DESCRIPTION OF A NEW SPECIES OF THE *LIOLAEMUS ELONGATUS* GROUP FROM THE ANDES OF CENTRAL CHILE (IGUANIA: LIOLAEMIDAE)

DESCRIPCIÓN DE UNA NUEVA ESPECIE DEL GRUPO DE *LIOLAEMUS ELONGATUS* DE LOS ANDES DE CHILE CENTRAL (IGUANIA: LIOLAEMIDAE)

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Resumen.– Los lagartos *Liolaemus* habitan en el sur de Sudamérica, y son uno de los géneros de vertebrados terrestres más diversos del mundo. En este género, las especies del grupo de *L. elongatus* habitan en la cordillera andina de Chile y Argentina, y en los afloramientos rocosos de la Patagonia Argentina. Aquí, revisamos la identidad taxonómica de una población de los Andes de la Región de O'Higgins, Chile, previamente confundida con *L. cristiani* y probablemente también con *L. ubaghsi*. Nosotros encontramos que este taxón no es asignable a ninguno de los *Liolaemus* actualmente descritos y proveemos una descripción para este. Preliminarmente incluimos a esta nueva especie en el grupo de *L. elongatus*, probablemente una de las especies del grupo distribuidas más al norte.

Palabras clave.– Endemismo, *Liolaemus cristiani*, *Liolaemus ubaghsi*, Lagarto, Región de O'Higgins, poros precloacales.

Abstract.– *Liolaemus* lizards inhabit southern South America, and are one of the most diverse terrestrial vertebrate genera in the world. In this genus, species of the *L. elongatus* group inhabit the Chilean and the Argentine Andean mountain range, and the Argentine Patagonian rocky outcrops. Here, we review the taxonomic identity of one population from the Andean O'Higgins Region, Chile, previously confused with *L. cristiani* and probably also with *L. ubaghsi*. We found that this taxon is not assignable to any of the *Liolaemus* currently described and provide a description for it. We preliminary include this new species in the *L. elongatus* group, likely one of the northernmost distributed species of this group.

Keywords.– Endemism, *Liolaemus cristiani*, *Liolaemus ubaghsi*, Lizard, O'Higgins Region, precloacal pores.

INTRODUCTION

The genus *Liolaemus* Wiegmann, 1834, is an extraordinarily diverse group of lizards distributed in Southern South America, mainly in Argentina and Chile, but also in Bolivia, Brasil, Peru, Paraguay and Uruguay. The genus reached 257 described species in the last review (Abdala & Quinteros, 2014). However, since several species are described each year, the diversity of the genus is estimated to be approximately 265 species at current (Ruiz et al., 2019a) and according to Núñez et al. (2018), 98 species of *Liolaemus* occurs in Chile. *Liolaemus* has been split into two subgenera, *Liolaemus* (*sensu stricto*) and *Eulaemus*, supported by both morphology (Etheridge, 1995; Laurent, 1985) and molecular evidence (Espinoza et al., 2004; Schulte et al., 2000), with each subgenus split into several groups (e.g. Avila et al., 2020). The *L. elongatus* group belongs to the subgenus *Liolaemus* (*sensu stricto)* (Morando et al., 2003) and comprises medium to large *Liolaemus* (with maximum snout vent length of approximately 100 millimeters), with long tail (approximately 1.5 of the SVL), absent or reduced sexual dichromatism, both presence of lateral

dark stripe and light dots on the dorsum in almost all species, viviparous, insectivorous, mainly saxicolous, and in almost all species high amount of midbody, ventral and dorsal scales (Abdala et al., 2010; Avila et al., 2015; Troncoso-Palacios et al., 2018). These species inhabit in the western and eastern slopes of the Andes mountain range, from the south of the Claro River (Chile) and the Mendoza River (Argentina), to the volcanic hills of the Patagonia in the Chubut Province (Argentina) and in the Araucanía Region (Chile) (Medina et al., 2017, 2018; Ramírez-Álvarez et al., 2017; Troncoso-Palacios et al., 2018). Esquerré et al. (2019) recovered the *L. elongatus* group as the sister group of the *L. leopardinus* clade.

In general, it is accepted that the *L. elongatus* group currently comprises the following species (Medina et al., 2018; Ruiz et al., 2019a; Troncoso-Palacios et al., 2018, 2019): *L. antonietae* Troncoso-Palacios, Esquerré, Urra, Díaz, Castro-Pastene & Ruiz, 2018; *L. antumalguen* Avila, Morando, Pérez & Sites, 2010; *L. burmeisteri* Avila, Fulvio Pérez, Medina, Sites & Morando, 2012; *L. carlosgarini* Esquerré, Núñez & Scolaro, 2013; *L. crandalli* Avila, Medina, Fulvio Pérez, Sites & Morando, 2015; *L. curis* Núñez & Labra, 1995; *L. elongatus* Koslowsky, 1896; *L. janequeoae* Troncoso-Palacios, Díaz, Puas, Riveros-Riffo, & Elorza, 2016; *L. quinterosi* Ruiz, Quipildor, Bulacios, Chafrat & Abdala, 2019; *L. scorialis* Troncoso-Palacios, Díaz, Esquerré & Urra, 2015; and *L. smaug* Abdala, Quinteros, Scrocchi & Stazzonelli, 2010. Additionally, the status of *L. choique* Abdala, Quinteros, Scrocchi & Stazzonelli, 2010, is disputed because it was found as paraphyletic in a DNA phylogenetic study by Medina et al. (2017), stating that results "does not support" to *L. choique* as valid species, because "individuals (from the type locality) are genetically related to *L. antumalguen* and *L. smaug*"; but later, Ruiz et al. (2019b) revalidated *L. choique* through a morphologic statistical study, which compared *L. choique* and *L. smaug* (without comparisons in regards to *L. antumalguen*).

Nine species of the 12 species of the *L. elongatus* group have been described in the last ten years (Abdala et al., 2010; Avila et al., 2010, 2012, 2015; Esquerré et al., 2013; Troncoso-Palacios et al., 2015, 2016, 2018; Ruiz et al., 2019a) and it has been proposed that the diversity inside the group is underestimated (Morando et al., 2003), especially in Chile (Troncoso-Palacios et al., 2016). In 2015, one of us (DRA) found a large *Liolaemus* sp. in the Andean mountain range of the O'Higgins Region of Chile and later used it to represent to *L. cristiani* Navarro, Núñez & Loyola, 1991 in a field guide (Ramírez-Álvarez, 2018). This misidentification occurred because both *Liolaemus* sp. nov. and *L. cristiani*, have a dark lateral stripe and slender aspect, they are closely distributed, the identification was based mainly on photographs and field observations (only one female specimen collected), and at the time there was no published scientific study on the lizards of this zone. Here, we review the taxonomic status of this population of lizards.

MATERIALS AND METHODS

Specimens of *Liolaemus* sp nov. were collected in the field by hand or lasso. We examined previously collected specimens of all Chilean species of the *L. elongatus* group. For *L. carlosgarini*, we directly examined specimens and also, we used the data of the holotype and the paratypes from Esquerré et al. (2013, n = 8). For *L. elongatus*, we directly examined specimens, but since this species is widely distributed, data was complemented with Avila et al. (2010, n = 99). Data for Argentine species of the *L. elongatus* group were taken from literature (Abdala et al., 2010; Avila et al., 2010, 2012, 2015; Ruiz et al., 2019a), but we examined some specimens of *L. antumalguen*. We also examined specimens of all similarly sized *Liolaemus* found near the type locality of *Liolaemus* sp. nov. (Alto Huemul), and that do not belong to the *L. elongatus* group. Table 1 summarizes the composition of the species groups following Esquerré et al. (2019), Medina et al. (2019) and Troncoso-Palacios et al. (2018), and the diagnosis of these species groups is included in the Diagnosis section.

We examined specimens of *L. ubaghsi* Esquerré, Troncoso-Palacios, Garín & Núñez, 2014, and *L. normae* Esquerré, Ramírez-Álvarez, Pavón-Vásquez, Troncoso-Palacios, Garín, Keogh & Leaché, 2019, both species of the *L. leopardinus* group, which is the sister group of the *L. elongatus* group (Esquerré et al., 2019). In the case of *L. ubaghsi*, we add data from nine more specimens from Esquerré et al. (2014). We examined specimens of *L. buergeri* Werner, 1907, a species of the *L. kriegi* group (Morando et al., 2003). We also examined specimens of *L. cristiani*, a species of the *L. chillanensis* group (Troncoso-Palacios et al., 2018), because *Liolaemus* sp. has been previously misidentified with it. In this case, we add data of five type specimens from Núñez et al. (1991). We examined specimens of *L. riodamas* Esquerré, Núñez & Scolaro, 2013, a species closely related to *L. cristiani* (Esquerré et al., 2013). For *L. riodamas*, we add data of ten type specimens from Esquerré et al. (2013). All directly examined specimens (n = 84) are listed in the Appendix I.

For species delimitation, we consider the "species category" as a geographically constrained lineage, characterized through character analysis and geographical research (Frost & Hillis, 1990). In particular, we used morphological characters comparisons between *Liolaemus* sp. nov. and other species, through Principal Component Analysis (PCA) of the morphometric variables, a statistical test of meristic variables, and qualitative character

Tabla 1. Grupos de especies de *Liolaemus* andinos usados para la comparación. La nueva especie es asignada al grupo de *L. elongatus*, pero algunas especies de otros grupos fueron incluidas en la diagnosis debido a su proximidad geográfica. Los grupos del complejo de *L. elongatus-kriegi* que habitan lejos de la localidad tipo de la nueva especie no se muestran. Las especies marcadas con un asterisco no fueron incluidas en la diagnosis debido a su lejanía geográfica (excluyendo las especies del grupo de *L. elongatus*). La taxonomía sigue a Esquerré et al. (2019), Medina et al. (2019) y Troncoso-Palacios et al. (2018). *Liolaemus riodamas* es ubicado en el grupo de *L. chillanensis* debido a su relación cercana con *L. cristiani* (fide Esquerré et al., 2013).

Table 1. Species groups of Andean *Liolaemus* used for comparisons. The new species is assigned to the *L. elongatus* group, but some species of other groups were included in the diagnosis due its geographical proximity. The groups of the *L. elongatus-kriegi* complex that inhabits far away from the type locality of the new species are not shown. Species marked with asterisks were not included in the diagnosis due to geographical remoteness (excluding the species of the *L. elongatus* group). Taxonomy follows Esquerré et al. (2019), Medina et al. (2019) and Troncoso-Palacios et al. (2018). ***Liolaemus riodamas*** is placed in the *L. chillanensis* group due its close relationship with *L. cristiani* (fide Esquerré et al., 2013). .

***L. chillanensis* group**	***L. elongatus-kriegi* complex**		
	***L. elongatus* group**	***L. kriegi* group**	***L. leopardinus* group**
*L. chillanensis**	*Liolaemus sp.*	*L. buergeri*	*L. frassinettii**
L. cristiani	*L. antonietae*	*L. kriegi**	*L. leopardinus**
L. riodamas (?)	*L. antumalguen*	*L. tregenzai**	*L. normae*
	L. burmeisteri	*L. zabalai**	*L. ubaghsi*
	L. carlosgarini		*L. valdesianus**
	L. choique		
	L. crandalli		
	L. elongatus		
	L. janequeoae		
	L. quinterosi		
	L. scorialis		
	L. smaug		

comparisons (colour pattern, scales shape and presence of precloacal pores), following several recent species descriptions of the *L. elongatus* group (Abdala et al., 2010; Troncoso-Palacios et al., 2015; Ruiz et al., 2019).

Morphological characters were examined according to Abdala et al. (2010), Avila et al. (2010, 2012, 2015), Ruiz et al. (2019a) and Troncoso-Palacios et al. (2018). Body measurements were taken using a digital Vernier calliper (0.02 mm precision) and are provided as mean ± standard deviation.

As a visualization and exploratory analysis, we performed a two PCA on the morphometric variables with the R package FactoMineR (Lê et al., 2008). One PCA was performed to compare between species of the *L. elongatus* group, using data of examined specimens or published data sets, including: *L. antonietae*, *L. antumalguen*, *L. carlosgarini*, *L. curis*, *L. elongatus*, *L. janequeoae*, *L. scorialis* and *Liolaemus* sp. Another PCA was performed to compare between *Liolaemus* sp. nov. and species outside of the *L. elongatus* group with similar size and geographical proximity to *Liolaemus* sp. nov.: *L. buergeri*, *L. cristiani*, *L. normae*, *L. riodamas* and *L. ubaghsi*. These analyses were performed in the R statistical environment version 3.2.3 (RDCT, 2016). We used the residuals of a regression between the snout-vent length (SVL) and the following six variables: head length (distance between anterior edge of auditory meatus and tip of the snout), head width, head height, axilla-groin distance, arm length and foot length. Missing data from some measurements of some individuals were imputed using the imputePCA function from the MissMDA R package (Josse & Husson, 2012).

We performed a normality test (Shapiro-Wilk) on the meristic variables and an One Way ANOVA followed by a Holm-Sidak post hoc to compare between species (Zar, 2010) of the following variables: midbody scales, dorsal scales (counted between the occiput and the level of the anterior border of the hind limbs), ventral scales, supralabial scales, infralabial scales and fourth toe lamellae; using data from all species listed before for the PCAs analyses methodology.

For species without a published dataset we performed a comparison based on scale count and SVL ranges following the diagnosis previously published for the description of species of the *L. elongatus* group (Abdala et al., 2010; Avila et al., 2010, 2012, 2015; Esquerré et al., 2013; Ruiz et al., 2019a). Color pattern features were used as qualitative features of comparison for all species.

RESULTS

PCA analyses between species of the *L. elongatus* group: The first three Principal Components (PCs) cumulatively account for 76.9% of the total variation (Table 2). PC1 is mainly explained by variation in head length, head width and axilla-groin distance. PC2 mostly represents variation in arm length, head height and head width. PC3 mostly represents variation in foot length, AGD and head height. The PCA plots (Fig. 1) have 95% confidence ellipses around the centroid of the species and illustrate the morphometric differences between the species included in the analysis. In the PC1 vs PC2 graph, *Liolaemus* sp nov. mostly overlaps with *L. scorialis*, whereas marginal overlap is observed with *L. antonietae*, *L. curis* and *L. elongatus*. There is no overlap with *L. antumalguen*, *L. carlosgarini* and *L. janequeoae*. In the PC1 vs PC3 graph, *Liolaemus* sp. nov. mostly overlaps with *L. antonietae* and *L. curis*, whereas marginal overlap is observed with *L. carlosgarini*, *L. elongatus* and *L. scorialis*. There is no overlap with *L. antumalguen* and *L. janequeoae*. Thus, none of the species of the *L. elongatus* group shows a great overlap with *Liolaemus* sp. nov. in both graphs (PC1 vs PC2 and PC1 vs PC3).

PCA analyses between *Liolaemus* sp. nov. and *Liolaemus* spp. with similar size found near the type locality of *Liolaemus* sp. nov.: The first three Principal Components (PCs) cumulatively account for 77.9% of the total variation (Table 3). PC1 is mainly explained by variation in foot length, head length and head width. PC2 mostly represents variation in axilla-groin distance, arm length and head height. PC3 mostly represents variation in head height, head width and axilla-groin distance.

In the PC1 vs PC2 graph (Fig. 2), *Liolaemus* sp. nov. does not show great overlap with any species, but shows marginal overlap with *L. normae* and *L. ubaghsi*. There is no overlap with *L. buergeri*, *L. cristiani* and *L. riodamas*. In the PC1 vs PC3 graph, *Liolaemus* sp. nov. mostly overlaps with *L. ubaghsi* and *L. riodamas*, whereas marginal overlap is observed with *L. cristiani* and *L. normae*. There is no overlap with *L. buergeri*. Thus, none of the similarly sized species that are geographically proximate to *Liolaemus* sp. shows a great overlap with *Liolaemus* sp. in both graphs (PC1 vs

Tabla 2. Resultados del Análisis de Componentes Principales. Porcentajes de la varianza total y el porcentaje de varianza acumulada para CP1-3, realizados para comparar entre especies del grupo de *L. elongatus* (incluyendo a *Liolaemus* sp.), y la correlación de cada variable (residuos de una regresión con la SVL).

Table 2. Results of the Principal Component Analysis. Percentage of the total variance and the cumulative percentage of variance for PC1-3, performed to compare between species of the *L. elongatus* group (including *Liolaemus* sp.), and the correlation of each variable (residuals of a regression with the SVL).

PCA			
Eigenvalues	**PC1**	**PC2**	**PC3**
Eigenvalue per Component	2.57	1.13	0.91
% of var.	42.77	18.92	15.23
Cum. % of var.	42.77	61.69	76.92
Eigenvectors	PC1	PC2	PC3
Head Length (HL)	0.884	-0.290	-0.018
Head Height (HH)	0.641	0.463	-0.258
Head Width (HW)	0.781	-0.316	0.099
Axilla-Groin Distance (AGD)	-0.656	0.281	0.387
Foot Length (FL)	0.468	0.114	0.826
Arm Length (AL)	0.408	0.804	-0.072

Tabla 3. Resultados del Análisis de Componentes Principales. Porcentajes de la varianza total y el porcentaje de varianza acumulada para CP1-3, , realizados para comparar entre *Liolaemus* sp. y las especies de tamaño similar geográficamente cercanas, y la correlación de cada variable (residuos de una regresión con la SVL).

Table 3. Results of the Principal Component Analysis. Percentage of the total variance and the cumulative percentage of variance for PC1-3, performed to compare between *Liolaemus* sp. and similarly sized geographically closer species, and the correlation of each variable (residuals of a regression with the SVL).

PCA			
Eigenvalues	**PC1**	**PC2**	**PC3**
Eigenvalue per Component	2.21	1.38	1.09
% of var.	36.81	22.98	18.14
Cum. % of var.	36.81	59.80	77.94
Eigenvectors	PC1	PC2	PC3
Head Length (HL)	0.772	-0.285	-0.024
Head Height (HH)	-0.074	0.471	0.827
Head Width (HW)	0.749	0.229	0.384
Axilla-Groin Distance (AGD)	-0.304	0.782	-0.356
Foot Length (FL)	0.820	-0.009	-0.186
Arm Length (AL)	0.530	0.649	-0.308

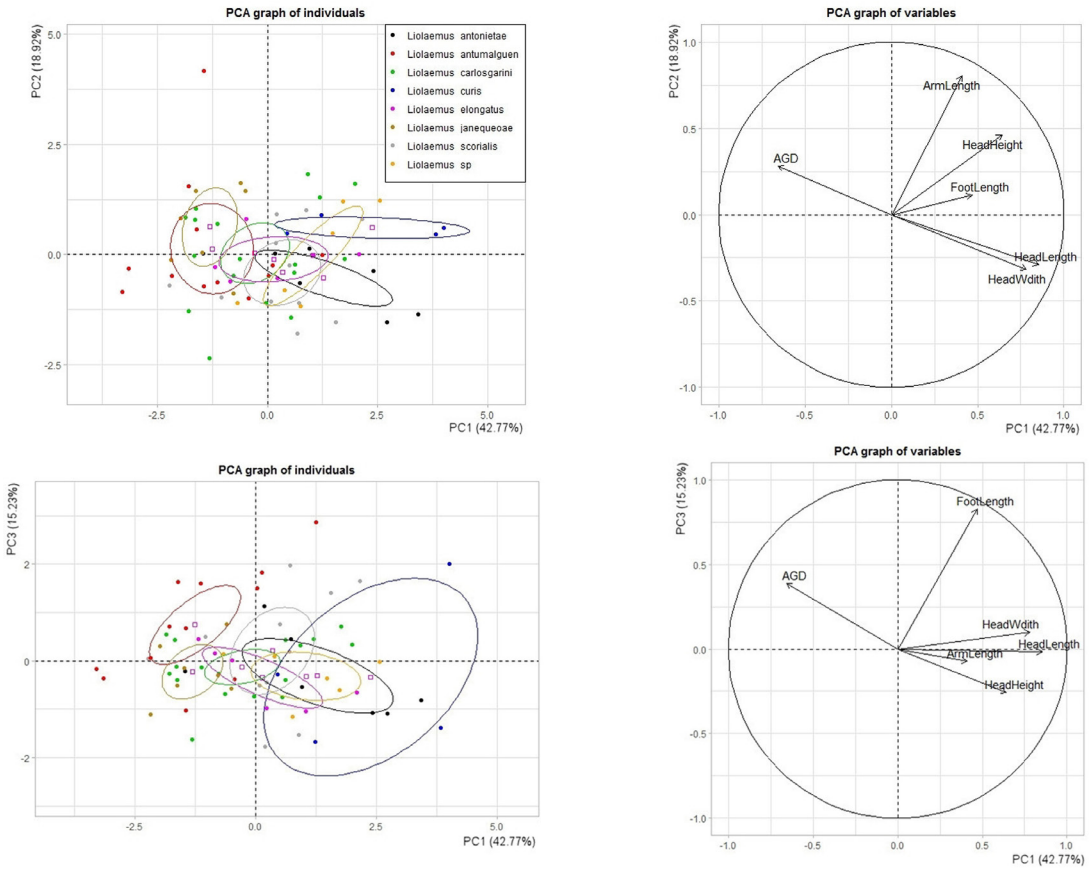

Figura 1. Gráficos del Análisis de Componentes Principales (ACP) de las especies del grupo de *L. elongatus* (incluyendo a *Liolaemus* sp. nov.). En los paneles de la izquierda, los individuos están coloreados de acuerdo a su especie como se muestra en la leyenda en la esquina superior derecha. Las elipses representan el intervalo de confidencia del 95% alrededor del centroide para cada especie. En los ejes, el CP está etiquetado de acuerdo a su número y al porcentaje de variancia total que explica el CP. A la derecha, los gráficos de las variables, los cuales ilustran la contribución de cada variable a la construcción de los ejes.

Figure 1. Principal Component Analysis (PCA) plots of the species of the *L. elongatus* group (including *Liolaemus* sp. nov.). On the left panels, the individuals are colored according to their species as shown on the legend on the top right corner. Ellipses represent the 95% confidence interval around the centroid for each species. On each axis, the PC is labelled according to its number and the percentage of the total variance that PC explains. On the right, the variables graphs, which illustrate the contribution of each variable to the construction of the axes.

PC2 and PC1 vs PC3).

A One-Way ANOVA test on the meristic variables revealed significant differences in four of the six variables analysed: scales around midbody, dorsal scales, ventral scales and supralabial scales (Table 4). The results show statistical differences in at least one meristic character between *Liolaemus* sp. and all species that show a major overlap with it in one of the PCA graphs.

Based on the absence of significant overlap with other species in the PCA analyses, the presence of precloacal pores in the males, and differences in coloration versus other species, we propose that the *Liolaemus* that we analyzed from Alto Huemul should be recognized as a distinct species and we here provide a description for it as:

Liolaemus pikunche sp. nov. (Fig. 3a,b)

2014 *Liolaemus* sp.(?) Esquerré, Troncoso-Palacios, Garín & Núñez. Zootaxa, 3815: 522.

2015 *Liolaemus ubaghsi*(?) Núñez & Gálvez. Pub. Oca. Mus. Nac. His. Nat. Chil., 64: 131.

2018 *Liolaemus cristiani* Ramírez-Álvarez. Fau. Nat. Reg. O'Higgins Chi. Ver. Terr., 108.

Material examined

Holotype: SSUC Re 781, adult male (Fig. 3a,b). Alto Huemul

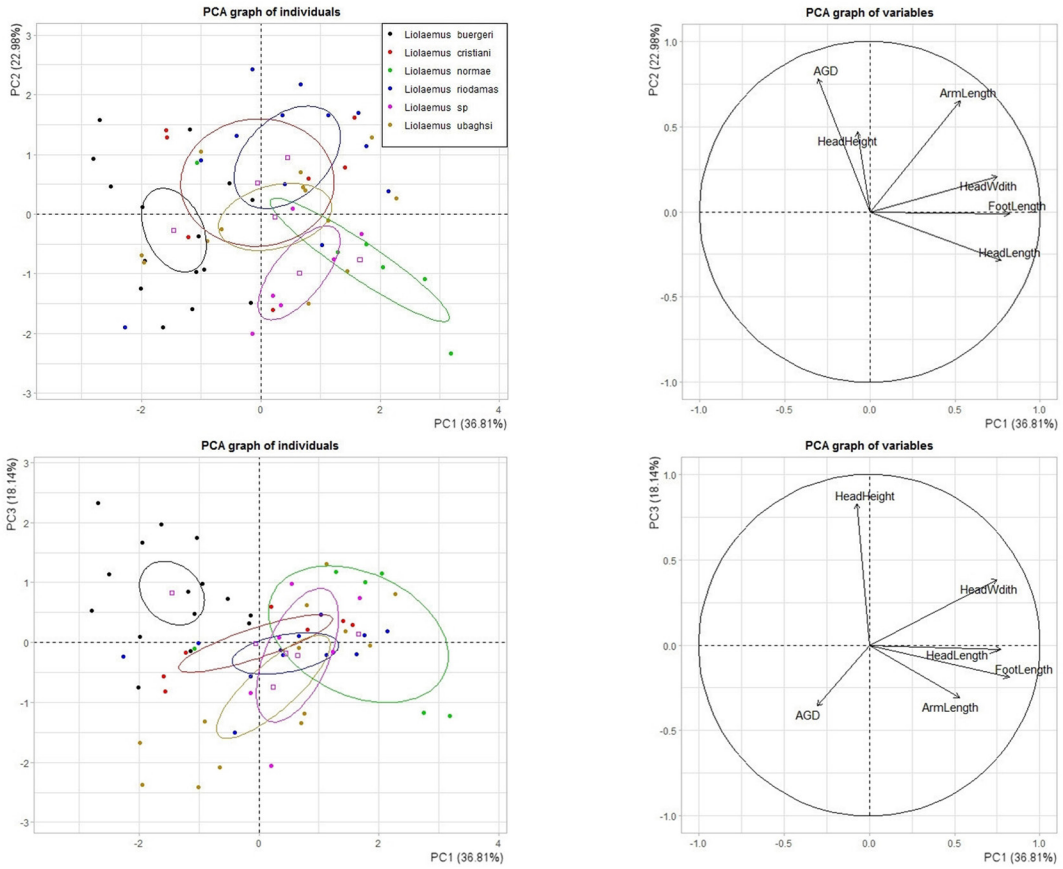

Figura 2. Gráficos del Análisis de Componentes Principales (ACP) de *Liolaemus* sp. nov. y las especies de tamaño similar que habitan cerca de Alto Huemul. En los paneles de la izquierda, los individuos están coloreados de acuerdo a su especie como se muestra en la leyenda en la esquina superior derecha. Las elipses representan el intervalo de confidencia del 95% alrededor del centroide para cada especie. En los ejes, el CP está etiquetado de acuerdo a su número y al porcentaje de variancia total que explica el CP. A la derecha, los gráficos de las variables, los cuales ilustran la contribución de cada variable a la construcción de los ejes.

Figure 2. Principal Component Analysis (PCA) plots of *Liolaemus* sp. nov. and species of similarly sized found near Alto Huemul. On the left panels, the individuals are colored according to their species as shown on the legend on the top right corner. Ellipses represent the 95% confidence interval around the centroid for each species. On each axis, the PC is labelled according to its number and the percentage of the total variance that PC explains. On the right, the variables graphs, which illustrate the contribution of each variable to the construction of the axes.

(34°56'S, 70°38'W, 1790 m asl), O'Higgins Region, Chile. Collected by D. Ramírez-Álvarez and J. Troncoso-Palacios. January 29, 2020. Paratypes: SSUC Re 782–784 (adult males), SSUC Re 785 (adult female), SSUC Re 786 (juvenile) (Fig. 3). Same locality and data as the holotype. SSUC Re 780 (adult female). Collected by D. Ramírez-Álvarez. February 22, 2015. Same locality as the holotype.

Diagnosis

We include this lizard in the *L. elongatus* group because it shows all the morphological features that characterized this group: *L. pikunche* is a large (maximum SVL = 91.3 mm) saxicolous *Liolaemus* with a relatively long tail (1.6–1.8 of the SVL), no sexual dichromatism, presence of lateral dark stripe, light dots on the dorsum, and high counts of midbody, ventral, and dorsal scales (82–90, 119–127 and 71–76, respectively). Additionally, *L. pikunche* is distributed within the geographical latitudinal range of the *L. elongatus* group, but it is allopatric in regards to all known species of this group.

Liolaemus pikunche differs from *L. antonietae*, which is smaller (maximum SVL = 77.6 mm) than *L. pikunche* (maximum SVL = 91.3 mm) and with head lighter than body and few dispersed dark brown spots (head markedly darker than the body and covered by several dark brown spots in *L. pikunche*).

Liolaemus pikunche differs from *L. antumalguen*, which is larger (maximum SVL = 107.8 mm) than *L. pikunche* (maximum SVL = 91.3 mm) and has inconspicuous or no tail rings, no dorsal stripes, and has ventral melanism (marked tail rings, light dorsal

Figura 3. *Liolaemus pikunche* sp. nov. A) Vista dorsal del holotipo macho (SSUC Re 781), B) Vista ventral del holotipo. C) Vista dorsal de un paratipo hembra (SSUC Re 780). D) Acercamiento a los poros precloacales del espécimen SSUC Re 782. E) Individuo no colectado. F) Vista dorsal de un paratipo macho (SSUC Re 784).

Figure 3. *Liolaemus pikunche* sp. nov. A) Dorsal view of the male holotype (SSUC Re 781), B) Ventral view of the holotype. C) Dorsal view of one female paratype (SSUC Re 780). D) Close-up to the precloacal pores of the SSUC Re 782 specimen. E) Not collected individual. F) Dorsal view of one male paratype (SSUC Re 784).

stripes, and no ventral melanism in *L. pikunche*). These species do not overlap in multivariate morphological space in the PCA.

Liolaemus pikunche differs from *L. burmeisteri* which lacks a dorsal pattern, whereas *L. pikunche* has occipital stripe and fragmented vertebral line. Moreover, the head is not darker than the body in *L. burmeisteri*, but is darker than the body in *L. pikunche*. Additionally, *L. pikunche* has more midbody scales (82–90) than *L. burmeisteri* (70–81), fewer dorsal scales (71–76) than *L. burmeisteri* (76–85) and more ventral scales (119–127) than *L. burmeisteri* (99–110).

Liolaemus pikunche is larger (maximum SVL = 91.3 mm) than *L. carlosgarini* (maximum SVL = 68.8 mm, Fig. 4). All males of *L. pikunche* have precloacal pores, whereas only 50% of *L. carlosgarini* males have precloacal pores. These species do not overlap in the PC1 vs PC2 graph.

Liolaemus pikunche differs from *L. choique*, which has bright yellow dorsal color with black spots or black stripes on the dorsum, or occasionally totally melanic trunk, and a tail with inconspicuous or no rings; whereas *L. pikunche* never has bright yellow or melanic dorsal coloration and has marked tail rings.

Liolaemus curis (Fig. 4) is the geographically most proximate species of the *L. elongatus* group to *L. pikunche*; however, these species can be easy differentiated by several characters. *Liolaemus curis* has a yellowish dorsal coloration accompanied by series of black transversal dorsal spots or an overall melanic dorsal coloration; whereas *L. pikunche* never has yellowish or melanic dorsal coloration. Moreover, *L. pikunche* has more midbody scales (82–90, 84.0 ± 3.0) than *L. curis* (68–76, 72.0 ± 4.6, Table 4), more dorsal scales (71–76, 73.8 ± 1.7) than *L. curis* (56–64, 61.3 ± 3.8, Table 4) and more ventral scales (119–127, 122.3 ± 3.1) than *L. curis* (102–116, 109.0 ± 6.2, Table 4). Males of *L. pikunche* have 3–4 precloacal pores, whereas males of *L. curis* have 0–2 precloacal pores.

Liolaemus pikunche can be differentiated from *L. crandalli* because dorsolateral field in *L. pikunche* are light brown color and the occipital stripe is marked and narrow, whereas *L. crandalli* has brown color on the dorsolateral field and the occipital stripe is inconspicuous and wide. Moreover, *L. crandalli* is endemic to the Auca Mahuida volcano in Argentina and separated by almost 350 km (airline).

Some specimens of *Liolaemus elongatus* have a wide deep black occipital stripe and some have totally melanic dorsal color. However, individuals of *L. pikunche* never have a deep black occipital stripe or melanism, but instead have a dark brown occipital stripe. Although *L. elongatus* is widely distributed, the northern most Chilean record from Lonquimay Volcano (Escobar-Huerta et al., 2015b; Troncoso-Palacios et al., 2016) is approximately 490 km (airline) south of the type locality of *L. pikunche*.

Liolaemus pikunche differs from *L. janequeoae*, because the latter species does not feature any dorsal pattern, apart from a few black or white dots and is smaller (maximum SVL 66.9) than *L. pikunche* (maximum SVL = 91.3 mm). Moreover, *L. pikunche* has fewer dorsal scales (71–76, 73.8 ± 1.7) than *L. janequeoae* (77–89, 85.0 ± 4.2, Table 4).

Liolaemus pikunche differs from *L. quinterosi*, which has more midbody scales (82–90) than *L. quinterosi* (70–78) and more ventral scales (119–127) than *L. quinterosi* (104–112). Besides, *L. quinterosi* has marked sexual dichromatism, a feature absent in *L. pikunche*. *Liolaemus quinterosi* has no precloacal pores in males, whereas males of *L. pikunche* have 3–4 precloacal pores.

Liolaemus pikunche is larger (maximum SVL = 91.3 mm) than *L. scorialis* (maximum SVL = 69.9 mm) and has more supralabial scales (6–8, 7.3 ± 0.8) than *L. scorialis* (6–7, 6.2 ± 0.4, Table 4).

Liolaemus pikunche differs from *L. smaug* because it is larger (maximum SVL = 91.3 mm) than *L. smaug* (maximum SVL = 71.3 mm) and has more midbody scales (82–90) than *L. smaug* (73–80). Moreover, *L. smaug* has inconspicuous or absent tail rings, whereas *L. pikunche* has dark brown tail rings.

Liolaemus pikunche differs from *Liolaemus* that do not belong to the *L. elongatus* group, but have similar size and occur near *L. pikunche* (though allopatric). In fact, *L. pikunche* differs from all species of the *L. leopardinus* group because the lack of "leopard type dorsal spots" and the lack of intense yellow or reddish ventral coloration present among the species of this group (Esquerré et al., 2019). In particular, *L. pikunche* can be easily differentiated from *L. normae*, because this latter species has red color on the flanks, ventral surface and even on the snout of some individuals, whereas *L. pikunche* has no red color. *Liolaemus ubaghsi* (Fig. 4) is characterized by a very variable dorsal pattern (occipital stripe absent/present, fragmented vertebral line absent/present, transversal dorsal whitish stripes absent/present, whitish dorsal dots on the trunk absent/present and yellow color on the flanks absent/present); whereas all specimens of *L. pikunche* have the same dorsal pattern with variation only in the shades. In *L. ubaghsi*, 69.2% of our sample totally lack or have an inconspicuous occipital stripe, whereas all specimens

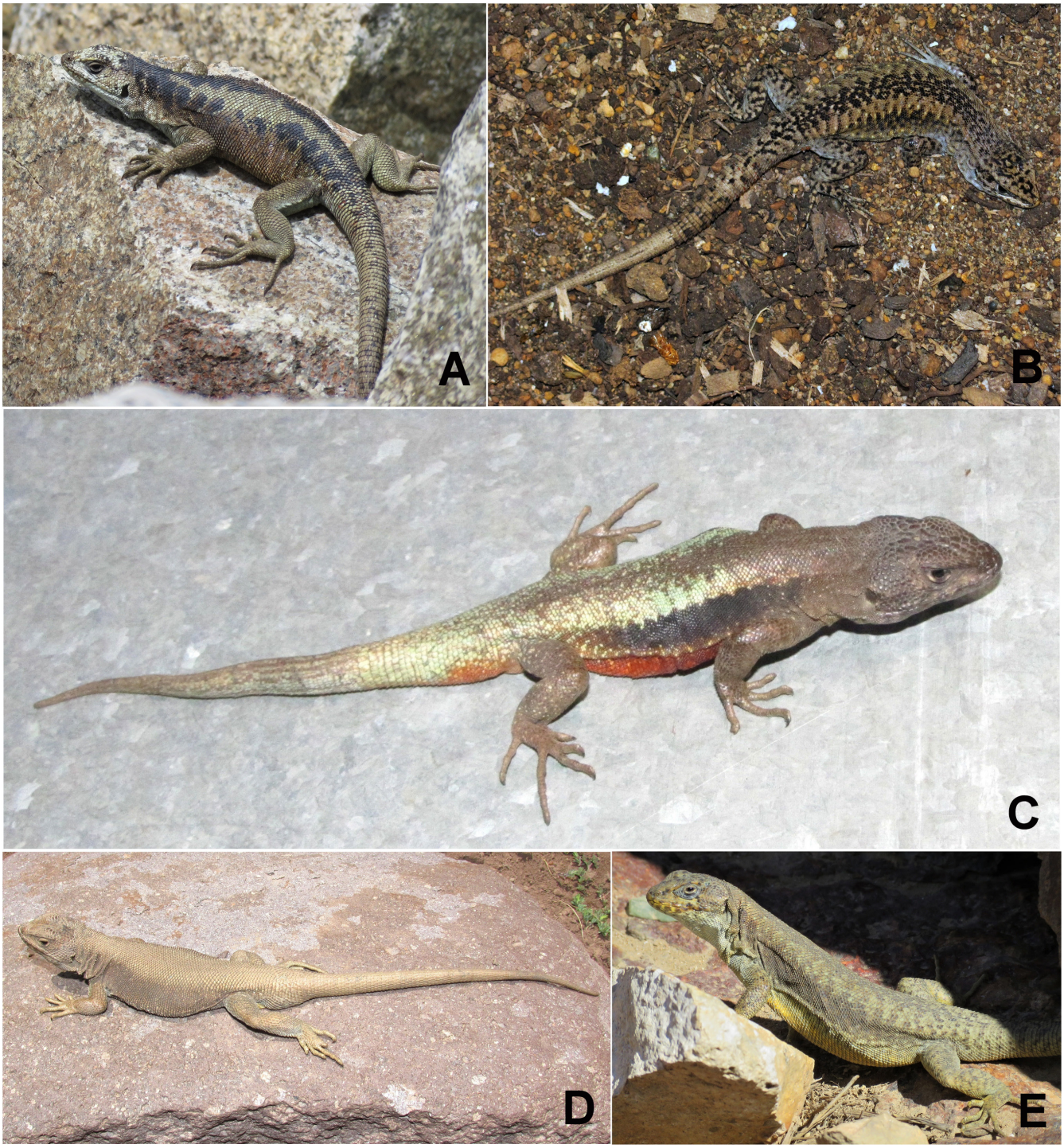

Figura 4. Algunas especies que habitan geográficamente cerca de *Liolaemus pikunche* sp. nov. A) *Liolaemus curis* del grupo de *L. elongatus* (Fotografía por DRA). B) *Liolaemus carlosgarini* del grupo de *L. elongatus* (Fotografía por JTP). C) *Liolaemus cristiani* del grupo de *L. chillanensis* (Fotografía por JTP). D–E) Parte de la variación fenotípica en *Liolaemus ubaghsi* del grupo de *L. leopardinus* (Fotografías por JTP y DRA, respectivamente).

Figure 4. Some pecies that are found in geographic proximity to *Liolaemus pikunche* sp. nov. A) *Liolaemus curis* of the *L. elongatus* group (Photograph by DRA). B) *Liolaemus carlosgarini* of the ***L. elongatus*** group (Photograph by JTP). C) *Liolaemus cristiani* of the *L. chillanensis* group (Photograph by JTP). D–E) Part of the phenotypic variation in *Liolaemus ubaghsi* of the *L. leopardinus* group (Photographs by JTP and DRA, respectively).

Tabla 4. Resultados de la ANOVA de una vía con grados de libertad (*df*) y la comparación *post hoc* (Holm-Sidak method). Solo se proveen los resultados significativos.

Table 4. Results of the One Way ANOVA with degrees of freedom (*df*) and the *post hoc* comparison (Holm-Sidak method). Only significant results are provided.

	One Way ANOVA			Holm-Sidak method
	F	*P*	*df*	
Midbody scales	12.04	> 0.01	12	*L. sp. > L. curis; L. antonietae > L. antumalguen, L. curis, L. elongatus, L. normae, L. scorialis, L. ubaghsi; L. buergeri > L. antumalguen, L. curis, L. normae, L. scorialis, L. ubaghsi; L. carlosgarini > L. antumalguen, L. curis, L. normae, L. ubaghsi; L. elongatus > L. curis; L. janequeoae > L. antumalguen, L. curis, L. normae, L. scorialis, L. ubaghsi; L. riodamas > L. curis; L. scorialis > L. curis*
Dorsal scales	18.33	> 0.01	12	*L. sp. > L. curis; L. antonietae > L. curis, L. normae; L. antumalguen > L. curis, L. normae; L. buergeri > L. sp., L. antonietae, L. antumalguen, L. carlosgarini, L. curis, L. elongatus, L. normae, L. riodamas, L. scorialis, L. ubaghsi; L. carlosgarini > L. curis, L. normae; L. cristiani > L. sp., L. antonietae, L. antumalguen, L. carlosgarini, L. curis, L. elongatus, L. normae, L. riodamas, L. scorialis, L. ubaghsi; L. janequeoae >L. sp., L. antonietae, L. antumalguen, L. carlosgarini, L. curis, L. elongatus, L. normae, L. riodamas, L. scorialis, L. ubaghsi; L. scorialis > L. curis, L. normae, L. ubaghsi; L. ubaghsi > L. curis*
Ventral scales	7.35	> 0.01	12	*L. sp. > L. curis, L. riodamas; L. antonietae > L. antumalguen, L. curis, L. riodamas; L. elongatus > L. curis, L. riodamas; L. janequeoae > L. antumalguen, L. buergeri, L. carlosgarini, L. cristiani, L. curis, L. riodamas; L. scorialis > L. antumalguen, L. curis, L. riodamas; L. ubaghsi > L. curis, L. riodamas*
Supralabial scales	3.41	> 0.01	11	*L. sp. > L. scorialis; L. antumalguen > L. scorialis; L. janequeoae > L. scorialis*

of *L. pikunche* have a marked occipital stripe. Several specimens of *L. ubaghsi* have whitish dots dispersed on the dorsum of the trunk, which from transversal stripes only in the 23.1% of our sample, whereas in *L. pikunche* white scales of the dorsum from transversal stripes in all specimens. Several specimens of *L. ubaghsi* have yellow color on the flanks, tail, limbs and snout (clearly observable from lateral view), whereas inconspicuous yellowish color in *L. pikunche* is only observable from ventral view. In *L. ubaghsi* the ventral surface has several dark gray spots dispersed, whereas *L. pikunche* lacks spots on the ventral surface or has inconspicuous light gray spots (one specimen). These species show only marginal overlap in multivariate morphological space, and their type localities are separated by more than 90 km (airline, including the Cachapoal, Claro and Tinguiririca river basins) without intermediate populations (Fig. 5).

There is no published morphological diagnosis for the species of the *L. chillanensis* group, but *L. pikunche* differs from all them, because in this group the males have no precloacal pores (Troncoso-Palacios, unpublished data). In particular, *L. pikunche* is larger (maximum SVL = 91.3 mm) than *L. cristiani* (maximum SVL = 78.2 mm) and has fewer dorsal scales (71–76, 73.8 ± 1.7) than *L. cristiani* (84–93, 88.5 ± 6.4). Moreover, *L. cristiani* has two color pattern features that are totally absent in *L. pikunche*, which are: metallic light green dorsolateral stripe and red ventral color (Fig. 4). Males of *L. pikunche* have 3–4 precloacal pores, whereas males of *L. cristiani* have no precloacal pores. These species do not overlap in the PC1 vs PC2 graph. *Liolaemus pikunche* can be easily differentiated from *L. riodamas* because this latter species has inconspicuous or absent dorsal pattern, has no tail rings and has light green color on the flanks, whereas *L. pikunche* has marked occipital and lateral stripes, tail rings and never has light green color on the flanks. These species do not overlap in the PCA space.

In regards to the *L. kriegi* group, *L. pikunche* differs because the species of this group have a very robust aspect, short limbs, and

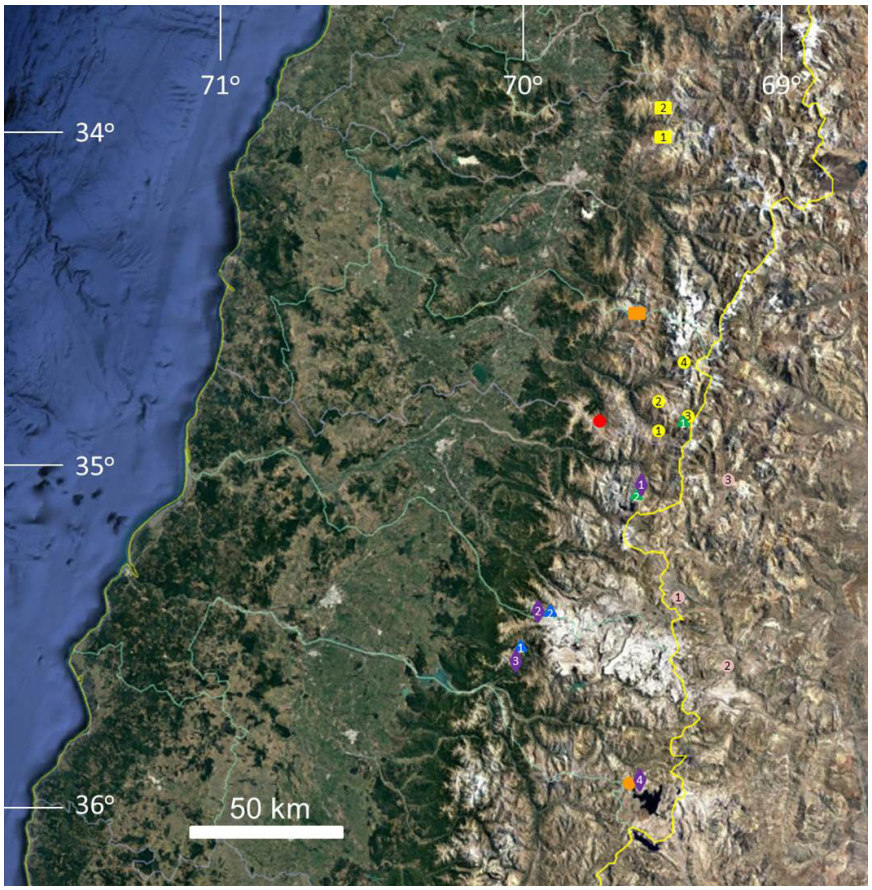

Figura 5. Distributional map for *Liolaemus pikunche* sp. nov. along with the geographically proximate species of the *L. elongatus* group (circles) and the species of similar size that belong to other groups. Red circle: *L. pikunche* sp. nov. (Alto Huemul). Orange circle: *L. carlosgarini* (Maule Lagoon). Yellow circle: *L. curis* (1 = Del Flaco hot springs, 2 = Los Humos flooded land, 3= Las Damas River and 4= University Glacier). Pink circles: *L. smaug* (1 = between Las Loicas and Peteroa Volcano, 2 = near Las Leñas and 3 = near Las Loicas). Orange square: *L. normae* (Cristales Lagoon). Yellow square: *L. ubaghsi* (1 = Chapa Verde and 2 = Pabellones Mountain). Blue triangle: *L. cristiani* (1 = El Peine Mountain and 2 = Siete Tazas National Park). Green triangle: *L. riodamas* (1 = Las Damas River and 2 = Planchón Volcano).

Figura 5. Mapa distribucional para *Liolaemus pikunche* sp. nov. junto con las especies geográficamente cercanas del grupo de *L. elongatus* (círculos) y las especies de tamaño similar que pertenecen a otros grupos. Círculo rojo: *L. pikunche* sp. nov. (Alto Huemul). Circulo naranja: *L. carlosgarini* (Laguna del Maule). Circulo amarillo: *L. curis* (1 = Termas del Flaco, 2 = Vegas de Los Humos, 3= Río Las Damas y 4= Glaciar Universidad). Círculos rosados: *L. smaug* (1 = entre Las Loicas y Volcán Peteroa, 2 = cerca de Las Leñas y 3 = cerca de Las Loicas).umos Cuadrado naranja: *L. normae* (Laguna Cristales). Cuadrado Amarillo: *L. ubaghsi* (1 = Chapa Verde y 2 = Montaña Pabellones). Triangulo azul: *L. cristiani* (1 = Cerro El Peine y 2 = Parque Nacional Siete Tazas). Triangulo verde: *L. riodamas* (1 = Río Las Damas y 2 = Volcán Planchón).

very developed neck folds (Pincheira-Donoso & Núñez, 2005), all traits absent in *L. pikunche*. In particular, *L. pikunche* has fewer dorsal scales (71–76, 73.8 ± 1.7) than *L. buergeri* (78–91, 83.9 ± 4.3, Table 4). Moreover, *L. buergeri* has inconspicuous or absent tail rings, whereas *L. pikunche* has dark brown tail rings. These species do not overlap in multivariate morphological space.

Description of the holotype

Adult male. SVL = 90.6 mm. Horizontal diameter of the eye: 4.3 mm. Subocular length: 6.0 mm. Length of the fifth supralabial: 3.3 mm. Head length (from the anterior border of the auditory meatus to the tip of the snout): 20.7 mm. Head height (at the level of ear openings): 10.3 mm. Head width (distance between the two ear openings): 16.1 mm. Neck width: 22.1 mm. Interorbital distance: 7.3 mm. Ear-eye distance: 8.5 mm. Internasal scales distance: 2.7 mm. Ear width: 1.3 mm. Ear height: 3.4 mm. Axilla-groin distance: 38.2 mm. Body width: 26.8 mm. Forelimb length: 27.8 mm. Hindlimb length: 47.9 mm. Tail length (not autotomized): 151 mm, with relation tail length/SVL = 1.7. Rostral scale, wider (4.4 mm) than high (1.4 mm).

Two postrostrals. Four internasals. Interparietal is

subtriangular, with a small central spot marking the position of the parietal eye. The interparietal is slightly smaller than the parietals, and is surrounded by six scales. The parietal scales are in contact. Ten scales between the interparietal and rostral. Sixteen scales between the occiput and the rostral (Hellmich index; Lobo 2005). Orbital semicircles are complete and formed by 15 scales on both sides. Five supraoculars on the right side and six on the left. Seven superciliary scales. Frontal area divided into three scales, from back to front: 1 and 2. Preocular separated from the lorilabials by one loreal scale. Two scales between nasal and canthal. Nasal separated of the rostral by one scale, surrounded by seven scales. One row of lorilabials between the supralabials and the subocular. Seven supralabials, the fifth is curved upward without contacting the subocular. Five infralabials scales. Pentagonal mental scale, in contact with four scales. Four pairs of post-mental shields, the second is separated by two scales. Temporal of variable shape, but mainly hexagonal, slightly keeled, juxtaposed. Nine temporal scales between the level of superciliary scales and the rictal level. Four small scales on the anterior edge of the ear, slightly projected, which do not cover the auditory meatus. Differentiated auricular scale, wide, restricted to the first third of the auditory meatus. Forty-eight gular scales between the auditory meatuses. The lateral neck fold is "Y" shaped. There is a slightly developed ventro-lateral fold running from the axilla to the half the trunk.

Midbody scales: 90. Dorsal scales are lanceolate, subimbricate, keeled (without mucrons) and with interstitial granules. Dorsal scales and ventral scales have similar size. Dorsal scales: 73. Ventral scales are rounded, smooth, imbricated and without interstitial granules. Ventral scales: 122. Four orange precloacal pores. Supra-femoral scales are lanceolate, imbricate and slightly keeled. Infra-femoral scales are lanceolate or rhomboidal, smooth and imbricated. Supra-antebrachials scales are lanceolate, imbricate and keeled. Infra-antebrachials are rounded or rhomboidal, imbricated and smooth, with some interstitial granules. Dorsal scales of the first third of the tail are rhomboidal, imbricate, keeled and mucronate. Ventral scales the first third of the tail are lanceolate, smooth and imbricate. Lamellae of the fingers: I: 10, II: 14, III: 19, IV: 21 and V: 12. Lamellae of the toes: I: 10, II: 16, III: 22, IV: 28 and V: 15.

Color in life: The dorsal surface of the head has light brown color and the dorsum has yellowish light brown color, but there are several dark brown spots on the dorsal surface of the head, especially on the supraocular and occipital areas, which gives to the head a darker color compared to the dorsum. Temporal area, snout and cheeks are light brown color with few dark brown spots dispersed. The subocular scale is dark brown on the upper half and whitish in the bottom half. There is an inconspicuous narrow occipital stripe (running from the occiput to the base of the tail) formed by small dark brown spots.

There are 14 series of whitish transversal stripes on the dorsolateral field (running from the shoulder to the base of the tail), with dark brown spots on the anterior border. There is a dark brown lateral wide stripe, running from the temporal area to the groin, with few whitish stripes into it. The limbs are light brown, with dispersed dark brown spots. The tail has a light brown dorsal coloration, with marked dark brown rings. Ventrally, the throat, the belly, the limbs and the tail are light gray, with more dark shades on the middle of the belly. Inconspicuous yellowish color on the sides of the belly.

Variation

In four males: SVL: 77.6–91.3 mm. Axilla-groin distance: 30.8–38.2 mm. Head length: 17.4–20.7 mm. Head width: 14.0–16.3 mm. Head height: 8.1–11.3 mm. Leg length: 47.6–53.8 mm. Arm length: 26.0–31.2 mm. Foot length: 23.4–27.5 mm. Tail length: 128–154 mm (three specimens, autotomized in another). Tail length/SVL = 1.6–1.8. In two females: SVL: 85.2–89.0 mm. Axilla-groin distance: 35.6–39.1 mm. Head length: 18.5–19.1 mm. Head width: 15.8–16.4 mm. Head height: 7.9–11.2 mm. Leg length: 46.0–47.4 mm. Arm length: 29.2–29.9 mm. Foot length: 25.1–25.4 mm. Tail length: 140–145 mm (no autotomized), with relation tail length/SVL = 1.6–1.7. The juvenile has: SVL: 62.0 mm. Axilla-groin distance: 26.8 mm. Head length: 14.4 mm. Head width: 11.9 mm. Head height: 6.6 mm. Leg length: 36.9 mm. Arm length: 22.7 mm. Foot length: 21.1 mm. Tail length: 109 mm (not autotomized). Tail length/SVL = 1.8.

The variation in the scalation of the adult specimens is as follows. Midbody scales: 82–90 (84.0 ± 3.0). Dorsal scales: 71–76 (73.8 ± 1.7). Ventral scales 119–127 (122.3 ± 3.1). Fourth finger lamellae: 21–24 (23.0 ± 1.5). Fourth toe lamellae: 28–31 (29.2 ± 1.2). Supralabial scales: 6–8 (7.3 ± 0.8), the fifth curved upward. Infralabial scales: 4–6 (5.0 ± 0.6). Interparietal scale subtriangular, pentagonal, hexagonal or heptagonal, bordered by 6–9 scales (7.0 ± 1.3). Interparietal and parietal scales have similar size. Nasal and rostral always separated by one scale. Precloacal pores in males: 3–4. Precloacal pores are absent in females.

Males and females have a similar color patterns compared with the holotype, with small variations on the shades. Some specimens have a fragmented dark brown vertebral line on the center (running from the occiput to the first third of the tail). One male has a sky-blue transversal stripes instead of whitish

stripes, which are placed all over the dorsal surface (trunk and tail), and also it is the only specimen with whitish dots dispersed on the head and limbs. Another male has light brown dorsal color with yellowish shade on the paravertebral fields. A female has light gray spots dispersed all over on the ventral surface. A specimen with autotomized tail has no dorsal pattern on the regenerated portion of the tail. Inconspicuous yellowish color on the cloaca, thighs and sides of the belly is present in both, some adult males (n = 2) and one adult female. Precloacal pores in the males are orange, but are discolored in alcohol. The juvenile has the same color described for the holotype, but has light gray spots dispersed all over on the ventral surface.

Distribution and natural history

Known only from the type locality in the O'Higgins Region, Chile: Alto Huemul (34°56' S, 70°38' W, Fig. 5). Specimens were found between 1790 and 1900 m asl. As in almost all species of the *L. elongatus* group (Morando et al., 2003; Avila et al., 2015; Troncoso-Palacios et al., 2018), *L. pikunche* is saxicolous and specimens were seen basking on medium to large rocks generated by the fragmentation of basaltic formations on the sides of the Claro River basin and its tributaries Los Nucos and Los Lagartos. On two occasions, we found a male near a female (few than five meters), with juveniles found approximately 20 meters away. The vegetation has been described as "lower-bush of the Chilean Mountain range" (Luebert & Pliscoff, 2006), the most abundant shrubs are *Chuquiraga oppositifolia*, *Ephedra andina*, *Discaria trinervis* and *Berberis empetrifolia*. The most abundant herbs are *Festuca* sp., *Hypericum perforatum*, *Viguiera revoluta* and *Acaena* sp. Some trees were found near the river: *Maytenus boaria* and *Escallonia revoluta*. *Liolaemus pikunche* is not an abundant lizard and few other individuals, apart from those collected, were seen. At the dates of capture (January and February, summer), females have no embryos but have several small oocytes. *Liolaemus pikunche* was found in syntopy with *L. chiliensis* (Lesson, 1830), *L. curicensis* Müller & Hellmich, 1938, *L. tenuis* (Duméril & Bibron, 1837) and the snake *Tachymenis chilensis* (Schlegel, 1837), which may represent a predator. The variable hawk, *Geranoaetus polyosoma* (Quoy & Gaimard, 1834), was also seen and likely preys on *L. pikunche*, since this hawk usually preys on lizards in Andean habitats (Martínez-Piña & González-Cifuentes, 2017).

Etymology

The epithet "pikunche", is a noun in apposition, from the Mapudungun language meaning "north people" ("pikun" = north; "che" = people). We named this species after the native Pikunche people of Central Chile (between Aconcagua and Biobío rivers) where we found this new species.

DISCUSSION

Although we have tentatively assigned *L. pikunche* to the *L. elongatus* group because it is in found in the latitudinal range of this group and matches all the morphological and ecological features previously reported for these lizards (Abdala et al., 2010; Avila et al., 2015; Troncoso-Palacios et al., 2018), further DNA study is required to confirm this hypothesis. *Liolaemus pikunche* was previously confused with *L. cristiani*, which is a member of the *L. chillanensis* group (Troncoso-Palacios et al., 2018). As a consequence of our study, the distribution of *L. cristiani* is restricted to the Peine Mountain and Siete Tazas National Park of the Maule Region, Chile (Núñez et al., 1991; Castro-Pastene et al., 2015), and must not be listed for the O'Higgins Region as was suggested previously by Ramírez-Álvarez (2018). Additionally, it is possible that *L. pikunche* was referred to in two previous publications. Esquerré et al. (2014) mention two specimens (MNHNCL 4081–82) of "*Liolaemus* sp." from Alto Huemul, type locality of *L. pikunche*, collected by H. Núñez, J.C. Torres-Mura and P. Henríquez in 2006. Later, Núñez and Gálvez (2015) assigned those same specimens to *L. ubaghsi*, a member of the *L. leopardinus* group. Although we did not examine MNHNCL 4081–82 and no photographs of these specimens were published by either Esquerré et al. (2014) or Núñez and Gálvez (2015), it is likely that both records refer to *L. pikunche* because we did not find another large *Liolaemus* in Alto Huemul. If indeed *L. pikunche* was confused with *L. ubaghsi*, this was probably because some similarities of the color pattern, size and shape (see Diagnosis section).

Given that several lineages have been proposed as candidate species of the *L. elongatus* group through molecular phylogenetic studies (Morando et al., 2003; Medina et al., 2017; Troncoso-Palacios et al., 2018) whose taxonomic status remains undetermined and that several additional species of the group have been recently described (Troncoso-Palacios et al., 2018; Ruiz et al., 2019a;, this study), it is probable that the described diversity of this group of lizards will continue to increase in the coming years. For example, as was noted by Troncoso-Palacios et al. (2019), it is needed a deeper study to clarify the taxonomic status of the population of lizards that occur in Altos de Lircay, Maule Region, which has been listed with several names: *L. monticola* Müller & Hellmich, 1932, *L. carlosgarini*, *L.* sp. 1 and *L.* sp. *Lircay* (Pincheira-Donoso & Núñez, 2005; Escobar-Huerta et al., 2015a; Medina et al., 2017; Troncoso-Palacios et al., 2018, 2019). We hope that further studies help to clarify these issues.

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APPENDIX I

Specimens examined. Museum codes are as follow: LCUC (Laboratorio de Citogené¬tica, Facultad de Ciencias, Universidad de Chile), MNHNCL (Museo Nacional de Historia Natural, Chile), MRC (Museo Regional de Concepción), MZUC (Museo de Zoología of Universidad de Concepción) and SSUC (Colección de Flora y Fauna Patricio Sánchez Reyes, Pontificia Universidad Católica de Chile).

Liolaemus antonietae (*n* = 12). MZUC 28249, 28251, 28254, 28569, 38086 and 38090. Termas de Chillán, Biobío Region, Chile. SSUC Re 695–99. Termas de Chillán, Biobío Region, Chile. J. Troncoso-Palacios, H. Díaz and F.A. Urra colls. January 9, 2014. SSUC Re 700. Laguna del Huemul, Shangrila, Biobío Region, Chile. F.A. Urra coll. December, 2014.

Liolaemus antumalguen (*n* = 3). SSUC Re 763–65. Eight Km NW from Tromen Volcano, Neuquén Province, Argentina. J. Troncoso-Palacios and C. Castro-Pastene colls. December 9, 2017.

Liolaemus buergeri (*n* = 15). LCUC 2311. El Planchón, Maule Region, Chile. M. Lamborot and M.E. Manzur colls. Juanary 7, 1996. SSUC Re 171– 180. Maule Lagoon. F. Ferri coll. February 20, 2011. SSUC Re 434–37. El Planchón, road to Teno Lagoon. J. Troncoso-Palacios, L. Negrete and R. Barros colls. January, 2012. SSUC Re 776–77. Los Humos, O'Higgins Region, Chile. J. Troncoso-Palacios and D. Ramírez-Álvarez colls. Marsh 10, 2018.

Liolaemus carlosgarini (*n* = 10). SSUC Re 181–189, 349. Road to Maule Lagoon, Maule Region, Chile. F. Ferri coll. February 20, 2011.

Liolaemus cristiani (*n* = 2). MNHNCL 4174. El Peine Mountain, Maule Region. H. Núñez and A. Labra colls. February 24, 1990. SSUC Re 537. El Peine Mountain, Maule Region, Chile. J. Troncoso-Palacios coll. October, 2011.

Liolaemus curis (*n* = 4). SSUC Re 166–68. Termas del Flaco, O'Higgins Region, Chile. F. Ferri coll. January 2, 2011. SSUC Re 495. Termas del Flaco, O'Higgins Region, Chile. J. Troncoso-Palacios coll. January 14, 2011.

Liolaemus elongatus (*n* = 6). SSUC Re 545–46, 618–21. Eight km east of the summit of the Llaima volcano, Araucanía Region, Chile. J. Troncoso-Palacios and D. Esquerré Colls. December 9, 2012.

Liolaemus janequeoae (*n* = 7). SSUC Re 649–51. Laguna Verde, approximately 13.5 km NW of the summit of the Tolhuaca volcano, Araucanía Region, Chile. J. Troncoso-Palacios, F. Urra and H. Díaz colls. January 5, 2014. SSUC Re 712–14. Laguna Verde, approximately 13.5 km NW of the summit of the Tolhuaca volcano, Araucanía Region, Chile. J. Troncoso-Palacios and E. Riveros-Riffo colls. January 15, 2016. SSUC Re 715. Laguna Verde, approximately 13.5 km NW of the summit of the Tolhuaca volcano, Araucanía Region, Chile. E. Riveros-Riffo coll. February 18, 2015.

Liolaemus normae (*n* = 6). SSUC Re 738–41, 743. Los Cristales Lagoon, Rengo, O'Higgins Region, Chile. D. Ramírez-Álvarez and J. Troncoso-Palacios colls. January 21, 2016. SSUC Re 742. Los Cristales Lagoon, Rengo, O'Higgins Region, Chile. D. Ramírez-Álvarez coll. March 28, 2015.

Liolaemus pikunche sp. nov. (*n* = 7). SSUC Re 780. Alto Huemul, O'Higgins Region, Chile. D. Ramírez-Álvarez coll. February 22, 2015. SSUC Re 781–786. Alto Huemul, O'Higgins Region, Chile. D. Ramírez-Álvarez and J. Troncoso-Palacios colls. January 29, 2020.

Liolaemus riodamas (*n* = 2). SSUC Re 493–94. Teno Lagoon, Maule Region, Chile. J. Troncoso-Palacios, L. Negrete and R. Barros colls. January, 2012.

Liolaemus scorialis (*n* = 11). MRC 675, 677, 680, 682. La Mula Lagoon, Ralco National Reserve. Unknown coll. December 1, 2001. SSUC Re SSUC Re 612–17, 680. 7 km NW of the summit of the Antuco volcano, near the Laja Lagoon, Biobío Region, Chile. J. Troncoso-Palacios, F. Urra and H. Díaz colls. January 8, 2014.

Liolaemus ubaghsi (*n* = 4). MNHNCL 1601. Sewell, O'Higgins Region, Chile. M. Elgueta coll. December, 1982. SSUC Re 491–92. El Teniente, Tranque Barahona, O´Higgins Region, Chile. R. Thomson and G. Ugalde colls. April 15, 2008. SSUC Re 735. Road of Río Tinto Miner, O'Higgins Region, Chile. D. Ramírez-Álvarez coll. November, 2016.