms only part of which can be dealt with here.

During 1931 Mr. E. F. Boehm, of Sutherlands, South Australia, submitted young specimens for identification and exchange. Owing to difficulty in sorting out the affinities of immature material, the Trustees secured adults from Mr. Boehm, who accorded permission to describe the form. I am indebted to Mr. A. S. Le Souef for the opportunity to describe specimens from Western Australia; also to Mr. T. Hodge-Smith, Mineralogist and Petrologist to the Museum, who, while on an expedition to the interior in 1930, secured specimens of a form not reported since 1896.

Subgenus *Pseudomys* Gray.

Pseudomys Gray, Proc. Zool. Soc., 1832, p. 39.

Size largest of the genus. Front edge of zygomatic plate evenly concave, with a strong projection above. No antero-internal secondary cingular cusp on m^1 (except as an unusual abnormality).

Type.—*Ps. australis* Gray.

Pseudomys (*Pseudomys*) *minnie*, sp. nov.

Diagnosis.—A small-toothed, large-eared form, intermediate between *Ps. auritus* and *Ps. australis*: the ear, hindfoot, and skull decidedly smaller than in the former, and the ear apparently longer, the teeth smaller, and lacking the warm coloration of the latter.

Colour.—Back pale buffy-grey in the male holotype and buffy-brown in the allotype, the tone near "wood brown" (Ridgway), composed of the grey base, pinkish cinnamon upper part and sepia brown tips of the fur. Sides of the female washed with light pinkish cinnamon, which extends along the cheeks and outside of the limbs and contrasts sharply with the undersurface; in the male, probably not fully adult, the coloration of these parts, and generally, is much paler and

the contrast with the undersurface therefore less marked. Undersurface dull white just tinted with pale pinkish buff, grey basally, the general tone not dark enough for the "soiled buffy" of *auritus*. Outwardly the ears are sparsely haired with dark brown in front, and with buffy hairs over the remainder and internally. Manus and pes dull white; a dark brown to blackish patch on the outside and back of the heel. Basal two-thirds of tail above pinkish buff and brown mixed, becoming paler at tip; undersurface dull white.

External characters.—The hindfoot (27–28 mm.) and ear (21.5–23) are definitely smaller than given for *auritus*, 32 and 26 respectively; the ear laid forward just reaches the anterior canthus of the eye and is apparently definitely longer than in *australis*.

Skull and dentition.—The skull is much shorter and considerably smaller in all dimensions, excepting perhaps the interorbital width, than in *auritus*. Palatal foramina apparently shorter than in typical *australis*, not extending beyond the first lamina of m^1 , instead of reaching the middle of that tooth, as Thomas indicated for the latter. Teeth shorter than in either ally.

Dimensions of female allotype.—In spirit: head and body, 117; tail, 111; hindfoot, 27; ear, 23.

Skull: greatest length, 30.7; basilar length, 25; greatest breadth, 16.3; nasals, 11.1×3 ; interorbital breadth, 4; breadth of brain-case, 14.3; palatal length, 15; palatal foramina 7.3×1.7 ; upper molar series, 5.8.

Range.—Minnie Downs Station, in the extreme north-east of South Australia. Dug out of burrows by aborigines and forwarded to Mr. Boehm by Mr. L. von Reon Reese.

Holotype, young adult male, No. M.5195 in the Australian Museum collection, received in exchange from Mr. E. F. Boehm. Allotype, adult female, in the collection of Mr. Boehm.

Remarks.—Thomas stated that *auritus* was the largest of the genus, but his later coastal subspecies, *Ps. australis oralis*, apparently has a longer skull, and definitely larger teeth. The new inland form, however, is a much smaller animal than *auritus*, while the ears are apparently longer than in *australis*, which Thomas said, of the original material, "has the ears of about the normal size".

It is notable that the new form is the most central recorded for the subgenus, and that the paler coloration, smaller teeth and intermediate ear-length may be due to its different habitat to that of the coastal *auritus*, and the more fertile Darling Downs and Liverpool Plains areas from which *australis* and its two synonyms were described. The habitat of *australis* was given on the authority of the donor as "holes in swampy sandy grounds on the south-west or lower side of Liverpool Plains in New Holland"; *lineolatus* was "common in all the open parts of the grassy plains" and "called *Yar-lic* by the natives of the Darling Downs", according to Gilbert, whom Gould quoted. The type of Gould's *murinus* was "procured by Mr. Gilbert on the plains bordering the rivers Namoi and Gwydyr, where the natives informed him it was very abundant".

As it is possible that these slight differences in habitat led to the colour variation described for *australis* and the two synonyms, it is to be expected that specimens from much farther inland should display characteristics of specific importance.

Pseudomys (Pseudomys) rawlinnæ, sp. nov.

Diagnosis.—Apparently allied to *Ps. shortridgei*, but the tail proportionately much longer, and the ear and hindfoot longer; the nasals are longer and decidedly narrower, and the teeth are smaller than in the type of *shortridgei*.

Colour.—Above, the general effect is a mottling of light and dark brown, composed of the cinnamon buff of the shorter and sepia tips of the longer hairs; the general tone apparently brighter than the "pale hair-brown with a tinge of buffy" of *shortridgei*. Sides of body and limbs a clearer buffy-brown, washed with light pinkish cinnamon without the mottling of the back, owing to the paling of the brown tips. Undersurface contrasting with the upper, instead of being similar if rather paler and without demarcation as in *shortridgei*; the tips are dull buffy-white and the basal colour is about dark mouse grey. Ears with outer anterior third closely covered with bister hairs, posteriorly almost naked; insides fringed with buffy hairs. Manus white, pes tinged with pale pinkish buff. The well-haired tail is sepia grizzled with buffy-white above, contrasting strongly with the dull white below.

External characters.—Compared with the type of *shortridgei* with a total length 43 mm. longer, the hindfoot and ears are longer; the tail is also proportionately longer, the length 1.1 as opposed to 1.3 in the length of the head and body.

Skull and dentition.—The skull is only 1.2 mm. shorter than that of the type of *shortridgei* with a considerably greater total length. The nasals, however, are longer and decidedly narrower, 12×2.9 opposed to 11.5×3.7 , and the palatal foramina are not narrowly pointed posteriorly, and extend almost to the first lamina of m^1 instead of barely projecting between the front of the roots. Front edge of zygomatic plate quite deeply and evenly concave. Teeth smaller than in *shortridgei*.

Dimensions of male holotype.—In spirit: head and body, 113; tail, 99; hind-foot, 27.5; ear, 21.5.

Skull: greatest length, 30.8; greatest breadth, 16.1; nasals, 12×2.9 ; inter-orbital, 3.8; breadth of brain-case, 13.7; palatilar length, 14.5; palatal foramina, 7×1.4 ; upper molar series, 5.3; breadth of m^1 , 1.8 mm.

Range.—Rawlinna, Trans-Australian Railway, Western Australia, 235 miles east of Kalgoorlie.

Holotype, adult male, No. M.4642, and an immature male, M.4643, in the Australian Museum collection, donated by Mr. A. S. Le Souef, C.M.Z.S.

Remarks.—The new form is doubtless the sub-desert representative of the south-western *Ps. shortridgei* which the collector, after whom it is named, "trapped near water" at 970 ft., in conditions evidently so entirely different from those of Rawlinna, over 450 miles eastward, as to warrant the differences shown above.

Subgenus **Leggadina** Thomas.

Leggadina Thomas, Ann. Mag. Nat. Hist. (8), vi, 1910, p. 606.

Size small. Anterior zygomatic plate straight or convex in front as in ordinary murines. Molars very variable, but always with a well-marked antero-internal cingular cusp on m^1 .

Type.—*Ps. (Leggadina) forresti* Thomas.

***Pseudomys (Leggadina) waitei*, sp. nov.**

Mus gouldi ? Waite (nec. Waterhouse), Rept. Horn Exped., ii, 1896, pp. 398-403, pl. xxv, fig. 2a-f.

Diagnosis.—A small, short-tailed form with unicoloured belly fur, decidedly smaller in all dimensions and differing cranially from the true *Ps. gouldii*. Apparently closely allied to the smaller *Ps. messorius* which differs in having a relatively longer tail and larger skull, longer palatal foramina, and bicoloured belly fur.

Colour.—The holotype male, dried after long preservation and considerably faded: general colour of back sandy buff, about tawny olive, composed of pale cinnamon buff pencilled with the darker tipping of snuff brown, the latter accentuated on the crown; on the cheeks, sides of body and limbs the cinnamon buff is paler and clearer owing to reduction of the darker tipping, but still strikingly contrasted with the creamy white undersurface, the fur of which is not bicoloured, but is whitish from base to tips. Hands and feet buffy-white. Tail brownish above, buffy-white below. Anterior outer margin of ear cinnamon brown, contrasting with body fur.

A recently collected adult female from the Hart Range near Alice Springs, according well with the dimensions of Waite's females, indicates that a medium brown tone (about snuff brown) with a suffusion of pale ochraceous salmon is typical of the living coloration, rather than the pale sandy buff tones following long preservation.

External characters.—As Waite remarked, the Alice Springs series were smaller in all dimensions than *gouldii*, especially the hindfoot range of 16-17.8 as opposed to 25.5, the latter including the negligible claw-length. The holotype male, which is toptotypical and possibly of the original collection from Alice Springs, agrees in colour and general appearance with two immature mounted specimens of the original series; the dimensions accord perfectly with those of Waite's males, and the ear, likewise, when laid forward does not reach the eye, but to slightly under 2 mm. from the posterior canthus. The hairs of the tail are long, almost concealing the scales.

Skull and teeth.—Characters of the holotype, as indicated by Waite's description and illustration of the zygomatic plate and m^1 , typical of the subgenus *Leggadina*, and not of *Thetomys*, to which *gouldii* belongs. Dimensions and appearance agreeing well with Waite's presentation, excepting his measurement for the male upper molar series, which seems contradictory and is possibly intended for 4 instead of 5 mm.; the palatal foramina projecting further posteriorly than in the figure, reaching the level of the inner corners of the secondary cingular cusp. Palatal foramina shorter than in *messorius*, and apparently less narrowed and not projecting so far posteriorly.

Palate-ridges.—As described by Waite, three complete premental and five divided interdental ridges, the fourth reduced to a tubercle on each side. The Hart Range female differs in both the angulation of the interdentals and in having the fourth ridge fully developed, a variation which may be sexual, but must remain doubtful until examples of both sexes taken jointly can be examined; Waite unfortunately did not designate the sex or discuss the variation of his specimens.

Dimensions of holotype.—In spirit: head and body, 83; tail, 59; hindfoot, 16.5; ear 12.

Skull: Greatest length, 22.6; condylo-incisive length, 21.8; zygomatic breadth, 12; nasals, 7.6 × 2.3; interorbital, 3.5; breadth of brain-case, 11.1; palatilar length, 11.2; palatal, 12.5; pal. foramina, 5.3; upper molar series 4.1, lower 3.6 mm.

Range.—Alice Springs area, Central Australia.

Specimens examined.—The holotype male, No. M.5194, in the Australian Museum collection, and a paratype male. An adult female from the Hart Range, E.N.E. of Alice Springs, collected by Mr. T. Hodge-Smith, Mineralogist and Petrologist to the Museum, has a longer ear and differences in palatal arrangement which may be mere variation, the scope of which cannot be checked on present material.

Remarks.—The habitat of *Ps. gouldii* was given as "New South Wales" by Waterhouse, but Gould in his "Mammals of Australia" stated that: "The original example . . . was probably from Mr. Coxen's collection, made either on the Upper Hunter or on the interior side of the Liverpool Range." He also refers to seeing specimens from the Liverpool Plains, from "between the River Courong and Lake Albert", South Australia, and "the neighbourhood of Moore's River, in Western Australia", thus affording the species an impossible range. In view of the disparities in habitat, and in the dimensions noted by Waite, it is surprising that he hesitated to name the Alice Springs form and regarded it as doubtfully identical with the larger coastal *gouldii*.

In "The Mammals of South Australia" Wood Jones refers to the Coorong examples of Gould, and remarks that so far as South Australia is concerned, *gouldii* appears to be a lost animal. However, as Thomas (A.M.N.H., 1921) carefully selected the lectotype from the Hunter River, N.S.W., and, as with *Ps. auritus* and its allies, the Coorong specimens were doubtless quite different, it seems evident that the range of *gouldii* has never extended to South or Central Australia.

As with many desert forms, the Alice Springs series exhibits disparity in the size of the sexes, the males averaging smaller externally. The new species is most nearly allied to *Ps. messorius*, described by Thomas (A.M.N.H., 1925) from Melrose, Spencer Gulf, and near Lake Frome, South Australia, but has a relatively smaller skull, the dimensions averaging less than in the holotype male *messorius*, which has a 22 mm. shorter total length; the palatal foramina are shorter, the tail proportionately longer, and the belly fur entirely white instead of bicoloured.

The name of the late Edgar Ravenswood Waite is associated with this interesting form as a small tribute to the work in mammalogy which he carried out so thoroughly.

Pseudomys (Leggadina) hermannsburgensis Waite.

Mus hermannsburgensis Waite, Rept. Horn Exped., ii, 1896, pp. 405-6, pl. xxvi, fig. 5a-f.

In his introduction Waite stated that most of the mice referred to in the Report were not obtained at the time the Horn Expedition visited the McDonnell Ranges, but that Professor Spencer collected quite a large number later, the entire collection subsequently being submitted to him. Part of this collection, including types, was presented to the Australian Museum, the mammal register containing this entry: "The balance of the specimens were returned to Professor Spencer; one of each species (the type) being retained.—E.R.W."

Selection of lectotype.—A holotype was not selected in the report, but in the Museum register Waite entered "specimen D in paper" as type. Unfortunately two specimens bear the one number, specimen D not being indicated, or the sex determinable in the mounted animals. Of the two co-types, however, it seems evident that the larger represents Waite's "type" and it is accordingly selected as the lectotype, No. M.1070A, in the Australian Museum.

Amongst recent acquisitions are specimens from several localities along the Trans-Australian Railway which, compared with the lectotype, appear to represent a definable race, as follows:

Pseudomys hermannsburgensis bolami, subsp. nov.

Diagnosis.—Proportions of head and body and tail as in typical form, but coloration less warm, and the hindfoot and ear consistently larger.

Colour.—Not so warmly brown as in the above co-types and, though these are faded by display, it seems improbable that such bright tones could result from similar fading in the more drab coastal race. General colour of back about Saccardo's umber, composed of cinnamon buff fur-tips and the plentiful dark pencilling, from crown to rump, of longer mummy brown hairs. Cheeks and sides of limbs and body washed with light ochraceous buff, sharply contrasting with the white undersurface. Basal fur very dark above, about blackish slate; below, only basal third of fur is of a much paler grey. Ear with outer anterior third clove brown, whitish haired within. Manus white, pes buffy white. Tail bister above, pinkish buff below. The holotype female, skinned from spirit, has a more pinkish cinnamon tone above, and a yellowish tinge below, possibly influenced by preservation.

External characters.—Ear and hindfoot longer, 15-16.5 opposed to 11-12.5, and 19.3-20 opposed to 17-17.5 mm. respectively. The ear is noticeably longer and broader than in co-types of the typical form; laid forward they reach slightly beyond the eye instead of not surpassing its centre.

Skull and teeth.—Dimensions inclined to intergrade, but the interorbital width averaging larger, 3.8 against 3.3-3.5; palatal foramina averaging slightly longer and projecting back to a level with the first lamina of m^1 instead of to its front level. Upper molar series slightly heavier.

Dimensions of holotype.—In spirit: head and body, 87; tail, 88; hindfoot, 19.5; ear, 16.

Skull: Greatest length, 23.7; basal length, 19.7; zygomatic breadth, 12.3; nasals, 7.9 × 2.4; interorbital, 3.8; breadth of brain-case, 11.4; palatal length 11.8, foramina 4.8; upper molar series 3.7, lower 3.5 mm.

Range.—Ooldea, Fisher, and Rawlinna, along the Trans-Australian Railway in South and Western Australia.

Specimens examined.—The holotype female, No. M.4938, and several spirit and dried specimens, collected at Ooldea by Messrs. Troughton and Wright, and specimens from Fisher and Rawlinna donated by Mr. A. S. Le Souef, C.M.Z.S.

Remarks.—In his Mammal Handbook, Wood Jones referred to the form occurring around Ooldea as "slightly larger than the type specimens", but the dimensions of the ear and pes of my material average decidedly larger than those listed as

captured by Mr. A. G. Bolam. Deeply interested in the sub-desert fauna around Ooldea while stationmaster there, Mr. Bolam greatly assisted collecting activities and has written an interesting account of the district.

Subgenus *Gyomys* Thomas.

Gyomys Thomas, Ann. Mag. Nat. Hist. (8), vi, 1910, p. 607.

Size small to medium. Anterior zygomatic plate much as in *Leggadina*, the front edge either convex, straight or slightly concave, but never markedly concave as in the other two subgenera. Molars of the normal murine shape; never with an antero-internal cingular cusp on m^1 .

Type.—*Ps. (Gyomys) novæ-hollandiæ* Waterhouse.

Pseudomys (Gyomys) desertor, sp. nov.

Mastacomys sp., Waite, Rept. Horn Exped., ii, 1896, pp. 406-8, pl. xxvi, fig. 6*d-f*, and Proc. Roy. Soc. Vict. (n.s.), x, 2, 1898, p. 128.

Mus nanus Waite. (*nec.* Gould), Proc. Roy. Soc. Vict., n.s., x, 2, 1898, pp. 127-8, pl. vi, fig. 4*a-d*.

Pseudomys (Thetomys) nanus Wood Jones, Handbook Mamm. South Austr., pt. 3, 1925, pp. 314-5. (Central Australian specimens only.) Not *Ps. nanus* Gould.

Diagnosis.—The only known Central Australian representative of the subgenus; the subgeneric characters separate it from *Ps. (Thetomys) nanus* to which it bears a close external resemblance.

Colour.—General tone of back about tawny-olive, composed of the cinnamon buff fur-tips and plentiful pencilling of argus brown longer hairs; becoming clearer on the sides owing to the increase of the buffy tone and decrease of the darker element. Undersurface buffy-grey, rather than greyish white as described for *nanus*; on the centre of the belly there is an unusual repetition or washing of the brownish of the back, and there is no conspicuous whitish patch beneath the tail. Anterior outer margin of ear cinnamon brown. Manus and pes warm buffy; the dark mark on the foreleg mentioned by Waite appears to be a continuation and deepening of the brown coloration of the upper limb. Tail above light argus brown, below light buff.

The holotype and paratype, as described above, faded by spirit and exposure to light, are of a clearer brown than Gould's figure of *nanus*, but were probably very similar when fresh. There is, however, no mention or trace of the dark wrist-mark in Gould's description or figure, while Waite did not refer to the under-surface colour as forming a whitish patch beneath the tail.

General characters.—The ear is relatively small, the hindfoot stout, and the hairs of the tail tend to form a brush at the tip. The front edge of zygomatic plate, in the holotype, straight, not evenly concave as in Waite's figure, and the palatal foramina comparatively short and not projecting between the molar rows, more tapered posteriorly than in the figure. Molars normally murine in shape, without any trace of an anterior cingular cusp on m^1 .

Palate-ridges.—Three premental undivided; five divided interdental, the first arising at the corner of the anterior cusp of m^1 and the last at the antero-internal cusp of m^3 , the last two less evenly arched.

Dimensions of mounted holotype.—Tail, about 88; hindfoot, 21.5; ear, 11.5. For additional dimensions, see Waite's description.

Skull: Greatest length, 27.4; nasals, 9.5×3 ; interorbital, 3.8; brain-case breadth, 12.9; palatal length 14.1, foramina 4.4; upper molar series 5.1, lower 4.9; length of bulla, 5.4 mm.

Range.—Locality of holotype and paratype given in Museum register as Central Australia, but they are undoubtedly of the original series, the localities of which were listed by Waite as Wycliffe Creek, Barrow Creek, and Alice Springs, Central Australia.

Specimens examined.—The holotype, No. M.1306, and paratype, M.1307, in the Australian Museum collection; both are mounted specimens, the sex of which was unfortunately not noted. Presented by Professor Baldwin Spencer.

Remarks.—The external similarity which led Waite to associate this Central form with the Western Australian *nanus* is entirely discounted by differences in subgeneric character shown by the skull and teeth. It may be noted that Wood Jones's description of *nanus* combines characteristics of both forms, namely, the dark wrist-mark apparently characteristic of *desertor*, and the more whitish belly colour of *nanus* which forms a conspicuous patch under the tail.

The Central Australian specimens appear to represent a very distinct species, the fourth known of the subgenus and the only one occurring in the Central region according to present knowledge.
