

## FOUR NEW SPECIES OF ANOLES (GENUS *ANOLIS*) FROM THE SERRANÍA DE TABASARÁ, WEST-CENTRAL PANAMA (SQUAMATA: POLYCHROTIDAE)

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**ABSTRACT:** We describe four new species of anoles (genus *Anolis*) from the Serranía de Tabasará, west-central Panama. Two of the new species are most similar in external morphology to a cluster of Central American species that are short-legged (fourth toe of adpressed hindlimb reaches only to tympanum), have a single elongated prenasal scale, smooth ventral scales, and slender habitus, often delicate. They differ from the other species in this cluster by hemipenial morphology and scalation characteristics. One of the new species appears to be most similar to *A. pachypus* and *A. tropidolepis* from which it differs by male dewlap coloration and its very small dorsal head scales. The fourth new species appears to be most similar to *A. laevis* from which it differs by its multicarinate head scales, lack of heterogeneous flank scalation, and an overall green coloration.

**Key words:** *Anolis*; New species; Panama; Polychrotidae; Reptilia; Squamata

PANAMA is known for its great climatic and topographical diversity (Myers and Duellman, 1982), which, in spite of its small size, (77,082 km<sup>2</sup>) includes one of the most diverse and abundant herpetofauna of any Central American country (Ibañez et al., 2001; Martínez and Rodríguez, 1992). The highlands between Costa Rica and Panama are considered one of the most important herpetofaunal diversity hotspots in Central America, with a high number of endemic species (Campbell, 1999; Savage, 1966; Savage, 2002; Wake, 2005). The eastern portion of these highlands corresponds to the “Serranía de Tabasará”, which has been poorly explored biologically. Some herpetological collections are now available from some portions of this mountain range, including Cerro Colorado (Myers, 1969; Myers and Duellman, 1982), Cerro Tute, Cerro Narices, Cerro La Anselma (Martínez and Rodríguez, 1992; Martínez et al., 1994) and from the region of La Nevera, 2 km east of Cerro Colorado (Batista and Ponce, 2002).

The Serranía de Tabasará reaches to slightly higher than 2000 m above sea level and is relatively isolated from other highlands by intervening areas of about 1000 m above sea level. The Pacific slope of this mountain range

is characterized by severe human intervention resulting in about 90% of its surface having been converted into farm land, pasture and secondary forest (CGNB-PAN-ANAM-GTZ, 2001). The Atlantic slope still supports large areas of primary cloud forest interrupted only by a growing number of agricultural patches (Batista and Ponce, 2002).

Thirty-one species of the genus *Anolis* are known to occur in Panama, eleven of which are restricted to the highlands of lower Central America (i.e., *A. aquaticus*, *A. altae*, *A. casildae*, *A. exul*, *A. fungosus*, *A. fortunensis*, *A. microtus*, *A. pachypus*, *A. tropidolepis*, *A. vociferans* and *A. woodi*) (Köhler, 2003). Even against this background we were initially surprised to encounter four undescribed species of anoles within a 24 h period at a cloud forest site in the Serranía de Tabasará in January 2006. Nevertheless, comparisons with the known species of *Anolis* from Mexico and Central America demonstrated that these lizards represent four undescribed species. The purpose of the present paper is to describe these new species.

### MATERIALS AND METHODS

A list of the comparative specimens examined is provided in the Appendix. Abbreviations for museum collections follow those of Leviton et al. (1985) except MHCH (Museo

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FIG. 1.—Male holotype of *Anolis gruuo* (SMF 85416) in life, SVL 47.0 mm.

Herpetologica de Chiriquí, David, Chiriquí, Panama), MVUP (Museo de Vertebrados, Universidad de Panamá, Panama City, Panama) and MZ-ICACH (Museo Zoológico de la Universidad de Ciencias y Artes del Estado de Chiapas, Tuxtla Gutiérrez, Chiapas, Mexico). Nomenclature of scale characters follows that of Köhler (2003). 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 4th toe. We 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 SVL (snout–vent length), HL (head length), HW (head width), SS (supraorbital semicircles), IP (interparietal plate), SO (subocular scales), SPL (supralabial scales), and INL (infralabials). We follow Hulebak and Poe (in press) in regarding *A. pandoensis* Savage and Guyer to be a junior synonym of *A. kemptoni* Dunn.

#### SYSTEMATICS

##### *Anolis gruuo* sp. nov.

*Holotype* (Fig. 1).—SMF 85416, an adult male from near the headwaters of Río San Félix, ca. 2 km N Escopeta Camp, ca. 8° 32' N, 81° 50' W, Serranía de Tabasará, 900 m elevation, Comarca Ngöbe Bugle, Distrito de Nole Diiima, Corregimiento de Jadeberi, Panama. Collected 22 January 2006 by Abel A. Batista R. and Marcos Ponce. Field tag number GK 1607.

*Paratypes*.—SMF 85417 (adult female) SMF 85418 (adult male) and 85419 (subadult male), same collecting data as holotype.

*Diagnosis*.—A medium-sized species (snout–vent length [SVL] in largest specimen 47.0 mm) of the genus *Anolis* (sensu Poe, 2004) that is most similar in external morphology to a cluster of Central American species that are short-legged (longest toe of adpressed hindlimb reaches only to tympanum), have a single elongated prenasal scale, smooth ventral scales, and slender habitus, often delicate (i.e., *Anolis altae*, *A. carpenteri*, *A. exsul*, *A. fortunensis*, *A. fuscoauratus*, *A. kemptoni*). *Anolis gruuo* differs from the species in this cluster by the following characteristics (condition for *A. gruuo* in parentheses): *Anolis altae*: 134–154, mean 141.0, scales around midbody (116–132, mean 126.0), ratio tail length / SVL 1.80–2.22, mean 2.01 (1.70–1.76, mean 1.73); tail not conspicuously contrastingly dark and pale banded (contrasting banding present); no dewlap in females (a small orange dewlap in females). *Anolis carpenteri*: tail not conspicuously contrastingly dark and pale banded (contrasting banding present); dorsal coloration with a greenish cast in life (no greenish cast in life); no dewlap in females (a small orange dewlap in females). *Anolis exsul*: hemipenis unilobate (bilobate); male dewlap orange at base with cherry red margin (male dewlap orange); a small white dewlap in females (a small orange dewlap in females); no enlarged postanal scales in males (distinctly enlarged). *Anolis fortunensis*: hemipenis unilobate (bilobate); male dewlap yellowish orange at base with orange red margin (male dewlap orange). *Anolis fuscoauratus*: male dewlap pinkish-brown to red (orange); no dewlap in females (a small orange dewlap in females); no enlarged postanal scales in males (distinctly enlarged). *Anolis kemptoni*: hemipenis unilobate (bilobate); dewlap in females white (orange); male dewlap bicolored: posterior portion rose pink, anterior portion orange (male dewlap orange).

*Description of the holotype*.—Adult male as indicated by everted hemipenes; SVL 47.0 mm; tail length 83.0 mm, tail complete; tail slightly compressed in cross section, tail height 2.2 mm, tail width 1.8 mm; axilla to groin distance 21.8 mm; head length 13.0 mm, head length/SVL ratio 0.28; snout length 6.1 mm; head width 7.7 mm; longest toe of

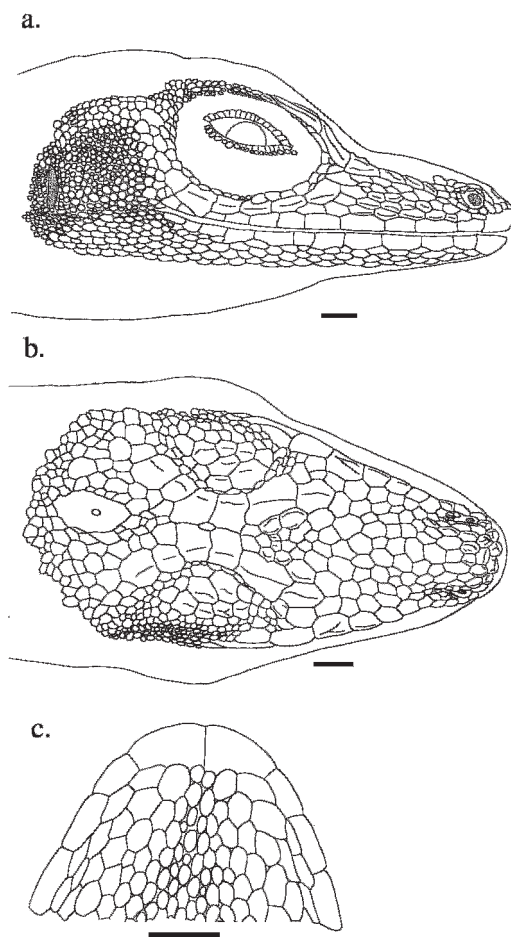


FIG. 2.—Head of holotype of *Anolis gruuo* (SMF 85416). (a) lateral view; (b) dorsal view; (c) ventral view. Scale bars equal 1.0 mm.

adpressed hind limb reaching to a point between tympanum and eye; shank length 11.6 mm, shank length/head length ratio 0.89; longest finger of extended forelimb reaching tip of snout; longest finger of adpressed forelimb not reaching anterior insertion of hind limbs. Scales on snout keeled (Fig. 2); 9 postrostrals; 8 scales between nasals; 3 prenasals, the lowest one in contact with rostral; scales in distinct prefrontal depression slightly tuberculate; supraorbital semicircles well developed, two scales of each semicircle medially in broad contact; supraorbital disc composed of 10–12 distinctly enlarged keeled scales; circumorbital row almost complete, therefore, enlarged supraorbitals only narrow-

ly in contact with supraorbital semicircles; a single large elongated superciliary; 3–4 rows of small keeled scales extending between enlarged supraorbitals and superciliaries; no parietal depression present; interparietal scale well developed,  $1.8 \times 0.9$  mm (length  $\times$  width), surrounded by scales of moderate to large size; 2 scales present between interparietal and supraorbital semicircles; canthal ridge distinct, composed of 5 large (posterior one largest) and 3 small anterior canthal scales; 7 scales present between second canthals; 10 scales present between posterior canthals; 29 (right)–28 (left) keeled loreal scales in a maximum of 5 horizontal rows; 6 keeled subocular scales arranged in a single row; 8 (right)–9 (left) supralabials to level below center of eye; 4 suboculars broadly in contact with supralabials; ear opening  $0.6 \times 1.2$  mm (length  $\times$  height); mental distinctly wider than long, completely divided medially, bordered posteriorly by 6 postmentals (outer pair larger); 9 (right)–10 (left) infralabials to level below center of eye; sublabials undifferentiated; smooth granular scales present on chin and throat; dewlap extending from level below oral ricti to a point about 2 mm posterior to level of axilla; dorsum of body with weakly keeled scales with rounded posterior margins, 2–4 medial rows slightly enlarged, largest dorsal scales about  $0.29 \times 0.20$  mm (length  $\times$  width); about 51 medial dorsal scales in one head length; about 95 medial dorsal scales between axilla and groin; lateral scales homogeneous, average size 0.2 mm in diameter; ventrals at midbody smooth, slightly bulging, non-imbricate, about  $0.30 \times 0.25$  mm (length  $\times$  width); about 43 ventral scales in one head length; about 72 ventral scales between axilla and groin; 119 scales around midbody; caudal scales strongly keeled except at base of tail; caudal middorsal scales slightly enlarged, without whorls of enlarged scales, although an indistinct division in segments is discernible; a pair of enlarged postanal scales present, about 0.7 mm wide (Fig. 3); no tube-like axillary pocket present; limb scales keeled, imbricate; largest scales on dorsal surface of forelimb about  $0.40 \times 0.35$  mm (length  $\times$  width); digital pads dilated; distal phalanx narrower than and raised from dilated pad; 22 (right)–23 (left) lamellae

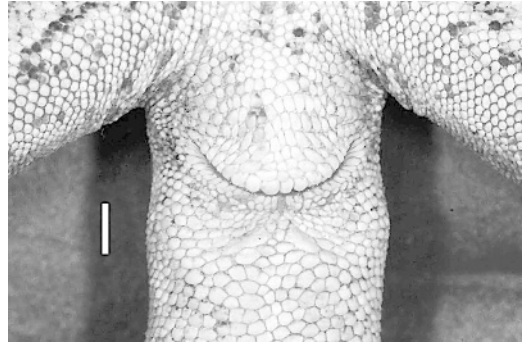


FIG. 3.—View of cloacal region of holotype of *Anolis gruu* (SMF 85416); photo was taken before eversion of hemipenes.

under phalanges ii–iv of fourth toe; 9 scales under distal phalanx of fourth toe.

The completely everted hemipenis is a medium-sized bilobate organ; sulcus spermaticus bordered by well developed sulcal lips and bifurcating at base of apex; the branches of the sulcus spermaticus continue to tips of lobes, bordered by well developed sulcal lips; surface of apex and distal truncus strongly calyculate, base of truncus with transverse folds; no asulcate processus present.

*Coloration in life.*—Dorsal ground color Light Drab (color 119C in Smithe 1975–1981) suffused with Hair Brown (119A); dorsal surface of head Light Drab (119C); chin white with Warm Sepia (221A) flecks; venter dirty white with Dark Drab (119B) mottling, more intensive towards the sides; tail Drab Gray (119D) with contrasting transverse Fuscous (21) bands; iris Robin Rufous (340); dewlap Spectrum Orange (17) grading into Chrome Orange (16) anteriorly, gorgetals Grayish Brown (20).

*Variation.*—The paratypes agrees well with the holotype in general appearance, morphometrics and scalation (see Table 1). The female paratype has a small dewlap. The coloration in life of the female paratype (SMF 85417) was recorded as: Dorsal ground color Tawny Olive (223D) suffused with Raw Umber (123); dorsal surface of head Light Drab (119C) with a Prout's Brown (121A) interorbital bar; chin white with Tawny Olive (223D) flecks; venter dirty white with Dark Drab (119B) mottling on lateral venter;



TABLE 1.—Selected measurements, proportions and scale characters of *Anolis gruuo*, *A. pseudopachyippus*, *A. pseudokemptoni*, *A. datzorrum*. Range is followed by mean value and one standard deviation in parentheses. For abbreviations see text. Morphometric data were only taken from adults.

	<i>A. gruuo</i>		<i>A. pseudokemptoni</i>		<i>A. pseudopachyippus</i>		<i>A. datzorrum</i>	
	♂	♀	♂	♀	♂	♀	♂	♀
Maximum SVL	47.0		54.5		46.5		43.0	
	males		females		females		females	
Tail length/SVL	43.0		55.0		48.0		49.0	
	males		females		females		females	
Tail diameter vertical/horizontal	1.76		1.82		1.76–2.05	(1.91 ± 0.11)	1.53	
	females		females		1.10–1.21	(1.17 ± 0.05)	1.39–1.73	(1.58 ± 0.16)
	1.70		1.73		1.04–1.18	(1.10 ± 0.05)	1.61	
	males		females		0.39–0.46	(0.43 ± 0.02)	1.17–1.38	(1.27 ± 0.08)
Axilla–groin distance/SVL	1.13–1.25	(1.18 ± 0.05)	1.19–1.40	(1.29 ± 0.15)	0.45–0.46	(0.45 ± 0.01)	0.44	
	males		females		0.47		0.28	
	0.41–0.46	(0.44 ± 0.03)	0.25–0.27	(0.26 ± 0.01)	0.25–0.27	(0.26 ± 0.01)	0.43–0.45	(0.44 ± 0.01)
	females		females		0.26		0.28	
HL/SVL	0.42		0.26		0.24–0.27	(0.25 ± 0.01)	0.26–0.28	(0.27 ± 0.01)
	males		females		1.45–1.56	(1.48 ± 0.04)	1.53	
HL/HW	1.63–1.67	(1.65 ± 0.02)	1.83–1.85	(1.84 ± 0.01)	1.48–1.62	(1.55 ± 0.06)	1.55–1.67	(1.60 ± 0.06)
	males		females		1.85		0.14	
Snout length/SVL	1.67		0.12–0.13	(0.13 ± 0.01)	0.10–0.12	(0.11 ± 0.01)	0.12–0.13	(0.12 ± 0.01)
	males		females		0.13		0.50	
Snout length/HL	0.13		0.47–0.51	(0.49 ± 0.03)	0.39–0.45	(0.42 ± 0.02)	0.43–0.49	(0.47 ± 0.02)
	males		females		0.49		0.23	
Shank length/SVL	0.48–0.52	(0.50 ± 0.02)	0.21–0.22	(0.21 ± 0.01)	0.28–0.31	(0.30 ± 0.01)	0.21–0.23	(0.22 ± 0.01)
	males		females		0.21		0.81	
Shank length/HL	0.22–0.24	(0.23 ± 0.01)	0.80–0.86	(0.83 ± 0.04)	1.13–1.27	(1.18 ± 0.04)	0.74–0.85	(0.78 ± 0.05)
	males		females		0.85		21–29	(25.16 ± 3.60)
	0.82–0.91	(0.88 ± 0.05)	22–25	(23.00 ± 1.41)	21–25	(22.03 ± 1.24)	21–29	(25.16 ± 3.60)
Subdigital lamellae of 4th toe	22–25	(23.00 ± 1.41)	24–28	(25.33 ± 2.31)	21–25	(22.03 ± 1.24)	21–29	(25.16 ± 3.60)
Number of scales between SS	0–1	(0.75 ± 0.96)	1		6–9	(7.30 ± 1.25)	0–1	(0.50 ± 0.54)
Number of scales between IP and SS	1–3	(2.00 ± 0.82)	2–3	(2.33 ± 0.58)	7–12	(8.64 ± 1.45)	1–2	(1.50 ± 0.54)
Number of scales between SO and SPL	0		0		0–1	(0.47 ± 0.52)	0	
Number of SPL to level below center of eye	8		7		6–8	(7.13 ± 0.64)	6–7	(6.5 ± 0.55)
Number of INL to level below center of eye	7–9	(7.75 ± 0.96)	7–9	(8.33 ± 1.15)	6–9	(7.86 ± 0.95)	5–8	(6.33 ± 1.21)
Total number of loreals	26–47	(34.75 ± 9.39)	75–88	(81.33 ± 6.51)	30–90	(62.53 ± 15.97)	28–50	(36.50 ± 7.84)
Number of horizontal loreal scale rows	4–6	(5.00 ± 0.82)	8–9	(8.33 ± 0.58)	5–9	(7.13 ± 1.06)	5–7	(5.36 ± 0.63)
Number of postrostrals	7–9	(7.75 ± 0.96)	7–8	(7.33 ± 0.58)	6–9	(7.02 ± 0.80)	5–9	(6.50 ± 1.37)
Number of postmentals	6		4–6	(5.33 ± 1.15)	6–7	(6.36 ± 0.50)	4–6	(5.33 ± 1.03)
Number of scales between nasals	7–8	(7.25 ± 0.50)	7–8	(7.67 ± 0.58)	8–11	(9.13 ± 0.92)	8–9	(8.33 ± 0.51)
Number of scales between 2nd canthals	7–9	(8.25 ± 0.96)	10		15–21	(17.14 ± 2.11)	5–8	(7.16 ± 1.17)
Number of scales between posterior canthals	9–10	(9.50 ± 0.58)	10–11	(10.33 ± 0.58)	16–22	(19.07 ± 1.86)	6–9	(7.83 ± 1.17)
Number of medial dorsal scales in one head length	52–58	(55.33 ± 3.06)	56–58	(56.67 ± 1.15)	42–54	(44.93 ± 3.28)	48–58	(52.66 ± 3.92)
Number of ventral scales in one head length	38–44	(40.50 ± 2.52)	40–52	(45.33 ± 6.11)	28–44	(33.73 ± 3.99)	32–50	(44.00 ± 6.81)



FIG. 4.—Male holotype of *Anolis pseudokemptoni* (SMF 85420) in life, SVL 54.0 mm.

dewlap Burnt Orange (116) with dirty white gorgetals.

*Etymology*.—The name *gruuo* is used as a noun in apposition and refers to the local name (“gruuo”) used by the Ngöbe indians for small lizards that have a dewlap (i.e., anoles). The species is currently known only from within the territory of the Ngöbe indios in the Serranía de Tabasará.

*Natural history notes*.—All specimens were collected active during the day in a shade coffee plantation. One of the adults was spotted on a tree (Lauraceae), 5–6 m above the ground, whereas most of the other specimens were collected on a citrus tree about 5 m above the ground. One juvenile was collected on a coffee tree 1 m above the ground.

*Anolis pseudokemptoni* sp. nov.

*Holotype* (Fig. 4).—SMF 85420, an adult male from La Nevera, 8° 29' 45" N, 81° 46' 35" W, 1600 m elevation, Serranía de Tabasará, Comarca Ngöbe Bugle, Distrito de Nole Düüma, Corregimiento de Jadeberi, Panama. Collected 22 January 2006 by Abel Batista,

Gunther Köhler, Marcos Ponce and Javier Sunyer. Field tag number GK 1578.

*Paratypes*.—SMF 85421, an adult female with the same collecting data as holotype. SMF 85422, an adult male from La Nevera, along dirt road, 1630 m elevation, Serranía de Tabasará, Comarca Ngöbe Bugle, Distrito de Nole Düüma, Corregimiento de Jadeberi, Panama. Collected 22 January 2006 by Abel Batista and Marcos Ponce.

*Diagnosis*.—A medium-sized species (snout–vent length [SVL] in largest specimen 54.0 mm) of the genus *Anolis* (sensu Poe, 2004) that is most similar in external morphology to a cluster of Central American species that are short-legged (longest toe of adpressed hindlimb reaches only to tympanum), have a single elongated prenasal scale, smooth to slightly keeled ventral scales, and slender habitus, often delicate (i.e., *Anolis altae*, *A. carpenteri*, *A. exsul*, *A. fortunensis*, *A. fuscoauratus*, *A. gruuo*, and *A. kemptoni*). *Anolis pseudokemptoni* differs from the species in this cluster by the following characteristics (condition for *A. pseudokemptoni* in parentheses): *Anolis altae*: male dewlap uniform dull orange (male dewlap tricolored:

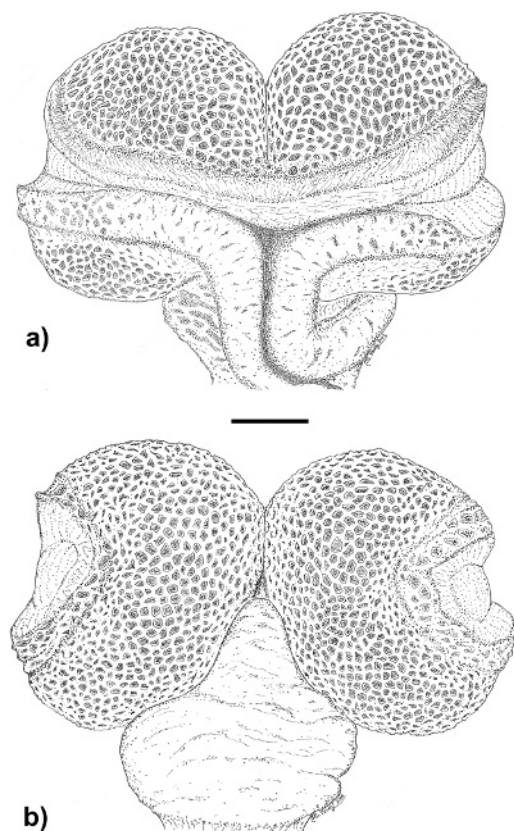


FIG. 5.—Hemipenis of *Anolis pseudokemptoni* (SMF 85420). (a) sulcate view; (b) asulcate view. Scale bar equals 1.0 mm.

posterior portion vinaceous, anterior portion orange, anterodorsal corner chamois); no dewlap in females (a small orange dewlap in females). *Anolis carpenteri*: male dewlap orange (male dewlap tricolored: posterior portion vinaceous, anterior portion orange, anterodorsal corner chamois); no dewlap in females (a small orange dewlap in females). *Anolis gruuo*: ratio HL/HW 1.63–1.67 (1.83–1.85); male dewlap orange (male dewlap tricolored: posterior portion vinaceous, anterior portion orange, anterodorsal corner chamois); tail contrastingly dark and pale banded (no contrasting banding). *Anolis exsul*: hemipenis unilobate (bilobate); male dewlap orange at base with cherry red margin (male dewlap tricolored: posterior portion vinaceous, anterior portion orange, anterodorsal corner chamois); a small white dewlap in females (a small orange dewlap in females); no

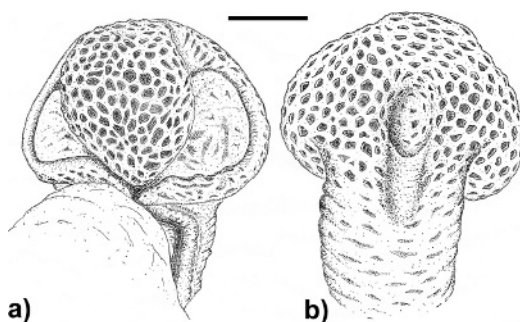


FIG. 6.—Hemipenis of *Anolis kemptoni* (SMF 85406). (a) sulcate view; (b) asulcate view. Scale bar equals 1.0 mm.

enlarged postanal scales in males (distinctly enlarged). *Anolis fortunensis*: male dewlap yellowish orange at base with orange red margin (male dewlap tricolored: posterior portion vinaceous, anterior portion orange, anterodorsal corner chamois); hemipenis unilobate (bilobate). *Anolis fuscoauratus*: male dewlap pinkish-brown to red (male dewlap tricolored: posterior portion vinaceous, anterior portion orange, anterodorsal corner chamois); no dewlap in females (a small orange dewlap in females); no enlarged postanal scales in males (distinctly enlarged). *Anolis kemptoni*: hemipenis unilobate (bilobate; Figs. 5 and 6); dewlap in females white (orange). Within this cluster of species, *A. pseudokemptoni* is most similar to *A. kemptoni* from which it further differs in the total number of loreal scales (*kemptoni*: 33–61; *pseudokemptoni*: 75–88) and in having smooth ventral scales (slightly keeled in *A. kemptoni*).

*Description of the holotype*.—Adult male as indicated by everted hemipenes; SVL 54.0 mm; tail length 99.0 mm, tail complete; tail slightly compressed in cross section, tail height 2.1 mm, tail width 1.6 mm; axilla to groin distance 24.0 mm; head length 14.1 mm, head length/SVL ratio 0.26; snout length 7.0 mm; head width 7.7 mm; longest toe of adpressed hind limb reaching to tympanum; shank length 12.4 mm, shank length/head length ratio 0.88; longest finger of extended forelimb reaching to a point midway between eye and nostril; longest finger of adpressed forelimb failing to reach anterior insertion of hind limbs by 5.2 mm. Scales on snout keeled (Fig. 7); 7 postrostrals; 8 scales between nasals; a single large

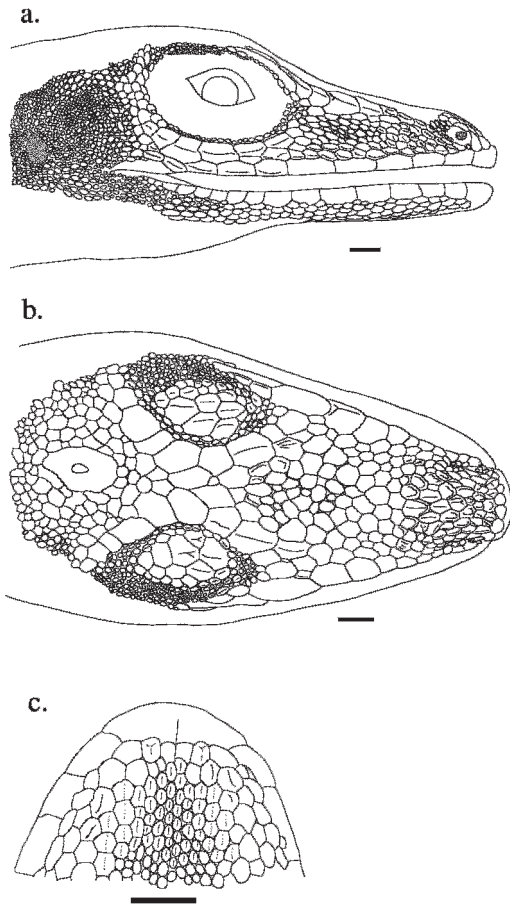


FIG. 7.—Head of holotype of *Anolis pseudokemptoni* (SMF 85420). (a) lateral view; (b) dorsal view; (c) ventral view. Scale bars equal 1.0 mm.

prenasal, in contact with first supralabial and rostral; scales in distinct prefrontal depression mostly smooth; supraorbital semicircles well developed, at narrowest point separated from each other medially by one scale row; supraorbital disc composed of 10–11 distinctly enlarged keeled scales; circumorbital row complete, therefore, enlarged supraorbitals completely separated from supraorbital semicircles; a single large elongated superciliary; 3–4 rows of small keeled scales extending between enlarged supraorbitals and superciliaries; no parietal depression present; interparietal scale well developed,  $2.3 \times 1.3$  mm (length  $\times$  width), surrounded by scales of moderate to large size; 2 scales present between interparietal and supraorbital semi-

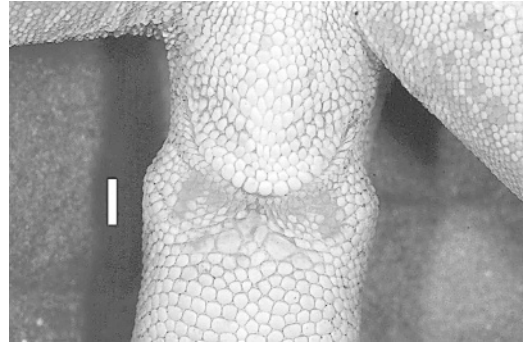


FIG. 8.—View of cloacal region of holotype of *Anolis pseudokemptoni* (SMF 85420); photo was taken before evertion of hemipenes.

circles; canthal ridge distinct, composed of 3 large (posterior one largest) and 7 small anterior canthal scales; 10 scales present between second canthals; 10 scales present between posterior canthals; 81 (right)–80 (left) keeled loreal scales in a maximum of 9 horizontal rows; 6 keeled subocular scales arranged in a single row; 7 supralabials to level below center of eye; 2 suboculars broadly in contact with supralabials; ear opening  $0.8 \times 1.1$  mm (length  $\times$  height); mental distinctly wider than long, almost completely divided medially, bordered posteriorly by 6 postmentals (outer pair larger); 10 (right)–9 (left) infralabials to level below center of eye; sublabials undifferentiated; keeled granular scales present on chin and throat; dewlap extending from level below oral ricti to a point about 5.5 mm posterior to level of axilla; dorsum of body with weakly keeled scales with rounded posterior margins, 2 medial rows slightly enlarged, largest dorsal scales about  $0.28 \times 0.30$  mm (length  $\times$  width); about 56 medial dorsal scales in one head length; about 106 medial dorsal scales between axilla and groin; lateral scales homogeneous, average size 0.2 mm in diameter; ventrals at midbody smooth, flat, imbricate, about  $0.35 \times 0.30$  mm (length  $\times$  width); about 52 ventral scales in one head length; about 82 ventral scales between axilla and groin; 134 scales around midbody; all caudal scales strongly keeled; caudal middorsal scales distinctly enlarged, without whorls of enlarged scales, although an indistinct division in segments is discernible; a pair of enlarged



postanal scales present, about 0.6 mm wide (Fig. 8); no tube-like axillary pocket present; limb scales keeled, imbricate; largest scales on dorsal surface of forelimb about  $0.28 \times 0.30$  mm (length  $\times$  width); digital pads dilated; distal phalanx narrower than and raised from dilated pad; 24 lamellae under phalanges ii–iv of fourth toe; 10 scales under distal phalanx of fourth toe.

The completely everted hemipenis is a medium-sized bilobate organ with a very short and stout truncus; sulcus spermaticus bordered by well developed sulcal lips and bifurcating at base of apex; the branches of the sulcus spermaticus continue to tips of lobes, bordered by well developed sulcal lips, at the tip of lobe each branch opens into a broad concave area; surface of apex and sulcate side of truncus strongly calyculate, asulcate side of truncus with folds; a large asulcate processus present.

*Coloration in life.*—Ground color of dorsal surfaces of body, limbs and tail Citrine (51) suffused with Dark Drab (119B) in vertebral area and with indistinct Cinnamon (123A) transverse bands in flank region; a Prout's Brown (121A) interorbital bar present; tail with Hair Brown (119A) bands, edged with Sepia (119); venter dirty white with Army Brown (219B) flecks; cloacal region and ventral surface of base of tail Olive Yellow (52); iris Cinnamon (123A); posterior portion of dewlap Vinaceous (3) with a shade of Deep Vinaceous (4), anterior portion Burned Orange (116), anterodorsal corner Chamois (123).

*Variation.*—The paratypes agree well with the holotype in general appearance, morphometrics and scalation (see Table 1). The female paratype has a small dewlap. The coloration in life of the female paratype was recorded as: Dorsal ground color Prout's Brown (121A) with a narrow middorsal Raw Umber (223) stripe; flanks Verona Brown (223B) with Tawny (38) flecks; chin dirty white suffused with Sulphur Yellow (57); venter dirty white with Verona Brown (223B) flecks; iris Cinnamon (123A); dewlap Spectrum Orange (17) with Orange Yellow (18) gorgetals.

*Etymology.*—The species name *pseudokemptoni* is used as a noun in apposition and reflects the similarity and suspected close

relationship between the new species and its congener *Anolis kemptoni* Dunn.

*Natural history notes.*—Two individuals were collected at night while they were sleeping on leaves or small banches about 1.0 to 1.5 m above the ground. The male paratype was collected during the day while it was active on a small branch in the vegetation along a dirt road. The collection area can be characterized as Tropical Premontane Rainforest and the vegetation at the type locality is undisturbed, except for some trails (probably used by hunters).

#### *Anolis pseudopachypus* sp. nov.

*Holotype* (Fig. 9).—SMF 85153, an adult male from La Nevera,  $8^{\circ} 29' 45''$ ,  $81^{\circ} 46' 35''$  W, 1600 m elevation, Serranía de Tabasará, Comarca Ngöbe Bugle, Distrito de Nole Düüma, Corregimiento de Jadeberi, Panama. Collected 22 January 2006 by Abel Batista, Gunther Köhler, Marcos Ponce and Javier Sunyer. Field tag number GK 1579.

*Paratypes.*—SMF 85154–63, 85296–97 same collecting data as holotype. USNM 297707–09 Cerro Bollo, 3.5 km E of Escopeta Camp,  $8^{\circ} 34' N$ ,  $81^{\circ} 50' W$ , 1800 m; collected 30 June–6 July 1980 by R. Izor. All paratypes are adult males except SMF 85162–63, 85296, USNM 297708–09 (adult females) and SMF 85155 (juvenile).

*Diagnosis.*—A medium-sized species (snout–vent length [SVL] in largest specimen 48.0 mm) of the genus *Anolis* (sensu Poe, 2004) that is most similar in external morphology to *Anolis pachypus* and *A. tropidolepis* both of which also have more than 5 complete scale rows between supraorbital semicircles, no enlarged postanal scales in males, usually an indication of a lyreform marking in the occipital region, and weakly keeled ventrals at midbody. *Anolis pseudopachypus* differs from *A. pachypus* and *A. tropidolepis* by male dewlap coloration (*A. pachypus*: red orange with central yellow blotch; *A. pseudopachypus*: uniform orange yellow; *A. tropidolepis*: uniform purple red) and by its longer hind legs (ratio shank length / SVL 0.21–0.29, mean 0.25, in *A. pachypus* and *A. tropidolepis* versus 0.28–0.31, mean 0.30, in *A. pseudopachypus*). *Anolis pseudopachypus* differs further from *A. pachypus* and *A.*



FIG. 9.—Male holotype of *Anolis pseudopachypus* (SMF 85153) in life, SVL 41.5 mm.

*tropidolepis* in several scalation characteristics including its tiny head scales and ill-defined supraorbital semicircles (semicircles well-developed in *A. pachypus* and *A. tropidolepis*), number of scales between interparietal scale and supraorbital semicircles (*A. pachypus* and *A. tropidolepis*: usually 6 or less; *A. pseudopachypus*: usually 7 or more); and number of scales between second canthals (*A. pachypus* and *A. tropidolepis*: usually 15 or less; *A. pseudopachypus*: usually 16 or more).

*Description of the holotype.*—Adult male as indicated by everted hemipenes; SVL 41.5 mm; tail length 88.0 tail complete; tail slightly compressed in cross section, tail height 2.3 mm, tail width 1.6 mm; axilla to groin distance 20.3 mm; head length 12.0 mm, head length/SVL ratio 0.29; snout length 5.4 mm; head width 7.7 mm; longest toe of adpressed hind limb reaching tip of snout; shank length 13.8 mm, shank length/head length ratio 1.15; longest finger of extended forelimb reaching 3.8 mm beyond snout; longest finger of adpressed forelimb reaching anterior insertion of hind limbs. All dorsal head scales strongly keeled (Fig. 10); 7 post-rostrals; 9 scales between nasals; 2 scales

between nasal and rostral; scales in distinct prefrontal depression keeled (unicarinate); supraorbital semicircles hardly differentiated, separated medially by a minimum of 9 scale rows; supraorbital disc composed of many keeled scales, none distinctly enlarged; 4 elongated, overlapping superciliaries, decreasing in size posteriorly; no parietal depression evident; interparietal scale not well developed,  $0.7 \times 0.4$  mm (length  $\times$  width), surrounded by scales of small size; 11–12 scales present between interparietal and ill-defined supraorbital semicircles; canthal ridge distinct, composed of 5 (posteriormost one largest) large and 5 small anterior canthal scales; 20 scales present between second canthals; 24 scales present between posterior canthals; 88 (right)—86 (left) keeled loreal scales in a maximum of 10 horizontal rows; subocular scales hardly enlarged; 9–8 supralabials to level below center of eye; suboculars completely separated from supralabials by one scale row; ear opening  $0.7 \times 1.5$  mm (length  $\times$  height); mental distinctly wider than long, almost completely divided medially, bordered posteriorly by 7 postmentals (outer pair larger); 9 infralabials to level below center of eye;

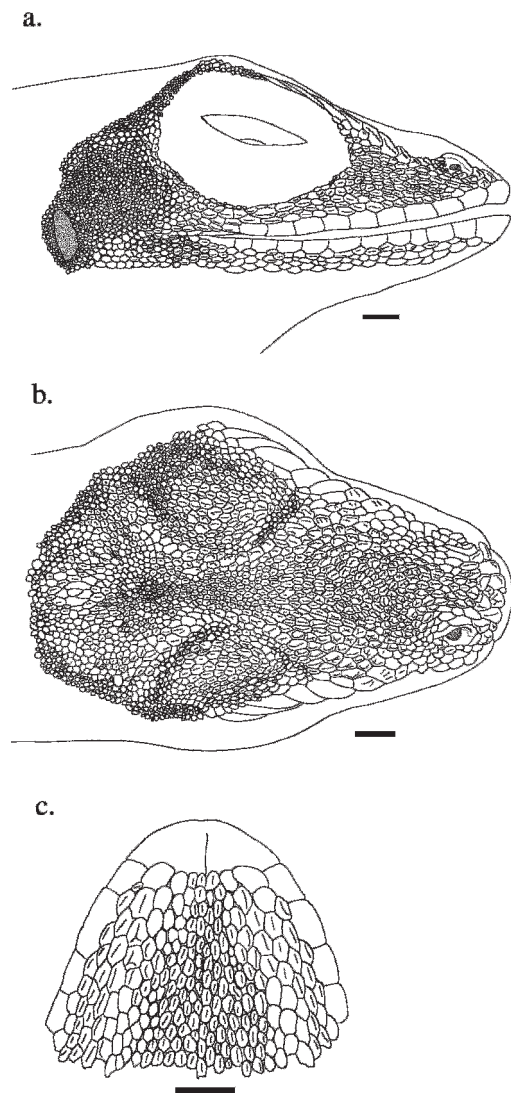


FIG. 10.—Head of holotype of *Anolis pseudopachypus* (SMF 85153). (a) lateral view; (b) dorsal view; (c) ventral view. Scale bars equal 1.0 mm.

sublabials undifferentiated; keeled granular scales present on chin and throat; dewlap extending from level below oral ricti to chest (not reaching level of axilla); dorsum of body with keeled scales with rounded posterior margins, two medial rows slightly enlarged, dorsal scales about  $0.30 \times 0.25$  mm (length  $\times$  width); about 44 medial dorsal scales in one head length; about 80 medial dorsal scales between axilla and groin; lateral scales homogeneous, average size 20 mm in diameter;

most ventrals at midbody weakly keeled (some smooth, especially on posterior venter), imbricate, about  $0.35 \times 0.30$  mm (length  $\times$  width); about 42 ventral scales in one head length; about 59 ventral scales between axilla and groin; 146 scales around midbody; all caudal scales strongly keeled; caudal mid-dorsal scales not enlarged, without whorls of enlarged scales, although an indistinct division in segments is discernible; postanal scales not enlarged; no tube-like axillary pocket present; limb scales keeled, imbricate; largest scales on dorsal surface of forelimb about  $0.30 \times 0.40$  mm (length  $\times$  width); digital pads dilated; distal phalanx narrower than and raised from dilated pad; 23 (right)—22 (left) lamellae under phalanges ii–iv of fourth toe; 9 scales under distal phalanx of fourth toe.

*Coloration in life.*—Dorsum with a Cinnamon Brown (33) broad longitudinal dorsal band bordered by Hair Brown (119A); lateral body Citrine (51) with Green Olive (49) blotches; dorsal surfaces of limbs Olive Green (Auxiliary; 48) with Dark Brownish Olive (129) markings; ventral surfaces of limbs and tail Bunting Green (150); venter dirty white with a shade of Drab Gray (119D); iris Brick Red (132A); dewlap uniform Orange Yellow (18) with Dusky Brown (19) gorgetals.

*Variation.*—The paratypes agree well with the holotype in general appearance, morphometrics and scalation (see Table 1). The dewlap of all adult males was uniform Orange Yellow (18) with Dusky Brown (19) gorgetals.

*Etymology.*—The species name *pseudopachypus* is used as a noun in apposition and reflects the similarity and suspected close relationship between the new species and its congener *Anolis pachypus* Cope.

*Natural history notes.*—Most specimens were collected at night while they were sleeping on leaves or small branches about 0.2 to 0.8 m above the ground. Some specimens were found during daytime while they were active on the ground. The collection area can be characterized as Tropical Premontane Rainforest and the vegetation is undisturbed, except for some trails (probably used by hunters).

#### *Anolis datzorum* sp. nov.

*Holotype* (Fig. 11).—SMF 85093, an adult female from La Nevera,  $8^{\circ} 29' 45''$  N,  $81^{\circ} 46'$



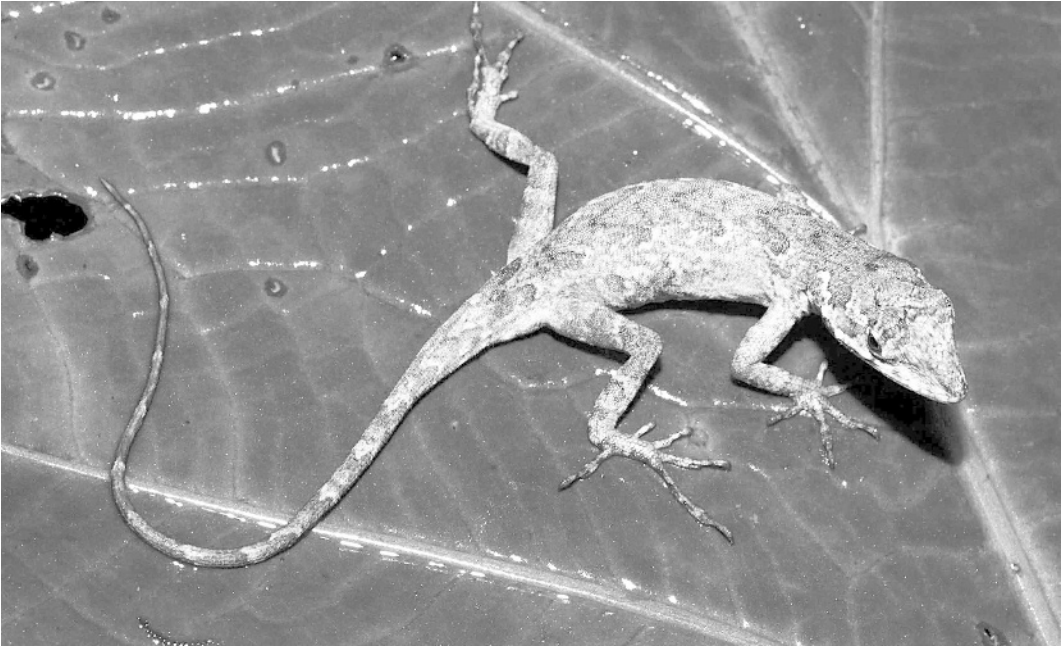


FIG. 11.—Female holotype of *Anolis datzorum* (SMF 85093) in life, SVL 44.5 mm.

35' W, 1600 m elevation, Serranía de Tabasará, Comarca Ngöbe Bugle, Distrito de Nole Düüma, Corregimiento de Jadeberi, Panama. Collected 22 January 2006 by Abel Batista, Gunther Köhler, Marcos Ponce and Javier Sunyer. Field tag number GK 1581.

*Paratype*.—MHCH 611 (adult female) and SMF 85067 (juvenile), same collecting data as holotype.

*Referred specimens*.—PANAMA: Bocas del Toro: Sendero El Pianista, 8° 50' 48" N, 82° 25' 28" W, 1656 m: SMF 86380; Chiriquí: Parque Internacional la Amistad, near Estación de Guardaparques Las Nubes, 1800 m: SMF 86642; Parque Internacional la Amistad, near Estación de Guardaparques Las Nubes, Sendero La Cascada, 2400 m: MHCH 065.

*Diagnosis*.—A medium-sized species (snout-vent length [SVL] in largest specimen 49.0 mm) of the genus *Anolis* (sensu Poe, 2004) that is most similar in external morphology to *Anolis laevis*, *A. kreutzii* and *A. cusuco* all of which also have short hind limbs (longest toe of adpressed hind limb reaching to tympanum), no distinctly enlarged middorsal scale rows, keeled ventrals at midbody, slightly enlarged postanal scales in males, and a white to pale

yellow dewlap in males. *Anolis datzorum* differs from *A. laevis*, *A. kreutzii* and *A. cusuco* by having most head scales distinctly multicarinate (smooth, wrinkled or unicarinate in *A. laevis*, *A. kreutzii* and *A. cusuco*), by having a homogeneous flank scalation (usually a few enlarged, often whitish, scales scattered among smaller granular flank scales in *A. laevis*, *A. kreutzii* and *A. cusuco*), and by having an overall greenish coloration (grayish brown to yellowish brown in *A. laevis*, *A. kreutzii* and *A. cusuco*).

*Description of the holotype*.—Adult female as indicated by slender base of tail, small dewlap and habitus; SVL 44.5 mm; tail length 78.0 mm, tail complete; tail slightly compressed in cross section, tail height 2.2 mm, tail width 1.7 mm; axilla to groin distance 18.6 mm; head length 12.8 mm, head length/SVL ratio 0.29; snout length 5.5 mm; head width 8.0 mm; longest toe of adpressed hind limb reaching to tympanum; shank length 9.8 mm, shank length/head length ratio 0.77; longest finger of extended forelimb reaching to tip of snout; longest finger of adpressed forelimb failing to reach anterior insertion of hind limbs by 1.0 mm. Scales on snout keeled



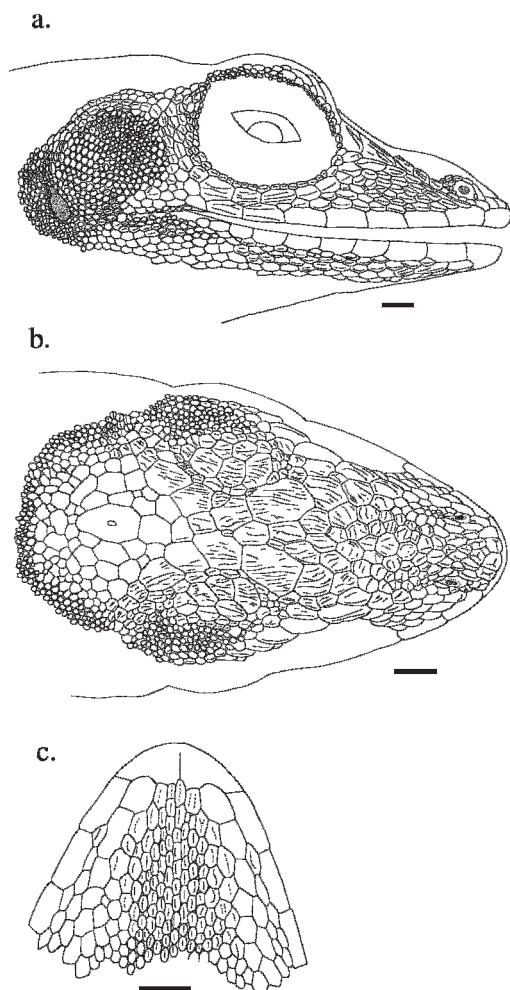


FIG. 12.—Head of holotype of *Anolis datzorum* (SMF 85093). (a) lateral view; (b) dorsal view; (c) ventral view. Scale bars equal 1.0 mm.

(Fig. 12); 6 postrostrals; 6 scales between nasals; two prenasals, the lower one in contact with first supralabial and rostral; scales in distinct prefrontal depression strongly multicarinate; supraorbital semicircles well developed, medially narrowly in contact, consisting of large, multicarinate scales; supraorbital disc composed of 7–8 distinctly enlarged, multicarinate scales; circumorbital row rudimentary, therefore, most enlarged supraorbitals in contact with supraorbital semicircles; two elongated superciliaries, anterior one about twice the size of posterior one; 4–5 rows of small keeled scales extending between enlarged supraorbitals and superciliaries; parie-

tal depression present; interparietal scale well developed,  $1.6 \times 0.9$  mm (length  $\times$  width), surrounded by scales of moderate to large size; 2 scales present between interparietal and supraorbital semicircles; canthal ridge distinct, composed of 4 large (posterior one largest, all multicarinate) and 4 small multicarinate anterior canthals; seven scales present between second canthals; eight scales present between posterior canthals; 39 (right)–38 (left) keeled loreal scales in a maximum of 6 (right)–5 (left) horizontal rows; 8 keeled subocular scales arranged in a single row; 6 (right)–7 (left) supralabials to level below center of eye; 2 suboculars broadly in contact with supralabials; ear opening  $0.5 \times 1.1$  mm (length  $\times$  height); mental distinctly wider than long, almost completely divided medially, bordered posteriorly by 6 postmentals (outer pair largest); 7 infralabials to level below center of eye; sublabials undifferentiated; keeled granular scales present on medial portion of chin and throat, scales on lateral portion enlarged and uni- to tricarinate; dewlap extending from level below tympanum to level of anterior insertion of forelimbs; dorsum of body with strongly keeled scales with rounded posterior margins, 10–12 medial rows slightly enlarged, largest dorsal scales about  $0.33 \times 0.30$  mm (length  $\times$  width); about 58 medial dorsal scales in one head length; about 85 medial dorsal scales between axilla and groin; lateral scales homogeneous, average size 0.19 mm in diameter; ventrals at midbody keeled, slightly mucronate, subimbricate, about  $0.35 \times 0.30$  mm (length  $\times$  width); about 43 ventral scales in one head length; about 69 ventral scales between axilla and groin; 132 scales around midbody; all caudal scales strongly keeled; caudal mid-dorsal scales slightly enlarged, without whorls of enlarged scales, although an indistinct division in segments is discernible; no tubelike axillary pocket present; limb scales keeled, imbricate; largest scales on dorsal surface of forelimb about  $0.45 \times 0.35$  mm (length  $\times$  width); digital pads dilated; distal phalanx narrower than and raised from dilated pad; 24 lamellae under phalanges ii–iv of fourth toe; 12 scales under distal phalanx of fourth toe.

*Coloration in life.*—Dorsal ground color of head and body Cinnamon (239) with Lime

Green (159) markings in frontal area and on dorsolateral body; vertebral region suffused with Hair Brown (119A); chevrons on dorsum Sepia (219); occipital region Prout's Brown (121A); interorbital bar Warm Sepia (221A); venter dirty white suffused with Chamois (123D); Tail Brick Red (132A) with narrow Lime Green (159) transverse bands; iris Mars Brown (223A); dewlap Cream Color (54).

*Variation.*—The paratypes and referred specimens agree well with the holotype in general appearance, morphometrics and scalation (see Table 1). The dewlap of the only known adult male (MHCH 065) was uniform pale yellow. MHCH 065 has slightly enlarged postanal scales.

*Etymology.*—The species name *datzorum* is a patronym for Erika Datz and her late brother Walter Datz, Bad Homburg, Germany, in recognition of their generous support of biodiversity and taxonomic research at the Forschungsinstitut Senckenberg through the Erika and Walter Datz Foundation.

*Natural history notes.*—The holotype was collected at night while it was sleeping on a tree about 4 m above the ground. The tree was heavily overgrown with moss and also supported some bromeliads. The juvenile was found at night while it was sleeping on a leaf about 1.5 m above the ground. The collection area can be characterized as Tropical Premontane Rainforest and the vegetation is undisturbed, except for some trails (probably used by hunters).

#### DISCUSSION

Most of the Serranía de Tabasará has not yet been sampled and we expect a fair number of species unknown to science in this large mountain range. Furthermore, it appears that the taxonomically difficult groups of amphibians and reptiles in the few collections from this region have not been studied in detail (Martínez and Rodríguez, 1992; Martínez et al., 1994). Since the original discovery of *Anolis datzorum*, a few more specimens that we allocate to this species became available from other localities indicating a geographic distribution of this taxon that ranges at least from the eastern portion of the Cordillera de Talamanca (Parque Internacional la Amistad) to the western portion of the Serranía de

Tabasará (Fig. 13). In contrast, two of the species described herein, *A. gruuo* and *A. pseudokemptoni*, are known only from their respective type localities. Our fourth new species, *A. pseudokemptoni*, is known from two closeby localities in the Serranía de Tabasará.

Due to its richly structured physiography (Myers, 1969; Myers and Duellman, 1982) it is likely that the herpetofauna of the Serranía de Tabasará contains a high percentage of endemic species. The documented endemic vertebrate species from the Serranía de Tabasará includes mammals (e.g., *Isthmomys flavidus*), birds (e.g., *Selasphorus ardens*, *Pseliophorus luteoviridis*), and amphibians (e.g., *Hyla graceae*, *Eleutherodactylus tabasarae*) (Angehr, 2003; Myers and Duellman, 1982; Ridgely and Gwynne, 1993; Reid, 1997; Savage et al., 2004). With the description of our new species of anoles, we add the first reptiles to the list of endemics of this region. Notwithstanding the great ecological value of the Serranía de Tabasará, there is a high anthropogenic pressure on the natural habitats in this region. Therefore, it was recommended as a high priority area for conservation (Batista and Ponce, 2002).

#### RESUMEN

Se describen cuatro nuevas especies de anolis (genero *Anolis*) de la Serranía de Tabasará en la parte oeste central de Panamá. Dos de las nuevas especies son muy similares en morfología externa a un grupo de especies de anolis centroamericanos que tienen patas cortas (cuarto dedo de la pata plegado al cuerpo llega hasta el tímpano), poseen una singular y elongada escama prenasal, presentan escamas ventrales lisas y una apariencia corporal delgada y a menudo delicada. Estas especies difieren de las otras del grupo en la morfología de sus hemipenes y en características de escamación. Otra de las especies nuevas parece ser muy similar a *A. pachypus* y *A. tropidolepis*, pero difiere de estos en la coloración de la papera gular de los machos y en el tamaño de las escamas de la superficie dorsal de la cabeza. La cuarta especie nueva parece estar relacionada con *A. laevis* pero se diferencia de este en poseer escamas multicarinadas en la superficie dorsal de la

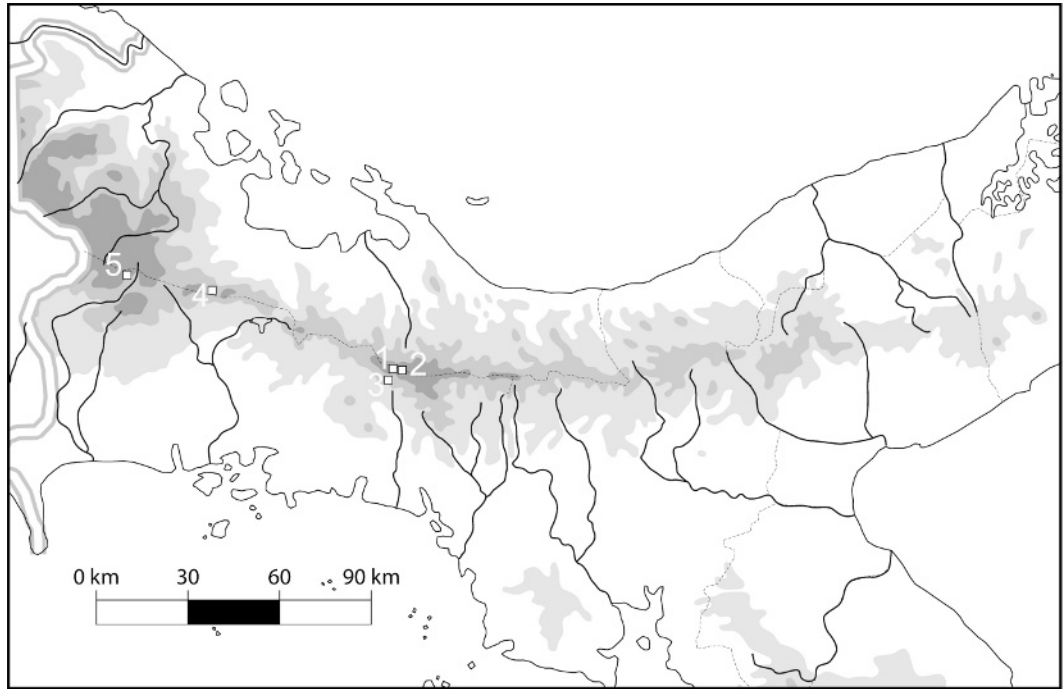


FIG. 13.—Map indicating the collecting sites mentioned in the text. (1) Cerro Bollo; (2) La Nevera; (3) Escopeta; (4) Sendero El Pianista; (5) Estación de Guardaparques Las Nubes, Parque Internacional la Amistad. Indicated elevations: Pale gray shading 500–1000 m above sea level, medium gray shading 1000–2000 m above sea level, dark gray shading greater than 2000 m above sea level.

cabeza, en carecer de escamas heterogéneas en los flancos, y en poseer una coloración en vida predominantemente verde.

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#### APPENDIX I

##### Comparative Material Examined

*Anolis altae*—AMNH 90401, KU 103946–66, LACM 114187, 151311, 151319–20, UMMZ 117749. *Anolis amplisquamosus*—KU 219924–49, SMF 77747–50. *Anolis anisolepis*—AMNH 90830, MHNG 1566.26, TCWC 30362, UIMNH 79914, 86925, 86927–28. *Anolis aquaticus*—SMF 82183–86, UF 66180–94, 71980–97, 72030–43, 72351–403, USNM 219547–51. *Anolis auratus*—AMNH 107424, UF 34369–77, 34379–82, 34384, 34397–98, USNM 139711–12. *Anolis barkeri*—AMNH 64985–87, MCZ 85008, SMF 81587. *Anolis bicaorum*—SMF 77100–02, 77104–05, 77107, 77559–60, 77562, 77984. *Anolis biporcatus*—AMNH 17089, 17091–92, 89179, 126045–47, KU 85636, 101389–90. *Anolis capito*—KU 124988, 174047, SMF 77287–88, 77550, 77973, 78282, 78406, 78570–71. *Anolis carpenteri*—FMNH 167681, 167720, 167726–27, KU 85722, 195056, USNM 266152–53, 347200–04, 348442. *Anolis cobanensis*—SMF 77465–66, UF 96494, UMMZ 90233–38. *Anolis crassu-*



- lus—BMNH 1946.8.5.92–93, KU 219950, UMMZ 89194 (1–2), SMF 78099–103. *Anolis cristifer*—CAS 68214–16, SMF 82593, 84432–33, UTA R20248, R22071, R37464. *Anolis cupreus*—KU 66860–61, 101394, 195064–68, LSUMZ 52374, 52377. *Anolis cuprinus*—UIMNH 52959. *Anolis cusuco*—KU 194275–85, SMF 79170–71, 79182. *Anolis dollfusianus*—MNHN 2435, 1994.1361–63, SMF 82582–86, 84434–35, 84447–49. *Anolis exsul*—LACM 72910, MVUP 902. *Anolis fortunensis*—MVUP 756. *Anolis fungosus*—KU 113451. *Anolis fuscoauratus*—AMNH 57703, SMF 77252–54, 78699. *Anolis haguei*—UMMZ 90226, 90227 (1–2), 90228 (1–2), 90229 (1–2), 90230 (1–2), 90231 (1–2). *Anolis heteropholidotus*—KU 219974–76, SMF 43041, 42191, 44394, 51979, 51990, 78020–21. *Anolis hobartsmithi*—ANSP 30556–81, 30660–70. *Anolis humilis*—KU 101391, 112984, 113013, SMF 77451–57. *Anolis johnmeyeri*—SMF 77755–58, 77760–61, 78824–27. *Anolis kemptoni*—AMNH 89891–92, ANSP 21708–10, 24507–15, SMF 85423–29. *Anolis kreutzi*—SMF 78844, 79172, USNM 532565–66, 532571. *Anolis laeiventris*—SMF 10987–88, 78118–19, 78271–72, 79179, UIMNH 34221, 63724, ZMB 503. *Anolis lemurius*—CRE 065–066, 6300, 6370, MCZ 32324, 32327–29 UMMZ 80694, ZSM 73/1998. *Anolis limifrons*—KU 85651–55, 174048–50, SMF 77552–53. *Anolis lionotus*—KU 85676, 101405, 112992, SMF 78349–52, 78524–26. *Anolis loveridgei*—FMNH 21776, 21870, KU 219982, SMF 78793. *Anolis macrophallus*—KU 184050, SMF 42590, 42713, 43146, 43158, 45025, 79034–37. *Anolis matudai*—UTA R-40209–27, R-40221, R-42020–29, R-45708–14, R-46034. *Anolis muralla*—SMF 78093, 78372, 78376, USNM 521910, 521913–18. *Anolis ocelloscapularis*—SMF 78841, 79077–78, 79090–92, USNM 529973–77. *Anolis pachypus*—KU 40698–713, 86565, 91780–82, 104050–71, 125830, UMMZ 117625–28, 125497. *Anolis parvicirculatus*—MZ-ICACH 282–84, 616. *Anolis pentapriion*—AMNH 75987, 123262, ANSP 24540–42, 34059, USNM 298136, 347921, 348211–12, 348481. *Anolis petersi*—SMF 34399, 77135, ZMB 3209, 3909, 6417, 7231, 26110, 58909. *Anolis pijolensis*—SMF 78796–98, USNM 322871–84. *Anolis poecilopus*—SMF 80773–76, UMMZ 152900, USNM 150107, 150109. *Anolis polylepis*—SMF 85211–20, 85287. *Anolis purpurgularis*—SMF 78794–95, USNM 322885–91. *Anolis pygmaeus*—UIMNH 37975. *Anolis quaggulus*—SMF 79638, 81938–40, 82036–39, 82847–48. *Anolis rodriguezii*—MNHN 2411 UMMZ 91186–92, SMF 79085–86. *Anolis rubri-barbaris*—UF 90206. *Anolis sagrei*—SMF 10780–86, 77506, 77743–44. *Anolis sericeus*—KU 101410, SMF 77343–51. *Anolis serranoi*—SMF 78835–40, UMMZ 87443, 87485–87. *Anolis sminthus*—KU 219961–66, SMF 77176–79. *Anolis tropidogaster*—UMMZ 124957, USNM 48528, 102748–49, 129857–62. *Anolis tropidolepis*—FMNH 236174, UMMZ 131794–95, UTA R4543, R45923–24, ZFMK 53888–89. *Anolis tropidonotus*—KU 85721, SMF 77505, 77729–36. *Anolis uniformis*—SMF 77182, 77190–91, 77286, 79130–34, 79148–49. *Anolis utilensis*—SMF 77051–55, 77983, 79364–65. *Anolis vil-lai*—KU 85723–29, 159646–48. *Anolis vittigerus*—ANSP 24558, KU 74856, 75891, 75892, UMMZ 63633, 124943, 124952, 124953 (1–2), 124954, 128976 (1–5). *Anolis vociferans*—AMNH 69621, ANSP 26287, USNM 203831, ZFMK 27609–11. *Anolis wermuthi*—KU 195080, 195089–90, SMF 77167, 77323–27, 78009. *Anolis woodi*—AMNH 80086, UMMZ 128610 (1–3), 130853, 131796–802, 147673. *Anolis yoroensis*—SMF 80765–69, USNM 541012–20. *Anolis zeus*—SMF 77193–96, 80698–700, USNM 541022–25.