

A NEW BANDED *SPHAERODACTYLUS* FROM EASTERN HISPANIOLA (SQUAMATA: GEKKONIDAE)

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ABSTRACT: A new species of *Sphaerodactylus* is described from Loma El Peñón in the Cordillera Oriental of the Dominican Republic. It is a banded species that appears to be related to two species also occurring in the eastern Dominican Republic: *S. samanensis* Cochran and *S. callocricus* Schwartz. It differs in having fewer dorsal scales, more hair-bearing scale organs, a postsacral patch and ocelli, more crossbands, and in lacking a scapular patch and ocelli.

Key words: Reptilia; West Indies; Caribbean; Dominican Republic; Systematics

Two prominently banded species of *Sphaerodactylus* (*S. samanensis* and *S. callocricus*) occur in the eastern Dominican Republic around the mesic enclosure of the Bahía de Samaná (Schwartz, 1976). During recent fieldwork, we explored an eastern karst outlier in the Cordillera Oriental and found a third banded species that is distinctive in pattern and scale morphology.

MATERIALS AND METHODS

The following abbreviations are used: SVL (snout-vent length) and USNM (United States National Museum). Dorsal and ventral scale counts were made to one side of midline and to one side of midventer (respectively), along a line connecting axilla to groin. Escutcheon counts are reported as (1) the maximum number of scales anterior to posterior and (2) the maximum number transversely across the patch (including extensions onto thighs). Sex was determined by gonadal examination or by the presence of an escutcheon in males. Counts and measurements of the holotype are given (in brackets) in the description.

Sphaerodactylus epiurus sp. nov.

Holotype.—USNM 317883, an adult female, from Loma El Peñón (near García), approximately 5 km airline N Bejucal, 100–290 m, Altigracia Province, Dominican Republic, one of a series collected 16–17 July 1991 by Nicholas Plummer and Richard Thomas. Original number USNMFS 192450.

Paratopotypes.—USNM 317884–91, same data as holotype.

Diagnosis.—A moderate-sized *Sphaerodactylus* (adults 20–25 mm SVL) with a moderately long and relatively pointed snout (snout averages 38.6% head length); large, flattened, relatively long, imbricate dorsal body scales (17–21) with many (13–17) hair-bearing scale organs, and small, keeled snout scales; distinguished by a pattern of 10 dark crossbands on the head, neck, and body (about half the bands interrupted in the midline), on a pale pinkish gray ground color; no scapular ocelli or transverse H-marking but with a pair of postsacral ocelli in a dark patch; adult males patternless and with a yellow head.

The species that appear to be most close-

FIG. 1.—(A) *Sphaerodactylus epiurus* (female, 24 mm SVL), from Loma El Peñón (near García), approximately 5 km N (airline) Bejucal, Altigracia Province, Dominican Republic; (B) *S. samanensis* (female, 24 mm SVL) from 9.5 km W (airline) Sabana de la Mar, Hato Mayor Province, Dominican Republic; and (C) *S. callocricus* (female, 27 mm SVL), from 6 km SSW Las Galeras, Samana Province, Dominican Republic.



ly related to *S. epiurus* are *S. samanensis* (Fig. 1B) and *S. callocricus* (Fig. 1C). Both are banded and are similar to *S. epiurus* in rostral shape, snout shape, and scalation. All three have allopatric distributions in the hilly karst areas of eastern Hispaniola (see below). However, *S. epiurus* has markedly lower dorsal scale counts (17–21) than *S. samanensis* (23–28) or *S. callocricus* (26–34). This indicates that *S. epiurus* has longer dorsal scales than the other two species, which correlates with its greater number of scale organs (13–17) than reported by Schwartz (1976) for *S. callocricus* (2–6) and *S. samanensis* (6–8). Scale organs in these species occur along the free margins of the scale, and if the scale is longer, there will tend to be more scale organs.

In color pattern, *Sphaerodactylus callocricus* is distinct in the possession of a single head band at the level of the ears, across the occiput; *S. samanensis* and *S. epiurus* have a U-shaped figure anterior to this point (the condition of *callocricus* may be the result of fusion of the two bands). *Sphaerodactylus epiurus* has two additional neck bands and has no scapular ocelli, only dark crossbands.

An undescribed species related to this group of *Sphaerodactylus* is known from the Samaná Peninsula of the Dominican Republic (Thomas and Cheng, unpublished). It has a higher dorsal scale count than *S. epiurus* (22–29 versus 17–21 in *epiurus*) and fewer scale organs (6–8 versus 13–17 in *epiurus*). In color pattern, it lacks the isolated bands on the head, having instead a nearly uniform brown head color with a pair of pale paramedian stripes or lobes extending behind the orbit and ending before the edge of the brown head color; a large dark scapular patch and pair of white ocelli; and (usually) a pair of wide, brown, mesially interrupted transverse bands on the trunk.

Description.—Adults 20–25 [holotype = 22] mm SVL. Snout moderate and somewhat pointed with a rounded rostral having a small semicircular to V-shaped plate (basal flat area) not delimited by a sharp ridge or border but rising to a broadly curved periphery; cleft usually extending

well beyond flat area giving rostral a bilobed appearance; internasal absent (mode) or one [absent], flanked by laterally expanded but roughly triangular supranasals. Upper postnasal elongate, roughly rectangular to subtriangular, oriented dorso-posteriorly (bilaterally fused with supranasals in one); lower postnasal, small, roughly semicircular and apically fused with the upper postnasal or the first labial (rarely separate and granular). First loreal platelike, larger than naris. First upper labial roughly pentagonal, emarginate on anterodorsal edge, high point about midway along scale; second and third upper labials (to mideye) narrow rectangles. Eyelid spine well developed; pupils round to oval with narrow pale edge. Mental subpentagonal (rounded anteriorly) with two large subpentagonal or subhexagonal postmentals followed by a short zone of large flat, smooth, cobblelike (broad, rounded, raised) gulars quickly changing to smaller, more granular but imbricate scales on throat (gulars between the ear openings 38–46 [38], $\bar{x} = 44.3$, $n = 9$); becoming flattened and imbricate on posterior throat; gulars smooth. First lower labial subrectangular, somewhat wider anteriorly, the second subtriangular, and the third small and elongate (roughly pentagonal).

Snout covered by small broad, rounded, swollen, subimbricate, keeled (to multicarinate) scales (scales between first interlabial sutures 10–13 [12], $\bar{x} = 12.0$, $n = 9$); snout scales narrower between eyes, more symmetrically granular but sloping upwards (anterior to posterior) on top of head, more conical on neck, flattening on trunk and becoming large, flat, flat-lying, imbricate, acute to slightly mucronate, and strongly keeled; no middorsal zone of granules or granular scales; dorsal scales 17–21 [19] ($\bar{x} = 19.6$, $n = 9$); dorsal scales reducing in size on lower sides before transition to ventrals. Pectoral and ventral scales smooth, flat, angled to rounded, ventrals 24–30 [not scorable in holotype] ($\bar{x} = 25.6$, $n = 8$); scales around midbody 38–49 ($\bar{x} = 42.8$ [41], $n = 9$). Unregenerated dorsal scales of tail acute, keeled, slightly swollen, flat-lying, imbricate, and verticillate; ventral caudals larger, more rounded on pos-

terior edge, smooth and flat with midventral row enlarged. Escutcheon small, not very distinct from adjacent scales with small central area and extension onto thighs (range = 4–5 × 12–20). Toe pads moderately expanded, wider than adjacent phalangeal segments; three toe pad bracket scales; 10–12 [11] subdigital lamellae on fourth digit; 13–17 single-hair-bearing scale organs on dorsal surface of dorsal scales near the free edge.

Coloration.—Basic pattern (females, juveniles, and immature males): ground color pale pinkish gray with a pattern of (1) solid dark loreal stripes, (2) a median stripe, often fragmented, extending along the snout and ending between the eyes; (3) an interocular U-band, curving slightly posterior to eyes (may be present as three spots); (4) joined upper postocular stripes forming a U-band over the parietal region; (5) a more posterior dark U-band, interrupted in the midline, formed from the joining of lower postocular stripes curving ventrad and interrupted by the ear openings, curving dorsad, and meeting on the occiput; (6) a heavy, dark neck band with pale anterior edging; (7) a heavy dark scapular band that may or may not be interrupted at the midline; (8) five heavy dark crossbands on the body, usually interrupted or narrowed at the midline, each band ending midlaterally; (9) a series of irregular ventrolateral dark spots or flecks below band termini; (10) a postsacral dark band with a pair of included ocelli. Tails with irregular, pale (nearly white) dark-edged crossbands; no tail complete and unregenerated. Ten total bands from head to groin in the most well-developed patterns. Ventrals pale, off white, with no markings; throat of one female showing faint converging throat lines. Males becoming unicolor gray-brown with age, losing basic pattern (in some present as a “ghost” remnant) and heads becoming dull yellow.

Middorsal interruption of the bands occurs most frequently in band 3 (seven of seven in which it was determinable), less frequently in bands 5–8, and never in bands two and four. In one juvenile (317887) the body bands are obviously paired and the band interspaces are paler than the ground

color, which seems to indicate that the crossbands of *S. epiurus* are derived from the anterior and posterior edges of broad bands that were hollowed (pale) in the middle. Schwartz (1976) noted that specimens of *S. callocricus* showed evidence of central hollowing, and at least two of the bands of *S. samanensis* are arranged in pairs with the interband space being clearly paler than the ground color (Fig. 1).

Etymology.—A noun in apposition; from the Greek, *epi* (on, over) and *oura* (tail), in allusion to the distinctive postsacral ocelli.

Remarks.—The type locality lies to the north of the El Seibo-Higüey road. Loma El Peñón is a series of limestone hills about 5 km long, oriented southeast to northwest and reaching a height of 472 m. The hills are situated on the southern edge of the Cordillera Oriental (Montes del Seibo). Some of the specimens were taken at a northern outlier separated from the main massif by a creek that has cut through the formation. García is a community (not a village) from which we ascended into the limestone hills. It is about 5 km airline north of Bejucal and is marked by a stone structure housing communal equipment. All specimens were taken beneath limestone rocks (often in piles) in mesic, canopied situations, including entrances to caves; some were found on the undersides of rocks.

It seems likely that these three species evolved in allopatry as a formerly continuous karst area became fragmented: *S. callocricus* on the Samaná Peninsula and areas to the southwest, *S. samanensis* in the haitises (an area of haystack karst on the southwestern margin of Samaná Bay), and *S. epiurus* in the eastern Cordillera Oriental. The limestone hills where the type series of *S. epiurus* was taken appears to be an isolated formation. We suppose that the limestone was once more extensive and has been eroded away in this region leaving only Loma El Peñón. Although one should be cautious in attributing to species of *Sphaerodactylus* so specific a habitat, it seems likely that these three species are calcicoles, at least in the sense of occurring in areas dominated by limestone. Two lo-

calities for *S. callocricus* are in the western part of the haitises (Schwartz, 1976; Schwartz and Henderson, 1991), which is separated from the Samaná Peninsula (the rest of the range of *callocricus*) by the low meander belts and estuaries of the Yuna, Nagua, and other streams. Therefore, the geographic division between *S. callocricus* and *S. samanensis*, the latter known only from the eastern haitises, does not follow an obvious physiographic division. Additional specimens from the central haitises are needed to clarify the distributions of these two species, and the more poorly known *S. cochranæ*.

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APPENDIX I

Specimens Examined

S. samanensis.—Dominican Republic; Hato Mayor Province, Los Haitises, 9.5 km W (airline) Sabana de la Mar, USNM 319133–36.

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THE TAXONOMY AND BIOGEOGRAPHY OF *THAMNOPHIS HAMMONDII* AND *T. DIGUETI* (REPTILIA: SQUAMATA: COLUBRIDAE) IN BAJA CALIFORNIA, MÉXICO

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ABSTRACT: The taxonomic status of *Thamnophis hammondi* and *T. digueti* was reevaluated using characters of squamation and color pattern. A comparison of scale counts using discriminant function analysis and a Student-Newman-Keuls multiple range test and the presence or absence of certain color pattern characters demonstrate that *T. digueti* is an invalid taxon. Therefore, it is placed in the synonymy of *T. hammondi*. It appears that *T. hammondi* was once broadly distributed in Baja California and has since become isolated in mesic refugia due to xerification of central peninsular regions. Similar patterns of distribution are also observed in other transpeninsular mesophilic taxa.

Key words: *Thamnophis hammondi*; *Thamnophis digueti*; Taxonomy; Discriminant function analysis; Baja California; Biogeography

THE systematic relationships of the North American Pacific Coast garter snakes of the *Thamnophis elegans-couchii-ordinoides* complex (sensu Lawson and Des-

sauer, 1979) has been enigmatic. In an exhaustive analysis of this group, Fitch (1940) suggested that the three species recognized at that time, *T. ordinoides*, *T. hammondi*, and *T. digueti*, formed a natural group that he termed the *ordinoides* artenkreis. Despite his own contention that *T. hammondi* and *T. digueti* were probably sis-

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