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New Anguid Lizard (*Diploglossus*) from Cuba

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A new species of *Diploglossus* is described from the Sierra Maestra of eastern Cuba. It is most closely related to the only currently recognized Cuban species, *D. delasagra*, but is distinguished by snout shape, size of ear opening, head scalation, number of scale organs, and coloration. Morphological variation within *D. delasagra* is reexamined, and the eastern subspecies is recognized as a third Cuban species, *D. nigropunctatus*, on the basis of body size, dorsal and ventral coloration, and hemipenial structure. A sexually dimorphic and spinose structure adjacent to the cloaca, termed the ovolo, is described for males.

Se describe un nueva especie de *Diploglossus* de Cuba oriental. La nueva especie esta mas relacionada a la única especie ya conocida de Cuba, *D. delasagra*; se distingue de aquella especie por la forma del hocico, el tamaño de la apertura del oido, el patrón de las escamas cefálicas y la coloración. Se re-examina la variación morfológica en *D. delasagra* y la subespecie del este se reconoce como una tercera especie de Cuba, *D. nigropunctatus*, basado en el tamaño del cuerpo, coloración del dorso y vientre y la forma del hemipene. Se describe una estructura espinosa presente en los machos, adyacente a la cloaca, que se llama el ovolo.

ANGUID lizards of the subfamily Diploglossinae are Neotropical in distribution and include about 40 described species (Peters and Donoso-Barros, 1970; Powell et al., 1996). The majority of species are placed in the wide-ranging genera *Celestus* and *Diploglossus*, although several different generic arrangements have been proposed in recent years (Strahm and Schwartz, 1978; Savage and Lips, 1993; Hedges, 1996). Diploglossine species diversity is highest in the West Indies, but only a single species, *D. delasagra* Cocteau (1838), is currently known from the largest island, Cuba.

During the summer of 1994, we ascended the north versant of the Sierra Maestra south of the city of Bayamo and collected the first known specimen of *Diploglossus* from that mountain range. Comparison with other species in the genus shows that it represents a new species that we describe herein. Also, we reevaluate the taxonomic status of the two subspecies of *D. delasagra*, *D. d. delasagra* and *D. d. nigropunctatus* Barbour and Shreve (1937). We have found differences in hemipenial ornamentation, body size, and pigmentation comparable to morphological differences between sympatric species of diploglossine lizards (see below). Although Schwartz and Henderson (1991) reported that the two taxa intergrade in "at least northern Camagüey Province," they cited no data, and we see no evidence of intergradation. For these reasons, we regard *D. delasagra* and *D. nigropunctatus* as distinct species.

MATERIALS AND METHODS

Snout–vent length (SVL) and tail measurements were taken to the nearest millimeter by laying the specimen along a ruler, or, with contorted specimens, by measuring a thin wire laid along the ventral midline to conform to the specimen. Other length measurements were made with a digital readout micrometer caliper and recorded to the nearest 0.1 mm. Angular measurements of head scales were made by superimposing a dissecting microscope image of a specimen onto a camera lucida image of a protractor and rotating the arm of the protractor to conform to the angle being measured. If any curvature existed in the two edges of the scale angle being measured, the angle was measured proximal to the curvature. Dorsal counts were made along the midline, beginning with the first scale behind the occipital and counting to the base of the tail (level of the posterior inguinal angle). Ventral counts start with the first gular scale behind the mental and continue to the margin of the cloaca. Axillary tubercles are enlarged, swollen scales lacking free edges in the axilla. Hemipenial terminology follows Dowling and Savage (1960). Museum abbreviations follow standardized usage (Leviton et al., 1985) except for MNHNCU, which refers to the collection of the Museo Nacional de Historia Natural (Havana, Cuba), and RT (collection of Richard Thomas).

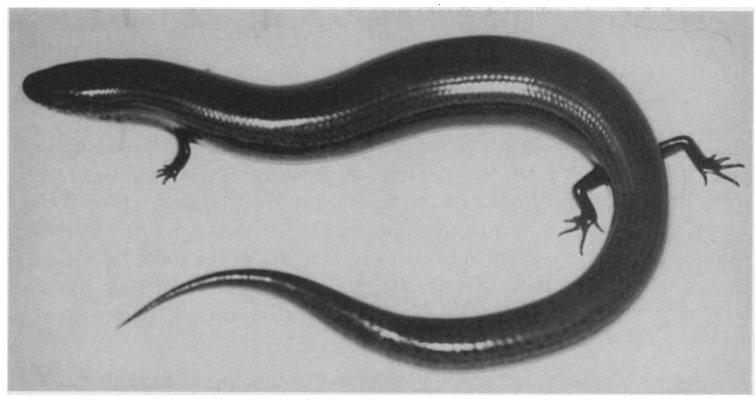

Fig. 1. *Diploglossus garridoi*, female holotype from El Manguito, Santiago de Cuba Province, Cuba.

Diploglossus garridoi, sp. nov.
Figs. 1–2A

Holotype.—MNHNCU 4420, collected at El Manguito, 1110 m elev., Granma Province, Cuba, 20°03′15″N, 76°41′02″W, on 30 June 1994 by Richard Thomas; original field number USNMFS 193507; fixed in 80% ethanol.

Diagnosis.—A species of *Diploglossus* most closely related to *D. delasagra* and *D. nigropunctatus* but differing from them in having a more rounded, higher snout; less distinct canthus rostralis; smaller ear opening; suture between first and second labials in line with posterior edge of the nasal scale; more convex posterior edge of prefrontal; greater angle between first supraocular and frontal scale; low numbers of scale organs on head and lateral scales of neck and body; and unspotted, finely lined dorsal pattern and extensively pigmented venter.

Description of holotype.—A gravid female bearing four shelled eggs, 103 mm SVL, 100 mm tail length, distal 43 mm regenerated; body elongate, diameter at midbody 13 mm; distance from axilla to groin 71 mm; forelimb short, 10

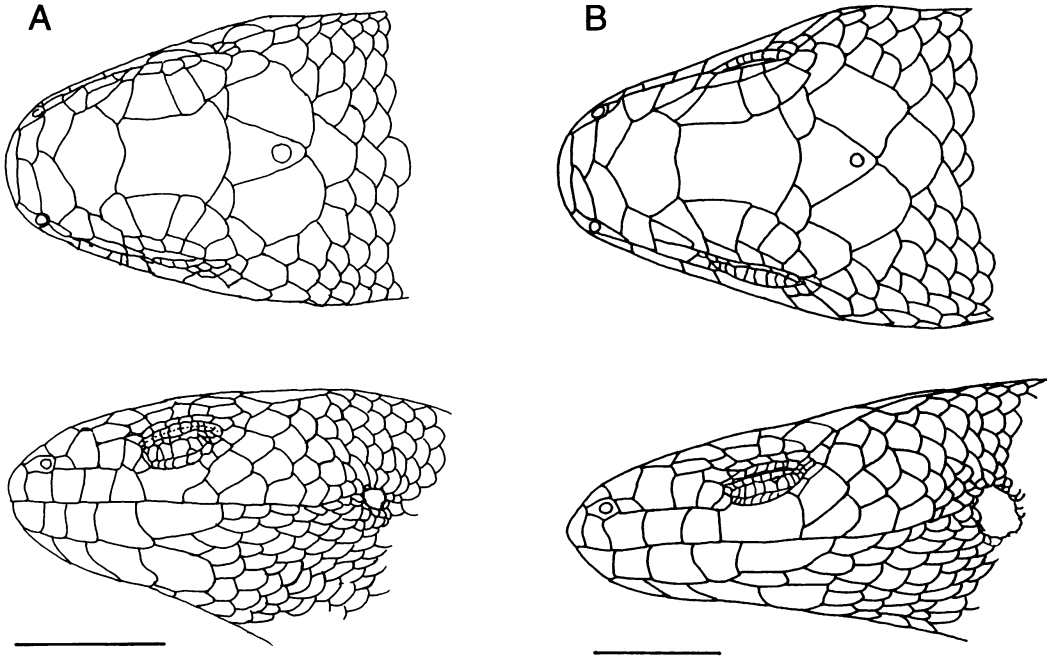

Fig. 2. Dorsal and lateral views of head scalation in (A) *Diploglossus garridoi* (holotype), and (B) *D. nigropunctatus* (USNM 512240). Scale = 5 mm.

mm from axilla to tip of longest (fourth) toe; hind limb longer, 17 mm from groin to tip of longest toe; head length from anterior margin of ear to tip of snout 12.2 mm, maximum head width 9.6 mm; rostral scale subrectangular, wider than high (2.6 mm × 1.4 mm), a pair of transversely elongate internasals meeting in a diagonal suture, followed by a similarly shaped but larger pair of frontonasals also meeting in a diagonal suture; prefrontal roughly rhomboid, slightly wider than long, posterior margin strongly convex; frontal roughly rectangular, slightly flared posteriorly, anterior margin concave, posterior margin convex and contacting the acutely angled, posteriorly projecting interparietal; parietal eye milky, diameter approximately 0.5 mm, situated in depression near apex of interparietal; large elytroid parietals lateral to the interparietal and extending posteriorly 0.4 mm beyond tip of interparietal; small paired triangular postfrontals surrounded by lateral flaring of frontal, fourth supraocular (and a parietal on left side only), parietals and interparietals; occipital scale small (1.60 mm × 2.44 mm), irregularly rounded; five large supraoculars, the first forming a 75°/71° (left/right) angle with the sides of the frontal; four lateral supraoculars; 5/5 upper intercalary palpebrals, the first not in contact with the following; 8/8 upper marginal ciliaries; 8/8 lower marginal ciliaries; 9/11 palisade palpebrals, the sixth the largest on both sides; 2/2 lower intercalary palpebrals; 8/8 lower palpebrals; 9/9 supralabials, the fifth (= angular subocular) broadly Y-shaped and below the eye; nasal scale tear-drop shaped, narrow anteriorly, expanded posteriorly with naris in posterior portion, contacting rostral, internasal, frontonasal, first supralabial, second supralabial (corner), and postnasal; first nasal-second nasal suture in line with posterior edge of nasal; a small trapezoidal postnasal about half the height of nasal, followed by a high, wing-shaped second loreal, followed in turn by a lozenge-shaped third loreal bordered above by a narrow, rectangular canthal scale; upper preocular a rounded right triangle, lower preocular rectangular to trapezoidal; eye followed by an arc of five postoculars from the angular subocular to the fifth supraocular; these in turn followed by three rows of temporals (4 + 4 + 2); ear opening very small, nearly round (left: 0.57 mm × 0.59 mm. right: 0.55 mm × 0.62 mm).

Scales of neck and dorsum subhexagonal to cycloid, imbricate, weakly strigate with about 15 strigae per scale, and unkeeled, strigae becoming weaker on sides; 90 dorsal scales from occipital to base of tail; scales of venter smooth, nonstrigate, cycloid, imbricate; dorsal and ventral scales of tail like dorsal and ventral scales of body. Mental subtriangular, followed by 9/9 infralabials; postmental rhomboid, followed by three large sublabials on each side, a wedge cleft between infralabials 5 + 6 and sublabial three, filled by three elongate lateral gulars; gular scales nonstrigate, unkeeled, cycloid, imbricate, rounded to transversely expanded, grading into rounded cycloid ventrals, 103 median ventrals from mental to cloacal margin; cloacal flap with slightly enlarged scales, seven along free margin, but not strongly different from preceding ventral scales; 20 small, irregular postcloacals; postanal tubercle rounded, soft; forelimbs small (10 long) with five short digits, having fully sheathed claws with subungual scale overlapping dorsal ungual sheath scale; palms tiled with 20/18 tubercles; subdigital lamellae 2-4-5-5-3; longest length of palm to end of third finger 9; hind limb similar in general structure to forelimb but with longer digits and larger plantar area (21/20 tubercles); subdigital lamellae 4-8-7-5-2; scales of forelimb and hind limb nonstrigate and unkeeled on outer surfaces, weakly strigate with uncoalesced prestrigal tubercles (Thomas and Hedges, 1989) on inner (palmar and plantar) surfaces; osteoderms of dorsal body scales with extensive cloudlike radices on the basal portion and arbors on the free edges of around five fairly straight branches tending to branch at the base, similar to the illustration in Strahm and Schwartz (1977, fig. 1A); scale organs fairly uniformly distributed on anterior head scales, including those of the lower jaw but becoming sparse to absent on frontal (absent), interparietal, parietals, occipitals, and posterior temporals, present but sparse on supraoculars and first row of temporals; present on upper and lower labials, largely absent on gulars; very sparse on lateral scales of neck and body.

Color pattern (in life), a wide brown dorsal zone (10 median dorsal scale rows plus half a row on each side), sharply demarcated from darker (black to charcoal) lateral zone; dorsal zone between dark dorsolateral lines medium brown, with a series of fine longitudinal interrupted lines formed by massing of dark pigment mostly on lateral edges of scales; below dorsolateral line, sides black near lines, fading ventrad; dark zone denser on head (lores, temples, neck); dark zone fading ventrad but pigmentation extending well onto venter, except for irregular median zone; massing of dark pigment on scale edges of lateral zone forming a series of fine vertical striations; dark dorsoventral line wider on neck than on body, throat marked with a heavy black reticulum formed by massing

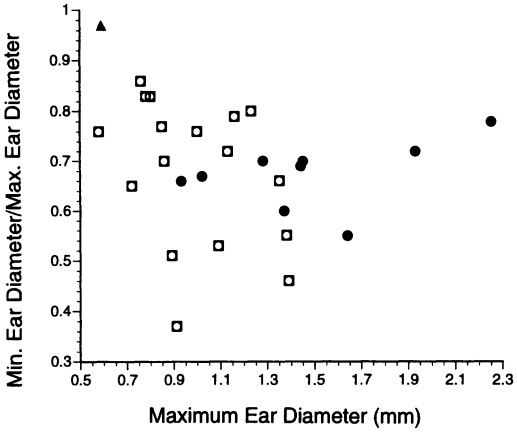

Fig. 3. Differences in size and shape of ear opening in Cuban species of *Diploglossus* showing that the ear opening of *D. garridoi* is both smaller and rounder than that of the other two species (filled circle = *D. nigropunctatus*, hollow box/circle = *D. delasagra*, filled triangle = *D. garridoi*).

of dark pigment at scale edges of labials and gulars; palisade palpebrals unpigmented.

Comparisons.—Within the anguid genus *Diploglossus*, the three Cuban taxa form a group based on a combination of relatively small body size (SVL < 121 mm), low number of midbody scales (30–34), undivided prefrontal, and subocular scale between supralabials 4 and 5 (Peters and Donoso-Barros, 1970; Strahm and Schwartz, 1977; Schwartz and Henderson, 1991). For that reason, the female holotype of *D. garridoi* is compared in more detail here with males and females of *D. delasagra* (21 specimens) and *D. nigropunctatus* (eight specimens; see Comparative Materials Examined). Additional data for the two latter species were taken from the literature (Barbour and Shreve, 1937; Strahm and Schwartz, 1977; Schwartz and Henderson, 1991).

One of the most striking features differentiating *D. garridoi* from *D. delasagra* and *D. nigropunctatus* is the small round ear opening (Figs. 1–2). Although there are muscles in anguids and other lizards that can to some extent narrow the ear-opening (Iordansky, 1968), these are not circular muscles and would not cause a diametric reduction. Based on examination of many anguids, there are obvious species-specific differences in ear size (Thomas and Hedges, 1989), and the differences in ear opening size within species involve principally a narrowing of an elongate opening (Fig. 3). These substantial differences shown by *D. garridoi* from the other Cuban taxa (Table 1) are comparable to, or greater than, morphological differences between sympatric species of diploglossine lizards (Schwartz, 1964).

In none of the specimens of *D. nigropunctatus* or *D. delasagra* is the convexity of the free posterior edge of the prefrontal equal to that of the holotype of *D. garridoi*. In one specimen of *D. delasagra* (USNM 27647) and one of *D. nigropunctatus* (USNM 512239, the prefrontal edge is slightly convex, but neither is equal that of *D.*

TABLE 1. COMPARISON OF CHARACTERS OF CUBAN *Diploglossus*.

Character	*D. delasagra*	*D. nigropunctatus*	*D. garridoi*
Ear opening	Large	Large	Small
Canthus rostralis	Sharp	Sharp	Rounded
Frontal angle	Small	Small	Large
ILNPNS suture	Offset	Offset	Inline
Scale organs	Dense, extensive	Dense, extensive	Sparse, limited
Axillary tubercles	3–9	6–16	6/7
Hemipenis	Small flounces	Pleated flounces	Unknown
Body size	Moderate	Large	Moderate
Dorsal scales	92–99	88–95	90
Ventral scales	95–102	94–103	103
Midbody scales	30–33	31–34	31
4th toe lamellae	8–10	9–12	8
SVL/MBD	7.1–9.3	6.5–8.0	8.0
Dorsal zone pigmentation	Uniform to weakly spotted	Spotted	Lined
Ventral pigmentation	None	None	Extensive
Lateral zone (neck)	Somewhat widened	Very wide, barred	Somewhat widened
Lateral zone (body)	Narrow, fading	Dark, barred	Fading, striate
Throat pattern	Faint	Dark marbling	Dark reticulum

garridoi. The snout shape of *D. garridoi* is distinct from that of the other two species in that the canthal ridge is much less obvious; as a consequence, more of the high second loreal is visible in dorsal aspect. In the other species, the curvature is more abrupt and the lower part of the scale is more vertical and less visible. The snout is also higher in *D. garridoi* in proportion to its length. Although the anterior head scales of the holotype of *D. garridoi* have an even stippling of scale organs, the scale organs are noticeably less dense than they are on the scales of *D. delasagra* and *D. nigropunctatus*. For the rostral, internasals, and interprefrontals, we estimate that *D. garridoi* has only two-thirds of the scale organs of the other species. Furthermore, the frontal scale completely lacks scale organs, whereas those of the other two species always have scale organs on the frontal, usually an even stippling completely covering the scale. Scale organs are also sparser on the lateral neck and body scales (the dorsal body scales of all three species lack scale organs).

The basic color pattern of the Cuban species of *Diploglossus* is a broad dorsal zone delimited by the dorsal sharp edge of a dark lateral zone that varies in width (ventrad extent) along the body and extends from the side of the head, where it is a continuation behind the eye of a dark loreal bar, along the neck, body, and tail. The dorsal zone may be virtually unmarked, brown to tan in color, or have sparsely scattered dark scales, or be spotted with bolder spots (*D. nigropunctatus*; Barbour and Shreve, 1937) or finely lined (*D. garridoi*). The dark lateral zone varies in width with the part of the body and the individual. On the neck, it may extend ventrad to below the level of the ear; on the sides of the body, it may be narrow, only a few scale rows wide, to much more extensive, but fading ventrally. The dark lateral zone may be traversed by a series of vertical light bars, yielding a banded pattern that may extend onto the tail. The expansion of the lateral zone on the neck is particularly dark and extensive in *D. nigropunctatus*. In this species, the throat is heavily marbled with black pigment, and the marbling extends onto the side of the neck grading into the dark neck markings. *Diploglossus delasagra* tends to have a minimal dark zone, more of a stripe, and an unmarked (or only lightly marked) dorsal zone without barring and only faint throat markings. The overall impression of *D. garridoi* is that it more strongly resembles *D. delasagra* in dorsal pattern, in that the dark lateral zone is relatively narrow (i.e., it fades in a few scale rows to a relatively even mixture of light and dark pigment). However, the sides of

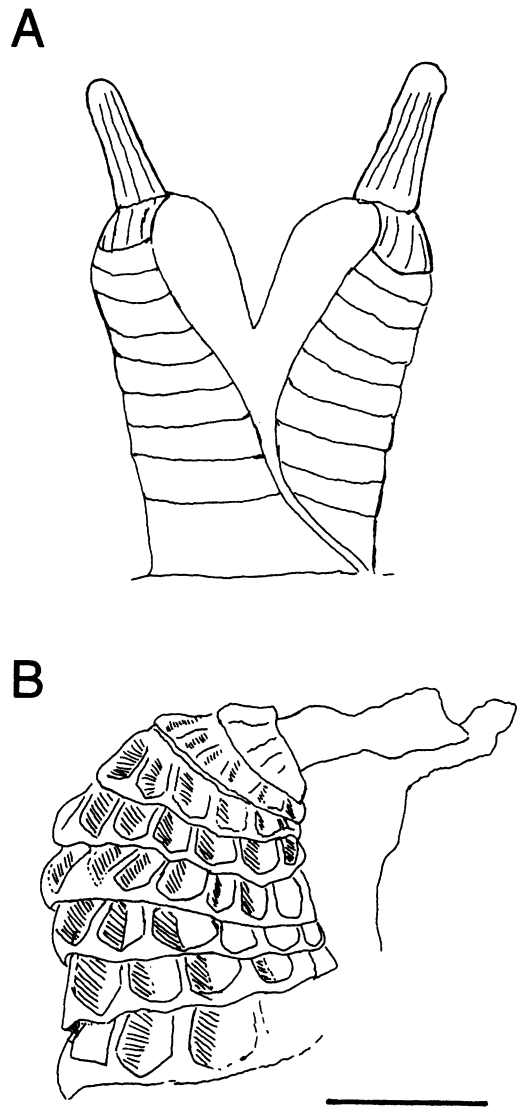

Fig. 4. Hemipenis of *Diploglossus nigropunctatus* (USNM 512241). (A) Fully everted hemipenis (diagrammatic, but proportional) showing rows of flounces (but not details), widened sulcus spermaticus, and awns. (B) Lateral view of right hemipenis (made with camera lucida) showing details of the pleated flounces; median lobe of hemipenis shown in outline (scale = 1 mm).

D. garridoi are strikingly patterned with fine vertical striations, not found in the other two species, and dark pigment extends strongly but unevenly onto the venter, leaving only an irregular midventral zone unpigmented. In all specimens of the other species, pigmentation ends fairly sharply along a ventrolateral line. Besides this dark ventral coloration, the fine longitudinal dorsal lines and the boldly reticulate throat pat-

tern are other features unique to *D. garridoi* among the Cuban *Diploglossus*.

We have examined everted hemipenes in both *D. nigropunctatus* and *D. delasagra* (the holotype and only specimen of *D. garridoi* is a female). In these species, the organs are subcylindrical basally and divide; solid awns project from the apices of each lobe, and surfaces of the organs are covered with a series of about 10 transverse rows of pleated flounces (Fig. 4). The pleating is so marked in *D. nigropunctatus* that the ridges of the pleats appear almost like spines, and the depth of the folds is such that the organ at first inspection appears calyculate. On the most apical row of flounces, the pleats are longer and so compressed that they appear plicate, and along the ridge of each pleat is a row of fine toothlike serrations (not evident on the more basal pleats). The sulcus spermaticus enters each everted organ medially and spirals around the base to the anterior face where it widens shortly below the division of the organ and each lip then proceeds onto its respective lobe, leaving a large nude area covering the inner surface of each lobe (Fig. 4). Note that the sulcus spermaticus widens and does not divide, since distal to the widening there is only one sulcal lip for each "branch." On the posterior (asulcate) surface the flounces are shallower and the pleating not as pronounced. In the one specimen of *D. delasagra* with everted hemipenes (USNM 512237), pleating is much less extreme. A partially everted hemipenis of *D. pleei* (RT 9056) shows a similar structure to that of the Cuban species, in being divided, in having somewhat pleated flounces, and in having solid apical awns. Among the lizards, Kluge (1982) described bones in the hemipenes of the gekkonid *Aristelliger* and Böhme (1988) has noted solid awns in varanids.

Etymology.—We take great pleasure in naming the new species for our colleague and dean of Cuban herpetologists (not to mention ornithologists and coleopterists), Orlando H. Garrido.

Remarks.—Males of both *D. delasagra* and *D. nigropunctatus* have a spiny ovolo-like protuberance just dorsal to each posterior angle of the cloacal margin. The ovolo is a flat or slightly grooved, elongate shelf on top of a rounded protuberance that curves ventrally, merging with the surface of the tail base; it is formed from a single, hypertrophied scale. The structure is present in females, but it is smaller, softer, and not spiny. The spininess of the ovolo varies from a slightly staggered line of toothlike spines to an array of spines over the edge and curvature of the structure (USNM 512238, *D. delasagra*; USNM 512241, *D. nigropunctatus*). The spines may be rigid and serrate or thinner and somewhat flexible. In the animals with more abundant spines, it can be seen that the teeth derive from an elongation and extension of the scales' surface tubercles that, on the dorsal body scales, coalesce ontogenetically to form the fine striae (ridges) of the mature scale (Thomas and Hedges, 1989). The top of the ovolo bears a darkly pigmented spot. We are not aware of this sexually dimorphic structure being noted previously, except by Avila-Pires (1993) who remarked, in reference to the South American *D. fasciatus*, "behind cloacal slit, at each side, a single or partially divided tubercle is found in adult specimens." We have examined specimens of *D. fasciatus* and find that some specimens, apparently males, do indeed bear an undivided, elongate but rounded ovolo with no shelf and no spines. Similarly, in the holotype (and only known specimen) of *D. montisserati* the ovolo is a simple, rounded boss. *Diploglossus pleei*, on the other hand, has a very pronounced ovolo in which the edge is thin and upturned, almost spoonlike, and with at most weak serrations but no spines.

Natural history.—The type locality is about 37 km south of the city of Bayamo and around 2 km north-northeast of Pico Botella. The site is a very small settlement at the headwaters of the Río Peladeros, which flows south to the Caribbean. The holotype was collected beneath a pile of cut vegetation debris near a stream. The area was generally open, but the surrounding area is a mixture of pine and disturbed broadleaf vegetation with pine predominating.

Comparative Materials Examined

Diploglossus delasagra.—MCZ 7924, 38396-97 (Cuba: near Habana); AMNH R-77603 (Habana Prov., Santiago de las Vegas); AMNH R-77791–2 (Camagüey Prov., 5.5 mi. NE Banao, Paso de Lesca, Sierra de Cubitas); USNM 3141, 4157, 11809, 12356, 26365, 27647, 36807–10, 54405, 58170, 75840; USNM 512237–238 (Pinar del Rio Prov., 4.0 km NW San Vicente).

Diploglossus nigropunctatus.—MCZ 7426 (paratype; eastern Cuba); MCZ 42563 (paratype), Oriente Prov., Cuchillo de Guajinero; USNM 11809A, 11809B; USNM 512239 (Guantánamo Prov., 5.4 km WSW La Tagua); USNM 512240 (Guantánamo Prov., 1 km SW San Luis de Potosi), USNM 512241–242 (Guantánamo Prov., 4.7 km N. Los Calderos).

Diploglossus fasciatus.—MCZ 17222–23, 20685.

Diploglossus montisserrati.—MCZ 76924 (Montserrat: Woodlands Spring).

Diploglossus pleei.—Many MCZ and RT specimens.

We also examined Hispaniolan and Jamaican *Celestus* for comparative purposes.

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