



Cerro Chucantí, as viewed from the village of Río Pavo, Provincia de Darién, in eastern Panama. This isolated massif rises from sea level to an elevation of 1,439 m, and sustains a diverse cloud forest and other tropical forest ecosystems. The geographic isolation of this mountain has allowed for considerable differentiation of its fauna and flora, such that it contains a number of endemic species found nowhere else on Earth (www.advantagepanama.com/guidowp/chucanti-reserve/; accessed 14 December 2106). One of these species is described in the following article.

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A new species of centipede snake of the genus *Tantilla* (Squamata: Colubridae) from an isolated premontane forest in eastern Panama

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ABSTRACT: We describe a new species of *Tantilla* from Cerro Chucantí, Serranía de Majé, Provincia de Darién, Panama. We allocate this species to the *reticulata* section of the *taeniata* group and consider it most closely related to *Tantilla reticulata*, from which it can be distinguished by color pattern, pholidosis, and hemipenial morphology.

Key Words: COI, Lower Central America, morphology, *reticulata* section, Serranía de Majé, 16S, *Tantilla taeniata* group

RESUMEN: Describimos una nueva especie de *Tantilla* de Cerro Chucantí, Serranía de Majé, Provincia de Darién, Panamá. Asignamos esta especie a la sección *reticulata* del grupo *taeniata* y consideramos que está más estrechamente relacionada con *Tantilla reticulata*, de la cual se puede distinguir por patrón de color, folidosis, y morfología hemipenial.

Palabras Claves: Baja Centroamérica, COI, 16S, grupo de *Tantilla taeniata*, morfología, sección *reticulata*, Serranía de Majé

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INTRODUCTION

Tantilla is one of the most widespread genera of snakes of the family Colubridae in the Western Hemisphere, as its members range from the central and southern United States through much of Mexico and Central America to northern and southeastern South America (Wilson, 1982a). *Tantilla* also is the second largest genus of snakes in the Western Hemisphere, with 61 currently recognized species (Wilson and Mata-Silva, 2014, 2015). Thirty-six of the 61 species of *Tantilla* (59.0%) are endemic at the country level. Furthermore, 12 species are known only from the holotype, representing 19.7% of the currently recognized taxa (Wilson and Mata-Silva, 2015).

Hypotheses about relationships among the species of *Tantilla* are based on features of color and pattern and have resulted in the recognition of six phenetic groups, as well as a number of ungrouped taxa (Wilson, 1999; Townsend et al., 2013; Wilson and Mata-Silva, 2015). These phenetic groups and the number of species included are as follows: *calamarina* (seven); *coronata* (three), *melanocephala* (seven), *planiceps* (seven); *rubra* (three); and *taeniata* (21). Representatives of the *calamarina*, *melanocephala*, *rubra*, and *taeniata* groups are found in Central America, with only a single species each from the *calamarina* and *rubra* groups, *T. vermiformis* and *T. rubra*, respectively, occurring in this region. The *melanocephala* group contains three species inhabiting Central America: *T. armillata*, *T. melanocephala*, and *T. ruficeps*. *Tantilla armillata* and *T. ruficeps* are endemic to this region, whereas *T. melanocephala*, as currently envisioned, also is broadly distributed as far as southeastern South America. Within the *taeniata* group, 12 species are distributed in Central America, including *T. brevicauda*, *T. cuniculator*, *T. hendersoni*, *T. impensa*, *T. jani*, *T. olympia*, *T. psittaca*, *T. reticulata*, *T. taeniata*, *T. tecta*, *T. tritaeniata*, and *T. vulcani* (Townsend et al., 2013; Wilson and Mata-Silva, 2015). Only one species in this group, *T. reticulata*, is found in Lower Central America (Costa Rica, Panama), and the remaining occur in Central America north of the Nicaraguan Depression.

Most species of *Tantilla* are secretive and rarely encountered (Townsend et al., 2013), which renders them difficult to detect during standardized herpetological surveys. From 2012 to 2016, we visited the Serranía de Majé in eastern Panama and collected several herpetofaunal taxa new to science, of which only a few recently have been described (Batista et al., 2014, 2016). During five trips to this mountain range, we found only a single specimen of *Tantilla*. This specimen corresponds well with the pattern description of the *reticulata* section of the *taeniata* group, but otherwise is distinguishable from the three named species in the *reticulata* section and other *Tantilla* species. We consider it to represent an unknown taxon, which we describe below.

MATERIALS AND METHODS

We conducted a field trip to Cerro Chucantí (8.8046°N, 78.4595°W; elev. 1,439 m), located in the southeastern part of the Serranía de Majé (Fig. 1). This region is part of the Eastern Panamanian montane forests (Fund, 2014). The specimen of *Tantilla* was euthanized with the euthanasia solution T61, fixed with a preservative solution of 5 ml formalin (36%) in 1 L ethanol (94%), and subsequently stored in ethanol (70%). The holotype was deposited at the Senckenberg Museum Frankfurt (SMF), Germany.

We examined and measured the holotype with a stereomicroscope and precision digital calipers to the nearest 0.1 mm. The format for the description generally follows that of Townsend et al. (2013). The terminology for hemipenial morphology follows Savage (2002). The ventral scales were counted using the methodology of Dowling (1951). We used a slash mark (/) to delineate characters that differ from the left to the right side of the holotype. We used the following abbreviations for morphological measurements: SVL (snout–vent length), TL (tail length), TOL (total length), HL (head length), HW (head width), and ED (eye diameter). The sex was determined by the presence of everted hemipenes.

DNA of the holotype was extracted from a fresh piece of tissue cut between the dorsal and ventral scales, taken from the first third of the body. We sequenced a fragment of the mtDNA16S (forward: L2510, 5'-CGCCTGTTTATCAAAAACAT-3'; reverse: H3056, 5'-CCGGTCTGAACTCAGATCACGT-3') and a COI fragment that was sequenced in the Southern China DNA Barcoding Center at the Kunming Institute of Zoology, China. Details on the molecular laboratory work are the same as used by Batista et al. (2016).

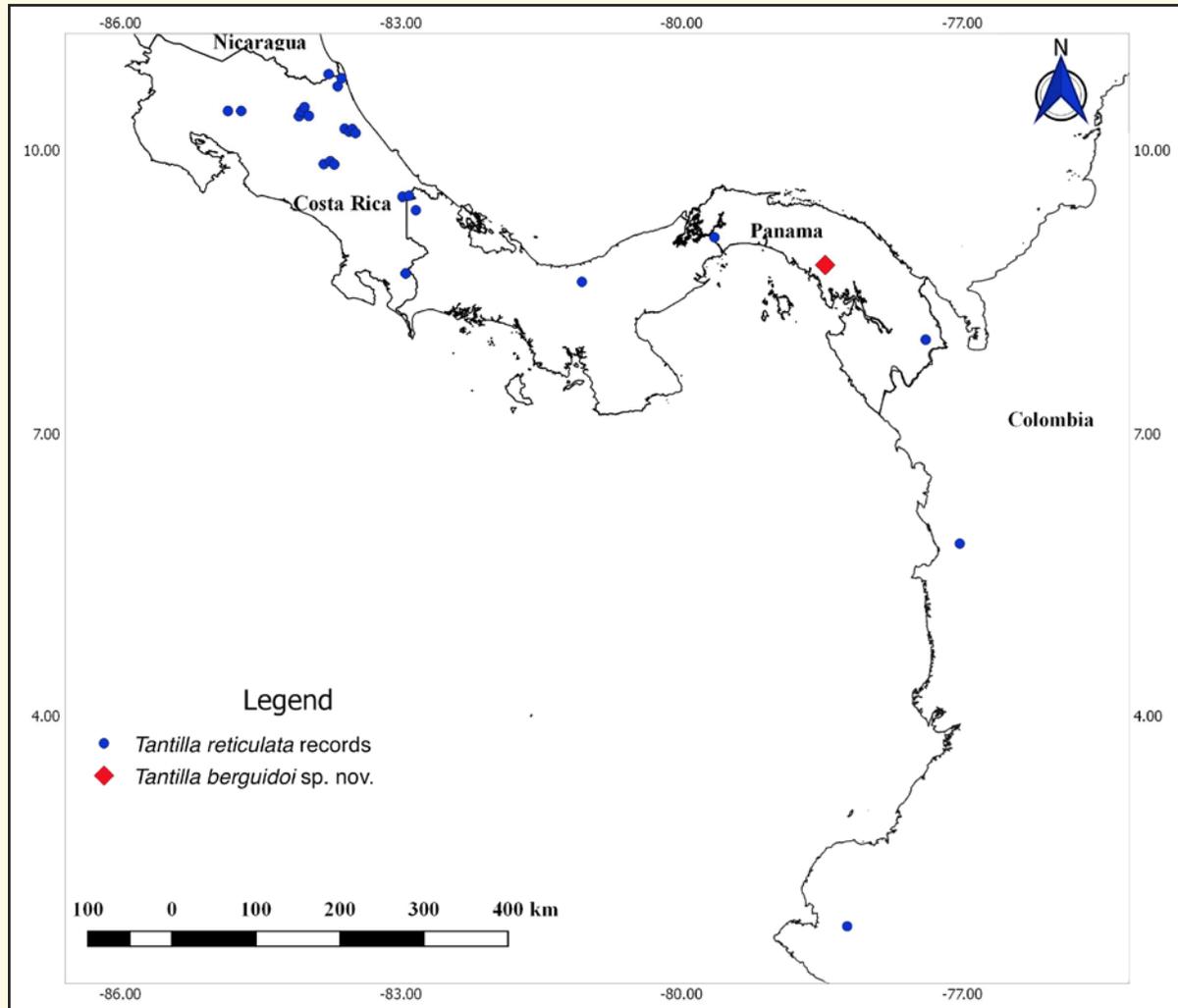


Fig. 1. Distribution map for *Tantilla berguidoi* and *T. reticulata*. Records for *T. reticulata* were generated based on Wilson (1985), Savage (2002), Köhler (2008), and NMNH (2016).

RESULTS

Tantilla berguidoi sp. nov. (Figs. 2–4)

Common name: Chucantí Centipede Snake (English); Centipedívora de Chucantí (Spanish).

Holotype: SMF 97636 (original field number AB 1029), an adult male from Panama, Provincia de Darién, Serranía de Majé, Cerro Chucantí (8.79904°N, 78.46158°W; elev. 1,376 m asl; Fig. 1), collected by Abel Batista and Konrad Mebert on 2 December 2012.

Diagnosis: A snake of the genus *Tantilla* and the *reticulata* section of the *taeniata* group. *Tantilla berguidoi* is allocated to the *taeniata* group based on the presence of a dorsal pattern consisting of pale middorsal and lateral stripes on a darker background and a head pattern with a pale nuchal band. We placed it in the *reticulata* section of this group based on the presence of a pale lateral stripe occupying dorsal scale row 4 and adjacent halves of scale rows 3 and 5. It differs from the other three species of the *reticulata* section (i.e., *T. flavilineata*, *T. oaxacae*, and *T. reticulata*) based on the presence of a narrower, pale middorsal stripe confined to the median portion of the mid-dorsal scale row (vs. occupying the middorsal scale row and adjacent halves of the paravertebral scale rows), and an obscure pale nuchal collar beginning on the posterior portions of the parietals and extending posteriorly onto the

middorsal scale immediately behind the median parietal suture, and laterally grading into pale pigment on the posterior portion of the last supralabial and the nuchal scale situated posterior to the last supralabial and the posterior temporal scale (vs. a well-developed pale nuchal collar either complete or middorsally divided and either crossing the last supralabial or not).

Tantilla berguidoi can be distinguished further from the other three members of the *reticulata* section by the presence of the following combination of characters (Figs. 2, 3): (1) a dark brown dorsolateral stripe occupies the upper portion of scale row 5, rows 6 and 7, and sometimes the lateral tips of the middorsal scales; (2) pale brown lateral stripes located on the upper portion of dorsal scale row 3, all of row 4, and the lower portion of row 5; (3) dorsal area below pale lateral stripe dark brown; (4) 152 ventrals; (5) 65 subcaudals; and (6) tail length 25.2% of total length.

Description of holotype (Figs. 2–4): Adult male, as evidenced by size and partially everted hemipenes (Fig. 4); SVL 305 mm; TL 103 mm; TOL 408 mm, TL ca. 25% of TOL; head slightly broader than body; HL 8.8 mm; HW 5.4 mm; ED 1.3 mm, about 15% of HL; rostral 1.36 times broader than high; internasals about 2.13/2.0 times wider than long, contacting anterior and posterior nasals, mental, and one/both prefrontals; prefrontals hepta-/hexagonal, contacting internasals, posterior nasals, preoculars, supraoculars, frontal, and also very narrowly second supralabials; median prefrontal suture 0.41 times length of frontal; frontal about 1.16 times longer than wide; parietals 1.59/1.65 times longer than wide, their medial suture 0.83 times length of frontal; nasals divided into anterior and posterior portions; nostrils relatively large, contacting internasals narrowly and anterior as well as posterior nasals broadly, with their short suture at level of its posterior border; loreal absent; postnasal contacting prefrontal, internasal, anterior nasal, first and second supralabial; 1 preocular; 2 postoculars; temporals 1 + 1, separating supralabials 5–7 from parietal; 7 supralabials, 1st in contact with anterior and posterior nasals and (narrowly) rostral, 2nd contacting posterior nasal, preocular, and (very narrowly) prefrontal, 3rd contacting preocular and orbit, 4th contacting orbit and lower postocular, 5th contacting lower postocular and anterior temporal, 6th in contact with anterior temporal, and 7th contacting anterior and posterior temporals; 6 infralabials with 4th by far the largest, 1st infralabial in contact with mental and anterior chin shields, 2nd and 3rd contacting anterior chin shield, 4th contacting anterior and posterior chin shields; mental 1.31 times as wide as long, in narrow contact with anterior chin shields; anterior chin shields large, about 2.0/2.1 times as long as wide; posterior chin shields 0.95/0.90 times as long as anterior chin shields; one



Fig. 2. Holotype of *Tantilla berguidoi* in life.

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pair of gulars; 3 preventrals; smooth dorsal scales arranged in 15 longitudinal scale rows throughout body, without discernable apical pits; 152 ventrals, excluding a narrow “half-ventral” on left side directly anterior to cloacal scute; cloacal scute divided; and 65 paired subcaudals between cloacal opening and terminal spine.

Description of hemipenis (Fig. 4G, H): Only the left hemipenis is sufficiently everted to allow for a partial description. The pedicel and truncus are well visible; the truncus is fully covered by hooked and broad (at the base) spines encircling the organ in more than eight irregular transverse rows. Two lateral, large basal hooks lie at the beginning of the truncus, the tip reaching more than one-half of the pedicel level; below this spine there are two or three rows of scattered small spines. The sulcus spermaticus is single and bordered by well-developed sulcal lips.

Coloration in life of holotype (Figs. 2, 3): A pale brown middorsal stripe is present, restricted to the median portion of middorsal scale row, and bounded on either side by two dorsolateral dark stripes that occupy the lateral edge of middorsal scale row, rows 7 and 6, and the upper half of row 5 (hence, about 2.5 scale rows wide); a dark ventrolateral stripe is present on scale rows 1, 2, and the upper half of row 3 (2.5 scales wide); dorsolateral and ventrolateral dark brown stripes are separated by a lateral pale brown stripe that covers scale row 4 and the adjacent halves of rows 3 and 5 (2 scales wide); the edges of the dorsolateral and ventrolateral dark stripes are not bordered by a sharp black line, but rather grade from dark to pale brown within about one-half of the adjacent pale scale rows; a pale middorsal stripe begins about four middorsal scales posterior to the parietals and reaches the tail tip; the ventral edge of the dark ventrolateral stripe begins behind head at mid-scale on the 1st scale row and increasingly involves more of the lateral portion of ventral scales proceeding toward the tail tip; the dark head cap extends from the nasals across top of head and covers the upper half of the temporal scale area; the remainder of lateral portions of head, including the supralabials and chin are cream to whitish; the lateral borders of the ventral scales are slightly suffused with orange; the right side of cloacal scute is orange, as well as the first three subcaudals (two on the right, one on the left); the remaining ventrals are white.



Fig. 3. Photographs of the holotype of *Tantilla berguidoi* in life. (A) right side of head; and (B) left side of head.

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Coloration in preservative (Fig. 4): A pale vertebral stripe is present, restricted to the median portion of the middorsal scale row, and bounded on either side by two dorsolateral reddish brown stripes occupying rows 7 and 6 and the upper half of row 5 (hence, 2.5 scale rows wide); a ventrolateral stripe, suffused with dark pigment, is present on scale rows 1, 2, and the upper half of row 3 (2.5 scales wide); a pale lateral stripe covers scale row 4 and the adjacent halves of rows 3 and 5 (2 scales wide); a pale middorsal stripe begins anteriorly within about four middorsal scales posterior to the parietals and reaches the tail tip; a pale brown nuchal band is present on the posterior portions of the parietals, and extends about one scale posterior to the median parietal suture, and laterally to grade into cream to whitish color on the posterior portion of the last supralabial and the scale immediately posterior to it; the dark head cap extends from the nasals across top of head, covering the upper half of the temporal scale area; and the remainder of the lateral portions of head, including the supralabials and chin, are cream to whitish.

Etymology: This species is named in honor of Guido Berguido, founder of the Adopt Panama Rainforest Association (ADOPTA) and manager of the Chucantí Private Nature Reserve. The reserve is located on Cerro Chucantí, “an isolated massif in eastern Panama that rises from sea level to 1,439 meters in elevation and sustains a

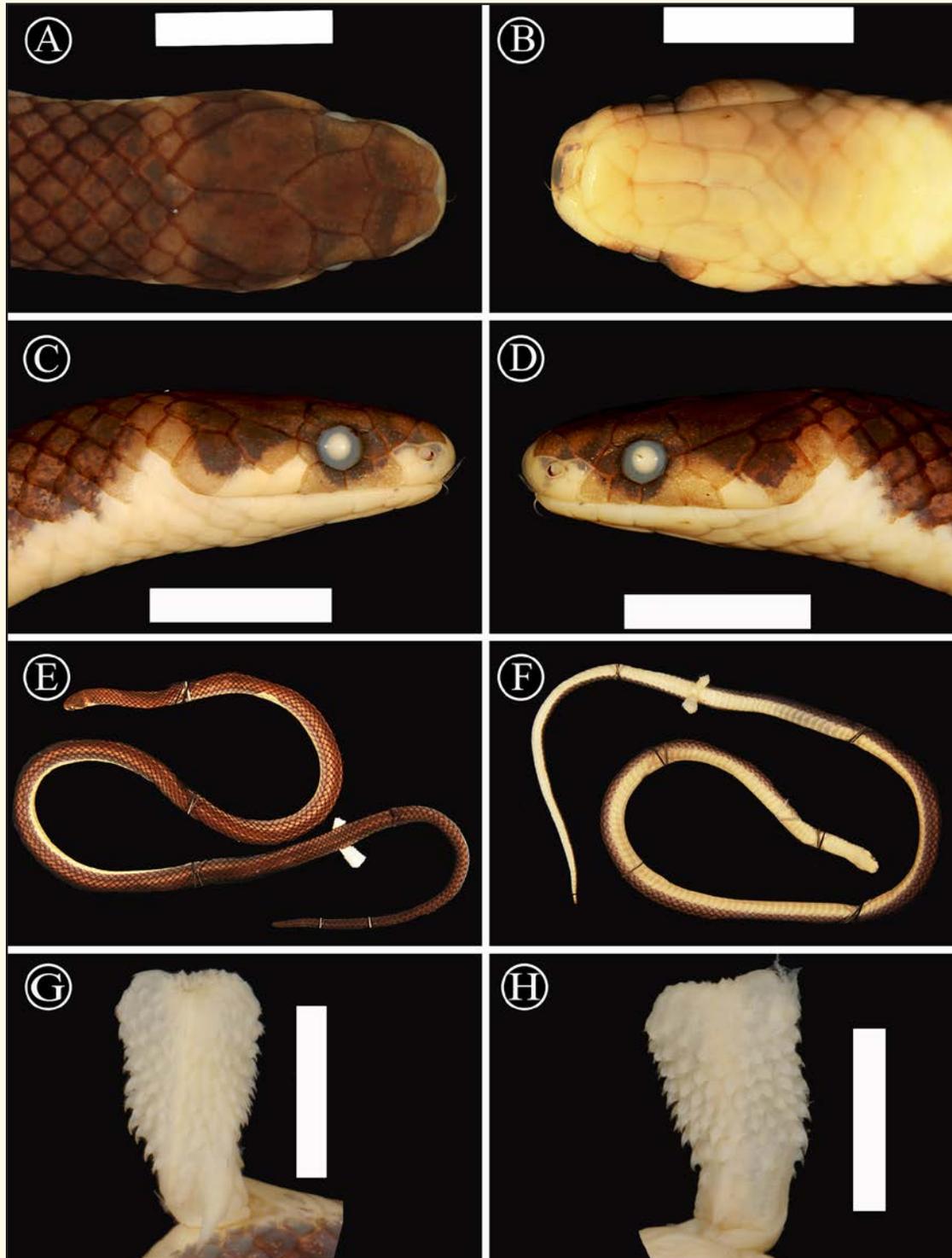


Fig. 4. Photographs of the holotype of *Tantilla berguidoi* in preservative. (A) dorsal view of the head; (B) ventral view of the head; (C) right side of head; (D) left side of head; (E) body, dorsal view; (F) body, ventral view; (G) left hemipenis, sulcate view; and (H) left hemipenis, asulcate view. Bars represent 5 mm.  © Sebastian Lotzkat

diverse cloud forest as well as other tropical forest ecosystems” (adoptapanamarainforest.org; accessed 24 October 2016).

Habitat and natural history observations (Fig. 5): *Tantilla berguidoi* occurs in the eastern Panamanian montane forest (*sensu* Fund and Hogan, 2012; Fig. 5), which is comprised of trees attaining heights of about 15 m, with their branches densely covered with mosses, liverworts, bromeliads, and other epiphytes (e.g., orchids and Loranthaceae or hemiparasitic woody plants of a mistletoe habit), and with palms, vines, ferns, and bromeliads dominating the understory (Fig. 5). According to the ecoregion, the annual precipitation is expected to range between 3,000 and 4,000 mm, and the mean annual temperature between 20 and 27°C. The life zones in this area are: Lowland Moist Forest (0–500 m elev.), Premontane Moist Forest (500–1,000 m elev.), and a small area of the Premontane Wet Forest above 1,000 m elev. at Cerro Chucantí (Holdridge, 1967). In this region, rainfall occurs mostly from April to December (Río Majé meteorological station, 70 m elev.; www.hidromet.com.pa/; accessed 19 September 2016). The holotype was found at 2014 h, active on leaf litter beside a trail, 600 m southwest of the summit of Cerro Chucantí. A drizzling rain had fallen between 1830 and 2100 h, and only a slight breeze was evident. Other species of amphibians and reptiles observed in the area that day were *Oedipina* aff. *complex*, *Diasporus majeensis*, *Colostethus* aff. *pratti*, *Pristimantis moro*, *P. caryophyllaceus*, *P. cruentus*, *Espadarana prosoblepon*, *Silverstoneia* sp., *Ptychoglossus* sp., and *Geophis* sp.



Fig. 5. Habitat of *Tantilla berguidoi* sp. nov. at Cerro Chucantí in the Serranía de Majé, Provincia de Darién, Panama, at an elevation above 1,300 m. (A) Collecting site of the holotype; and (B) view near the top of Cerro Chucantí. © Anand Varma

Distribution (Fig. 1): This species is known only from Cerro Chucantí, located at the easternmost portion of the Majé massif, the only area within that serranía that reaches elevations higher than 1,200 m. The area above this height was calculated as 1.79 km² (ArcGIS, SRTM 3s cells), the only known habitat for *Tantilla berguidoi*.

Conservation status: Using the Environmental Vulnerability Score (EVS) methodology (Johnson et al., 2015), we calculated the conservation status of this species as 16, placing it in the middle of the high vulnerability category. This score is based on a contributory score of 6 for geographic distribution, because it is known only from the type locality, 8 for ecological distribution, because it is known only from one forest formation, and 2 for human persecution, because it is semifossorial, nocturnal, non-venomous, and escapes human notice. An EVS of 16 is the highest score calculated for any of the *Tantilla* species; Wilson and Mata-Silva (2015) gave this score to 13 other species in the genus. Considering the above-mentioned area of ca. 1.79 km² that Cerro Chucantí exhibits above 1,200 m elevation as an estimation of either the species’ extent of occurrence or its area of occupancy, *Tantilla berguidoi* automatically falls into the Critically Endangered (CR) category, according to IUCN criteria B1ab(iii)+2ab(iii).

DISCUSSION

The *taeniata* group is the largest of the phenetic groups in *Tantilla*, with 21 species ranging from southern Mexico to Colombia (Townsend et al., 2013). Its members are characterized by the presence of a pale middorsal stripe and/or pale lateral stripes, as well as pale markings on the nape ranging from a pair of pale spots to a complete nuchal collar extending from one oral rictus to the other (Townsend et al., 2013).

In their revision of the *taeniata* group, Wilson and Meyer (1971) divided the group as then understood (with six species) into two portions called the *reticulata* section and the *taeniata* section. In the intervening 45 years, many changes have transpired in the composition of the *taeniata* group, most notably the current recognition of 21 species—15 more than recognized by Wilson and Meyer (1971). These changes have been confined to the *taeniata* section, with the content of the *reticulata* section remaining stable. These authors characterized the *reticulata* section as follows: “a middorsal light stripe on the middorsal scale row and adjacent halves of the paravertebral rows, a dorsolateral dark stripe on row 6 and adjacent halves of rows 5 and 7, a lateral light stripe on row 4 and adjacent halves of rows 3 and 5, and a lateral dark stripe on adjacent halves of rows 2 and 3” (Wilson and Meyer, 1971: 36). In contrast, they defined the *taeniata* section as follows: “middorsal light stripe on the middorsal scale row and adjacent halves of the paravertebral rows, a dorsolateral dark stripe on rows 5 and 6 and adjacent halves of 4 and 7, and a lateral light stripe on adjacent halves of rows 3 and 4” (Wilson and Meyer, 1971: 36). Nevertheless, these authors negated a portion of their characterization by noting that, “the middorsal light stripe is somewhat obscure in *jani* [as then understood, but see Campbell, 1998] and confined to the middorsal row.” Based on the allocation of *T. berguidoi* to the *reticulata* section of the *taeniata* group, the definition for this section needs to be modified to read “a middorsal light stripe on the middorsal scale row and adjacent halves of the paravertebral rows or on the median portion of the middorsal scale row, a dorsolateral dark stripe on row 6 and adjacent halves of rows 5 and 7, a lateral light stripe on row 4 and adjacent halves of rows 3 and 5, and a lateral dark stripe on adjacent halves of rows 2 and 3.”

The most obvious pattern distinction between the *reticulata* and *taeniata* sections within the *taeniata* group is the placement of the pale lateral stripe, on row 4 and adjacent halves of rows 3 and 5 in the former and on adjacent halves of rows 3 and 4 in the latter (Wilson and Meyer, 1971). The placement of the pale lateral stripe of the holotype of *T. berguidoi* according to the pattern of the *reticulata* section is the strongest piece of evidence that this species is most closely related to the other three members of this section, as opposed to any member of the *taeniata* section within the *taeniata* group. Nonetheless, *T. berguidoi* differs significantly in color pattern from the other three members of the *reticulata* section, *T. flavilineata*, *T. oaxacae*, and *T. reticulata* (Wilson and Mata-Silva, 2014, 2015; Wilson and Meyer, 1971). Each of these three species is characterized by the presence of a pale middorsal stripe occupying the middorsal scale row and the adjacent halves of the paravertebral rows, unlike the condition in *T. berguidoi*, in which the pale middorsal stripe strictly is confined to the median portion of the middorsal scale row. Each of these three species also is characterized by the presence of a well-developed pale nuchal band that either is complete (*T. flavilineata*) or usually or always interrupted middorsally (*T. oaxacae* and *T. reticulata*) and either does (*T. flavilineata* and *T. reticulata*) or does not (*T. oaxacae*) cross the ultimate supralabial (Wilson and Meyer, 1971); in *T. berguidoi* the pale nuchal band is obscure and poorly distinguished from the head cap and the dorsal groundcolor posterior to it.

Wilson and Meyer (1971) placed three species in their concept of the *reticulata* section, i.e., *Tantilla flavilineata* Smith and Burger, 1950, *T. oaxacae* Wilson and Meyer, 1971, and *T. reticulata* (Cope, 1860). In their view, the *reticulata* section comprised two geographical segments, one confined to the state of Oaxaca (*T. flavilineata* and *T. oaxacae*) and the other (containing only *T. reticulata*) distributed from “southeastern Nicaragua to Panamá” (Wilson and Meyer, 1971: 36). Wilson (1982b: 49) indicated the occurrence of *T. reticulata* in South America as well, characterizing the distribution as follows: “Low and moderate elevations of the Caribbean versant of Central America from southeastern Nicaragua to Panamá and the Caribbean and Pacific versant[s] of northwestern Colombia.”

Available data on features of scutellation, measurements, and proportions are limited for the members of the *reticulata* section (Table 1). Nevertheless, a few guarded comparisons are possible. *Tantilla berguidoi* appears to be the longest species in the section, with a total length of 408 mm. The next longest species seems to be *T. reticulata*, with a maximum known total length of 312 mm. The number of ventrals in the male holotype of *T. berguidoi* is 152, which is the lowest among the four species in the *reticulata* section, except for *T. oaxacae*, in which the ventrals in

males range from 151 to 158. The number of subcaudals in the male *T. berguidoi* is 65, which is higher than that in males of any other species in this section except for *T. reticulata* (60–67). The number of ventrals plus subcaudals in the holotype of *T. berguidoi* is 217, which lies within the range for males of *T. flavilineata* (206–222). Both the hemipenes of *T. berguidoi* and *T. reticulata* are spinose; nevertheless, two enlarged basal hooked spines are visible in the hemipenis of *T. berguidoi*, whereas a single basal hook is small and almost of the same size as the remaining spines on the truncus in *T. reticulata* (van den Berghe et al., 2014).

Table 1. Selected features of measurements, proportions, and scutellation of members of the *reticulata* section of the *Tantilla taeniata* group. Data for *T. flavilineata* and *T. oaxacae* are from Wilson and Mata-Silva (2014) and those for *T. reticulata* are from Townsend et al. (2013). Numbers in parentheses represent mean values.

Species	Maximum TOL (mm)	Ventrals (Males)	Ventrals (Females)	Subcaudals (Males)	Subcaudals (Females)	Ventrals + Subcaudals (Males)	Ventrals + Subcaudals (Females)	Tail/TOL Ratio
<i>Tantilla berguidoi</i> sp. nov.	408	152	—	65	—	217	—	0.252
<i>Tantilla flavilineata</i>	293	154–166 (160.0)	152–168 (161.3)	51–56 (53.4)	43–49 (46.2)	206–222 (213.4)	195–215 (207.3)	0.177–0.206
<i>Tantilla oaxacae</i>	284	151–158 (153.2)	145	46–52 (48.3)	45–48 (46.5)	199–205 (201.8)	193	0.199–0.212
<i>Tantilla reticulata</i>	312	158–159	162–173	60–67	59–70	—	—	0.217–0.241

Neither the available data on color pattern nor meristic/mensural features offer a clear picture of the relationships of *T. berguidoi*. We hypothesize that *T. berguidoi* is most closely related to its geographically nearest member of the *reticulata* section, i.e., *T. reticulata* (Fig. 1). The color pattern of *T. berguidoi*, however, is distinctly different from that of *T. reticulata* (see Köhler, 2008; Savage, 2002; Solórzano, 2004), but this hypothesis, as well as the relationship among members of the members of the *taeniata* section, requires testing with sufficient molecular materials once they are available. For now, we have produced molecular sequences for *T. berguidoi* based on fresh tissue from the holotype. We sequenced one fragment each of the 16S and COI mtDNA, but due to the lack of comparative sequences from other members of *Tantilla* (available only from four species from North America; Clark et al., 2016), we could not perform a reasonable DNA-based phylogenetic analysis. Nonetheless, we are including the sequences in Appendix I, as a provision for later analysis when comparative molecular information becomes available. These sequences of *T. berguidoi* also are available under the ID: BOLD:ACJ9945, at www.boldsystems.org/ (pending a GENBANK accession number). Given the wide geographic range of the genus *Tantilla* and the relative difficulty of finding individuals of most taxa, such an undertaking will have to depend on a broad-scale collaborative effort among herpetologists throughout the Western Hemisphere.

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LITERATURE CITED

- BATISTA, A., G. KÖHLER, K. MEBERT, AND M. VESELY. 2014. A new species of *Bolitoglossa* (Amphibia: Plethodontidae) from eastern Panama, with comments on other species of the *adpersa* species group from eastern Panama. *Mesoamerican Herpetology* 1: 97–121.
- BATISTA, A., KÖHLER, G., MEBERT, K., HERTZ, A., AND M. VESELY. 2016. An integrative approach to reveal speciation and species richness in the genus *Diasporus* (Amphibia: Anura: Eleutherodactylidae) in eastern Panama. *Zoological Journal of the Linnean Society*, 178: 267–311.
- CAMPBELL, J. A. 1998. Comments on the identities of certain *Tantilla* (Squamata: Colubridae) from Guatemala, with the descriptions of two new species. *Scientific Papers, Natural History Museum, University of Kansas* 7: 1–14.
- CLARK, K., I. KARSCH-MIZRACHI, D. J. LIPMAN, J. OSTELL, AND E. W. SAYERS. 2016. GenBank. Nucleic acids research, 44: D67–D72 (<https://www.ncbi.nlm.nih.gov/genbank/>; accessed 6 November 2016).
- COPE, E. D. 1860. Catalogue of Colubridae in the Museum of the Academy of Natural Sciences of Philadelphia. I. Calamarinae. *Proceeding of the Academy of Natural Sciences of Philadelphia* 12: 74–79.
- DOWLING, H. G. 1951. A proposed standard system of counting ventrals in snakes. *British Journal of Herpetology* 1: 97–99.
- FUND, W., AND C. HOGAN. 2012. Isthmian-Pacific moist forests. (<http://www.eoearth.org/view/article/153928>; accessed 25 September 2013).
- FUND, W. 2014. Eastern Panamanian montane forests. (www.eoearth.org/view/article/151914; accessed 25 September 2013).
- HOLDRIDGE, L. R. 1967. *Life Zone Ecology*. 2nd ed. Tropical Science Center, San José, Costa Rica.
- JOHNSON, J. D., V. MATA-SILVA, AND L. D. WILSON. 2015. A conservation reassessment of the Central American herpetofauna based on the EVS measure. *Amphibian & Reptile Conservation* 9(2) [General Section]: 1–94 (e100).
- KÖHLER, G. 2008. *Reptiles of Central America*. 2nd ed. Herpeton, Offenbach, Germany.
- NATIONAL MUSEUM OF NATURAL HISTORY, SMITHSONIAN INSTITUTION (NMNH). 2016. Amphibians & Reptiles. Record ID: www.n2t.net/ark:/65665/381bd29ec-a04c-4722-bd6e-438ab49d08bc. Source: www.collections.mnh.si.edu/ipt/resource.do?r=nmnhdwca (source published 21 July 2016).
- SAVAGE, J. M. 2002. *The Amphibians and Reptiles of Costa Rica: A Herpetofauna between Two Continents, between Two Seas*. The University of Chicago Press, Chicago, Illinois, United States.
- SMITH, H. M., AND L. BURGER. 1950. A new snake (*Tantilla*) from Mexico. *Herpetologica* 6: 117–119.
- SOLÓRZANO, A. 2004. *Serpientes de Costa Rica: Distribución, Taxonomía e Historia Natural / Snakes of Costa Rica: Distribution, Taxonomy, and Natural History*. Instituto Nacional de Biodiversidad (INBio), Santo Domingo de Heredia, Costa Rica.
- TOWNSEND, J. H., L. D. WILSON, M. MEDINA-FLORES, AND L. A. HERRERA-B. 2013. A new species of centipede snake in the *Tantilla taeniata* group (Squamata: Colubridae) from premontane rainforest in Refugio de Vida Silvestre Texiguat, Honduras. *Journal of Herpetology* 47: 191–200.
- VAN DEN BERGHE, E., J. SUNYER, AND M. SALAZAR-SAAVEDRA. 2014. *Tantilla reticulata* Cope, 1860. *Mesoamerican Herpetology* 2: 304–305.
- WILSON, L. D., AND J. R. MEYER. 1971. A revision of the *taeniata* group of the colubrid snake genus *Tantilla*. *Herpetologica* 27: 11–40.
- WILSON, L. D. 1982a. *Tantilla*. *Catalogue of American Amphibians and Reptiles* 307.1–307.4.
- WILSON, L. D. 1982b. A review of the colubrid snakes of the genus *Tantilla* of Central America. *Milwaukee Public Museum Contributions in Biology and Geology* 52: 1–77.
- WILSON, L. D. 1985. *Tantilla reticulata*. *Catalogue of American Amphibians and Reptiles* 370.1.
- WILSON, L. D. 1999. Checklist and key to the species of the genus *Tantilla* (Serpentes: Colubridae), with some commentary on distribution. *Smithsonian Herpetological Information Service* 122: 1–36.
- WILSON, L. D., AND V. MATA-SILVA. 2014. Snakes of the genus *Tantilla* (Squamata: Colubridae) in Mexico: taxonomy, distribution, and conservation. *Mesoamerican Herpetology* 1: 4–95.
- WILSON, L. D., AND V. MATA-SILVA. 2015. A checklist and key to the snakes of the *Tantilla* clade (Squamata: Colubridae), with comments on taxonomy, distribution, and conservation. *Mesoamerican Herpetology* 2: 417–498.

Appendix 1. mtDNA sequences of *Tantilla berguidoi*.

16S mtDNA (443 bp)

TGCATGAAAGGCTTAATGAGGGGCCAGCTGTCTCTTATAATAAATCAATTAAACTGATCTCCC
 AGTAAAAAAGCTAGGATTCTAACATAAGACCAGAAGACCCTGTGAAGCTTAAACTAAATTA
 TTAAACCATATAATAACTAATTTTGGTTGGGGCGACCTTGGAAAAAAAAAAGAACTTCCAACA
 CAATAACTTCCACATATAAAATTAGGCTAACAAGCCATTCAACGACCCAGCTAGACTGATAAA
 TGAACCAAGTTACTCCAGGGATAACAGCGCAATCTTCTTTAAGAGCCCATATCAAAAAGAAGG
 TTTACGACCTCGATGTTGGATCAGGACATCCTAATGGTGCAGAAGCTATTAAGGGTTCGTTTG
 TTCAACGATTAATAGTCCTACGTGATCTGAGTTCACCGGAA

COI MTDNA (570 BP)

ATCGGAGCCTGCTTAAGCATTCTAATACGAATAGAATTAACTCAACCGGGGTCTCTACTGGGC
 AATGACCAAATCTTTAATGTTTTAGTTACAGCCACGCATTTATTATAATTTTCTTTATAGTAA
 TACCAATTATAATCGGCGGATTTGGCAACTGATTAATCCCATAATAATCGGAGCCCCTGA
 CATAGCCTTCCCCCGGATAAATAATATAAGCTTCTGATTGCTACCACCAGCCCTGCTCCTCC
 TACTCTTCTTCTCCTACGTCGAAGCTGGAGCGGGTACAGGGTGAAGTGTTCACCCACCTCTA
 TCCGGAAATCTAGTACACTCTGGTCCATCCGTAGACCTAGCAATTTTCTCCCTACACCTAGCA
 GGCGCTTCTTCCATCCTGGGAGCAATTAACTTCATTACAACATGCATCAATATAAAACCTAAGT
 CCATACCCATATTTAATATCCCATTGTTTGTCTGATCCGTATTAATTACCGCTATTATACTATTACT
 AGCCCTACCAGTACTAGCAGCAGCAATCACCATATTATTAACCGATCGAAACCTTAATACCTC





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Konrad Mebert is an independent researcher and international project coordinator based in Switzerland, who focuses on reptiles. After completing his Master's degree on geographic variation and the effects of inbreeding on the Dice Snake at the University of Zürich, Switzerland, and a Doctoral degree on hybrid zones in North American water snakes at Old Dominion University, in Virginia, he currently is associated with the Universidade Estadual de Santa Cruz, Departamento de Ciências Biológicas, Ilhéus - Bahia, Brazil. To date, Konrad has authored more than 100 professional and popular publications and two books on such topics as evolution, ecology, biodiversity, and conservation. His passion for photography and love of travel have led him to all the continents except Australia, but his preference is the Neotropics, where he has developed a special affection for Panama.



Sebastian Lotzkat studied Biology at Goethe-University Frankfurt, Germany, where he received his Diploma degree in 2007 and his Doctoral degree in 2015. As a Postdoc at Senckenberg Research Institute Frankfurt's Herpetology Department, he perpetuates and expands his Ph.D. studies on the diversity and distribution of Neotropical herpetofauna, chiefly focusing on Lower Central American reptiles. Besides, Sebastian delights in the communication of biological topics to a broad audience through print and online publications, lectures, guided tours, and excursions.



Larry David Wilson is a herpetologist with lengthy experience in Mesoamerica. He has authored or co-authored over 350 peer-reviewed papers and books on herpetology, including several papers over the last three years on the conservation status of the herpetofauna of Central America and Mexico. Larry is the senior editor of *Conservation of Mesoamerican Amphibians and Reptiles* and the co-author of seven of its chapters. His other books include *The Snakes of Honduras*, *Middle American Herpetology*, *The Amphibians of Honduras*, *Amphibians & Reptiles of the Bay Islands and Cayos Cochinos, Honduras*, *The Amphibians and Reptiles of the Honduran Mosquitia*, and *Guide to the Amphibians & Reptiles of Cusuco National Park, Honduras*. To date, he has authored or co-authored the descriptions of 70 currently recognized herpetofaunal species, including 11 species of the snake genus *Tantilla*. Seven species have been named in his honor, including the anuran *Craugastor lauraster*, the lizard *Norops wilsoni*, and the snakes *Oxybelis wilsoni*, *Myriopholis wilsoni*, and *Cerrophidion wilsoni*. Currently, Larry is an Associate Editor and Co-chair of the Taxonomic Board for the journal *Mesoamerican Herpetology*.