

NOTAS

TAXONOMIC EVALUATION OF *Sylvilagus brasiliensis* (LAGOMORPHA: LEPORIDAE) IN BELIZE AND EASTERN GUATEMALA AND DISTRIBUTIONAL COMMENTS FOR *S. floridanus*.

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The forest rabbit or conejo de monte, *Sylvilagus brasiliensis*, represents two well defined subspecies in Middle America; *S. b. truei* in eastern and southern Mexico and western Guatemala and *S. b. gabbi* from northwestern Honduras to Panama (Diersing, 1981). Diersing (1981) utilized bivariate and discriminant function analyses to investigate evidence of intergradation in regional samples of rabbits. Specimens from four localities in southeastern Chiapas and western Guatemala were determined to be *S. b. truei* although geographically intermediate. A narrow zone of intergradation was proposed since no specimens were examined from eastern and northern Guatemala, Belize, and El Salvador.

I report specimens of *Sylvilagus brasiliensis* from southern Belize and eastern Guatemala (Appendix). These provide an opportunity to further define subspecific limits for *S. brasiliensis*. Skull and external measurements are in millimeters and follow Diersing and Wilson (1980). The discriminant multipliers for determining the discriminant function scores were provided by Diersing (1981:544). Four rabbits analyzed by Diersing (1981) from Guatemala (KU: Alta Verapaz) and Honduras (TCWC: Atlántida and Olancho) were included here as references for the plotting of the discriminant and bivariate values for the Belize-Guatemala sample. The distributions of the eastern cottontail rabbit, *S. floridanus*, and the conejo de monte in the region are examined based on specimen documentation. Rabbits of both species are deposited in the following collections: Academy of Natural Sciences, Philadelphia (ANSP); American Museum of Natural History (AMNH); Natural History Museum, London (BMNH); Carnegie Museum of Natural History (CM);

Field Museum of Natural History (FMNH); University of Kansas (KU); Los Angeles County Museum of Natural History (LACM); Texas A&M University (TCWC); Timothy J. McCarthy (TJMc, uncataloged CM); University of Michigan (UMMZ); National Museum of Natural History (USNM).

The presence of rabbits in Belize was recorded in the zooarchaeology literature. Skeletal remains of *Sylvilagus* were reported from an excavation at a Mayan site in the Belize River Valley (Wiley, 1965). Pendergast (1969) initially identified skeletal elements excavated from a cave in the southern Vaca Plateau, Cayo District, as *S. floridanus*, but these have been re-evaluated as *S. brasiliensis* (D. M. Pendergast, personal communication). Subsequent faunal elements from additional cave sites in southern Belize were reported as *S. brasiliensis* (Savage, 1971; Luther, 1974) and undefined remains were reported from Maya sites in northern Belize (Carr, 1985; Wing and Scudder, 1991).

Samuel N. Rhoads and E. L. Poole visited in the valley of the Río Motagua, eastern Guatemala, during February to April, 1915. In addition to their bird collections, 62 mammals (ANSP) were secured from the vicinity of Gualán, Departamento de Zacapa, and Quiriguá, Departamento de Izabal. Gualán and Quiriguá are situated in extremely different habitats along a west to east transition of semi-arid to moist-wet environments. Three adult *S. brasiliensis* from the Quiché Farm at Quiriguá, Departamento de Izabal, Guatemala were collected on 10, 11, 13 March, 1915 in association with broad-leaf forest. Two females represent skins with skulls. The male is a skin only. These represent the first forest rabbit specimens from eastern Guatemala.

Kirkpatrick and Cartwright (1975) listed both *S. brasiliensis* and *S. floridanus* in a mammal checklist for Belize without documentation. Three *S. brasiliensis* were obtained in Toledo District, southern Belize. A roadkill, subadult female (FMNH) was collected 05 January 1978 along the San Antonio Rd., 2.5 km westward of junction with Mafredi Rd., and prepared as a skin only. Two rabbits (CM) were hunted on 1, 8 August 1982 in deciduous forest near Aguacate. External measurements for the adult male and female are: total length, 371, 386; tail length, 34, 36; hind foot length, 75, 78; ear length (fresh), 46, 52. Testicular length and width measured 37 and 12. The female was pregnant with two fetuses (crown-rump length 45) in the right uterine horn. The male weighed 919 g. A litter of three young rabbits was discovered 24 July 1974 in a leaf nest lined with hair in tall grass, bordering high forest in the Columbia Forest Reserve, near Forestry Camp, Toledo. Each of the newborn did not exceed 100 mm in total length.

The male skull from Belize was heavily damaged and was not measured. Three measurements, basal length, basioccipital length, and basioccipital breadth, were estimated for the Belizean female. Cranial measurements for the females, respectively, from Belize and Izabal are: greatest skull length, 71.5, 75.05, 73.0;

rostrum depth, 13.6, 13.5, 14.05; skull depth, 30.1, 28.6, 29.7; bullar length, 9.8, 8.8, 9.0; shield-bullae depth, 20.1, 19.4, 19.9; maximillary toothrow length, 14.1, 14.3, 14.35; incisive foramen length, 17.9, 18.7, 18.35; breadth across maxillary toothrows, 23.3, 20.15, 20.4; post dental breadth, 9.5, 9.2, 9.4; braincase breadth, 25.0, 23.6, 24.35; palate length, 6.95, 7.85, 7.4; diastema length, 20.8, 21.6, 21.9; bullae breadth, 23.0, 24.4, 24.7; nasal length, 29.5, 31.2, 32.05; breadth across nasals, 14.2, 13.4, 13.4; zygomatic breadth, 34.8, 34.4, 33.8; ramus height, 10.0, 9.6, 9.6; mandible length, 37.8, 37.65, 37.25; mandibular toothrow length, 14.9, 14.45, 15.6; mandible height, 35.9, 34.5, 34.75; infraorbital canal breadth, 17.1, 18.4, 18.15; first upper incisor length, 6.3, 6.6, 6.8.

The resulting discriminating function scores were plotted on Figure 5 in Diersing (1981:546). An individual score of 14.3 for the Belizean female compares with the geographically intermediate sample from southeastern Chiapas and western Guatemala. Morphologically, the rabbits from southern Belize are best referred to as *S. b. truei*. Scores of 12.6 and 13.4 for the females from Izabal compare well with the *S. b. gabbi* sample. Bivariate plots for the shield-bullae depth and bullar length place the specimens from Belize and Izabal, respectively, with the *truei*- and *gabbi*-clusters. Shield-bullae depth averaged larger and bullar length shorter for the Guatemala specimens when compared to the Honduran reference specimens of *S. b. gabbi*. Limited overlap occurs for the Izabal plots on the scattergram (Diersing, 1981:545) although the *S. b. gabbi* plots are not identified. Results here and those in Diersing (1981) suffer from few specimens. Diersing (1981) reported *S. b. truei* from lowland Alta Verapaz and coastal Esquintla. The intermediate zone for *S. b. truei* is expanded eastward across the Gulf-Caribbean lowland corridor to include southern Belize. Results here support the presence of *S. b. gabbi* in the lower Río Motagua Valley, Izabal, Guatemala, extended from northwestern Honduras.

The general distributions for *S. brasiliensis* and *S. floridanus* align with rainfall patterns (Hall, 1981:297, 303). The forest rabbit inhabits mesic regions from eastern cottontail and southern Mexico, Guatemala, Honduras and southward; corresponds with drier Pacific versant from northwestern Costa Rica northward to Mexico, including dry intermontane valleys and the Yucatán platform. These two *Sylvilagus* overlap in montane Chiapas, Guatemala, and western Honduras where a mosaic pattern of rainfall and habitats occurs.

Specimens of *S. floridanus* are reported from Campeche, Yucatán, Quintana Roo, and eastern Tabasco on the Yucatán Peninsula (Jones *et al.*, 1974; Dowler and Engstrom, 1988; Cervantes *et al.*, 1997). Taibel (1977) identified *S. floridanus* along Lago Petén Itza, Departamento de Petén, Guatemala. Additional specimens (UMMZ, USNM) from Petén support this rabbit in open savanna habitat. The presence of the eastern cottontail in northern Belize is anticipated in the dry northern plain at the base of the Yucatán platform. It remains a question if *S. brasiliensis* is restricted to the

moist Gulf-Caribbean corridor south of the peninsular region.

The dry upper Motagua Valley appears to present a barrier for the distribution of *S. brasiliensis*, being replaced by *S. floridanus*. Rhoads and Poole collected two adults and one juvenile specimen (ANSP) of *S. floridanus* in February, 1915, in open, thorn-scrub habitat near Gualán. An additional subadult specimen (TJMc) was hunted in similar habitat at San Diego, western Zacapa, in September, 1994. The range of the cottontail rabbit apparently continues along the dry valleys and low mountains of southeastern Guatemala that connect the Motagua Valley with the Pacific coast. The few available rabbits (FMNH, UMMZ) from this region are *S. floridanus* from the departments of Jutiapa and Santa Rosa. Additional specimens (AMNH) place this rabbit on the southern coastal plain of Jutiapa and Santa Rosa.

The majority of the specimens (AMNH, FMNH, LACM, TCWC, USNM) from highland Guatemala are those of *S. floridanus* from the departments of Alta Verapaz, Chimaltenango, Guatemala, Huehuetenango, Sololá, and Totonicapán. Two rabbits (BMNH, FMNH) from Sacatepéquez are *S. brasiliensis*. Alston (1879-1882) and Goodwin (1934) described the latter species from the forests on Volcán de Fuego, Sacatepéquez, and Chimaltenango. Agricultural expansion and the disappearance of forest habitats probably favors populations of *S. floridanus*.

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Appendix: Specimens examined.

Sylvilagus brasiliensis. BELIZE. Toledo: Aguacate, 2 (CM 90596, 90597); San Antonio Rd., 2.5 km W jct. Mafredi Rd., 1 (FMNH 121558). GUATEMALA. Alta Verapaz: 3 km NW Chinajá, 1 (KU 82150). Izabal: Quiriguá, Quiché Farm, 3 (ANSP 13686, 13696, 13697). Sacatepéquez: Dueñas, 1 (BMNH 1875.2.24.12); 6 km W Mixco, Finca San Rafael, 1 (FMNH 64464).

Sylvilagus floridanus. GUATEMALA. Alta Verapaz: 1 mi N Cobán, 1 (TCWC 7814). Chimaltenango: Sierra Santa Elena, 2 (FMNH 19978, 19979); Tecpán, 2 (FMNH 15949, 15950). Guatemala: Guatemala City, Vista Hermosa III, 1 (USNM 565069). Huehuetenango: 130.5 km N Quetzaltenango, 3 (53549, 53552, 53553). Jutiapa: 3 mi W Jutiapa, 1 (FMNH 73339); Montúfar, El Paraiso, 1 (AMNH 242827). Petén: no locality, 3 (UMMZ 62413, 76610, 76611); Libertad, 2 (USNM 244928, 244929). Santa Rosa: 1.2 mi N La Avellana, 2 (AMNH 235252, 235253); Finca El Zapote, 1 (UMMZ 99367). Sololá: Panajachel, 1 (AMNH 74245). Totonicapán: Momostenango, 1 (AMNH 96275). Zacapa: Gualán, 3 (ANSP 13683, 13685, 13687); San Diego, 1 (TJMc 8950). HONDURAS. Atlántida: 6 mi SW La Ceiba, 1 (TCWC 14807); 4 mi S Monte Cristo, 1 (TCWC 14808). Olancho: Río Coco, 78 ENEE Danlí, 1 (TCWC 10614).
