

## Correspondence

Notes on the easternmost population of *Diploglossus bilobatus* (Squamata: Anguidae) in Veraguas, PanamaSEBASTIAN LOTZKAT<sup>1+2</sup>, LEONHARD STADLER<sup>1+3</sup>, ARCADIO CARRIZO<sup>4</sup>,  
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*Diploglossus bilobatus* was described as *Celestus bilobatus* by O'SHAUGHNESSY (1874) based on a single specimen from 'Costa Rica'. This moderate-sized anguid with sheathed claws is a terrestrial inhabitant of humid forests of low and premontane elevations (SAVAGE 2002). KÖHLER (2001) and KÖHLER et al. (2004) documented its presence in the Caribbean lowlands of Nicaragua. MYERS (1973) published the first record from Panama, referring to three specimens from the vicinity of Almirante in Bocas del Toro Province. MARTÍNEZ & RODRIGUEZ (1992) and consequently MARTÍNEZ et al. (1994) reported *D. bilobatus* from the vicinity of Santa Fé (Veraguas Province), extending its known distribution by about 160 km to the southeast. However, their record was little noticed, as neither YOUNG et al. (1999) nor KÖHLER (2008) included Veraguas in the distribution of *D. bilobatus*. Unfortunately, the specimens collected around Santa Fé have since been lost (V. MARTÍNEZ pers. comm.).

Fieldwork conducted in western Panama in January 2006 as well as between May and August 2008 produced several specimens of *Diploglossus bilobatus*, both from Bocas del Toro and Veraguas provinces. It is the purpose of the present paper to report on the localities of, and the morphological variation among, these specimens.

The specific identities of our specimens were determined using taxonomic keys and species descriptions provided by TAYLOR (1956), MYERS (1973), SAVAGE (2002), and KÖHLER (2008). Scale nomenclature follows MYERS (1973). Abbreviations for collectors are AC for Arcadio Carrizo, AH for Andreas Hertz, GK for Gunther Köhler, NH for Nadim Hamad, LS for Leonhard Stadler, and SL for Sebastian Lotzkat. Specimens labelled with LSt field numbers will be deposited in the collection of the Universidad Autónoma de Chiriquí, David, Panama. The capitalized colours and colour codes (the latter in parentheses) are those of SMITHE (1975–1981). The map (Fig. 1) was created using

DIVA-GIS and the NASA elevation datasets processed by JARVIS et al. (2006). General climate data for the region were taken from the WorldClim database (HIJMAN et al. 2005).

## Distribution

We provide the following records for *Diploglossus bilobatus* from western Panama:

Bocas del Toro Province: Isla Popa, 9°13.23'N, 82°8.47'W, 10 m a.s.l.: one juvenile (SMF 85002, field number GK 1559), collected by GK on 19 January 2006. Veraguas Province: Cerro Mariposa near Alto de Piedra, approx. 3.5 km W of Santa Fé, 8°30.96'N, 81°7.11'W, 883 m a.s.l.: four adult females (SMF 89546–9; field numbers SL 124–7), collected by AH and SL on 12 May 2008; Cerro Mariposa, approx. 4 km W of Santa Fé, 8°30.91'N, 81°7.21'W, 933 m a.s.l.: juvenile (field number LSt 89), collected by LS and NH on 2 August 2008. Cerro Negro, approx. 6 km NNW of Santa Fé, 8°34.53'N, 81°5.85'W, 1063 m a.s.l.: one juvenile (SMF 89951), collected by AC on 29 July 2008.

The juvenile specimen from Isla Popa documents the presence of *D. bilobatus* on an island of the Archipiélago Bocas del Toro for the first time. The specimens from Cerro Mariposa – which corresponds to the 'Cerro Tute' of MARTÍNEZ & RODRIGUEZ (1992) and MARTÍNEZ et al. (1994) – and Cerro Negro (see Fig. 1) reconfirm the species' presence in the area of Santa Fé, Veraguas, about 160 km SE from the records published by MYERS (1973). Since the Caribbean lowlands of western Panama form a continuous humid corridor, an uninterrupted occurrence of *D. bilobatus* along these lowlands and the adjacent northern versants of the western Panamanian highlands (Serranías de Talamanca and Tabasará) is to be presumed.

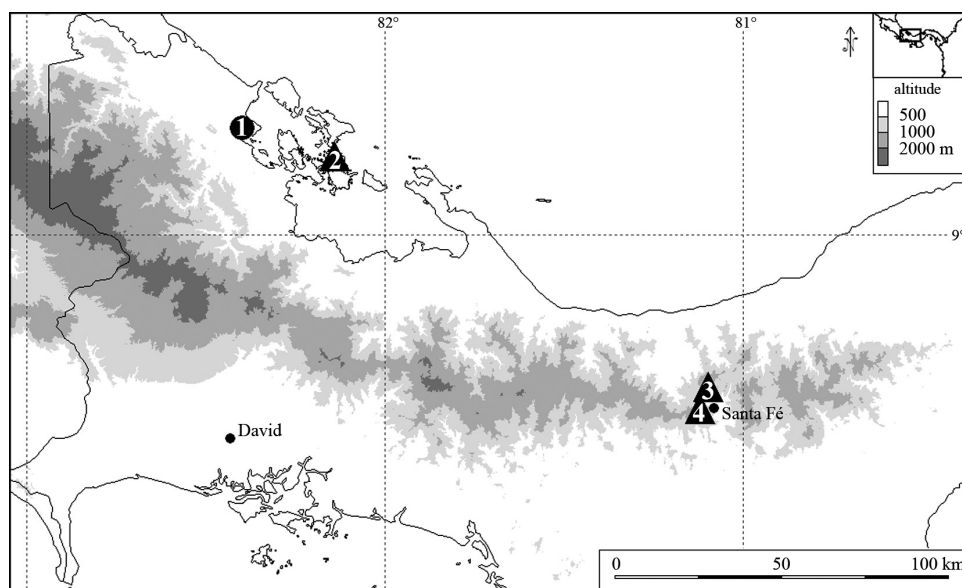


Figure 1. Map of western Panama indicating records of *Diploglossus bilobatus* (see text for details): (1) Almirante; (2) Isla Popa; (3) Cerro Negro; (4) Cerro Mariposa.

### Variation

All seven specimens reported herein share the pholidotic characters mentioned by MYERS (1973) as diagnostic for *Diploglossus bilobatus*: a single, large prefrontal; two superposed postnasals; nasal in contact with rostral; nostril pierced in the posterior portion of the nasal; and striated dorsal and lateral body scales (smooth in juveniles). However, certain pholidotic characters vary among our Panamanian sample: as in the material examined by MYERS (1973), several of our specimens exhibit, either on one (SMF 89549; LSt 89) or both (SMF 89548) sides of the head, a single first (anterior) loreal touching the posterior internasal rather than the two superposed first loreals (with the upper one touching the prefrontal) commonly found in this species. One specimen (SMF 89547) shows five, another one (SMF 89951) seven instead of the usual six supralabials to the level below the centre of eye on one side of the head. Three specimens (SMF 85002, 89549; LSt 89) have five instead of the usual six infralabials to the level below the centre of eye on one side of the head. The number of longitudinal scale rows at midbody ranges from 36 (SMF 89951) to 42 (SMF 89546). While dorsal and lateral trunk scales of the juvenile specimens are smooth, those of the adult specimens have 8–12 striae. In contrast to the specimens described by TAYLOR (1956) and MYERS (1973), none of our specimens has any discernible median keels on these scales. Nevertheless, the pholidotic variation within our sample concurs well with the observations of these authors.

### Colouration in life

We found colouration to be quite variable among our sample. One of the adult females (SMF 89548; Fig. 2b) from Cerro Mariposa, Veraguas, was recorded as follows: Dorsal scales Verona Brown (223B), edged by Sepia (219); a Cream

Color (54) dorsolateral stripe present, lateral surfaces of body Cinnamon-Drab (219C), grading ventrally into Light Russet Vinaceous (221D); venter Light Russet Vinaceous (221D); dorsal surface of head Verona Brown (223B); lateral surfaces of head and neck Light Drab (119C), with Chamois (123D) bars on lips and neck; upper surfaces of limbs Raw Umber (223); dorsal surface of tail Sepia (119) with Light Drab (119C) scale centres; ventral surfaces of head and neck Pale Neutral Gray (86) with Chamois (123D) flecks on chin; ventral surface of tail Light Neutral Gray (85); ventral surfaces of hands and feet Plumbeous (78).

The other three adult females from Cerro Mariposa exhibited a different colouration. As a representative example, one of them (SMF 89547; Fig. 2a) was recorded as follows: Dorsal scales Verona Brown (223B), edged by Sepia (119); a Clay Color (123B) dorsolateral line present; lateral surfaces of body Mars Brown (223A), grading into Kingfisher Rufous (240) ventrally; venter Kingfisher Rufous (240); dorsal surface of head Raw Umber (123), lateral surfaces of head and neck Olive-Green (Auxiliary) (48) with Chamois (123D) bars on lips and Sulfur Yellow (157) flecks on neck; upper surfaces of limbs Raw Umber (223); dorsal surface of tail Sepia (119) with Dark Drab (119B) pigment in scale centres; ventral surfaces of head and neck Light Drab (119C) with Chamois (123D) flecks on chin; ventral surfaces of hands and feet Sepia (119).

The juvenile collected on Cerro Mariposa was recorded as follows: Dorsal ground colour Jet Black (89), grading into Spectrum Yellow (55) towards tip of snout; venter mainly transparent, with a suggestion of Dark Neutral Gray (83); ventral surface of tail uniform Dark Neutral Gray (83); lateral surfaces speckled with Apple Green (61).

The juvenile from nearby Cerro Negro (Fig. 2c) has a lower number of rather bluish-white speckles on the flanks and shows suggestions of the dorsal reticulum present in the adults. The juvenile from Isla Popa (Fig. 2d) exhibits a conspicuous reddish flank colouration posterior to the



forelimbs. All three juveniles share the bright yellow snout, but differ from each other in the extent of this colouration posteriorly onto the dorsum.

Since all our adult specimens are females, the differences observed among them are clearly due to individual variation. Nevertheless, all our specimens' colourations agree with the generalized colouration traits given by SAVAGE (2002: pp. 530–1). As suspected by MYERS (1973), colouration obviously changes drastically during ontogenesis.

#### Natural history

The four adult females were encountered between 20:15 and 20:40 hrs. under logs and boards lying on the ground within, but near the edge of, secondary forest covering the slopes of Cerro Mariposa just above the clearings pertaining to the village of Alto de Piedra. Two more adult specimens were spotted darting through the leaf litter along a forest trail, between 01:00 and 01:30 hrs. in the same night. The juvenile specimen from Cerro Mariposa was found crossing a forest trail around noon on a sunny day, at an air temperature of 24.2 °C and 87% relative humidity. On Cerro Negro, the juvenile moved about through the leaf litter at 23:00 hrs, at an air temperature of 20.1 °C and fog. The individual from Isla Popa was discovered while rak-

ing through leaf litter in a patch of secondary forest in the early afternoon. Reptile species encountered close to our specimens of *D. bilobatus* either on Cerro Negro or Cerro Mariposa, or (if marked with an asterisk) on both include: *Ameiva festiva*, *A. quadrilineata*, *Anolis biporcatus*\*, *A. frenatus*\*, *A. humilis*\*, *A. insignis*, *A. limifrons*\*, *A. lionotus*\*, *Atropoides nummifer*\*, *Corytophanes cristatus*\*, *Echinosaura panamensis*, *Imantodes cenchoa*\*, *Ninia maculata*, *Oxybelis brevirostris*\*, *Pliocercus euryzonus*\*, *Ptychoglossus plicatus*, *Sibon annulatus*\*, *S. nebulatus*, and *Spilotes pullatus*.

Apart from the fact that only two of our seven specimens possess complete tails, our most remarkable observation concerns a blatant discontinuity in the perceivable abundance of this lizard: While six individuals (more than of any other reptile species) were seen during little more than five hours in the first night (12/13 May 2008) on Cerro Mariposa, the following 30 days of field work conducted by LS and NH on this mountain between May and August (including the operation of two pitfall- and funnel-trap arrays) yielded but one additional specimen. The same holds for eight collecting days AC spent at Cerro Negro between June and October 2008. Since the onset of the rainy season around Santa Fé took place in the second half of May 2008, we suspect the observability of *Diploglossus bilobatus* to be somewhat correlated to the amount of precipitation. This assumption is supported by the fact that there



Figure 2. Individuals of *Diploglossus bilobatus* collected in western Panama: (a) adult female (SMF 89547) from Cerro Mariposa; (b) adult female (SMF 89548) from Cerro Mariposa; (c) juvenile (SMF 89951) from Cerro Negro; (d) juvenile (SMF 85002) from Isla Popa. Photos: a-c by S. LOTZKAT; d by G. KÖHLER.

were no rainfalls on Cerro Mariposa during 12/13 May 2008, nor during the preceding days (family PEÑA SOLÍS pers. comm.). During their fieldwork, LS and NH recorded precipitation in the periods from 29 May–8 June and 31 July–7 August 2008. These 19 days yielded a total precipitation of 258.8 mm, with a mean of 13.6 mm per day and only one day without rain. Likewise, during their trip to Cerro Negro from 29–31 July that produced the other juvenile, AC, AH and SL measured a total amount of precipitation of 50.3 mm with a mean of 16.8 mm per day and no day without rain. Generally speaking, the region west and north of Santa Fé is very humid, with annual total precipitation amounting to between 2500 and 3000 mm. Daily rainfalls are the rule between May and November, when monthly total precipitation averages well above 200 mm (HIJMANS et al. 2005).

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