



A revision of the Central American species related to *Anolis pentaprion* with the resurrection of *A. beckeri* and the description of a new species (Squamata: Polychrotidae)

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Abstract

Based on differences in coloration, morphometrics, and scalation, I recognize seven species of anoles related to *Anolis pentaprion* in Central America: *Anolis beckeri* (southeastern Mexico to northern Nicaragua), *A. cristifer* (Pacific lowlands of Chiapas to central Guatemala), *A. fungosus* (Caribbean premontane zone from central Costa Rica to western Panama), *A. pentaprion* (Caribbean lowlands of southern Nicaragua to northwestern Colombia, also on Pacific versant in central and eastern Panama), *A. salvini* (Pacific premontane and lower montane zones from central Costa Rica to western Panama), *A. utilensis* (restricted to Isla de Utila, Honduras), and a new species (from the Pacific lowlands of Costa Rica and western Panama) described herein. The new species differs from *A. pentaprion* by having a red male dewlap with few large, widely spaced gorgetal scales scattered across the dewlap (pink with purple pigment between rows of gorgetals, and with regular rows of numerous small, narrowly spaced gorgetal scales in *A. pentaprion*). Furthermore, I resurrect the name *A. beckeri* Boulenger for the *pentaprion*-like populations of anoles distributed from southeastern Mexico to northern Nicaragua. *Anolis beckeri* differs from *A. pentaprion* most obviously in the dorsal tail scalation (a serrated caudal crest present in *A. pentaprion* versus no such crest in *A. beckeri*) and dewlap scalation (gorgetal rows with 17–25 narrowly spaced scales in *A. pentaprion* versus gorgetal rows with 4–10 widely spaced scales in *A. beckeri*). Finally, SMF 83608 is proposed as the neotype for *Anolis pentaprion*. I provide standardized descriptions of *A. beckeri*, *A. pentaprion*, and the new species described herein.

Key words: Reptilia, Squamata, Polychrotidae, *Anolis*, new species, Neotype Designation, Central America

Resumen

Basado en diferencias de coloración, morfometría, y folidosis, reconozco siete especies de anolis relacionados con *Anolis pentaprion* en Centroamérica: *Anolis beckeri* (sureste de México hasta el norte de Nicaragua), *A. cristifer* (tierras bajas de Chiapas hasta el centro de Guatemala), *A. fungosus* (zonas premontanas del Caribe desde el centro de Costa Rica hasta el oeste de Panamá), *A. pentaprion* (tierras bajas del vertiente del Caribe desde el sur de Nicaragua hasta el noroeste de Colombia, también en el vertiente del Pacífico en el centro y este de Panamá), *A. salvini* (zonas premontanas y montañas bajas del Pacífico desde el centro de Costa Rica hasta el oeste de Panamá), *A. utilensis* (restringido a la isla de Utila, Honduras) y una nueva especie aquí descrita (tierras bajas del Pacífico de Costa Rica y el oeste de Panamá). La nueva especie difiere de *A. pentaprion* por tener el abanico gular rojo con pocas escamas gorgetales grandes que están ampliamente separadas entre sí (rosa con numerosas escamas gorgetales pequeñas con poco espacio entre sí que están regularmente distribuidas en hileras en *A. pentaprion*). Adicionalmente, revalido el nombre *A. beckeri* Boulenger para las poblaciones de anolis distribuidas desde el sureste de México hasta el norte de Nicaragua previamente referidas como *Anolis* (o *Norops*) *pentaprion*. *Anolis beckeri* difiere de *A. pentaprion* en la escamación del dorso de la cola (cresta caudal aserrada presente en *A. pentaprion*, ausente en *A. beckeri*) y en la escamación del abanico gular (hileras gorgetales con 17–25 escamas con poco espacio entre sí en *A. pentaprion*, 4–10 escamas ampliamente separadas entre sí en *A. beckeri*). Finalmente, propongo SMF 83608 como neotipo para *A. pentaprion*. Proveo descripciones estándar de *A. beckeri*, *A. pentaprion* y la nueva especie aquí descrita.

Introduction

In 1862, Cope described the new species *Anolis pentaprion* based on a single specimen obtained in “New Granada, near the river Truando.” Apparently, the holotype of *A. pentaprion* is lost (Barbour 1934; Smith and Taylor 1950a). Boulenger (1881) described the new species *A. beckeri* based on two specimens (both specimens presently catalogued under IRSNB 2010) from “Yucatán.” Smith & Taylor (1950b) restricted the type locality to Chichén Itzá, Yucatán. However, based on distributional and ecological grounds, Lee (1996) considered the single Chichén Itzá record of *A. pentaprion* published by Barbour and Cole (1906) as highly doubtful. In 1885, Boulenger named the new species *A. salvini* based on a male specimen (now BMNH 1946.9.8.19) from “Guatemala.” The taxonomic identity of *A. salvini* has been uncertain since its original description. Köhler (2007) demonstrated the holotype of *A. salvini* to be conspecific with *A. vociferans*. Boulenger (1890) added another nominal species, *A. panamensis*, based on two specimens (now BMNH 1946.8.13.7–8) from “Panama.” Myers (1971) designated BMNH 1946.8.13.8 as the lectotype of this taxon. Dunn (1930) synonymized *A. panamensis* with *A. pentaprion*. In 1968, Smith described *Anolis pentaprion cristifer* based on an adult male (UIMNH 37066) from “vicinity of a small lake near Acacoyagua, Chiapas,” Mexico. Myers (1971:35) stated that the nominal taxon *cristifer* “in scutellation and proportions ... seems to fall within the variational limits of southern populations of *pentaprion*.” However, based on differences in the middorsal trunk scalation, Köhler and Acevedo (2004) and Köhler (2008) recognized *cristifer* as a species distinct from *pentaprion*. In 1971, Myers described two new species related to *Anolis pentaprion*: *Anolis fungosus*, based upon a single specimen (KU 113451) from “Campo Mojica, a clearing on a trail at 1450 m elevation, on the north slopes of Cerro Pando, upper watershed of Río Changena, in the Cordillera de Talamanca, Bocas del Toro Province, Republic of Panama” and *A. vociferans*, the holotype (AMNH 69621) of which originated from “4 km West of Cerro Punta, 1829 m elevation, Chiriquí Province, Republic of Panama.” Köhler (2007) placed *A. vociferans* in the synonymy of *A. salvini* and considered the type locality of the latter as erroneous. Köhler (1996) described a new species of *pentaprion*-like anole, *A. utilensis*, from Isla de Utila, off the north coast of Honduras.

Here I report upon the results of my study on the variation in hemipenial and scalation morphology as well as morphometrics of the anoles commonly referred to as *Anolis pentaprion*.

Material and methods

In evaluating whether multiple species exist within the *Anolis pentaprion* complex, I follow the Evolutionary Species Concept (Simpson 1961, Wiley 1978), and operationalize this concept by identifying species based on consistent differences among populations (Frost & Kluge 1994). A list of specimens examined is provided in the Appendix. Abbreviations for museum collections follow those of Leviton *et al.* (1985) except ECOCHH (Museo de Zoología-Ecosur, Chetumal, Quintana Roo, Mexico), MZ-UNICACH (Museo Zoológico de la Universidad de Ciencias y Artes del Estrado de Chiapas, Tuxtla Gutiérrez, Chiapas, Mexico), and IHNHERP (Colección Herpetológica del Instituto de Historia Natural, Tuxtla Gutiérrez, Chiapas, Mexico). POE field numbers refer to specimens that will be deposited in the Museum of Southwestern Biology, University of New Mexico, Albuquerque, New Mexico, U.S.A.; and SL field numbers refer to specimens that will be deposited in the Universidad Autónoma de Chiriquí, David, Panama. I had the privilege of examining all extant primary types of nominal species regarded as synonyms of *Anolis pentaprion* by previous authors (Peters & Donoso-Barros 1970, Myers 1971), as well as the primary types of *A. salvini*, *A. vociferans*, *A. fungosus*, and *A. utilensis*. For the synonymy lists, only those works have been included that cite actual specimens. Nomenclature of scale characters follows that of Köhler (2008). Terminology for hemipenial morphology follows that of Myers *et al.* (1993) and Savage (1997).

Scale sizes were measured using the ocular micrometer of a stereo microscope (Leica MZ 12) and rounded to the nearest 0.01 mm. All other measurements were made using precision calipers and were rounded to the nearest 0.1 mm. Head length was measured from the tip of the snout to the anterior margin of

the ear opening. Snout length was measured from the tip of the snout to the anterior border of the orbit. Head width was determined as the distance between the oral ricti. Dorsal and ventral scales were counted at midbody along the midline. Tail height and width were measured at the point reached by the heel of the extended hind leg. Subdigital lamellae were counted on phalanges ii to iv of the fourth toe. I considered the scale directly anterior to the circumnasal to be a prenasal. The capitalized colors and color codes (the latter in parentheses) are those of Smithe (1975–1981). Abbreviations used are 2Canths (number of scales between second canthals), DHL (number of medial dorsal scales in one head length), HL (head length), HW (head width), INL (infralabials), IP (interparietal plate), SAM (scales around midbody), SO (subocular scales), SPL (supralabial scales), SS (supraorbital semicircles), SVL (snout–vent length), TNLS (total number of loreal scales on one side), and VHL (number of medial ventral scales in one head length).

Systematics

Status of *Anolis beckeri* Boulenger 1881

Whereas some earlier authors treated the nominal species *Anolis beckeri* as a full species (e.g., Barbour & Cole 1906, Barbour 1934, Smith & Taylor 1950a), subsequent authors variably recognized it either as a subspecies of *A.* (or *Norops*) *pentaprion* (e.g., Stuart 1963, Peters & Donoso-Barros 1970), or a synonym of the latter taxon (e.g., Smith & Kerster 1955, Meyer & Wilson 1973, Campbell & Vannini 1989, Stafford & Meyer 2000, McCranie *et al.* 2006).

Myers (1971:35) pointed out “a caudal crest is lacking in specimens from Yucatan through Honduras.” He also noted that specimens from the northern populations “possibly average somewhat smaller in size than representatives of southern populations, but I have not noted any other major differences.” Recently, Campbell (1989:133) treated *beckeri* (as *Norops beckeri*) as a species distinct from *A. pentaprion* with no other justification than stating that “the populations of this lizard from Petén, Belize, and the Yucatán Peninsula of Mexico have long gone under the name of *Norops pentaprion*, a species occurring to the south in lower Central America and northern South America.” I examined 39 specimens of *pentaprion*-like anoles from the Caribbean versant of Nuclear Central America and found that these specimens indeed consistently lack a pronounced serrated caudal crest (versus a pronounced serrated caudal crest in adult specimens from southern Nicaragua, Costa Rica and Panama; Fig. 1). However, there is also some ontogenetic variation in this character and juveniles of the southern population usually lack a serrated caudal crest. Another difference I noted is in dewlap scalation. The dewlap in adult males from Belize and Guatemala have gorgetal rows with 4–10 widely spaced scales (versus gorgetal rows with 17–25 narrowly spaced scales in specimens from southern Nicaragua as well as from the Caribbean versant of Costa Rica and Panama; Fig. 2). Therefore, I regard *A. beckeri* as a valid species. Other than in caudal and dewlap scalation, there is great overlap in the ranges of all examined characters of scalation and morphometrics between *A. beckeri* and *A. pentaprion* (Table 1). The geographic ranges of these two species are allopatric and there is a hiatus of about 150 km between the southernmost collecting site for *A. beckeri* and the northernmost record of *A. pentaprion* (Fig. 3).

Status of the populations of *pentaprion*-like anoles from the the Pacific versant of Costa Rica and western Panama

In the course of my field work in Central America I have collected *pentaprion*-like anoles from various parts of their geographic range. After having seen the dewlap of adult males in life from Nicaragua and from the Caribbean versant of Costa Rica, I was surprised to learn that the coloration and scalation of the male dewlap is distinctly different in individuals from around the town of David in western Panama (both types of dewlap figured in Köhler 2008). This observation caused me to investigate whether these two dewlap types are geographically correlated and, if so, what the distributional pattern is. From colleagues I received photos of the extended dewlap in life of 13 adult males from 10 localities in southern Nicaragua, Costa Rica, and Panama, and I examined the dewlap scalation in numerous preserved specimens (Appendix I). I found that there is a strong geographic correlation of the dewlap coloration and scalation of the two dewlap types.

Individuals from southern Nicaragua as well as from the Caribbean versant of Costa Rica and western Panama, and from both versants in central and eastern Panama have a purple dewlap in life with regular rows of numerous small, narrowly spaced gorgetal scales. On the contrary, specimens from the Pacific versant of Costa Rica and western Panama have a brick red dewlap in life with few large, widely spaced gorgetal scales scattered across the dewlap (Figs. 2 and 3). The geographic ranges of the two dewlap types are allopatric and among the specimens I examined there are no intermediate forms. Therefore, I regard these dewlap types as characteristic of two distinct species. The type locality of *Anolis pentaprion* is “New Granada, near the river Truando.” According to Myers (1971:32) the “Río Truandó, a tributary of the lower Río Atrato, is in the Atlantic drainage although it rises not far from the Pacific coast, in the Chocó of extreme northwestern Colombia.” Therefore, the name *A. pentaprion* has to be applied to the species that possess a pink dewlap with purple pigment between rows of gorgetals, and with regular rows of numerous small, narrowly spaced gorgetal scales.

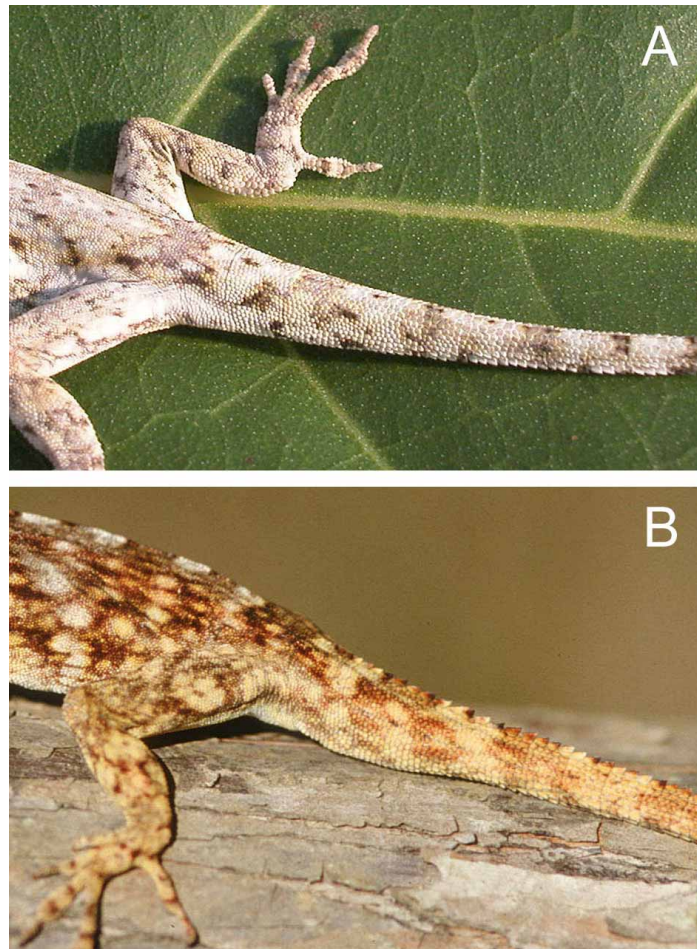


FIGURE 1. Posterior portion of body and part of tail in (A) *Anolis beckeri* (Belize; photo by S. Poe); (B) *A. pentaprion* (from Bartola, Río San Juan, Nicaragua; photo by G. Köhler). Note the difference in the dorsal tail scalation.

I have examined the two syntypes (BMNH 1946.8.13.7–8) of *Anolis panamensis* Boulenger 1890 with the type locality “Panama.” At my request, Colin McCarthy recently sent me close-up photos of the dewlaps of BMNH 1946.8.13.7–8. The dewlaps of these two specimens have regular rows of numerous small narrowly spaced gorgetal scales. Because *A. pentaprion* Cope is the oldest available name for this species, *Anolis panamensis* Boulenger remains in the synonymy of *A. pentaprion*. Interestingly, there is no available scientific name for the *pentaprion*-like species from the Pacific versant of Costa Rica and western Panama that has a brick red dewlap in life with few large widely spaced gorgetal scales scattered across the dewlap. I therefore describe it as a new species below.

TABLE 1. Selected measurements, proportions and scale characters of *Anolis beckeri*, *A. charlesmyersi*, and *A. pentaprion*. Range is followed by mean value and one standard deviation in parentheses. For abbreviations see text.

Character		<i>A. beckeri</i> ♂ 8, ♀ 11	<i>A. charlesmyersi</i> ♂ 26, ♀ 17	<i>A. pentaprion</i> ♂ 25, ♀ 23
SVL	♂	46.5–60.6 (51.03±4.97)	39.7–78.0 (65.30±10.36)	52.0–77.0 (62.64±5.65)
	♀	38.0–55.4 (50.31±4.94)	44.0–66.7 (56.10±6.07)	46.0–64.0 (56.41±5.43)
Tail length / SVL	♂	1.03–1.55 (1.35±0.19)	1.02–1.43 (1.29±0.10)	1.01–1.42 (1.27±0.10)
	♀	1.14–1.37 (1.21±0.08)	1.02–1.40 (1.24±0.11)	1.06–1.40 (1.22±0.09)
Tail diameter vertical / horizontal	♂	0.86–1.25 (1.03±0.18)	0.55–1.56 (1.15±0.23)	0.75–5.67 (2.79±2.15)
	♀	0.8–1.24 (1.04±0.15)	0.75–1.31 (1.08±0.17)	0.92–1.16 (1.05±0.09)
HL / SVL	♂	0.25–0.28 (0.27±0.01)	0.25–0.28 (0.27±0.01)	0.25–0.27 (0.26±0.01)
	♀	0.24–0.28 (0.26±0.01)	0.25–0.28 (0.27±0.01)	0.24–0.27 (0.26±0.01)
HL / HW	♂	1.55–1.67 (1.59±0.05)	1.50–1.80 (1.64±0.08)	1.59–1.73 (1.64±0.05)
	♀	1.54–1.73 (1.64±0.06)	1.35–1.83 (1.65±0.14)	1.50–1.70 (1.61±0.08)
IP/ ear	♂	2.62–3.66 (3.14±0.42)	1.17–9.00 (3.13±2.17)	1.19–5.45 (2.29±1.45)
	♀	1.78–3.90 (3.10±0.70)	1.26–2.71 (2.22±0.50)	1.28–5.38 (2.76±1.61)
Shank length / SVL	♂	0.15–0.21 (0.19±0.02)	0.14–0.22 (0.19±0.02)	0.15–0.42 (0.26±0.01)
	♀	0.15–0.2 (0.18±0.02)	0.17–0.23 (0.20±0.02)	0.13–0.22 (0.18±0.03)
Axilla–groin distance / SVL	♂	0.38–0.44 (0.42±0.02)	0.31–0.44 (0.38±0.03)	0.39–0.44 (0.42±0.02)
	♀	0.38–0.45 (0.41±0.02)	0.34–0.44 (0.39±0.03)	0.39–0.47 (0.43±0.03)
Subdigital lamellae of 4th toe		18–32 (26.47±4.81)	27–34 (30.75±2.37)	29–31 (30.25±0.96)
Number of scales between SS		0–1 (0.32±0.48)	0–2 (0.69±0.53)	0–1 (0.78±0.42)
Number of scales between IP and SS		1–3 (2.16±0.60)	0–3 (1.94±0.65)	1–4 (2.03±0.56)
Number of scales between SO and SPL		0	0	0
Number of SPL to level below center of eye		7–10 (8.32±0.69)	7–11 (8.83±1.07)	7–10 (8.60±1.06)
Number of INL to level below center of eye		7–10 (8.5±0.76)	6–10 (8.48±1.07)	7–10 (8.92±0.93)
Total number of loreals		18–30 (23.16±3.5)	18–50 (30.34±8.16)	13–29 (20.36±4.59)
Number of horizontal loreal scale rows		3–4 (3.62±0.44)	3–6 (4.54±0.86)	3–6 (3.92±0.74)
Number of postrostrals		5–8 (6.06±0.93)	5–10 (7.00±0.91)	5–8 (6.77±0.83)
Number of postmentals		5–7 (6.17±0.62)	5–8 (6.05±0.57)	5–6 (5.87±0.35)
Number of scales between nasals		5–9 (6.72±1.13)	5–9 (7.50±0.91)	5–9 (6.95±0.94)
Number of scales between 2nd canthals		6–14 (7.79±1.81)	6–9 (7.14±0.91)	5–9 (7.13±1.25)
Number of scales between posterior canthals		7–9 (7.75±0.86)	6–12 (8.95±1.28)	6–15 (8.4±2.20)
DHL		45–80 (62.17±10.90)	48–72 (59.94 ±7.04)	46–72 (56.40±5.87)
VHL		34–60 (49.42±6.91)	40–76 (55.82±8.37)	34–62 (47.75±8.00)
SAM		130–178 (157.06±14.32)	136–200 (168.95±15.13)	134–190 (153.54±15.08)



FIGURE 2. Dewlap of (A) *Anolis beckeri* (from Belize; POE field number 1183; photo by S. Poe); (B) *A. pentaprion* (from Bartola, Río San Juan, Nicaragua; SMF 80961; photo by G. Köhler); (C) *A. charlesmyersi* (from Los Algarrobos, Chiriquí, Panama; SMF 89508; photo by S. Lotzkat).

***Anolis charlesmyersi* sp. nov.**

Figs. 4, 5, and 6

Anolis pentaprion: Wettstein (1934), Taylor (1956; in part), Williams and Smith (1968 “1966”), Myers (1971; in part),
Anolis pentaprion pentaprion: Etheridge (1959; in part.),

Holotype. SMF 89688, adult male, from trail to Río Majagua, Los Algarrobos, 8.48927°N, 82.43333°W, ca. 130 m a.s.l., Province Chiriquí, Panama; collected by Sebastian Lotzkat and Andreas Hertz on 23 April 2009.

Paratypes. SMF 89508, 90053, adult males, from trail to Río Majagua, Los Algarrobos, 8.48456°N, 82.43417°W, ca. 110 m a.s.l., Province Chiriquí, Panama; collected by Sebastian Lotzkat and Andreas Hertz on 7 June 2008.

Diagnosis. A medium-sized species (SVL in largest specimen examined 78.0 mm in males, 76.7 mm in females) of the genus *Anolis* (sensu Poe, 2004) that differs from all Central American anoles except *A. beckeri*, *A. cristifer*, *A. fungosus*, *A. pentaprion*, *A. salvini*, *A. utilensis* by (1) having (1) extremely short hind legs (fourth toe of adpressed hindlimb usually reaching to level of tympanum; ratio shank length / head length 0.49–0.84); (2) smooth, juxtaposed ventral scales; (3) a relatively short tail (ratio tail length / SVL 1.0–1.5).

Anolis charlesmyersi differs from *A. beckeri* by having a pronounced serrated caudal crest (versus lacking a pronounced serrated caudal crest). *Anolis charlesmyersi* differs from *A. cristifer* by having a double row of slightly enlarged middorsal scales, not forming a serrated crest (versus a serrated middorsal crest, at least on posterior portion of dorsum, present in *A. cristifer*). *Anolis charlesmyersi* differs from *A. fungosus* by lacking bony parietal protuberances (versus having a pair of small bony parietal protuberances posterior and lateral to interparietal plate). *Anolis charlesmyersi* differs from *A. pentaprion* by having a brick red (in life) dewlap with few large widely spaced gorgetal scales scattered across the dewlap or in loosely arranged rows with 4–9 widely spaced scales (versus a pink dewlap with purple pigment between rows of gorgetal scales and with regular rows of 17–25 small narrowly spaced gorgetal scales). *Anolis charlesmyersi* differs from *A. salvini* by having smooth, obliquely conical ventral scales (versus keeled), lacking a dark interorbital bar (versus present), and lacking enlarged postcloacal scales (versus males with a pair of greatly enlarged postcloacal scales). *Anolis charlesmyersi* differs from *A. utilensis* by having the proximal subdigital scales of toes differentiated as slightly broadened lamellae (versus those scales granular) and by having a pronounced serrated caudal crest (versus lacking a pronounced serrated caudal crest).

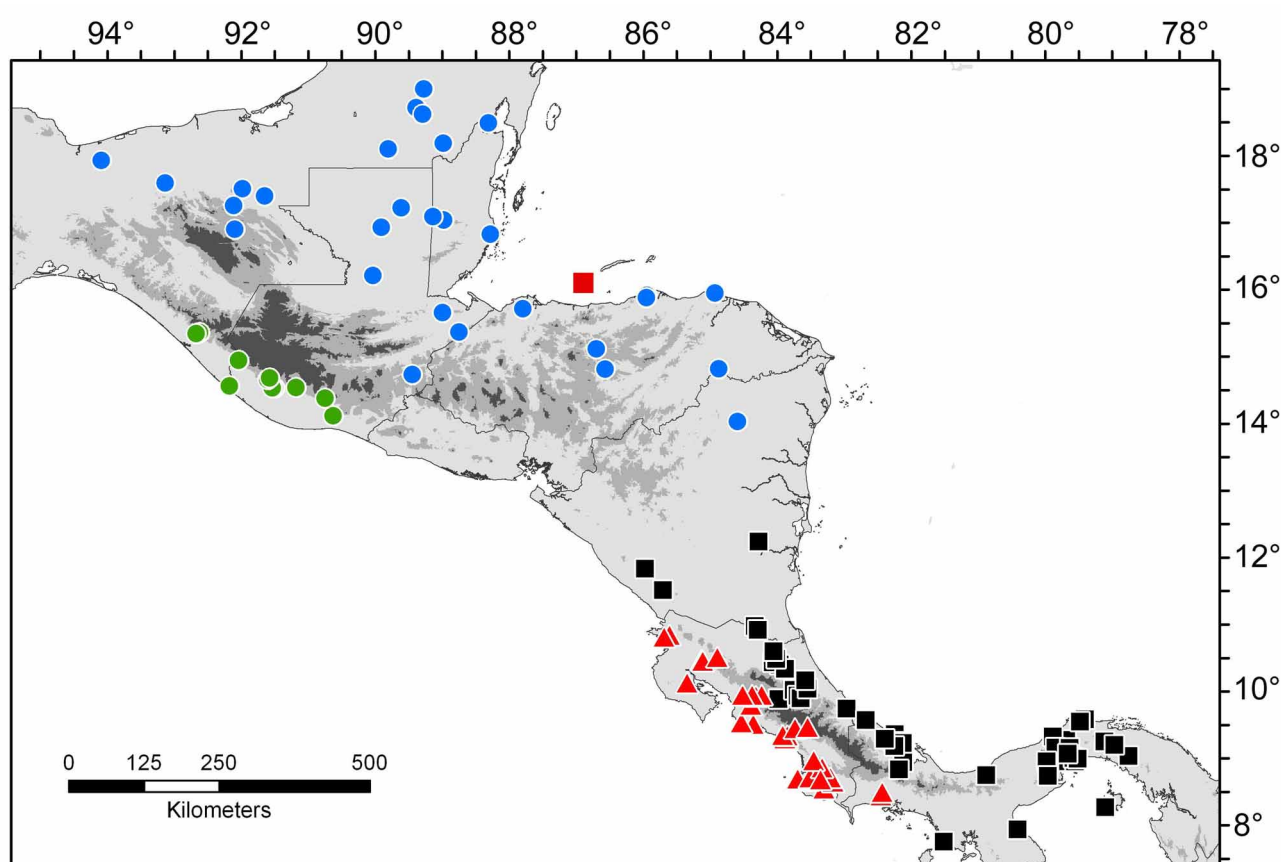


FIGURE 3. Map indicating collecting localities of *Anolis pentaprion* and related taxa in Mexico and Central America. Each symbol can represent one or more adjacent localities. Areas above sea level, 500 and 1000 m are shaded pale, medium dark, and dark gray, respectively. Red triangles: *Anolis charlesmyersi*; blue circles: *A. beckeri*; green circles: *A. cristifer*; black squares: *A. pentaprion*; red square: *A. utilensis*.

Description of holotype. Adult male as indicated by everted hemipenes; SVL 65.0 mm; tail length 93.0 mm, tail complete; tail length/SVL ratio 1.43; tail compressed in cross section, tail height 4.4 mm, tail width 3.1 mm; axilla to groin distance 24.9 mm; head length 17.5 mm, head length/SVL ratio 0.27; snout length 8.5 mm; head width 10.4 mm; longest toe of adpressed hind limb reaching to a point between shoulder and tympanum; shank length 13.6 mm, shank length/head length ratio 0.78; longest finger of extended forelimb reaching to a point between eye and nostril; longest finger of adpressed forelimb reaches to a point 2 mm anterior to insertion of hind limbs. Scales on snout tuberculate to weakly keeled; 10 postrostrals; 7 scales

between nasals; scales in distinct prefrontal depression slightly wrinkled to tuberculate; supraorbital semicircles well developed, 2 (right)–3 (left) scales broadly in contact; supraorbital disc composed of 11–14 distinctly enlarged smooth scales; three short superciliaries, posterior one shortest; about 4 rows of small keeled scales extending between enlarged supraorbitals and superciliaries; interparietal scale well developed, 3.1 x 1.3 mm (length x width), surrounded by scales of moderate size; interparietal and supraorbital semicircles in broad contact; canthal ridge distinct, composed of three large and four small anterior canthal scales; 6 scales present between second canthals; 8 scales present between posterior canthals; 19 (right)–20 (left) loreal scales in a maximum of 3 (right)–4 (left) horizontal rows, with the scales of lower rows mostly smooth, and those of upper rows mostly weakly keeled; subocular scales smooth to wrinkled, five subocular scales broadly in contact with five supralabials; 8 supralabials to level below center of eye; ear opening 0.8 x 0.9 mm (length x height); mental 2.0 x 0.9 mm (width x length), almost completely divided medially, bordered posteriorly by 6 postmentals (outer pair largest); 8 infralabials to level below center of eye; sublabials undifferentiated; smooth granular scales present on chin and throat; dewlap extending well onto chest, from level below mideye to 3.5 mm beyond level of axilla; dorsum of body with smooth conical non-imbricate scales, 2 medial rows of slightly enlarged scales, largest dorsal scales about 0.35 x 0.29 mm (length x width); about 51 medial dorsal scales in one head length; about 75 medial dorsal scales between axilla and groin; lateral scales smooth, granular and homogeneous, average size 0.24 mm in diameter; ventrals at midbody smooth, bulging, nonimbricate, about 0.34 x 0.31 mm (length x width); about 52 ventral scales in one head length; about 77 ventral scales between axilla and groin; 154 scales around midbody; ventral caudal scales strongly keeled, forming longitudinal ridges; caudal middorsal scales enlarged, forming a serrated crest; lateral caudal scales mostly smooth, without whorls of enlarged scales, although an indistinct division in segments is discernible; precloacal scales pointed and granular; postcloacal scales not enlarged; no tube-like axillary pocket present; scales on dorsal surface of forelimb smooth, conical, subimbricate, about 0.25 x 0.24 mm (length x width); digital pads dilated, dilated pad about three times width of non-dilated scales on distal phalanx; distal phalanx narrower than and raised from dilated pad; 33 (right)–34 (left) lamellae under phalanges II–IV of fourth toe; seven scales under distal phalanx of fourth toe.

The completely everted left hemipenis is a large bilobate organ; sulcus spermaticus bordered by well developed sulcal lips and bifurcates at base of apex, branches continue to tip of lobes; a small asulcate processus present; apex covered with fine calyces, truncus with transverse folds.

The extended dewlap has four horizontal gorgetal-sternal rows with 8–10 large scales per row; about 75 scales in marginal series, modal number of anterior marginal pairs 4; about 35 apicogorgetals; gorgetals widely spaced, no scales between gorgetal rows; about 20 apicosternals.

In life, dorsal and lateral surfaces Dark Drab (119B), with diffuse spots and blotches of Vandyke Brown (221) and circular dirty white blotches with a suggestion of Pearl Gray (81); a dirty white middorsal stripe with a suggestion of Pearl Gray (81) interrupted by Sepia (119) blotches; a diffuse dirty white lateral stripe with a suggestion of Pearl Gray (81) extending from shoulder to groin; tail Beige (219D), except for its base, with broad Brussels Brown (121B) transverse bands and fine Sepia (119) mottling; a diffuse Vandyke Brown (221) pre- and postorbital stripe extending about 0.5 cm each anteriorly and posteriorly of orbit; ventral surfaces of body, limbs, and base of tail dirty white with a suggestion of Pearl Gray (81), with reticulate Dark Drab (119B) mottling; chin and gular region Flaxflower Blue (170C) with a suggestion of Light Sky Blue (168D), with reticulate Hair Brown (119A) mottling; iris Cinnamon (123A); throat Blackish Neutral Gray (82); tongue Cream Color (54); dewlap Poppy Red (108A) with circular Crimson (108) blotches between gorgetal rows; dewlap scales dirty white with a suggestion of Lavender Blue (170D). Color in preservative (70% ethanol) similar to color in life except for chin and gular region is dirty white.

Variation. The paratypes agree well with the holotype in general appearance, morphometrics, and scalation (see Table 1). The coloration in life of SMF 89508 was recorded as follows: Dorsal and lateral surfaces of body, limbs and anterior half of tail Smoke Gray (45) suffused with Cinnamon-Drab (219C), sparse Sepia (219) mottling and scattered flecks of dirty white with a suggestion of Pearl Gray (81); posterior half of tail Drab-Gray (119D) with broad Raw Sienna (136) transverse bands; ventral surfaces of body, limbs, and anterior half of tail dirty white with a suggestion of Opaline Green (162D); dorsal and lateral surfaces of

head Drab-Gray (119D) with Sepia (219) mottling on supraorbital semicircles, snout, and parietal region; ventral surface of head Light Sky Blue (168D) with Hair Brown (119A) spots on anterior half; dewlap Spectrum Red (11) with Carmine (8) blotches and dirty white scales.

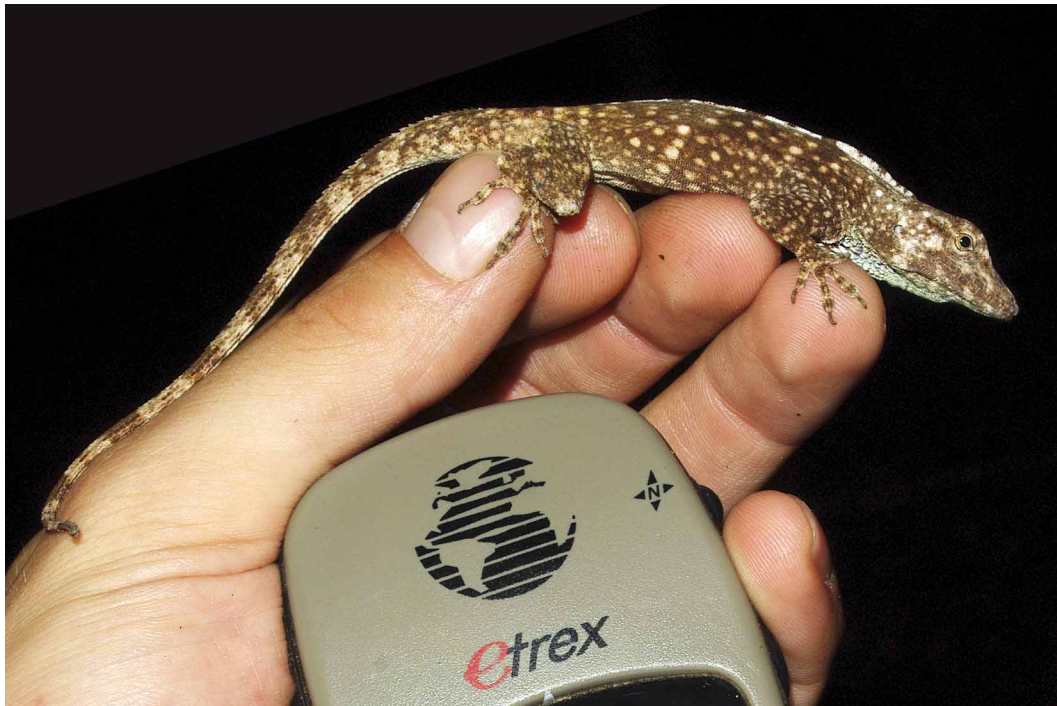


FIGURE 4. Holotype of *Anolis charlesmyersi* (SMF 89688) in life. SVL = 65.0 mm. Photo by S. Lotzkat.

Natural history notes. In the area of Hacienda Barú (near Dominical, Costa Rica) *Anolis charlesmyersi* appears to be fairly common, especially along the beach and flat areas where there are many *Terminalia catappa* trees (Almendro de playa) (R. Mason pers. communication 23 January 2009). This statement is also supported by the relative large number of specimens collected from this site (see Appendix I). However, I failed to detect this species during a two days stay at Hacienda Barú during the dry season in March 2009. Whether my lack of spotting this species indicates some kind of seasonality remains to be investigated. Barbour (1934:145) stated that *Anolis pentaprion* was “not uncommon in the Canal Zone during the rainy season, excessively rare during the dry months.” At the type locality near Los Algarrobos, Chiriquí, Panama, a similar seasonality seems to occur with several observations during a single search in the rainy season and none but the holotype during numerous searches at the peak of the dry season (Lotzkat pers. comm. Oct. 2009). The holotype was collected at 22:40 hours sleeping on a vertical twig of a small tree, about 2.5 m above the ground in relatively open secondary vegetation.

Geographic distribution. As currently understood, *Anolis charlesmyersi* is distributed along the lowlands of the Pacific versant in Costa Rica and western Panama (Fig. 3).

Etymology. The specific name is a patronym for my colleague Charles W. Myers in recognition of his important contributions to the herpetology of Lower Central America in general and to the understanding of the taxonomy and systematics of the anoles of the *pentaprion* group in particular.

Anolis beckeri Boulenger 1881

Anolis beckeri Boulenger, 1881:921; two syntypes, IRSNB 2010 (1–2), from “Yucatán.” Barbour (1934).

Anolis pentaprion: Stuart (1937; in part), Stuart (1948; in part), Myers (1971; in part), Meyer and Wilson (1973; in part); Fitch and Seigel (1984; in part), Lee (1996), Poe (2004; in part.).

Anolis pentaprion beckeri: Etheridge (1959), Stuart (1963).

Norops pentaprion: Köhler (2001; in part), McCranie *et al.* (2006; in part).

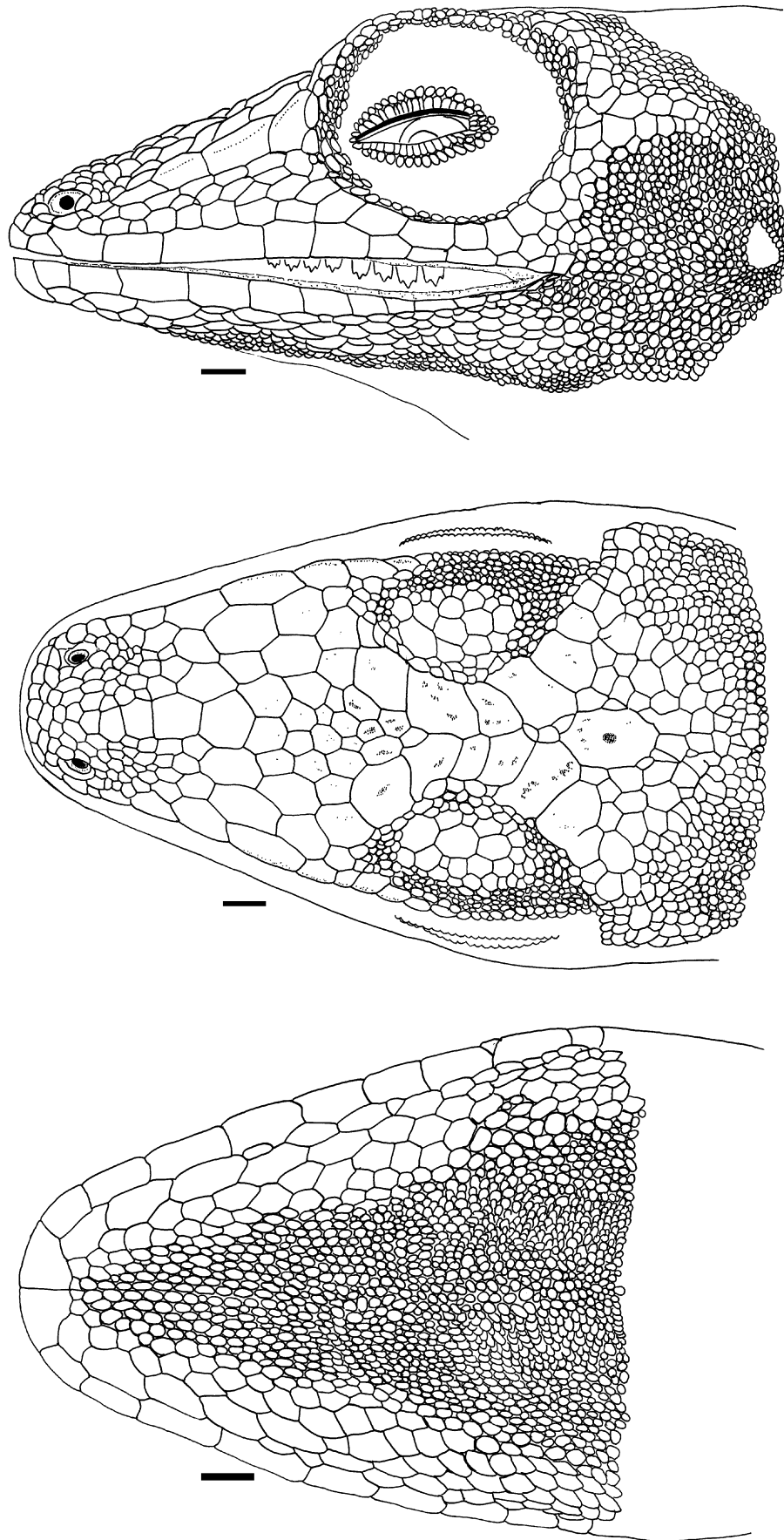


FIGURE 5. Head of holotype of *Anolis charlesmyersi* (SMF 89688). Scale bars equal 1.0 mm.

Diagnosis. A medium-sized species (SVL in largest specimen examined 60.6 mm in males, 55.4 mm in females) of the genus *Anolis* (sensu Poe, 2004) that differs from all Central American anoles except *A. charlesmyersi*, *A. cristifer*, *A. fungosus*, *A. pentaprion*, *A. salvini*, and *A. utilensis* by having (1) extremely short hind legs (fourth toe of adpressed hindlimb usually reaching to level of tympanum; ratio shank length / head length 0.49–0.84); (2) smooth, juxtaposed ventral scales; (3) a relatively short tail (ratio tail length / SVL 1.0–1.5). *Anolis beckeri* differs from *A. charlesmyersi* by having a pink dewlap in life with purple pigment between rows of gorgetal scales and regular rows of numerous small narrowly spaced gorgetal scales (versus a brick red dewlap with few large widely spaced gorgetal scales scattered across the dewlap). *Anolis beckeri* differs from *A. cristifer* by having a double row of slightly enlarged middorsal scales, not forming a serrated crest (versus a serrated middorsal crest, at least on posterior portion of dorsum, present in *A. cristifer*). *Anolis beckeri* differs from *A. fungosus* by lacking bony parietal protuberances (versus having a pair of small bony parietal protuberances posterior and lateral to interparietal plate). *Anolis beckeri* differs from *A. pentaprion* by lacking a pronounced serrated caudal crest (versus having a pronounced serrated caudal crest) and by having gorgetal rows with 4–10 widely spaced scales (versus gorgetal rows with 17–25 narrowly spaced scales). *Anolis beckeri* differs from *A. salvini* by having smooth, obliquely conical ventral scales (versus keeled), lacking a dark interorbital bar (versus present), and lacking enlarged postcloacal scales (versus males with a pair of greatly enlarged postcloacal scales). *Anolis beckeri* differs from *A. utilensis* by having the proximal subdigital scales of toes differentiated as slightly broadened lamellae (versus those scales granular).

Description. SVL 46.5–60.6 (51.0±5.0) mm in males, 38.0–55.4 (58.3±9.6) mm in females; for other morphometric data see Table 1; dorsal head scales in internasal, prefrontal, and frontal areas rugose; scales in parietal area rugose to smooth; shallow frontal and parietal depressions present; 5–8 postrostrals; anterior nasal divided, lower scale contacting rostral and first supralabial; 5–9 internasals; canthal ridge sharply defined; scales comprising supraorbital semicircles ridged, especially anterior ones, largest scale in semicircles larger than largest supraocular scale; supraorbital semicircles well defined; supraorbital semicircles broadly in contact with each other or separated by one scale at narrowest point; 1–3 scales separating supraorbital semicircles and interparietal at narrowest point; interparietal well defined, irregular in outline, longer than wide, larger than size of ear opening; about 4–11 enlarged, smooth to faintly keeled supraocular scales on each side, in 2–3 rows; enlarged supraoculars completely separated from supraorbital semicircles; three short superciliaries, posterior one shortest; usually 3 enlarged canthals; 6–14 scales between second canthals; 7–9 scales present between posterior canthals; loreal region slightly concave, 18–30 mostly smooth or rugose (some keeled) loreal scales in a maximum of 3–4 horizontal rows; 7–10 supralabials and 7–10 infralabials to level below center of eye; suboculars smooth to rugose, in broad contact with supralabials; ear opening vertically oval; scales anterior to ear opening slightly larger than those posterior to ear opening; 5–7 postmentals, outer pair largest; gular scales not keeled; male dewlap moderately large, extending to beyond level of axillae onto chest; male dewlap with 5–6 horizontal gorgetal-sternal scale rows, about 16–18 scales per row; female dewlap well developed, extending to level of axillae; female dewlap with 4–7 horizontal gorgetal-sternal scale rows, with about 9–15 scales per row; about 2 middorsal scale rows slightly enlarged, mostly smooth, dorsal scales lateral to middorsal series grading into granular lateral scales; no enlarged scales among granular laterals; lateral scales granular, slightly smaller than largest dorsal scales; about 95–104 dorsal scales along vertebral midline between levels of axillae and groin in males, about 84–123 in females; about 56–80 dorsal scales along vertebral midline contained in one head length in males, about 45–70 in females; ventral scales on midsection slightly larger than largest dorsal scales; ventral body scales smooth, obliquely conical, juxtaposed; about 67–86 ventral scales along midventral line between levels of axilla and groin in males, about 67–92 in females; about 34–60 ventral scales contained in one head length in males, about 34–60 in females; about 146–178 scales around midbody in males, about 130–178 in females; tubelike axillary pocket absent; precloacal scales not keeled; enlarged postcloacal scales absent; tail oval at about midlength; tail height/tail width 0.80–1.25; basal subcaudal scales smooth to faintly keeled; lateral caudal scales keeled, homogeneous, although an indistinct division in segments is discernible; dorsal medial caudal scale row enlarged, keeled, not forming a crest; 2 median subcaudal scale rows distinctly enlarged, keeled; most scales on lateral surface of antebrachium smooth; 18–32 subdigital lamellae on Phalanges II–IV

of Toe IV of hind limbs; 7–10 subdigital scales on Phalanx I of Toe IV of hind limbs; longest toe of adpressed hind limb usually reaching to shoulder region.

Geographic distribution: Along the Caribbean versant of Nuclear Central America from Tabasco, Mexico, to northern Nicaragua, including the southern portion of the Yucatán Peninsula.

Anolis pentaprion COPE 1862

Anolis pentaprion: Dunn (1930), Schmidt (1933), Barbour (1934), Gaige et al. (1937), Taylor (1956; in part.), Etheridge (1959; in part.), Myers (1971), Poe (2004; in part.).

Anolis panamensis BOULENGER, 1890:81; two syntypes BMNH 1946.8.13.7–8 from “Panama.”

Norops pentaprion: Köhler (2001; in part.).

Neotype designation. The holotype of *Anolis pentaprion*, supposedly designated to be deposited at USNM, is lost (Barbour 1934, Myers 1971). K.A. Tighe (pers. comm. 2 September 2009) wrote that “the holotype [of *Anolis pentaprion*] was apparently never returned to the USNM after Cope described it. There is an old lost type card in Cochran's handwriting that has the information from the original description, but no catalogue number.”

To avoid future uncertainties I herewith designate SMF 83608 as the neotype of *Anolis pentaprion* Cope. SMF 83608 was collected on 12 August 2009 by Johannes Köhler and Arne Schulze at San Rafael, ca. 15 km S Los Chiles, 10.73719°N, 84.49378°W, 60 m elevation, Alajuela Province, Costa Rica. Original field number JJK 182. SMF 83608 is an adult male as indicated by its partially everted hemipenes; SVL 61.0 mm; tail length 79.0 mm (tail complete); head length 15.4 mm; head width 9.5 mm; snout length 7.4 mm; ear length 0.8 mm; ear height 1.5 mm; interparietal length 1.3 mm; interparietal width 1.1 mm; axilla–groin–distance 26.0 mm; shank length 12.5 mm. Scallation characteristics of SMF 83608 are given in parentheses in the description below.

Diagnosis. A medium-sized species (SVL in largest specimen examined 77.0 mm in males, 74 mm in females) of the genus *Anolis* (sensu Poe, 2004) that differs from all Central American anoles except *A. beckeri*, *A. charlesmyersi*, *A. cristifer*, *A. fungosus*, *A. salvini*, *A. utilensis* by (1) having extremely short hind legs (fourth toe of adpressed hindlimb usually reaching to level of tympanum; ratio shank length / head length 0.49–0.84); (2) smooth, juxtaposed ventral scales; (3) a relatively short tail (ratio tail length / SVL 1.0–1.5). *Anolis pentaprion* differs from *A. beckeri* by having a pronounced serrated caudal crest (versus lacking a pronounced serrated caudal crest) and by having gorgetal rows with 17–25 narrowly spaced scales (versus gorgetal rows with 4–10 widely spaced scales). *Anolis pentaprion* differs from *A. charlesmyersi* by having a pink dewlap in life with purple pigment between rows of gorgetal scales and regular rows with 17–25 small narrowly spaced gorgetal scales (versus a brick red dewlap with few large widely spaced gorgetal scales scattered across the dewlap or in loosely arranged rows with 4–9 widely spaced scales). *Anolis pentaprion* differs from *A. cristifer* by having a double row of slightly enlarged middorsal scales, not forming a serrated crest (versus a serrated middorsal crest, at least on posterior portion of dorsum, present in *A. cristifer*). *Anolis pentaprion* differs from *A. fungosus* by lacking bony parietal protuberances (versus having a pair of small bony parietal protuberances posterior and lateral to interparietal plate). *Anolis pentaprion* differs from *A. salvini* by having smooth, obliquely conical ventral scales (versus keeled), lacking a dark interorbital bar (versus present), and lacking enlarged postcloacal scales (versus males with a pair of greatly enlarged postcloacal scales). *Anolis pentaprion* differs from *A. utilensis* by having the proximal subdigital scales of toes differentiated as slightly broadened lamellae (versus those scales granular) and by having a pronounced serrated caudal crest (versus lacking a pronounced serrated caudal crest).

Description. SVL 52.0–77.0 (62.6±5.7) mm in males, 46.0–64.0 (56.4±5.4) mm in females; for other morphometric data see Table 1; dorsal head scales in internasal, prefrontal, and frontal areas rugose; scales in parietal area rugose to smooth; shallow frontal and parietal depressions present; 5–8 postrostrals (7); anterior nasal divided, lower scale contacting rostral and first supralabial; 5–9 internasals (6); canthal ridge sharply defined; scales comprising supraorbital semicircles ridged, especially anterior ones, largest scale in

semicircles larger than largest supraocular scale; supraorbital semicircles well defined, broadly in contact with each other or separated by one scale at narrowest point (in contact); 1–4 scales separating supraorbital semicircles and interparietal at narrowest point (2); interparietal well defined, irregular in outline, longer than wide, larger than size of ear opening; about 6–16 enlarged, smooth to faintly keeled supraocular scales on each side (9), in 2–3 rows; enlarged supraoculars completely separated from supraorbital semicircles; three short superciliaries, posterior one shortest; usually 3 enlarged canthals; 5–9 scales between second canthals (8); 6–15 scales present between posterior canthals (6); loreal region slightly concave, 13–29 mostly smooth or rugose (some keeled) loreal scales (16) in a maximum of 3–6 horizontal rows (3); 7–10 supralabials (9) and 7–10 infralabials (9) to level below center of eye; suboculars smooth to rugose, in broad contact with supralabials; ear opening vertically oval; scales anterior to ear opening slightly larger than those posterior to ear opening; usually 6, occasionally 5 postmentals (6), outer pair largest; gular scales not keeled; male dewlap moderately large, extending to beyond level of axillae onto chest; male dewlap with 5–7 horizontal gorgetal-sternal scale rows, about 16–18 scales per row; female dewlap well developed, extending to level of axillae; female dewlap with 4–7 horizontal gorgetal-sternal scale rows, with about 9–15 scales per row; about 2 middorsal scale rows slightly enlarged, mostly smooth, dorsal scales lateral to middorsal series grading into granular lateral scales; no enlarged scales among granular laterals; lateral scales granular, slightly smaller than largest dorsal scales; about 73–108 dorsal scales along vertebral midline between levels of axillae and groin in males (73), about 88–110 in females; about 56–80 dorsal scales along vertebral midline contained in one head length in males (52), about 45–70 in females; ventral scales on midsection slightly larger than largest dorsal scales; ventral body scales smooth, obliquely conical, juxtaposed; about 67–86 ventral scales along midventral line between levels of axilla and groin in males (84), about 65–93 in females; about 34–62 ventral scales contained in one head length in males (44), about 36–52 in females; about 134–190 scales around midbody in males (154), about 136–162 in females; tubelike axillary pocket absent; precloacal scales not keeled; enlarged postcloacal scales absent; tail oval at about midlength; basal subcaudal scales smooth to faintly keeled; lateral caudal scales keeled, homogeneous, although an indistinct division in segments is discernible; dorsal medial caudal scale row enlarged, keeled, not forming a crest; 2 median subcaudal scale rows distinctly enlarged, keeled; most scales on lateral surface of antebrachium smooth; 29–33 subdigital lamellae on Phalanges II–IV of Toe IV of hind limbs (29); 6–9 subdigital scales on Phalanx I of Toe IV of hind limbs (6); longest toe of adpressed hind limb usually reaching to shoulder region.

The coloration in life of an adult male (SMF 80961) from Bartola, Department Río San Juan, Nicaragua, was recorded as follows: Dorsal and lateral surfaces of body, limbs and anterior half of tail Clay Color (123B) with Raw Umber (223) and Beige (219D) blotches; dorsal surface of head Cinnamon Drab (119C); dewlap Vinaceous (4) with rows of Magenta (2) blotches and dirty white scales. The coloration of the dewlap in life of another adult male (SMF 82100) from the same locality was recorded as Pink (7) with rows of Magenta (2) blotches and dirty white scales.

Geographic distribution: Along the Caribbean versant of Lower Central America from southern Nicaragua to northwestern Colombia; also on Pacific versant in central and eastern Panama.

A key to the species of anoles related to *Anolis pentaprion* from Central America

- 1 Scales along mid-dorsal surface of tail not forming a serrated crest (Fig. 1a) 2
- Scales along mid-dorsal surface of tail forming a serrated crest (Fig. 1b) 4
- 2 A pair of small bony parietal protuberances posterior and lateral to interparietal plate.....*Anolis fungosus*
- No bony parietal protuberances 3
- 3 Proximal subdigital scales of toes differentiated as slightly broadened lamellae; male dewlap with 5–6 horizontal gorgetal-sternal scale rows, about 16–18 scales per row *Anolis beckeri*
- Proximal subdigital scales of toes granular; male dewlap with 4–7 horizontal gorgetal-sternal scale rows, with about 7–9 scales per row *Anolis utilensis*
- 4 Ventrals keeled; a dark interorbital bar; males with enlarged postcloacal scales *Anolis salvini*
- Ventrals smooth; no dark interorbital bar; males without enlarged postcloacal scales 5
- 5 Adult males with a well-developed serrated mid-dorsal crest; SVL to 88 mm..... *Anolis cristifer*

- A double-row of slightly enlarged mid-dorsal scales; SVL to 78 mm 6
- 6 Dewlap of males and females pink with purple pigment between rows of gorgetals; male dewlap with numerous, narrowly spaced small gorgetal scales arranged in regular rows (Fig. 2b) *Anolis pentaprion*
- Dewlap of males and females brick red (in life) dewlap with few large, widely spaced gorgetal scales scattered across the dewlap (Fig. 2c) *Anolis charlesmyersi*

Discussion

Anolis pentaprion and *A. charlesmyersi* differ most notably from one another in coloration and scalation of the dewlap in both sexes. The anole dewlap is a conspicuous organ in almost all extant species of anoles and is used in courtship and territorial defense behavior. Dewlap size, coloration, and scalation are species specific traits, and the dewlap is regarded as important for species recognition (Fitch & Hillis 1984). Williams & Rand (1977) found a significant correlation between the complexity of a local anole fauna and the variation of dewlap coloration indicating that in places where numerous species occur the different dewlaps tend to be more diverse in coloration and very species-diagnostic. In most species of anoles, the females develop only a rudimentary gular appendage or no dewlap at all (Köhler 2008). An exception to this rule is the species related to *A. pentaprion*, all of which have large dewlaps in females. Therefore, both sexes of the new species described herein can be readily distinguished from *A. pentaprion* by dewlap color and morphology. Should the ranges of *A. pentaprion* and *A. charlesmyersi* meet (i.e., in Guanacaste, Costa Rica, and in eastern Chiriquí, Panama), the different dewlap coloration and scalation possibly might serve as a prezygotic isolation mechanism to prevent hybridization in the contact zones. However, additional field work is needed in order to reveal whether contact zones between these two species exist and if putative hybrids can be detected. Interestingly, the hemipenes of *A. charlesmyersi* and *A. pentaprion* look very much alike (see Figs. 6 and 7). In several other species pairs of mainland anoles, distinct differences were documented in hemipenial morphology (e.g., Köhler & Sunyer 2008, Köhler 2009).

Anolis charlesmyersi belongs to an assemblage of species that has a restricted range along the Pacific versant of Costa Rica and western Panama. Other lizard species in this assemblage include *Ameiva leptophrys*, *Anolis aquaticus*, *A. polylepis*, *Bachia blairi*, *Coloptychon rhombifer*, *Lepidophyma reticulatum*, *Neusticurus apodemus*, and *Sphaerodactylus graptolaemus* (Savage 2002). This assemblage corresponds to the Southwest Pacific unit of Savage (2002), which he characterized as humid and perhumid with Lowland Moist and Wet Forests (sea level to about 600 m elevation).

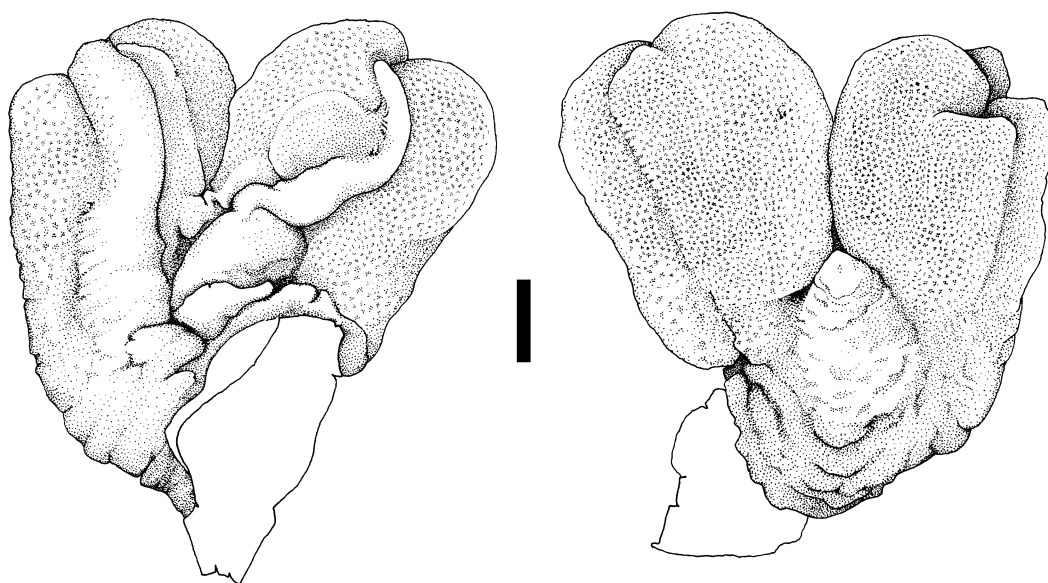


FIGURE 6. Hemipenis of *Anolis charlesmyersi* (SMF 89353). (A) sulcate view; (B) asulcate view. Scale bar equals 1.0 mm.

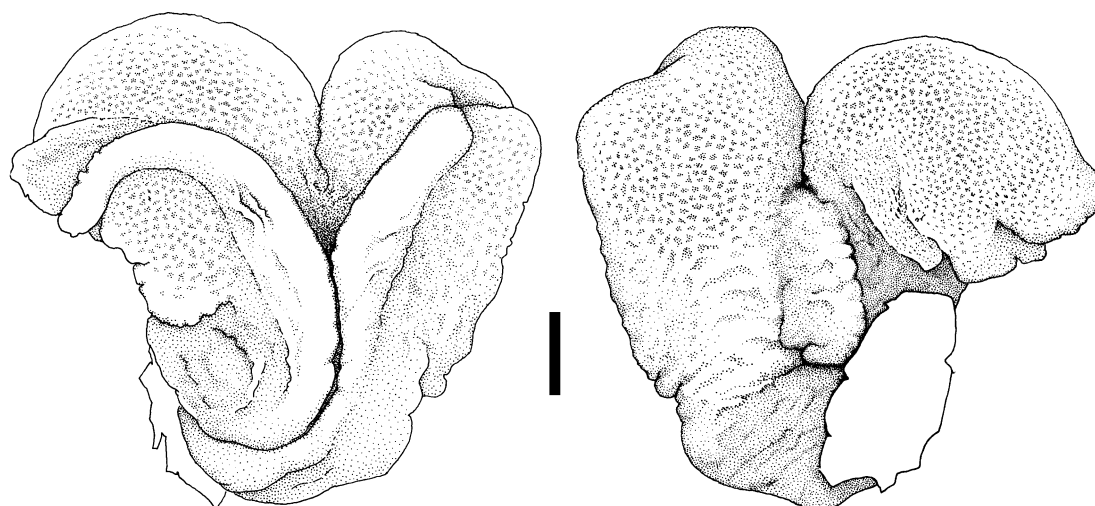


FIGURE 7. Hemipenis of *Anolis pentaprion* (SMF 83163). (A) sulcate view; (B) asulcate view. Scale bar equals 1.0 mm.

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Appendix. Comparative material examined

Anolis beckeri—**Belize**: Cayo: Five Sister Lodge; 16 mi S on Caracol Rd. then W 2 mi: Poe field number 1217, 1183–84; San Ignacio, 12 mi SW of, Xunantunich ruins: USNM 220398. **Guatemala**: Chiquimula: Ceiba: UMMZ 79081; Izabal: Morales, Sierra de Caral, Camino Quebradas-La Firmeza: UTA R39784; Fronteras: Puente de Río Dulce: UVG 452; El Petén: Parque Nacional Tikal: UF 13773, 24616, UMMZ 117822; Flores, Carretera de Yaxha a Nakum: UVG 1355. **Honduras**: Atlántida: Guaymas District [=an old United Fruit Company Plantation located 40 km WSW of Tela at 10 m elev., 15°43'N, 87°48'W], UMMZ 58392–95; Lancetilla, MCZ 38835; Colón: mountains just S of Trujillo: CM 64619; Salamá, 15°00'N, 86°50'W: USNM 242056; Cerro Calentura, LSUMZ 33678; Gracias a Dios: Palacios, BMNH 1985.1121; Olancho: Montana del Ecuador, 15°07'N, 86°42'W, 1400 m: USNM 344805. **Mexico**: Campeche: 24 Km N X-Pujil, Entrada a “El Papagayo”: ECOCHH 0559; Zona Arqueológica de Calakmul: ECOCHH 0835; 64 Km N X-Pujil, Km 2.5 on road to Rancho San Isidro: ECOCHH 0964; Chiapas: Cascadas de Agua Azul: MZFC 489; Zona Arqueológica de Yaxchilán, Ocosingo: MZFC 12207; Rancho Alejandria, 6 km SE Estación Juárez, Municipio Juárez, 60 m: IHNHERP 559, 652; Reforma Agracia, Zona Marques de Camillas, Ocosingo: MZ-UNICACH 241; Palenque: MCZ 93676–77, USNM 136491; San Juanito: UIMNH 37067–90, USNM 136492–516; Lake near Acacoyagua: USNM 136490; Quintana Roo: Chetumal:

ECOCHH 1437; 1 Km N de Nuevo Becal, Aguada: ECOCHH 1417; Ejido Tres Garantías: ECOCHH 2311-12; Tres Garantías Aguadas Burgos: ECOCHH 2273; Veracruz: Las Choapas, Colonia Bateria Los Soldados: MZFC 16574; Yucatán: no specific locality: IRSNB 2010 (1–2).

Anolis charlesmyersi—**Costa Rica**: Alajuela: Balsa: UCR 12422; Hwy 3 between Atenas and Coyolar: SMF 89353; Guanacaste: Finca La Pacifica, 4 km NW Cañas: LACM 148372, 148377; Finca La Pacifica, Río Corobici (margin): LACM 148393; Río Sandillal at Interamerican Highway: LACM 148386, 148392, 148394; Sta. Rosa, Mirador Valle Naranjo: UCR 14642; Vieja Tronadora: UCR 2903; Pueblo Viejo: UCR 14931; Casona at Santa Rosa, 300 m: UCR 18022; Puntarenas: 3.5 mi SW Rincón: UF 135769; 4.5 km W Rincón de Osa: KU 102418; Aguabuena: UCR 4950, 11755; ca. 1.5 km SW of Rincón de Osa, Osa Tropical Science Center.: USNM 219557–60; Dos Bocas, Fila San Andrés: UCR 14565; EB Marengo: UCR 15117; Golfito: UCR 12245, 14227, 18315; Guapil, near Dominical, 100 m: POE field number 2266, 2616–17; Hacienda Barú: UCR 2438, 14316–18, 14774; La Gamba, Esquinas Lodge: UCR 12698; Palmar: KU 34254–55; Península de Osa, Golfo Dulce, Puerto Jiménez, jardín at Jiménez Yacht Club: SMF 81506; Pl. Palma: UCR 13599; Punta Mala: UCR 11012; Rincón de Osa: UCR 2542, 5279; Tres Piedras: UCR 15916; Hatillo: Sabina's: POE field number 2563; 5 km NW of Río Salena Nuevo on Hwy 2: LACM 148379; San Jose: Near Piedras Negras, Río Virilla Crossing, 490 m: POE field number 2224; Alto Palma: UCR 11121; Brasil: UCR 7467; C. Chirripó, Llano Bonito: UCR 11942. **Panama**: Chiriquí: Los Algarrobos: Weg zum Río Majagua: SL 176–177; Universidad Autonoma de Chiriquí, David: SMF 85056–57; Chiriquí or Veraguas: E of David (along PanAm; 20–100 km E of David): POE field number 1449–51.

Anolis cristifer—**Guatemala**: Quetzaltenango: El Palmar, Palajunoj, Finca El Patrocinio: SMF 82593; San Marcos: Hacienda California: MCZ 29771; Suchitepequez: Mazatenango: CAS 68214–15; Volcán Zunil: CAS 68216.

Anolis pentaprion—**Costa Rica**: Cartago: 5 km SE Turrialba: UF 15946; 8 km W, 13 km N Turrialba: KU 67070; Santa Rosa de Turrialba: LACM 148397; Turrialba, CATIE, R. Reventazón: UCR 4999; Turrialba, IICA: LACM 148376, 148378; Heredia: 10 km S Puerto Viejo: LSUMZ 53173; 3 km SE Puerto Viejo: UF 31055, 31078–79, 31091, 31110–12, 31160–62; Río Frio, Standard Fruit Company: UF 30804, 30810, 30907, 30943–47, 31044–46, 31304, 31552, 31592, 31665, 32353; Sarapiquí: AMNH 16354; Limon: Pandora: MCZ 78389; Alto de Guayacán: UCR 14574; Colombiana: USNM 67349; San Miguel: UCR 12870. **Nicaragua**: Atlántico Sur: Río Siquia, 7 miles above Rama: UMMZ 79825; Granada: Volcán Mombacho: Photo provided by Eric van den Berghe; Río San Juan: Bartola: SMF 80961, 82100; Machuca: ANSP 7911; Río El Chanco, 5–6 km above junction with Río San Juan: SMF 83163; Rivas: Ometepe: Photo provided by S. Robleto. **Panama**: Bocas del Toro: 13.8 km S of turnoff to Almirante (14.5 km N of province boundary), Fortuna road, 235 m: POE field number 1855; Cerro Brujo, western portion of Laguna de Chiriquí: SMF 85058; hill behind Chiriquí Grande: AMNH 123262; Bocas del Toro: Isla Colon, N of mouth of Big Creek: USNM 347921; Isla Cristobal, Bocatorito camp: USNM 348211–12; Isla Popa, 1 km SE of Deer Island channel: USNM 298136; Laguna de Tierra Oscura, 3.7 km S of Tiger Key: USNM 348481; N of Fortuna, Caribbean slope: POE field number 1522; vicinity of Almirante: ANSP 34059; Coclé: between El Copé town and park entrance (creek crossing), 500 m: POE field number 1442; between El Copé town and park entrance (creek crossing), 500 m: POE field number 1443; N of El Copé town, 500 m: POE field number 1537; Colón: Buena Vista: UF 102012–13; Canal Zone, Margarita: CM 22978; Viento Frio: USNM 48539; Los Santos: Los Santos: USNM 148221; Panamá: 8 km NNW Chepo, Madrona: UF 102000; Arraijan: USNM 163503; Balboa: AMNH 42926; Barro Colorado Island: AMNH 75987; ANSP 24540–42, KU 75960; Chilibre: UF 102001–02, 102004–05; Comunidad Embera, along Río Maje near Lake Bayamo, 305 m: POE field number 1655; El Aguacate: UF 102003, 102006–11, 102014; int. of Pan American Hway and 'Nusagandi' road; 1km W of El Llano: POE field number 1556; near Aguacate, Cerro Trinidad: AMNH 103231; near Fort Clayton Reservation: UIMNH 42177–78, 42185; USNM 15131, 53888; Panama Viejo: KU 75959; Río Masambí: Photo Cesar Jaramillo; San José Island: USNM 120572–83; Veraguas: Bahía Honda: AMNH 62773.

Anolis fungosus—**Panama**: Bocas del Toro: upper watershed of Río Changena, north slopes of Cerro Pando, 1450 m: KU 113451; Chiriquí: Quebrada Arena, 8°43'04.7"N, 82°13'42.1"W, Reserva Forestal de Fortuna, 1074 m: SMF 86385.

Anolis salvini—**Panama**: Chiriquí: 4 km W Cerro Punta, 1829 m, AMNH 69621; Bambito, 6 mi S Cerro Punta, USNM 203831; ca. 4 km W Cerro Punta, ca. 6000 ft, AMNH 69621; above Boquete, ZFMK 27609–11; Pelo Santo, 4 mi NW El Volcán, 4600 ft, ANSP 26287; Cerro Jurutungo, 8°54'30.5"N, 82°43'22.4"W, 1860 m, SMF 85451–52; Cerro La Pelota, 8°49'51"N, 82°36'50"W, 1580–1640 m, SMF 85453–57.

Anolis utilensis—**Honduras**: Islas de la Bahía: Isla de Utila, 2 km NNE of Utila, SMF 77051–55, 77983, 79364–65, 79866.