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## MURIDAE RECORDED FROM VICTORIA.

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(Plates XIII-XVI.)

Australian rats and mice, as a group, received little attention from Australian systematists till recent years. Few examples of early collecting are preserved in this country. Almost all the work of classification and description has been carried out in Europe, and based upon a few specimens; some of these descriptions are broad enough, in the light of modern specialization, to apply to more than one species, and without early material from typical collecting grounds the task of identifying species already described, and of describing new, must necessarily be difficult and doubtful.

The National Museum possesses good series of Victorian forms, taken in 1857 by the Polish naturalist, W. Blandowski, who collected in north-western Victoria near the junction of the Murray and Darling Rivers. Unfortunately when Blandowski left the State he took with him all notes and data relating to the collection.

Since then our murine fauna has been greatly depleted in species and individuals. Though destruction of habitat by agriculture, bush fires, etc., is largely responsible, the introduction of foreign members of the same family is also a contributing factor. European rats have spread throughout the State and, because of their greater pugnaciousness and fertility, have driven out and replaced native species in many districts. This usurpation will no doubt continue until all native species are extinct, except possibly the Water Rat, whose size and strength may allow it to hold its own.

Many Australian rats and mice are highly specialized and as peculiarly Australian as any marsupial. Amongst these the Water Rat may, perhaps, be placed first, though the Rabbit Rats and the Jerboa Mice have almost equal claims. Its fine, closely-furred pelt of comparatively large size has lately been in demand as a commercial fur-skin, and many thousands of these rats are trapped yearly; though still common in many places the animal cannot long survive such systematic depletion of its numbers. Most of our marsupial mammals are

now protected by law, and it cannot be too strongly urged that some similar action be taken in regard to this typically Australian rodent. Suggestions have been made that the animal might be farmed on a commercial basis as is the Musk Rat in America; it is an omnivorous feeder so that a food supply should be comparatively simple, it is reasonably hardy, and when in good condition it produces four young at a birth. Furthermore, selective breeding should improve the quality and value of the pelts. This would seem to be the only way to maintain a supply, for sooner or later the wild animals must be trapped out.

The following list of Victorian rats contains all species which have been recorded from the State. Ridgway's system for names of colours is used (*Colour Standards and Nomenclature*).

#### Family **MURIDAE** Gray 1821.

Rat-like rodents, none with more than three cheek-teeth in each half of each jaw. Australian members are divided into two sub-families.

#### Sub-family **HYDROMYINAE**.

Rats having only two cheek-teeth in each half of each jaw. There are two genera, both confined to Australasia, one of which is found in Victoria.

#### Genus **HYDROMYS** Geoffroy 1805.

This genus contains the Australian Water Rats. Large, heavily-built, semi-aquatic animals with partially-webbed toes; they frequent banks of rivers, creeks, and lagoons.

#### *Hydromys chrysogaster* Geoffroy 1805.

*Hydromys chrysogaster* Geoffroy, Ann. Mus. d'Hist. Nat., vi, p. 90, 1805; Gould, Mamm. Aust., iii, pl. xxiv, 1863; Collet, Zool. Jahrb., p. 841, 1887; Thomas, P.Z.S., p. 247, pl. xxix, fig. 7, 1889; Ogilby, Aust. Mus. Cat., No. 16, Aust. Mamm., p. 101, 1892; Wood Jones, Mamm. Sth. Aust., iii, p. 290, 1925.

*Hydromys leucogaster* Geoffroy, Ann. Mus. d'Hist. Nat., vi, p. 90, 1805; Gould, Mamm. Aust., iii, pl. xxvi, 1863; Thomas, P.Z.S., p. 790, 1908.

*Hydromys fulvogaster* Jourdan, Comptes Rendus Acad. Sci. Paris, v, p. 523, 1837.

*Hydromys fulvoventer* Jourdan, Ann. Sci. Nat., (2) viii, p. 372, 1837; Thomas and Dolman, P.Z.S., p. 790, 1908.

The Eastern Water-Rat was originally described from a specimen collected in Tasmania. Geoffroy says, "Pelage brun-marrons en dessus, orange en dessous," Gould better described the colour as "black mingled with buff, the former predominating" above, and "rich, deep, reddish orange" below. However, the colour of the animal is very variable, and on the dorsal surface depends to a great extent on the number and length of the black hairs. Many variants have been described as distinct species, but the present practice is to divide the species into the following geographical races:

*Hydromys chrysogaster chrysogaster* Geoffroy.

The originally-described form in which the dorsal colour is very dark brown (almost black) and the ventral surface deep orange. The abrupt change of the long hairs to white on the sides of the body produces a well-defined line of demarcation between the dorsal and ventral surfaces.

*Type Locality*.—Tasmania.

*Hydromys chrysogaster fulvolavatus* Gould.

*Hydromys fulvolavatus* Gould, Mamm. Aust., iii, pl. xxv, 1863; Thomas and Dolman, P.Z.S., p. 790, 1908.

*Hydromys chrysogaster fulvolavatus* Collett, P.Z.S., p. 323, 1897; Wood Jones, Mamm. Sth. Aust., iii, p. 293, 1925.

A pale form in which black hairs are few and the general colour of the dorsal surface is orange-tawny; the ventral surface is not as richly orange and grades gently into the dorsal colouration.

*Type Locality*.—River Murray, South Australia.

*Hydromys chrysogaster lutilla* Gould.

*Hydromys lutilla* Gould (ex. Macleay MS.), Mamm. Aust., Intro., 1863; Thomas and Dolman, P.Z.S., p. 790, 1908.

A grey form with a white ventral surface and no white tip to the tail.

*Type Locality*.—New South Wales.

*Hydromys chrysogaster reginae* Thomas and Dolman.

*Hydromys chrysogaster reginae* Thomas and Dolman, P.Z.S., p. 790, 1908; Thomas, Ann. Mag. Nat. Hist. (8), iv, p. 197, 1909.

A grey form with a buffy ventral surface. Tail with the usual white tip.

*Type Locality*.—Queensland.

Through the kindness of Mr. T. E. Rose, of Brunswick, Victoria, I had the opportunity to examine some thousands of Water Rat skins from various localities in Victoria, but principally from northern (Murray River) districts. Practically all colour forms were found amongst them, but no specimen had a wholly-black tail, though the white tip varied in length from half-an-inch to more than five inches.

*Description of an Average Victorian Specimen.*

General colour olive-tawny, suffused on the neck and forepart of the body with an orange hue. Dorsal surface grizzled with black hairs which are not sufficiently numerous to hide the yellow fur. Sides of body and outer sides of limbs lighter. Ventral surface buffy-yellow. Head a little darker than body, cheeks with an orange-buffy patch below the eye. Mystacial vibrissae long and numerous; shorter anterior hairs white, longer posterior hairs black. Ears short and dark brown. Basal inch of tail clothed with hair of body, remainder with stiff adpressed hair which completely hides scales; black for a varying distance of somewhat more than half its length, then with a conspicuous white tip. Manus and pes well covered with silky adpressed hair. Manus with a black patch on the wrist; phalanges and nails white. Pes uniformly dark brown.

*Skull.*—Heavily built, rounded, and without any marked ridges. In profile the upper border is remarkably straight. Bullae small.

*Teeth.*—Incisors long and strong. Two molars only, the anterior nearly three times as long as the posterior and divided into three laminae in the upper and two in the lower jaw.

*General Dimensions.*—Head and body, 320 mm.; tail, 317 mm.; hind foot, 73 mm.; ear, 19 mm.

*Dimensions of Skull.*—Greatest length, 55 mm.; basal length, 50.5 mm.; greatest breadth, 27 mm.; nasals, 17.5 × 6.5 mm.; interorbital breadth, 7.5 mm.; palate length, 29 mm.; breadth inside M<sup>2</sup>, 7.5 mm.; breadth outside M<sup>2</sup>, 11 mm.; diastema, 15 mm.; palatal foramina, 5 mm.; upper molar length, 8.5 mm.

The above description applies to about 65 per cent. of the rats examined, but the perfect gradation from very deep brown to grey does not allow of any sharp division. An increase, or otherwise, of black hairs causes variation in the depth of dorsal colour and also in the distinctness of the line of demarcation between the dorsal and ventral surfaces; this line may be well marked or absent. Of the remaining skins about 10 per cent. are of varying degrees of greyness to a cold grey above and whitish below, and 25 per cent. are darker to a deep brown above and orange below. Specimens almost black above and reddish-orange below are not common, and seldom exceed more than one in each batch of 400 to 600 skins.

Though specimens can be found to match most of the geographical races mentioned above, there is obviously little use in so classifying them; great variation in colour occurs in a single and quite restricted locality, and the species must be considered generally, rather than racially, variable in colour. Interbreeding between the various colour forms takes place. The suggestion is ventured that at least some of the subspecific forms mentioned above are founded on insufficient material and cannot be accepted as valid.

The Water Rat is not uncommon in Victoria and is widely distributed. Its usual habitat is a burrow in the bank of a stream or lagoon, but sometimes it lives in a fallen log. The burrow, which is long and usually inclined upwards from the entrance, ends in an enlarged chamber containing a nest of grass, leaves, etc. The animal is omnivorous in diet and will take molluscs, crustaceans, fish, small water birds and coarse grass or rushes. Usually four young are delivered at a birth.

#### Subfamily **MURINAE** Baird 1857.

This subfamily includes the true rats and mice; all are small and have three molar teeth in each half of each jaw. The tail is usually long and scaly.

#### Genus **RATTUS** Fitzinger 1867.

The true or normal rats. Skull strongly built, with well-marked supraorbital ridges which usually extend back to the outer corners of the interparietal. Front edge of zygomatic plate always convex. Molars normal, the laminae not greatly tilted; no anterior-internal cusp on M<sup>1</sup>.

#### *Rattus assimilis* (Gould).

*Mus assimilis* Gould, P.Z.S., p. 241, 1857; id. Mamm. Aust., iii, pl. xv, 1863; Collet, Zool. Jahrb., p. 838, 1887; Ogilby, Aust. Mus. Cat., No. 16, Aust. Mamm., p. 105, 1892.

*Epimys assimilis* Thomas, Ann. Mag. Nat. Hist., (8), vi, p. 605, 1910; Troughton, Rec. Aust. Mus., xiii, p. 119, 1920.

The Allied Rat is the most common indigenous Victoria rodent and is found almost throughout the State. It is a plump little animal with long and very soft fur.

#### *Description of an Average Victorian Specimen, based on Examination of over 100 Examples.*

General colour greyish-brown. Dorsal fur (25 mm.) slate for four-fifths of its length, tipped with wood-brown, the grey showing through, and the whole darkened by numerous long black guard-hairs which, on the hinder part of the body, are twice as long as the fur. Sides of body but little lighter, grading into ventral colouration without a line of demarcation. Ventral surface greyish-white; hairs basally grey with dull white tips. Head as body; cheeks slightly greyer, a few black hairs around the eye. Mystacial vibrissae long (50 mm.); black except for a few anterior hairs which are tipped with white. Ear long, dark brown; outer surface sparsely sprinkled with a few dark-brown, adpressed hairs, inner surface with even fewer short, silvery white hairs. Tail about as long as head and body, uniformly dark-brown; sparsely clothed with short, stiff, brown hairs. Manus and pes well clothed with soiled white, adpressed hair.

*Skull*.—Slender, comparatively smooth and rounded, but with raised supra-orbital beads diverging backwards towards the outer corners of the interparietal. Muzzle comparatively long and narrow. Bullae about half length of diastema.

*Teeth*.—Incisors long and slender. Molars comparatively small and narrow.

*General Dimensions* (from flesh).—Head and body, 161 mm; tail, 170 mm.; hind foot, 33 mm.; ear, 23 mm.

*Dimensions of Skull*.—Greatest length, 41.5 mm.; basal length, 37.5 mm.; greatest breadth, 21.5 mm.; nasals,  $17 \times 4.5$  mm.; interorbital breadth, 5.5 mm.; palate, 19 mm.; breadth inside  $M^2$ , 4 mm.; breadth outside  $M^2$ , 8.8 mm.; palatal foramina, 7.5 mm.; diastema, 11.5 mm.; upper molars, 8 mm.

*Type Locality*.—Clarence River, New South Wales.

The colour variation in the species is small and is not localized. It depends chiefly upon the length and depth of colour of the light tips of the fur, which may vary from rich yellowish-brown to a much colder, almost grey tone.

The Allied Rat is an inconspicuous, completely nocturnal animal. It prefers a habitat in thick scrub and makes its burrows under the overhanging branches of bushes, under logs, or at the base of thick grass clumps. As a rule the burrows are not deep; they slope gently down to an enlarged chamber in which is a nest of grass. In the outer layers of the nest the grass stems are long and interwoven, but the inner surface is well lined with short, bitten ends. This rat leaves no very noticeable tracks, for its runs seldom extend far from the mouth of its burrow and have not a well-used appearance.

This species does little or no damage. It is entirely vegetarian and its stomach contents disclose in most cases fibrous material such as grass stems.

In 1935 a series of about 60 rats was taken at Portland (in western coastal Victoria), which in general size, colour, and pelage are indistinguishable from *assimilis*. They have, however, a smaller skull, a shorter tail and a shorter pes. They were compared with *Rattus assimilis* and also with *R. greyi*, which occurs in South Australia, but has not been identified in Victoria.

The species *greyi* was described by Gray in 1841, but was not recognized by Gould nor figured in his "Mammals of Australia." Ogilby included it in his catalogue in 1892, but did not follow Gray, describing its colour instead as "intense reddish-brown." This erroneous description was in general use until 1925, when Wood Jones exposed the error and re-established the species as still surviving; he also remarked on its similarity to the description of *assimilis*, which animal he had not seen.

Only three immature specimens of *greyi* are available to this Museum, and except in small size, they are in every way similar in external appearance to *assimilis*. Using measurements of four adult *greyi* published by Wood Jones, the following dimensional comparison may be formulated:

*General Size.*—The two species are of equal size. In *assimilis* females may attain the size of large males; in *greyi* they are always smaller than large males.

*Tail.*—The tail of *assimilis* is long, that of *greyi* shorter. In large *assimilis* the tail is proportionally longer, in large *greyi* shorter than the mean average of a series.

*Pes.*—In adults the pes of *assimilis* exceeds 31 mm.; the pes of *greyi* is less than 29 mm.

*Skull.*—Except in size the skulls of the two species are identical, as are also the proportional size and structure of the teeth. The same minor variations of palatal foramina, zygomatic plate, pterygoid region, etc., occur in each. The skull of *assimilis* is larger and heavier than that of a specimen of *greyi* of the same head and body length.

The two rats are outwardly similar. Dimensional differences are usually considered to be subspecific rather than specific characters, but in this case the relative sizes of male and female, and the proportional length of the tail in large specimens, are additional constant differences, and it is better to regard the two as distinct species unless the gap between can be completely bridged.

The rats collected at Portland are not truly intermediate, for though their tail and ear measurements favour *assimilis* the more important pes and skull dimensions are close to *greyi*. They further resemble *greyi* in the relative sizes of males and females, and in the proportionally shorter tails of large specimens.

The following table gives dimensions of the three groups:

No. of Spec.	Species.	Average Lengths of			
		Tail. Expressed as % of head and body	Pes.	Ear.	Skull.
4	<i>greyi</i> (Wood Jones) ..	76.3	27.2	16 .	36 .
20	Rats from Portland ..	96.1	29.1	20.9	36.2
20	<i>assimilis</i> (east. Vic.) ..	101.1	33.3	23.8	40.6

The Portland rats must therefore be grouped with *greyi*, and do not bridge the gap between that species and *assimilis*. They are therefore described as:

*Rattus greyi ravus* subsp. nov.

Size and general colouration similar to those of both *greyi* and *assimilis*. Dorsal fur basally grey, tipped with brown, the grey showing through, and the whole modified by long black guard-hairs. Sides of body a little lighter, grading into greyish-white of ventral surface. Ventral hairs basally grey tipped with greyish-white. Head as body; cheeks a little greyer. Mystical vibrissae long; black, a few tipped with silvery white. Ears larger than in *greyi*; dark-brown; almost naked on inner surface, sparsely clothed on outer surface with short, brown, adpressed hair. Tail longer than in *greyi*; shorter than head and body; uniform brown, sparsely clothed with stiff, short, brown hairs. Pes larger than in *greyi*; well clothed with white adpressed hair.

*Skull*.—Indistinguishable from *greyi*, and smaller than, though otherwise similar to, *assimilis*.

*Teeth*.—As in *greyi*; proportionally smaller than in *assimilis*. A posterior cusp is present on the lower molars of all three rats.

*Dimensions of Male*.—Head and body, 163 mm.; tail, 145 mm.; hind foot, 29.5 mm.; ear, 21 mm.

*Dimensions of Female*.—Head and body, 148 mm.; tail, 148 mm.; hind foot, 29 mm.; ear, 21.5 mm.

*Dimensions of Skull*.—Greatest length, 36.5 mm.; basal length, 31.5 mm.; greatest breadth, 18.8 mm.; nasals,  $14 \times 3.8$  mm.; interorbital breadth, 5.2 mm.; palate length, 16.8 mm.; breadth inside  $M^2$ , 4 mm.; breadth outside  $M^2$ , 8 mm.; palatal foramina, 7.3 mm.; diastema, 10 mm.; upper molars, 6.4 mm.

*Type Locality*.—Portland, Victoria.

Types in National Museum, Melbourne; ♂, C759; ♀, C688.

This eastern race of Grey's Rat replaces *assimilis* in the south-western corner of Victoria, and is similar to that species in its habits and habitat. Its burrows may be found in scrub or in the more heavily-clothed, heath country, and its runs are not conspicuous. At present its only known habitat is the vicinity of Portland.

*Rattus lutreolus* (Gray).

*Mus lutreola* Gray, Append. Grey's Travels, p. 409, 1841; Gray, Brit.

Mus. Cat., p. 111, 1843; Gould, Mamm. Aust., iii, pl. xi, 1863.

*Epimys lutreola* Thomas, Ann. Mag. Nat. Hist., (8), vi, p. 605, 1910.

*Rattus lutreola* Wood Jones, Mamm. Sth. Aust., iii, p. 229, 1925.

The Swamp Rat inhabits the continent of Australia from east to west, and there is some doubt whether the eastern form should be accorded full specific distinction from the western (*R. fucipes* Waterhouse, 1840).

*Description of an Average Victorian Specimen, based on about Sixty Specimens.*

A thickly-built, sturdy little animal with short legs and a short tail. Fur long (18 mm.), and though not harsh yet distinctly crisp to the touch. General

colour varies from dusky (blackish) brown to warm yellowish-brown, most commonly the former hue. Dorsal hairs slate for three-fourths of their length, tipped with brown. Guard-hairs numerous and shining black. Sides of body very little lighter, grading without demarcation into buffy-grey of ventral surface. Fur of latter smoky at base, tipped with buffy-white, the buff being more pronounced at the hinder part of body. Head as body; cheeks scarcely lighter. Mystical vibrissae moderate (30 mm.); very dark-brown with lighter tips. Ears short, rounded, and sparsely sprinkled with light-brown adpressed hair on both inner and outer surfaces. Tail short; uniformly dark; sprinkled with stiff, dark-brown hairs. Skin of manus and pes dusky brown; upper surface of both clothed with fine, adpressed, shining brown hair.

*Skull*.—Stoutly built and strongly ridged, with raised supraorbital beads extending backwards to the interparietal. Compared with the previous species it is shorter in the muzzle and more massive.

*Teeth*.—Large and heavy. Molars much broader than in the proceeding species.

*Dimensions of Skin* (from flesh).—Head and body, 154 mm.; tail, 127 mm.; hind foot, 30 mm.; ear, 19 mm.

*Dimensions of Skull*.—Greatest length, 39 mm.; basal length, 35 mm.; greatest breadth, 21.5 mm.; nasals, 14 × 4 mm.; interorbital breadth, 5 mm.; palate length, 21 mm.; breadth inside M<sup>2</sup>, 4 mm.; breadth outside M<sup>2</sup>, 9 mm.; palatal foramina, 6 mm.; diastema, 11 mm.; upper molars, 7 mm.

*Type Locality*.—Hunter River, New South Wales.

Once widely distributed throughout the State, the Eastern Swamp Rat is now confined to south-western Victoria. Numbers live in somewhat isolated colonies on the marshy flats of Cape Otway, but do not inhabit scrub or forest country. The flats, which are used for grazing cattle, are dotted with clumps of tea-tree and plantations of pines, within which the rats make their home. The long, deep burrows, which are large in proportion to the size of the rats, are thickly clustered around butts of trees. Much of this country is under water in wet periods, and the burrows become uninhabitable; the rats then migrate to higher ground and burrow into banks and at the base of grass clumps. They do not build nests above ground. Some colonies inhabit coastal sand dunes during the whole year. Unlike the previous species the Swamp Rat makes definite "runs," denuded of grass, and extending for some distance from the mouths of burrows.

The Swamp Rat is entirely herbivorous, stomach contents revealing coarse vegetable matter. It has a liking for the outer bark of roots of trees, and is a pest in new plantations, where it kills many young trees.

## Genus PSEUDOMYS Gray 1832.

Contains the Australian mice, the genus being restricted to Australia and Tasmania. The skull is slender and the braincase rounded and without supraorbital ridges. In 1910 O. Thomas divided the genus into four subgenera.

## Subgenus PSEUDOMYS s.str.

Size large. Skull flat or concave in posterior nasal region. Front edge of zygomatic plate concave, with projecting point above. Palatal foramina large. Molars high with heavy cusps; no anterior-internal cusp on  $M^1$  (except as an unusual abnormality).

No example of this subgenus has been recorded from Victoria.

## Subgenus THETOMYS.

Size medium. Form of skull more normal. Front edge of zygomatic plate less concave; without projecting point above. Palatal foramina long but not widely open. Molars less heavy with a distinct antero-internal cusp on  $M^1$ .

*Pseudomys (Thetomys) gouldi* (Waterhouse).

*Mus gouldi* Waterhouse, Voy. "Beagle," ii, pl. 34, fig. 18a and 18b, 1839; Gould, Mamm. Aust., iii, pl. xix, 1863; Ogilby, Aust. Mus. Cat., No. 16, Aust. Mamm., p. 107, 1892.

*Pseudomys (Thetomys) gouldi* Thomas, Ann. Mag. Nat. Hist., (8), vi, p. 606, 1910; Wood Jones, Mamm. Sth. Aust., iii, p. 315, 1925.

Gould's Mouse has not been recorded from Victoria since 1857, when Blandowski secured several specimens. Unfortunately these were crushed, apparently soon after their preparation as skins, and are completely flattened. The skull of one specimen has been removed but is too fragmentary to reconstruct. Waterhouse's original description is here somewhat extended.

A medium-sized mouse with close soft fur and a long slender pes. General colour tawny-olive. Dorsal fur (11 mm.) slate for a little more than half its length then ochraceous to the tip. The numerous long hairs are of two colours, some yellowish, some black to the base. The general effect is an etched appearance. Sides of body lighter with faint demarcation between the dorsal and ventral surfaces. Throat white, hairs white to base; chest and abdomen yellowish-white, hairs basally smoky-grey for about half their length. Head as body; cheeks lighter, upper lip white. Mystical vibrissae long; brown with lighter tips. Ears fairly long and rather pointed; sparsely clothed on outer surface with light-brown hair, inner surface naked except for

a few silvery hairs at the tip. Tail brown above, whitish beneath; scales about 19 to centimetre; clothed with stiff hairs which are longer and more numerous towards the tip. Manus and pes sparsely clothed with silvery adpressed hair. Pes long and, as far as can be judged from the dried skin, very slender. Metatarsal pads very small.

*Skull.*—Owing to its crushed condition little can be said of the general form of the skull. The anterior edge of the zygomatic plate is almost evenly concave and does not project above. The palatal foramina is long and (in the present specimen) extends backwards to the anterior third of  $M^1$ . Interorbital region wide, flat, and with squared edges.

*Teeth.*—The molars are unworn and the rather bold laminae show little tilting. Incisors slender and narrow.

*Dimensions of Skin.*—Head and body, 99 mm.; tail, 101 mm.; hind foot, 24·8 mm.; ear, 18 mm.

*Dimensions of Skull.*—Back of frontals to front of incisor teeth, 18·8 mm.; interorbital breadth, 4·3 mm.; palate length, 14·5 mm.; palatal foramina, 5 mm.; diastema, 6·5 mm.; upper molars 4·5 mm.

*Type Locality.*—New South Wales.

Though it differs slightly from his description there can be no doubt that this is the mouse described by Waterhouse. It has not been recognized in Victoria for nearly eighty years and nothing is known regarding its habits. Gould's specimens taken in South Australia may, or may not belong to this species, but of these he says:

"It inhabits the sides of grassy hills where the soil is loose; its burrows, which are constructed about six inches below the surface, are often of great extent, and it is generally found in small families of from four to eight in number, inhabiting the same burrow and even the same nest of dried grass."

#### Subgenus LEGGADINA.

Size small. Form of skull normal. Front edge of zygomatic plate straight or convex as in ordinary murines. Palatal foramina narrow. Parapterygoid fossae broad, shallow, scarcely hollowed, the ectopterygoids bordering it externally low, not or scarcely raised above the level of its floor. Molars variable but always with a well-marked antero-internal cusp on  $M^1$ .

#### *Pseudomys (Leggadina) novae-hollandiae* (Waterhouse).

*Mus novae-hollandiae* Waterhouse, P.Z.S., p. 146, 1842; Gould, Mamm. Aust., iii, pl. xxii, 1863; Ogilby, Aust. Mus. Cat., No. 16, Aust. Mamm., p. 109, 1892.

*Pseudomys (Gyomys) novae-hollandiae* Thomas, Ann. Mag. Nat. Hist., (8) vi, p. 607, 1910.

*Pseudomys (Leggadina) novae-hollandiae* Brazenor, Mem. Nat. Mus., Melb., No. 9, p. 9, 1936.

Size small. General colour about buffy-brown, pencilled with darker hairs on the back. Dorsal fur (9 to 10 mm.) slate for three-fourths of its length, then wood-brown with lighter tips. Long black hairs numerous. Sides of body and outer sides of limbs lighter; sharply demarcated from ventral colouration. Ventral surface soiled buffy-white; fur basally grey for half its length, the tint being lighter on the throat and chest than on the lower part of the body, then tipped with whitish. Head as body; cheeks lighter, upper lip white. Mystical vibrissae dense, long, black with a few anterior hairs white. Ears long, oval in outline; inner surface nearly naked, outer surface clothed with dark-brown adpressed hair. Tail about as long as head and body; white below except towards the tip where it is uniformly brown; clothed with stiff hairs which are not numerous enough to hide scales (15 to centimetre). Manus and pes buffy-white; sparsely covered with white adpressed hair which barely hides the skin.

*Skull*.—All available skulls have the occipital region cut away. The braincase is smooth and rounded and the anterior edge of the zygomatic plate is almost vertical and very slightly concave.

*Teeth*.—Laminae somewhat tilted. First molar with an antero-internal cingular cusp which in some specimens is more developed than in others.

*Dimensions of Skin*.—Head and body, 68 mm.; tail, 69 mm.; hind foot, 18 mm.; ear, 15 mm.

*Dimensions of Skull*.—Back of parietals to tip of nasals, 20 mm.; nasals, 7.8 × 2 mm.; interorbital breadth, 3.8 mm.; palate length, 12 mm.; palatal foramina, 4.3 mm.; breadth inside M<sup>2</sup>, 2.5 mm.; breadth outside M<sup>2</sup>, 5 mm.; diastema, 5.5 mm.; upper molars, 3.5 mm.

*Type Locality*.—Upper Hunter River, New South Wales.

This is another species which has not been recorded from this State since the Blandowski expedition in 1857. Evidently at this time it was common, for more than 30 specimens were collected. Little is known of its habits, but Gould said:

“I usually found this species among stones, or under flat slabs of bark left by the Aborigines at their encampments.”

#### Subgenus GYOMYS.

Size small. Skull as in *Leggadina*. Molars quite normal; no antero-internal cusp on M<sup>1</sup>, and molar laminae of the usual murine shape and position.

#### *Pseudomys (Gyomys) fumeus* Brazenor.

*Pseudomys (Gyomys) fumeus* Brazenor, Mem. Nat. Mus. Melb., No. 8, p. 158, 1934.

Only two specimens of the Smoky Mouse are known. Both were taken in one restricted locality near Beech Forest, in the Otway Ranges, and both are males.

General colour quaker-drab, a little darker on the mid-dorsal line. Dorsal fur long (15 mm.), soft, fine; slate grey for four-fifths of length, tipped with mouse grey. Long hairs (20 mm.) numerous; black, imparting a cool tone

to the whole. Sides of body lighter with fewer long hairs, grading into greyish-white of ventral surface. Ventral fur slaty for three-fifths of length, tipped with soiled white, the grey showing through. Head as body; lighter on cheeks and muzzle, upper lip greyish-white. Mystical vibrissae long (39 mm.), shorter hairs white, longer hairs black at base with white tips. Ears long; purplish-grey in freshly-killed animal; sparsely clothed with white and grey adpressed hair. Tail longer than head and body; greyish-brown above, white on sides and below; well clothed with hair 3-4 scales in length which, nevertheless, does not hide scales. Manus and pes white; well clothed with silvery-white adpressed hair which forms a fringe around the nails.

*Skull*.—Smooth and rounded with a long narrow muzzle. Anterior edge of zygomatic plate slightly concave and sloping gently forward to its base. Bullae small, anterior-posterior length about half that of diastema.

*Teeth*.—Comparatively large and heavy. Laminae not tilted; no anterior-internal cingular cusp on M<sup>1</sup>.

*Dimensions of Skin* (from flesh).—Head and body, 115 mm.; tail, 134 mm.; hind foot, 29 mm.; ear, 22 mm.

*Dimensions of Skull*.—Greatest length, 32 mm.; basal length, 27 mm.; greatest breadth, 16 mm.; nasals, 11·8 × 4 mm.; interorbital breadth, 5 mm.; palate length, 15·8 mm.; breadth inside M<sup>2</sup>, 3·4 mm.; breadth outside M<sup>2</sup>, 7 mm.; palatal foramina, 6 mm.; diastema, 8 mm.; upper molars, 5·5 mm.

*Type Locality*.—Otway Forest, Victoria.

No details of the habits of this mouse have been discovered. It inhabits dense, scrubby forest country, which also harbours a large population of *Rattus assimilis*. It is a south-eastern representative of the *albocinereus-glaucus* group.

*Pseudomys (Gyomys) desertor* Troughton.

*Mastacomys* sp. Waite (nec. Thomas), Rept. Horn Expdn., ii, p. 406, pl. xxvi, 1896; id. Proc. Roy. Soc. Vict., x, 2, p. 128, 1898.

*Mus nanus* Waite (nec. Gould), Proc. Roy. Soc. Vict., x, 2, p. 128, pl. vi, 1898.

*Pseudomys (Thetomys) nanus* Wood Jones, Mamm. Sth. Aust., iii, p. 314, 1925.

*Pseudomys (Gyomys) desertor* Troughton, Rec. Aust. Mus., xviii, p. 293, 1932.

The Desert Mouse was for many years confused with the Little Mouse, *Pseudomys (Thetomys) nanus* Gould, 1858, which it outwardly resembles very closely. In 1932 Troughton (loc. cit.) found that it had no cingular cusp on M<sup>1</sup>, and placed it in the subgenus *Gyomys* as a new species.

Size small. General colour about tawny-olive, heavily pencilled with dark-brown hairs. Dorsal fur moderately long (11 mm.) and crisp; slate for more than half its length, tipped with cinnamon-buff. Long hairs numerous, deep brown. Sides of body lighter, grading into brownish-buff of ventral surface. Ventral fur basally grey, tipped with brownish-white, the grey showing through. Head as body; cheeks and muzzle a little lighter. Mystical

vibrissae long (35 mm.), dark-brown. Ear small, brown, a little lighter on the anterior margin; outer surface lightly clothed with adpressed brown hair, inner surface with fewer buffy-white hairs. Tail a little shorter than head and body; brown above, buffy-white below, sharply contrasted; clothed with stiff hairs which are brown on the upper and whitish on the lower surface. Manus buffy-white with dark patch on wrist; pes buffy-white; well clothed with silky adpressed hair.

*Skull*.—Arched. Nasals bent downwards. Muzzle comparatively thick and heavy. Front edge of zygomatic plate slightly concave and almost vertical.

*Teeth*.—Incisors curved and comparatively heavy. Molars broad; laminae not tilted, on antero-internal cusp on M<sup>1</sup>.

*Dimensions of Skin*.—Head and body, 95 mm.; tail, 91 mm.; hind foot, 23 mm.; ear, 12 mm.

*Dimensions of Skull*.—From back of parietals to tip of nasals, 25.5 mm.; nasals, 11.5 × 3 mm.; interorbital breadth, 3.8 mm.; palate length, 14 mm.; breadth inside M<sup>2</sup>, 2.8 mm.; breadth outside M<sup>2</sup>, 7.3 mm.; palatal foramina, 4.5 mm.; diastema, 6.5 mm.; upper molars, 5.2 mm.

*Type Locality*.—Wycliffe Creek, South Australia.

The specimens from which the Desert Mouse was originally described were taken on the Horn Expedition to Central Australia in 1895, and were the only examples known. It is therefore interesting to note that the range of the species originally extended beyond the Central area, and that at one time it was an inhabitant of Victoria. The five specimens in the National Museum were taken by Blandowski near the Murray River in 1857.

Mr. E. le G. Troughton was good enough to compare a Victorian specimen with the type, and pronounced it "indistinguishable from the central form."

No records of habits or habitat have been preserved.

### Genus MASTACOMYS Thomas 1882.

The genus was erected for a Tasmanian rat possessing remarkably broadened cheek-teeth. Until 1933 only two specimens were known (the Tasmanian type, and an immature female from Victoria taken many years ago), though skull fragments and teeth had been found in the Wellington Caves, New South Wales, and at Mount Gambier, South Australia. Teeth from the latter locality are smaller than those from other localities, and Thomas created a new species which he called *mordicus*.

#### *Mastacomys fuscus* Thomas.

*Mastacomys fuscus* Thomas, Ann. Mag. Nat. Hist., (5), ix, p. 413, 1882; id. Ann. Mag. Nat. Hist., (9), x, p. 550, 1922; Lydekker, B.M. Cat.

Fos. Mamm., i. p. 227, 1885; Ogilby, Aust. Mus. Cat., No. 16, Aust. Mamm., p. 120, 1892; Wood Jones, Mamm. Sth. Aust., iii, p. 323, 1925; Finlayson, Trans. and Proc. Roy. Soc. Sth. Aust., lvii, p. 125, 1933; Brazenor, Mem. Nat. Mus. Melb., viii, p. 159, 1934.

The Broad-toothed Rat is a stoutly-built, dusky-brown animal with long fluffy fur and a short tail. In external appearance it is almost indistinguishable from *Rattus lutreola*, but it is slightly larger and has longer and softer fur.

General colour yellowish-brown. Dorsal fur slate for three-fourths of its length, tipped with yellow. Long hairs few, shining black. Sides of body a little lighter, grading into buffy-grey of ventral surface without demarcation. Ventral fur basally leaden-grey, tipped with ashy-grey, and the whole washed with buff. Head as body, scarcely lighter on cheeks. Mystical vibrissae not particularly numerous or long (40 mm.); short anterior hairs mixed black and white, longer posterior hairs black with white tips. Ear short, broad, rounded in outline; clothed with dark brown adpressed hair. Tail slight, short, almost uniform in colour; sparsely clothed with stiff brown hair which is a little lighter on the ventral surface. Manus and pes dusky both above and below; upper surface clothed with adpressed, greyish hair. Nails white.

*Skull*.—Large, heavy, and in fully adult specimens boldly sculptured. Anterior edge of zygomatic plate deeply concave with a projecting point above. Braincase not tapering forward as in *Rattus*, but suddenly constricted immediately in front of the fronto-parietal suture.

*Teeth*.—Molars large and very broad; not graduated in size, the third being fully as long as the first. In younger specimens the laminae are very tilted and boldly tuberculated, but in older examples with worn molars these characters are modified, though the sharp-edged, transversely-folded crown pattern is quite different from the rather-rounded crowns of *Rattus*. The incisors are heavy, but considerable variation occurs in breadth; they are more opisthodont than those of any other Victorian rat.

*Dimensions of Skin* (from flesh).—Head and body, 172 mm.; tail, 123 mm.; hind foot, 3.4 mm.; ear, 21 mm.

*Dimensions of Skull*.—Greatest length, 40 mm.; basal length, 35 mm.; greatest breadth, 22.5 mm.; interorbital, 4 mm.; palate length, 22 mm.; breadth inside M<sup>2</sup>, 2 mm.; breadth outside M<sup>2</sup>, 9.5 mm.; palatal foramina, 8 mm.; diastema, 10.3 mm.; upper molars, 10 mm.

*Type Locality*.—Tasmania.

That the Broad-toothed Rat is still a living Victorian mammal was discovered only recently. No details of its ecology are known. In its only known habitat it lives amongst large numbers of *Rattus assimilis*, and leaves no conspicuous signs, such as "runs," by which its presence can be recognized. Its recent capture, in each case, has been incidental to the trapping of *assimilis*.

The Broad-toothed Rat is nowhere in any considerable numbers, though it inhabits a large area of the Otway Forest.

Thomas has already pointed out the enlarged caecum of *Mastacomys*, and Finlayson its likeness in skull structure to the Holarctic voles. Investigation of the stomach contents of recently-trapped animals disclosed coarse vegetable matter composed of the fibrous stalk of Wire Grass (*Tetrahena*) which is further evidence of the animal's approach to Micritine forms.

Recently several skulls were found in limestone caves on the River Glenelg. The dimensions of these agree with *fuscus*.

### Genus LEPORILLUS Thomas 1906.

This genus contains the House-building Rats, large, blunt-headed, long-eared rats having a large but unspecialized pes with the normal six pads. The skull is stoutly built, and the molars are without postero-internal cusps.

#### *Leporillus apicalis* (Gould).

*Hapalotis apicalis* Gould, Proc. Zool. Soc., 1851, p. 126; id. Mamm. Aust., iii, pl. ii, 1863; Kreffft, Cat. Mamm. Aust. Mus., p. 64, 1864; Spencer, Rept. Horn Expdn., ii, p. 11, 1896.

*Conilurus apicalis* Ogilby, Aust. Mus. Cat., No. 16, Aust. Mamm., p. 116, 1892; Waite, Proc. Roy. Soc. Vict., x, 2, p. 115, pl. v, 1898.

*Leporillus apicalis* Thomas, Ann. Mag. Nat. Hist., (7), xvii, p. 83, 1906; Troughton, Rec. Aust. Mus., xvi, p. 32, 1923; Wood Jones, Mamm. Sth. Aust., iii, p. 334, 1925.

General colour tawny-olive, lightly pencilled with black hairs. Dorsal fur (17 mm.) slate for two-thirds of length, tipped with clay colour. On sides of body yellowness fades and general colour is about smoke-grey, the fur being slaty at base, with lighter tips, the grey showing through. Line of demarcation between dorsal and ventral colouration fairly sharply marked and situated well down the sides of the body. Fur of ventral surface white to base. Crown of head as body; cheeks grey, upper lip white. Mystacial vibrissae very long (80 mm.) and numerous; dark-brown with lighter tips. Ear long; greyish-brown; clothed on outer surface with brownish hair, inner surface with a few silvery hairs. Tail longer than head and body; dark-brown on upper surface for from two-thirds to four-fifths of its length, tip and underside white; hairs fairly numerous, but not hiding scales except towards tip where they are much lengthened (18 mm.). Manus soiled white with a brown patch on the wrist extending more than half way down metacarpals; Phalanges white and well covered with adpressed white hair. Pes white; some specimens have brown mark along outer metatarsal; well clothed with white hair.

*Skull*.—All available skulls have occipital region missing. More lightly built than other Victorian member of genus. Front edge of zygomatic plate almost straight and quite vertical. Interorbital region with sharply-angled edges.

*Teeth*.—Incisors slender and narrow. Upper molars comparatively small; slightly diverging posteriorly.

*Dimensions of Skin*.—Head and body, 73 mm.; tail, 77 mm.; hind foot, 42 mm.; ear, 27 mm.

*Dimensions of Skull*.—Back of parietals to tip of nasals, 34 mm.; nasals,  $15 \times 5$  mm.; interorbital breadth, 5.5 mm.; palate length, 21 mm.; breadth inside  $M^2$ , 3.5 mm.; breadth outside  $M^2$ , 7.8 mm.; palatal foramina, 7.8 mm.; diastema, 10.8 mm.; upper molars, 7.5 mm.

*Type Locality*.—South Australia.

There are nineteen Victorian specimens in the collection, all taken by Blandowski near the Murray-Darling junction. They do not differ in any feature from more recent Central Australian specimens.

Kreffft, who accompanied Blandowski during part of his expedition, records some interesting data regarding the habits of the White-tailed House-building Rat (*loc. cit.*). He says:

“This pretty little animal is nocturnal and gregarious. I have frequently taken from 8 to 10 out of a hollow tree, and tamed them so that they kept about the camp, mounting the supper table at tea-time for their share of sugar and damper. . . . It has been stated that the tail of this animal is nearly destitute of the long brushy hairs towards the tip, which are found in almost all species of this genus; this, however, is not the rule but the exception only, though specimens kept in captivity soon lose their long hairs, and frequently their tails also, if kept with other rodents.”

#### *Leporillus conditor* (Gould).

*Mus conditor* Gould, Sturt's Expdn. Cent. Aust., i, p. 120, pl. i; and ii, app., p. 7, 1848.

*Hapalotis conditor* Gould, Mamm. Aust., iii, pl. vi, 1863; Krefft, Cat. Mamm. Coll. Aust. Mus., p. 65, 1864.

*Conilurus conditor* Ogilby, Aust. Mus. Cat., No. 16, Aust. Mamm., p. 118, 1892.

*Leporillus conditor* Troughton, Rec. Aust. Mus., xiv, p. 24, 1923; Wood Jones, Mamm. Sth. Aust., iii, p. 327, 1925.

General colour buffy-brown, lightly grizzled with black hairs. Dorsal fur slate for two-thirds of length, then yellowish-brown with darker tips. Sides of body lighter but same buffy hue. No line of demarcation between dorsal and ventral colouration. Ventral surface buffy-white; hair smoky at base, tipped with buffy-white, some grey showing through. Head as body; cheeks scarcely lighter, upper lip white. Mystacial vibrissae of moderate length (60 mm.); black. Ear large and rounded; outer surface dark-brown anteriorly, fading to yellowish on hinder edge and well clothed with adpressed hair, inner surface naked except towards the tip where there are a few buffy hairs. Tail less than head and body; whitish below, dark-brown above to the tip; hairs numerous but not sufficiently so to hide scales, not or scarcely lengthened at tip. Manus with dark-brown patch on carpus extending half-way down digits; well clothed with hair. Pes yellowish-white, a dark line on outer metatarsal extending to a patch on digits; well clothed with hair.

*Skull*.—Heavier than in the last species. The front edge of the zygomatic plate slopes forwards to its base instead of being vertical. Interorbital region without sharply-angled edges.

*Teeth*.—Heavier, but otherwise similar to those of last species.

*Dimensions of Skin*.—Head and body, 188 mm.; tail, 154 mm.; hind foot, 43 mm.; ear, 30 mm.

*Dimensions of Skull*.—Back of parietals to tip of nasals, 38 mm.; nasals,  $16 \times 4.8$  mm.; interorbital breadth, 6 mm.; palate length, 23.5 mm.; breadth inside  $M^2$ , 3.5 mm.; breadth outside  $M^2$ , 9 mm.; palatal foramina, 10.5 mm.; diastema, 11.8 mm.; upper molars, 8.8 mm.

*Type Locality*.—Darling River, New South Wales.

The House-building Rat has apparently long been extinct in Victoria. Kreffft, writing in 1864, says:

“This animal has become exceedingly rare, and is only found in localities where it is not disturbed by sheep or cattle. I do not think it occurs south of the Murray, where, according to the Aborigines, it was found in large numbers years ago. The hut-like mounds of dry sticks which this rat uses in the construction of its habitation, may be frequently met with on the Murray Plains, but they are either uninhabited or occupied by *Hapalotis apicalis*, a species always at war with the larger, and apparently stronger, though not so numerous, *Hapalotis conditor*.”

The rat still lives and builds its “wurlies” in South and Western Australia. Troughton (loc. cit.) gives a full account of its habits in those localities in his monograph of the genus.

#### Genus NOTOMYS Lesson 1842.

The genus contains a group of the Australian Jerboa Mice having a glandular organ in the gular area. They are comparatively small, and have lengthened hind feet on which the pads are reduced to three or four. The tail is long, with lengthened hairs towards the tip. Gland on throat sharply defined by silvery hair. Skull rounded and without ridges; anterior edge of zygoma root deeply concave and with a projecting point above. Teeth with no antero-internal cusp on molars.

#### *Notomys mitchelli* (Ogilby).

*Dipus mitchelli* Ogilby, Trans. Linn. Soc. Lond., xviii, p. 130, 1841.

*Notomys mitchelli* Thomas, Ann. Mag. Nat. Hist., (9), viii, p. 539, 1921; id., Ann. Mag. Nat. Hist., (9), ix, p. 315, 1922; Wood Jones, Rec. Sth. Aust. Mus., iii, p. 3, 1925; id., Mamm. Sth. Aust., iii, p. 339, 1925; Brazenor, Mem. Nat. Mus., Melb., No. 8, p. 78, 1934.

More than 30 specimens of Mitchell's Jerboa Mouse collected by Brandowski are in the National Museum, but no examples have since been recorded. They agree with Ogilby's material in the Australian Museum, Sydney, and were taken very close to the type locality.

General colour tawny-olive, darker on the mid-dorsal line. Dorsal fur (14 mm.) slate for a little more than half length, then tawny with dark tips, the latter becoming more pronounced at the hinder part of the body. Sides of body lighter, line of demarcation between dorsal and ventral colouration fairly sharp. Ventral fur basally grey for a little more than half length, with white tips. Head as body; cheeks lighter, upper lip white. Ears long, tips bluntly pointed; outer surface sparsely covered with dark brown hairs, inner surface with silvery adpressed hairs. Gular glandular area well defined by thick, silky, white hair. Tail brown above, white below to the tip; hairs of tip much lengthened. Manus and pes silvery-white. Pes long and narrow, with four pads, though in some specimens the hallucal pad is not well defined.

*Skull*.—Comparatively large for the size of the animal. Smooth and rounded. Anterior edge of zygomatic plate deeply concave with a projecting point above.

*Teeth*.—Incisors slender. Molars with no antero-internal cusp.

*Dimension of Skin*.—Head and body, 112 mm.; tail, 148 mm.; hind foot, 36 mm.; ear, 23.5 mm.

*Dimensions of Skull*.—Back of parietals to tip of nasals, 27 mm.; nasals, 10.5 × 3 mm.; interorbital breadth, 5 mm.; palate length, 14 mm.; breadth inside M<sup>2</sup>, 3.3 mm.; breadth outside M<sup>2</sup>, 6.3 mm.; palatal foramina, 5.5 mm.; diastema, 7 mm.; upper molars, 5 mm.

*Type Locality*.—Junction of Murray and Murrumbidgee Rivers.

No details of the habits of this species have been preserved, but allied forms construct burrows in which they make grass nests in typical murine fashion.

### *Notomys mitchelli macropus* Thomas.

*Notomys mitchelli macropus* Thomas, Ann. Mag. Nat. Hist., (9), viii, p. 540, 1921; Wood Jones, Mamm. St. Aust., iii, p. 341, 1925; Brazenor, Mem. Nat. Mus., Melb., No. 8, p. 79, 1934.

This form of Mitchell's Jerboa Mouse is probably still living in north-western Victoria. It is greyer in colour, has longer fur, and slightly longer feet than the typical form.

General colour between avellaneus and wood-brown, but darkened on the dorsal surface by a grizzling of dark-tipped hairs. Dorsal fur (18 mm.) slate for two-thirds of its length, then pallid with dark tips. Sides of body lighter, with less demarcation between dorsal and ventral colouration than in typical form. Ventral fur grey for less than half its length, tipped with white. Head as body; cheeks lighter, upper lip white. Mystical vibrissae very long (55 mm.); dark-brown with lighter tips. Ear long, more truly oval than in typical *mitchelli*; clothed on outer surface with hair same colour as body. Gular glandular area as in *mitchelli*. Tail greyish-brown above, white below; hairs of tip lengthened. Manus and pes white. Pes a little longer and stouter than in *mitchelli*. Four pads.

*Skull and Teeth*.—Similar to those of typical form.

*Dimensions of Skin*.—Head and body, 107 mm.; tail, 145 mm.; hind foot, 39 mm.; ear, 26 mm.

*Dimensions of Skull.*—Greatest length, 32.5 mm.; basal length, 27 mm.; greatest breadth, 17 mm.; nasals, 11.5 × 3 mm.; interorbital breadth, 5.5 mm.; palate length, 15 mm.; breadth inside M<sup>2</sup>, 4 mm.; breadth outside M<sup>2</sup>, 7.3 mm.; palatal foramina, 6 mm.; diastema, 8 mm.; upper molars, 5.3 mm.

*Type locality.*—Port Lincoln, South Australia.

Since the Australian Jerboa Mice were reviewed in this journal (loc. cit.) two additional specimens of *m. macropus* have been discovered in the Museum collection. Except that they are slightly warmer in general tone, being about wood-brown, they agree with the specimen described. One is an adult male, the other an immature female. No data as to precise habitat is preserved in either case.

In the early part of this year a very good description of a Jerboa Mouse was given to me by an observer who, for several minutes, watched an animal hopping on and around a log on the banks of a small creek near Natimuk, in the Wimmera district, western Victoria. Its colour was described as grey, and I have no doubt that it was an example of this subspecies.

The Murine population of Victoria cannot be dismissed without some mention of introduced species. Three of these occur. They are the Black Rat, *Rattus rattus* (with which is grouped its grey-coloured subspecies, the Alexandrine Rat, *R. rattus alexandrinus*), the Brown or Norway Rat, *R. norvegicus*, and the House Mouse, *Mus musculus*. The first and the last are as common, and more widely distributed throughout the State than any native species; at times they reach plague proportions and do incalculable damage to crops, etc. The two species of introduced *Rattus* may be distinguished from native rats by their shorter and more hispid fur. They have many times been redescribed in Australia, and the Black Rat has a list of nearly a dozen synonymous names.

#### *Rattus novegicus* Erxleben 1777.

A large, heavily-built rat with coarse, spiny fur. General colouration of dorsal surface brownish, individual hairs being slaty-grey at the base, then yellowish-brown with darker tips. Sides of body lighter. Ventral surface greyish-white, hair grey at base tipped with white. Ear thick and short; when laid forward will not reach the eye. Tail shorter than head and body; with large coarse scales, sparsely sprinkled with blackish-brown hairs. Manus and pes brown.

*Skull.*—Large and robust, the braincase long and narrow. In fully adult specimens the supraorbital ridges, which extend backwards to the interparietal, are almost parallel, and the length of the parietal is greater than the width of the interparietal measured across the skull.

*Teeth*.—Compared with native Victorian species the molar teeth are small. Incisors robust.

*Dimensions of Skin* (from flesh).—Head and body, 217 mm.; tail, 180 mm.; hind foot, 37 mm.; ear, 18 mm.

*Dimensions of Skull*.—Greatest length, 46 mm.; basal length, 43 mm.; greatest breadth, 25·5 mm.; nasals,  $17 \times 4\cdot5$  mm.; interorbital breadth, 6·5 mm.; palate length, 25·5 mm.; breadth inside  $M^2$ , 5·5 mm.; breadth outside  $M^2$ , 10 mm.; palatal foramina, 8 mm.; diastema, 14 mm.; upper molars, 6·8 mm.

*Type Locality*.—Northern Europe.

In Victoria the Brown Rat is more or less confined to towns and human habitation. It is essentially a burrower, or lives underground in drains or sewers. Omnivorous in diet, it prefers animal food, and is a particular pest in hide warehouses, where it does much damage.

### *Rattus rattus* Linnaeus 1758.

The Black Rat is more lightly built than the last species, it has a longer tail, and its fur is not so coarse.

General colour varies from slaty-grey to black on the back, the ventral surface being scarcely lighter. The animal has a slender appearance, with a long head and pointed muzzle. Ear thin and membranous, when laid forward almost covers the eye. Tail long and tapering; considerably longer than head and body. Manus and pes dark in colour, on the underside as well as above.

*Skull*.—Less massive in appearance than that of the Brown Rat. The braincase is wider, and the supraorbital ridges are not parallel but bowed outwards. The length of the parietals is not as great as the width of the interparietals.

*Teeth*.—Size approximately as in the last species.

*Dimensions of Skin* (from flesh).—Head and body, 189 mm.; tail, 261 mm.; hind foot, 36 mm.; ear, 24 mm.

*Dimensions of Skull*.—Greatest length, 45·5 mm.; basal length, 41 mm.; greatest breadth, 22 mm.; nasals,  $16 \times 4\cdot5$  mm.; interorbital breadth, 7 mm.; palate length, 24·8 mm.; breadth inside  $M^2$ , 4·5 mm.; breadth outside  $M^2$ , 9 mm.; palatal foramina, 8 mm.; diastema, 12·5 mm.; upper molars, 6·5 mm.

*Type Locality*.—Northern Europe.

### *Rattus rattus alexandrinus* Geoffroy 1803.

General form as in typical species, but colour varies from greyish-brown to speckled ochraceous-buff above, contrasted with greyish-white to cream on the ventral surface. Ear and tail similar to Black Rat. Manus and pes brown to buff, usually conforming to the general colouration of the animal.

*Skull, Teeth and Dimensions*.—As in typical form.

*Type Locality*.—Southern Europe.

The Black and Alexandrine Rats have spread throughout almost the length and breadth of Victoria. They are met with in uninhabited bush, and in the centre of the busiest cities. Though they sometimes construct burrows, they are not essentially fossorial but often live in trees, where they make nests or take over those originally built by birds. In buildings they live in walls and ceilings. They prefer a vegetable diet, play havoc in grain warehouses, and in orchards often climb trees to eat the growing fruit. They are also ships' rats and are the hosts of the plague flea.

In the towns of Northern Europe the Black Rat has been driven out and largely replaced by the Brown or Norway Rat, but, strangely, the exact opposite has taken place in Melbourne. Thirty years ago the rat population of this city was composed entirely of *R. norvegicus*, and the Black Rat was of such rarity that any specimens captured were considered worthy of preservation in the museum. About four years ago the writer investigated the present-day rat population of Melbourne, and, through the kindness of the City Health Officer, Dr. Dale, examined all rats caught by the City ratcatchers for a period of several weeks. About 500 adult specimens were individually examined, measured, and variation noted. Only the general facts are quoted here as an illustration of the present-day dominance of the smaller species.

Of the rats caught within the City area of Melbourne, 87.5 per cent. were *R. rattus*; of *R. rattus* the black form was represented by only 10 per cent, the remainder being grey. The colour forms do not grade, though the fact of interbreeding was verified, the two forms being present in a single litter of young.

In Europe and America the colour forms remain more or less true to geographical conditions. The black form is northern (cool climate), the grey southern (warm climate). In Australia the two forms intermingle, though in view of the great percentage of greys in the cooler south it would be interesting to know whether, if at all, the percentage varies in the warmer climate of northern cities.

Victoria has not been greatly troubled with rat plagues, though other States, principally northern, have had many occurrences.

#### *Mus musculus* Linnaeus 1758.

The European House Mouse has invaded every part of Victoria, and is usually known in the bush as the Field Mouse.

Size small. General colour varies from greyish-brown to yellowish-brown on the dorsal surface, and from brownish-grey to white below. The majority show little contrast between the upper and lower surfaces. Ear fairly large. Tail about as long as head and body. Manus and pes buffy-white, sparsely clothed with brownish-white hairs.

*Skull*.—Comparatively broad and flat. Wide in the interorbital region. Anterior edge of zygomatic plate sloping gently backwards towards its base.

*Teeth*.—First molar large, its length more than  $M^2$  and  $M^3$  combined. Wearing surface of upper incisors notched.

*Dimensions of Skin* (from flesh).—Head and body, 74 mm.; tail, 82 mm.; hind foot, 17·5 mm.; ear, 11·5 mm.

*Dimensions of Skull*.—Greatest length, 22·3 mm.; basal length, 19·5 mm.; greatest breadth, 12 mm.; nasals, 7·5 × 2·3 mm.; interorbital breadth, 4 mm.; palate length, 11·5 mm.; breadth inside  $M^2$ , 3 mm.; breadth outside  $M^2$ , 4·5 mm.; palatal foramina, 5 mm.; diastema, 5·5 mm.; upper molars, 3 mm.

*Type Locality*.—Europe.

The teeth characters mentioned above are a simple means of separating the European House Mouse from the native mice. Molar teeth of the latter are graduated in size, the second being only a little smaller than the first, and the incisors have a true chisel edge. If the upper lip of the House Mouse be lifted, the notched incisors are easily seen.

Many mouse plagues have occurred in Victoria, and in every case they have consisted of this species. Periodically, and probably in relation to suitable weather conditions, the fertility of the mice increases tremendously, and their numbers become many hundreds of times more than normal. Food supply becomes inadequate, and they commence a migratory movement, usually towards the south. Wood Jones also points out (*Mamm. Sth. Aust.*, iii, p. 322) that, apart from migration, the wave of increased fertility also moves progressively, and has been known to affect an island colony to which the mainland animals could have no access. At the height of the plague millions of mice are on the move. They are preyed upon by other mammals and birds, and are trampled in hundreds under the feet of agricultural workers. Finally starvation and disease set in, and, as suddenly as they increased, numbers return to normal. The amount of damage and the monetary loss to the State caused by such incidents cannot be calculated, but it must amount to a huge sum.

## EXPLANATION OF PLATES.

Skulls; *a*, dorsal; *b*, lateral; *c*, ventral view. Pes, *d*. Upper Molars, *e*.

## Plate XIII.

- Fig. 1. *Hydromys chrysogaster* Geoffroy.
- Fig. 2. *Rattus assisimilis* (Gould).
- Fig. 3. *R. greyi ravus* subsp. nov.
- Fig. 4. *R. lutreolus* (Gray).

## Plate XIV.

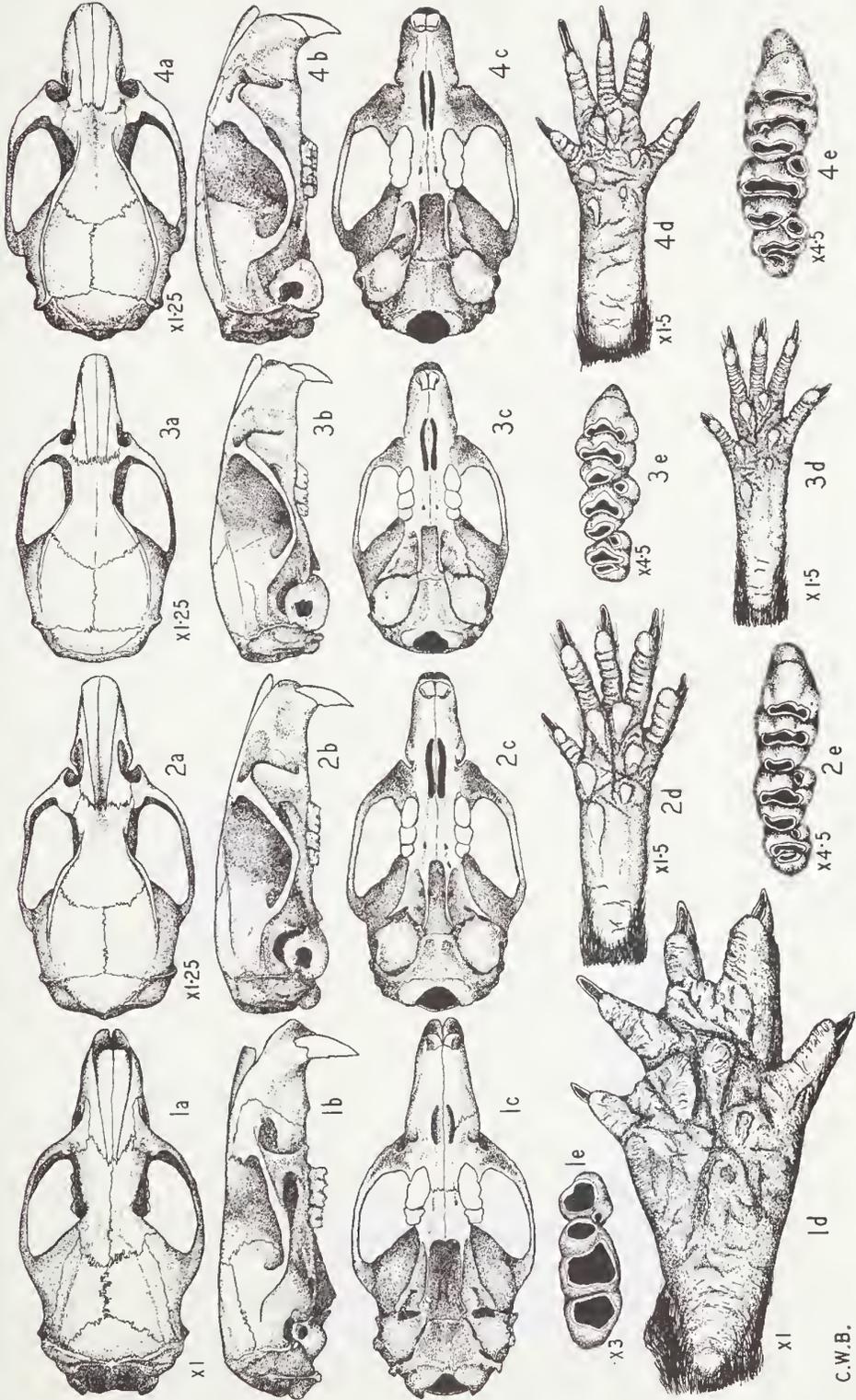
- Fig. 1. *Pseudomys (Leggadina) novae-hollandiae* (Waterhouse).
- Fig. 2. *P. (Thetomys) gouldi* (Waterhouse).
- Fig. 3. *P. (Gyomys) fumeus* Brazenor.
- Fig. 4. *P. (Gyomys) desertor* Troughton.

## Plate XV.

- Fig. 1. *Mastacomys fuscus* Thomas.
- Fig. 2. *Leporillus apicalis* (Gould).
- Fig. 3. *L. conditor* (Gould).
- Fig. 4. *Notomys mitchelli macropus* Thomas.

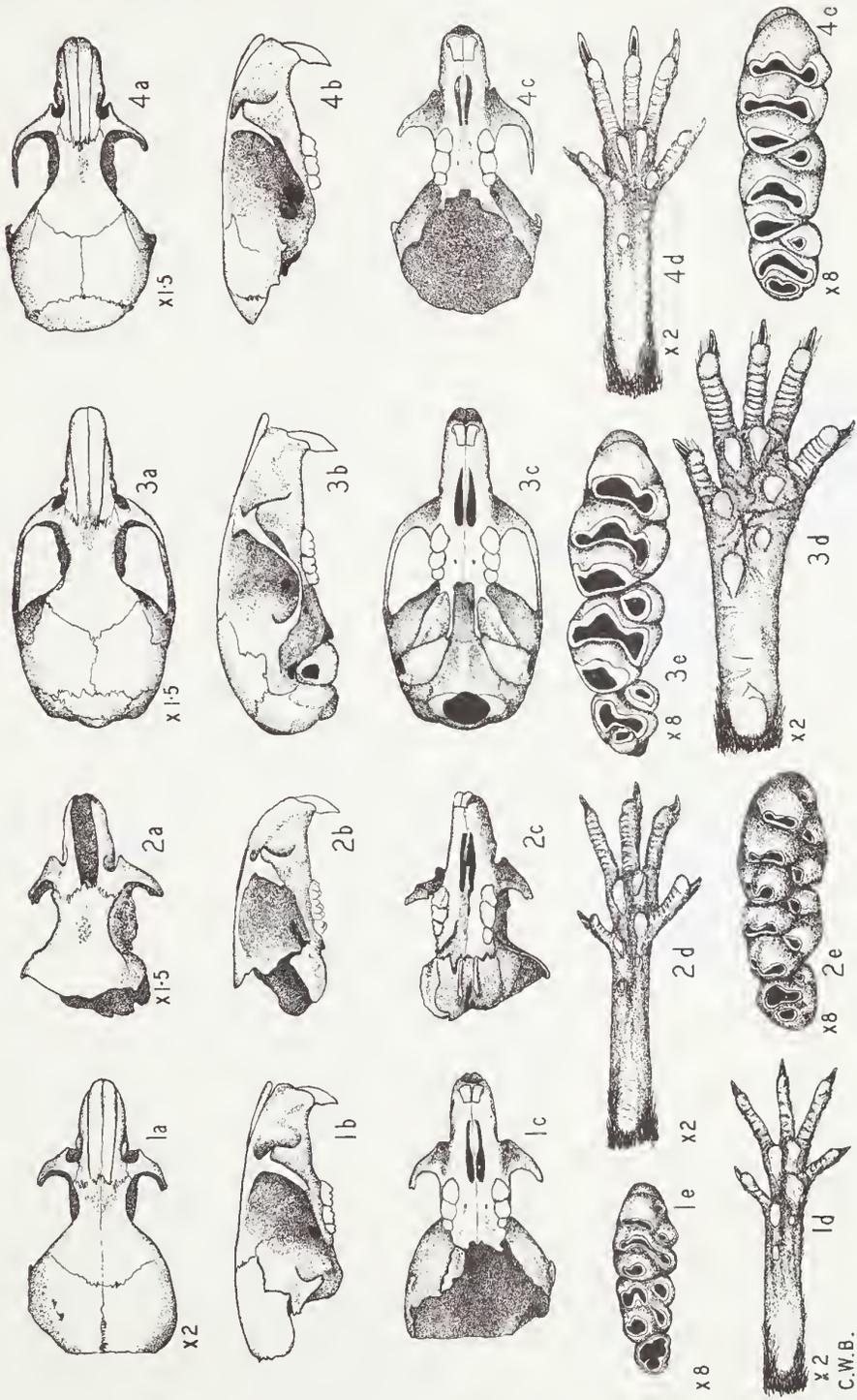
## Plate XVI.

- Fig. 1. *Notomys mitchelli* (Ogilby).
- Fig. 2. *Mus musculus* Linnaeus.
- Fig. 3. *Rattus rattus* Linnaeus.
- Fig. 4. *R. norvegicus* Erxleben.



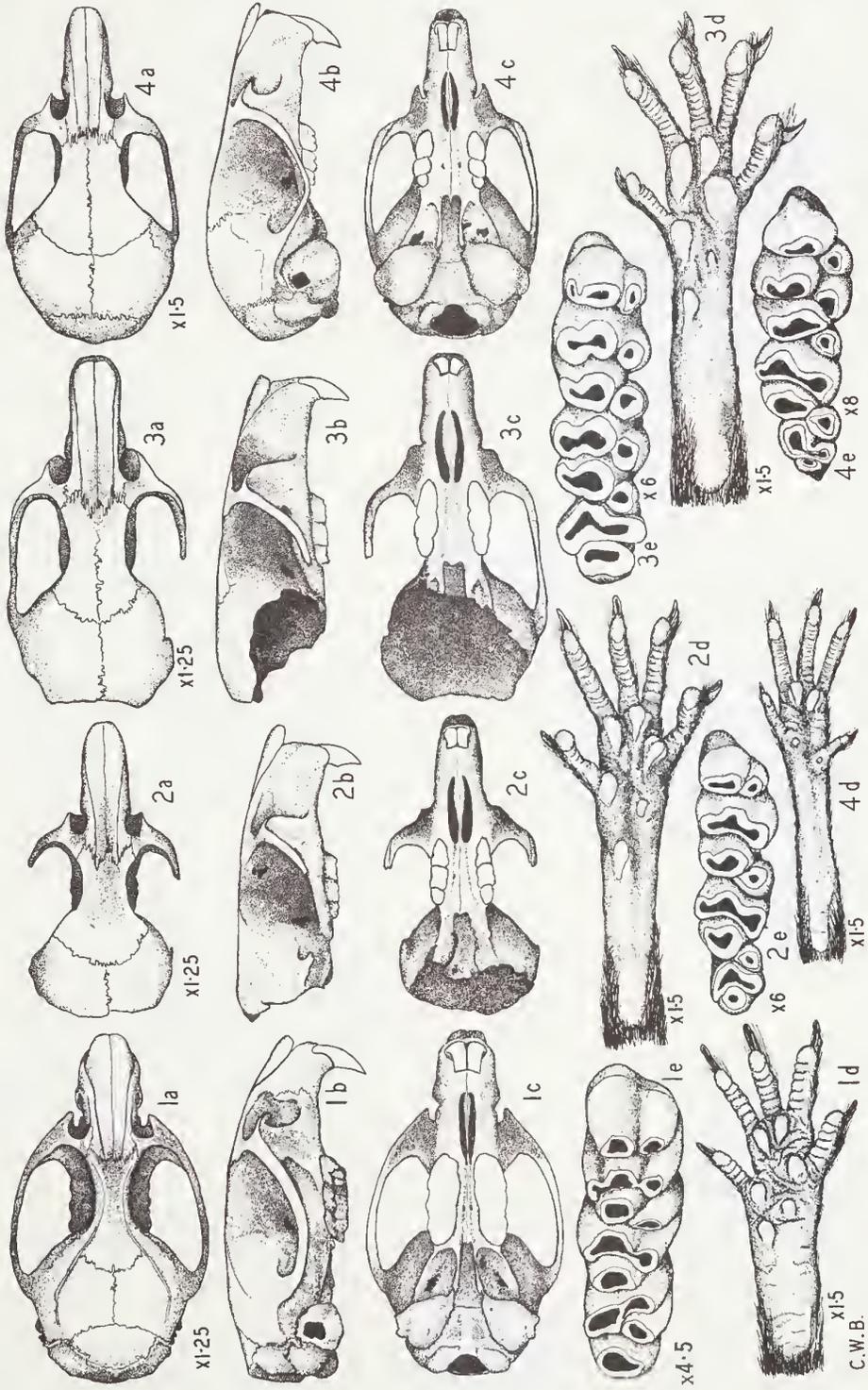
Muridae

C.W.B.



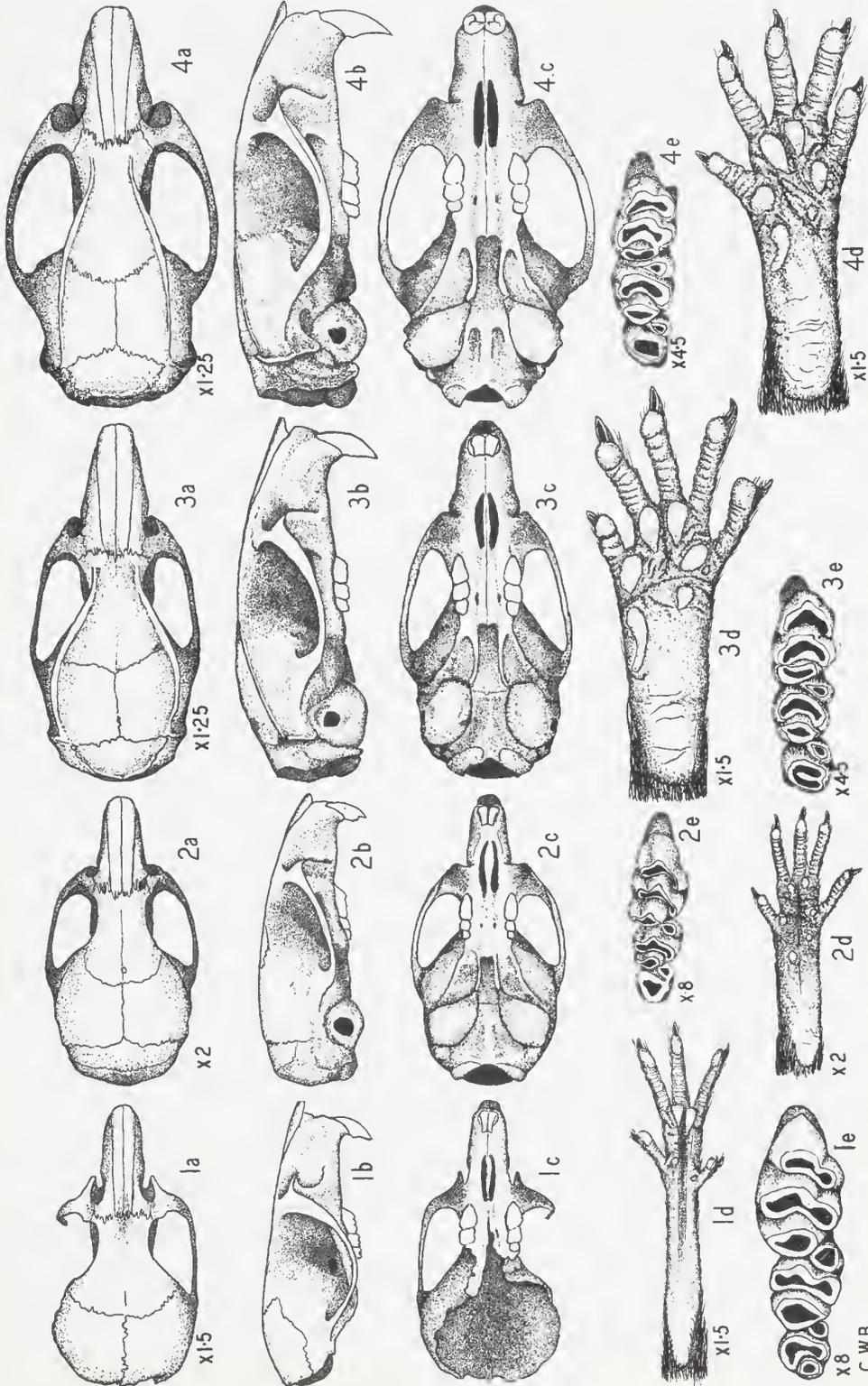
Muridae

x 2  
C.W.B.



Muridae

C.W.B.



Muridae

x8  
C.W.B.