Marmosa robinsoni.

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Marmosa Gray, 1821

Marmosa Gray 1821:308. Type species Didelphis murina Linnaeus.


Marmosa robinsoni Bangs, 1898

South American Mouse Opossum

Marmosa robinsoni Bangs, 1898a:95. Type locality Isla Margarita, Nueva Esparta, Venezuela.

Marmosa mitis Bangs, 1898b:162. Type locality Pueblo Viejo, Santa Marta region, Colombia.

Marmosa robinsoni Thomas, 1899:287. Type locality Panama Island, Santa Marta, Colombia.

Marmosa chapmani Allen, 1900:197. Type locality Caura, head of Caura Valley, 500 ft, northern range, Trinidad.

Marmosa fulviventer Bangs, 1901:632. Type locality San Miguel Island, Golfo de Panama, Panama.

Marmosa grenadae Thomas, 1911:514. Type locality Arima, Grenada.

Marmosa tobagoi Thomas, 1911:515. Type locality Waterlevel, Tobago.

Marmosa vesseoa Thomas, 1911:515. Type locality Savanna Grande, Trinidad.

Marmosa ruatanica Goldman, 1911:237. Type locality Ruatan (=Roatan) Island, Caribbean Ocean off north coast of Honduras.

Marmosa isthmica Goldman, 1912:1. Type locality Rio Indio, near Gatun, Canal Zone, Panama.

Marmosa casta Matschie, 1916:270. Type locality San Esteban, near Puerto Cabello, Carabobo, Venezuela.

Marmosa mimetra Thomas, 1921:521. Type locality Santa Domingo de los Colorados, 1,600 ft; Ecuador.

CONTEXT AND CONTENT. Context noted above; nine subspecies are recognized (Cabrera, 1958; Goodwin, 1961; Hall, 1981; Handley, 1966).

M. r. chapmani (Allen, 1900:197), see above.

M. r. fulviventer (Bangs, 1901:632), see above.

M. r. grenadae (Thomas, 1911:514), see above.

M. r. isthmica (Goldman, 1912:1), see above.

M. r. luridavolta (Godwin, 1961:5). Type locality Speyside, Tobago.

M. r. mimetra (Thomas, 1921:521), see above.

M. r. robinsoni (Bangs, 1898a:95), see above.

M. r. ruatanica (Goldman, 1911:237), see above.

M. r. simsoni (Thomas, 1899:287), see above.

DIAGNOSIS. The genus Marmosa was divided into five groups by Tate (1933): M. robinsoni was included in the murina group. Species in this group are distinguished from the other Marmosa species by the following external characteristics: body size moderate to large; ears with large, lobate, reflected spina helicis; scales of tail spirally arranged with scale spirals 2 to 16 per cm of tail length; pelage never with tricolor pattern (as in elegans group) or woolly (as in cinerea group); mammae abdominal, never pectoral. Cranial characteristics which distinguish the murina group include: bullae widely separated, rounded, with no processes; palate never strongly fenestrated.

Marmosa robinsoni is distinguished from the other species in the murina group (Tate, 1933) by its relatively large body size; large scarcely pigmented ears (Fig. 1); thick, relatively short, and rather densely pilose tail; and proportionately short and broad hindfoot. Diagnostic cranial characteristics (Fig. 2) include: supraorbital ridges well developed, moderately pointed, and with pronounced dorsal grooves; posterior border of nasals rounded; a pronounced constriction postorbitally (Hall, 1981; Tate, 1933).

GENERAL CHARACTERS. Marmosa robinsoni is typically cinnamon brown above with buffy yellow underparts. Dorsal color varies from russet to pale brown or gray. Hairs on the venter are unicolor but on sides and dorsum can be gray at base. Top of the head is generally paler in color than the dorsum. The black facial mask, typical of the genus, is always present but varies in size. Prefemoral tail (Fig. 3) is approximately 1.3 times the head and body length. Tail is finely scaled with 16 to 22 scales per cm and is covered with short, fine, white hairs. The proximal 10 to 20 mm of the tail has general body fur. All four feet are well modified for grasping, having plantar pads and an opposable hallux. Plantar pads between the second and third digits are the same size as those between the third and fourth digits.

The following measurements (in mm) were compiled from Allen and Chapman (1893), Barnes (1977), Goldman (1911), Hall and Kelson (1959), and Tate (1953); total length, 359.8 (282 to 376); length of tail, 186.7 (152 to 210.8); length of hindfoot, 22.8 (20 to 25); length of ear, 25.5 (22 to 32); basal length of skull, 36.1 (30.5 to 41.7); zygomatic breadth, 21.8 (20.5 to 23); inter-
orbital breadth, 6.6 (5.1 to 8.5); nasal length, 16.4 (15 to 18.6); nasal width, 4.8 (4.4 to 5.2); palatal length, 20.1 (18.2 to 21). Males are larger than females. Measurements of 16 male *M. r. chapmani* were: total length, 361 (340 to 395); length of tail, 190 (175 to 218); length of hindfoot, 24.4 (20 to 28); length of ear, 25 (22 to 29). Four females of the same subspecies measured, respectively, 324 (302 to 365); 176 (163 to 197); 22 (20 to 24); 22 (20 to 23) (Allen and Chapman, 1933). The weight of mature males ranges from 80 to 110 g and that for mature females from 40 to 60 g.

**DISTRIBUTION.** *Marmosa robinsoni* is known from the northern Neotropics (Fig. 4). In Central America, it has a discontinuous range; one subspecies is found on the island of Roatan off the coast of Honduras and on the coast of Belize; two more insular taxa are known from the islands of San Miguel and Saboga in the Gulf of Panama and from the island of Grenada; on the mainland the species is known from Panama. In South America, *M. robinsoni* ranges from Trinidad and Tobago, across northern Venezuela to Colombia, where it is found to the west of the Andes extending as far south as northern Peru.

**FOSSIL RECORD.** Fossil material of *Marmosa* is known from several areas: the caves of Lagoa Santa, Minas Gerais, Brazil, and limestone caves in Yucatán (Tate, 1933) and Argentina (Reig, 1968). None of these sites is within the present range of *M. robinsoni* and none of the fossils has been identified as that species.

**FORM.** There is considerable information available on the anatomy of *M. robinsoni* resulting from interest in this marsupial as an experimental animal in problem-oriented research. The anatomy of *M. robinsoni* has been described in detail by Barnes (1977). Unless otherwise noted, the following description is based on his account. The skin, which constitutes 10 to 15% of body weight, has several associated glands. In males there is a patch of stained hair extending 10 to 15 mm from the throat to sternum, which darkens from yellow to orange with age. The gland field associated with this patch is composed of hypertrophied apocrine sudoriferous glands and sebaceous glands. This gland field can only be discerned histologically in females. Mammary nipples are surrounded by glands, the secretions of which stain the fur orange-brown to rust. Sudoriferous and sebaceous glands are found in association with simple hair follicles.
The mammary of female M. robinsoni are arranged in a circle in the posterior abdominal region. The nipples are small and are located in the axillary region. Adults groom mohair away from the vicinity of the mammae. Striated muscle is located between the deep fascia and base of each nipple. Three lactiferous ducts supply each nipple.

The spleen of M. robinsoni is actively hematopoietic throughout life. The splenic red pulp is characterized by a lack of venous sinuses, lymphocytes decreased corresponding to an increase in percentage of neutrophils; red and white blood cell count increased. No change with respect to age was reported for eosinophils, monocytes, and basophils. Electrophoretic analysis showed that α-globulins remained constant with age.

The respiratory system begins functioning early in its ontogeny. The lungs of neonate M. robinsoni are somewhat primitive, with five to seven compartments per lobe. The air spaces of neonate and adult, however, have the same dimensions. The upper respiratory tract of adult M. robinsoni is characterized by well-developed mucous and serous glands in the nasal walls. Pared vromeronasal organs that are lined by sensory epithelium are present.

The digestive system of neonate Marmosa differs both in cellular and tissue structures from adults. In the neonate there is no differentiation of glands in the gastric mucosa, which is a simple cuboidal epithelium. The duodenal glands are undeveloped. The adult digestive tract is monogastric, with a short, simple, small intestine that is divided into duodenal and ileal regions. A short cecum is present. The colon is also short with no haustra or other specialization. A 46-g M. robinsoni was reported having a small intestine 46 mm long, a cecum of 10 mm, and a colon 30 mm long. The liver constituted an average of 5.72% of the body weight.

The urinary system of M. robinsoni is characterized by two ureters, the two and the two vaginals join internally to form the urogenital sinus. The two vaginas function only in sperm transport and young are born via a median connection to the urogenital sinus through which the young seem to actively tunnel to reach the urogenital sinus. The urethra are separate from each other and the median vaginal cul-de-sac is divided until the birth of the first litter. The myometrium of the uterus is thinner than the muscle layers of the lateral vaginals. The endometrium has many conspicuous uterine glands opening on its surface and is villous. These glands become cystic in older females.

The glans penis of M. robinsoni is bifid and split for part of its length. These are two pairs of bulboaural glands present, the largest of which gives rise to a relatively large seminal plug when catalyzed by secretions of the prostate. The size of the prostate gland is an unvarying system in sexually active males it represents 3.59% of the body weight. There is little storage of spermatophor in any portion of the epididymis.

FUNCTION. As in other opossums, young of M. robinsoni are born in a relatively underdeveloped state (Fig. 3). During the first few days, there is no digestion; milk proteins and lipids are absorbed directly; carbohydrates, except for galactose (which is also absorbed) are not present (Barber et al., in Barnes, 1977). Nursing young are able to continue respiration uninterrupted by swallowing because a seal is formed by the tight-fitting nasopharyngeal orifice grasping the tubular glottis. Evidence from experiments with inhalation anesthesia suggests that the glottis may be sealed by a muscular flap in adults as well. The neonate’s mouth may be open and not affect ventilation (Barnes, 1977).

 much of the work on the physiology of M. robinsoni has been done by Hunsaker (1977). He reported a mean body temperature of 39.9°C with a range from 29 to 35°C. The body temperature of M. robinsoni will use active body movements and saliva spreading. In males, the scrotum, which is darkly pigmented, perhaps to radiate heat, is extended from the body during heat stress. As the T increases, animals cease their escape movements and began panting. Hunsaker (1977) estimated that ambient temperatures, T, 45 to 44°C, are lethal for M. robinsoni. In response to low T, M. robinsoni enters torpor.

As mentioned, the kidney of M. robinsoni is capable of producing a urine of high osmolarity (Barnes, 1977). Consequently, M. robinsoni is able to maintain its water balance at a lower level of water intake than Didelphis (Hunsaker, 1977).

ONTGENY AND REPRODUCTION. Marmosa robinsoni females were reported to enter their first estrous at 265 to 275 days (Hunsaker, 1977) or when they weighed 27 to 42 g (Barnes, 1968a). Spermatogenesis were observed in 60-g males, but full breeding behavior was not seen until about 1 year of age (Barnes and Wolf, 1971). Females appear polyestrous (Enders, 1966; Barnes, 1968) and have an interesting interval of 18 to 31 days, averaging 23 days (Hunsaker, 1977). Estrous lasts approximately 2 to 3 days (Eisenberg and Maliniak, 1967; Hunsaker, 1977) with peak estrus lasting less than 8 h (Eisenberg, in litt.). In males, the testes, which is darkly pigmented, perhaps to radiate heat, are extended from the body during heat stress. As the T increases, animals cease their escape movements and began panting. Hunsaker (1977) estimated that ambient temperatures, T, 45 to 44°C, are lethal for M. robinsoni. In response to low T, M. robinsoni enters torpor.
adjacent to cleared areas and was often locally abundant. Like other didelphids, *M. robinsoni* is basically nocturnal. Although well-adapted for arboreal life, this species also can be readily captured on the ground. Handley (1976) and O'Connell (1979) reported that 66% and 41% of their captures, respectively, were obtained in ground traps. Escape behavior, however, is usually via vines and trees (O'Connell, 1979). Individuals generally do not have a permanent nest site, but use whatever suitable shelter is available at daybreak.

Females with young have been reported occupying wooden nest boxes for varying lengths of time (Enders, 1966; O'Connell, 1979). M. robinsoni is one of the few didelphids that nests in away from the ground, in the case of *M. chapmani* and *M. relatosis*, in trees, in cavities of logs, and in the United States in banana shipments (Adams, 1928; Enders, 1976; Kraatz, 1930; Wagner, 1928).

Marmosa robinsoni is mainly insectivorous, although fruit is also important in the diet. However, captive individuals died when fed only fruit (Enders, 1935). Enders (1935) reported that the species has a varied diet of insects, grubs, spiders, spiders, caterpillars, and earthworms.

Individuals of density for *M. robinsoni* from northern Venezuela ranged from 0.25 to 4.25 adults per ha. In both Panama and Venezuela densities are highest at the end of the wet season and during the dry season.

Field studies indicate that *M. robinsoni* is basically solitary and nomadic. This mouse opossum has been observed attacking and consuming weaker conspecifics (Enders, 1955).

**Densities of** *M. robinsoni* **vary among different habitats** (Fleming, 1972) and during different seasons of the year (Fleming, 1972; O'Connell, 1979). In Panama, Fleming (1972) found an average density of 0.31 to 2.25 per ha. During a 1-year study he trapped an average of 5.6 (range 1 to 15) individuals per month. During a 2-year study in northern Venezuela, O'Connell (1979) also trapped an average of 5.6 (range 0 to 22) individuals per month. Enders (1976) recorded a density of 1.3 per ha in Brazilian *M. robinsoni*.

**Thrasier et al.** (1971) described the internal parasites of *M. robinsoni*. Six species of helminths were found in 84 wild *M. robinsoni*, only two of which were considered deleterious to the health of the host. Fifty-five of the 84 individuals had more than one infected fig, bat carcasses, viscera of mice and birds, earthworms, grashoppers, and moths, but has a preference for insects. O'Connell (1979) found that *M. robinsoni* rejected moths with bright aposematic coloration. This mouse opossum has been observed attacking and consuming weaker conspecifics (Enders, 1955).

**Remarks.** *M. robinsoni* is represented in the United States by one subspecies, *M. r. robinsoni*. This subspecies is evidently restricted to the eastern states, ranging from New York to Florida. It is smaller than *M. mitis* and is darker in color. The fur is softer and the body is more compressed. The tail is shorter and the ears are smaller. The range of *M. r. robinsoni* overlaps with that of *M. mitis* in the southern part of the United States, but the two species are distinct in the eastern part of their range. *M. r. robinsoni* is found in forested areas, while *M. mitis* is found in open woodlands and swamps. The two species are sympatric in the southeastern United States, but *M. r. robinsoni* is generally more common in the northern part of its range.

**Genetics.** The karyotype of *M. robinsoni* is 2n = 36, with 7 pairs of metacentric chromosomes, 4 pairs of submetacentric chromosomes, and 1 pair of acrocentric chromosomes. The sex chromosomes are XO, with the X chromosome being submetacentric and the Y chromosome being acrocentric. The X chromosome is much larger than the Y chromosome. The sex determination mechanism in *M. robinsoni* is similar to that in *M. mitis*. The Y chromosome is the determining factor for male sex. The karyotype of *M. robinsoni* is consistent with the hypothesis that *M. robinsoni* and *M. mitis* are distinct species, not simply subspecies or geographic races. The karyotype of *M. robinsoni* is similar to that of other South American marsupials, indicating a common ancestry with these species. The karyotype of *M. robinsoni* is also similar to that of other didelphids, suggesting a close relationship between these species.

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which had previously been recognized as M. tobagi (Thomas, 1911). Further proposed that a second species of Marmosa from Tobago, M. chapmani (Tate, 1933) suggested that further collecting from the region between northern Honduras and Panama would reveal the presence of this species, but this has not been the case.

**LITERATURE CITED**


Hershkovitz, P. 1951. Mammals from British Honduras, Mexico, Jamaica, and Haiti. Fieldiana Zool., 31:547-569.


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