

Sylvilagus graysoni. By Fernando A. Cervantes

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Sylvilagus graysoni (J. A. Allen, 1877)

Tres Marias Cottontail

Lepus graysoni J. A. Allen, 1877:347. Type locality "Tres Marias Islands, Nayarit, Mexico" (undoubtedly from Maria Madre; Nelson, 1899).

Sylvilagus graysoni Lyon, 1904:336. First use of current name combination.

CONTEXT AND CONTENT. Order Lagomorpha, Family Leporidae, Subfamily Leporinae, Genus *Sylvilagus*, Subgenus *Sylvilagus* (Hall, 1981; Hoffmann, 1993). *Sylvilagus graysoni* has two subspecies (Wilson, 1991a):

S. g. graysoni (J. A. Allen, 1877), see above.

S. g. badistes Diersing and Wilson, 1980:15. Type locality "San Juanito Island of the Tres Marias Islands, Nayarit, México."

DIAGNOSIS. *Sylvilagus graysoni* is morphologically more like *S. cunicularius* than *S. floridanus*. *S. graysoni* and *S. cunicularius* both differ from *S. floridanus* in having a markedly deeper mandible, greater breadth across the carotid foramina, and larger skulls. These differences from *S. floridanus* were evident in a discriminant-function analysis where *S. floridanus* was separated from *S. graysoni* and *S. cunicularius* on the first discriminant function (Diersing and Wilson, 1980).

Sylvilagus graysoni differs from *S. cunicularius* in having markedly shorter ears, which range in length (dry) from 50.8 to 60.4 mm, whereas lengths of ear of *S. cunicularius* (samples 1, 2 and 3 of Diersing and Wilson, 1980) range from 59.8 to 74.4 mm. Once specimen of *S. cunicularius* was responsible for the overlap. In addition, *S. graysoni* is more reddish on the upper parts, sides, and legs. Cranially, *S. graysoni* differs principally in having much shorter and narrower nasals. The skull is slenderer, especially in the rostral region. A discriminant-function analysis correctly allocated all individuals of the two species (Diersing and Wilson, 1980; Hall, 1981).

GENERAL CHARACTERS. *Sylvilagus graysoni* is a medium-sized to large rabbit with relatively short ears. These rabbits are reddish-colored dorsally, with the nape and rump the brightest. Laterally, they are paler reddish, and the venter is whitish except for the brownish throat patch. The skull is also medium-sized to large, with a long rostrum, long diastema, and long incisive foramina (Fig. 1). The maxillary tooththrow is relatively short, and the basioccipital is narrow (Wilson, 1991a). The posterior extensions of the supraorbital processes are united to the braincase throughout most of their length as in *S. palustris* (Hall, 1981). Average external measurements (in mm) of 19 *S. g. graysoni* and 11 *S. g. badistes*, respectively, are as follows: total length, 466.11, 436.91; length of tail, 50.21, 32.55; length of hind foot, 95.42, 90.73; length of ear (wet) 63.75, 62.18, and (dry) 56.83, 57.11 (Diersing and Wilson, 1980).

Mean cranial measurements (in mm) for 19 *S. g. graysoni* and 11 *S. g. badistes*, respectively, are: length of first upper incisor, 8.93, 9.14; length of palate, 8.04, 7.84; greatest length of skull, 79.92, 78.22; basal length, 64.83, 63.95; zygomatic breadth, 37.00, 37.27; breadth of braincase, 27.33, 27.57; length of nasals, 34.31, 34.42; breadth of nasals, 14.90, 14.97; length of maxillary tooththrow (alveolar), 15.23, 16.09; breadth of maxillary tooththrow (alveolar), 22.60, 22.49; postdental breadth, 10.15, 10.23; length of incisive foramen, 19.93, 18.57; length of basioccipital, 10.09, 9.99; breadth of basioccipital, 9.73, 10.07; length of diastema, 22.05, 20.19; depth of rostrum, 16.47, 16.15; length of bulla, 11.31, 11.43; breadth of bulla, 27.48, 27.04; depth of shield-bullae, 23.03, 23.19; depth of skull, 33.31, 33.20; breadth of carotid foramina, 11.99, 11.97; breadth of infraorbital canals, 19.71, 20.11; height of man-

dible, 38.84, 38.40; length of mandible, 41.15, 40.64; depth of mandibular ramus, 12.73, 12.66; length of mandibular tooththrow (alveolar), 15.71, 15.89 (Diersing and Wilson, 1980).

DISTRIBUTION. *Sylvilagus graysoni* is an insular species with a distribution limited to the Tres Marias Islands, Nayarit (Fig. 2), ca. 100 km off the west coast of Mexico (21-22° N, 106-107° W; Wilson, 1991a). *S. g. graysoni* occurs on Maria Madre, Maria Magdalena and Maria Cleofas islands, whereas *S. g. badistes* is only on San Juanito Island (Chapman and Ceballos, 1990). Elevational records for this cottontail are from sea level to ca. 350 m (Hall, 1981; Nelson, 1909). No fossils are known.

FORM AND FUNCTION. The skin of *S. graysoni* is delicate, and it is difficult to skin specimens without tearing them (Nelson, 1899; Wilson, 1991a). It is impossible to carry a specimen by



FIG. 1. Dorsal, ventral, and lateral view of skull, and lateral view of mandible of *Sylvilagus graysoni* (male, United States National Museum, 512548) from San Juanito Island, Nayarit, Mexico. Greatest length of skull is 75.5 mm. Photos by Don E. Wilson.

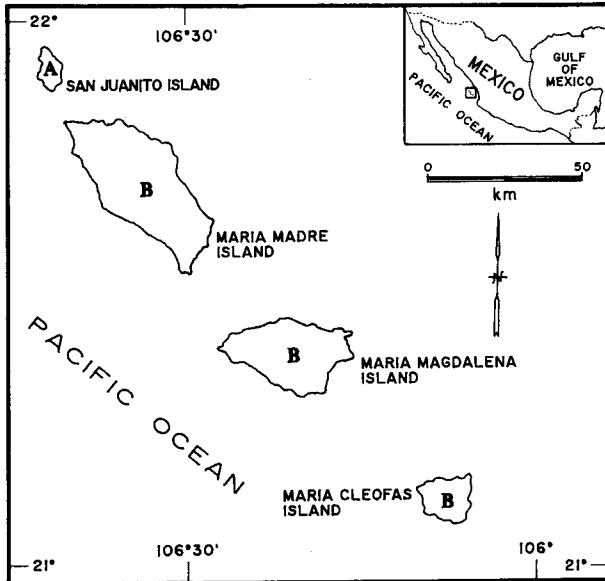


FIG. 2. Geographic distribution of the Tres Marias cottontail (*Sylvilagus graysoni*; modified from Hall, 1981). A = *S. g. badistes*. B = *S. g. graysoni*.

the hind legs even a short distance without having the skin tear and slip where it had been grasped by the hand (Nelson, 1899). The dental formula is $i\ 2/1, c\ 0/0, p\ 3/2, m\ 3/3$, total 28. There are no significant differences in cranial characters between samples of *S. graysoni* collected in 1897 and 1960–1976 (Diersing and Wilson, 1980). The only data on reproductive biology is from March; 11 females were lactating and two had 75-mm embryos (Wilson, 1991a).

ECOLOGY. The habitat of *S. graysoni* is more arid than the mainland. Average yearly rainfall is 635 mm, most of which falls in the summer—often in violent storms from the southeast. Temperatures are moderate, with monthly averages ranging from 20.3°C in January and February to 28.1°C in July and August. Recorded extremes are 4.6° and 37.5°C (Wilson, 1991a).

Sylvilagus graysoni is a tranquil rabbit and easy to catch since it does not fear humans (Acevedo, 1995; Dooley, 1988). The extreme tameness of these rabbits may be due to a dearth of predators (Wilson, 1991a). Racoons (*Procyon lotor*), red-tailed hawks (*Buteo jamaicensis*), and caracaras (*Polyborus plancus*) probably are their only predators (Nelson, 1899). This lack of escape behavior is particularly apparent in *S. graysoni* from San Juanito Island, although cottontails from the other islands show far less fear of man than do their mainland counterparts (Diersing and Wilson, 1980).

San Juanito is the smallest (5 km long by 2 km wide, with a maximum elevation of ca. 50 m) and northwesternmost island, separated from María Madre by a shallow channel ca. 3 km wide. The island is relatively flat, but access to most of the interior is made virtually impossible by the thick cacti (Fig. 3). The elevated portion of the island is covered with dense stands of trees, bushes, and agaves ca. 3–4 m in height, where *S. graysoni* thrives (Wilson, 1991a).

This island is not inhabited by humans and lacks fresh water (Dooley, 1988; Wilson, 1991a). Although this cottontail was abundant in some places on the four islands at the beginning of this century (Nelson, 1899), recently this species was found to be abundant only on San Juanito Island (Wilson, 1991a). It still occurs on the other islands, but not in large numbers.

María Madre is the largest island of the archipelago (23 km long by 5–10 km wide, with a maximum elevation of >600 m). The natural vegetation in coastal areas is tropical deciduous forest with a canopy height of 4 m, although most of this forest was removed by humans. The Mexican government maintains a penal colony there with a population of 2,000–3,000, and agricultural use of the coastal areas is common. The interior of the island originally was forested with trees up to 30 m, but much of the harvestable timber has been removed (Dooley, 1988; Wilson, 1991a).



FIG. 3. Overview of the habitat *Sylvilagus graysoni* on San Juanito Island, Nayarit, Mexico. Photo by Don E. Wilson.

BEHAVIOR. *Sylvilagus graysoni* was abundant at the end of the past century (Nelson, 1899) in old fields on an abandoned ranch at the northern end of María Madre island. The cottontails often sat in their forms under bushes, and when driven out into an open space they often sat quietly. The old fields were covered with a scattered growth of bushes, which seemed more suitable for the cottontails than the forested areas, where they occurred much more sparingly. The cottontails frequented the road through the woods leading from the shore up over the forested slopes, and after 1500 h could be found sitting in small open places in the undergrowth apparently waiting for sunset before coming out into the roads (Nelson, 1899). *S. graysoni* from María Madre Island shares its habitat with the native mammals *Marmosa canescens*, *Oryzomys nelsoni*, *Peromyscus madrensis*, *Procyon lotor*, *Artibeus intermedius*, *Lasius blosevilli*, *Rhogeessa parvula*, *Myotis findleyi*, *Antrozous dubiaquercus*, *Macrotus waterhousii*, and *Glossophaga soricina* (Nelson, 1899; Wilson, 1991a).

Sylvilagus graysoni was numerous in a deserted ranch on the north side of María Magdalena Island, but was scarcer elsewhere on that island by the end of the past century (Nelson, 1899). This island was designated an ecological reserve by the Mexican Government. It is the second largest island (15 km long by 8 km wide, with a maximum elevation of ca. 500 m) and is separated from María Madre Island by a channel 8 km wide. The forest is less disturbed than on María Madre Island, as there are no permanent residents. The island is densely vegetated in the interior, with a relatively flat coastal area along the north coast. However, the effects of browsing by introduced deer and goats are noticeable (Dooley, 1988; Wilson, 1991a).

A few *S. graysoni* have been reported from María Cleofas Island (Wilson, 1991a). This is the least disturbed island, where the forest appears to be in good condition. It is the southernmost island and is separated from María Magdalena Island by a 16 km. The shape of the island is round (5 km in diameter, with a maximum elevation of 400 m) and the vegetation is fairly open woodland around the coast, but the interior is thick. However, portions of the eastern side of the island have been cleared in preparation for plantations. In addition, a small detachment of navy personnel stays near their camp on that side of the island (Dooley, 1988; Wilson, 1991a).

GENETICS. The karyotype of *S. graysoni* consists of $2n = 42$ and $FN = 78$. The autosomal complement includes 15 pairs of medium-to-small metacentric and submetacentric chromosomes and 5 pairs of small acrocentric or subtelocentric chromosomes. Some of these latter five pairs may bear satellites on the short arms. The X chromosome is a small acrocentric or subtelocentric, whereas the Y is a small acrocentric (Diersing and Wilson, 1980). *S. cunicularius* shares the diploid number with *S. graysoni*, *S. floridanus*, and *S. audubonii*, which supports the hypothesis of close kinship between the former two species (Lorenzo et al., 1993).

CONSERVATION STATUS. Populations of *S. graysoni* are declining (Dooley, 1988). An expedition to the Tres Marias Islands in 1987 did not find any *S. g. graysoni* in the three islands where

it occurs (Dooley, 1988), and no signs of its activity were seen. San Juanito Island was the only one in which many were observed.

Sylvilagus graysoni has been designated as an endangered species (Ceballos and Navarro, 1991; SEDESOL, 1994). The main threats to its survival are hunting and extensive modification of its habitat by clearance of the vegetation and introduced pigs and goats, and by increasing human settlements derived from the presence of a federal prison at María Madre Island (Chapman and Ceballos, 1990; Chapman et al., 1990; Dooley, 1988). Recommendations to ensure the survival of this rabbit are to establish reserves on María Madre Island, to turn San Juanito Island into an ecological reserve, to stop all hunting, to conduct status surveys to determine its present status and specific habitat requirements, and to initiate research on its natural history and population densities in long-term projects (Chapman and Ceballos, 1990; Chapman et al., 1990; Dooley, 1988).

REMARKS. *S. graysoni* is more closely related to *S. cunicularius* of the nearby mainland; the ancestral stock of *S. graysoni* may have reached the islands during some earlier period of land connection to the islands. After becoming established on all four islands, the population on San Juanito Island must have become isolated from the others, as that population is distinct enough to warrant subspecific recognition as *S. g. badistes* (Diersing and Wilson, 1980; Wilson, 1991a).

Grayson collected the first specimens *S. graysoni* in 1865 and shipped them to the American Museum of Natural History, where J. A. Allen named them after him (Wilson, 1991a). At present, the holotype, an adult female, is housed in the United States National Museum of Natural History (USNM-8318; Wilson, 1991b). The name *badistes*, from the Greek stem *badio* (to advance slowly, step by step) refers to the unusual lack of escape behavior in these cottontails (Acevedo, 1995; Diersing and Wilson, 1980).

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