MAMMALIAN SPECIES No. 241, pp. 1–3, 2 figs.

Peromyscus melanocarpus.

By Eric A. Rickart and Paul B. Robertson

Published 13 December 1985 by The American Society of Mammalogists

Peromyscus melanocarpus Osgood, 1904

Black-wristed Deer Mouse

Peromyscus melanocarpus Osgood, 1904:73. Type locality Mount Zempoaltepec 8,000 ft, Oaxaca, México.

CONTEXT AND CONTENT. Order Rodentia, Family Muridae, Subfamily Cricetinae. *P. melanocarpus* is monotypic, and is a member of the subgenus *Peromyscus* and the *P. mexicanus* species group (Hooper and Musser, 1964; Huckaby, 1980). Carleton and Musser (1984) place the genus *Peromyscus* in the subfamily Sigmodontinae.

DIAGNOSIS. This species can be identified by the dusky color that extends to the base of the toes (Osgood, 1904). In addition, size, presence of supraorbital beading, and absence of pectoral mammae distinguish it from the sympatric species *P. oaxacensis, P. lepturus, P. chinanteco* (all of which are smaller), and *P. thomasi* (which is larger) (Huckaby, 1980; Robertson and Musser, 1976). *Peromyscus mexicanus totontepecus,* also sympatric at some localities, is similar in size and general color, but lacks supraorbital beading, has smaller molars, a shorter incisive foramen, longer nasals, and white carpal and tarsal regions (Huckaby, 1980; Osgood, 1904).

GENERAL CHARACTERISTICS. Size large for the subgenus; tail longer than head and body. Skull (Fig. 1) large, with relatively broad braincase. Frontals faintly beaded on supraorbital border and depressed along midline, forming shallow depressions anteriorly and posteriorly. Nasals moderately long, terminating anterior to orbits. Interpterygoid fossa large, extending past posterior margin of M3. Incisive foramen long and broadly open, terminating just anterior to M1. Cheekteeth moderately complex and relatively large, usually with undivided anterocone. Auditory bullae relatively small (Goodwin, 1969; Huckaby, 1980; Osgood, 1904).

Means and ranges of external and selected cranial measurements (in mm) of 10 to 11 specimens from the Sierra de Juárez (Huckaby, 1980) are: head and body length, 122 (100 to 130); length of tail, 124 (100 to 133); length of hindfoot, 29.1 (28 to 30); length of skull, 32.9 (29.8 to 34.4); length of rostrum, 10.2 (8.4 to 11.2); length of braincase, 15.1 (14.7 to 15.8); interorbital breadth, 5.3 (5.1 to 5.6); braincase breadth, 14.2 (13.7 to 15.0); length of incisive foramen, 7.1 (6.0 to 7.6); length of interpterygoid fossa, 5.5 (4.6 to 6.1); interpterygoid fossa breadth, 2.1 (1.7 to 2.5); length of molar toothrow, 4.8 (4.6 to 5.0); intermolar breadth, 3.3 (3.1 to 3.5); molar breadth, 1.5 (1.4 to 1.5). Robertson (1975) recorded an average adult field weight of 59.0 g. There is no apparent sexual dimorphism in size (Rickart, 1977).

Adult pelage is long and soft. Dorsal color is dark mummy brown, slightly darker along the midline. Underparts are blackish slate washed with white. The tail is covered with short blackish hairs, somewhat paler below than above. Scales of the tail are dusky, sometimes with irregular paler patches. Forefeet and hindfeet are dusky brownish to the base of the toes (Osgood, 1904). We observed no seasonal color variation among adults in a large series of specimens from the Cerro Pelón region, Sierra de Juárez (University of Kansas collection). Color of juveniles in this series is nearly uniform Chaetura Brown dorsally, with Plumbeous undercolor, and underparts Slate Gray washed with white (capitalized terms from Ridgway, 1912). Subadult and adult pelages are not readily distinguishable (Rickart, 1977).

The glans penis is relatively long, with large spines, a long protractile tip, and undivided dorsal lappets. The baculum is cylindrical, unexpanded distally, with a large cartilaginous tip. Females have two pairs of inguinal mammae (Huckaby, 1980).

DISTRIBUTION. This species is restricted to montane forests in the mountains of north-central Oaxaca, México. The distribution as presently known is discontinuous, consisting of two segments (Fig. 2). Specimens have been taken at Cerro Zempoaltepec (type locality) and nearby Totontepec, and at localities between 900 and 2,800 m on the north slope of the Sierra de Juárez. The range limits are probably known (Huckaby, 1980). There is no fossil record.

FORM AND FUNCTION. Average ages of initiation and completion of postjuvenile molt are 72 and 120 days, respectively. External evidence of subsequent developmental molt is obscured by the absence of distinct molt lines and the similar coloration of subadults and adults (Rickart, 1977). The stomach has been described as partially pouched, with morphology similar to that of *P. melanurus* (Carleton, 1973; Huckaby, 1980).

REPRODUCTION AND ONTOGENY. Robertson (1975) found a seasonal breeding peak extending from March to July (corresponding to the transition between dry and wet seasons). However, at least some reproduction occurs throughout the year. The mean litter size for 30 parous females (as determined from counts of embryos or placental scars) was 2.3 (range 1 to 3). The average size of 28 laboratory litters was 1.8. The sex ratio (male : female)

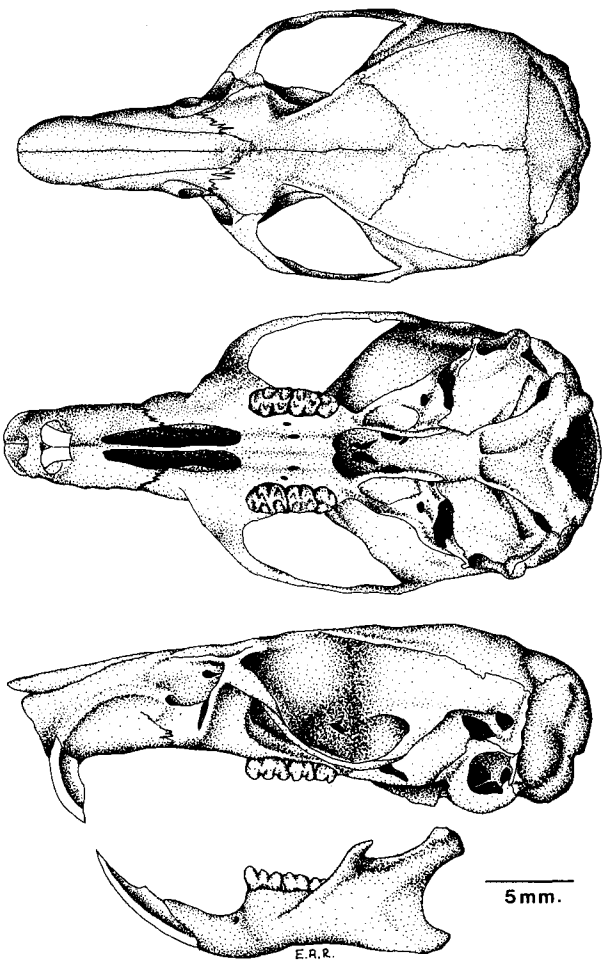

FIG. 1. Dorsal, ventral, and lateral views of cranium and lateral view of lower jaw of *Peromyscus melanocarpus* (KU 124626, adult male) from Cerro Pelón, Sierra de Juárez, Oaxaca.

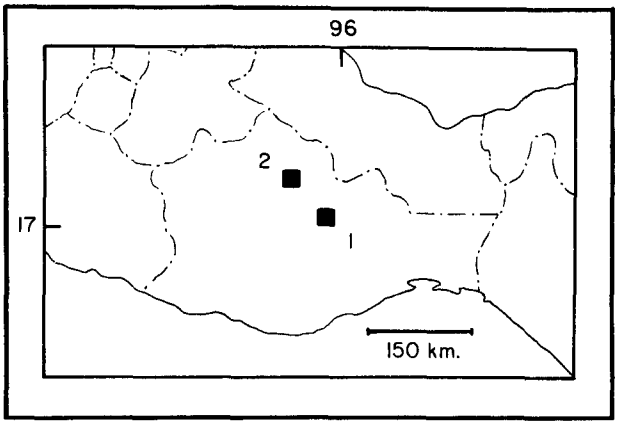

FIG. 2. Map of southern Mexico showing the distribution of *Peromyscus melanocarpus* in the state of Oaxaca: 1, Cerro Zempoaltepec region; 2, Sierra de Juárez region.

for 41 individuals born in captivity was 1.93:1, whereas that of 246 snap-trapped specimens from the Cerro Pelón region was 1.54: 1. The length of gestation in the laboratory has been estimated at 1 month. There is indirect evidence of postpartum estrus in captives (Rickart, 1977; Robertson, 1975).

Growth rates are much slower for *P. melanocarpus* than for most *Peromyscus* (Rickart, 1977). Young reach 50% of adult weight between 6 and 7 weeks, and by 10 weeks are still below 90% adult size. Morphological development is similar to that documented for other species, but is also relatively slow. The following mean ages (days) were recorded for selected developmental events: eruption of lower incisors, 11.6; eruption of upper incisors, 14.8; opening of auditory meatus, 17.6; opening of eyes, 21.9. Weaning is estimated to occur shortly after eye opening. There is an apparent sex difference in the age of maturation as estimated from the appearance of external genitalia. For six females, the average age of vaginal perforation was 79.3 days (range 70 to 98); for nine males, the testes became scrotal at an average age of 124 days (range 86 to 154) (Rickart, 1977).

ECOLOGY. *Peromyscus melanocarpus* inhabits montane forests in regions characterized by steep slopes, lateritic soils, high rainfall and heavy cloud cover, and relatively low insect and avian diversities and abundances. A study of this species on the north slope of the Sierra de Juárez (Robertson, 1975) showed that it occurs between 900 and 2,800 m elevations in montane rainforest and evergreen cloud forest. These two forest types grade into one another at approximately 1,500 m. The montane rainforest is characterized by *Engelhardia mexicana, Liquidamber styraciflua, Cyathea mexicanus,* and a profusion of epiphytic ferns (Lycopodiaceae, Hymenophyllaceae, Polypodiaceae), orchids (Orchidaceae), bromeliads (Bromeliadaceae), and bryophytes. The rich epiphytic flora and *Liquidamber* persist into the evergreen cloud forest where several species of *Quercus* are common. Mosses cover limbs, trunks, exposed roots, and much of the forest floor, forming a springy mat. *Pinus strobus* appears in the cloud forest association at about 2,600 m. Both forest types have a dense, herbaceous understory, and bamboo (*Bambusa*) is common in the cloud forest understory. In general, canopy trees have smooth, straight trunks and average 35 to 40 m in height in the rainforest, decreasing in height to 20 m at 2,800 m. Average annual precipitation at 1,500 m is 584.0 cm with a June-through-October wet season. No month averages less than 200 mm of precipitation. Temperatures below the canopy are always cool and the forest floor damp (Robertson, 1975; Rzedowski, 1981).

The steep slopes and high rainfall produce vast networks of exposed tree roots, and in these *P. melanocarpus* is found most commonly. Here the mice are shielded from rain and provided with a complex, subterranean system among the roots. Small piles of partially eaten acorns and other seeds usually are found in runways among the roots. In hundreds of releases from live-traps, *P. melanocarpus* always sought shelter among roots, showing no tendency toward arboreality (Robertson, 1975).

Compared with peromyscines in other tropical and temperate habitats (Terman, 1968), trap success for *P. melanocarpus* commonly is high, often approaching 40% and seldom below 20% (Robertson, 1975). Variations in trap success seem to reflect density changes caused by seasonal breeding. Seasonal breeding and food-hoarding behavior in captives (Rickart, 1977) suggest seasonality in resource abundance.

In the Sierra de Juárez, *Peromyscus melanocarpus* has been taken in association with *Cryptotis magna, C. mexicanus, Sorex veraepacis, S. saussurei, Heteromys lepturus, Oryzomys alfaroi, Reithrodontomys mexicanus, R. microdon, Peromyscus chinanteco, P. lepturus, P. mexicanus, P. oaxacensis, P. thomasi, Microtus mexicanus, M. oaxacensis, Tylomys nudicaudus,* and *Nyctomys sumichrasti* (Jones and Genoways, 1967; Robertson, 1975; Robertson and Musser, 1976). Community associates vary with altitude (Robertson, 1975). There is no published information regarding predators or parasites.

BEHAVIOR. *P. melanocarpus* adjusts well to captivity, is relatively tractable, and rarely bites when handled gently. Captive females with dependent young are tolerant of their mates and breeding pairs caged together rarely fight. There is substantial male parental care involving nest maintenance, and retrieval, grooming, and defense of young. These behaviors may indicate a relatively monogamous mating structure under natural conditions (Rickart, 1977).

In the laboratory, copulation lasts approximately 1 s. Males mount from behind and there is no mechanical tie or vaginal thrusting. Compared with other species of *Peromyscus,* copulation was initiated rapidly (mean intromission latency for 10 tests 277.3 s), but the mean number of copulations per test was low (2.1) (Dewsbury, 1979).

REMARKS. Nothing has been published concerning the genetics of this species. The vernacular name Zempoaltepec deer mouse has also been applied to *P. melanocarpus* (Hall, 1981). We thank Robert S. Hoffmann for providing access to specimens under his care and for reviewing an earlier draft of the manuscript.

LITERATURE CITED

CARLETON, M. D. 1973. A survey of gross stomach morphology in New World Cricetinae (Rodentia, Muroidea) with comments on functional interpretations. Misc. Publ. Mus. Zool., Univ. Michigan, 146:1–43.

CARLETON, M. D., AND G. G. MUSSER. 1984. Muroid rodents. Pp. 289–379, *in* Orders and families of Recent mammals of the world (S. Anderson and J. K. Jones, Jr., eds.). John Wiley and Sons, New York, 686 pp.

DEWSBURY, D. A. 1979. Copulatory behavior of four Mexican species of *Peromyscus.* J. Mamm., 60:844–846.

GOODWIN, W. H. 1969. Mammals from the state of Oaxaca, Mexico, in the American Museum of Natural History. Bull. Amer. Mus. Nat. Hist., 141:1–270.

HALL, E. R. 1981. The mammals of North America. Second ed. John Wiley and Sons, New York, 2:601–1181 + *90.*

HOOPER, E. T., AND G. G. MUSSER. 1964. Notes on the classification of the rodent genus *Peromyscus.* Occas. Papers Mus. Zool., Univ. Michigan, 635:1–13.

HUCKABY, D. G. 1980. Species limits in the *Peromyscus mexicanus* group (Mammalia; Rodentia; Muroidea). Contrib. Sci. Nat. Hist. Mus. Los Angeles Co., 326:1–24.

JONES, J. K., JR., AND H. H. GENOWAYS. 1967. Notes on the Oaxacan vole, *Microtus oaxacensis* Goodwin, 1966. J. Mamm., 48:320–321.

OSGOOD, W. H. 1904. Thirty new mice of the genus *Peromyscus* from Mexico and Guatemala. Proc. Biol. Soc. Washington, 17:55–77.

RICKART, E. A. 1977. Reproduction, growth and development in two species of cloud forest *Peromyscus* from southern Mexico. Occas. Papers Mus. Nat. Hist., Univ. Kansas, 67:1–22.

RIDGWAY, R. 1912. Color standards and color nomenclature. privately published, Washington, D. C.

ROBERTSON, P. B. 1975. Reproduction and community structure of rodents over a transect in southern Mexico. Unpubl. Ph.D. dissert., Univ. Kansas, Lawrence, 124 pp.

ROBERTSON, P. B., AND G. G. MUSSER. 1976. A new species of

Peromyscus (Rodentia; Cricetidae), and a new specimen of *P. simulatus* from southern Mexico, with comments on their ecology. Occas. Papers Mus. Nat. Hist., Univ. Kansas, 47:1–8.

RZEDOWSKI, J. 1981. Vegetación de México. Editorial Limusa, México, 432 pp.

TERMAN, C. R. 1968. Population dynamics. Pp. 412–450, *in* Biology of *Peromyscus* (Rodentia) (J. A. King, ed.). Spec. Publ., Amer. Soc. Mamm., 2:1–593.

Editors of this account were B. J. VERTS and J. K. JONES, JR. Managing editor was TIMOTHY E. LAWLOR.

E. A. RICKART, MUSEUM OF NATURAL HISTORY, UNIVERSITY OF KANSAS, LAWRENCE 66045, AND P. B. ROBERTSON, DEPARTMENT OF BIOLOGY, TRINITY UNIVERSITY, SAN ANTONIO, TEXAS 78284. PRESENT ADDRESS OF RICKART: LABORATORY FOR ENVIRONMENTAL BIOLOGY, UNIVERSITY OF TEXAS AT EL PASO 79968.