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## Three new species of the *Tropidurus spinulosus* group (Squamata: Tropiduridae) from Eastern Paraguay

ANDRÉ LUIZ G. CARVALHO<sup>1</sup>

### ABSTRACT

*Tropidurus* Wied, 1825, is one of the most ubiquitous lizard genera endemic to South America. Herpetologists from different regions of the continent have progressively mapped new populations, including undescribed species hidden under widely distributed nominal taxa. Currently, four monophyletic species groups are recognized in *Tropidurus* (*T. bogerti* group [monotypic], *T. semitaeniatus* group [four species], *T. spinulosus* group [five species], and *T. torquatus* group [16 species]), but none have been comprehensively revised taxonomically. During a collection expedition carried out in Paraguay in 2013, I recognized three new, distinct morphotypes among populations of the *Tropidurus spinulosus* group formerly assigned to *T. guarani* Alvarez et al., 1994. To delimit these new taxa, I analyzed coloration patterns, and quantified meristic and morphometric variables, comparing freshly collected samples with specimens housed in five museum collections. In this paper, I describe and illustrate the allopatric *T. lagunablanca*, n. sp., *T. tarara*, n. sp., and *T. teyumirim*, n. sp., and provide notes on their distribution limits, natural history, and conservation status.

### INTRODUCTION

The *Tropidurus spinulosus* species group was formally delimited by Frost et al. (2001) as one of the four main clades constituting the South American lizard genus *Tropidurus* Wied, 1825. Currently, it includes five nominal species—*T. callathelys* Harvey and Gutberlet, 1998, *T. guarani* Alvarez et al., 1994, *T. melanopleurus* Boulenger, 1902, *T. spinulosus* (Cope, 1862), and

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*T. xanthochilus* Harvey and Gutberlet, 1998—inhabiting open environments of the cis-Andean tropical and subtropical South America, between 12° and 32° S. All together, their ranges encompass territories within five countries, including areas in northern Argentina (*T. spinulosus* and *T. melanopleurus*), eastern Bolivia (*T. callathelys*, *T. melanopleurus*, *T. spinulosus*, and *T. xanthochilus*), central Brazil (*T. aff. guarani* and *T. callathelys*), eastern and western Paraguay (*T. guarani* and *T. spinulosus*), and the southernmost part of Peru (*T. melanopleurus*); see Carvalho (2013) for an updated review of the distribution of *Tropidurus* species.

In contrast with the *Tropidurus torquatus* and *T. semitaeniatus* species groups,<sup>2</sup> whose taxonomic diversity has been progressively expanded by recent morphological and molecular studies (Passos et al., 2011; Kunz and Borges-Martins, 2013; Werneck et al., 2015; Carvalho et al., 2016), species diversity in the *T. spinulosus* group remain unrevised for almost two decades (Alvarez et al., 1994; Frost et al., 1998; Harvey and Gutberlet, 1998). In Paraguay, Frost et al. (1998) conducted the most comprehensive taxonomic investigation focused on species of the *T. spinulosus* group to date,<sup>3</sup> and detected high levels of morphological and molecular divergence among populations of the then subspecies *T. spinulosus guarani* Alvarez et al., 1994, and *T. spinulosus spinulosus* (Cope, 1862). That study also gathered compelling phylogenetic evidence supporting the existence of at least two diagnosable evolutionary lineages east and west of the Paraguay River. Consequently, *T. s. guarani*, distributed in the mesic eastern Paraguayan region, and *T. s. spinulosus*, endemic to the xerophilous Chacoan districts west of the Paraguay River, were elevated to the species rank as *T. guarani* and *T. spinulosus*, corroborating preliminary findings of Alvarez et al. (1994).

Although Frost et al.'s (1998) results did not reject the possibility of independent lineages coexisting on the eastern side of the Paraguay River, the taxonomic diversity comprised by populations of the *Tropidurus spinulosus* group distributed in eastern Paraguay has not been reassessed since. After analyzing numerous specimens collected during a three-month expedition carried out in Paraguay between August and October 2013, I was able to distinguish four allopatric morphotypes among populations previously assigned to *T. guarani* (Alvarez et al., 1994; Frost et al., 1998). Of those, three were found to represent new species and the fourth morphotype was associated to nominal *T. guarani* (fig. 1). To delimit these new taxa, I examined coloration patterns, and quantified meristic and morphometric variation in a geographic scale, comparing freshly collected material with specimens housed in five museum collections. In this paper, I describe and illustrate *T. lagunablanca*, n. sp., *T. tarara*, n. sp., and *T. teyumirim*, n. sp., and provide notes on their distribution limits, natural history, and conservation status.

<sup>2</sup> The *Tropidurus bogerti* group is monotypic and endemic to the Auyantepui, Venezuela (Roze, 1958; Frost et al., 2001; Myers and Donnelly, 2008; Carvalho, 2013).

<sup>3</sup> Until Frost et al. (1998), only *Tropidurus spinulosus* was known from Paraguay, with two subspecies, *T. s. guarani* Alvarez et al., 1994, and *T. s. spinulosus* (Cope, 1862), distributed, respectively, on the eastern and western sides of the country, separated by the Paraguay River (Alvarez et al., 1994).

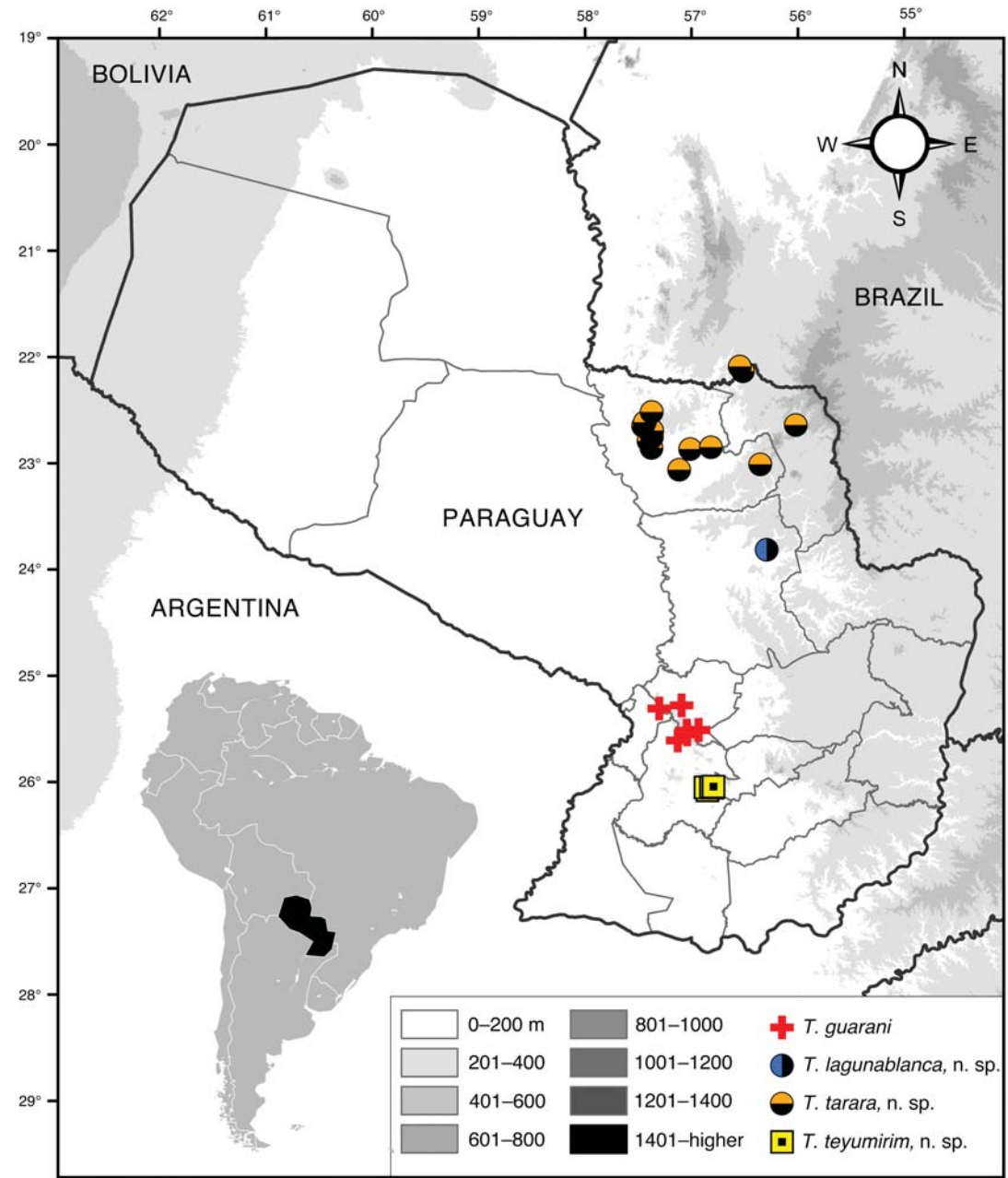


FIGURE 1. Distribution map of *Tropidurus guarani*, *T. lagunablanca*, n. sp., *T. tarara*, n. sp., and *T. teyumirim*, n. sp. For information on the distribution of additional species of the *T. spinulosus* species group, refer to Carvalho (2013).

## MATERIAL AND METHODS

**SAMPLES:** I analyzed 245 specimens representing four (of five) nominal species assigned to the *Tropidurus spinulosus* species group by Frost et al. (2001)—namely *T. guarani*, *T. melanopleurus*, *T. spinulosus*, and *T. xanthochilus*—and extracted data on *T. callathelys* from Harvey and Gutberlet (1998) and Morais et al. (2014). In addition to individuals freshly collected in numerous localities from Paraguay, Bolivia, and Argentina, my samples included specimens housed in five museum collections. In the field, specimens were collected with the aid of rubber bands or nooses between 05 August and 13 December 2013, euthanized with an overdose of 2% lidocaine, preserved with 10% unbuffered formalin, and then transferred to 70% ethyl alcohol solution. All specimens collected and analyzed for this study are housed in the following museum collections: American Museum of Natural History, New York (AMNH); Colección Zoológica Para La Tierra, Santa Rosa del Aguaray, Paraguay (CZPLT); Museo de Historia Natural Alcide d'Orbigny, Cochabamba, Bolivia (MNHNC); Museo Nacional de Historia Natural del Paraguay, Asunción, Paraguay (MNHNP); and U.S. National Museum–Smithsonian Institution, Washington D.C. (USNM). A complete list of examined material is provided in appendix.

**EXTERNAL MORPHOLOGY:** I adopted the general terminology revised by Carvalho et al. (2016) for description of external morphological structures. However, because that study dealt exclusively with species of the *Tropidurus torquatus* group, I extended their protocol to account for additional morphological features and scale counts found in species of the *T. spinulosus* group. All species in the *T. spinulosus* group have a midvertebral row of protruding or spinelike scales forming a dorsal crest that extends from the postoccipital region to the proximal, medial, or distal portion of the tail. Scales forming the dorsal crest, hereafter referred to as vertebrales, were counted from the first protruding, or spinelike scale on the postoccipital area, extending to the level of the anterior margin of hind limb insertion. The dorsal crest is significantly more conspicuous in males than females (Frost, 1992; Harvey and Gutberlet, 1998). Paravertebrales correspond to the series of dorsal scales immediately adjacent to vertebrales and were counted following a line drawn just to the right of the vertebral crest.

Tropidurine lizards have marked skin folds and granular mite pockets distributed in different areas of the body. Frost (1992) identified 10 types of skin folds. Of those, antegular, antehumeral, dorsolateral, gular, longitudinal neck, oblique neck, postauricular, and rictal folds were observed during my analysis of specimens of the *T. spinulosus* group. Frost (1992) described four types of mite pockets with a number of morphological states, namely antegular-oblique neck, axillary, antehumeral, and inguinal mite pockets. The antegular-oblique neck mite pocket is the only one found among species of the *T. spinulosus* group; refer to morphological descriptions and figures 22–24 in Frost's (1992) study for details and schematic representations of the location of skin folds and mite pockets. Tufts of spines on the side of the neck are additional structures shared by species of the *T. spinulosus* group. These tufts of spines are usually more pronounced in males and vary ontogenetically, with adults showing bigger tufts than juveniles and subadults. Their number, size, and morphology also show strong geographic variation (Frost et al., 1998).

TABLE 1. Mean  $\pm$  standard deviation, minimum and maximum values of morphometric measurements (in mm) of adult males.

Abbreviations: **SVL**, snout–vent length; **BH**, body height; **HH**, head height; **HW**, head width; **EOS**, ear opening–snout distance; **AL**, arm length; **FAL**, forearm length; **HDL**, manus length; **THL**, thigh length; **SL**, shank length; **FOL**, pes length; **TL**, tail length. The number of measured individuals is followed (between parentheses) by the number of individuals with fully grown tails. See Material and Methods for details on treatment of individuals with broken, regrown, or missing tails.

	<i>T. guarani</i> N = 5 (3)	<i>T. lagunablanca</i> , n. sp. N = 6 (4)	<i>T. tarara</i> , n. sp. N = 11 (5)	<i>T. teyumirim</i> , n. sp. N = 37 (18)
SVL	97.94 $\pm$ 9.46 (87.73–109.44)	104.02 $\pm$ 9.37 (89.35–113.09)	110.28 $\pm$ 8.65 (98.04–122.82)	84.34 $\pm$ 6.08 (67.82–94.41)
TL	118.35 $\pm$ 22.01 (97.05–141.00)	146.88 $\pm$ 16.44 (136–171)	142.00 $\pm$ 13.13 (124–155)	127.23 $\pm$ 12.60 (93.96–144.99)
HH	13.76 $\pm$ 1.69 (12.05–16.32)	13.91 $\pm$ 1.14 (12.03–15.55)	14.58 $\pm$ 1.68 (11.77–17.52)	10.97 $\pm$ 0.85 (9.42–12.48)
EOS	22.00 $\pm$ 1.27 (20.25–23.40)	23.73 $\pm$ 2.25 (20.25–25.95)	24.70 $\pm$ 1.60 (22.38–27.18)	19.82 $\pm$ 1.19 (16.58–21.68)
HL	27.22 $\pm$ 2.67 (24.44–30.55)	28.16 $\pm$ 2.82 (24.22–31.11)	29.65 $\pm$ 2.88 (25.90–34.42)	23.47 $\pm$ 1.42 (19.57–26.56)
HW	20.42 $\pm$ 2.00 (18.24–22.85)	20.88 $\pm$ 2.08 (17.76–23.86)	22.43 $\pm$ 2.13 (18.39–25.40)	17.17 $\pm$ 1.16 (14.03–19.14)
AL	16.76 $\pm$ 2.38 (14.57–19.84)	16.59 $\pm$ 2.23 (13.03–18.94)	17.06 $\pm$ 1.08 (15.82–18.87)	13.31 $\pm$ 1.21 (10.82–15.34)
FAL	13.29 $\pm$ 1.27 (12.13–15.38)	14.29 $\pm$ 1.59 (11.96–16.05)	15.00 $\pm$ 1.10 (13.39–17.20)	11.43 $\pm$ 1.03 (9.08–13.24)
HDL	18.10 $\pm$ 1.89 (15.43–19.90)	19.42 $\pm$ 1.20 (17.80–20.97)	20.26 $\pm$ 1.32 (17.85–22.44)	16.16 $\pm$ 0.98 (13.84–17.57)
THL	20.99 $\pm$ 2.88 (17.54–24.44)	20.95 $\pm$ 2.37 (17.29–23.51)	22.03 $\pm$ 1.94 (17.60–24.38)	17.49 $\pm$ 1.53 (14.37–20.28)
SL	18.04 $\pm$ 1.88 (15.62–20.06)	18.60 $\pm$ 1.66 (16.25–20.16)	18.51 $\pm$ 1.68 (16.27–20.96)	15.43 $\pm$ 1.20 (12.43–17.17)
FOL	27.61 $\pm$ 2.66 (25.02–30.66)	29.82 $\pm$ 2.21 (26.13–32.47)	30.19 $\pm$ 1.58 (26.55–32.05)	24.69 $\pm$ 1.29 (20.75–26.40)

**SEX DETERMINATION:** Species of the *Tropidurus spinulosus* group are highly sexually dimorphic (Laurent, 1980; Alvarez et al., 1994; Harvey and Gutberlet, 1998). I determined the sex of the specimens based on the observation of colored patches of glandular scales located on ventral surface of the thighs and precloacal flap of adult males; adult females lack ventral colored patches (Frost, 1992; Alvarez et al., 1994). Adult males have wider heads and thinner bodies than females of the same body size and also have a marked middorsal crest; the dorsal crest is weakly marked or nearly absent in females (Frost, 1992; Alvarez et al., 1994; Harvey and Gutberlet, 1998). In several cases, I was unable to determine the sex of juveniles or subadults based on their external morphology alone. Therefore, in some cases, I inspected gonads to determine sex.

**MORPHOMETRIC AND MERISTIC DATA:** Morphometric measurements from the right side of 101 adult males and 111 adult females were taken with aid of a digital caliper (to the nearest 0.1 mm; tables 1–2). I followed the morphometric protocol described in Carvalho et al. (2016),

TABLE 2. Mean  $\pm$  standard deviation, minimum and maximum values of morphometric measurements (in mm) of adult females.

Abbreviations: **SVL**, snout–vent length; **BH**, body height; **HH**, head height; **HW**, head width; **EOS**, ear opening–snout distance; **AL**, arm length; **FAL**, forearm length; **HDL**, manus length; **THL**, thigh length; **SL**, shank length; **FOL**, foot length; **TL**, tail length. The number of measured individuals is followed (between parentheses) by the number of individuals with fully grown tails. See Material and Methods for details on treatment of individuals with broken, regrown, or missing tails.

	<i>T. guarani</i> N = 7 (6)	<i>T. lagunablanca</i> , n. sp. N = 2 (1)	<i>T. tarara</i> , n. sp. N = 4 (1)	<i>T. teyumirim</i> , n. sp. N = 49 (25)
SVL	70.59 $\pm$ 7.54 (62.53–86.19)	85.03 $\pm$ 13.51 (75.48–94.59)	88.96 $\pm$ 3.41 (86.35–93.97)	70.17 $\pm$ 4.24 (61.41–80.79)
TL	102.09 $\pm$ 11.87 (89.12–117.56)	115.74	127.76	106.83 $\pm$ 6.73 (92.08–121.95)
HH	9.28 $\pm$ 1.60 (7.77–12.70)	10.89 $\pm$ 2.33 (9.25–12.54)	11.77 $\pm$ 0.97 (10.61–12.89)	8.96 $\pm$ 0.53 (7.89–10.10)
EOS	16.12 $\pm$ 1.78 (14.69–19.84)	18.92 $\pm$ 2.29 (17.30–20.54)	19.78 $\pm$ 0.69 (18.82–20.36)	16.54 $\pm$ 0.86 (14.82–18.80)
HL	19.40 $\pm$ 2.18 (17.45–24.07)	22.98 $\pm$ 2.70 (21.07–24.89)	23.56 $\pm$ 1.18 (22.72–25.23)	19.47 $\pm$ 0.89 (17.20–21.60)
HW	14.07 $\pm$ 1.49 (12.59–16.93)	16.82 $\pm$ 2.38 (15.14–18.50)	16.99 $\pm$ 1.43 (15.4–18.64)	14.01 $\pm$ 0.83 (12.19–15.85)
AL	11.18 $\pm$ 1.31 (9.96–13.74)	12.39 $\pm$ 1.18 (11.56–13.23)	13.84 $\pm$ 0.71 (13.24–14.69)	10.87 $\pm$ 0.87 (9.01–13.08)
FAL	9.54 $\pm$ 1.02 (8.29–11.53)	11.42 $\pm$ 1.53 (10.34–12.5)	12.12 $\pm$ 0.75 (11.23–12.81)	9.38 $\pm$ 0.67 (7.88–10.95)
HDL	13.94 $\pm$ 1.56 (12.55–17.22)	16.21 $\pm$ 0.13 (16.12–16.30)	16.46 $\pm$ 0.87 (15.73–17.48)	13.71 $\pm$ 0.88 (11.87–15.68)
THL	14.64 $\pm$ 2.01 (13.31–19.06)	17.41 $\pm$ 1.89 (16.07–18.74)	18.19 $\pm$ 0.75 (17.14–18.85)	14.51 $\pm$ 0.83 (12.16–16.24)
SL	12.68 $\pm$ 1.11 (11.53–15.03)	15.06 $\pm$ 1.29 (14.15–15.97)	15.19 $\pm$ 0.78 (14.50–16.00)	12.40 $\pm$ 0.71 (10.85–14.16)
FOL	20.71 $\pm$ 1.29 (18.44–22.49)	23.95 $\pm$ 2.01 (22.53–25.37)	25.24 $\pm$ 0.84 (24.35–26.37)	20.34 $\pm$ 1.03 (17.92–23.14)

adding the following variables: **AGD** (armpit to groin distance), from the base of the armpit to groin; **BH** (body height), distance between belly and dorsum measured at a point between the insertion of forelegs and hind legs; **BW** (body width), distance between flanks measured at a point between the insertion of forelegs and hind legs; **HL** (head length), from tip of snout to posterior limit of the occipital region.

Variations in scale counts among species were investigated to detect taxonomically informative characters (tables 3–4). See External Morphology and Carvalho et al. (2016) for details on scale counts (i.e., topography, scale nomenclature). In total, I analyzed 87 male and 61 female specimens for meristic data. I failed to identify consistent correlations between SVL (as a proxy for age) and scales counts (results not shown), and for that reason I pooled juveniles, subadults, and adults of each species for meristic comparisons. All statistical procedures were performed for males and females separately, using the statistical platform R version 3.0.2 (R Core Team, 2013).



TABLE 3. Mean  $\pm$  standard deviation, minimum and maximum values of scale counts of male lizards.

Abbreviations: **VB**, vertebrales; **PB**, paravertebrales; **VT**, ventrals; **GU**, gulars; **MD**, scales around midbody; **TI**, tibials; **LF**, subdigital lamellae under fourth finger; **LT**, subdigital lamellae under fourth toe; **SL**, supralabials; **IL**, infralabials.

	<i>T. guarani</i> (N = 7)	<i>T. lagunablanca</i> , n. sp. (N = 10)	<i>T. tarara</i> , n. sp. (N = 18)	<i>T. teyumirim</i> , n. sp. (N = 18)
VB	60.43 $\pm$ 5.53 (51–68)	60.10 $\pm$ 2.96 (56–64)	56.61 $\pm$ 4.50 (48–65)	70.06 $\pm$ 7.33 (60–83)
PB	111.71 $\pm$ 6.24 (100–117)	121.60 $\pm$ 3.10 (116–125)	111.83 $\pm$ 6.27 (97–124)	117.17 $\pm$ 5.44 (107–128)
VT	85.71 $\pm$ 2.43 (82–89)	84.20 $\pm$ 2.97 (78–88)	82.22 $\pm$ 4.87 (71–91)	21.50 $\pm$ 0.71 (21–22)
GU	73.14 $\pm$ 4.78 (65–80)	76.00 $\pm$ 2.87 (71–80)	69.94 $\pm$ 7.60 (61–92)	75.50 $\pm$ 5.27 (67–86)
MB	99.57 $\pm$ 4.35 (92–103)	106.10 $\pm$ 4.18 (100–113)	99.89 $\pm$ 5.85 (92–112)	101.44 $\pm$ 3.70 (94–107)
TI	22.29 $\pm$ 1.38 (21–24)	25.60 $\pm$ 0.97 (24–27)	23.28 $\pm$ 2.16 (20–28)	21.22 $\pm$ 1.06 (19–23)
LF	20.43 $\pm$ 1.27 (19–22)	20.50 $\pm$ 1.08 (19–22)	19.94 $\pm$ 1.06 (17–22)	20.11 $\pm$ 1.23 (18–22)
LT	25.86 $\pm$ 0.69 (25–27)	26.30 $\pm$ 1.25 (24–28)	24.94 $\pm$ 1.43 (23–29)	24.94 $\pm$ 1.55 (22–28)
SL	4.57 $\pm$ 0.53 (4–5)	5.50 $\pm$ 0.53 (5–6)	5.50 $\pm$ 0.62 (5–7)	4.72 $\pm$ 0.57 (4–6)
IL	5.00 $\pm$ 0.00 (5–5)	5.20 $\pm$ 0.42 (5–6)	5.72 $\pm$ 0.46 (5–6)	4.89 $\pm$ 0.58 (4–6)

SPECIES ACCOUNTS

TROPIDURIDAE BELL, 1843

*TROPIDURUS* WIED, 1825

My analyses revealed three new species of the *Tropidurus spinulosus* group distributed in eastern Paraguay. The species treated below may be diagnosed as members of the *T. spinulosus* group by having: (1) an enlarged middorsal scale row forming a dorsal crest (absent in other species groups); (2) yellow, orange, or cream thigh flash marks in the preloacal region and on ventral surface of the thighs of males (black in males of other species groups); (3) a strong antegular fold (absent in other species groups); (4) poorly defined postmental scale series (well defined in other species groups); (5) usually two rows of circumorbital scales (a single row in other species groups); and (6) body not extremely depressed (primarily found in the *T. semi-taeniatus* species group and, more moderately, in *T. bogerti*).

*Tropidurus lagunablanca*, n. sp.

Figures 2A–F, 3A–F

**HOLOTYPE:** CZPLT-H 402 (adult male; 23° 48' 43.20" S 56° 17' 40.92" W, WGS84 system; ~207 m above sea level; geographic coordinates not specified in the CZPLT catalog, estimated based on field observations of the restricted local distribution of the species in the type locality in September 2013), collected at Reserva Natural Laguna Blanca, Santa Rosa del Aguaray, San Pedro, Paraguay.

**PARATYPES:** AMNH-R 176291 (juvenile male), AMNH-R 176292 (adult female), collected at Reserva Natural Laguna Blanca, Santa Rosa del Aguaray, San Pedro, Paraguay (23° 48' 43.20" S 56° 17' 40.92" W, WGS84 system; ~207 m above sea level) by André L. Gomes de Carvalho,



TABLE 4. Mean  $\pm$  standard deviation, minimum and maximum values of scale counts of female lizards.

Abbreviations: **VB**, vertebrales; **PB**, paravertebrales; **VT**, ventrals; **GU**, gulars; **MD**, scales around midbody; **TI**, tibials; **LF**, subdigital lamellae under fourth finger; **LT**, subdigital lamellae under fourth toe; **SL**, supralabials; **IL**, infralabials.

	<i>T. guarani</i> (N = 7)	<i>T. lagunablanca</i> , n. sp. (N = 2)	<i>T. tarara</i> , n. sp. (N = 4)	<i>T. teyumirim</i> , n. sp. (N = 20)
VB	94.43 $\pm$ 3.41 (90–98)	77.00 $\pm$ 14.14 (67–87)	79.00 $\pm$ 7.12 (69–85)	96.90 $\pm$ 8.97 $\pm$ (79–112)
PB	113.86 $\pm$ 9.60 (94–121)	120.50 $\pm$ 3.54 (118–123)	119.25 $\pm$ 3.95 (116–124)	118.35 $\pm$ 5.51 (109–129)
VT	89.57 $\pm$ 2.82 (84–92)	88.50 $\pm$ 0.71 (88–89)	80.00 $\pm$ 2.45 (77–82)	85.30 $\pm$ 4.16 (77–93)
GU	76.43 $\pm$ 2.64 (74–81)	75.00 $\pm$ 2.83 (73–77)	64.25 $\pm$ 5.19 (58–69)	74.10 $\pm$ 5.30 (67–88)
MB	103.14 $\pm$ 5.52 (98–111)	110.50 $\pm$ 4.95 (107–114)	99.00 $\pm$ 4.24 (95–104)	103.10 $\pm$ 5.25 (94–112)
TI	22.71 $\pm$ 1.50 (21–25)	23.50 $\pm$ 0.71 (23–24)	21.50 $\pm$ 2.65 (19–25)	21.35 $\pm$ 1.14 (20–24)
LF	20.00 $\pm$ 1.73 (18–23)	20.50 $\pm$ 0.71 (20–21)	18.00 $\pm$ 1.41 (16–19)	19.55 $\pm$ 1.57 (17–22)
LT	25.29 $\pm$ 1.50 (23–27)	26.50 $\pm$ 0.71 (26–27)	23.00 $\pm$ 1.83 (21–25)	24.25 $\pm$ 1.68 (22–27)
SL	4.43 $\pm$ 0.53 (4–5)	5.00 $\pm$ 0.00 (5–5)	5.25 $\pm$ 0.50 (5–6)	4.65 $\pm$ 0.59 (4–6)
IL	5.00 $\pm$ 0.58 (4–6)	5.50 $\pm$ 0.71 (5–6)	5.25 $\pm$ 0.50 (5–6)	5.00 $\pm$ 0.46 (4–6)

Frederick Bauer, Nicolás Martínez, Viviana Espínola, and Marcelo Dujak in 7 September 2013. AMNH-R 176293 (adult female), collected at Reserva Natural Laguna Blanca, Santa Rosa del Aguaray, San Pedro, Paraguay (23° 48' 43.20" S 56° 17' 40.92" W, WGS84 system; ~207 m above sea level) by André L. Gomes de Carvalho, Rodrigo Ayala, and Johanna López in 29 September 2013. CZPLT-H 157, CZPLT-H 406, CZPLT-H 409, CZPLT-H 461 (adult males), CZPLT-H 405 (juvenile male), collected at Reserva Natural Laguna Blanca, Santa Rosa del Aguaray, San Pedro, Paraguay. MNHNP 11463 (adult male), collected at Laguna Blanca, San Pedro, Paraguay, by Norman J. Scott in 18 February 2010. MNHNP 11755 (juvenile male), MNHNP 11756 (subadult male), collected at Reserva Natural Laguna Blanca, Santa Rosa del Aguaray, San Pedro, Paraguay (23° 48' 43.20" S 56° 17' 40.92" W, WGS84 system; ~207 m above sea level), by André L. Gomes de Carvalho, Rodrigo Ayala, and Johanna López in 29 September 2013.

**MORPHOLOGICAL DIAGNOSIS:** *Tropidurus lagunablanca*, n. sp., may be distinguished from all congeners by the following combination of characteristics: (1) adult large and robust, reaching 113.09 and 94.59 mm SVL in males and females, respectively; (2) iris golden brown; (3) strongly projecting, serrate vertebral crest in males, reduced in females; (4) 1–2 canthals; (5) preocular not contacting canthal; (6) two rows of circumorbitals; (7) moderate tufts of neck spines; (8) high number of scales around midbody (100–113 in males and 107–114 in females); (9) sexes not extraordinarily dimorphic in body proportions, scutellation, and color pattern; (10) bright yellow lips in males; (11) orange coloration on the neck, posterior and lateral head (small greenish-blue spots, usually 2–3 scales in size, distributed frontally), extending posteriorly to form a vertebral stripe in males; (12) dorsum and flanks with gray background decorated with numerous greenish-blue light specks one scale in size or smaller, and irregular dark spots; (13) venter of head with dark and/or burnt orange spots, never exhibiting dark bars on the chin connected with a dark medial patch; (14) creamy yellow flash marks on the underside of the thighs and precloacal flap; (15) arboreal habits.

**COMPARISON WITH OTHER SPECIES:** *Tropidurus lagunablanca*, n. sp., is likely to be confounded with *T. tarara*, n. sp., but differs from that species by having males with orange color-

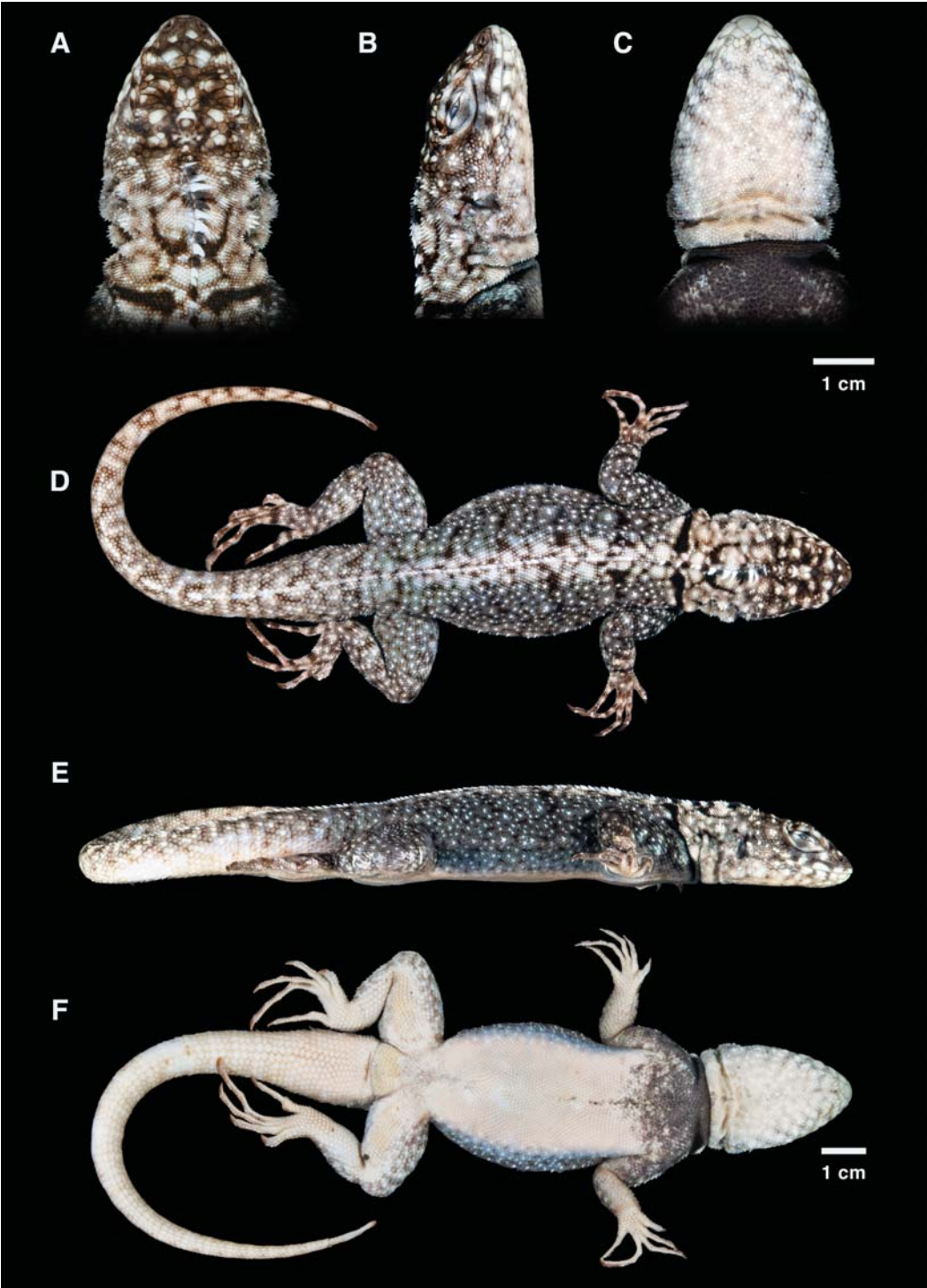


FIGURE 2. Holotype of *Tropidurus lagunablanca*, n. sp. (CZPLT-H 402). A–C. Dorsal, lateral, and ventral views of the head. D–F. Dorsal, lateral, and ventral views of the body.

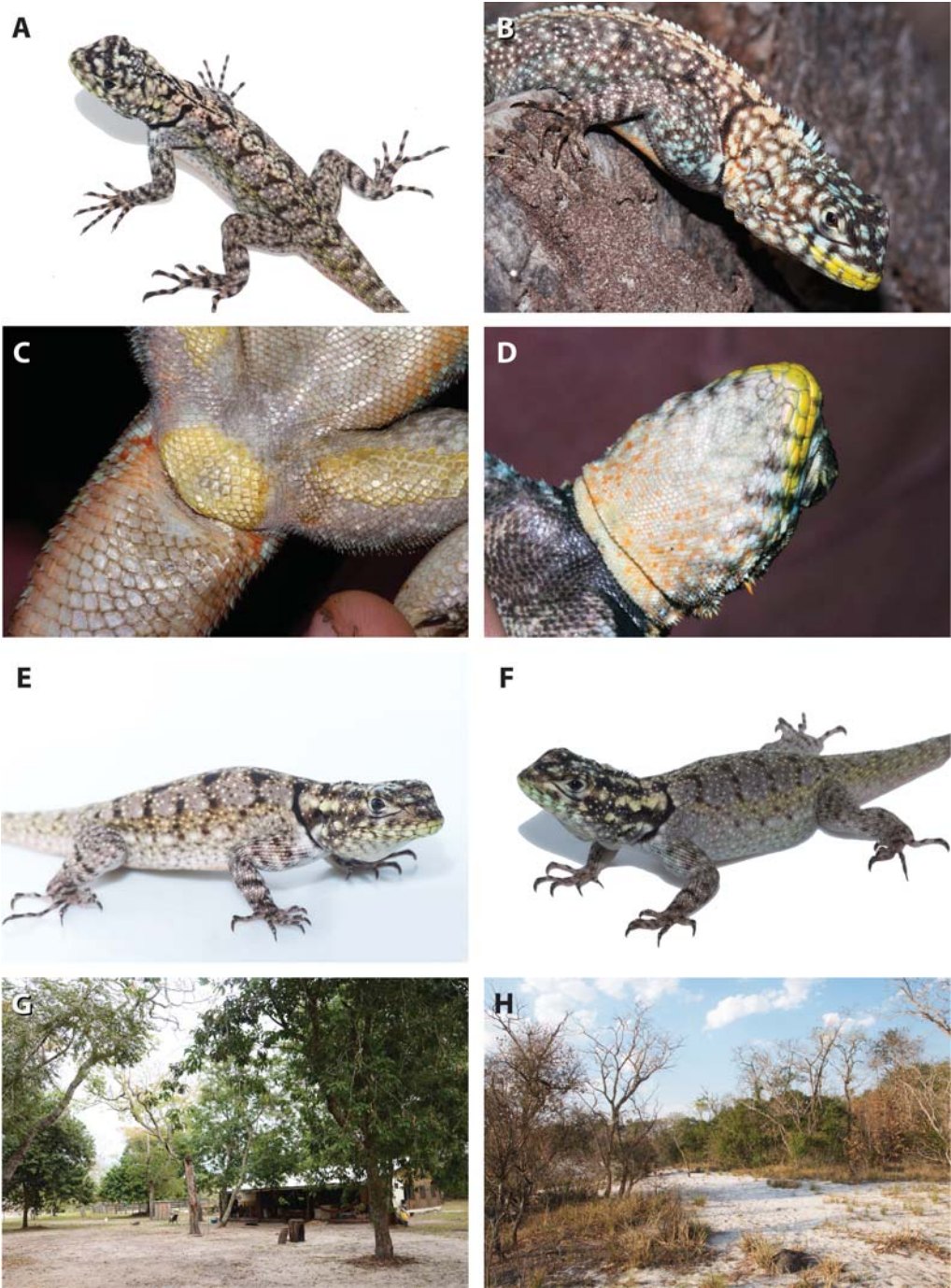




FIGURE 3. *Tropidurus lagunablanca*, n. sp. **A.** Juvenile male (AMNH-R 176291, paratype) showing its colorful dorsal pattern marked with diamondlike marks. **B.** Adult male (not collected). **C.** Ventral region of the adult male represented in figure 4B showing the creamy yellow flash marks on the underside of the thighs and precloacal flap. **D.** Ventral head of the adult male represented in Figure 4B. **E.** Female (AMNH-R 176293, paratype); **F.** Adult, gravid female exhibiting intensified dark coloration of the head (AMNH-R 176292, paratype). **G.** Biological station inside the Reserva Natural Laguna Blanca, showing the trees used by *T. lagunablanca*, n. sp., at the type locality. **H.** Sandy Cerrado at the northern portion of the Reserva Natural Laguna Blanca. Photos B–D: courtesy of Jean-Paul Brouard (Fundación Para La Tierra, Paraguay).

ation on the neck and posteriormost and lateral parts of the head, and greenish-blue spots 1–3 scales in size decorating the head frontally; the orange coloration of the neck extends posteriorly forming a vertebral stripe composed of circular blotches of variable sizes somewhat similar to, but not as circular as the ones on the head (males of *T. tarara*, n. sp., exhibit orange coloration as blotches or spots over the whole head and neck, and orange vertebral stripe formed by circular or irregular blotches of variable sizes). In both species, a dark, reticulated pattern is found on the head and neck, delimiting individual orange or orangey cream circular blotches (and greenish-blue spots in the frontal head of males of *T. lagunablanca*, n. sp.). Females of *T. lagunablanca*, n. sp., have higher number of ventrals (88–89 in *T. lagunablanca*, n. sp.; 77–82 in *T. tarara*, n. sp.), gulars (73–77 in *T. lagunablanca*, n. sp.; 59–69 in *T. tarara*, n. sp.), scales around midbody (107–114 in *T. lagunablanca*, n. sp.; 95–104 in *T. tarara*, n. sp.), lamellae under fourth finger (20–21 in *T. lagunablanca*, n. sp.; 16–19 in *T. tarara*, n. sp.), and lamellae of four toe (26–27 in *T. lagunablanca*, n. sp.; 21–25 in *T. tarara*, n. sp.).

*Tropidurus lagunablanca*, n. sp., differs from *T. teyumirim*, n. sp., by having larger body size (89.35–113.09 mm SVL in males and 75.48–94.59 mm SVL in females of *T. lagunablanca*, n. sp.; 67.82–94.41 mm SVL in males and 61.41–80.79 mm SVL in females of *T. teyumirim*, n. sp.) and cream or creamy yellow flash marks on the underside of the thighs and precloacal flap (orange-yellow in *T. teyumirim*, n. sp.). *Tropidurus lagunablanca*, n. sp., may still be distinguished from *T. guarani* and *T. teyumirim*, n. sp., by having males with a strongly projecting, serrate vertebral crest (low in the latter forms) and bright yellow lips (lips not as intensely colored in yellow and presenting stronger black bars in the later forms), orange coloration of the neck extending posteriorly to form a well-marked vertebral stripe, and venter of head decorated with tiny dark and/or burnt orange spots (vertebral stripe absent or lightly pigmented in orange, and chin decorated with intense black bars oriented lateromedially, connecting with a dark medial patch posteriorly in the latter forms).

*Tropidurus lagunablanca*, n. sp., could be confused with *T. xanthochilus* both of which have intense yellow lips and a strongly projecting, serrate dorsal crest. However, the new species differs from the latter form by having much lower number vertebrals (56–64 in males and 67–87 in females of *T. lagunablanca*, n. sp.; 80–87 in males and 105–118 in females of *T. xanthochilus*), cream or creamy yellow flash marks on the underside of the thighs and precloacal flap (orange-yellow in *T. xanthochilus*), and iris golden brown (dark in *T. xanthochilus*).

*Tropidurus lagunablanca*, n. sp., is distinguished from *T. spinulosus* by presenting moderate tufts of spines laterally on neck (strongly projecting in *T. spinulosus*), dorsal background and flanks gray, scattered with greenish-blue light specks restricted to one scale or smaller (greenish-

blue light specks absent in *T. spinulosus*), and higher number of scales around midbody (100–113 in males and 107–114 in females of *T. lagunablanca*, n. sp.; 77–98 in males and 82–95 in females of *T. spinulosus*). *Tropidurus lagunablanca*, n. sp., may be easily differentiated from *T. callathelys* and *T. melanopleurus* by presence of a gray background and lacking pronounced sexual dimorphism and dichromatism (males of *T. callathelys* are dark olive and females have a dark dorsal background and a flame scarlet head; males of *T. melanopleurus* have an intense orange head and complex dorsal coloration, with marked black background with light blotches anteriorly, transitioning into gray background with vivid green-yellow spots. Females have a brown head, black dorsal background laterally decorated with 4–6 red, cream, and green bands). *Tropidurus lagunablanca*, n. sp., is also distinguishable from *T. callathelys* and *T. melanopleurus* by having males with extremely serrate black and white vertebral crest, with touches of greenish blue (strongly serrate but very white, contrasting against the dark olive background in *T. callathelys*; low and similar in color to background in *T. melanopleurus*). The new species may also be differentiated by having two rows of circumorbital scales (one in *T. callathelys* and *T. melanopleurus*) and by lacking contact between preocular and canthal (preocular and posteriormost canthal in contact in *T. melanopleurus*). Unlike *T. callathelys*, *T. guarani*, *T. melanopleurus*, and *T. teyumirim*, n. sp., *T. lagunablanca*, n. sp., is arboreal (the former species are saxicolous).

**DESCRIPTION OF HOLOTYPE:** Large species of *Tropidurus*, body and limbs robust, SVL 109.33 mm; head triangular, length 27% of SVL and width 71% of head length; skull slightly depressed medially, not particularly elevated at level of the orbits; rostrum not shortened relative to most other species of the *T. spinulosus* group; scales of frontonasal region slightly elevated, not imbricating posteriorly; one to several diminutive scale organs present on head scales; rostral not tall, about 2 times as high as first supralabial, not tumescent, contacting first supralabials, first lorilabials, and three postrostrals; 2/1 postrostrals; nasal single, slightly higher than adjacent scales, separated from rostral by postrostral-lorilabial contact; 6/6 enlarged supralabials followed by a series of smaller scales that reach the *riktus oris*, never contacting subocular; nostril elliptical, occupying about 45% of nasal, positioned posteriorly, directed dorsolaterally; 2/2 canthals, anteriormost canthal separated from supralabials by 1/1 rows of loreals and 2/2 rows lorilabials; 6/6 enlarged, imbricate, diagonally oriented, laminate superciliary scales; 1/1 dorsally keeled, subretangular preoculars contacting 4/5 loreals; 1/1 dorsally keeled, elongate suboculars; palpebrals granular, second row with scales tumescent, subconical, bearing a scale organ on top; 2/2 main rows of supraoculars, the largest ones several times larger than the smallest; posteriormost enlarged supraoculars occupying whole width of the supraocular area; 2/2 rows of small, angulate circumorbitals, similar in size or slightly larger than the smallest supraocular scales; 1/1 rows of semi-laminate scales separating supraorbitals and superciliaries; 1/1 rows of short, laminate scales separating superciliaries and palpebrals; interparietal enlarged, subcordiform, 14% wider than long; parietal eye visible, positioned medially on the posterior limit of the first third of the interparietal scale; temporals unkeeled, angulate, tumescent, slightly imbricate posteriorly, noticeably larger than lateral neck scales and smaller than parietals, upper temporals slightly larger than lower temporals; one row of occipitals separating interparietal from dorsals; ear opening shaped like inverted keyhole, canal deep, largest diameter of meatus about 25% of meatus to snout dis-

tance; tympanum semitranslucent; preauricular fringe with a lower cluster of 5/5 spines; width of mental about 70% of the width of rostral; mental extending posteriorly to the level of two thirds of the adjacent infralabials; 6/6 enlarged infralabials followed by a series of small scales that reach the *riktus oris*; 3/3 enlarged postmentals; 1/1 postmentals in contact with first infralabial; first postmentals in contact with one another; 6/7 sublabials in contact with enlarged infralabials; 80 gulars, imbricated posteriorly; 3/3 nearly aligned and evenly spaced tufts of keeled, mucronate spines located between the dorsal margin of the ear and dorsal limit of the oblique neck fold, largest spines up to eight times larger than lateral neck spines; additional smaller clusters of heavily mucronate scales present on the lateral neck.

Vertebral crest present, extremely serrate, extending to the end of the first half of tail (tail regrown), vertebral spines much larger anteriorly, before nuchal collar, reaching twice the size of the posterior ones; 57 vertebrales; 120 paravertebrals; 100 scale rows around midbody; 86 ventrals; dorsals large, moderately keeled, imbricate, mucronate, up to about 20% larger than scales on the flanks; small, nonmucronate scales in the axillary region, growing in size and mucronation along the flanks; ventrals smooth, nonmucronate, imbricate, smaller than dorsals; flash marks on the underside of the thighs formed by 7/7 rows of glandular scales; 19 cloacal scales, precloacal flap with 8 rows of glandular scales similar to the ones on the underside of the thighs; supracarpals and supratarsals subtriangular, smooth or keeled, bearing a scale organ on the distal end of the scale; infracarpal and infratarsal scales smooth, slightly mucronate; digits thin, cylindrical, slightly compressed laterally; supradigital lamellae smooth, subtriangular to subrhomboidal, scale organ positioned on the distal end of the scales; infradigital lamellae tricarinate, 21/20 under fourth finger, 26/27 under fourth toe, medial keel larger and more projected than lateral; ungual similar to subdigital lamellae, nearly smooth; claws long, curved; pre- and postaxial scales of brachium moderately keeled or nearly smooth, slightly mucronate or presenting a scale organ on the distal end; preaxial thigh scales moderately keeled or smooth, slightly mucronate, postaxial ones heavily keeled and mucronate; 26/26 crus scales, keeled, mucronate; rictal fold present; nuchal and suprauricular folds absent; postauricular and longitudinal neck folds present, antegular fold heavily marked, bearing a deep mite pocket ventrolaterally, coated with diminutive granular scales; supernumerary antegular fold present; oblique neck fold well marked; gular fold incomplete medially, extending dorsally to form a heavily marked antehumeral fold; axillary and inguinal mite pockets absent; tail cylindrical, slightly compressed; caudal verticils absent; scales of tail keeled, mucronate, imbricate, up to three times larger than dorsals, caudal crest formed by serrate, laterally deflected, expanded scales.

**COLORATION IN LIFE:** There are no notes of coloration in life of the holotype.

**COLORATION IN PRESERVATIVE:** Coloration of the head, neck, and vertebral area pale orangish cream or cream; light areas in these regions contoured with dark, reticulated pigmentation defining circular blotches and spots of variable sizes; lateral head and neck with coloration similar to dorsal head, but decorated with moderately larger circular light blotches. Coloration of the head and neck extends posteriorly to form a well-defined vertebral stripe composed of continuous light blotches of variable sizes present middorsally. Lips pale cream, bearing four complete or interrupted dark bars extending downwards. Ventral side of head pale

cream, with faded, coarsely defined, dark-pigmented bars marginally on chin. Dorsal background dark gray, decorated with numerous light, greenish-blue speckles one scale in size or smaller, and dark blotches and spots of variable sizes. Four evenly spaced pairs of irregular, interrupted dark bars on dorsum (the anterior one rhombic in shape), with lateral tips extending towards the upper flanks. Flanks background gray, similar to dorsum, slightly lighter, decorated with numerous light, greenish-blue speckles one scale in size or smaller, and multiple small dark spots; dark spots on flanks slightly smaller than dorsolateral ones, occasionally forming an anastomosed pattern. Dark nuchal collar incomplete dorsally and U-shaped dark mark located between the back of the head and nuchal collar, both well marked.

Ventral ground coloration cream; chest and area between gular and antegular folds pigmented in black; lateral limits of the venter contact a thin, bluish area along the lower flanks, between the axillary and inguinal regions. Fore- and hind limbs with coloration similar to flanks, grading into an orangey cream background towards the dorsum of manus and pes. Light, greenish-blue speckles and dark spots present on limbs; distal regions of forelimbs, manus, and pes with thin dark stripes, more evident on digits. Ventral surface of forelimbs, hind limbs, manus, and pes cream, similar to venter of body and tail. Femoral and precloacal glandular flash marks pale creamy yellow. Tail with coloration similar to dorsum, slightly lighter; posterior half of tail grading into dull orangish cream; small dark spots scattered dorsally and on upper flanks of tail forming an anastomosed pattern; lower limits and ventral surface of the tail cream.

MEASUREMENTS OF THE HOLOTYPE (IN MM): SVL: 109.33; TL: 143.65; BH: 15.35; BW: 32.82; HH: 14.33; EOS: 24.95; HL: 30.13; HW: 21.70; AL: 17.30; FAL: 15.14; HDL: 20.97; THL: 21.74; SL: 19.79; FOL: 30.30; AGD: 46.31.

ETYMOLOGY: The epithet *lagunablanca*, an indeclinable word, refers to the type locality of the new species, the Reserva Natural Laguna Blanca, located in Santa Rosa del Aguaray, Department of San Pedro, Paraguay.

DISTRIBUTION, NATURAL HISTORY, AND CONSERVATION STATUS: *Tropidurus lagunablanca*, n. sp., is currently known exclusively from the type locality, the Reserva Natural Laguna Blanca, Department of San Pedro, Paraguay (figs. 1, 3G). Inside the reserve, the local range of the new species is apparently restricted to an area no larger than ~120,000 m<sup>2</sup>. *Tropidurus lagunablanca*, n. sp., was sighted only on large trees around the main house of the biological station, and very few specimens were observed in natural patches of sandy Cerrado woodland on the northern section of Laguna Blanca (J.P. Brouard, personal commun.; fig. 3H). Large sandy Cerrado fragments and the semideciduous Atlantic Forest that once covered the surroundings of Laguna Blanca were mostly converted into agricultural zones, with the result that natural landscapes that presumably harbored larger populations of *T. lagunablanca*, n. sp., no longer exist. For that reason, I support its classification under the category “critically endangered” according to the rules proposed by IUCN (2001). Additional fieldwork is needed to allow for a proper assessment of the distribution range of *T. lagunablanca*, n. sp., and molecular studies focused on the identification of genetic bottlenecks and determination of population viability are highly advisable.



*Tropidurus lagunablanca*, n. sp., is an arboreal species, very similar in habit to *T. tarara*, n. sp., and *T. spinulosus*. Feeding strategies and dietary preferences of *T. lagunablanca*, n. sp., have not been studied, but individuals from the Reserva Natural Laguna Blanca have been observed feeding on termites and wasps from nests located on the trees used by the species. Some individuals were also sighted hunting insects on the ground by quickly running down the tree trunks and, in just a few seconds, returning to their original position on the trees after having succeeded in capturing insects on the ground. *Tropidurus lagunablanca*, n. sp., is heliophilous and the frequency of specimen encounters apparently depends on environmental temperature and amount of sunlight. On a overcast day of fieldwork during my second visit to the Reserva Natural Laguna Blanca, I observed a much reduced number of active specimens, and their positions on the trees seemed determined by the distribution of patches of sunlight. Detailed assessments of ecological parameters, distribution limits, and population size of *T. lagunablanca*, n. sp., have never been performed, and should be prioritized due its critically endangered conservation status.

***Tropidurus tarara*, n. sp.**

Figures 4A–F, 5A–D

*Tropidurus guarani*—Frost et al., 1998: 839.

*Tropidurus guarani*—Frost et al., 2001: 361.

**HOLOTYPE:** MNHNP 12044 (adult male; 22° 41' 32.611" S, 57° 22' 9.574" W, WGS84 system; ~166 m above sea level), collected at Reserva Natural Cerrados del Tagatiya, Concepción, Paraguay, by André L. G. de Carvalho, Pastor Enmanuel Perez-Estigarribia, Rodrigo Ayala, Johanna López, and Nestor Romero in 20 September 2013.

**PARATYPES:** AMNH-R 176304 (adult male), AMNH-R 176305 (adult female), MNHNP 11771 (subadult male), collected with the holotype. AMNH-R 176307 (adult male), AMNH-R 176308 (juvenile of undetermined sex), AMNH-R 176309 (adult female), MNHNP 11772 (adult male), MNHNP 11773 (subadult male), MNHNP 11774 (adult male), MNHNP 11775 (adult male), MNHNP 11776 (adult male), collected at Loma farm corral, Reserva Natural Cerrados del Tagatiya, Concepción, Paraguay (22° 31' 5.495" S 57° 22' 21.219" W, WGS84 system; ~377 m above sea level), by André L. G. de Carvalho, Pastor Enmanuel Perez-Estigarribia, Rodrigo Ayala, Johanna López, and Nestor Romero in 20 September 2013. AMNH-R 176310 (juvenile of undetermined sex), AMNH-R 176311 (adult male), MNHNP 11767 (subadult male), collected at Estancia Bello Horizonte pathway, Ñu Porã, Reserva Natural Cerrados del Tagatiya, Concepción, Paraguay (22° 45' 5.350" S 57° 22' 17.198" W, WGS84 system; 200 m above sea level), by André L. G. de Carvalho, Pastor Enmanuel Perez-Estigarribia, Rodrigo Ayala, Johanna López, and Nestor Romero in 21 September 2013. MNHNP 11766 (juvenile female), collected at Estancia Bello Horizonte pathway, Ñu Porã, Reserva Natural Cerrados del Tagatiya, Concepción, Paraguay (22° 47' 26.34" S 57° 24' 13.28" W, WGS84 system; 200 m above sea level), by André L. G. de Carvalho, Pastor Enmanuel Perez-Estigarribia, Rodrigo Ayala, Johanna López, and Nestor Romero in 21 September 2013. AMNH-R 176312 (adult

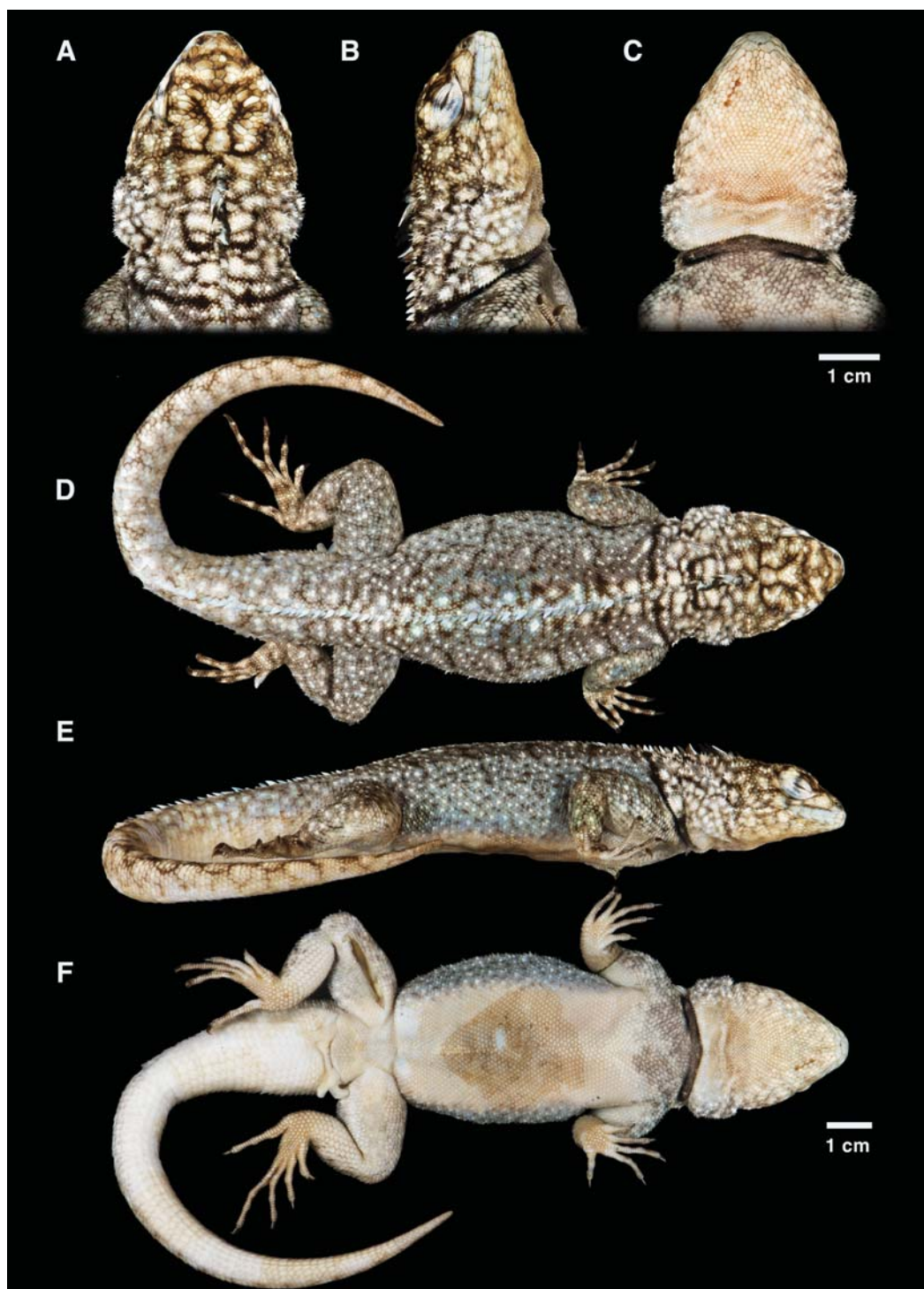


FIGURE 4. Holotype of *Tropidurus tarara*, n. sp. (MNHNP 12044). A–C. Dorsal, lateral, and ventral views of the head. D–F. Dorsal, lateral, and ventral views of the body.

male), AMNH-R 176313 (adult male), MNHNP 11768 (juvenile female), collected at the Parque Nacional Serranía San Luís (22° 38' 54.056" S 57° 27' 11.602" W, WGS84 system; 285 m above sea level), by André L. G. de Carvalho, Pastor Enmanuel Perez-Estigarribia, Rodrigo Ayala, Johanna López, and Nestor Romero in 21 September 2013.

**MORPHOLOGICAL DIAGNOSIS:** *Tropidurus tarara*, n. sp., differs from all congeners by the following combination of characteristics: (1) adult large and robust, reaching 122.82 and 93.97 mm SVL in males and females, respectively; (2) iris golden brown or orangish; (3) strongly projecting, serrate vertebral crest in males, reduced in females; (4) usually one, less frequently two canthals; (5) preocular not contacting canthal; (6) two rows of circumorbitals; (7) moderate tufts of neck spines; (8) intermediate number of scales around midbody (92–112 in males and 95–104 in females); (9) sexes not extraordinarily dimorphic in body proportions, scutellation, and color pattern; (10) bright yellow or greenish-yellow lips in males; (12) orange coloration spread as blotches or spots over the whole head and neck, extending posteriorly to form a vertebral stripe in males; (13) dorsum and flanks with gray background decorated with numerous greenish-blue light specks restricted to one scale or smaller, and numerous irregular dark spots; (14) ventral head with dark and/or burnt orange spots, never exhibiting lateromedially oriented dark bars on the chin, connecting with dark medial patch; (15) cream flash marks on the underside of the thighs and precloacal flap; (16) arboreal habits.

**COMPARISON WITH OTHER SPECIES:** *Tropidurus tarara*, n. sp., is most similar to *T. lagunablanca*, n. sp., but can be distinguished by the orange coloration spread as blotches or spots of variables sizes over the whole head and neck, extending posteriorly to form a vertebral stripe in males (*T. lagunablanca*, n. sp., exhibits orange coloration on the neck and posterior-most part of the head, and greenish-blue spots 1–3 scales in size anteriorly on head; an orange vertebral stripe is also present). In both species, a dark, reticulate pattern is present on the head and neck, defining individual orange or orangey cream circular blotches (and greenish-blue spots anteriorly on the head of males of *T. lagunablanca*, n. sp.). Females of *T. tarara*, n. sp., have lower number of ventrals (77–82 in *T. tarara*, n. sp., 88–89 in *T. lagunablanca*, n. sp.), gulars (58–69 in *T. tarara*, n. sp.; 73–77 in *T. lagunablanca*, n. sp.), scales around midbody (95–104 in *T. tarara*, n. sp.; 107–114 in *T. lagunablanca*, n. sp.), lamellae under fourth finger (16–19 in *T. tarara*, n. sp.; 20–21 in *T. lagunablanca*, n. sp.), and lamellae of fourth toe (21–25 in *T. tarara*, n. sp.; 26–27 in *T. lagunablanca*, n. sp.).

*Tropidurus tarara*, n. sp., differs from *T. guarani* and *T. teyumirim*, n. sp., by having males with a strongly projecting, serrate vertebral crest (low in the latter forms), bright yellow or greenish-yellow lips not decorated with intense dark vertical bars (lips not as intensely colored in yellow and presenting strong black bars in the later form), irregularly arranged orange spots on head and coloration of the head extending posteriorly to form a well-marked vertebral stripe middorsally, and ventral surface of head with dark and/or burnt orange spots (vertebral stripe absent or lightly pigmented in orange, and chin with intense black bars oriented lateromedially, connecting with a dark medial patch posteriorly in the latter forms). *Tropidurus tarara*, n. sp., may also be distinguished from *T. teyumirim*, n. sp., by having cream flash marks on the underside of the thighs and precloacal flap (orange-yellow in *T. teyumirim*, n. sp.) and



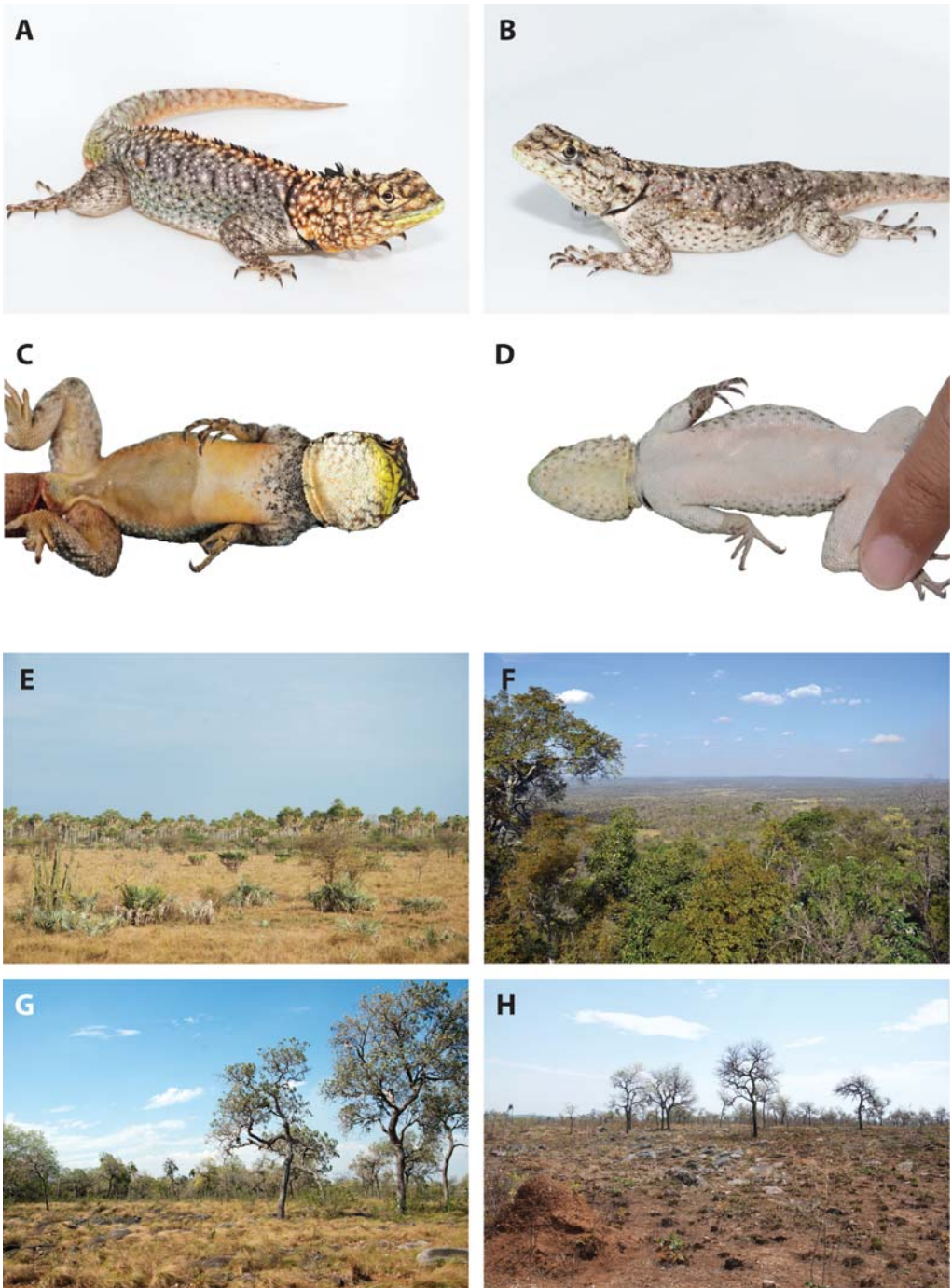


FIGURE 5. *Tropidurus tarara*, n. sp. **A.** Adult male (MNHN 12044, holotype), **B.** Adult female (AMNH-R 176305, paratype). **C.** Adult male, venter (AMNH-R 176304, paratype), **D.** Adult female, venter (AMNH-R 176305, paratype). **E–F.** Natural Cerrado landscapes from Reserva Natural Cerrados del Tagatiya and surroundings, Department of Concepción, Paraguay. **G–H.** Natural Cerrado fields dominated by Bignoniaceae occupied by *T. tarara*, n. sp., at the Parque Nacional Serranía San Luís, Department of Concepción, Paraguay. Sites G and H are located a few kilometers apart from each other and show different stages of recovery of the vegetation after fire events.

much larger body (98.04–122.82 mm SVL in males and 88.35–93.97 mm SVL in females of *T. tarara*, n. sp.; 67.82–94.41 mm SVL in males and 61.41–80.79 mm SVL in females of *T. teyumirim*, n. sp.). *Tropidurus tarara*, n. sp., could be confused with *T. xanthochilus*, which also has intense yellow lips and strongly projecting, serrate dorsal crest, but differs from that form by having much lower number of vertebrae (48–65 in males and 69–85 in females of *T. tarara*, n. sp.; 80–87 in males and 105–118 in females of *T. xanthochilus*), cream flash marks on the underside of the thighs and precloacal flap (orange-yellow in *T. xanthochilus*), and iris golden brown or orangish (dark in *T. xanthochilus*).

*Tropidurus tarara*, n. sp., differs from *T. spinulosus* by presenting moderate tufts of spines on lateral neck (strongly projecting in *T. spinulosus*), a dorsal background gray scattered with greenish-blue light specks restricted to one scale or smaller (light specks absent in *T. spinulosus*), higher number of scales around midbody (92–112 in males and 95–104 in females of *T. tarara*, n. sp.; 77–98 in males and 82–95 in females of *T. spinulosus*). *Tropidurus tarara*, n. sp., is easily distinguished from *T. callathelys* and *T. melanopleurus* by presenting gray background and by lacking pronounced sexual dimorphism and dichromatism (males of *T. callathelys* are dark olive and females have a dark dorsal background and a flame scarlet head; males of *T. melanopleurus* have an intense orange head and complex dorsal coloration, with marked black background with light blotches anteriorly, transitioning into gray background with vivid green-yellow spots. Females have a brown head, black dorsal background laterally decorated with 4–6 red, cream, and green bands. Another clear distinction between *T. tarara*, n. sp., *T. callathelys*, and *T. melanopleurus* is the extremely serrate black and white vertebral crest present in males of the new species (strongly serrate but very white, contrasting against the dark olive background in *T. callathelys*; low and similar in color to background in *T. melanopleurus*). *Tropidurus tarara*, n. sp., may also be differentiated by having two rows of circumorbital scales (one in *T. callathelys* and *T. melanopleurus*) and by lacking contact between preocular and canthal (preocular and posteriormost canthal in contact in *T. melanopleurus*). Unlike *T. callathelys*, *T. guarani*, *T. melanopleurus*, and *T. teyumirim*, n. sp., *T. tarara*, n. sp., is arboreal (the former species are saxicolous).

**DESCRIPTION OF HOLOTYPE:** Large species of *Tropidurus*, body and limbs robust, SVL 106.01 mm; head triangular, length 29% of SVL and width 75% of head length; skull slightly depressed medially, not particularly elevated at level of the orbits; rostrum not shortened relative to most other species of the *T. spinulosus* group; scales of frontonasal region slightly elevated, not imbricating posteriorly; one to several diminutive scale organs on head scales; rostral not remarkably tall, about 2.5 times as high as first supralabial, not tumescent, contacting first supralabials, first lorilabials, and four postrostrals; 2/2 postrostrals; nasal single, slightly higher

than adjacent scales, separated from rostral by postrostral-lorilabial contact; 5/5 enlarged supralabials followed by a series of smaller scales that reach the *rictus oris*, never contacting subocular; nostril elliptical, occupying about 40% of nasal, positioned posteriorly, directed dorsolaterally, borders not noticeably elevated; 1/1 canthals, separated from supralabials by 1/1 rows of lorilabials; 7/8 enlarged, imbricate, diagonally oriented, laminate superciliary scales; 1/1 dorsally keeled, subretangular preoculars contacting 3/3 loreals; 1/1 dorsally keeled, elongate suboculars; palpebrals granular, second row with tumescent scales, subconical, bearing a scale organ on top; 3/3 rows of supraoculars, most scales occupying up to one third of the width of the supraocular area, posteriormost enlarged supraoculars occupying two thirds of the width of the supraocular area; 2/2 rows of small, angulate circumorbitals, slightly smaller than medial supraocular scales; 1/1 rows of semilaminate scales separating supraorbitals and superciliaries; 1/1 rows of short, laminate scales separating superciliaries and palpebrals; interparietal enlarged, subcordiform, about 10% wider than long; parietal eye visible, positioned medially on the posterior limit of the first third of the interparietal scale; temporals unkeeled, angulate, tumescent, subconical, slightly imbricate posteriorly, noticeably larger than lateral neck scales and smaller than parietals, upper temporals slightly larger than lower temporals; two rows of occipitals separating interparietal from dorsals; ear opening shaped like inverted keyhole, canal noticeably deep, largest diameter of meatus about 25% of meatus to snout distance; tympanum semitranslucent; preauricular fringe with a lower cluster of 8/6 spines; width of mental about 80% of the width of rostral; mental extending posteriorly to the level of the first half of adjacent infralabials; 6/6 enlarged infralabials followed by a series of small scales that reach the *rictus oris*; 2/3 enlarged postmentals; 1/1 postmentals in contact with first infralabial; first postmentals in contact with one another; 6/6 sublabials in contact with enlarged infralabials; 66 gulars, imbricated posteriorly; 3/3 nearly aligned and evenly spaced tufts of keeled, mucronate spines located between the dorsal margin of the ear and dorsal limit of the oblique neck fold, largest spines up to seven times larger than lateral neck spines; smaller clusters of heavily mucronate scales present of the lateral neck.

Vertebral crest present, extremely serrate, extending to the end of the first half of tail, vertebral spines much larger anteriorly, before nuchal collar, reaching twice the size of the posterior ones; 61 vertebrae; 122 paravertebrals; 93 scale rows around midbody; 85 ventrals; dorsals large, moderately keeled, imbricate, mucronate, up to about 20% larger than scales on flanks, scale organ substitutes mucron in part of the dorsal scales; small, nonmucronate scales in the axillary region, increasing in size along the flanks; ventrals smooth, nonmucronate, imbricate, smaller than dorsals; flash marks and mucronation on the underside of the thighs formed by 6/6 rows of glandular scales; 18 cloacal scales, precloacal flap with 8 rows of glandular scales similar to the ones on the underside of the thighs; supracarpals and supratarsals subtriangular, smooth, bearing a scale organ on the distal end of the scale; infracarpal and infratarsal scales smooth, slightly mucronate; digits thin, cylindrical, slightly compressed; supradigital lamellae smooth, subtriangular to subrhomboidal, scale organ positioned on the distal end of the scales; infradigital lamellae tricarinate, 21 under left fourth finger, right finger amputated, 26 under right fourth toe, left toe amputated, medial keel larger and more projected than lateral; ungual

similar to subdigital lamellae, nearly smooth; claws long, curved; pre- and postaxial scales of brachium moderately keeled or smooth, mucronate or presenting a scale organ on the distal end, grading into smooth, nonmucronate scales on the ventral surface of the limb; preaxial thigh scales moderately keeled or smooth, mucronate, postaxial ones heavily keeled and mucronate; 23/23 crus scales, keeled, mucronate; rictal fold present; nuchal and supraauricular folds absent; postauricular and longitudinal neck folds present, antegular fold heavily marked, bearing a deep mite pocket ventrolaterally, coated with diminutive granular scales; supernumerary antegular fold present; oblique neck fold well marked; gular fold incomplete medially, extending dorsally to form a heavily marked antehumeral fold; axillary and inguinal folds absent; tail cylindrical, slightly compressed; caudal verticils absent; scales of tail imbricate up to three times larger than dorsals, keeled, mucronate or bearing a scale organ in the distal end of the scale, caudal crest formed by serrate, laterally deflected, expanded scales.

**COLORATION IN LIFE:** Head and neck marked with dark reticulations that define orange and orange-cream spots and blotches of variable sizes; two dark bars oriented perpendicularly to the main body axis distinguishable on the snout and between the eyes; burnt orange coloration scattered on the lateral head and neck, concentrated on the tip or posterior margin of the scales. Lips bright green-yellow. Iris golden brown, nearly orange. Ventral side of the head cream with small burnt orange spots randomly distributed; discrete, sparse, short, marginal, semianastomosed dark marks on lateral chin; medial dark patch absent. Orange coloration of head and neck extends posteriorly forming a well-marked vertebral stripe that ends just before the beginning of the tail; vertebral stripe with light spots or blotches of variable sizes. Dorsal background dark gray, decorated with pale green or pale orange scales distributed dorsolaterally. Flanks greenish gray, scattered with touches of green yellow (upper) and turquoise green (lower) nearly forming longitudinal stripes. Multiple small dark spots decorate the dorsum, occasionally forming short, irregular, descending stripes dorsolaterally; spots on flanks slightly smaller than dorsolateral ones. Dorsally complete nuchal collar formed by 2–3 rows of dark scales positioned at the level of gular fold. U-shaped dark bar present between the back of the head and nuchal collar.

Ventral ground coloration orangey cream, chest scattered with a few burnt orange spots posteriorly; lateral limits of the venter decorated with 3–4 scales thick orange stripe oriented anteroposteriorly, from axillary to inguinal region. Fore- and hind limbs with same coloration of flanks proximally, similarly ornate, grading into orangey cream coloration towards the dorsum of manus and pes. Limbs scattered with small dark spots or short, thin, irregular stripes, including digits; ventral surface of manus and pes orange cream. Femoral and precloacal glandular flash marks yellow, 20/21 and 16 scales long, respectively. Tail with gray background, similar to dorsum, slightly lighter, laterally decorated with green-yellow scales along its first half, becoming orangey cream posteriorly; small dark spots scattered dorsally and on upper flanks of the tail, lower limits orange and similar coloration on the ventral surface.

**COLORATION IN PRESERVATIVE:** Orange coloration on dorsal head and neck faded into dull pale cream; second half of vertebral stripe mostly vanished. Dark pigmentation on head and lateral neck preserved, although contrast against background was noticeably reduced; burnt orange coloration originally scattered on the lateral head and neck completely lost. Lips pale



green. Ventral side of the head cream, burnt orange spots lost; discrete, sparse, short, marginal, semianastomosed dark marks on the lateral chin partially faded; medial dark patch absent. Dark, reticulated pigmentation on the posterior side of the head lateral neck delineate light areas or spots of variable sizes. Dorsal background dark gray; pale green or pale orange scales persisted dorsolaterally, yet dully colored. Flanks background gray, similar to dorsum, slightly lighter; green yellow and pale turquoise scales became pale green or cream. Multiple small dark spots ornate the dorsum, occasionally forming short, irregular, descending stripes dorsolaterally present, yet presenting reduced contrast against the darker background; spots on flanks slightly smaller than dorsolateral ones. Nuchal collar and U-shaped dark bar located between the back of the head and nuchal collar nearly unchanged.

Ventral ground coloration cream; throat and chest dark, burnt orange spots originally scattered on the posterior area of chest completely vanished; lateral limits of the venter lost the orange stripe oriented anteroposteriorly, between axillary and inguinal region. Fore- and hind limbs maintained coloration similar to flanks, however grading into cream background coloration towards the dorsum of manus and pes. Small dark spots or short, thin, irregular stripes, preserved on limbs, including digits; ventral surface of hind limbs, forelimbs, manus, and pes turned cream, similar to venter. Femoral and precloacal glandular flash marks turned pale creamy yellow. Tail maintained coloration similar to dorsum, slightly lighter; green-yellow scales distributed laterally along its first half became pale bluish green; second half of tail grading into dull orange cream; small dark spots scattered dorsally and on upper flanks of tail preserved; lower limits and ventral surface of the tail grading from bright orange coloration to cream.

MEASUREMENTS OF THE HOLOTYPE (IN MM): SVL: 116.01; TL: 146.00; BH: 19.16; BW: 35.74; HH: 16.68; EOS: 27.18; HL: 33.79; HW: 25.40; AL: 17.58; FAL: 14.84; HDL: 20.30; THL: 22.46; SL: 20.87; FOL: 30.40; AGD: 51.29.

ETYMOLOGY: The specific epithet (pronounced *ta-ra-rá*) is an indeclinable word. In Guarani language, “*tarara*” is both a verb and a noun that refers to making strong, repetitive sounds (or to the sound itself) by clattering the teeth. The word *tarara* is also employed colloquially as an adjective meaning “unquiet” or “restless.” The epithet “*tarara*” makes reference to this colloquial meaning, and alludes to the remarkable behavior of *T. tarara*, n. sp. (and other congeners), which use series of head bobs and body push-ups for visual communication and territorial displays.

DISTRIBUTION, NATURAL HISTORY, AND CONSERVATION STATUS: *Tropidurus tarara*, n. sp., is currently known from localities in northern Paraguay, east of the Paraguay River (figs. 1, 5E–H). Field observations and specimens housed in the Museo Nacional de Historia Natural del Paraguay (MNHN) and American Museum of Natural History (AMNH) confirmed the presence of the new species in the Departments of Amambay and Concepción. The species likely enters the State of Mato Grosso do Sul, Brazil, but Brazilian territory has not been systematically examined. *Tropidurus tarara*, n. sp., is locally abundant and protected by three conservation units in Paraguay, namely the Reserva Natural Cerrados del Tagatiya (figs. 5E–F), the Parque Nacional Serranía San Luís (figs. 5G–H), and the Parque Nacional Cerro Corá. Therefore, I support its classification under the category “least concern” according to the rules proposed by IUCN (2001).

*Tropidurus tarara*, n. sp., is an arboreal species restricted to Cerrado savannas. The species is very similar in habit to the Chacoan *T. spinulosus*. In natural areas of the Parque Nacional Serranía San Luís, Department of Concepción, *T. tarara*, n. sp., was observed on virtually every tree along pathways that cut through the cerrados dominated by Bignoniaceae trees. Feeding strategies and dietary preferences of *T. tarara*, n. sp., have not been studied. *Tropidurus tarara*, n. sp., is a heliophilous species easily observable basking on tree trunks. In the Reserva Natural Cerrados del Tagatiya, Department of Concepción, I observed up to six individuals on large trees around the main houses of the Garay Cué Farm. The number of animals seemed proportional to the size of the trees and complexity of the canopy. Females and juveniles occupied trees dominated by a large, adult male, but satellite males seemed to cohabitate. Individual lizards or adult couples were frequently observed on small and middle-sized trees. As a rule, lizards of both sexes normally bask on tree trunks, but several individuals opportunistically used fence poles and the rooftops of the corral of the Loma Farm, associated to the Reserva Natural Cerrados del Tagatiya. However, ecology of *T. tarara*, n. sp., has never been studied in Paraguay.

***Tropidurus teyumirim*, n. sp.**

Figures 6A–F, 7A–D

*Tropidurus spinulosus guarani*—Alvarez et al., 1994: 164.

*Tropidurus guarani*—Frost et al., 1998: 839.

*Tropidurus guarani*—Frost et al., 2001: 361.

**HOLOTYPE:** MNHNP 12045 (adult male; 26° 2' 59.715" S, 56° 52' 12.809" W, WGS84 system; ~229 m above sea level), collected at the Parque Nacional Ybycui, Paraguari, Paraguay, by André L. G. de Carvalho, Frederick Bauer, Nicolás Martínez, Viviana Espínola, and Marcelo Dujak in 10 August 2013

**PARATYPES:** AMNH-R 176285 (adult female), MNHNP 11752–53 (two juveniles of undetermined sex), collected with the holotype; AMNH-R 176286 (adult male; 26° 3' 9.529" S, 56° 48' 28.357" W, WGS84 system; 201 m above sea level), AMNH-R 176287 (juvenile female; 26° 3' 6.559" S, 56° 48' 29.570" W, WGS84 system; 205 m above sea level), MNHNP 11754 (juvenile of undetermined sex; 26° 3' 6.48" S, 56° 48' 29.52" W, WGS84 system; 205 m above sea level), collected in Salto Mbocarusu, Parque Nacional Ybycui, Paraguari, Paraguay, by André L. G. de Carvalho, Frederick Bauer, Nicolás Martínez, Viviana Espínola, Marcelo Dujak, Alejandro Bonzi, and Camila Corvalan in 11 August 2013. MNHNP 4361 (adult male), collected at the Parque Nacional Ybycui, Arroyo Corrientes, Salto Mbocarusú, Paraguari, Paraguay, by L. Fitzgerald in 1 May 1981. MNHNP 4383 (adult male), collected at the Parque Nacional Ybycui, Arroyo Corrientes, Salto Mbocarusú, Paraguari, Paraguay, by L. Fitzgerald and J. Filion in 18 April 1981. MNHNP 4386 (adult female) and MNHNP 4388 (adult male) collected at the Parque Nacional Ybycui, Arroyo Corrientes, Salto Mbocarusú, Paraguari, Paraguay, by L. Fitzgerald in 23 January 1981. MNHNP 8505 (adult female), MNHNP 8508 (adult male), MNHNP 8509 (adult female), and MNHNP 8510 (adult female) collected at the Parque Nacional Ybycui, Arroyo Corrientes, Saltos Mbocarusú Paraguari, Paraguay, by L. Fitzgerald between

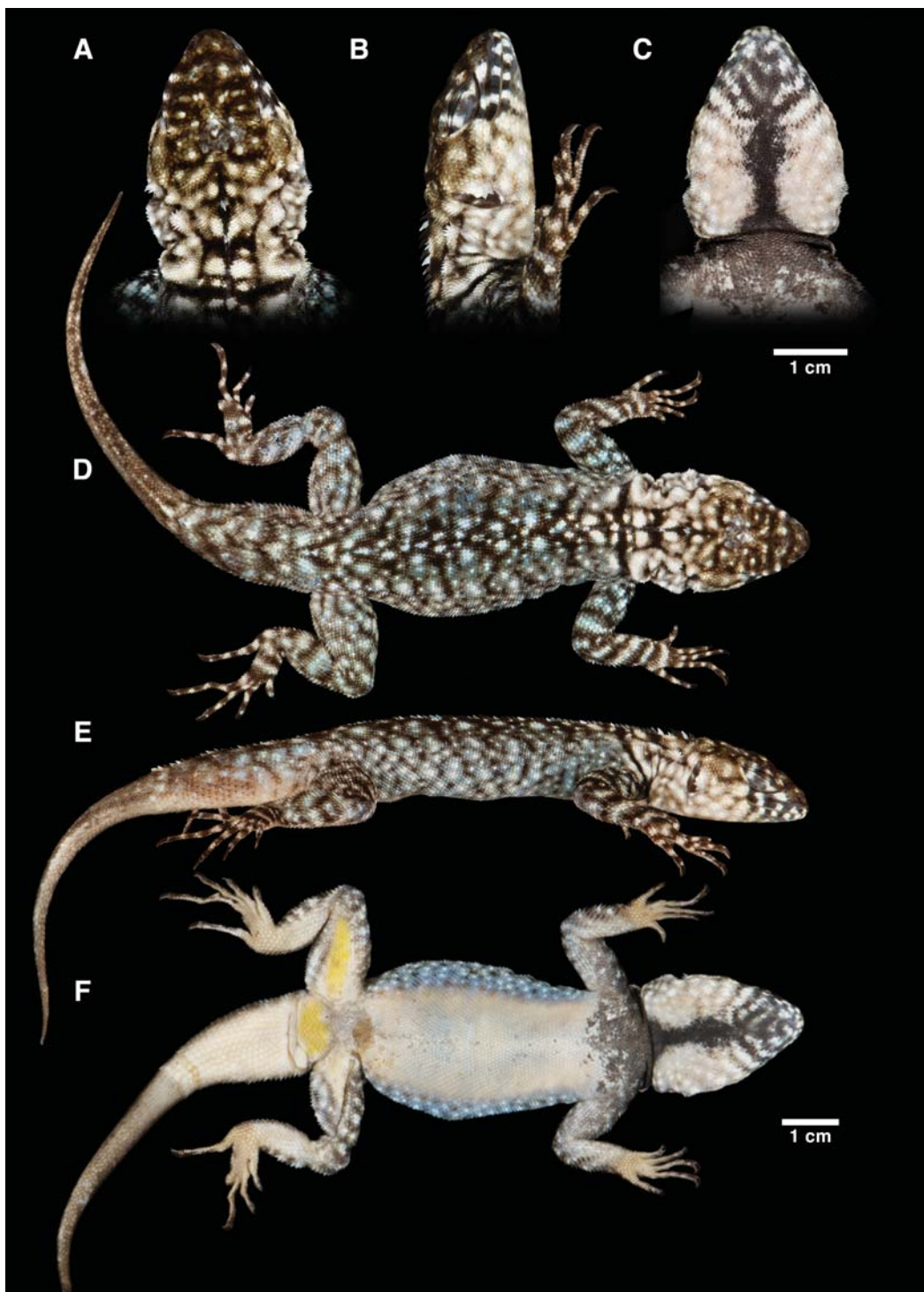


FIGURE 6. Holotype of *Tropidurus teyumirim*, n. sp. (MNHN 12045). A–C. Dorsal, lateral, and ventral views of the head. D–F. Dorsal, lateral, and ventral views of the body.

17–23 April 1981. MNHNP 8506 (adult female) and MNHNP 8507 (adult male) collected at the Parque Nacional Ybycui, Arroyo Corrientes, 2 km NO de Saltos, Paraguarí, Paraguay, by L. Fitzgerald between 22–23 January 1981.

**MORPHOLOGICAL DIAGNOSIS:** *Tropidurus teyumirim*, n. sp., differs from all congeners by the following combination of characteristics: (1) small-sized adult, reaching 94.41 and 80.79 mm SVL in males and females, respectively; (2) body slightly depressed; (3) large number of vertebral scales (60–83 in males and 79–112 in females); (4) iris golden brown; (5) low vertebral crest in males, reduced in females; (6) one canthal; (7) preocular not contacting canthal; (8) two rows of circumorbitals; (9) reduced tufts of neck spines; (10) sexes not extraordinarily dimorphic in body proportions, scutellation, and color pattern; (11) lips decorated with touches of yellow and intense black vertical bars; (12) ventral head decorated with well-marked black bars oriented lateromedially on chin, connecting posteriorly with a dark medial patch; (13) orange-yellow flash marks on the underside of the thighs and preloacal flap; (14) saxicolous habits.

**COMPARISON WITH OTHER SPECIES:** *Tropidurus teyumirim*, n. sp., differs from all other congeners by having smaller size (67.82–94.41 and 61.41–80.79 mm SVL in males and females, respectively). This species is most similar with *T. guarani*, but differs from the latter by having orange-yellow flash marks on the underside of the thighs and preloacal flap (yellow or creamy yellow in *T. guarani*) and higher number of vertebral scales (51–68 in males and 90–98 in females of *T. guarani*; 60–83 in males and 79–112 in females of *T. teyumirim*, n. sp.). Unlike *T. lagunablanca*, n. sp., *T. spinulosus*, *T. tarara*, n. sp., and *T. xanthochilus*, *T. teyumirim*, n. sp., exhibits a low vertebral crest (strongly projecting, serrate vertebral crest in the former species), intensely marked black bars on chin, posteriorly reaching a medial dark patch that separates two burnt orange areas on each side of the posterior ventral head, and intensely dark pigmented throat and chest (other patterns in the former species), body slightly depressed (robust body in the former species), and saxicolous habit (former species are arboreal). *Tropidurus teyumirim*, n. sp., also differ from *T. spinulosus* and *T. xanthochilus* in the number of vertebrales (40–56 in males and 55–81 in females of *T. spinulosus*; 80–87 in males and 105–118 in females of *T. xanthochilus*; 60–83 in males and 79–112 in females of *T. teyumirim*, n. sp.) and scales around midbody (77–98 in males and 82–95 in females of *T. spinulosus*; 94–107 in males and 94–112 in females of *T. teyumirim*, n. sp.). *Tropidurus teyumirim*, n. sp., is easily distinguished from *T. spinulosus*, *T. lagunablanca*, n. sp., and *T. tarara*, n. sp., by having orange-yellow flash marks on the underside of thighs and preloacal flap (cream in *T. spinulosus* and yellow or creamy yellow in *T. lagunablanca*, n. sp., and *T. tarara*, n. sp.).

*Tropidurus teyumirim*, n. sp., is readily distinguished from *T. callathelys* and *T. melanopleurus* by having a gray dorsal background and by lacking pronounced sexual dimorphism and dichromatism (males of *T. callathelys* are dark olive and females have a dark dorsal background and flame scarlet head; males of *T. melanopleurus* have intense orange head and complex dorsal coloration, with marked black background with light blotches anteriorly, transitioning into a gray background with vivid green-yellow spots, and females have a brown head, black dorsal background laterally decorated with 4–6 red, cream and green bands). *Tropidurus teyumirim*, n. sp., also differs from *T. callathelys* and *T. melanopleurus* by having a low black and white



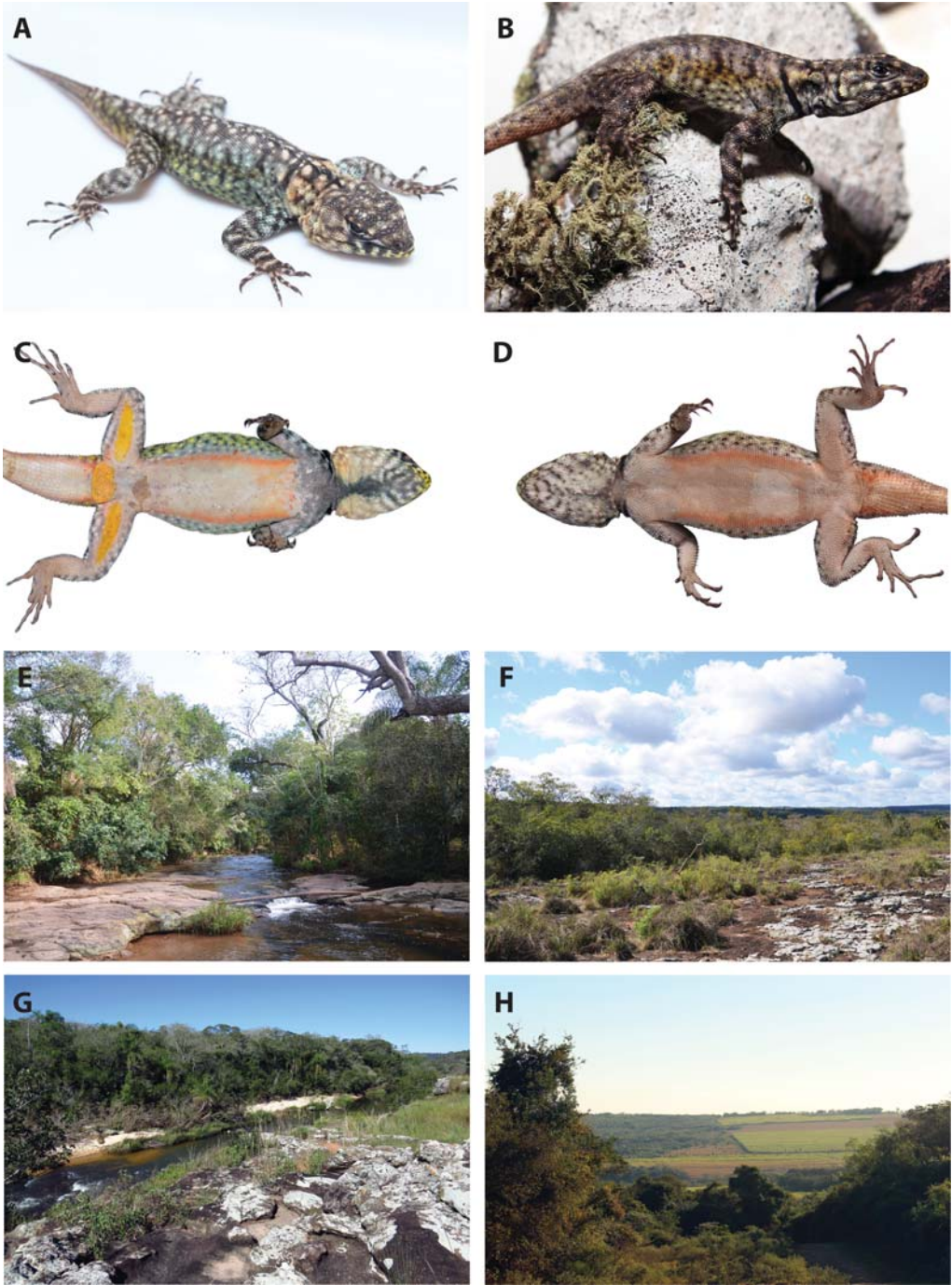


FIGURE 7. *Tropidurus teyumirim*, n. sp. **A, C.** Adult male (MNHN 12045, holotype). **B, D.** Adult female (AMNH-R 176285, paratype). **E.** Semideciduous Atlantic Forest at the Parque Nacional Ybycui, Department of Paraguari, Paraguay. **F.** Type locality of *T. teyumirim*, n. sp., with exposed sedimentary rocks at the Parque Nacional Ybycui. **G.** Exposed sedimentary rocks used by *T. teyumirim*, n. sp., along the margins of the Arroyo Corrientes at a site known as Salto Mbocarusu, located in the Parque Nacional Ybycui. **H.** Northern limits of the Parque Nacional Ybycui showing natural areas of semideciduous Atlantic Forest changing abruptly into croplands.

dorsal crest (strongly serrate and distinctly white, contrasting against the dark olive background in *T. callathelys*; low and similar in color to background in *T. melanopleurus*). Unlike *T. callathelys* and *T. melanopleurus*, *T. teyumirim*, n. sp., has two rows of circumorbital scales (usually one in the former species) and lacks contact between preocular and canthal (preocular and posteriormost canthal in contact in *T. callathelys* and *T. melanopleurus*).

**DESCRIPTION OF HOLOTYPE:** Small species of *Tropidurus*, body slightly depressed, SVL 94.41 mm; head subtriangular, length 25% of SVL and width 79% of head length; skull slightly depressed, not particularly elevated at level of orbits; rostrum not particularly shortened relative to other species of the *T. spinulosus* group; scales of frontonasal region not imbricating posteriorly; one to multiple lenticulate scale organs distributed over the head scales; rostral not remarkably tall, less than twice as high as first supralabial, not tumescent, contacting first supralabials, first lorilabials, and three postrostrals; 1/2 postrostrals; nasal single, not higher than adjacent scales, separated from rostral by postrostral–lorilabial contact; 5/5 enlarged supralabials followed by a series of smaller scales reaching the *rictus oris*, never contacting subocular; nostril elliptical, occupying about 60% of nasal, positioned posteriorly, directed dorsolaterally, borders elevated; 1/2 canthals; 6/6 enlarged, imbricate, diagonally oriented, laminate superciliaries; 2/2 dorsally keeled preoculars contacting 4/4 loreals; 1/1 dorsally keeled, elongate suboculars medially separated from supralabials by 2 rows of lorilabials; palpebrals granular; 3/3 rows of supraoculars, most scales occupying less than one third, and posteriormost enlarged scales occupying two thirds or less of the width of the supraocular area; 2/2 rows of small, angulate circumorbitals, about the same size of the anterior supraocular scales; 1/1 rows of short, laminate scales separating circumorbitals from enlarged superciliaries, and 1/1 rows of short, laminate scales separating superciliaries from palpebrals; interparietal enlarged, subcordiform, as long as wide; parietal eye visible, positioned medially on the posterior limit of the first third of the interparietal scale; temporals unkeeled, angulate, tumescent, slightly imbricate posteriorly, noticeably larger than lateral neck scales and smaller than parietals; upper temporals slightly larger than lower temporals; parietals angulate; two rows of occipitals separating interparietal from dorsals; ear opening shaped like inverted keyhole, canal deep, largest diameter of meatus about 30% of meatus to snout distance; tympanum semitranslucent; preauricular fringe with a lower cluster of 8/5 spines; mental subtriangular, about 70% of the width of rostral, extending posteriorly to the level of the first third of the adjacent infralabials; 6/5 enlarged infralabials followed by a series of smaller scales reaching the *rictus oris*; 2/3 enlarged postmentals; 1/1 postmentals in contact with first infralabial; first postmentals not contacting one another; 8/7 sublabials in contact with enlarged infralabials; 78 gulars, slightly imbricate posteriorly; 3/3 nearly evenly spaced tufts of keeled, mucronate spines aligned

between the dorsal margin of the ear and dorsal limit of the lateral neck fold, largest spines up to eight times larger than lateral neck spines; clusters of heavily mucronate scales distributed in the area adjacent to the dorsal limit of the antehumeral fold.

Vertebral crest low, serrate, extending to the distal half of the tail; vertebral, spinelike scales larger anteriorly, before nuchal collar; 76 vertebrae; 131 paravertebrals; 101 scales around mid-body; 82 ventrals; dorsals large, slightly keeled, mucronate, imbricate, about 20% larger than scales on the flanks; axillary region with diminutive, nonmucronate scales, growing in size and mucronation along the flanks; ventrals slightly smaller than dorsals, smooth, nonmucronate, imbricate; flash marks on underside of the thighs formed by 6/6 rows of glandular scales; 15 cloacal scales, precloacal flap with 8 rows of glandular scales similar to the ones on the underside of the thighs; supracarpals subtriangular, supratarsals subtriangular to subrhomboidal, both smooth and bearing a scale organ on the distal end of the scale; infracarpals smooth and infratarsals mucronate, reducing in size towards digits III and IV; digits thin, cylindrical, slightly compressed; supradigital lamellae smooth, subtriangular to subrhomboidal, scale organ positioned on the distal end of the scales; infradigital lamellae tricarinate, 20/19 under fourth finger, 24 under right fourth toe, left toe amputated, medial keel larger and more projected than lateral keels; ungual similar to subdigital lamellae, nearly smooth; claws long, curved; preaxial scales of brachium moderately keeled and mucronate, postaxial ones with more pronounced keels and mucrons; preaxial thigh scales moderately keeled or smooth, slightly mucronate, postaxial ones heavily keeled and mucronate; 22/21 crus scales, keeled, mucronate; rictal and nuchal folds absent; postauricular and longitudinal neck folds present, antegular fold heavily marked, bearing a deep mite pocket dorsolaterally, coated with diminutive granular scales; supernumerary antegular fold present; oblique neck fold well marked and diverging dorsally; gular fold incomplete medially, extending dorsally to form a heavily marked antehumeral fold internally coated with granular scales; axillary and inguinal folds absent; tail regenerated, cylindrical, slightly compressed; caudal verticils absent; scales of tail up to four times larger than dorsals, keeled, mucronate, imbricate, caudal crest formed by laterally deflected, expanded vertebral scales.

**COLORATION IN LIFE:** Pale orange head, dark pigmentation scattered from frontonasal to parietal and temporal regions; two parallel, slightly darker bars oriented perpendicularly to the main body axis distinguishable anteriorly and between the eyes. Orange coloration spread over lateral head and neck. Loreal, lorilabial, palpebral, and circumorbital regions with light gray background. Palpebral, subocular, lorilabial and labial regions decorated with parallel, descending dark bars. Lips light yellow. Iris dark. Dark line, 2–3 scales thick, extends from posterior end of the subocular bar all the way along the lateral neck on each side, passing over the dorsal limit of the lower temporal region, upper auricular region and lateral neck below the base of the tufts of spines. Similar dark line extends from upper temporal region to nuchal collar, flanking the limits of the vertebral region on each side. Mental region with pale background, decorated with dark bars directed antero/lateromedially; a thick dark patch extends medially along the gular region, separating bright orange areas decorated ventrolaterally with light spots 3–7 scales in size on each side of the ventral head.



Vertebral region with pale orange spots 3–12 scales in size, defined against a dark vertebral background. Flanks pale opaline green decorated with numerous green-yellow spots of variable sizes and marked with descending, irregular dark stripes that may anastomose or semireticate, followed by small dark spots on the lower flanks. The dorsal background is marked with a dorsally complete nuchal collar positioned at the level of gular fold, formed by 3–4 rows of dark scales; dark bar present between parietal region and nuchal collar, preceded by narrower and more elongate subrhomboidal dark mark positioned at the beginning of the dorsal crest. Dark pigmentation covers the throat and extends posteriorly into the chest and base of forearms. Ventral ground coloration pale orange, area just posterior to forelimbs scattered with irregular bright orange spots, ventrolaterally positioned; straight, three scales thick, bright orange stripe extends from axillary to inguinal region. Brachium pale opaline green with irregular dark spots or stripes proximally, grading into pale orange background with well-marked, nearly parallel stripes distally. Background of thighs is a mix of pale opaline green and pale orange coloration scattered with irregular dark stripes and spots not as marked and symmetrical as the ones on forelimbs. Dorsum of manus and pes pale orange, marked with well-defined dark stripes, including digits. Ventral surface of limbs pale orange. Femoral and precloacal flash marks orange-yellow, 20/21 and 16 scales long, respectively. Tail with coloration similar to dorsum, laterally decorated with green-yellow spots similar to those on the flanks, ventral side pale orange, ventrolateral straight, bright orange line, similar to, but discontinuous with orange stripes on lateral limits of venter.

**COLORATION IN PRESERVATIVE:** Orange pigmentation on dorsal head and neck faded into dull cream coloration. Dorsal body gained an overall darker appearance, opaline green coloration turned grayish, offering more contrast for numerous light green spots spread over the dorsum, flanks, and tail, specially the larger ones distributed throughout the vertebral region. Dark marks and irregular spots preserved on vertebral region, dorsum, and flanks. Green-yellow spots that brightly colored the flanks of the specimen in life were completely washed out. Coloration of mental region preserved, with a series of dark stripes directed antero/lateromedially. Dark medial patch on the ventral side of the head well marked, extending throughout the throat. Light spots of variable sizes scattered posteriorly on the ventrolateral area of the head. Nuchal collar, throat, and chest dark coloration remained nearly unchanged. Ventral coloration faded, bright orange stripes along the lateral limits of the venter almost entirely faded. Dark stripes preserved on the dorsal face of limbs, manus, and pes, pale orange background coloration almost completely lost in both fore- and hind limbs. Flash marks of the precloacal flap and underside of the thighs turned yellow, not preserving the originally intense orange-yellow coloration. Tail preserved coloration similar to dorsum, but green-yellow spots originally present laterally were washed out; ventral coloration became pale cream and bright orange ventrolateral stripes were lost.

**MEASUREMENTS OF THE HOLOTYPE (IN MM):** SVL: 94.41; TL: 79.33 (tail regrown); BH: 11.34; BW: 27.69; HH: 10.64; EOS: 21.29; HL: 23.90; HW: 18.89; AL: 14.70; FAL: 12.45; HDL: 16.71; THL: 19.20; SL: 16.48; FOL: 24.94; AGD: 40.37.

**ETYMOLOGY:** The specific epithet, *teyumirim*, is a newly coined, indeclinable word derived from the juxtaposition of the noun *teyu* (= “lizard”) and the adjective *mirim* (= “little”), literally

meaning “little lizard,” in Guaraní language. The name alludes to the reduced size of *T. teyumirim*, n. sp., the smallest species of the *T. spinulosus* species group known to date.

**DISTRIBUTION, NATURAL HISTORY, AND CONSERVATION STATUS:** *Tropidurus teyumirim*, n. sp., is known only from the type locality, in the western side of the Parque Nacional Ybycui, and a couple of sites approximately 6.5 km east of the type locality, inside the same park (Salto Mbo-carusu and area near the confluence of the rivers Karaimi and Corrientes) (figs. 1, 7E–H). The Serranía de Ybycui comprises the entire distribution of the species as currently known. The geography of the region is similar to that of the areas occupied by *T. guarani*, marked by the presence of exposed sedimentary rock terraces on mountaintops surrounded by semideciduous Atlantic Forest. However, *T. teyumirim*, n. sp., also dwells on the margins of the main rivers inside the Parque Nacional Ybycui. In riverine areas, the species uses large sedimentary rocks exposed on riverbanks and near waterfalls (*saltos*). The number of specimens collected by different workers at the Parque Nacional Ybycui within the past three decades indicates that the population of *T. teyumirim*, n. sp., is large in that area. Daytime temperatures during my visit to the Parque Nacional Ybycui in early August 2013, varied 6°–13° C; hence, the few active specimens of *T. teyumirim*, n. sp., observed are unlikely to represent the actual density of the new species in the type locality. Since a formal assessment of the distribution limits, ecological requirements, and population size of *T. teyumirim*, n. sp., is currently unavailable, I recommend the new species to be classified as “data deficient” according to the rules proposed by IUCN (2001).

*Tropidurus teyumirim*, n. sp., is diurnal, heliophilous, and saxicolous, hardly differing from *T. guarani* with respect to its ecology. It uses the same types of sedimentary rocks as its congener and has similar coloration pattern, which provides camouflage against the lichenous background. Nothing is known about the dietary preferences of *T. teyumirim*, n. sp. *Tropidurus teyumirim*, n. sp., uses rock surfaces for basking and seeks shelter underneath rock blocks and in rock crevices. Lizards can be found lying dormant underneath rock blocks early in the morning when temperatures are still low. The species was never observed on three trunks along the limits or inside the forests surrounding the exposed sedimentary terraces. *Tropidurus teyumirim*, n. sp., is syntopic with *Notomabuya frenata* (Cope, 1862) and an undescribed species of the genus *Ameivula* at the Parque Nacional Ybycui, however, aspects of their interactions are unknown.

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## APPENDIX

## SPECIMENS EXAMINED

Collections: **AMNH**, American Museum of Natural History, New York, United States; **CZPLT**, Colección Zoológica Para La Tierra, Santa Rosa del Aguaray, Paraguay; **MNHNP**, Museo Nacional de Historia Natural del Paraguay, Asunción, Paraguay; **MHNC**, Museo de Historia Natural Alcide d'Orbigny, Cochabamba, Bolivia; **USNM**, US National Museum, Washington, D.C., United States.

Number	Species	Sex	Locality	Data Type
AMNH-R 176281	<i>T. guarani</i>	Male	Cerro Naranjo (aka. Cerro Pedregal), Piribebuy, Cordillera, Paraguay	Meristic/Morphometric
AMNH-R 176282	<i>T. guarani</i>	Female	Cerro Tobati, Tobati, Cordillera, Paraguay	Meristic/Morphometric
AMNH-R 176283	<i>T. guarani</i>	Male	Mirador viewpoint of the Lake Ypacarai, San Bernardino, Cordillera, Paraguay	Meristic
AMNH-R 176288	<i>T. guarani</i>	Male	Cerro Hu, Paraguairí, Paraguairí, Paraguay	Meristic/Morphometric
AMNH-R 176289	<i>T. guarani</i>	Female	Cerro Hu, Paraguairí, Paraguairí, Paraguay	Meristic/Morphometric
AMNH-R 176290	<i>T. guarani</i>	Male	Cerro Hu, Paraguairí, Paraguairí, Paraguay	Meristic/Morphometric
MNHNP 4360	<i>T. guarani</i>	Male	Salto de Pirareta, 16 km E Piribebuy, Cordillera, Paraguay	Meristic/Morphometric
MNHNP 8502	<i>T. guarani</i>	Female	Salto de Pirareta, 16 km E Piribebuy, Cordillera, Paraguay	Meristic/Morphometric
MNHNP 8503	<i>T. guarani</i>	Female	Salto de Pirareta, 16 km E Piribebuy, Cordillera, Paraguay	Meristic/Morphometric
USNM 342058	<i>T. guarani</i>	Male	Piribebuy, ca. 16 km E Salto de Pirareta, Piribebuy, Cordillera, Paraguay	Meristic/Morphometric
USNM 342059	<i>T. guarani</i>	Female	Piribebuy, ca. 16 km E Salto de Pirareta, Piribebuy, Cordillera, Paraguay	Meristic/Morphometric
USNM 342060	<i>T. guarani</i>	Female	Piribebuy, ca. 16 km E Salto de Pirareta, Piribebuy, Cordillera, Paraguay	Meristic/Morphometric
USNM 342061	<i>T. guarani</i>	Male	Piribebuy, ca. 16 km E Salto de Pirareta, Piribebuy, Cordillera, Paraguay	Meristic
USNM 342062	<i>T. guarani</i>	Female	Piribebuy, ca. 16 km E Salto de Pirareta, Piribebuy, Cordillera, Paraguay	Meristic/Morphometric
AMNH-R 176291	<i>T. lagunablanca</i> , n. sp.	Male	Estación Biológica Laguna Blanca, Santa Rosa del Aguaray, San Pedro, Paraguay	Meristic
AMNH-R 176292	<i>T. lagunablanca</i> , n. sp.	Female	Estación Biológica Laguna Blanca, Santa Rosa del Aguaray, San Pedro, Paraguay	Meristic/Morphometric
AMNH-R 176293	<i>T. lagunablanca</i> , n. sp.	Female	Estación Biológica Laguna Blanca, Santa Rosa del Aguaray, San Pedro, Paraguay	Meristic/Morphometric
CZPLT-H 157	<i>T. lagunablanca</i> , n. sp.	Male	Estación Biológica Laguna Blanca, Santa Rosa del Aguaray, San Pedro, Paraguay	Meristic/Morphometric

Number	Species	Sex	Locality	Data Type
CZPLT-H 402	<i>T. lagunablanca</i> , n. sp.	Male	Estación Biologica Laguna Blanca, Santa Rosa del Aguaray, San Pedro, Paraguay	Meristic/Morphometric
CZPLT-H 405	<i>T. lagunablanca</i> , n. sp.	Male	Estación Biologica Laguna Blanca, Santa Rosa del Aguaray, San Pedro, Paraguay	Meristic
CZPLT-H 406	<i>T. lagunablanca</i> , n. sp.	Male	Estación Biologica Laguna Blanca, Santa Rosa del Aguaray, San Pedro, Paraguay	Meristic/Morphometric
CZPLT-H 409	<i>T. lagunablanca</i> , n. sp.	Male	Estación Biologica Laguna Blanca, Santa Rosa del Aguaray, San Pedro, Paraguay	Meristic/Morphometric
CZPLT-H 461	<i>T. lagunablanca</i> , n. sp.	Male	Estación Biologica Laguna Blanca, Santa Rosa del Aguaray, San Pedro, Paraguay	Meristic/Morphometric
MNHNP 11463	<i>T. lagunablanca</i> , n. sp.	Male	Laguna Blanca, San Pedro, Paraguay	Meristic/Morphometric
MNHNP 11755	<i>T. lagunablanca</i> , n. sp.	Male	Estación Biologica Laguna Blanca, Santa Rosa del Aguaray, San Pedro, Paraguay	Meristic
MNHNP 11756	<i>T. lagunablanca</i> , n. sp.	Male	Estación Biologica Laguna Blanca, Santa Rosa del Aguaray, San Pedro, Paraguay	Meristic
MHNC-R 310	<i>T. melanopleurus</i>	Male	Arce, Alarache, Tarija, Bolivia	Morphometric
MHNC-R 388	<i>T. melanopleurus</i>	Male	Arce, Alarache, Tarija, Bolivia	Morphometric
MHNC-R 389	<i>T. melanopleurus</i>	Female	Arce, Alarache, Tarija, Bolivia	Morphometric
MHNC-R 431	<i>T. melanopleurus</i>	Male	Chapare, Villa Fátima, Cochabamba, Bolivia	Morphometric
MHNC-R 463	<i>T. melanopleurus</i>	Male	Parapetiguasu, Okita Valle, Bolivia	Morphometric
AMNH-R 141502	<i>T. spinulosus</i>	Male	San Antonio de Parapetí, Santa Cruz, Bolivia	Morphometric
AMNH-R 141503	<i>T. spinulosus</i>	Male	San Antonio de Parapetí, Santa Cruz, Bolivia	Meristic/Morphometric
AMNH-R 141506	<i>T. spinulosus</i>	Female	La Brecha, ca 104-120 km NE Charagua, Izozog Region, Santa Cruz, Bolivia	Meristic
AMNH-R 141512	<i>T. spinulosus</i>	Female	La Brecha, ca 104-120 km NE Charagua, Izozog Region, Santa Cruz, Bolivia	Meristic/Morphometric
AMNH-R 141513	<i>T. spinulosus</i>	Male	La Brecha, ca 104-120 km NE Charagua, Izozog Region, Santa Cruz, Bolivia	Meristic/Morphometric
AMNH-R 141734	<i>T. spinulosus</i>	Male	La Brecha, ca 104-120 km NE Charagua, Izozog Region, Santa Cruz, Bolivia	Meristic/Morphometric
AMNH-R 141735	<i>T. spinulosus</i>	Female	La Brecha, ca 104-120 km NE Charagua, Izozog Region, Santa Cruz, Bolivia	Meristic/Morphometric
AMNH-R 141736	<i>T. spinulosus</i>	Male	La Brecha, ca 104-120 km NE Charagua, Izozog Region, Santa Cruz, Bolivia	Meristic/Morphometric
AMNH-R 141737	<i>T. spinulosus</i>	Female	La Brecha, ca 104-120 km NE Charagua, Izozog Region, Santa Cruz, Bolivia	Meristic/Morphometric
AMNH-R 141738	<i>T. spinulosus</i>	Male	La Brecha, ca 104-120 km NE Charagua, Izozog Region, Santa Cruz, Bolivia	Meristic/Morphometric



Number	Species	Sex	Locality	Data Type
AMNH-R 141739	<i>T. spinulosus</i>	Male	La Brecha, ca 104-120 km NE Charagua, Izozog Region, Santa Cruz, Bolivia	Meristic/Morphometric
AMNH-R 141740	<i>T. spinulosus</i>	Female	La Brecha, ca 104-120 km NE Charagua, Izozog Region, Santa Cruz, Bolivia	Meristic/Morphometric
AMNH-R 141741	<i>T. spinulosus</i>	Female	La Brecha, ca 104-120 km NE Charagua, Izozog Region, Santa Cruz, Bolivia	Meristic/Morphometric
AMNH-R 141742	<i>T. spinulosus</i>	Female	La Brecha, ca 104-120 km NE Charagua, Izozog Region, Santa Cruz, Bolivia	Meristic/Morphometric
AMNH-R 143312	<i>T. spinulosus</i>	Female	25 Leguas, about 100 km airline NW Pozo Colorado on Transchaco Hwy, Presidente Hayes, Paraguay	Morphometric
AMNH-R 176294	<i>T. spinulosus</i>	Male	Rodeo Trebol, Loma Plata, Boquerón, Paraguay	Meristic/Morphometric
AMNH-R 176295	<i>T. spinulosus</i>	Female	Rodeo Trebol, Loma Plata, Boquerón, Paraguay	Meristic/Morphometric
AMNH-R 176296	<i>T. spinulosus</i>	Male	Rodeo Trebol, Loma Plata, Boquerón, Paraguay	Meristic/Morphometric
AMNH-R 176297	<i>T. spinulosus</i>	Male	Rodeo Trebol, Loma Plata, Boquerón, Paraguay	Meristic/Morphometric
AMNH-R 176298	<i>T. spinulosus</i>	Male	Rodeo Trebol, Loma Plata, Boquerón, Paraguay	Meristic/Morphometric
AMNH-R 176299	<i>T. spinulosus</i>	Male	Parque Nacional Teniente Agripino Enciso, Boquerón, Paraguay	Meristic
AMNH-R 176300	<i>T. spinulosus</i>	Female	Small farm near the main entrance of the Parque Nacional Teniente Agripino Enciso, Boquerón, Paraguay	Meristic/Morphometric
AMNH-R 176301	<i>T. spinulosus</i>	Female	Destacamento Militar Número 1, III Cuerpo de Ejercito, 5ª Division de Infanteria, Boquerón, Paraguay	Meristic/Morphometric
AMNH-R 176302	<i>T. spinulosus</i>	Male	Destacamento Militar Número 1, III Cuerpo de Ejercito, 5ª Division de Infanteria, Boquerón, Paraguay	Meristic/Morphometric
AMNH-R 176303	<i>T. spinulosus</i>	Male	Destacamento Militar Número 1, III Cuerpo de Ejercito, 5ª Division de Infanteria, Boquerón, Paraguay	Meristic/Morphometric
AMNH-R 176314	<i>T. spinulosus</i>	Male	Ruta Transchaco Km 323.5, Rio Verde, Presidente Hayes, Paraguay	Meristic/Morphometric
AMNH-R 176315	<i>T. spinulosus</i>	Female	Ruta Transchaco Km 323.5, Rio Verde, Presidente Hayes, Paraguay	Meristic/Morphometric
AMNH-R 176316	<i>T. spinulosus</i>	Male	Approx. 3 km coming toward Rancho Karanda farm, from km 328.5 Ruta Transchaco, Rio Verde, Presidente Hayes, Paraguay	Meristic
MNHNP 11277	<i>T. spinulosus</i>	Female	Estancia Gral Diaz, Laguna Gral Diaz, Alto Paraguay, Paraguay	Morphometric
MNHNP 11279	<i>T. spinulosus</i>	Male	Estancia Campo Verde, Presidente Hayes, Paraguay	Morphometric
MNHNP 11287	<i>T. spinulosus</i>	Female	Estancia Campo Verde, Presidente Hayes, Paraguay	Morphometric



Number	Species	Sex	Locality	Data Type
MNHNP 11291	<i>T. spinulosus</i>	Female	Parque Nacional Defensores del Chaco, Madrejón, Alto Paraguay, Paraguay	Meristic/Morphometric
MNHNP 11408	<i>T. spinulosus</i>	Female	Parque Nacional Teniente Agripino Enciso, 680 km NO Asunción, Boquerón, Paraguay	Meristic/Morphometric
MNHNP 11757	<i>T. spinulosus</i>	Female	Rodeo Trebol, Loma Plata, Boquerón, Paraguay	Morphometric
MNHNP 11758	<i>T. spinulosus</i>	Male	Rodeo Trebol, Loma Plata, Boquerón, Paraguay	Meristic
MNHNP 11759	<i>T. spinulosus</i>	Female	Rodeo Trebol, Loma Plata, Boquerón, Paraguay	Meristic/Morphometric
MNHNP 11760	<i>T. spinulosus</i>	Female	Rodeo Trebol, Loma Plata, Boquerón, Paraguay	Meristic/Morphometric
MNHNP 11761	<i>T. spinulosus</i>	Male	Rodeo Trebol, Loma Plata, Boquerón, Paraguay	Meristic/Morphometric
MNHNP 11762	<i>T. spinulosus</i>	Male	Rancho Karanda, Rio Verde, Presidente Hayes, Paraguay	Meristic
MNHNP 11763	<i>T. spinulosus</i>	Female	Rancho Karanda, Rio Verde, Presidente Hayes, Paraguay	Meristic
MNHNP 11764	<i>T. spinulosus</i>	Female	Destacamento Militar Número 1, III Cuerpo de Ejercito, 5ª Division de Infanteria, Boquerón, Paraguay	Meristic/Morphometric
MNHNP 11765	<i>T. spinulosus</i>	Male	Destacamento Militar Número 1, III Cuerpo de Ejercito, 5ª Division de Infanteria, Boquerón, Paraguay	Meristic/Morphometric
MNHNP 11769	<i>T. spinulosus</i>	Male	Parque Nacional Teniente Agripino Enciso, Boquerón, Paraguay	Meristic
MNHNP 11770	<i>T. spinulosus</i>	Male	Parque Nacional Teniente Agripino Enciso, in front of visitors' lodge, Boquerón, Paraguay	Meristic
MNHNP 2690	<i>T. spinulosus</i>	Female	Parque Nacional Defensores del Chaco, Agua Dulce, Chaco, Paraguay	Meristic/Morphometric
MNHNP 3357	<i>T. spinulosus</i>	Male	Colonia Potrerito, 30 km SO Bahia Negra, Alto Paraguay, Paraguay	Morphometric
MNHNP 3358	<i>T. spinulosus</i>	Male	Colonia Potrerito, 30 km SO Bahia Negra, Alto Paraguay, Paraguay	Morphometric
MNHNP 4031	<i>T. spinulosus</i>	Female	Pedro P. Peña, Boquerón, Paraguay	Morphometric
MNHNP 4038	<i>T. spinulosus</i>	Male	Pedro P. Peña, Boquerón, Paraguay	Morphometric
MNHNP 4304	<i>T. spinulosus</i>	Female	Parque Nacional Teniente Enciso, Nueva Asunción, Paraguay	Meristic
MNHNP 4351	<i>T. spinulosus</i>	Male	Parque Nacional Defensores del Chaco, Agua Dulce, Chaco, Paraguay	Meristic/Morphometric
MNHNP 4352	<i>T. spinulosus</i>	Female	Teniente Enciso, Nueva Asunción, Paraguay	Morphometric
MNHNP 4353	<i>T. spinulosus</i>	Female	Teniente Enciso, Nueva Asunción, Paraguay	Morphometric
MNHNP 4355	<i>T. spinulosus</i>	Female	Estancia La Victoria, Ruta Transchaco km 234, Presidente Hayes, Paraguay	Morphometric

Number	Species	Sex	Locality	Data Type
MNHNP 4356	<i>T. spinulosus</i>	Female	Agua Dulce, Administración, Chaco, Paraguay	Meristic/Morphometric
MNHNP 4358	<i>T. spinulosus</i>	Female	Estancia La Victoria, Ruta Transchaco km 234, Presidente Hayes, Paraguay	Morphometric
MNHNP 4359	<i>T. spinulosus</i>	Female	Parque Nacional Defensores del Chaco, Cerro León, Tribu Nueva, Chaco, Paraguay	Meristic/Morphometric
MNHNP 4362	<i>T. spinulosus</i>	Male	Teniente Enciso, Nueva Asunción, Paraguay	Meristic/Morphometric
MNHNP 4363	<i>T. spinulosus</i>	Female	Estancia La Victoria, Ruta Transchaco km 234, Presidente Hayes, Paraguay	Morphometric
MNHNP 4530	<i>T. spinulosus</i>	Male	Parque Nacional Defensores del Chaco, Cerro León, Tribu Nueva, Chaco, Paraguay	Meristic/Morphometric
MNHNP 6006	<i>T. spinulosus</i>	Female	Estancia La Victoria, Ruta Transchaco km 234, Presidente Hayes, Paraguay	Morphometric
MNHNP 6007	<i>T. spinulosus</i>	Female	Estancia La Victoria, Ruta Transchaco km 234, Presidente Hayes, Paraguay	Morphometric
MNHNP 6832	<i>T. spinulosus</i>	Female	Parque Nacional Defensores del Chaco, Madrejón, Alto Paraguay, Paraguay	Meristic/Morphometric
MNHNP 7151	<i>T. spinulosus</i>	Female	Parque Nacional Defensores del Chaco, Cruce 4 de mayo, Alto Paraguay, Paraguay	Meristic/Morphometric
MNHNP 7265	<i>T. spinulosus</i>	Male	Parque Nacional Defensores del Chaco, 68 km O Cruce 4 de mayo, Alto Paraguay, Paraguay	Meristic/Morphometric
MNHNP 7829	<i>T. spinulosus</i>	Male	Estancia La Gama, Boquerón, Paraguay	Morphometric
MNHNP 7830	<i>T. spinulosus</i>	Male	Estancia La Gama, Boquerón, Paraguay	Morphometric
MNHNP 7833	<i>T. spinulosus</i>	Female	Estancia Jabali, 9 km O 4ª División Infantería, Boquerón, Paraguay	Morphometric
MNHNP 7834	<i>T. spinulosus</i>	Female	Estancia Jabali, 9 km O 4ª División Infantería, Boquerón, Paraguay	Morphometric
MNHNP 7836	<i>T. spinulosus</i>	Female	Estancia Jabali, 9 km O 4ª División Infantería, Boquerón, Paraguay	Morphometric
MNHNP 7837	<i>T. spinulosus</i>	Female	Estancia Jabali, 9 km O 4ª División Infantería, Boquerón, Paraguay	Morphometric
MNHNP 7841	<i>T. spinulosus</i>	Male	Estancia Josefina, Presidente Hayes, Paraguay	Morphometric
MNHNP 7842	<i>T. spinulosus</i>	Female	Estancia Josefina, Presidente Hayes, Paraguay	Morphometric
MNHNP 7844	<i>T. spinulosus</i>	Male	Estancia Josefina, Presidente Hayes, Paraguay	Morphometric
MNHNP 7898	<i>T. spinulosus</i>	Male	6 km O del km 695, Ruta Transchaco, Parque Nacional Teniente Enciso, Nueva Asunción, Paraguay	Meristic/Morphometric
MNHNP 7900	<i>T. spinulosus</i>	Female	3 km del km 695 Ruta Transchaco, Nueva Asunción, Paraguay	Meristic/Morphometric

Number	Species	Sex	Locality	Data Type
MNHNP 7901	<i>T. spinulosus</i>	Male	Parque Nacional Teniente Enciso, Nueva Asunción, Paraguay	Meristic/Morphometric
MNHNP 7902	<i>T. spinulosus</i>	Male	Parque Nacional Defensores del Chaco, Administración, Chaco, Paraguay	Meristic/Morphometric
MNHNP 7904	<i>T. spinulosus</i>	Female	Parque Nacional Defensores del Chaco, Agua Dulce, Chaco, Paraguay	Meristic/Morphometric
MNHNP 7905	<i>T. spinulosus</i>	Male	Parque Nacional Defensores del Chaco, Agua Dulce, Chaco, Paraguay	Meristic/Morphometric
MNHNP 7906	<i>T. spinulosus</i>	Female	34 km NO Base Aeronaval Pozo Hondo, Boquerón, Paraguay	Morphometric
MNHNP 8002	<i>T. spinulosus</i>	Female	Estancia Jabali, 9 km O 4 <sup>a</sup> División Infantería, Boquerón, Paraguay	Morphometric
MNHNP 8111	<i>T. spinulosus</i>	Female	Estancia Josefina, Presidente Hayes, Paraguay	Morphometric
MNHNP 8125	<i>T. spinulosus</i>	Female	Estancia Josefina, Presidente Hayes, Paraguay	Morphometric
MNHNP 8470	<i>T. spinulosus</i>	Female	Laguna General Díaz, Alto Paraguay, Paraguay	Morphometric
MNHNP 8471	<i>T. spinulosus</i>	Female	Estancia General Díaz, Laguna General Díaz, Alto Paraguay, Paraguay	Morphometric
MNHNP 8472	<i>T. spinulosus</i>	Male	Estancia General Díaz, Laguna General Díaz, Alto Paraguay, Paraguay	Morphometric
MNHNP 9793	<i>T. spinulosus</i>	Female	Parque Nacional Defensores del Chaco, Agua Dulce, Alto Paraguay, Paraguay	Meristic/Morphometric
MNHNP 9794	<i>T. spinulosus</i>	Male	Parque Nacional Defensores del Chaco, Agua Dulce, Alto Paraguay, Paraguay	Meristic/Morphometric
MNHNP 9795	<i>T. spinulosus</i>	Male	Parque Nacional Defensores del Chaco, Agua Dulce, Alto Paraguay, Paraguay	Meristic/Morphometric
USNM 314206	<i>T. spinulosus</i>	Male	El Mistolar, Matacos, Formosa, Argentina	Meristic/Morphometric
USNM 314207	<i>T. spinulosus</i>	Female	Teniente. General Fraga, Matacos, Formosa, Argentina	Meristic/Morphometric
USNM 73505	<i>T. spinulosus</i>	Male	La Rioja, Patquia, Estancia de Breyer, Argentina	Meristic/Morphometric
AMNH-R 176304	<i>T. tarara</i> , n. sp.	Male	Reserva Natural Cerrados del Tagatiya, next to the house of the owner, Concepción, Paraguay	Meristic/Morphometric
AMNH-R 176305	<i>T. tarara</i> , n. sp.	Female	Reserva Natural Cerrados del Tagatiya, next to the house of the owner, Concepción, Paraguay	Meristic/Morphometric
AMNH-R 176307	<i>T. tarara</i> , n. sp.	Male	Reserva Natural Cerrados del Tagatiya, Loma farm corral, Concepción, Paraguay	Meristic/Morphometric
AMNH-R 176308	<i>T. tarara</i> , n. sp.	Undetermined	Reserva Natural Cerrados del Tagatiya, Loma farm corral, Concepción, Paraguay	General morphology
AMNH-R 176309	<i>T. tarara</i> , n. sp.	Female	Reserva Natural Cerrados del Tagatiya, Loma farm corral, Concepción, Paraguay	Meristic/Morphometric

Number	Species	Sex	Locality	Data Type
AMNH-R 176310	<i>T. tarara</i> , n. sp.	Undetermined	Tagatiya, Estancia Bello Horizonte pathway, Concepción, Paraguay	General morphology
AMNH-R 176311	<i>T. tarara</i> , n. sp.	Male	Tagatiya, Estancia Bello Horizonte pathway, Concepción, Paraguay	Meristic/Morphometric
AMNH-R 176312	<i>T. tarara</i> , n. sp.	Male	Parque Nacional Serranía San Luís, Concepción, Paraguay	Meristic/Morphometric
AMNH-R 176313	<i>T. tarara</i> , n. sp.	Male	Parque Nacional Serranía San Luís, Concepción, Paraguay	Meristic/Morphometric
MNHNP 11290	<i>T. tarara</i> , n. sp.	Male	Cerca de la Estancia San Fernando, Concepción, Paraguay	Meristic/Morphometric
MNHNP 11295	<i>T. tarara</i> , n. sp.	Male	17 Km S, 20 Km E Yby Yau; Estancia Siete Lagunas, Concepción, Paraguay	Meristic/Morphometric
MNHNP 11766	<i>T. tarara</i> , n. sp.	Female	Tagatiya, Estancia Bello Horizonte pathway, Concepción, Paraguay	Meristic
MNHNP 11767	<i>T. tarara</i> , n. sp.	Male	Tagatiya, Estancia Bello Horizonte pathway, Concepción, Paraguay	Meristic
MNHNP 11768	<i>T. tarara</i> , n. sp.	Female	Parque Nacional Serranía San Luís, Concepción, Paraguay	Meristic
MNHNP 11771	<i>T. tarara</i> , n. sp.	Male	Reserva Natural Cerrados del Tagatiya, Concepción, Paraguay	Meristic
MNHNP 11772	<i>T. tarara</i> , n. sp.	Male	Reserva Natural Cerrados del Tagatiya, Loma farm corral, Concepción, Paraguay	Meristic
MNHNP 11773	<i>T. tarara</i> , n. sp.	Male	Reserva Natural Cerrados del Tagatiya, Loma farm corral, Concepción, Paraguay	Meristic
MNHNP 11774	<i>T. tarara</i> , n. sp.	Male	Reserva Natural Cerrados del Tagatiya, Loma farm corral, Concepción, Paraguay	Meristic
MNHNP 11775	<i>T. tarara</i> , n. sp.	Male	Reserva Natural Cerrados del Tagatiya, Loma farm corral, Concepción, Paraguay	Meristic
MNHNP 11776	<i>T. tarara</i> , n. sp.	Male	Reserva Natural Cerrados del Tagatiya, Loma farm corral, Concepción, Paraguay	Meristic
MNHNP 12044	<i>T. tarara</i> , n. sp.	Male	Reserva Natural Cerrados del Tagatiya, Concepción, Paraguay	Meristic/Morphometric
MNHNP 4385	<i>T. tarara</i> , n. sp.	Male	85 km NE Concepción, Arroyo Capitigo, Concepción, Paraguay	Meristic/Morphometric
MNHNP 6009	<i>T. tarara</i> , n. sp.	Female	Bella Vista, Amambay, Paraguay	Morphometric
MNHNP 6010	<i>T. tarara</i> , n. sp.	Female	Bella Vista, Amambay, Paraguay	Morphometric
MNHNP 7651	<i>T. tarara</i> , n. sp.	Male	Rancho Z, Concepción, Paraguay	Meristic/Morphometric
MNHNP 8388	<i>T. tarara</i> , n. sp.	Male	2 km NE Bella Vista, Amambay, Paraguay	Meristic/Morphometric
AMNH-R 176285	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Paraguari, Paraguay	Meristic/Morphometric
AMNH-R 176286	<i>T. teyumirim</i> , n. sp.	Male	Salto Mbocarusu, Parque Nacional Ybycui, Paraguari, Paraguay	Meristic/Morphometric
AMNH-R 176287	<i>T. teyumirim</i> , n. sp.	Female	Salto Mbocarusu, Parque Nacional Ybycui, Paraguari, Paraguay	Meristic

Number	Species	Sex	Locality	Data Type
MNHNP 4361	<i>T. teyumirim</i> , n. sp.	Undetermined	Parque Nacional Ybycui, Arroyo Corrientes, Salto Mbocaruzu, Paraguari, Paraguay	General morphology
MNHNP 4383	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Arroyo Corrientes, Salto Mbocaruzu, Paraguari, Paraguay	Meristic/Morphometric
MNHNP 4386	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Arroyo Corrientes, Salto Mbocaruzu, Paraguari, Paraguay	Meristic/Morphometric
MNHNP 4388	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Arroyo Corrientes, Salto Mbocaruzu, Paraguari, Paraguay	Meristic/Morphometric
MNHNP 6657	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Arroyo Corrientes, Paraguari, Paraguay	Meristic/Morphometric
MNHNP 6658	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Arroyo Corrientes, Paraguari, Paraguay	Meristic/Morphometric
MNHNP 6662	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Paraguari, Paraguay	Morphometric
MNHNP 6665	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Paraguari, Paraguay	Morphometric
MNHNP 6666	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Paraguari, Paraguay	Morphometric
MNHNP 6667	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Paraguari, Paraguay	Morphometric
MNHNP 6668	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Paraguari, Paraguay	Morphometric
MNHNP 6669	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Arroyo Corrientes, Paraguari, Paraguay	Meristic/Morphometric
MNHNP 6672	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Paraguari, Paraguay	Morphometric
MNHNP 6682	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Paraguari, Paraguay	Morphometric
MNHNP 6683	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Paraguari, Paraguay	Morphometric
MNHNP 6684	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Arroyo Corrientes, Paraguari, Paraguay	Morphometric
MNHNP 7433	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Arroyo Caraimi, Paraguari, Paraguay	Morphometric
MNHNP 7446	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Arroyo Caraimi, Paraguari, Paraguay	Morphometric
MNHNP 7447	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Arroyo Caraimi, Paraguari, Paraguay	Morphometric
MNHNP 7448	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Arroyo Caraimi, Paraguari, Paraguay	Morphometric
MNHNP 7449	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Arroyo Caraimi, Paraguari, Paraguay	Morphometric
MNHNP 7451	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Arroyo Caraimi, Paraguari, Paraguay	Morphometric



Number	Species	Sex	Locality	Data Type
MNHNP 7452	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Arroyo Caraimi, Paraguari, Paraguay	Morphometric
MNHNP 7453	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Arroyo Caraimi, Paraguari, Paraguay	Morphometric
MNHNP 7454	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Arroyo Caraimi, Paraguari, Paraguay	Morphometric
MNHNP 7843	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Arroyo Corrientes, Paraguari, Paraguay	Meristic/Morphometric
MNHNP 7845	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Arroyo Corrientes, Paraguari, Paraguay	Meristic/Morphometric
MNHNP 7847	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Arroyo Corrientes, Paraguari, Paraguay	Meristic/Morphometric
MNHNP 7848	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Arroyo Corrientes, Paraguari, Paraguay	Morphometric
MNHNP 7851	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Arroyo Corrientes, Paraguari, Paraguay	Meristic/Morphometric
MNHNP 7852	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Arroyo Corrientes, Paraguari, Paraguay	Morphometric
MNHNP 7853	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Arroyo Corrientes, Paraguari, Paraguay	Meristic
MNHNP 7855	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Cerro que se encuentra en la conjunción del Arroyo Caraimi y Arroyo Corrientes, Paraguari, Paraguay	Morphometric
MNHNP 7856	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Cerro que se encuentra en la conjunción del Arroyo Caraimi y Arroyo Corrientes, Paraguari, Paraguay	Morphometric
MNHNP 7857	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Cerro que se encuentra en la conjunción del Arroyo Caraimi y Arroyo Corrientes, Paraguari, Paraguay	Morphometric
MNHNP 7858	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Cerro que se encuentra en la conjunción del Arroyo Caraimi y Arroyo Corrientes, Paraguari, Paraguay	Morphometric
MNHNP 7859	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Arroyo Corrientes, Paraguari, Paraguay	Meristic/Morphometric
MNHNP 7861	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Arroyo Corrientes, Paraguari, Paraguay	Meristic
MNHNP 7862	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Arroyo Corrientes, Paraguari, Paraguay	Morphometric
MNHNP 7864	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Arroyo Corrientes, Paraguari, Paraguay	Meristic/Morphometric
MNHNP 7865	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Arroyo Corrientes, Paraguari, Paraguay	Meristic/Morphometric
MNHNP 7866	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Arroyo Corrientes, Paraguari, Paraguay	Meristic/Morphometric

Number	Species	Sex	Locality	Data Type
MNHNP 7868	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Cerro que se encuentra en la conjunción del Arroyo Carai-mi y Arroyo Corrientes, Paraguari, Paraguay	Morphometric
MNHNP 7871	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Cerro que se encuentra en la conjunción del Arroyo Carai-mi y Arroyo Corrientes, Paraguari, Paraguay	Morphometric
MNHNP 7872	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Cerro que se encuentra en la conjunción del Arroyo Carai-mi y Arroyo Corrientes, Paraguari, Paraguay	Morphometric
MNHNP 7873	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Cerro que se encuentra en la conjunción del Arroyo Carai-mi y Arroyo Corrientes, Paraguari, Paraguay	Morphometric
MNHNP 7874	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Cerro que se encuentra en la conjunción del Arroyo Carai-mi y Arroyo Corrientes, Paraguari, Paraguay	Morphometric
MNHNP 7878	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Paraguari, Paraguay	Morphometric
MNHNP 7880	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Paraguari, Paraguay	Morphometric
MNHNP 7881	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Paraguari, Paraguay	Morphometric
MNHNP 7882	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Paraguari, Paraguay	Morphometric
MNHNP 7885	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Zona Arroyo Corrientes, Paraguari, Paraguay	Meristic/Morphometric
MNHNP 7886	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Zona Arroyo Corrientes, Paraguari, Paraguay	Morphometric
MNHNP 7887	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Zona Arroyo Corrientes, Paraguari, Paraguay	Meristic/Morphometric
MNHNP 7888	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Zona Arroyo Corrientes, Paraguari, Paraguay	Meristic/Morphometric
MNHNP 7889	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Zona Arroyo Corrientes, Paraguari, Paraguay	Meristic/Morphometric
MNHNP 7890	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Zona Arroyo Corrientes, Paraguari, Paraguay	Morphometric
MNHNP 7891	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Zona Arroyo Corrientes, Paraguari, Paraguay	Meristic
MNHNP 7893	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Zona Arroyo Corrientes, Paraguari, Paraguay	Meristic/Morphometric
MNHNP 7894	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Zona Arroyo Corrientes, Paraguari, Paraguay	Meristic/Morphometric
MNHNP 7907	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Arroyo Corrientes, Paraguari, Paraguay	Meristic/Morphometric

Number	Species	Sex	Locality	Data Type
MNHNP 7908	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Arroyo Corrientes, Paraguari, Paraguay	Meristic
MNHNP 7909	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Arroyo Corrientes, Paraguari, Paraguay	Meristic/Morphometric
MNHNP 7910	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Arroyo Corrientes, Paraguari, Paraguay	Meristic/Morphometric
MNHNP 7911	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Paraguari, Paraguay	Morphometric
MNHNP 7914	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Paraguari, Paraguay	Morphometric
MNHNP 7915	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Paraguari, Paraguay	Morphometric
MNHNP 7916	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Paraguari, Paraguay	Morphometric
MNHNP 7917	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Paraguari, Paraguay	Morphometric
MNHNP 7918	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Paraguari, Paraguay	Morphometric
MNHNP 7919	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, cerro que se encuentra 1 km N de la conjunción de los arroyos Carai-mi y Corrientes, Paraguari, Paraguay	Morphometric
MNHNP 7921	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Paraguari, Paraguay	Morphometric
MNHNP 7922	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Paraguari, Paraguay	Morphometric
MNHNP 7923	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Paraguari, Paraguay	Morphometric
MNHNP 7925	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Paraguari, Paraguay	Morphometric
MNHNP 7926	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, cerro que se encuentra a 1 km N de la conjunción de los arroyos Carai-mi y Corrientes, Paraguari, Paraguay	Morphometric
MNHNP 7927	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, cerro que se encuentra a 1 km N de la conjunción de los arroyos Carai-mi y Corrientes, Paraguari, Paraguay	Morphometric
MNHNP 8505	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Arroyo Corrientes, Saltos Mbocarusu, Paraguari, Paraguay	Meristic/Morphometric
MNHNP 8506	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Arroyo Corrientes, 2 km NO Saltos Mbocarusu, Paraguari, Paraguay	Meristic/Morphometric
MNHNP 8507	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Arroyo Corrientes, 2 km NO Saltos Mbocarusu, Paraguari, Paraguay	Meristic/Morphometric

Number	Species	Sex	Locality	Data Type
MNHNP 8508	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Arroyo Corrientes, Saltos Mbocarusu, Paraguari, Paraguay	Meristic/Morphometric
MNHNP 8509	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Arroyo Corrientes, Saltos Mbocarusu, Paraguari, Paraguay	Meristic/Morphometric
MNHNP 8510	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Arroyo Corrientes, Saltos Mbocarusu, Paraguari, Paraguay	Meristic/Morphometric
MNHNP 8511	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Arroyo Corrientes, Paraguari, Paraguay	Meristic/Morphometric
MNHNP 8858	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Paraguari, Paraguay	Morphometric
MNHNP 8859	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Paraguari, Paraguay	Morphometric
MNHNP 8861	<i>T. teyumirim</i> , n. sp.	Female	Parque Nacional Ybycui, Paraguari, Paraguay	Morphometric
MNHNP 11752	<i>T. teyumirim</i> , n. sp.	Undetermined	Parque Nacional Ybycui, Paraguari, Paraguay	General morphology
MNHNP 11753	<i>T. teyumirim</i> , n. sp.	Undetermined	Parque Nacional Ybycui, Paraguari, Paraguay	General morphology
MNHNP 11754	<i>T. teyumirim</i> , n. sp.	Undetermined	Salto Mbocarusu, Parque Nacional Ybycui, Paraguari, Paraguay	General morphology
MNHNP 12045	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Paraguari, Paraguay	Meristic/Morphometric
USNM 342064	<i>T. teyumirim</i> , n. sp.	Male	Parque Nacional Ybycui, Arroyo Corrientes, Saltos Mbocarusu, Paraguari, Paraguay	Morphometric
MHNC-R 3006	<i>T. xanthochilus</i>	Female	Estación Biologica El Refugio, Santa Cruz, Bolivia	Meristic/Morphometric

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