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Reithrodontomys fulvescens.

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Reithrodontomys Giglioli, 1874

Reithrodontomys Giglioli, 1874:326. Type species by subsequent selection (Howell, 1914:13), *Reithrodon megalotis* Baird.
Ochetodon Coues, 1874:184. No type selected.

CONTEXT AND CONTENT. Order Rodentia, Suborder Myomorpha, Family Muridae, Subfamily Cricetinae. The genus contains two subgenera, *Reithrodontomys* Giglioli, 1874 and *Aporodon* Howell, 1914. The subgenus *Reithrodontomys* consists of nine species while the subgenus *Aporodon* contains eight species. A key to the genus follows (measurements in mm; adapted from Hooper, 1952, by Hall, 1981):

1 Occurring in the United States ---------- 2
Occurring south of United States ---------- 6
2 (1) First primary fold of M3 at least as long as second primary fold, each usually extending more than halfway across crown; worn occlusal surface of left m3 S-shaped ---------- *R. fulvescens*
First primary fold of M3 distinctly shorter than second primary fold, extending less than halfway across crown; worn occlusal surface of left m3 C-shaped ---------- 3
3 (2) Distinct labial ridge, often with cusplets, on m1 and m2; major fold and 2nd primary fold in M1 and M2 tending to coalesce, isolating anterior cusps from posterior cusps; occurring in southeastern United States ---------- *R. humulis*
No distinct labial ridge on m1 and m2; major fold and second primary fold in M1 and M2 meeting but not coalescing, and thus isolating anterior cusps from posterior cusps; not occurring in southeastern United States ---------- 4
4 (3) Breadth of braincase not exceeding 9.6; rostrum short and broad; tail shorter than head and body; occurring in Great Plains and southwestern United States ---------- *R. montanus*
Breadth of braincase more than 9.5; rostrum longer and narrower; tail approximately equal to, or longer than, head and body ---------- 5
5 (4) Fur of upperparts long, dense, heavily pigmented; ears blackish; occurring in salt marshes in vicinity of San Francisco Bay, California ---------- *R. raviventris*
Fur of upperparts shorter and less dense, varying from pale buff to reddish brown; ears buffy or fuscous; not occurring in salt marshes in vicinity of San Francisco Bay, California ---------- *R. megalotis*
6 (1) Occurring in México ---------- 7
Occurring south of México ---------- 19
7 (6) Second primary fold in m3 well developed; m3 resembling but smaller than m2; zygomatic plate little if any broader than mesopterygoid fossa (except in some *gracilis*); mesopterygoid fossa approximately as wide as either pterygoid fossa (except in some *gracilis*); occurring in eastern and southern México ---------- 8
Second primary fold in m3 faint or absent; m3 not resembling m2 in form; zygomatic plate broader than mesopterygoid fossa; mesopterygoid fossa not more than ¾ as wide as either pterygoid fossa; not restricted to eastern or southern México ---------- 11
8 (7) Zygomata weak, especially anteriorly; braincase deep and barely narrower than zygomatic breadth; breadth of zygomatic plate less than 1.5; rostrum long, narrow; ear (from notch) barely shorter than hindfoot; occurring usually above 2,600 m in central and southern México ---------- *R. microdon*
Zygomata strong, usually 0.5 to 1.0 broader than braincase; breadth of zygomatic plate more than 1.4; rostrum relatively short, broad; ear (from notch) usually 3 to 4 less than hindfoot; occurring usually below 2,600 m ---------- 9
9 (8) Occurring on Cozumel Island; total length more than 204 ---------- *R. spectabilis*
Not occurring on Cozumel Island; total length less than 204 ---------- 10
10 (9) Length of skull usually less than 22; if more, then length of incisive foramina less than 4; frontals broad and flattened interorbitally; hindfeet whitish or dusky above; occurring in tropical lowlands of southern México ---------- *R. gracilis*
Length of skull usually more than 22; if less, then length of incisive foramina more than 4.0; frontals strongly constricted and not markedly flattened (but broad interorbitally); hindfeet dusky above; occurring above 300 m ---------- *R. mexicanus*
11 (7) First primary fold of M3 at least as long as second primary fold, each extending more than halfway across crown; major fold well developed, sometimes continuous with first primary fold; worn occlusal surface of left m3 E-shaped ---------- 12
First primary fold of m3 shorter than second primary fold; major fold indistinct, not more than a shallow indentation on lingual face of tooth; worn occlusal surface of m3 C-shaped ---------- 13
12 (11) Zygomatic breadth more than 11.9; interorbital breadth more than 3.4; supraorbital shelf trenchant or beaded; tail unicolor or barely paler below; duskiness of tarsi extending to dorsum of hindfeet ---------- *R. hirsutus*
Zygomatic breadth less than 11.9; interorbital breadth less than 3.4; supraorbital shelf neither trenchant nor beaded, although sometimes slightly elevated; tail paler below than above, usually sharply bicolor; hindfeet whitish or buffy above, not dusky ---------- *R. fulvescens*
13 (11) Breadth of braincase more than 10.7; tail more than 90 ---------- 14
Breadth of braincase less than 10.7; tail usually less than 85 (never more than 100) ---------- 15
14 (13) No buffy hairs on inner surfaces of ears; ears 17 to 19 from notch to tip; rostrum long, narrow; interorbital region strongly constricted, hourglass-shaped; occurring above 2,700 m in highlands of central México ---------- *R. chrysopsis*
Some buffy hairs on inner surfaces of ears (magnification sometimes required to see same); ears less than 18; rostrum and interorbital region broader; occurring below 2,700 m in central and southern México ---------- *R. sumichrasti*
15 (13) Tail shorter than head and body ---------- 16
Tail longer than head and body ---------- 18
16 (15) Total length less than 140; tail less than 95 percent of length of head and body; breadth of braincase usually less than 9.8 ---------- 17
Total length more than 140; tail more than 90 percent of length of head and body; breadth of braincase more than 9.6 ---------- *R. megalotis*
17 (16) Faint labial ridge on M1 and M2; tarsi whitish or whitish with thin longitudinal dusky line; pre- and post-auricular areas bright buffy, occurring in coastal region of Sonora ---------- *R. burti*
No labial ridge on M1 and M2; tarsi extensively dusky head, pre- and post-auricular areas grayish buff; not occurrin gin coastal region of Sonora ---------- *R. montanus*
18 (15) Breadth of mesopterygoid fossa more than 1.0 and approximately equal to distance between posterior palatine foramina; tail more than 75, usually more than 85 ---------- *R. sumichrasti*

Breadth of mesopterygoid fossa less than 1.3, and less than distance between posterior palatine foramina; tail usually less than 85 ________ *R. megalotis*

19 (6) Second primary fold indistinct or absent in m3; m3 unlike m2 in form; zygomatic plate broader than mesopterygoid fossa; mesopterygoid fossa narrower than either pterygoid fossa ________ 20

Second primary fold well developed in m3, usually appearing as posterior 1 of 2 internal folds; m3 similar to but smaller than m2; zygomatic plate little if any broader than mesopterygoid fossa; mesopterygoid fossa approximately as broad as either pterygoid fossa ________ 21

20 (19) First primary fold in M3 at least as long as second primary fold, each extending more than halfway across crown; major fold well developed, sometimes confluent with first primary fold; in m3 worn occlusal surface of left tooth S-shaped ____ *R. fulvescens*

First primary fold in M3 shorter than second primary fold; major fold indistinct, not more than a shallow indentation on lingual surface of tooth; worn occlusal surface of m3 C-shaped ________ *R. sumichrasti*

21 (19) Hindfoot 22 to 26; length of molar toothrow 3.9 to 4.5 ________ 22

Hindfoot less than 22; length of molar toothrow less than 3.9 ________ 23

22 (21) Interorbital breadth more than 4.0; length of rostrum (measured from the shallow notch lying on superior orbital border of zygomatic arch [lateral to lacrimal bone] to tip of nasal on same side) more than 9.0; occurring in mountains of Costa Rica and Panamá above 2,100 m ________ *R. creper*

Interorbital breadth less than 4.1; length of rostrum less than 9.2; occurring in mountains of Guatemala above 2,400 m ________ *R. tenuirostris*

23 (21) Greatest length of skull more than 24 ________ 24

Greatest length of skull less than 24 ________ 25

24 (23) Breadth of zygomatic plate less than 1.5; zygomatic breadth less than 12, approximately equal to breadth of braincase; depth of braincase more than 9.2 ________ *R. rodriguezi*

Breadth of zygomatic plate 1.5 or more; zygomatic breadth more than 12, and approximately 0.5 to 1.0 wider than braincase; depth of braincase less than 9.3 ________ *R. mexicanus*

25 (23) Braincase highly inflated; zygomatic breadth barely more than breadth of braincase; rostrum long, narrow; occurring in mountains of Guatemala above 2,600 m ________ *R. microdon*

Braincase moderately inflated; zygomatic breadth approximately 0.5 to 1.0 wider than braincase; rostrum broader; not restricted to mountains of Guatemala ________ 26

26 (25) Length of rostrum less than 7 ________ 27

Length of rostrum more than 7 ________ 28

27 (26) Hindfeet dusky above, occurring in lowlands of eastern Panamá ________ *R. darienensis*

Hindfeet whitish or dusky above; occurring north of Panamá ________ *R. gracilis*

28 (27) Length of molar toothrow less than 3.2 ________ 29

Length of molar toothrow more than 3.2 ________ 32

29 (28) Depth of braincase less than 8.6; dorsal surface of skull comparatively flat ________ 30

Depth of braincase more than 8.4; dorsal surface of skull convex ________ *R. mexicanus*

30 (29) Hindfeet dusky above; fur of upperparts long and dusky; zygomatic plate less than 1.5 wide; occurring in humid highlands of Costa Rica and uplands of Nicaragua ________ 31

Hindfeet whitish or lightly dusky above; fur of upperparts bright reddish buff and moderately short; zygomatic plate more than 1.5 wide; occurring in tropical lowlands ________ *R. gracilis*

31 (30) Upperparts near Ochraceous-Tawny suffused with black; well-developed ectolophid on m1 and m2; incisive foramina terminating posterior to anterior margins of first upper molars, and bony palate thus shorter (3.1 to 3.8) ________ *R. brevirostris*

Upperparts near Buffy Brown lightly suffused with ochraceous; ectolophid lacking on m1 and m2; incisive foramina terminating well anterior to first upper molars, and bony palate thus longer (3.9) ________ *R. paradoxua*

32 (28) Length of skull less than 22.5; depth of skull less than 8.5; tail less than 105; occurring in tropical lowlands ________ *R. gracilis*

Length of skull more than 22; depth of braincase more than 8.3; tail rarely less than 100; occurring above 900 m ________ *R. mexicanus*

Reithrodontomys fulvescens Allen, 1894

Fulvous Harvest Mouse

Reithrodontomys fulvescens Allen, 1894:319. Type from Oposura, 2,000 ft, Sonora.

Reithrodontomys laceyi Allen, 1896:235. Type from Watson's Ranch, 15 mi S San Antonio, Bexar Co., Texas.

Reithrodontomys chrysotis Elliot, 1899:281. Type from Dougherty, Washita River, Murray Co., Oklahoma.

Reithrodontomys tenuis Allen, 1899:15. Type from Rosario, Sinaloa.

Reithrodontomys difficilis Merriam, 1901:556. Type from Orizaba, about 4,500 ft, Veracruz.

Reithrodontomys griseoflavus Merriam, 1901:553. Type from Ameca, 4,000 ft, Jalisco.

Reithrodontomys levipes Merriam, 1901:555. Type from Tlalpan, Distrito Federal, México.

Reithrodontomys inexspectatus Elliot, 1903:145. Type from Patzcuaro, Michoacan.

Rhithrodontomys amoenus Elliot, 1905:234. Type from Reforma, 500 ft, Oaxaca.

CONTEXT AND CONTENT. Context noted in generic summary above. The following 17 subspecies were recognized by Hall (1981):

R. f. amoenus Elliot, 1905:234, see above.

R. f. aurantius Allen, 1895:137. Type from Lafayette, Lafayette Parish, Louisiana (*chrysotis* Elliot a synonym).

R. f. canus Benson, 1939:149. Type from 5 mi SE Chihuahua, Chihuahua.

R. f. chiapensis Howell, 1914:53. Type from Canjob, about 5,000 ft, Chiapas.

R. f. difficilis Merriam, 1901:556, see above.

R. f. fulvescens Allen, 1894:319, see above.

R. f. griseoflavus Merriam, 1901:553, see above.

R. f. helvolus Merriam, 1901:554. Type from Oaxaca City, about 5,000 ft, Oaxaca.

R. f. infernatis Hooper, 1950:167. Type from Teotitlan, 3,100 ft, Oaxaca.

R. f. intermedius Allen, 1895:136. Type from Brownsville, Cameron Co., Texas.

R. f. laceyi Allen, 1896:235, see above.

R. f. meridionalis Anderson and Jones, 1960:522. Type from 9 mi NNW Estelí, Estelí, Nicaragua.

R. f. mustelinus Howell, 1914:54. Type from Llano Grande, 300 ft, Oaxaca.

R. f. nelsoni Howell, 1914:53. Type from Colima, Colima.

R. f. tenuis Allen, 1899:15, see above.

R. f. toltecus Merriam, 1901:555, see above (*inexspectatus* Elliot a synonym).

R. f. tropicalis Davis, 1944:393. Type from Boca del Rio, 8 km S city of Veracruz, Veracruz.

DIAGNOSIS. Hooper (1952) placed *R. fulvescens* and its close relative *R. hirsutus* into the *fulvescens* group within the subgenus *Reithrodontomys*. The subgenera *Reithrodontomys* and *Aporodon* differ in skull characteristics. The part of the skull anterior to the least interorbital constriction in *Reithrodontomys* is approximately equal in length to the part posterior to the interorbital constriction. In *Aporodon*, the posterior part is longer. The braincase of *Reithrodontomys* is moderately inflated compared to *Aporodon* and extends laterally slightly beyond the anterolateral limits of the zygomatic arches. The zygomatic plate is much broader than the mesopterygoid fossa in *Reithrodontomys* but narrower than the mesopterygoid fossa in *Aporodon*. In *Aporodon*, the braincase is greatly inflated and elongated, extending laterally past the anterolateral limits of the zygomatic arches. Other differences include those of the ptyergoid hamulae; in *Reithrodontomys* they are only sightly inflated and barely reflexed laterad, whereas in *Aporodon* they are inflated, reflexed laterad, and club-shaped when viewed ventrally (Hall, 1981).

FIGURE 1. The fulvous harvest mouse (*Reithrodontomys fulvescens aurantius*). Photographed at the University of Houston Coastal Center by S. R. Spencer.

Reithrodontomys fulvescens is morphologically nearer the species of the subgenus *Reithrodontomys* than those of *Aporodon*. According to Hooper (1952), some of the characteristics appear to link *R. fulvescens* to *Aporodon* through *R. hirsutus*. *R. hirsutus* is larger than *R. fulvescens* with a much larger skull. The cranium of *R. fulvescens* has a characteristic appearance in having a large rostrum, ascending premaxillae branches that are broad dorsally, elongate braincase, inflated frontals at their junction with premaxillae, maxillae, and lachrymal bones, a zygomatic plate broader than the mesopterygoid fossa, and incisive foramina slightly longer than the rostrum is broad (Hooper, 1952).

GENERAL CHARACTERS. Variation in external measurements of 15 subspecies of *R. fulvescens* was described by Hooper (1952). Measurements (mm) for total length varied from 134 to 189, length of tail vertebrae ranged from 73 to 116, length of hindfoot was between 16 and 22, and the ear from the notch measured between 11 and 17. Hooper (1952) gave cranial measurements for the same subspecies. *R. fulvescens* is a moderate to small member of the genus with the tail between 10 and 50% longer than the head and body (Hooper, 1952). Compared with congeners, the pelage of *R. fulvescens* is coarse with a streaked or salt-and-pepper effect resulting from the contrast between the black guard hairs and the banded paler cover hairs (Hooper, 1952) (Fig. 1).

Hooper (1952) found that cranial length of *R. fulvescens* increased with altitude for both adults and subadults but not with latitude. The skull of *R. fulvescens* is illustrated in Fig. 2. The dental formula is i 1/1, c 0/0, p 0/0, m 3/3, total 16.

DISTRIBUTION. *Reithrodontomys fulvescens* has a widespread geographic range (Fig. 3) centered in México and extending south to Honduras, Guatemala, and El Salvador, and north to Arizona, southwestern and central Texas, central Oklahoma, southeastern Kansas, southern Missouri, Arkansas, and western Mississippi (Hooper, 1952). Range extensions into extreme southern New Mexico (Findley and Pullen, 1958), western Texas (Baccus, 1968), western Oklahoma (Goertz, 1962), and northern Missouri (Long, 1965) have been reported.

FOSSIL RECORD. According to Hooper (1952) the fossil record of *Reithrodontomys* is scanty and of little help in assessing the interrelationships and phyletic history of the species of the genus. *R. fulvescens* is known from late Pleistocene deposits of caves on the Edwards Plateau of central Texas (Roth, 1972) where it occurred in sympatry with *R. montanus* and *R. megalotis* about 8,000 years before the present. Sites include Klein Cave, Kerr

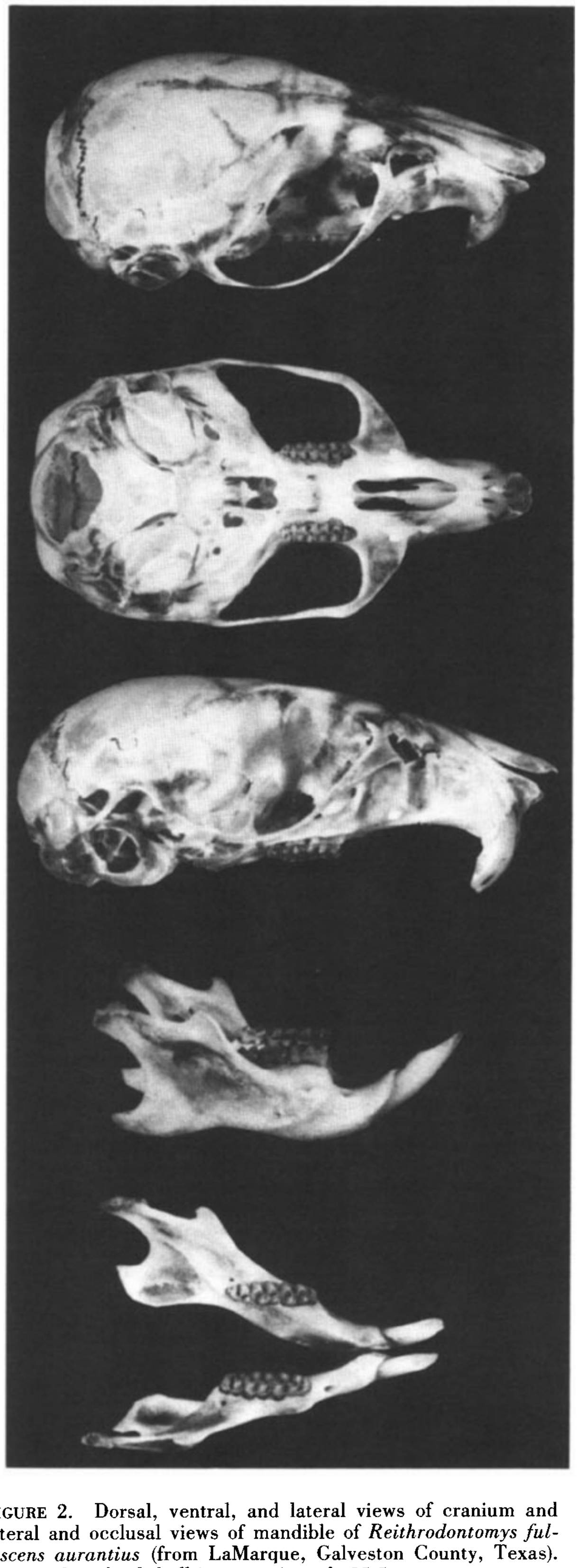

FIGURE 2. Dorsal, ventral, and lateral views of cranium and lateral and occlusal views of mandible of *Reithrodontomys fulvescens aurantius* (from LaMarque, Galveston County, Texas). Greatest length of skull is approximately 15.5 mm.

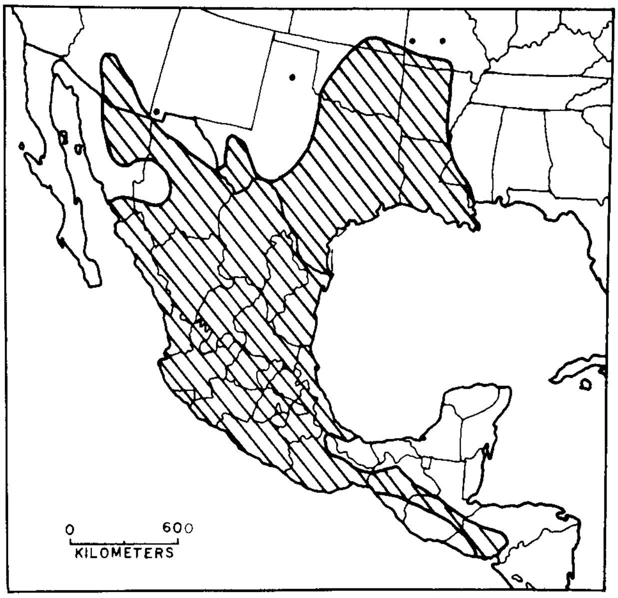

FIGURE 3. Distribution map of *R. fulvescens* (after Hall and Kelson, 1959). Closed circles indicate range extensions described in text.

Co., Texas, Schulze Cave, Edwards Co., Texas, and Easley Ranch, Foard Co., Texas (Kurtén and Anderson, 1980).

FORM. The pelage of *R. fulvescens* varies among the subspecies and with molting stage. Howell (1914) and Hooper (1952) described pelage in detail and found that upperparts varied from ochraceous buff to tawny to pinkish cinnamon or salmon, mixed medially with blackish to blackish-brown hairs which sometimes formed a darker band down the midline from nose to tail. Underparts varied from white to grayish-white or gray often tinged with buff or light pinkish cinnamon. The tail was hair brown to fuscous above and grayish white to soiled whitish below. Feet were white grayish-white to buffy-white and ears were hair brown to fuscous or sepia and often tinged with tawny or ochraceous on the inside surfaces. Hooper (1952) described at least three pelages including juvenile, subadult or post-juvenile, and adult stages; partial or complete molting was described between these stages; there is at least one annual molt of the adult pelage. Juvenile pelage was dark and dull, composed of long guard hairs and shorter cover hairs and appeared woolly. Subadult or post-juvenile pelage was coarser than juvenile pelage and the buffy tones subdued in juveniles were more intense because the bands containing that color were wider. Distinctive markings such as the dorsal band were well defined. Adult pelage was the brightest, with buffy tones more dominant and nearer the red end of the spectrum, while the black guard hairs contributed less to total coloration than in younger animals. The juvenile to subadult molt was the most complete molt observed. Almost all hairs were replaced starting from two centers: the venter, from which an expanding ellipse is formed; and the forehead or muzzle (which may simply be the first appearance of the molt wave from the venter). From the ventral surface the molt line proceeded dorsally, met in the middle of the back, and proceeded anteriorly and posteriorly; replacement of the hair on the rump was usually completed before replacement on the head. The muzzle area of the forehead expanded posteriorly to meet the molt from the back on the crown or neck and on the cheeks. The molt to adult pelage was similar but with greater variation, less symmetry, and more molting centers; the molt began in any one of them. Replacement did not occur on all areas of the body. In older individuals there was evidence of at least one, and possibly two, annual molts.

Hall (1981) noted six mammae in *R. fulvescens* including one pectoral and two inguinal pairs. Dental comparisons within the genus *Reithrodontomys* were made by Hooper (1952). Characteristics of third upper and lower molars distinguish *R. fulvescens* from all other species of the subgenus *Reithrodontomys* except *hirsutus*. The third upper molar has three prominent folds: major, first primary, and second primary. Variation in the occlusal pattern of both upper and lower M3 is illustrated for *R. fulvescens* in Fig. 4. The first and second primary folds are about equal in

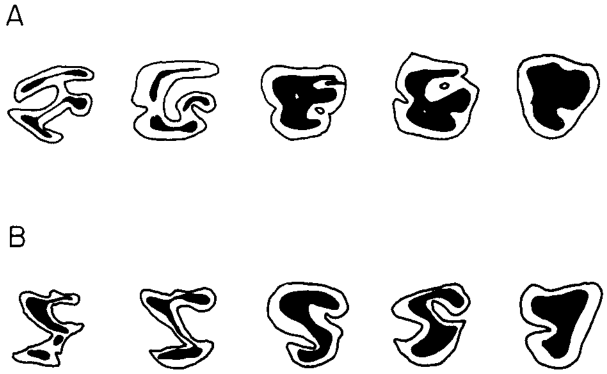

FIGURE 4. Variation in the occlusal pattern of the upper (A) and lower (B) third molar teeth of *R. fulvescens* (redrawn from Hooper, 1952: Fig. 24).

length; each extends labially about halfway across the tooth. The first is sometimes confluent with the major fold, the two folds separating the protocone and anterior cingulum from the remainder of the tooth. Until it is entirely eroded, the major fold is continuous with the margin of the tooth. The primary folds become separated from the margin as enamel islands of equal size (unequal size in other species). The major and first primary folds of M3 are the most conspicuous, being nearly equal in length and extending about halfway across the tooth. Both retain connection with the margin of the tooth until a later stage of wear. In other species, the primary fold is the only conspicuous one as wear of the tooth produces a large central enamel island.

Hooper (1959) described the glans penis of *R. fulvescens* as an elongate, rod-shaped structure similar in size and shape to those of *Peromyscus maniculatus*, *P. polionotus*, and other species of the *maniculatus* group. It consisted of two main divisions: a tapered, somewhat protractile tip with soft outer tissues and a main body composed of comparatively dense tissues, some of which were spinous. The distal margin of the body, where it invaginates and joins the tip, was crenate and puckered ventrally, and comparatively smooth dorsally. In *fulvescens* and *humulis* the margin was slightly cleft middorsally forming two lappets as seen in *Peromyscus*. Midventrally it was slightly notched with the notch bounded by slight projections. Immediately dorsal to those processes was the urinary meatus at the base of the protractile tip. The glans penis of two similar species, *R. megalotis* and *R. mexicanus*, were illustrated by Hooper (1959: Plate I).

Burt (1960: Plates XIII to XV) surveyed the bacula of the genus *Reithrodontomys*. They were rather uniform in size and shape, the bone consisting of a simple curved rod with a dorsoventrally flattened, laterally expanded base that was usually somewhat concave dorsally. The wide base tapered quickly into the shaft which was usually of uniform thickness to near the tip. Burt suggested that bacula of *Reithrodontomys* were of minor taxonomic importance. Length of bacula of *R. fulvescens* ranged from 6.9 to 9.4 mm and width of the base ranged from 0.8 to 1.2 mm.

Carleton (1973) discussed gross stomach morphology of New World Cricetinae. Differences among members of the genus *Reithrodontomys* were revealed mainly in the distribution of glandular and cornified epithelium and differences in the morphology of the bordering fold. Stomachs of six *Reithrodontomys* species (not including *fulvescens*) were illustrated.

FUNCTION. Gaertner (1968) investigated energy expenditure by *R. fulvescens*. Resting metabolic rate for harvest mice was related to body weight by the regression equation $Y = 2.47 + (-0.041X)$ where Y was the metabolism in ml O_2 g^{-1} h^{-1} and X was the body weight (g). Animals from Arkansas began depositing fat in November and continued into January when fat content started to decrease through April. Fat content expressed as percent of dry, fat-free body weight ranged from 13.35 ± 1.04 ($n = 5$) in May to 62.72 ± 1.41 ($n = 10$) in January. This response as well as an increase in hair length appeared to be adaptations for surviving winter cold. Gaertner (1968) also speculated on the occurrence of daily hypothermia in this species since the nest temperature decreased at the onset of daylight and mice were usually asleep in their nest at that time. Individuals appear to recover readily from hypothermia (Spencer, pers. obs.); animals caught in live traps during cold periods are often sluggish but recover easily when warmed. Summer animals expended the most energy for maintenance metabolism and very little for thermoregulation or activity (Gaertner, 1968). Energy for thermoregulation represented the greatest proportion of the energy budget during spring, fall, and winter. Total yearly energy costs were estimated as 2,759.3 kcal/yr for an average harvest mouse. Most of this energy came from seeds and invertebrates which had a mean assimilation efficiency of about 85%.

ONTOGENY AND REPRODUCTION. Litter size of *R. fulvescens* usually ranges between two and four. Cockrum (1952) and Svihla (1930) reported females with two embryos; Goertz (1962) reported three individuals with three embryos and one with four embryos. Petersen (1978) observed a pregnant female with six embryos while Cameron (1977*a*) found a mean litter size of 3.5 (range, 2 to 4; n = 15). Packard (1968) found two breeding peaks for *R. fulvescens* in east Texas, one in March and another in July. Cameron (1977*a*) also observed a bimodal pattern in southeast Texas with increased reproductive activity in late spring and early autumn; population peak densities usually occurred in July and December through February.

Limited information on growth and development of neonates is available. Svihla (1930) reported that two young born in captivity weighed 1.07 and 1.15 g, respectively, and were blind and hairless at birth. Packard (1968) found that weaning occurred at 13 to 16 days when the young weighed 3.0 to 3.5 g. Hair appeared at day 3 to 4 on the dorsal surface and at about day 11 on the ventral surface. Eyes opened at 9 to 12 days and climbing behavior ensued at 12 to 13 days. Mean body weight of *R. fulvescens* (all age classes combined) ranged from 11 to 12 g, a value also obtained by Cameron (1977*a*). Petersen (1978) found that male *R. fulvescens* weighed more than females. However, in a sample of 31 adult harvest mice, Goertz (1962) observed a range of 9 to 15 g for adult males ($\bar{X}$ = 12.05) and a range of 9 to 16 g for adult females ($\bar{X}$ = 12.08). Gaertner (1968) did not find any *R. fulvescens* less than 9.0 g that were sexually mature. He observed a weight range of 6.5 to 25.0 g (n = 206) for combined sexes.

Little is known of the estrous cycle of *R. fulvescens*. Packard (1968) speculated that the species has a diestrous cycle with a possible tendency toward polyestry in more southern areas.

ECOLOGY. Only a few studies of *R. fulvescens* have yielded sufficient data for reliable population estimates. Cameron (1977*a*) described a bimodal density pattern in southeastern Texas with peaks in summer (11/ha) and winter (28/ha), with autumn and spring densities near 5.8/ha. Packard (1968) also obtained high densities (5.75/ha) in summer and winter in east Texas but densities were much lower than the previous study.

Population turnover occurs rapidly for *R. fulvescens*. Cameron (1977*a*) obtained values for expectation of further life of 2.1 to 2.5 months; the longest period of survival was 14 to 15 months for males and 11 to 12 months for females. Petersen (1978) reported expectation of further life as 7 to 8 weeks, mean survival rate of 0.5 to 0.75/3 weeks, and population turnover as 0.6 to 1.41 years; lower values were obtained for populations in less preferred habitat.

The number of male *R. fulvescens* captured in field studies in southeastern Texas has commonly been greater than the number of females (Cameron, 1977*a*; Joule and Jameson, 1972). Cameron (1977*a*) suggested that this skewed sex ratio could have been caused by greater movement of males and therefore a greater probability of trap encounters or by a bias in the sex ratio at parturition. He found a 2:1 ratio in trap- and laboratory-born litters, favoring males. Goertz (1962) and Packard (1968) did not obtain ratios different from equality in field studies.

The habitat of *R. fulvescens* consists primarily of grassy fields containing shrubs. Petersen (1978) found that fulvous harvest mice were most numerous in mesquite-grassland, whereas Packard (1968) found highest densities in grassland, pine-grass ecotone, and grass-brush habitats. Hooper (1952) described the habitats of the various subspecies; grassy areas, possibly including rocky outcrops, cactus, or brush, were commonly utilized.

Food habits of *R. fulvescens* have been described by Gaertner (1968) and Kincaid (1975). Gaertner found great seasonal variation in Arkansas with invertebrates dominating the diet in spring (88%) and summer (82%), and seeds in fall (79%) and winter (79%). Herbs and grasses were used in very small amounts. Kincaid (1975) found invertebrates dominated the diet on the coastal prairie of Texas in all seasons (88.9% with seasons pooled, n = 419). There was much less seasonal variation than in Arkansas, primarily because the south Texas winter was milder and insects were almost continuously available. Dicots, dicot seeds, and monocots were also eaten but in significant amounts only in fall, when dicots made up 16.5% of the diet, and in winter, when monocots made up 18.6% of the diet.

Both home-range size and average distance moved between successive captures have been used as indices of movement by fulvous harvest mice. According to Packard (1968), females had a slightly larger trapping range (0.24 ha) than males (0.19 ha), with young females averaging the greatest linear movements. Adult females exhibited the smallest home ranges. Average linear movement between successive captures pooled over age and sex was 42.7 m. Cameron and Kincaid (in press) calculated average distance moved between successive captures for 455 individuals with an average of three captures per individual and found that males and females differed significantly. Males averaged 30.5 m (n = 258) and females averaged 24.5 m (n = 197). Average distance moved was 27.9 m (pooled over sexes). Seasonal differences in movement were significant, with shorter average movements occurring in winter when densities were greatest. A negative correlation between density and movement suggested intraspecific effects.

Dispersal of *R. fulvescens* was studied by Joule and Cameron (1975) in areas where harvest mice were continuously removed. There was no difference in tendency to disperse between sexes. Age structure of male dispersers was not different from resident populations, whereas dispersing females were mainly juveniles and subadults. There was a significant positive correlation between number of dispersers and source population density, and resident populations seemed to inhibit immigration by conspecific strangers. Little other information on intraspecific interactions is available other than the tendency for males and females to spatially associate (Spencer et al., in press).

Goertz (1962, 1963) observed that *R. fulvescens* and the plains harvest mouse (*R. montanus*) had overlapping ranges in Oklahoma. Although there was no evidence for interspecific interactions between these two species, there was a tendency toward habitat segregation. *R. fulvescens* used areas of heavy grassy cover while *R. montanus* occurred in areas of more sparse cover. The relationships between *R. fulvescens* and two sympatric rodents (*Sigmodon hispidus* and *Oryzomys palustris*) on the coastal prairie of Texas were studied by experimental removal of species (Cameron, 1977*a*, 1977*b*; Cameron et al., 1979; Joule and Cameron, 1975, 1980; Joule and Jameson, 1972; Kincaid and Cameron, in press). The general pattern that emerged from these studies was that the three species coexist with little overt evidence of competition. *Reithrodontomys* and *Oryzomys* segregated mainly on the basis of habitat. *Sigmodon* and *Reithrodontomys* segregated temporally, spatially, and by diet. *Sigmodon*, however, appeared to inhibit the trappability of *R. fulvescens* when *Sigmodon* individuals were removed, *Reithrodontomys* captures increased. The mechanism for this trap preemption is unknown.

No experimental studies of predation or parasitism of the fulvous harvest mouse have been undertaken. However, pellets of barn owls contain *R. fulvescens* skulls (pers. observation). Svihla (1930) found remains in a barred owl pellet. Lowery (1974) found fulvous harvest mice in stomachs of red-tailed hawks. Petersen (1978) collected fleas of the genus *Polygenis* from *R. fulvescens* in México.

BEHAVIOR. Daily activity patterns of *R. fulvescens* have been well described. Cameron et al. (1979) monitored live traps at 2-h intervals and found that *R. fulvescens* was strictly nocturnal with activity beginning abruptly after sunset, peaking at 2100 h, and ceasing at sunrise. Gaertner (1968) obtained similar results in the laboratory. Those animals that constructed nests exhibited activity patterns consisting of three distinct periods: 1) a period during the lights-on segment when they remained in their nest; 2) a period during darkness when they left their nest for long periods; and 3) a period after period two extending until the lights came on and during which animals made brief excursions from their nests. Animals exposed to winter photoperiod and temperature deviated most from this pattern; period two was usually absent and excursions were more evenly distributed throughout the day. Packard (1968) investigated activity patterns in controlled environmental chambers with varying light : dark periods. He concluded that activity was correlated to a period at onset of darkness or shortly afterwards. During periods of continuous light or darkness, activity occurred at times of natural darkness, suggesting an endogenous rhythm.

The nest of *R. fulvescens* was described by Svihla (1930) as a baseball-size mass constructed of grasses and sedges and placed several inches off the ground. The majority of nests observed contained a pair of mice. Gaertner (1968) provided harvest mice with grass and in the laboratory observed that they built small circular nests in the middle of the grass; the one or two entrances were plugged when the mouse was in the nest. Animals kept at temperatures simulating winter built nests with thicker walls and more shredded grasses than animals kept at warmer temperatures.

Scansoriality is well developed in *R. fulvescens*. Cameron and Kincaid (in press) placed Sherman live traps on 1-m-high platforms in above-ground vegetation and also on the ground. Approximately 66% of captures of fulvous harvest mice were in traps on these platforms.

The social behavior of *R. fulvescens* is not well known. Multiple captures of *R. fulvescens* in southeastern Texas involved significant excesses of male-female captures (Spencer et al., in press). In addition, significant excesses of same day male-female captures were also found at sites with two traps. These results indicate a spatial association of males and females and suggests that pair-bonding between males and females may exist.

GENETICS. Carleton and Myers (1979) described the karyotype of *R. fulvescens tropicalis* as consisting of 24 pairs of small to large acrocentric chromosomes and a single pair of large submetacentrics assumed to be the sex chromosomes ($2n = 50$; $FN = 48$). Engstrom et al. (1981) found several animals with $FN = 49$; an autosomal metacentric chromosome replaced a single acrocentric element resulting in a heteromorphic autosomal pair. Comparing the karyotype with that of other members of the genus, Carleton and Myers (1979) placed *R. fulvescens* as an intermediate form in the genus. Hooper (1952) placed it in the subgenus *Reithrodontomys* but thought that it shared many characteristics of the subgenus *Aporodon*. Robbins and Baker (1980) analyzed G- and C-banded chromosomes and concluded that *R. fulvescens*, along with some species of *Baiomys*, *Onychomys*, and *Peromyscus*, has undergone few rearrangements of chromosomes since these taxa diverged from a common ancestor. Rates of differentiation within the genus *Reithrodontomys* were highly irregular.

Moruzzi (1979) found that *R. fulvescens* would be useful for experiments in the separation of X- and Y-chromosome-bearing spermatozoa because of differences in chromatin content. *R. fulvescens* ranked eighth ($n = 524$); X-bearing spermatozoa contained 7.985% more chromatin than Y-bearing sperm cells.

REMARKS. Hooper and Musser (1964) and Carleton (1980) suggested that the genus *Reithrodontomys* is most closely related to the genus *Peromyscus*. Hooper (1952) speculated on the phyletic history of the genus *Reithrodontomys*. The subgenus *Reithrodontomys* probably originated in the southern part of the Mexican Plateau whereas the subgenus *Aporodon* originated in the Central American highlands. The *fulvescens* group occupied an intermediate geographical range between the two subgenera and was also morphologically intermediate. The *fulvescens* group segregated early from the primitive generic stock which gave rise to *Aporodon* and the remainder of *Reithrodontomys* (see Hooper, 1952: Plate I). Carleton (1980) corroborated the existence of the two subgenera by phylogenetic methods based on the seven species (including *fulvescens*) he examined.

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