

## TWO NEW SPECIES OF *LIOLAEMUS* (IGUANIA: *LIOLAEMIDAE*) OF CENTRAL WEST ARGENTINA

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**ABSTRACT.** We describe two new species of lizards of the genus *Liolaemus* belonging to the *chiliensis* group, one found in southwestern Catamarca, and the other in central western Argentina, in Mendoza, San Juan and Catamarca provinces. The species from southwestern Catamarca has morphological characteristics that may relate it to the species of the *capillitas* group, a northern clade of the *elongatus* group, whereas the other species has characters that relate it to the southern clade of the *elongatus* group. Both species exhibit diagnostic character states in their maximum snout-vent length, squamation, and dorsal and ventral colors, which differentiate them from the other species of the *chiliensis* group.

**KEYWORDS.** Iguanidae, *Liolaemus*, *elongatus* group, *capillitas* group, Argentina.

### INTRODUCTION

The genus *Liolaemus* has grown in number of species in the past several years, having currently more than 200 species, with more being described each year (Abdala 2005, Abdala and Lobo, 2006a; Cabrera and Monguillot, 2006; Scolaro and Cei, 2006; Avila *et al.* 2007; Pincheira-Donoso *et al.* 2007 and Pincheira-Donoso and Scolaro 2007). Several phylogenetic hypotheses have been proposed for its more important groups and the species included in those groups (Laurent, 1985; Etheridge, 1995; Schulte *et al.* 2000; Lobo, 2001, 2005; Morando *et al.*, 2003, 2004; Avila, *et al.* 2006, and Abdala 2007). Within *Liolaemus*, one of the most important groups is the *Liolaemus sensu stricto* group of Laurent (1985) or *chiliensis* group (Etheridge 1995), with approximately 80 species which share two characters: a fused Meckel's groove and four or fewer precloacal pores. The *chiliensis* group has been the subject of several phylogenetic studies which proposed hypotheses based on different characters and recognized several sub-clades. One of these is the *elongatus* group, originally defined by Cei (1974) and later redefined by Espinoza *et al.* (2000). In this study, the group was formed by six species: *L. austromendocinus*, *L. capillitas*, *L. elongatus*, *L. heliodermis*, *L. petrophilus* and *L. thermarum*. Later *L. umbrifer* was added to the group (Espinoza and Lobo 2003). In the phylogenetic analyses of Lobo (2001, 2005) and Díaz Gómez and Lobo (2006), some of the species of the *elongatus* group of Espinoza *et al.*

(2000) plus *L. heliodermis* and *L. umbrifer*, form a clade named the *capillitas* group, formed by *L. capillitas*, *L. heliodermis*, *L. dicktracyi* and *L. umbrifer*.

In the molecular-based phylogenies of Morando *et al.* (2003) and Avila *et al.* (2004), these species are included in two groups, the *elongatus* and *petrophilus* groups (Table 1), the latter including the *capillitas* group of Lobo (2001, 2005) and Díaz Gómez and Lobo (2006).

Here we describe two new species belonging to the *chiliensis* group, which exhibit characteristics similar to species of the *capillitas* (Lobo 2005; Díaz Gómez and Lobo, 2006) and *petrophilus* groups (Morando *et al.*, 2003 and Avila *et al.* 2004). One of the species inhabits the Sierra de Narváez, in Southwestern Catamarca province, and the other is widely distributed in central western Argentina, in Mendoza, San Juan and La Rioja provinces.

### MATERIALS AND METHODS

Morphological characters commonly used for *Liolaemus* taxonomy were considered, as described or cited in Laurent (1985); Etheridge (1993, 1995, 2000), Cei (1986), Lobo (2001), and Abdala (2007). Description of color in life was made at the time of capture, or using photographs taken at the time of capture. Description of features of body color patterns follows Lobo and Espinoza (1999). Squamation characters were taken with a binocular microscope (10-40X). Measurements were obtained using elec-

TABLE 1. Diagnostic characters for currently recognized members of the *Liolaemus petrophilus* group (Avila *et al.* 2004) plus the two new species described herein. Data for *L. heliodermis* follow Espinoza *et al.* (2000) and for *L. gununakuna*, Avila *et al.* (2004). Description of body color and patterns were taken from live lizards. Number of precloacal pores is from males only. Table modified from Espinoza and Lobo, 2003.

Character	<i>L. austromendocinus</i>	<i>L. capillitas</i>	<i>L. dicktracyi</i>	<i>L. gununakuna</i>	<i>L. heliodermis</i>	<i>L. parvus</i>	<i>L. petrophilus</i>	<i>L. talampaya</i>	<i>L. tulkas</i>	<i>L. umbrijer</i>
Mid-body scales	63-81	60-70	61-73	84-97	62-69	60-77	75-88	58-69	63-68	57-72
Keels on dorsal scales	Weak	Distinct	Weak/distinct	Distinct	Weak	Distinct	Distinct	Distinct	Distinct	Weak
Precloacal pores	2-4	0-4	3-4	1-3	3-4	1-4	2-5	3-5	0-1	3-4
Head color	Brownish gray	Brown/ Black	Black	Iridescent yellow	Black	Brown	Ochre/ yellow	Brown/ Dark brown	Dark Brown	Brown/ black
Body color	Brownish gray	Brown to black	Indigo/ light blue	Iridescent yellow	Sulfur yellow	Light brown with yellow	Ochre/yellow dark brown and yellow	Tan/light brown	Brown/black	Brown/ black
Dorsal body pattern	Indistinct	Indistinct	Indistinct	Transverse bars	Indistinct	Indistinct/ tiny spots in vertebral region	Indistinct transverse bars	Indistinct	Indistinct	Indistinct
Tail rings	Weak to distinct	Absent	Absent	Distinct	Absent	Weak to absent	Distinct	Weak to distinct	Absent	Absent
Max SVL (mm)	103	93	91	94.1	81	65.1	100	85.5	70.1	89

tronic callipers to the nearest 0.02 mm. The specimens were captured by noosing and sacrificed with sodium pentothal 1%, then fixed in 10% formalin and later preserved in 70% ethanol. Specimens used in the study are listed in the Appendix.

## RESULTS

*Liolaemus parvus* sp nov.  
(Figures 1-2)

- 1972 *Liolaemus elongatus elongatus* Cei, J. M., Physis, 83:411-422.
- 1974 *Liolaemus elongatus elongatus* Cei, J. M., J. Herp. 8:219-229.
- 1978 *Liolaemus elongatus* Cei, J. M., and L. P. Castro, Pub. Oc. I.B.A., 2:1-30.
- 1986 *Liolaemus elongatus elongatus* Cei, J. M., Mus. Reg. Sci. Nat. Torino, Monogr. 4:1-527.
- 1998 *Liolaemus elongatus* Cei, J. M. and L. J. Avila, Facena, 14:75-80.
- 1998 *Liolaemus elongatus* Avila et al., Cuad. Herp., 12:11-29.
- 2000 *Liolaemus elongatus* Schulte et al., Biol. J. Linn. Soc., 69:75-120.
- 2001 *Liolaemus cf. elongatus* Lobo, F., Herp. Jou., 11:137-150.
- 2003 *Liolaemus* sp. 4 Morando et al., Syst. Biol., 52:159-185.
- 2004 *Liolaemus* sp. 4 Avila et al., Herpetologica, 60(2):187-203.
- 2004 *Liolaemus cf. elongatus* Espinoza et al. Proc. Nat. Ac. Sci. 101:16819-16824.



FIGURE 1. Dorsal view of the holotype of *Liolaemus parvus* sp nov.

- 2005 *Liolaemus cf. elongatus* Lobo, F., Ac. Zool. Lill., 49:67-89.
- 2006 *Liolaemus cf. elongatus* Diaz Gomez J. M. and Lobo, F., Pap. Avuls. Zool. 46:261-274.
- 2008 *Liolaemus cf. elongatus* Acosta et al. Div. Biol. Cult. Alt. And. Arg. 167-179.

*Holotype*—FML 16548. Adult male, 58 km west of Jagüe, General Sarmiento Department, La Rioja Province, Argentina. 28°29'24.3"S; 68°49'45.3"W, 3532 msnm. Abdala, C. S., Quinteros, S., and C. Robles cols. 09-10-2005.

*Paratypes*—FML 16546-547; 16549. Two males and a female; Same data as holotype.

FML 16121-125. Three males and two females; El Peñon, Gualcamayo River, Jachal Department, San Juan Province, Argentina. Abdala C. S., S. Barrionuevo and M. J. Tulli cols. 02-11-2004.

FML 2593. Three males; 67 km west of Uspallata, National Road N° 7, Las Heras Department, Mendoza Province. M. Halloy col. 21-01-1991.

## Etymology

“*Parvus*” means ‘small’ in Latin. The specific epithet makes reference to the new species being the smallest of the *elongatus-petrophilus* group.

## Diagnosis

*Liolaemus parvus* belongs to the *L. chilensis* group for having Meckel’s groove fused and few or



FIGURE 2. Ventral view of the holotype of *Liolaemus parvus* sp nov.

no precloacal pores. Within this group it belongs to the *petrophilus* group (*sensu* Morando *et al.*, 2003 and Avila *et al.* 2004), with *L. austromendocinus*, *L. capillitas*, *L. dicktracyi*, *L. gununakuna*, *L. heliodermis*, *L. petrophilus*, *L. talampaya* and *L. umbrifer*. *Liolaemus parvus* differs from all these species in possessing a shorter snout-vent length (max. SVL 65.1 mm vs 81-103 mm) and a different color pattern. These characteristics also differentiate *L. parvus* from *L. thermarum*. It also differs from *L. capillitas*, *L. dicktracyi*, *L. heliodermis*, *L. talampaya* and *L. umbrifer* in their absence of red coloration in the cloacal region of males and females; from *L. capillitas*, *L. dicktracyi*, *L. heliodermis*, *L. talampaya* and *L. umbrifer* for possessing uniform shoulder coloration, with the absence of black or white spots; from *L. austromendocinus* in possessing fewer midbody scales (60-77 vs 75-97); from *L. austromendocinus*, *L. heliodermis*, *L. thermarum* and *L. umbrifer* in possessing more keeled dorsal scales than these species.

*Liolaemus parvus* differs from *L. buergeri* (included in the *capillitas* group of Lobo, 2005) in having a shorter snout-vent length (max SVL 65.1 mm vs 108.2 mm), fewer midbody scales (60-77 vs 86-113), fewer ventral scales (96-113 vs 116-139), and a different dorsal color pattern. *Liolaemus parvus* differs from *L. elongatus* (with which it was previously confused) by a shorter snout-vent length (max SVL 65.1 mm vs 89.0 mm), fewer midbody scales (60-77 vs 74-89), and a different color pattern.

#### Holotype description

*Adult male*. Snout-vent length 65.1 mm. Head 1.4 times longer (14.7 mm) than wide (10.6 mm). Head height 7.3 mm. Neck width 11.1 mm. Interorbital distance 6.5 mm. Orbit 3.1 mm. Orbit-auditory meatus distance 5.8 mm. Auditory meatus height 3.1 mm, width 1.4 mm. Orbit-commissure of mouth distance 1.6 mm. Distance between nares 2.7 mm. Subocular 3.9 mm. Trunk length 28.2 mm. Tail length 101.4 mm. Body width 14.7 mm. Femur length 10.5 mm. Tibial length 8.4 mm. Foot length 19.1 mm. Humerus length 6.5 mm. Forearm length 7.7 mm. Manus 11.2 mm. Pygal region 6.2 mm. Vent width 10.3 mm.

*Dorsal head scales smooth, with fourteen scales*. Rostral wider than long, in contact with eight scales. Mental trapezoidal, larger than rostral and in contact with four scales. Nasal in contact with rostral. Four internasals longer than wide. Eight scales surrounding

nasal, which is separated from canthal by two scales. Six scales between rostral and frontal. Frontal horizontally divided in two. Two postrostrals. Intraparietal in contact with six scales and smaller than parietals. Preocular in contact with row of lorilabials. Six superciliaries, fourteen upper ciliars. Anterior margin of the auditory meatus with two distinct auricular scales. Upper anterior margin of auditory meatus with two distinct scales. Seven temporals, slightly keeled. Subocular in contact with four lorilabials, not in contact with fourth supralabial. Five supraoculars. Eight supralabials. Seven lorilabials. Five infralabials, the second in contact ventrally with two scales. Four chin shields, the second separated by two scales.

*Sixty-two scales around midbody*. Seventy-eight dorsal scales from occiput to hindlimb, imbricate, keeled with round posterior margin. One hundred ventral scales, imbricated, laminar, larger than dorsals. Forty-three gulars, imbricated, smooth. Neck fold absent. Forty-four neck scales, from auditory meatus to shoulder in the longitudinal fold. Three precloacal pores. Distinct, large, subtriangular antehumeral scales. Auricular, antehumeral and longitudinal folds weakly developed. Scales on the longitudinal fold smooth. Fourth finger with twenty-one subdigital lamellae, fourth toe with twenty-six. Femoral patch absent. Dorsal caudal scales keeled and mucronate, ventral caudal scales smooth. Infracarpals and infratarsals laminar, imbricated and trifid.

*Color in life*. (Figure 1-2). Head dark brown with numerous black spots. Flanks of head of same color as dorsal head, with a black line from posterior margin of orbit to the anterior-upper margin of auditory meatus. Head slightly darker than body. Background color of body light brown with yellow. Vertebral line black and discontinuous. Numerous small black spots on the dorsal vertebral region that can be mistaken for vertebral line. Dorsolateral bands absent. Paravertebral and scapular spots absent. Flanks same color as dorsum, with a marked longitudinal black stripe, from the antehumeral region but not reaching hindlimbs. Forelimbs and hindlimbs same coloration pattern as dorsum; forelimbs lighter and hindlimbs darker than dorsum. Tail dorsally and on the sides light brown with vertebral line present. Ringed tail, with slightly marked lines. Background color of the body below ventrolateral line brown-greenish.

*Ventrally, belly, chest and throat uniform grey*. Distal region of throat brownish red. Limbs and belly, near the cloacal region, yellow. Cloacal region and tail, light grey.

## Variation

Based on eleven paratypes (eight males, three females) and four (one male, three females) additional specimens (Appendix 1). Dorsal surface of the head smooth. Nasal surrounded by seven scales. Supralabials 7-9 ( $X = 7.7$ ;  $SD = 0.8$ ), Lorilabials in one row, 7-9 ( $X = 7.4$ ;  $SD = 0.7$ ). Supraoculars 5-6 ( $X = 5.4$ ;  $SD = 0.5$ ). Frontal undivided or horizontally divided in two or three. Interparietal always smaller than parietals, surrounded by 5-8 ( $X = 6.8$ ;  $SD = 1.1$ ) scales. Thirteen-sixteen ( $X = 13.5$ ;  $SD = 0.8$ ) scales between rostral and occiput. Mental in contact with four scales. Infralabials 5-6 ( $X = 5.1$ ;  $SD = 0.4$ ); gulars 35-46 ( $X = 38.9$ ;  $SD = 4.1$ ). Seven temporals smooth to slightly keeled. Auditory meatus always taller ( $X = 2.6$  mm;  $SD = 0.4$ ) than wide ( $X = 1.6$  mm;  $SD = 0.2$ ); 0-3 ( $X = 1.9$ ;  $SD = 0.9$ ) auricular scales on anterior margin, one on upper-posterior margin. Neck folds slightly marked. Head longer ( $X = 13.2$  mm;  $SD = 0.8$ ) than wide ( $X = 10.1$  mm;  $SD = 0.8$ ) and tall ( $X = 6.6$  mm;  $SD = 0.5$ ). Trunk length in males ( $X = 26.1$  mm;  $SD = 1.9$ ), in females ( $X = 28.5$  mm;  $SD = 2.2$ ). Snout-vent length in males ( $X = 61.1$  mm;  $SD = 2.8$ ; Max = 65.1 mm), in females ( $X = 59.4$  mm;  $SD = 3.4$ , Max = 64.8 mm). Humerus length ( $X = 6.4$  mm;  $SD = 0.8$ ). Forearm ( $X = 6.3$ ;  $SD = 0.7$ ). Manus ( $X = 10.1$  mm;  $SD = 1.1$ ). Femur length ( $X = 9.0$  mm;  $SD = 1.0$ ). Midbody scales 60-77 ( $X = 67.3$ ;  $SD = 4.7$ ). Dorsal scales between occiput and hindlimbs 70-81 ( $X = 75.0$ ;  $SD = 3.1$ ). Dorsal scales keeled, subimbricate, rounded or sub-romboidal. Twenty to twenty-one ( $X = 20.8$ ;  $SD = 0.5$ ) subdigital lamellae on fourth finger; 25-28 ( $X = 26.5$ ;  $SD = 1.1$ ) on fourth toe. Infracarpals and infratarsals with imbricated, triphid, laminar scales. Femoral patch absent. Ventral scales, 96-113 ( $X = 100.8$ ;  $SD = 4.9$ ), larger than dorsals. Tail larger ( $X = 107.4$  mm;  $SD = 6.5$ ) than snout-vent length. Males with 1-4 ( $X = 2.2$ ;  $SD = 1.0$ ) precloacal pores, absent in females.

*Color in life.* Sexual dichromatism absent. Head dark to light brown, with black spots varying in number and intensity. Background color of the body brown-yellowish or brown-reddish to light brown. Number of vertebral spots variable, sometimes so few that the vertebral line can be observed. Other specimens have the black spots congregated, forming a stripe. Background color of forelimbs brown speckled with white spots. Hindlimbs light brown with dark brown transversal bands. Tail with vertebral line absent on some specimens. Ventral color remains constant, except on some males where the

yellow color of hindlimbs may be absent. Even though *Liolaemus parvus* is a widely distributed species, there is no clinal variation in the coloration pattern.

## Natural History

*Liolaemus parvus* is a saxicolous lizard; it can be found basking on large boulders. Depending on the localities where it has been observed, it can be in sympatry with *L. olongasta*, *L. ruibali*, *L. uspallatensis*, *Leiosaurus jaguaris*, *Phymaturus palluma* and *Prystidactylus scapulatus*. No more is known about its biology.

## Distribution (Figure 3)

*Liolaemus parvus* is widely distributed, from central-western La Rioja province to northeastern Mendoza province, between 2700-3500 m.

## *Liolaemus tulkas* sp nov. (Figure 4-5)

2004 *Liolaemus* sp. 9 Avila et al., Herpetologica, 60(2):187-203.

*Holotype* – FML 18136. Adult male, 57 km NW of Fiambalá, road to Paso San Francisco, Tinogasta Department, Catamarca Province, Argentina.  $27^{\circ}43'12.8''S$ ;  $67^{\circ}58'33.4''W$ , 2825 msnm. Abdala, C. S., Quinteros, S., and G. Scrocchi cols. 22-03-2007.

*Paratypes* – FML 18317-321. Three males and four females; Same data as holotype.

## Etymology

In the mythology of J. R. R. Tolkien, “Tulkas” is one of the Ainur or powers that helped shape Arda or Middle Earth. One of the characteristics of Tulkas is that of running faster than any other creature. *Liolaemus tulkas* is very fast in short sprints.

## Diagnosis

*Liolaemus tulkas* is a member of the *L. chilensis* group, diagnosed by having Meckel's groove

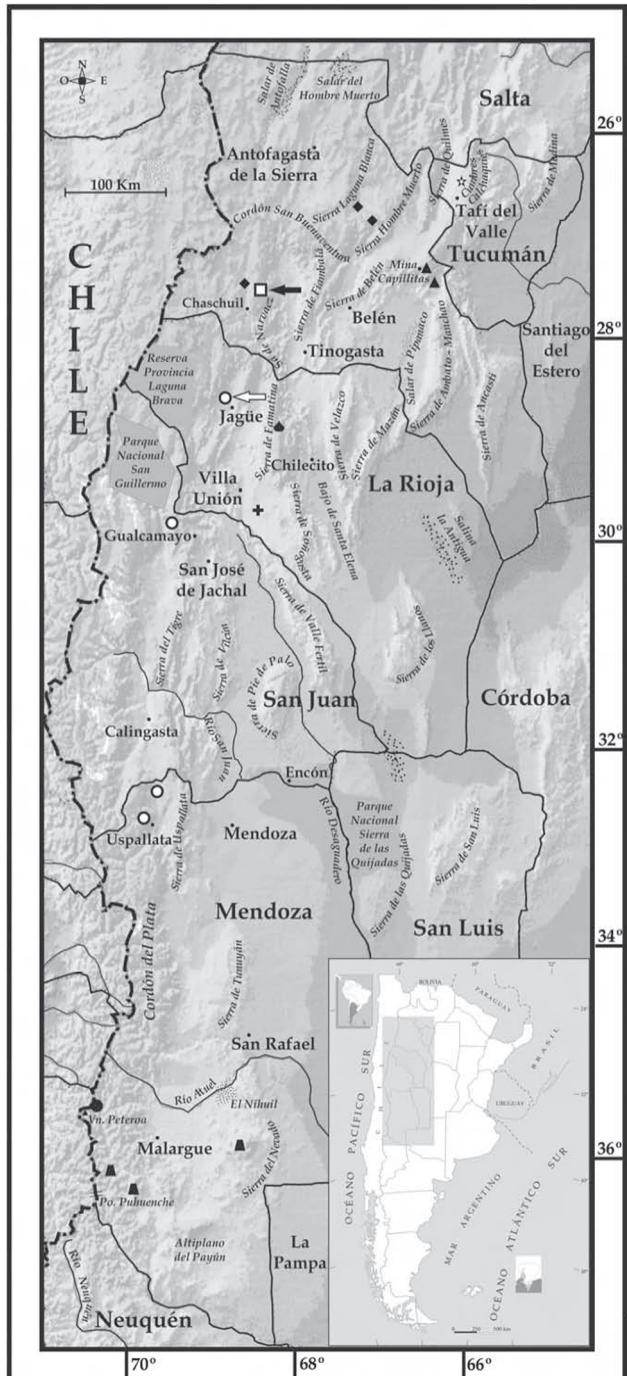


FIGURE 3. Map showing the distribution of some species related to the two new species. *L. buergeri* (black trapezoid), *L. capillitas* (black triangle), *L. dicktracyi* (black tear), *L. heliodermis* (black star), *L. parvus* sp nov. (white circle), *L. talampaya* (black cross), *L. thermarum* (black circle), *L. tulkas* sp nov. (black square) and *L. umbrifer* (black diamond). The arrows indicate type locality.

fused and few or absent precloacal pores. Within the *chiliensis* group, *L. tulkas* is a member of the *capillitas* group, diagnosed by having a distinct color pattern in shoulder region and red coloration in cloacal region (Lobo, 2005). The *capillitas* group is included



FIGURE 4. Dorsal view of *Liolaemus tulkas* sp nov. Note the color pattern in shoulder region, typical of *capillitas* group (Lobo 2005).



FIGURE 5. Ventral view of *Liolaemus tulkas* sp nov. Note the red coloration in cloacal region, typical of *capillitas* group (Lobo 2005) and *L. buergeri*.

the more inclusive *petrophilus* group (Morando *et al.* 2003; Avila *et al.* 2004). Within the *petrophilus* group *Liolaemus tulkas* differs from *L. austromendocinus*, *L. capillitas*, *L. dicktracyi*, *L. gununakuna*, *L. heliodermis*, *L. petrophilus*, *L. talampaya*, *L. thermarum* and *L. umbrifer* in having a shorter snout-vent length (max. SVL 70.1 mm vs. 81 a 103 mm) and a distinct color pattern; and from *L. austromendocinus*, *L. capillitas*, *L. dicktracyi*, *L. gununakuna*, *L. heliodermis*, *L. parvus* sp nov., *L. petrophilus*, *L. talampaya*, and *L. umbrifer* in having fewer precloacal pores in males (0-1 vs 0-5). It also differs from *L. austromendocinus*, *L. gununakuna*, *L. parvus* and *L. petrophilus* in having red color in the cloacal region. *Liolaemus tulkas* has distinctly keeled dorsal scales, in contrast with

*Liolaemus heliodermis* and *L. umbrifer* which have only slightly keeled dorsal scales. *Liolaemus tulkas* differs from *L. capillitas*, *L. dicktracyi* and *L. talam-paya* in having more dorsal scales between occiput and hindlimbs (71-83 vs 56-73).

*Liolaemus tulkas* differs from *L. buergeri* (included in the *capillitas* group by Lobo, 2005) in having a shorter snout-vent length (max. SVL 70.1 mm vs. 108.2 mm), fewer midbody scales (63-68 vs. 86-113), fewer ventral scales (98-112 vs 116-139), fewer pre-cloacal pores in males (0-1 vs 2-6), and a different dorsal color pattern.

#### Holotype description

**Adult male.** Snout-vent length 70.1 mm. Head 1.2 times longer (16.5 mm) than wide (13.9 mm). Head height 9.5 mm. Neck width 13.9 mm. Interorbital distance 8.91 mm. Orbit 4.9 mm. Orbit-auditory meatus distance 5.9 mm. Auditory meatus height 3.8 mm, width 1.7 mm. Orbit-commissure of mouth distance 5.6 mm. Distance between nares 3.8 mm. Subocular 4.7 mm. Trunk length 34.1 mm. Tail length 123.9 mm. Body width 19.1 mm. Femur length 13.6 mm. Tibial length 9.8 mm. Foot length 22.15 mm. Humerus length 8.5 mm. Forearm length 8.7 mm. Manus 11.7 mm. Pygal region 7.4 mm. Vent width 10.5 mm.

**Dorsal head scales smooth, with fifteen scales.** Rostral wider than long, in contact with eight scales. Mental trapezoidal, larger than rostral and in contact with four scales. Nasal in contact with rostral. Four internasals, longer than wide. Seven scales surrounding nasal, separated from canthal by two scales. Seven scales between rostral and frontal. Frontal horizontally divided in two. Two postrostrals. Intraparietal in contact with seven scales and smaller than parietals. Preocular separated from row of lorilabials by one scale. Six superciliaries, eleven upper ciliaries. Anterior margin of the auditory meatus with two distinct auricular scales, lateral-upper margin with one scale larger than the others, upper anterior margin of auditory meatus with no distinct scales. Seven temporals, smooth. Subocular in contact with four lorilabials, not in contact with fourth supralabial. Six supraoculars. Seven supralabials. Seven lorilabials. Six infralabials, the second in contact ventrally with three scales. Four chinshields, the second separated by two scales.

**Sixty-three scales around midbody.** Seventy-four dorsal scales from occiput to hindlimb, subimbricate,

keeled with round posterior margin. One hundred and two ventral scales between mental and precloacal pores, imbricated, laminar, larger than dorsals. Forty-three gulars, imbricated, smooth. Forty-nine nuchal scales, from auditory meatus to shoulder. One precloacal pore. Distinct, large, subtriangular antehumeral scales. Auricular, antehumeral and longitudinal neck folds slightly marked. Scales on the longitudinal neck fold smooth. Fourth finger with twenty-four subdigital lamellae, fourth toe with twenty-seven. Femoral patch absent. Dorsal caudal scales keeled and mucronate, ventral caudal scales smooth. Infracarpals and infratarsals laminar, imbricated and trifid.

**Color of the holotype in ethanol.** Head dark brown with black spots over the supraocular scales. Sides of head of same color as dorsal head, slightly lighter. Background color of body light brown. Black-dark brown area extends over the flanks from forelimbs to midbody, lighter posteriorly, speckled with black scales. Vertebral line, dorsolateral bands and prescapular spot absent. Flanks same color as dorsum, where black area absent. Forelimbs light brown with black markings, small white spots on the shoulder region, as is characteristic of the *capillitas* group. Hindlimbs same color as forelimbs, only lighter. Tail light brown dorsally and on the flanks.

**Ventrally grey-whitish throat, chinshields and mental dark grey.** Gular region lead grey. Chest and belly light grey. Forelimbs, hindlimbs and cloacal region same color as belly. Tail lead grey.

#### Variation

**Based on seven paratypes (three males, four females).** Dorsal surface of the head smooth. Nasal surrounded by 7-8 ( $X = 7.3$ ;  $SD = 0.5$ ) scales. Supralabials 7-8 ( $X = 7.6$ ;  $SD = 0.5$ ). Lorilabials in one row, 6-7 ( $X = 6.9$ ;  $SD = 0.4$ ). Supraoculars 5-6 ( $X = 5.1$ ;  $SD = 0.4$ ). Frontal undivided or horizontally divided in two or three. Interparietal always smaller than parietals, surrounded by 5-7 ( $X = 5.9$ ;  $SD = 0.7$ ) scales. Fourteen-eighteen ( $X = 15.7$ ;  $SD = 1.6$ ) scales between rostral and occiput. Mental in contact with four scales. Five-six ( $X = 5.9$ ;  $SD = 0.7$ ) infralabials; gulars 40-47 ( $X = 43.1$ ;  $SD = 2.6$ ). Seven-nine ( $X = 8$ ;  $SD = 0.6$ ) temporals, smooth. Auditory meatus always taller ( $X = 3.2$  mm;  $SD = 0.4$ ) than wide ( $X = 1.6$  mm;  $SD = 0.2$ ), 1-2 ( $X = 1.6$ ;  $SD = 0.5$ ), auricular scales on anterior margin, one on upper-posterior margin (only one individ-

ual does not exhibit a differentiated scale). Neck folds developed. Head longer ( $X = 13.6$  mm;  $SD = 0.8$ ) than wide ( $X = 10.3$  mm;  $SD = 2.0$ ) and tall ( $X = 7.7$  mm;  $SD = 0.9$ ). Trunk length in males ( $X = 20.4$  mm;  $SD = 5.2$ ), in females ( $X = 30.3$  mm;  $SD = 2.3$ ). Snout-vent length in males ( $X = 59.1$  mm;  $SD = 2.5$ ; Max = 70.1 mm), in females ( $X = 65.8$  mm;  $SD = 4.1$ ; Max = 69.4 mm). Humerus length ( $X = 6.3$  mm;  $SD = 0.4$ ). Forearm ( $X = 7.9$ ;  $SD = 0.6$ ). Manus ( $X = 10.9$  mm;  $SD = 1.1$ ). Femur length ( $X = 10.6$  mm;  $SD = 1.5$ ). Midbody scales 64-68 ( $X = 66.4$ ;  $SD = 1.4$ ). Dorsal scales between occiput and hindlimbs 71-83 ( $X = 76.6$ ;  $SD = 4.7$ ). Dorsal scales keeled, subimbricate, rounded or sub-romboidal. Twenty-one to twenty-three ( $X = 22.0$ ;  $SD = 0.8$ ) subdigital lamellae on fourth finger; 26-28 ( $X = 26.9$ ;  $SD = 0.7$ ) on fourth toe. Infracarpals and infratarsals with imbricated, triphid, laminar scales. Femoral patch absent. Ventral scales, 98-112 ( $X = 108.0$ ;  $SD = 5.2$ ), larger than dorsals. Tail longer ( $X = 107.7$  mm;  $SD = 9.9$ ) than snout-vent length. Males with 0-1 ( $X = 0.5$ ;  $SD = 0.6$ ) precloacal pores, absent in females.

*Color in life* (Figures 4-5). Sexual dichromatism absent. Head dark brown with some black spots. Flanks of head same color as dorsum of head. Background color of the body light brown with shades of golden or dark red. From occiput to midbody an area dark brown or black that can extend to the flanks, but not further than midbody. In some individuals this mark is interrupted at the lateral field. In some specimens with lighter coloration the vertebral line can be observed. Dorsum light brown from the end of the dark brown coloration to the tail. Shoulders with white spots characteristic of the *capillitas* group (Lobo, 2005). In some individuals, these white spots extend to the hindlimbs, although fewer in number and less evident. The anterior region of the hindlimbs same color as dorsum, only darker. In some specimens, a vertebral line is present. Ventrally grey-whitish throat, chinshields slightly darker. Flanks of gular region dark grey. Chest and belly greyish-white, flanks of belly may have a red-orange coloration. Cloacal region, hindlimbs and belly near the cloacal region intense red, characteristic of the *capillitas* group and *L. buergueri* (Lobo, 2005). Ventrally tail light brown to grey.

#### Natural History

*Liolaemus tulkas* is a saxicolous lizard that can be found in crevices or basking on large boulders,

usually where the rock walls have a reddish color. It is sympatric with *L. abaucan*. No more is known about its biology.

#### Distribution

(Figure 3)

*Liolaemus tulkas* is known only from the type locality, in the northern tip of the Sierra de Narváez, close to Cerro Punta Colorada, over 2000 m above sea level, in the rock outcrops south of Río Chaschuil, in Tinogasta, Catamarca Province.

#### DISCUSSION

The taxonomic composition of the *elongatus* group has been increasing since its original definition (Cei, 1974). Espinoza and Lobo (2003) redefined the group and considered it to be formed by six species (*L. austromendocinus*, *L. capillitas*, *L. elongatus*, *L. heliodermis*, *L. petrophilus* y *L. thermarum*). The assignation of these species to the group was made without any formal phylogenetic analysis, based on morphological similarities. Shulte *et al.* (2000) made a molecular-based phylogenetic analysis and recognized a clade formed by *L. austromendocinus* and *L. elongatus*. The individuals cited as *L. elongatus* in Schulte *et al.* (2000) from Uspallata, in Mendoza province, are actually *L. parvus*. Lobo (2001) made a phylogenetic analysis including 74 species from the *chiliensis* group, and recognized a monophyletic group which he termed the *elongatus* group: ((*L. austromendocinus* + *L. cf. elongatus*) (*L. elongatus* (*L. capillitas* + *L. cristiani*))). The terminal *cf. elongatus* of Lobo (2001) is actually *L. parvus*. Lobo and Espinoza (2003), describing two new species of the *elongatus* group, divided this clade into two subclades: the northern subclade, formed by *L. capillitas*, *L. dicktracyi*, *L. heliodermis*, and *L. umbrifer*, and the southern clade, which included *L. austromendocinus*, *L. elongatus*, *L. petrophilus* and *L. thermarum*. Later, Morando *et al.* (2003) recognized an *elongatus-kriegi* clade, which included the *elongatus*, *kriegi* and *petrophilus* groups, separating the populations assigned to *L. elongatus* from the remaining species of the group. The *petrophilus* group *sensu* Morando *et al.* (2003) is as follows: ((clade 3.1 + clade 3.2) (*L. sp 1* + *L. capillitas*)) ((*L. sp 2* (*L. sp 4* + *L. austromendocinus*)); in this analysis, the clades 3.1 and 3.2 correspond to different *L. petrophilus* populations; *L. sp*

1 is *L. talampaya*; *L. sp 2* is *L. gununakuna* and *L. sp 4* is *L. parvus* sp nov. Later, Avila *et al.* (2004) made a phylogenetic analysis including the populations from Morando *et al.* (2003) plus the species described by Espinoza and Lobo (2003) and other populations without taxonomic status. In that study, the *petrophilus* group is formed by two subgroups: the most basal formed by (*L. gununakuna* (*L. austromendocinus* + *L. sp 4*)), and the terminal formed by ((*L. talampaya* + *L. dicktracyi*) (*Liolaemus* sp 9)) (*L. capillitas* + *L. umbrifer*). *Liolaemus* sp 9 is actually a population of *Liolaemus tulkas* sp nov. and *L. sp 4* is *L. parvus* sp nov. Lobo (2005) reanalyzed the data set of Lobo (2001) adding more terminals and characters, defining the *capillitas* group as being formed by (*L. capillitas* + *L. heliodermis*) (*L. dicktracyi* + *L. umbrifer*). This clade is similar in composition to the clade recovered by Avila *et al.* (2004) and to the northern clade of the *elongatus* group of Espinoza and Lobo (2003). This occurs because Lobo (2005) did not include *L. talampaya* nor *L. sp 9* (*L. tulkas* sp nov.), and Avila *et al.* did not include *L. heliodermis*. The *capillitas* group of Lobo (2005) is supported by the presence of spots on the shoulder region (character #59). This character is present in *L. talampaya* and *L. tulkas*, which may lead us to consider the clade from Avila *et al.* (2004) as the *capillitas* group. In one of the topologies of Lobo (2005), the *capillitas* group is sister clade to a clade formed by *L. elongatus* RN (Río Negro) and *L. elongatus* ME (Mendoza). This last terminal, from Uspallata, Mendoza, is actually *L. parvus* sp nov. In some topologies from Lobo (2005), *L. buergeri* is sister taxon to the *capillitas* group. This is supported by the presence of red coloration in the cloacal region in males and females. *Liolaemus tulkas* exhibits red coloration in the cloacal region, which is evidence for its inclusion in the *capillitas* group.

The original *elongatus* group (Cei, 1974) has experienced several changes in its composition and phylogeny in recent years, and the number of its species has grown considerably. Even though in this paper we describe two new species (one of them mistaken as *L. elongatus* for several years), according to Morando *et al.* (2003) and Avila *et al.* (2004), there are still species left undescribed.

## RESUMEN

Se describen dos nuevas especies de lagartijas del género *Liolaemus* pertenecientes al grupo *chiliensis*, una habita en el suroeste de la provincia de Catamarca

y la otra en el centro oeste de la Argentina, abarcando las provincias Mendoza, San Juan y Catamarca. La especie que presenta una distribución más septentrional presenta características morfológicas que admiten relacionarlo con las especies del grupo *capillitas* o clado norte del grupo *elongatus*, mientras que la restante especie tiene caracteres que lo unen al clado sur del grupo *elongatus*. Ambas especies presentan estados de carácter particulares, como su máximo SVL, foliosis del cuerpo y coloración dorsal y ventral, que permiten diferenciarlas del resto de las especies descritas para el grupo *chiliensis*.

**Palabras clave:** Iguanidae, *Liolaemus*, *elongatus* group, *capillitas* group, Argentina.

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## APPENDIX 1

Specimens examined. The acronyms are: FML, Fundación Miguel Lillo; MCN, Museo de Ciencias Naturales de la Universidad Nacional de Salta; MVZ, Museum of Vertebrate Zoology. *L. austromendocinus*: FML 3432-433, 7189-191, 7240-243; MCN 604-609. *L. buergeri*: FML 7192-195; MCN 501-502, 2023-2024, 2188. *L. capillitas*: FML 1229; 1316; 1914; 1933, 2029; 2427; 3083-084. *L. dicktracyi*: FML 9928 (Holotype), FML 9929-33 (Paratypes), MCN 461-62 (Paratypes). *L. heliodermis*: FML 7196 (Holotype), 6006-07 (Paratypes). *L. parvus*: La Rioja Province: FML 16548 (Holotype), 16546-547, 16549. (Paratypes); FML 2737, 2965; Mendoza Province: FML 2593 (Paratypes); San Juan Province: FML 16121-125 (Paratypes). *L. petrophilus*: MCZ 156902 (Paratypes), 170441-42. MCN 1346-347; FML 793, 10074. *L. talampaya*: MCN 2031-036. *L. tulkas*: FML 18136 (Holotype). FML 18317-321 (Paratypes). *L. umbrifer*: FML 9934 (Holotype), FML 9935-45 (Paratypes), MCN 463-464 (Paratypes), 488-89, 2185-2187.