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NATURAL HISTORY OF THE BLACK JACKRABBIT (*LEPUS  
INSULARIS*) FROM ESPÍRITU SANTO ISLAND,  
BAJA CALIFORNIA SUR, MÉXICO

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The black jackrabbit, *Lepus insularis*, is found only on Espíritu Santo Island, Baja California Sur, México, in the Gulf of California (Hall, 1981). Espíritu Santo Island (99 km<sup>2</sup>), in the eastern portion of La Paz Bay (24°30'N, 110°21'W), is covered by rocky hills and low mountains of up to 600 m elevation (Moctezuma and Serrato, 1988). *Lepus insularis* is closely related to the black-tailed jackrabbit (*L. californicus*) from the adjacent mainland. However, a numerical taxonomic analysis of several species of

*Lepus* revealed sufficient differences to consider the two forms as distinct species (Dixon et al., 1983). The black jackrabbit is considered rare (Secretaría de Desarrollo Social, 1994) and threatened (Chapman et al., 1990; Ceballos and Navarro, 1991). Unfortunately, there is no detailed information on its habitat, ecology, behavior, or reproduction (Flux and Angermann, 1990; Thomas and Best, 1994). Ecological observations of this leporid were last reported over 30 years ago (Lindsay, 1962). During a recent inventory

of terrestrial mammals of Espiritu Santo Island, we observed black jackrabbits in their natural habitat. Because field data on the basic biology of *L. insularis* may be useful for its long-term conservation and management (Chapman et al., 1990), we report field observations about the natural history of this jackrabbit.

We visited Espiritu Santo Island during 28 September to 1 October 1993, 1 to 5 March 1994, 7 to 9 June 1994, and 31 October to 2 November 1994. Black jackrabbits ( $\bar{X}$  = 12 sightings per day) were observed during day and night (an average of 6 h/day) along transects from one side of the island to another, mainly in the southern portion. Transects ranged from sea level to ca. 150 m elevation. Voucher specimens ( $n$  = 24) were collected with a shotgun, prepared as museum specimens (skin, skeleton, and frozen tissues) and deposited in the Colección Nacional de Mamíferos, Instituto de Biología, Universidad Nacional Autónoma de México.

Black jackrabbits occupy most of the habitats on the island, particularly in open situations. They are common on rocky hills, small plateaus, dunes, sandy valleys, and beaches. Abundant fecal pellets are spread over the ground. They are common in the arid tropical scrub of the island with succulent cacti (*Pachycereus*, *Stenocereus*, *Opuntia*) and shrubs (*Prosopis*, *Ambrosia*, *Acacia*). They also occur in dune vegetation with grasses (*Cenchrus*) and halophytes (*Adenostoma*), where their tracks along natural trails are abundant. In the dry season, most dicot plants lose their foliage and look yellowish, making it easier to spot *L. insularis*.

The black jackrabbit is active day and night, but is particularly active during crepuscular hours. During these periods, the jackrabbits actively feed and constantly move about. In contrast, they rest in the shade of cacti and shrubs by midday hours. During grooming periods under the shelter or resting cover of cacti or tall shrubs, black jackrabbits groom their faces with their front paws from the eyes to the muzzle, lick their paws, body, legs, and feet, and scratch themselves with their hind legs.

Although *L. insularis* is usually solitary, jackrabbits were observed in groups of up to three individuals. Individuals were commonly observed taking sand baths, rolling in distinctive shallow cavities characterized by loose sand and scattered fecal pellets. The cavities, common and obvious throughout areas occupied by black jackrabbits, are nearly oval; 12 averaged 57 × 40 cm.

Black jackrabbits easily climb up hills where the ground is completely covered with stones, a condition typical of its habitat, and silently run from humans. When observed from the top of a hill, the black backs of the jackrabbits are easily observed due to the openness of the vegetation and the contrast with the pale color of the substrate. When approached, they sit motionless and alert, holding their ears upright and facing the disturbance. During the day, they escape by rapid, often ziz-zag running between rocks and vegetation for over 60 m. At night, they escape by moving slowly and making stops at short intervals. When slinking toward cover the body remains close to the ground and the ears are laid back. The only vocalization observed was a distress call, consisting of high-pitched screams produced by individuals injured during collecting.

Direct observations of jackrabbits feeding at dawn and dusk and gross examination of stomach contents and dry fecal pellets revealed that they feed upon a wide variety of grasses, herbs, and forbs. Evidence of their feeding was observed on the fleshy parts of short cacti (*Stenocereus*) and young stems of shrubs (*Prosopis*). This is similar to what has been described in other leporids from the mainland (Flux and Angermann, 1990). Similar food types (except grasses) were found in the diet of *L. californicus sheldoni* from Isla Carmen in the Gulf of California (Hoagland, 1992).

The mammae, vagina, uteri, and ovaries of five adult females (three from March and two from June) did not exhibit reproductive activity at a gross level. Ovaries averaged 13.6 by 5.0 mm with several small to medium follicles. A sixth adult female collected in November 1994 contained two embryos (33 mm in diameter), one in each uterine horn. The uteri were swollen and well vascularized. The ovaries averaged 19.2 by 9.1 mm, and each ovary had a few small, immature follicles and one large corpus luteum attached to its external wall.

Males with scrotal testes were found in September ( $n$  = 3), March ( $n$  = 5), June ( $n$  = 2), and October to November ( $n$  = 3). Average size of the testis was 43.9 by 15.5 mm. Jackrabbits with either inguinal or abdominal testes were collected in March and June; testes averaged 33.2 by 11.2 mm. No young individuals of either sex were observed during any of the field trips.

We observed no natural predation on black jackrabbits. Potential predators of *L. insularis* include rattlesnakes (*Crotalus mitchelli*), feral cats

(*Felis sylvestris*), ringtails (*Bassariscus astutus*), and raptors. However, Thomas and Best (1994) speculated that ringtails probably never hunt even young jackrabbits; the same is probably true for the only raptors known on the island, American kestrels (*Falco sparverius*) and caracaras (*Polyborus plancus*). We observed feral cats previously reported on Espiritu Santo Island (Moctezuma and Serrato, 1988); they may take young jackrabbits.

Ectoparasites of *L. insularis* observed during handling included abundant larvae and adult ticks, particularly on the ears, and less numerous fleas. Internal parasites observed included tapeworms (cestodes) and roundworms (nematodes) in the stomach, intestines, and caecum. Groups of cysticerci of tapeworms were found enclosed in a cyst between the skin and the muscle next to the neck of one hare. Individual cysticerci also were found on the walls of the abdominal cavity and the guts. Representative parasites are currently being identified (D. Gettinger, pers. comm.).

Only five other native mammals are known from Espiritu Santo Island, all of which are endemic taxa: spiny pocket mice (*Chaetodipus spinatus lambi*), Espiritu Santo Island antelope squirrels (*Ammospermophilus insularis*), cactus mice (*Peromyscus eremicus insulicola*), desert woodrats (*Neotoma lepida vicina*), and ringtails (*Bassariscus astutus saxicolis*). All were collected along with *L. insularis* during our survey. Feral cats and feral goats (*Capra hircus*) were observed in the same localities as jackrabbits. Neither house mice (*Mus*) nor black and Norway rats (*Rattus*) were caught in Sherman traps set on the island.

Although *L. insularis* has a restricted distribution, it is not likely that the island will be settled by people, probably making the black jackrabbit less threatened than several other Mexican leporids (Chapman et al., 1990). However, it is known that people from nearby Pichilingue Island hunt black jackrabbits for food (Thomas and Best, 1994), and tourist activities on Espiritu Santo Island are frequent. The channel between this latter island and the adjacent mainland (Canal de San Lorenzo; 5.5 km wide) is used intensively by small boats and large ships heading to La Paz (Moctezuma and Serrato, 1988). Currently, the black jackrabbit seems to be quite common on Espiritu Santo Island. Due to the extent of human activities on and around the island, we recommend periodic monitoring of jackrabbit abundance, restriction on tourist visits, and control of hunting.

La liebre negra (*Lepus insularis*) habita exclusivamente en la Isla Espiritu Santo en el Golfo de California, Baja California Sur, México. Esta liebre se considera rara y en peligro, y desafortunadamente no existe información detallada sobre su habitat, historia natural y estado de conservación. Con el propósito de fomentar su conocimiento biológico se visitó la isla en 1993 y 1994, y se observaron las liebres durante el día y la noche a lo largo de transectos, principalmente al sur de la isla. Para este estudio, se colectaron 24 ejemplares. Los resultados muestran aspectos de su actividad y comportamiento, alimentación, reproducción, depredación, parásitos, especies con las que coexiste, y actividades humanas en la isla. Se concluye con algunas recomendaciones para su protección.

We acknowledge the field assistance of A. Rojas, A. L. Colmenares, R. M. González, J. I. Calderón, G. Portales, P. Cortés, and J. Martínez. F. Chiang reviewed an early draft of this manuscript. Funding was provided by Dirección General de Asuntos del Personal Académico, Universidad Nacional Autónoma de México (grant IN-203793 to BV and FAC), and by the Sir Peter Scott fund through the Lagomorph Specialist Group of the Survival Species Commission, International Union for Conservation of Nature and Natural Resources (grant to FAC).

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FIRST RECORD OF THE SIERRA MADRE MANTLED GROUND SQUIRREL  
(*SPERMOPHILUS MADRENSIS*; RODENTIA: SCIURIDAE) FROM  
DURANGO, MÉXICO

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The Sierra Madre mantled ground squirrel (*Spermophilus madrensis*) has not been reported on previous mammalian surveys conducted in Durango (Baker and Greer, 1962). This species was described in 1901 from the Sierra Madre Occidental near Guadalupe y Calvo, Chihuahua, and all records to date have been from that state (Hall, 1981; Ramírez-Pulido et al., 1982). Baker and Greer (1962) reported this species in pine forest habitats at elevations above the piñon pine belt at the border of Chihuahua and Durango, but specimens from Durango were not obtained.

Eight specimens of *S. madrensis* (locally known as "chalote colino") were captured on 22 to 25 June 1994 during a survey of mammals in the vicinity of Bajío Largo, Durango (106°16'N, 26°05'W). Bajío largo is located in the Municipio de Guanaceví, 31 km NW of Guanaceví, Durango, at an elevation of 2,680 m. The area is dominated by pine forest (*Pinus arizonica*). Climate is temperate and humid, with a mean annual temperature of 9°C and an annual rainfall of 90 to 100 cm. The dry season is from March to June, followed by heavy rainfall between July and September; heavy winter rains from December to January, and occasional snowstorms from January to March.

Four adult males and four adult females were caught in a transect of Sherman live-traps, placed on the ground and baited with oats and vanilla scent. Skin and skull specimens are deposited at the Instituto de Biología, Universidad Nacional Autónoma de México (IBUNAM): IBUNAM 37377 to 37382, 37831, and 37832. Average and ranges of external measurements (in mm) were: body length, 176.6 (160 to 190); length of tail, 54.8 (47 to 73); length of hind foot, 33.5 (30 to 37); length of ear from notch, 20.5 (20 to 22); and weight, 137 g (109 to 180). Three of the males had scrotal testes averaging 20 × 12 mm.

The striped pattern and color of the pelage, and skull and external measurements of these specimens are similar to previous specimens of *S. madrensis* in the mammal collection of IBUNAM. This is the first record of this ground squirrel in Durango, extending its known distribution approximately 100 km to the south.

Se informa del primer registro de *Spermophilus madrensis*, la ardilla terrestre endémica de la Sierra Madre Occidental de México conocida localmente como "chalote colino," en el Estado de Durango, México. Se capturaron ocho ejemplares adultos (cuatro machos y cuatro hembras) en una