The Talamancan, or Lower Central American, highlands constitute the mountainous backbone of Costa Rica and western Panama and are home to numerous endemic taxa of amphibians and reptiles believed to have evolved *in situ*. This photo shows a westward view along the Pacific slope of the Panamanian portion of these highlands that usually is referred to as the Cordillera Central. The panoramic view ranges from the vicinities of the dam at La Fortuna (hidden behind the first few mountains) to Panama's highest mountain, the southerly offset Volcán Barú. Along the approximately 40 km of continental divide shown here are the respective type localities of 12 currently valid reptile species described between 1894 and 2012. Two more very recently designated type localities lie marginally out of sight, to the right: the holotype and only known specimen of *Sibon perissostichon* Köhler, Lotzkat, and Hertz, 2010 was collected about 400 airline meters uphill from, and that of the new species of *Celestus* described herein was secured approximately 4 meters below, the photographer's position on the terrace of the Lost and Found ecohostel.

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A new species of *Celestus* (Squamata: Anguidae) from western Panama

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Abstract: We describe the second specimen of the anguid genus *Celestus* collected in Panama as representative of a new species. The holotype of this new taxon was collected in the Reserva Forestal La Fortuna, about halfway between the type localities of the Panamanian endemic *C. adercus* and the Costa Rican endemic *C. orobius*. The new form is most similar to these two species, but differs from them and all other Mesoamerican congeners in scalation and coloration.

Key Words: Cryptozoic diversity, endemism, Lower Central America, Reserva Forestal La Fortuna, Talamancan highlands

Resumen: Describimos el segundo espécimen hallado en Panamá del género ánguido *Celestus* como representante de una nueva especie. El holotipo de este nuevo taxón fue colectado en la Reserva Forestal La Fortuna, aproximadamente al medio entre las localidades tipo correspondientes al endémico panameño *C. adercus* y el endémico costarricense *C. orobius*. La nueva especie es más similar a estas dos especies, pero se diferencia de ellas, así como de las demás especies del género conocidas de Mesoamérica, en escamación y coloración.

Palabras Claves: Baja Centroamérica, diversidad criptozoológica, endemismo, Reserva Forestal La Fortuna, tierras altas de Talamanca

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INTRODUCTION

As currently understood, the genus *Celestus* is comprised of 32 species of small to medium-sized lizards distributed in the Caribbean region, with 12 species on the Mesoamerican mainland (Savage et al., 2008; Uetz and Hošek, 2016). The majority of these mainland species, i.e., *C. atitlanensis* Smith, 1950 (in Smith and Taylor, 1950), *C. bivittatus* (Boulenger, 1895), *C. enneagrammus* (Cope, 1861), *C. ingridae* (Werler and Campbell, 2004), *C. legnotus* (Campbell and Camarillo, 1994), *C. montanus* Schmidt, 1933, *C. rozellae* Smith, 1942, and *C. scansorius* McCranie and Wilson, 1996, are distributed in Mexico and Nuclear Central America, north of the Nicaraguan Depression. The remaining three species, i.e., *C. cyanochloris* Cope, 1894, *C. hylaius* Savage and Lips, 1993, and *C. orobius* Savage and Lips, 1993, occur in Costa Rica and are considered endemic to this country. The presence of *Celestus* in Panama first was revealed by Savage et al. (2008: 851), who described the species *C. adercus* Savage, Lips, and Ibáñez, 2008, based on a single specimen (MVUP 1894, formerly CHP 4870) from "the abandoned sawmill site on the continental divide, 9.7 km NNW of El Copé, Parque Nacional General de División Omar Torrijos Herrera, La Pintada District, Coclé Province, Panama, ca. 850 m (8°40'04"N, 80°35'06"W)," which still constitutes the southern- as well as the easternmost documented occurrence for the genus on the Mesoamerican mainland (Fig. 1).

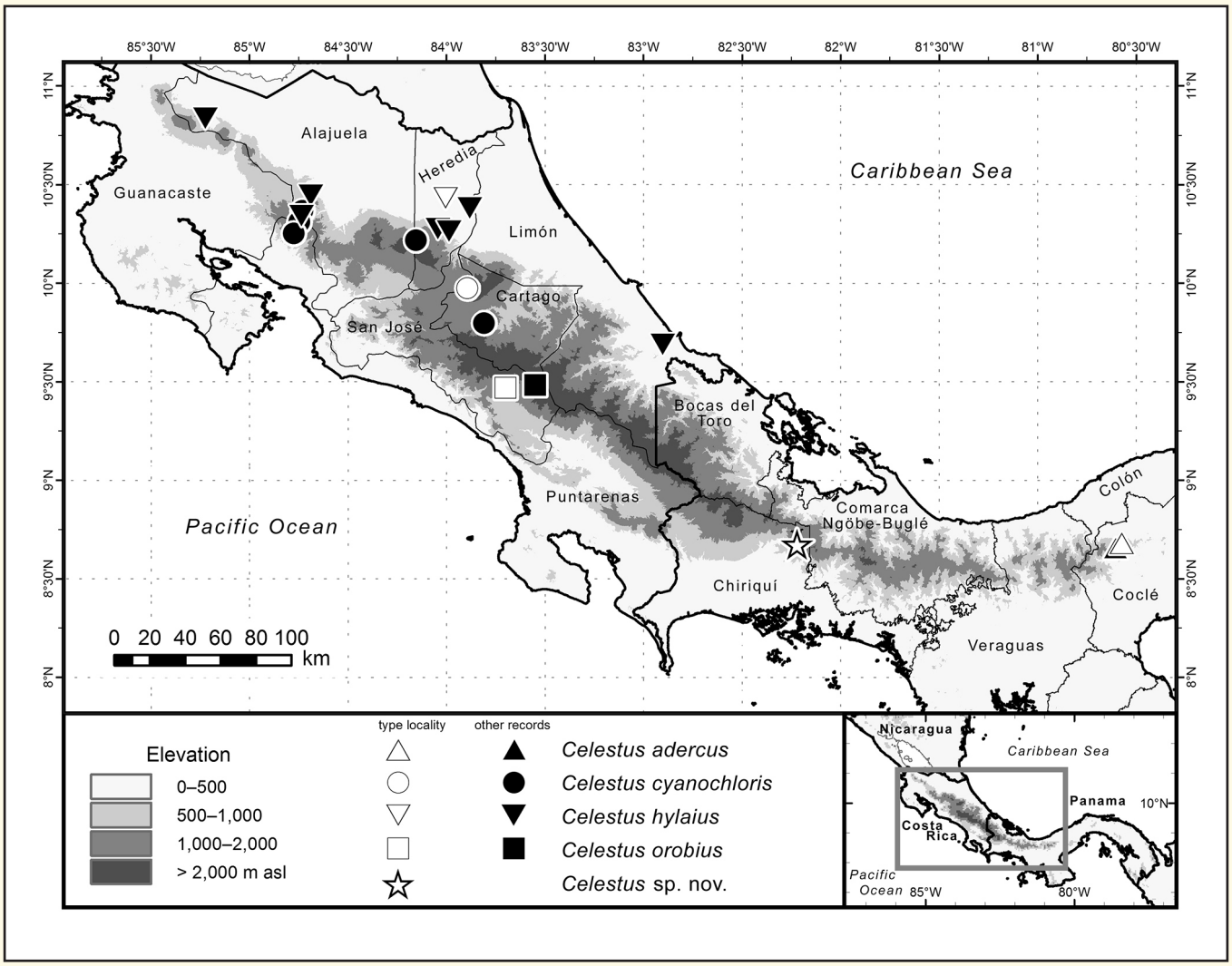

Fig. 1. Map of Costa Rica and western Panama showing the documented occurrences of the five species of *Celestus* now known from these countries. The symbols for the two discrete localities of *C. adercus* are slightly offset from each other for better visibility.

On 30 September 2009, Gabriel Palacios secured an anguid lizard on the grounds of the Lost and Found ecohostel (Fig. 2) in the Fortuna area of western Panama. While its exposed, well-visible claws clearly render it a member of the genus *Celestus,* we are unable to assign this specimen to any described species of *Celestus* known from Costa Rica, Panama, or the remaining Mesoamerican mainland. Consequently, below we describe it as representative of a new species.

Fig. 2. Type locality of the new species of *Celestus*. (A) looking west from the central shade coffee plantation toward the dormitory building (left) and the central building with a terrace (right, largely hidden behind the tree) of the Lost and Found ecohostel; lower arrow indicates the lower end of the concrete stairs that ascend to the opposite side of central building and on which the holotype was found; the upper arrow shows protruding portion of the central terrace and approximate position of the photographer for (B), which presents a view looking northwest from the center of the hostel's terrace and into the forest that covers the canyon west of the hostel; the arrow indicates the upper end of the aforementioned concrete stairs on which the holotype was found.

MATERIALS AND METHODS

We recorded the geographic coordinates and elevation above sea level for the type locality using a Garmin etrex Summit GPS receiver with a barometric altimeter, and provide all of the coordinates in this work in decimal degrees and WGS 1984 datum. Distributional data for Mesoamerican *Celestus* were taken from Savage (2002) and Savage et al. (2008). A standardized color description (capitalized colors and color codes that follow in parentheses are those of Smithe, 1975–1981) and photos of the holotype were taken before euthanasia through the pericardial injection of T61 (Intervet International, Unterschleißheim, Germany). The specimen was preserved by injecting a solution of 5–10 mL absolute (i.e., 36%) formalin in 1 L of 96% ethanol into the body cavity and thighs through the cloacal opening.

Acronyms for museum collections follow Sabaj Pérez (2014). We obtained comparative morphological data for other species of *Celestus* from the literature (Cope, 1894; Savage and Lips, 1993; Savage, 2002; Köhler, 2008; Savage et al., 2008) and through an examination of the holotype of *C. adercus* (MVUP 1894), photographs of the holotype of *C. orobius* (LACM 138540), and photographs of one additional living specimen of each of these two species. We took snout–vent length (SVL) measurements to the nearest mm along a meter stick, and other measurements to the nearest 0.1 mm with precision calipers and the aid of a dissecting microscope. Morphological terminology such as scale nomenclature follows Savage and Lips (1993), Lotzkat (2014), and especially Savage et al. (2008). The general format of the species description follows Savage et al. (2008).

RESULTS

In Table 1, we compare the key morphological characteristics of the specimen from La Fortuna to those of the four known Lower Central American species of *Celestus* as provided by Savage and Lips (1993), Savage (2002), Köhler (2008), and especially by Savage et al. (2008). After employing the keys, descriptions, and illustrations provided by these authors, this specimen cannot be identified as a representative of any species known from Costa Rica or Panama, or the remaining Mesoamerican mainland. Therefore, we describe it as a new species below.

Table 1. Pholidotic characters of *Celestus* from Costa Rica and Panama. Values and specimen numbers are taken from the literature (Savage and Lips,1993; Savage, 2002; Savage et al., 2008), except for the new species.

Characters	*Celestus adercus* (*n* = 1)	*Celestus cyanochloris* (*n* = 7)	*Celestus hylaius* (*n* = 12)	*Celestus orobius* (*n* = 1)	*Celestus laf* sp. nov. (*n* = 1)
Loreals	3	2	2–3	1–2	2
Canthals present	ii+iii	ii+iii	ii+iii	ii+iii	ii+iii
Postoculars and suboculars	juxtaposed	continuous	juxtaposed	juxtaposed	juxtaposed
Scales around midbody	31	32–34	31–33	33	33
Transverse rows of dorsals	79	65–73	76–81	66	72
Transverse rows of ventrals	86	73–77	84–92	75	77
4th toe lamellae	24	20–25	22–27	21–22	24–25
4th finger lamellae	?	16–18	15–20	15–17	19
Precloacal scales	8	10–12	10–12	8	10
Supracaudal scales	keeled, striated	keeled, striated	striated	keeled, striated	keeled, striated
Subcaudal scales	keeled	keeled	some weakly keeled	keeled	keeled, striated

***Celestus laf* sp. nov.**

Celestus sp.: Lotzkat (2014)

Figs. 3–4

***Holotype*:** SMF 90177, a juvenile, collected on the grounds of the Lost and Found ecohostel (8.67462°N, 82.21958°W; 1,250 m asl), Reserva Forestal La Fortuna, Chiriquí, Panama, on 30 September 2009 by Gabriel Palacios, Sebastian Lotzkat, and Andreas Hertz.

***Diagnosis*:** A presumably medium-sized (only known specimen is a small juvenile), skink-like lizard that immediately is recognized as a member of the genus *Celestus* by the presence of two pairs of internasals separating the rostral from the first unpaired dorsal head plate (vs. fewer than two pairs of internasals in members of the non-anguid, but superficially similar sympatric genera *Gymnophthalmus*, *Marisora*, and *Scincella*), the lack of a distinct lateral fold (vs. conspicuous longitudinal lateral fold of granular scales separating the enlarged dorsals from the ventrals in the anguid genera *Coloptychon* and *Mesaspis*), and exposed claws that are fully visible (vs. claws enclosed in a claw sheath, with only their tips visible in the anguid genus *Diploglossus*).

Among its congeners from the Mesoamerican mainland, *C. laf* differs from the Mexican species *C. enneagrammus*, *C. ingridae*, and *C. legnotus*, as well as the Costa Rican *C. cyanochloris*, in having its suboculars and postoculars juxtaposed posterioventrally to the orbit (vs. in a continuous series). It further differs from *C. cyanochloris* in having most of the pale middorsal dots bordered by dark pigment only anteriorly (vs. anteriorly and posteriorly). *Celestus laf* is distinguished from *C. atitlanensis*, *C. bivittatus*, *C. enneagrammus*, *C. legnotus*, *C. montanus*, *C. rozellae*, *C. scansorius,* and the Costa Rican *C. hylaius* by its markedly keeled and strongly striated caudal and subcaudal scales (vs. caudal scales striated but not keeled, subcaudals smooth). It further differs from *C. hylaius* by the presence of 72 transverse rows of dorsals (vs. 76–81) and 77 transverse rows of ventrals (vs. 84–92).

The only species of Mesoamerican *Celestus* that share both the juxtaposed subocular and postocular series and the presence of keels on all caudal scales with *C. laf* are the Panamanian *C. adercus* (Fig. 5) and the Costa Rican *C. orobius* (Fig. 6).

Fig. 3. Holotype of *Celestus laf* in life. (A, B) the entire specimen; (C) a close-up of the left side; and (D, E) the ventral surfaces.
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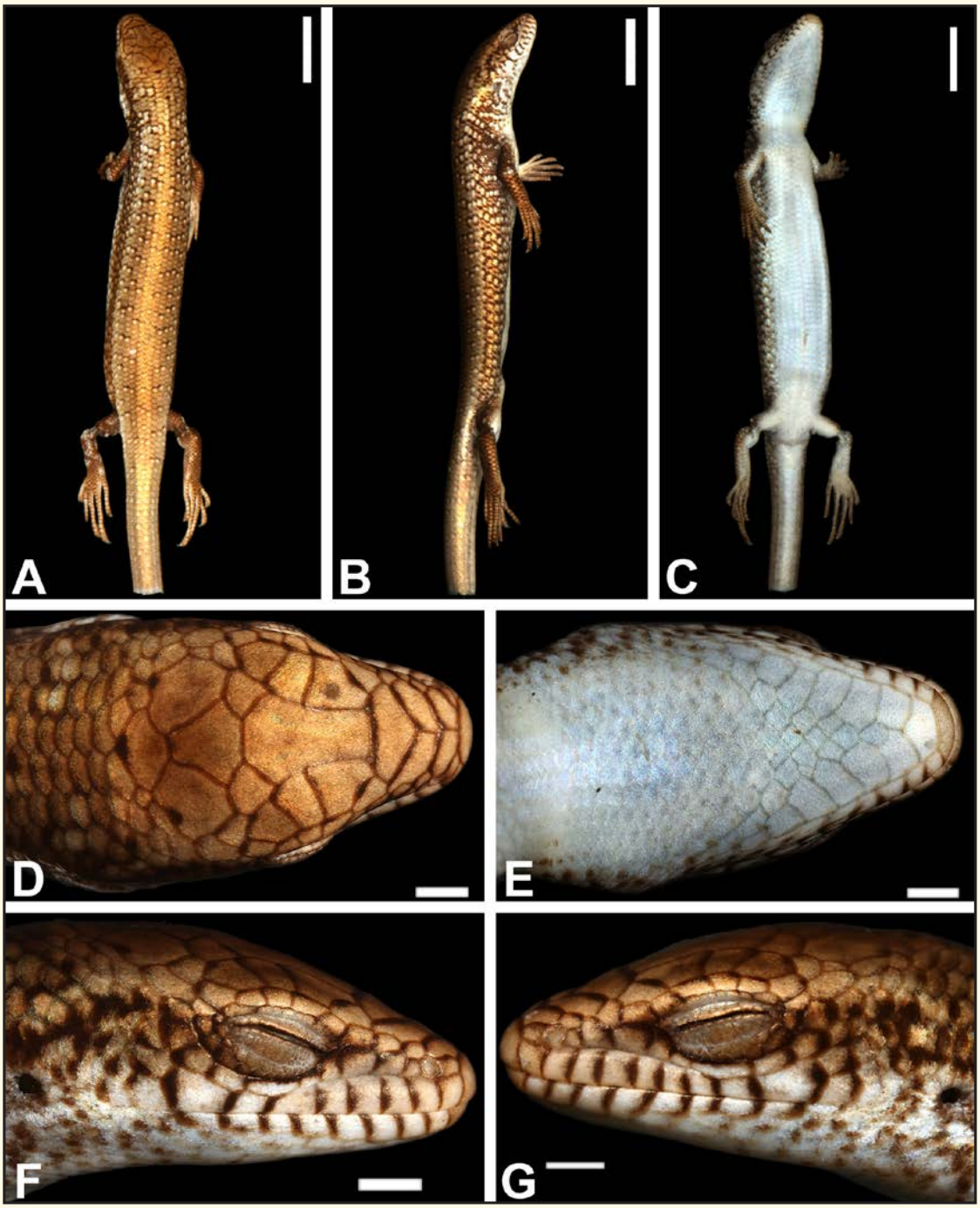

Fig. 4. Holotype of *Celestus laf* after seven years in 70% ethanol. (A–C) Entire specimen in (A) dorsal, (B) lateral, and (C) ventral views, scale bars = 5 mm; (D–G) the head in (D) dorsal, (E) ventral, and (F, G) lateral views; scale bars = 1 mm. In (E), the scale borders of postmental, chin shields, and the adjacent scales are accentuated for better visibility. © Gunther Köhler

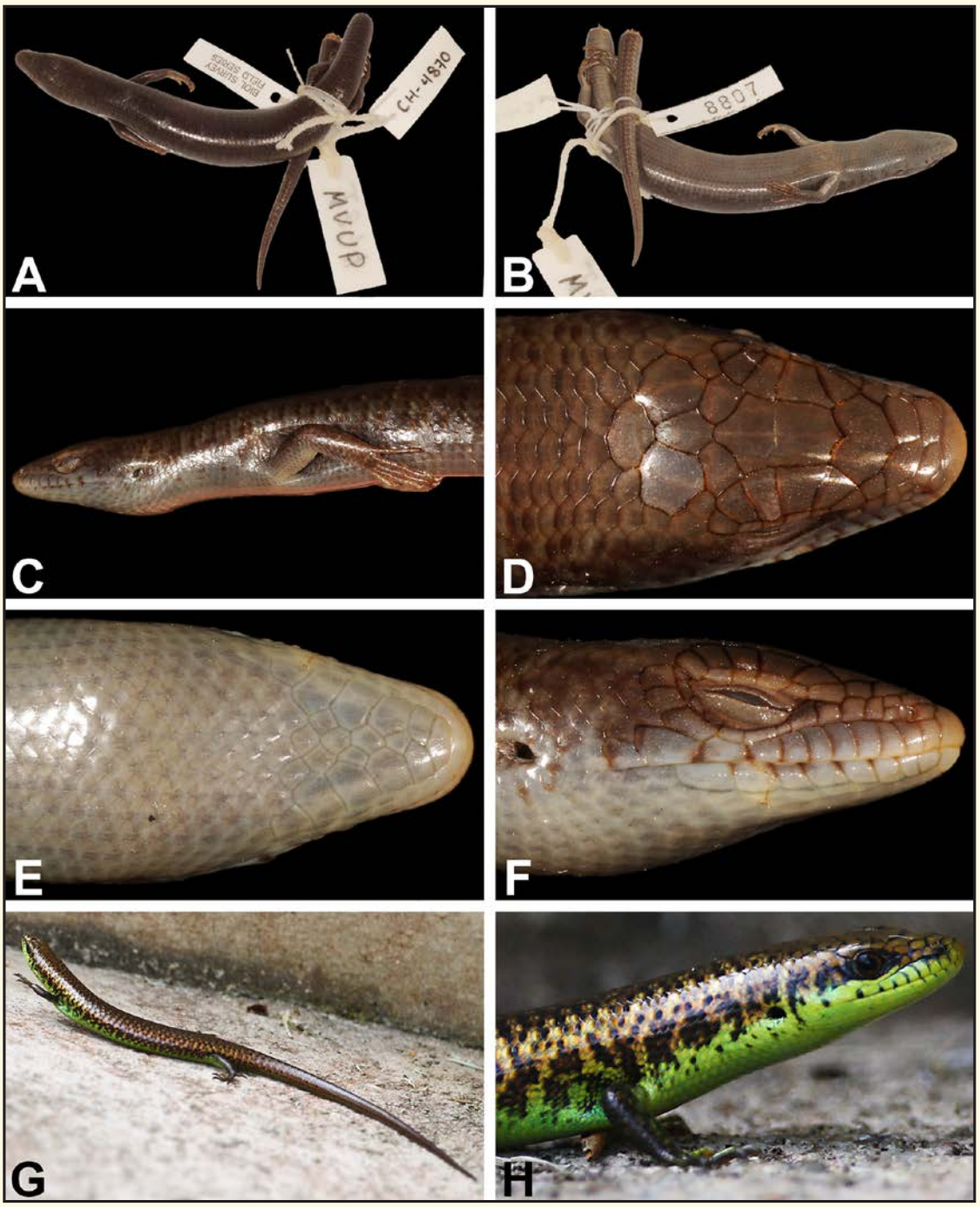

Fig. 5. Individuals of *Celestus adercus*. (A–F) Holotype MVUP 1894: (A) dorsal and (B) ventral views of the entire specimen; (C) a close-up of left side; and (D–F) the head in (D) dorsal, (E) ventral, and (F) lateral views; and (G, H) uncollected individual photographed on 20 October 2015 near the interpretation center of Parque Nacional General de División Omar Torrijos Herrera ("El Copé National Park"), less than 1 km W of the type locality. In (D–F), selected scale borders are accentuated for better visibility.

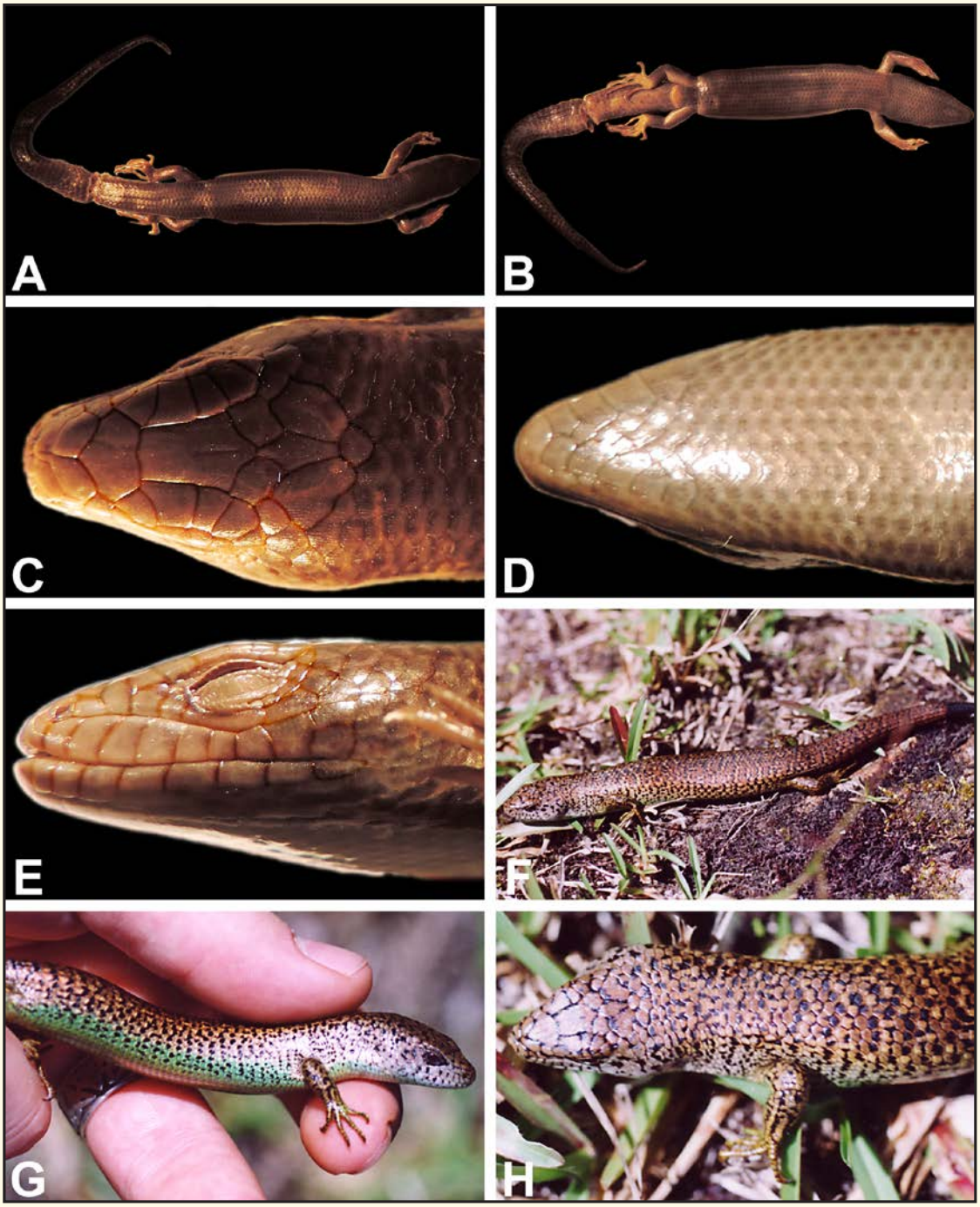

Fig. 6. Individuals of *Celestus orobius*. (A–E) Holotype LACM 138540: (A) dorsal and (B) ventral views of the entire specimen; (C–E) the head in (C) dorsal, (D) ventral, and (E) lateral views; (F–H) uncollected individual photographed ca. 15 km E of the type locality (according to the coordinates provided, but different to what was stated by Savage et al., 2008: 856, who pictured this animal in their fig. 3). In (C–E), selected scale borders are accentuated for better visibility. © Neftali Camacho (A–E), and Todd Castoe (F–H)

Celestus laf differs from *C. adercus* by the presence of 2 loreals (vs. 3), 33 scales around midbody (vs. 31), 72 transverse rows of dorsals (vs. 79), 77 transverse rows of ventrals (vs. 86), 10 precloacal scales (vs. 8), and a yellow ground color along the ventrolateral surfaces of head and neck in life (vs. bright green). It differs from *C. orobius*

by the presence of 72 transverse rows of dorsals (vs. 66), 77 transverse rows of ventrals (vs. 75), 10 precloacal scales (vs. 8), 24–25 lamellae under the 4th toe (vs. 21–22), broad interparietal and occipital plates that are about as wide as the frontal (vs. much narrower than frontal), and a yellow ground color along the ventrolateral surfaces of head and neck in life (vs. bluish cream). Further, the new species is distinguished from *C. adercus* and *C. orobius* by pronounced differences in the shape of the frontal plate. In *C. laf,* the transversely oriented frontal-interparietal suture is straight and very long, i.e., about as long as the laterally adjacent frontoparietals are wide, longer than the equally straight interparietal-interoccipital suture, and about as long as the almost parallel frontal-prefontral suture (vs. curved frontal-interparietal suture very short in *C. adercus* and *C. orobius,* i.e., by far shorter than the frontoparietals are wide, at most equal in length to the interparietal-interoccipital suture, and less than one-third the length of the frontal-prefontral suture, which furthermore is indented into the prefrontal in *C. adercus*).

***Description of the holotype*:** A juvenile, as indicated by the small size and not yet closed umbilical opening, with incomplete tail; SVL 35 mm; tail cylindrical, diameters at the point reached by the heel of the extended hind leg 2.6 mm horizontally and 2.7 mm vertically, length of incomplete tail 15 mm (before removal of tissue sample from tip); axilla-groin distance 19.1 mm (54.6% SVL); shank length 3.8 mm (10.9% SVL); snout length 3.0 mm (8.6% SVL); head length 7.5 mm (21.4% SVL); head width 4.9 mm (14% SVL); diameter of orbit 2.0 mm (5.7% SVL); horizontal diameter of ear opening 0.4 mm (1.1% SVL), vertical diameter of ear opening 0.3 mm (0.9% SVL); rostral much broader than high, distinctly visible from above, in contact with nasals, 1st supralabial, and anterior internasal on both sides; anterior internasals (supranasals) narrower than posterior ones; frontonasals and prefrontal fused into a single large plate with a slightly concave (almost straight) posterior margin, much wider than long, bordered by posterior internasals, frontal, the two anterior median supraoculars, and on left side also by anterior (ii) canthal (on right side excluded from canthal ii by contact between posterior internasal and anterior median supraocular); frontal narrow, much longer than wide; frontoparietals small, widely separated by frontal; interparietal plate about the size of parietals and separating them, posteriorly touching smaller interoccipital, which is much wider than long and about as wide as the interparietal; parietal separated from supraocular by uppermost temporal (and frontoparietal); nasal single, large nostril above suture between 1st and 2nd supralabials; 2 roughly quadrangular postnasals; 2 loreals; 1st loreal slightly longer than high and excluded from posterior internasal by contact between canthal ii and upper postnasal (right side) / about as high as long at its highest portion and in contact with posterior internasal (left side; separating canthal ii from upper postnasal); 2nd loreal larger, slightly longer than high; canthal ii quadrangular, longer than wide (right) / wider than long (left), not fused with 2nd loreal, smaller than 2nd loreal, touching loreals 1 and 2, posterior internasal, canthal iii, and upper postnasal / prefrontal and anterior median supraocular; canthal iii about the size of canthal ii, longer than wide, contacting anteriormost lateral and median supraoculars, canthal ii, 2nd loreal, and small upper preocular, as well as posterior internasal on right side; 5 median supraoculars, first two contacting prefrontal; 3 small lateral supraoculars; a moderately large anterior superciliary about the size of canthal iii; 6 / 7 smaller superciliaries, posterior one enlarged; 5 / 4 primary temporals, lowermost four contacting postoculars; 6 scales between postocular and ear opening; 4 large postoculars juxtaposed to suboculars; 3 suboculars, posterior subocular large, on left side rectangular; median subocular elongate, narrow; anterior subocular small; 9 /10 supralabials, 6 / 7 to level below center of eye; 9 infralabials, 6 to level below center of eye; mental about as wide as rostral; an azygous postmental; 4 pairs of enlarged chin shields, followed posteriorly by 2 pairs of less enlarged ones, 1st pair in contact with one another and 2nd and 3rd infralabial, 2nd to 4th pair separated by 1 to 4, 5th pair by 6, 6th pair by 8 scales; cycloid dorsal, lateral, and ventral body scales striated without a median keel; 72 transverse rows of dorsals from interoccipital to base of tail; 77 transverse rows of ventral scales from postmental to vent; 33 scales around midbody; digits laterally compressed (compression increasing distally) with slightly rounded lamellae; finger lengths 4>3>2>5>1, with 3 almost equal to 4 in length, 19 lamellae under 4th finger; toes relatively long and slender, lengths 4>3>5>2>1, with 24 / 25 lamellae under 4th toe; 10 precloacal scales; dorsal and lateral caudal scales as well as subcaudals cycloid, striated, with a strong median keel except on very base of tail.

The coloration in life (Fig. 3) was recorded as follows: dorsal ground color of head, body, and anterior portion of tail Warm Sepia (221A) with Tawny Olive (223D) dots partly bordered by Sepia (119); lips Beige (219D); dorsal and lateral head scale borders Sepia (119); dorsal surfaces of limbs Sepia (119); tail grading into Dark Neutral Gray (83) posteriorly; ventral surfaces of head and body Pistachio (161); ventral surfaces of tail grading from Pistachio (161) to Dark Neutral Gray (83); soles of hands and feet Grayish Horn Color (91); iris True Cinnamon (139).

After 42 months of preservation in 70% ethanol, the coloration (Fig. 4) was recorded as follows: dorsal surface of head brown, with plate sutures outlined by darker brown; lateral surfaces of head grading from brown to pale bluish gray ventrally, with dark brown sutures; dorsal and lateral surfaces of body and tail brown with scattered pale spots with dark anterior borders; pale spots loosely aggregated to form a subtle pattern of irregular and interrupted transverse stripes dorsolaterally, and more densely arranged to form a reticulum suggesting a diffuse, broad longitudinal band ventrolaterally; dorsal and lateral surfaces of limbs brown with dark scale borders, on upper arm also with pale spots; ventral surfaces of head, body, and limbs pale bluish gray to dirty white, almost free of dark pigmentation, grading into slightly darker gray under tail.

***Natural history notes*:** The juvenile specimen was collected at ca. 1200 h, active on the concrete stairs leading from the dormitory building up to the central building and terrace of the Lost and Found ecohostel (Fig. 2). These stairs are bordered on one side by a concrete wall sustaining the hostel's terrace, and on the other by a few meters of regularly cleared herbaceous vegetation behind which the terrain drops abruptly into a steep canyon vegetated with secondary forest. Otherwise, the aforementioned buildings are surrounded by a coffee plantation shaded by several old trees, which is bordered uphill by a closed forest that generally is similar to that in the aforementioned canyon and was described in more detail by Köhler et al. (2010). As discussed for *Celestus adercus* by Savage et al. (2008: 854), the high lamellar counts might be indicative of an arboreal lifestyle or not.

***Geographic distribution*:** Only known from the type locality.

***Etymology*:** The specific name is composed of the initials of the "Lost and Found" ecohostel and given in appreciation of the type locality. Ever since their first visit, which occurred at the beginning of their respective Ph.D. projects in May of 2008, Andreas Hertz and Sebastian Lotzkat have benefited greatly from the exceptional hospitality they always experienced at the ecohostel, and were happy to use its facilities as a convenient base for their herpetological explorations of the La Fortuna Forest Reserve and other areas nearby. Through this mutual partnership, the beautifully situated and by now widely known cloud forest lodge has contributed significantly to our herpetodiversity research in western Panama, and we are glad to honor this exceptional venture by dedicating the second new species we found on its grounds to it, well-timed in its 10th anniversary year.

DISCUSSION

The juvenile holotype of the new species is the second specimen of the genus *Celestus* collected in Panama. The diversity and distribution of this genus along the Talamancan Highlands of Lower Central America remains unsatisfactorily understood, with both *C. orobius* and *C. adercus* each represented in scientific collections by a single voucher specimen (Savage, 2002; Savage et al., 2008), and possibly undescribed forms reported from Boruca (Savage, 2002: 527) and Las Cruces (J. Savage, pers. comm., 2012) in southern Pacific Costa Rica, as well as from the province of Colón in west-central Panama (A. Batista, pers. comm., 2016). Likewise, the probable presence of *C. hylaius* in Caribbean western Panama remains unconfirmed to date.

In this context, the genus *Celestus* presents a very different case from those of many other lizard species that have been described from Panama and Costa Rica during this millennium. Most of these recently "discovered" species, e.g., *Dactyloa ginaelisae* Lotzkat, Hertz, Bienentreu, and Köhler, 2013, *D. ibanezi* (Poe, Latella, Ryan, and Schaad, 2009), *D. maia* Batista, Vesely, Mebert, Lotzkat, and Köhler, 2015, *Lepidoblepharis emberawoundule* Batista, Ponce, Vesely, Mebert, Hertz, Köhler, Carrizo, and Lotzkat, 2015, *Norops alocomyos* Köhler, Vargas, and Lotzkat, 2014, *N. apletophallus* (Köhler and Sunyer, 2008), *N. benedikti* (Lotzkat, Bienentreu, Hertz, and Köhler, 2011), *N. cryptolimifrons* (Köhler and Sunyer, 2008), *N. gruuo* (Köhler, Ponce, Sunyer, and Batista, 2007), and *N. pseudopachypus* (Köhler, Ponce, Sunyer, and Batista, 2007), had been collected several times long before their initial recognition and formal descriptions as separate species, and some are found in high densities, at least locally (Köhler et al., 2007; Köhler and Sunyer, 2008; Poe et al., 2009; Lotzkat et al., 2011, 2013, 2014; Lotzkat, 2014; Batista et al., 2015a, b). The major challenge that they posed to taxonomists, apart from accessing their remote and uncomfortable habitats in the case of some highland endemics, was the untangling of intra- and interspecific variation among them and their respective close relatives. Contrary to these more or less cryptic species, members of the genus *Celestus* present taxonomists with difficulties in the field by leading cryptozoic lives, i.e., by simply not showing up. The two Panamanian species are perfect examples, as their respective type localities are not located on some far-off mountain but in areas that are accessible, contain accommodation facilities, and have received intense

herpetological attention for several decades (Lotzkat, 2014: 69–73). Still, only one specimen per species could be secured and preserved by the dozens of herpetologists spending many thousands of survey hours in each of these areas since the 1970s. One might wonder how their conspecifics at these places manage to escape our attention so successfully, and how many undescribed *Celestus* still are awaiting discovery in areas less frequented by professionals.

Consequently, the variability in morphometric, pholidotic, coloration, and ontogenetic aspects among these poorly understood species remains nearly unknown. This problem, in turn, complicates any morphology-based taxonomic work on Lower Central American *Celestus*, especially the confident evaluation of the possibly new species from Costa Rica and Panama we mentioned above. Although the photographed individuals of *C. adercus* and *C. orobius* pictured in this work (Figs. 5, 6) comply well with their respective type specimens and corroborate the distinctness of both species from *C. laf,* they do not raise the sample size for either species by desirable means. Additional and well-documented vouchers of any of these species are sorely needed to further substantiate their taxonomic arrangement, reliably assess the practical value of the diagnostic characters thus far proposed, and aid in diagnosing any putative new species. The fact that little is known about the natural history of the three species focused on herein, except that the holotype of *C. adercus* was found in a thatched roof and all animals pictured in life herein were encountered on the ground, does not ease the accumulation of such comparative material much. Until additional specimens become available, a molecular review of the existing material will be the most promising path toward taxonomic reassurance. Taking a first step in this direction, we generated COI and 16S barcodes for the holotype of *C. laf*. Pending their deposition at GenBank, we provide these sequences in the Appendix below.

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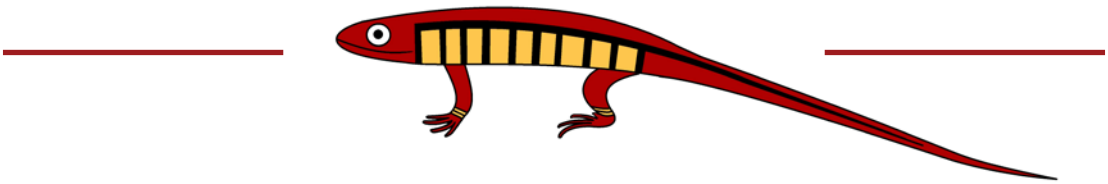
Appendix 1. mtDNA sequences of *Celestus laf* holotype SMF 90177.

16S mtDNA (556 bp)

TTCGCCTGTTTTTATCAAAAACATAGCCTTTAGCAAAAAAATATTAAAGGTCC
CGCCTGCCCAGTGACACACCGTTAAACGGCCGCGGTATACTAACCGTGCAAA
GGTAGCGTAATCACTTGTCCCCTAAATAGGGACTAGTATGAACGGCTAAATG
AGGGTACAACTGTCTCTTTCAACTAATCAGTGAAATTGATCTACCAGTACAA
AAGCTGGTATAAACCCATAAGACGAGAAGACCCTGTGGAGCTTTAGATAACG
ATCAATACACCATGATCCACCATCTTCAGTTGGGGCGACTACGGAGACAAAC
AAAACCTCCAAGCCAGAGAACTTAACTCCATCACAGACTAACACGTCTAACA
CATGACCCAGTATTACTGAGTAACGAACCAAGTTACCCCAGGGATAACAGCG
CTATCTTCTTTTAGAGTCCCCATCGCCAAGAAGGTTTACGACCTCGATGTTG
GATCAGGACACCCAAATGGTGCAGCTACTATTAAAGGTTCGTTTGTTCAACG
ATTAAAGTTCCTACGTGATCTGAGTTTCAGACCGG

COI mtDNA (610 bp)

ACCGCCCTAAGCCTTTTAATTCGCGCAGAACTCAGCCAACCAGGAGCCTTAC
TTGGCGATGACCAAATCTATAATGTCATTGTCACCGCACACGCATTTGTCAT
AATCTTCTTCATAGTTATACCCGTTATAATTGGAGGATTCGGAAACTGACTTG
TACCATTAATAATTGGAGCACCAGACATGGCCTTCCCACGAATAAACAATAT
AAGCTTCTGATTACTCCCCCCATCACTTCTTCTACTCTTAGCCTCTTCTGGAG
TAGAAGCTGGAGCCGGAACCGGATGAACAGTATACCCCCCTTTAGCAGGCA
ATCTGGCCCATGCAGGAGCTTCAGTAGATCTAACAATTTTTTCTCTTCACTTA
GCCGGAGTCTCATCCATCCTCGGAGCTATTAACTTTATCACAACCTGCATTA
ACATGAAACCACCTTCTATATCACAATACCAAACACCCCTATTTGTATGATCA
GTTATAATTACAGCAGTATTATTACTCCTATCTCTTCCAGTCCTAGCCGCAGG
CATTACAATACTCTTAACTGACCGTAACCTTAACACATCTTTTTTTGACCCGG
CCGGAGGAGGGGACCCAATTCTATACCAACACA



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.

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Gunther Köhler received a degree in Veterinary Medicine (Staatsexamen) at the University Gießen, Germany, in 1993, and a Doctoral degree at Goethe University Frankfurt am Main, Germany, in 1995; since that time, he has been the Curator of Herpetology at the Senckenberg Research Institute, Frankfurt am Main, Germany. His research focuses on the Neotropical herpetofauna, primarily that of Central America and Mexico. To date, Gunther has authored or co-authored 27 books and 210 research papers on amphibians and reptiles.