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THE STATUS OF "MUS" NOVAEHOLLANDIAE WATERHOUSE, AND ALLIED FORMS.

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As the subdivisions of the pseudomyid group of rats and mice are essential to the discussion of individual relationships, it is appropriate to emphasize that in 1910 Oldfield Thomas stressed their importance when defining the subgenera of *Pseudomys* (*sensu lato*) by stating that: "This genus contains species of very varied skull and molar structure, and it is with some hesitation that I leave such diverse species as, for example, *P. australis* and *P. forresti* under the same generic heading."

It is therefore clear that his subdivisions were not merely tentative, as suggested by Finlayson, but that it was actually their subgeneric status which Thomas considered possibly inadequate, when hesitating to retain them under the one genus. The elevation of the four subgenera to generic status in the Check-List by Iredale and Troughton¹ is therefore in accordance with the views of Thomas, as confirmed by his fixation of the subgenera by the nomination of genotypes, comparative diagnoses, and grouping of their known forms.

A striking example of the value of generic distinction, between species of close external resemblance, is provided by the central Australian *Gyomys desertor* Troughton, 1932, which authors previously confused with the south Western Australian *Thetomys nanus* Gould, 1858. The cranial and dental features actually represent the extremes in group distinction, *Thetomys* having the strongly concave zygomatic plate and subsidiary cusp to m¹, in contrast with the normal plate profile and absence of cusp in *Gyomys*.

Even if intergradation shown by extensive material eventually merges *Thetomys* with *Pseudomys* (*sensu stricto*), it is surely evident that the species of these allied genera, possessing the concave zygomatic plate, must be generically distinguished from the smaller *Leggadina* and *Gyomys*, which have the normally murine straight or convex zygomatic profile. Regarding the inference that variability affects the diagnostic value of the antero-internal cusp on m¹, presence or absence of which separates the pairs of allied genera, it is notable that a similar cusp distinguishes the Indian genus *Leggada*, upon which name Thomas based that of one of the subgenera, further emphasizing their generic distinction.

As possession of the subsidiary cusp is supported by differences in pterygoid and molar structure in distinguishing *Leggadina* from *Gyomys*, and the more normal pterygoid and molar pattern is associated with a subsidiary cusp in

¹ For general references, see Iredale and Troughton.—Check-List of the Mammals Recorded from Australia, Mem. Austr. Mus., vi, 1934.

separating *Thetomys* from *Pseudomys*, there appears to be no present justification for withholding generic status, of such practical value in dealing with complex relationships.

Regarding the status of *Leggadina*, it is clear that the extension of the subsidiary cusp almost to form an additional lamina in the genotype (*forresti*) cannot be reconciled generically with the complete absence of antero-internal molar cusps in *Gyomys*. The lamination of the cusp is even more pronounced in *berneyi* of central-western Queensland which, on comparison with additional allied material, now proves to be a species of *Leggadina*, allied to the northern *forresti*. Although a diminution of the cusp occurs in southern allies of *forresti*, approaching the tubercular *Leggada*-like cusp of *hermannsburgensis*, there is a coincidence of range of the large- and small-cusped groups, indicative of specific distinction.

The large-cusped shorter-tailed *forresti* group is represented inland from north to south by *forresti*, *berneyi*, *waitei*, and *messorius*, which occurs in the Spencer's Gulf - Lake Frome area. The smaller-cusped longer-tailed *hermannsburgensis*, originally described from west of Alice Springs, and apparently inhabiting somewhat different country, has been listed doubtfully by Thomas from the Northern Territory, and recorded as a geographical race from south-west South Australia. It now seems that another and more distinct south-eastern race is represented by the Blandowski series from western Victoria, which was recently listed erroneously as being identical with the rare *Gyomys* genotype, *novaehollandiae*, of north-eastern New South Wales.

As a final example of the importance of generic distinction, recent examination of the skull of the unique type of *Mus fieldi*, described by Waite as "so utterly crushed that not a single measurement of the bones could be made", provided a character placing the species in the genus *Pseudomys* (*s.s.*), instead of *Leggadina*, in which authors tentatively placed it without diagnostic evidence.

The general features and importance of the pseudomyid divisions have been reviewed in some detail to assist in avoiding the confusion arising from such errors in identification, based upon inadequate or wrongly classified material. In associating the name of Mr. C. W. Brazenor with the following correction, it may be stated that one is in complete accordance with his view that workers in "museums possessing extensive series, even of single species, should publish a critical survey", but, as a general corollary, it is suggested that workers should also fully consider and quote such contributions, preliminary to drastic alteration of generic or specific relationships.

Gyomys novaehollandiae Waterhouse.

Pseudomys (Leggadina) novaehollandiae Brazenor (*nec.* Waterhouse), Mem. Nat. Mus. Vict., ix, 1936, pp. 9-13, pl. ii, a-d.

In the paper quoted, Brazenor provides what is stated to be an extended description of the rare *Gyomys novaehollandiae* of north coastal New South Wales from Victorian material, upon examination of which that species is transferred to the "subgenus" *Leggadina*, and also erroneously added to the Victorian faunal list. The description, however, is based upon a series of mice from the drier north-west region of Victoria which, as the author indicated, are closely allied with a central Australian species.

The colour, dentition, and dimensions are described as intergrading so well with the central *L. hermannsburgensis* that only the difference in tail-length and

range justified separation of the Victorian specimens. In view of this similarity, and the far greater disparity of range involved with the coastal *novaeollandiae*, it seems remarkable that Brazenor should have regarded this species as even more closely identifiable with the Victorian series. Equally surprising was the transference of this typical species of *Gyomys* to the "subgenus" *Leggadina* without autoptic examination of the dentition.

The type of *novaeollandiae* provided the basis of *Gyomys*, when Thomas gave the main diagnostic feature as the absence of an antero-internal cingular cusp to m^1 , associated with normal murine laminae, whereas in *Leggadina* a well-marked antero-internal cusp is invariably present, with a consequent tilting backwards of the inner edges of the laminae, and reduction of the outer cusps. The very evident development of the subsidiary cusp in *Leggadina hermannsburgensis*, as shown by Brazenor's illustrations, makes it obvious that Thomas could not have overlooked the presence of such cusps in *novaeollandiae*, which *must* always be regarded as typical of the *Gyomys* section of the pseudomyid group.

The identification of the Victorian series with *novaeollandiae*, contrary to geographical distribution and at least subgeneric distinction, was based upon the necessarily superficial comparison of two "old collection" specimens with the type, kindly undertaken by Mr. M. A. C. Hinton, Keeper of Zoology at the British Museum. Although the material is stated to be in perfect agreement, no reference is made by Brazenor to the actual presence of antero-internal cingular cusps in the type of *novaeollandiae*, necessary to link it with a form of *Leggadina*.

Actually, specific distinction is clearly shown by the upper molar length of 3.5 mm. in the Victorian animal as opposed to 4.1 mm. given as typical of *novaeollandiae* by Thomas. The proportionately much longer tail of 74 mm., opposed to the 51 mm. given for the typical specimen, further emphasizes the distinction between animals of similar head and body length. In view of the fact that, apart from generic distinction, specific differences are supported by geographical range, it is evident that the extended description of the Blandowski series cannot possibly be considered representative of the coastal *novaeollandiae*, which remains typical of the genus *Gyomys*, and as yet unrecorded from Victoria.

In order to emphasize the central Australian affinity of the Victorian series of *Leggadina*, and prevent the inevitable confusion arising from mis-identification involving the status of genera, the Blandowski series listed by Brazenor is now recognized as a distinct form.

Leggadina hermannsburgensis brazenori, subsp. nov.

Diagnosis.—Size of body, pes, and ear much as in typical form of central Australia, but tail proportionately much shorter, and palatal length apparently greater. Colour of fresh specimens doubtless exhibiting variation due to difference in habitat.

Descriptive Notes.—General colour above given as about buffy-brown pencilled with darker hairs, lighter on sides and limbs, with the underparts soiled buffy-white, and the manus and pes buffy-white, the general tone probably darker than the typical form in fresh specimens. Tail equalling the head and body, instead of being decidedly longer. Pes and ear length given as being much as in typical race, but measurements are from dry material.

Total length of skulls not available, but the skull proportionately larger, judging by the greater palatal length of 12.3 opposed to 11.2 mm., in an animal

of somewhat smaller size; it is notable that this comparison applies only if Brazenor's measurement is taken to the gnathion, and not to the nasal-tips as Waite did in measuring the typical form. Molars of similar size, with tilted laminae typical of the genus, and the small somewhat variable antero-internal cingular cusps common to the species.

Lectotype.—The specimen in the National Museum, Melbourne, for which the following measurements were listed: Head and body 75; tail 74; pes 19; ear 15.8 mm.

Skull: Back of parietals to nasal-tips 20; nasals 7.5×2.3 ; interorbital width 3.5; palatal length 12.3; palatal foramina 4.3; upper molars 3.5 mm.

Habitat.—The original description was based upon a series of 27 specimens which were collected near the junction of the Murray and Darling Rivers by the explorer-naturalist W. Blandowski in 1857.

Remarks.—The Victorian race is evidently distinguishable by the proportionately much shorter tail; doubtless the coloration and complete cranial features of fresh specimens would further emphasize differences due to geographical separation and habitat.

In regard to Brazenor's merging of the southern race (*bolami*) with the typical form, on the ground of seasonal variation in arid regions, it is stressed that a geographical race and not a full species is involved, so that intergradation is to be expected. Although Brazenor noted a slight colour distinction, he did not review the cranial features cited, and it is notable regarding his table of external dimensions that the Victorian ones are from an entirely dried series in which ear measurements would be affected by the skinning and cutting away of the skull-base, while there is no separation of sexes in the three groups listed, and material of unspecified central localities is included.

Whether the relatively large variation of 3 mm. shown in maximum pes and ear lengths of 20 and 16.5 mm. respectively is due to the condition of material or method of measurement, such variation in small mice "taken in the same place at the same time" appears somewhat contradictory of the theory that marked size variation in desert forms is caused by prolonged changes of drought and plenty. It has, however, recently become rather a convention for local workers to stress such variability of size in discrediting established forms, while describing new ones based mainly upon size from central areas without comparative analyses.

The merging of species and races with type localities from 500–1,000 miles apart on the grounds of seasonal change appears to represent the opposite extreme to the past fallacy of according far too extensive ranges to individual forms. In view of the distance and intervening variations of habitat, it is considered that *bolami* is separable as a colder-toned race of *hermannsburgensis*, with the interorbital averaging wider and the palatal foramina longer, the teeth slightly heavier, and the nasalia broader in the posterior half and therefore with somewhat more sinuous sides.

The much greater geographical separation of *brazenori* from the typical form, and the richer habitat indicated by the C.S.I.R. Vegetation Map, doubtless reflected in the fresh coloration as well as in the characters reviewed, leaves no doubt of the distinction of this form.

Pseudomys fieldi Waite.

Mus fieldi Waite, Rept. Horn Exped., ii, 1896, pp. 403–4, pl. xxvi. *Id.*, Thomas, Proc. Zool. Soc., 1906, p. 539.

Pseudomys (Leggadina) fieldi Longman, Mem. Qld. Mus., v, 1916, p. 32.

The generic identity of this species has remained in doubt since the description of the unique specimen in the Australian Museum collection, the skull of which was so badly crushed that it could not be measured. The molar row, however, was figured by Waite, who remarked that the teeth were very similar to those shown for *hermannsburgensis*, excepting that the antero-internal cusp of m^1 was "extremely small".

The relative minuteness of the cusp in the decidedly larger tooth-row, however, was sufficient to discredit this comparison, and it was surprising that Thomas (1906) should consider *fieldi*, apart from the much longer tail, apparently near his *forresti*, in which the antero-internal cusp is unusually developed, almost forming a supplementary lamina. As a result of this comparison, no doubt, *fieldi* was included in the subgenus *Leggadina* by Longman in his List of Muridae in 1916.

The diagnostic importance of the subsidiary cusps, and uncertainty concerning *fieldi*, had previously been indicated, however, when Thomas refrained from allotting the species to any of the subgenera which he defined in 1910. Unfortunately, the molar rows of the type were apparently lost after removal for illustration, but recent examination of cranial remains *in situ* in the spirituous holotype revealed a complete zygomatic plate with the projection above and concave margin characteristic of *Pseudomys* and the allied *Thetomys*, instead of the normally murine straight to convex profile of *Leggadina*.

In Waite's illustration the "extremely small" subsidiary cusp is more suggestive of the small cingular rugosities occasionally observed in *Pseudomys* (*s.s.*), rather than the distinct antero-internal cusp on m^1 diagnostic of *Thetomys*, which genus is so far unrecorded from the centre. Therefore, from the indefinite nature of the cusp, associated with the concave zygomatic plate, and geographical range, it is evident that "*Mus*" *fieldi* is a species of *Pseudomys* (*s.s.*) allied to *Ps. minnie* of N.E. South Australia, which is represented by the subspecies *flavescens* in central western Queensland.

It is notable concerning the specific characters of *fieldi* that the holotype, taken at Alice Springs in June, 1895, was a fully adult suckling female, which Waite described as having a thin and very long tail, considerably longer than the head and body. All specimens of *Ps. minnie*, on the contrary, have the head and body definitely longer than the tail, and from a general comparison of dimensions there appears no doubt that *Ps. fieldi* is readily distinguishable from its nearest ally by the relatively much longer tail, as well as in having definitely smaller ears, pes, and molar rows.

Although long spirit preservation renders colour comparison of the holotype unsatisfactory, the "warm sandy-brown" of the original description would seem to be decidedly richer and lacking the more buffy tone of *Ps. minnie*, thus confirming the specific distinction of *fieldi* which, in common with *L. waitei*, supports a general impression of the distinctive faunal conditions about Alice Springs.

Note.

While reviewing various accounts of Austro-Malayan Muridae, concerning the relationship of New Guinea forms, it was noted that *Epimys* (= *Rattus*) *ravus* Robinson and Kloss² antedates *Rattus greyi ravus* Brazenor,³ for which the sub-specific name of *peccatus* is now submitted.

² Robinson and Kloss.—Journ. Straits Branch Roy. Asiatic Soc., No. 73, 1916, p. 272.

³ Brazenor.—Mem. Nat. Mus. Melb., x, 1936, p. 69.

Summary.

1. The subgenera of *Pseudomys* were not tentatively proposed, their author hesitating to leave all four subdivisions under the one generic heading.

2. The markedly concave zygomatic plate distinguishes *Pseudomys* and *Thetomys* generically from *Leggadina* and *Gyomys*, irrespective of whether intergradation subsequently merges the two former.

3. Absence of any trace of subsidiary cusp to m^1 in *Gyomys* distinguishes it generically from *Leggadina*, in which an obvious cusp persists in the most worn condition.

4. The extended description of the west Victorian mice cannot be applied to *novae-hollandiae* of north coastal N. S. Wales, which remains the type of *Gyomys*.

5. The Blandowski series from Victoria represents a new race of the central Australian *L. hermannsburgensis* (*brazenori*), and *bolami* of S.W. South Australia is reaffirmed as a naturally variable but recognizable race of that species.

6. On comparison with additional allied material *Gyomys berneyi* proves to be a species of *Leggadina*, allied to *forresti*.

7. Upon re-examination of the holotype, *Mus fieldi* Waite, 1896, is shown to be a species of *Pseudomys* (*s.s.*) allied to *minnie*, but specifically distinct.

8. The subspecific name *peccatus* is proposed for the Victorian race of *Rattus greyi*, in lieu of *ravus* Brazenor, 1936, *nec. Rattus ravus* Robinson and Kloss, 1916.

9. It should be noted that Tate⁴ was mistaken in giving the mammary formula in his *Rattus assimilis* "Group" as 0-2-4, when reviewing and charting the phylogeny of Indo-Australian Muridae, a formula occurring in Australian rats of the pseudomyid and *Uromys-Melomys* groups only.

In *R. assimilis* the mammary formula is 2-1-2=10, and the actual affinity is obviously with the true *R. rattus* and *R. tunneyi* groups, rather than with the more "ancient derivative" *R. chrysocomus* group of the Philippines and Celebes as Tate inferred.

⁴ Tate.—Bull. Amer. Mus. Nat. Hist., lxxii, art. 6, 1936, pp. 501-728.