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Description of *Phymaturus katenke*, a new species of lizard (Iguania: Liolaemidae) discovered through DNA barcoding

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Abstract. We describe a new sexually monomorphic species of the "*Phymaturus patagonicus*" group, called *Phymaturus katenke*. It lives at about 800 m altitude on basaltic outcrops, in the central steppe of Chubut Province, Argentina. Here, we morphologically compared individuals of the studied population with the phylogenetically related and geographically neighbouring congenerics from the "*patagonicus*" group. Its distribution and natural history are pointed out.

Key words: Argentina, Muchagua´s Lizard, Patagonian steppe, reptiles, rock-dwelling lizards, South America.

Introduction

The genus *Phymaturus* comprises herbivorous, viviparous and saxicolous species found in Argentina and Chile. Until 1970, two subspecies of a single species were recognized: *Phymaturus p. palluma* and *P. p. patagonicus* (Peters & Donoso-Barros 1970). Subsequently, new species and subspecies were described. Etheridge (1995) elevated both subspecies to species and described two groups (*palluma* and *patagonicus*) based on scalation and skeletal morphology. Morando et al. (2013) proposed the subdivision of each group in several clades. Fifty-three species have been described until 2020; however, some were synonymized or their status is debated (see Corbalán et al. 2016, Lobo et al. 2018 for details). Causes of confusion and misidentification of species are the presence of polymorphisms, the high chromatic variability within species as well as the highly conserved morphological and ecological traits among species (Scolaro & Ibargüengoytía 2008, Lobo et al. 2012a, Avila et al. 2014, Corbalán et al. 2016, 2018, Troncoso-Palacios et al. 2018). Uetz (2020) recognizes 46 valid species, 22 in the *palluma* group and 24 in the *patagonicus* group. Moreover, some populations under study are considered as candidate species (Morando et al. 2013). Within the *patagonicus* group, the debate is centered on the identity of *Phymaturus agilis* Scolaro et al. 2008, *P. spectabilis* Lobo & Quinteros 2005 and *P. excelsus* Lobo & Quinteros 2005 (Lobo et al. 2012a, Corbalán et al. 2016), all of which were recently synonymized with *P. spurcus* Barbour 1921 by Becker et al. (2019).

Under the DNA Barcoding initiative, Corbalán et al. (2016) found that the mitochondrial gene cytochrome c oxidase subunit I (COI) could reliably distinguish among species of the *patagonicus* group when genetic distances between species pairs are > 2%. Testing individuals belonging to an unidentified population from Los Adobes (Chubut, Argentina), these authors found that it differed genetically from described species and designed it as *Phymaturus* sp. 1. The Barcode of Life Data System assigned it a unique barcode index number (BIN), whereas phylogenetic analyses indicated that this population was closely related to *P. patagonicus* Koslowsky 1898 (genetic distance [GD] = 2.6%), and to *P. spurcus* (GD = 2.12–2.17%) (Corbalán et al. 2016). GD distances between *P.* sp. 1 and geographically close species such as *P. camilae* Scolaro et al. 2013 and *P. felixi* Lobo et al. 2010, instead, were greater (7.9 and 6.2%, respectively). Thus, Corbalán et al. (2016) pointed out that the Los Adobes population should be studied further, including morphological traits to establish its taxonomic status.

Here, we compare the morphological traits of the *Phymaturus* sp. 1 Los Adobes population with genetically and geographically close species. As genetically close species we consider *P. spurcus*, *P. patagonicus* and *P. manuelae* Scolaro & Ibargüengoytía 2008. Different phylogenies recovered *P. spurcus* as a member of the *spurcus* clade (Lobo et al. 2012b, Morando et al. 2013, González Marín et al. 2018, Lobo et al. 2018). *Phymaturus patagonicus* was included either in the *calcogaster* clade (González Marín et al. 2018), or the *spurcus* or s*omuncurensis* clades, but with very weak support (Lobo et al. 2018). *Phymaturus manuelae* was considered an independent lineage of the *spurcus* clade (Becker et al. 2019), or as a member of the *spurcus* clade (Lobo et al. 2012b, Morando et al. 2013, González Marín et al. 2018). Lobo et al. (2018) considered *P. manuelae* as a floating taxon since it introduced incongruences in the analyses. As geographically close species we consider *P. camilae* (belonging to the *calcogaster* or *somuncurensis* clades; González Marín et al. 2018, Lobo et al. 2018, respectively), *P. felixi* (*indistinctus* clade; González Marín et al. 2018, Lobo et al. 2018), and *P. curivilcun* Scolaro et al. 2016. This last species has not been included in any phylogeny analyses.

Material and Methods

We collected by hand or noose 15 individuals (10 males and 5 females) of *Phymaturus* sp. 1 in 2015 from the basaltic outgroups at Muchagua farm, Los Adobes locality (Chubut, Argentina). The specimens were fixed in 10% formalin and preserved in 70% ethanol, and subsequently were stored in the La Plata Museum (Faculty of Natural Sciences and Museum, University of La Plata, Buenos Aires Province; MLP-R) and the Herpetological Collection of the Argentinean

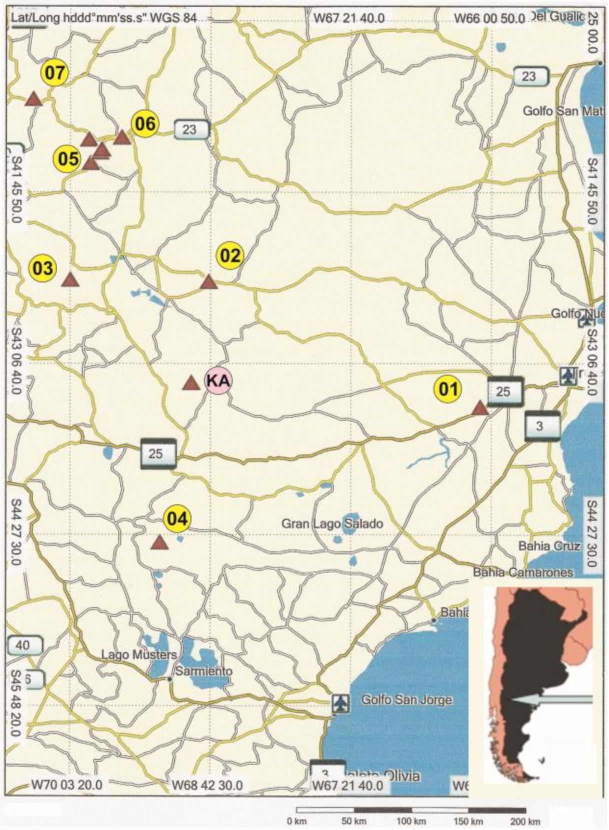

Figure 1. Geographic distribution of all neighboring members of the *Phymaturus katenke* of northwestern Chubut and southwestern Río Negro provinces (Argentina). Localities are indicated by numbers and represent *P. patagonicus* (01), *P. camilae* (02), *P. curivilcun* (03), *P. felixi* (04), *P. spurcus* (05), *P. desuetus* (06), *P. manuelae* (07) and *P. katenke* (KA).

Institute of Arid Zones Research (CH-IADIZA).

Seventeen continuous and meristic traits, typically used in systematic studies on the genus *Phymaturus* (Etheridge 1995, Lobo & Quinteros 2005, Lobo et al. 2012b), were measured following the procedure described by Pincheira-Donoso & Nuñez (2005), using a precision calliper (0.1 mm) or a stereo-microscope (Table 1). Data were collected from adults of both sexes, which were categorized as sexually mature after verifying the presence of mature gonads and secondary sex characters. We compared all measured traits between sexes to assess dimorphism, as well as the presence of precloacal pores. To identify distinctive traits, they were compared with data we obtained from collection specimens of genetically and geographically close species: *P. spurcus* (*n* = 90), *P. patagonicus* (*n* = 26), *P. manuelae* (*n* = 12), *P. camilae* (*n* = 30), *P. felixi* (*n* = 33), *P. curivilcun* (*n* = 14), and the single known specimen of *P. desuetus* Scolaro & Tappari 2009 (Appendix 1; Fig. 1). The Gaussian distributions of the data were tested for normality with Snedecor´s *F*-test, and the means were then tested using the Student's *t*-test or Mann-Whitney *U*-test. We considered statistical significance at $p < 0.05$.

Results

Sexual dimorphism in *Phymaturus* sp. nov. was only evident in the axilla-groin distance (Table 1) and by the presence of precloacal pores in males, two traits observed in several *Phymaturus* species.

Significant differences were found in 16 morphologic and meristic traits between the *Phymaturus* sp. nov. and two or more of all the compared species (Tables 2 and 3). Only scales around pineal showed no differences with any species. Most traits showed major expression in *P.* sp. nov., with the exception of scale count around midbody, which were more numerous in five out of the seven analyzed species (*P. spurcus*, *P. camilae, P. manuelae*, *P. felixi* and *P. desuetus*) (Tables 2, 3). The number of fragmented subocular scales was higher in *P. spurcus* than in *P.* sp. nov. (Table 2).

Phymaturus katenke sp. nov.

(Figs. 2, 3; Tables 1, 2, 3)

Phymaturus sp. 1 Corbalán, V., Debandi, G., Scolaro, J.A. & Ojeda, A., 2016.

Holotype. MLP.R. 6592, adult male, collected from an open basaltic outcrop in the farm "Muchagua" (43°15'39.9" S;

Table 1. *Phymaturus katenke*: mean, standard deviation (SD) and range of morphometric traits. Measurements in mm or number of scales. Significant statistical differences between the sexes are in bold.

Trait	Males (N = 10)		Females (N = 5)		Comparison	
	Mean (SD)	Range	Mean (SD)	Range	*t*	*P*
Snout-vent length	93.9 (4.69)	88.5–100.6	95.7 (4.93)	88.7–102	1.45	0.19
Axilla-groin distance	47.3 (2.66)	42.5–50.6	51.7 (5.14)	43.5–57.3	2.25	**0.04**
Head length	18.5 (0.69)	17.3–19.6	18.1 (0.48)	17.0–18.8	1.03	0.32
Head width	16.4 (0.85)	16.4–19.1	16.5 (0.57)	15.5–17.1	2.15	0.06
Hindlimb length	33.1 (1.37)	30.6–35.0	33.7 (1.60)	31.9–35.1	0.75	0.46
Forelimb length	48.9 (2.71)	44.5–53.0	47.7 (1.91)	44.4–49.1	0.90	0.38
Fourth finger length	2.2 (0.83)	10.7–13.3	12.6 (1.25)	11.1–14.4	0.80	0.61
Fourth finger lamellae	23.6 (1.71)	22–28	23.8 (0.84)	23–25	0.24	0.76
Fourth toe length	16.4 (1.16)	15.9–18.8	16.4 (1.33)	15.1–18.3	0.12	0.71
Dorsal head scales	22.9 (1.28)	21–25	21.8 (1.92)	19–24	1.33	0.29
Scales around pineal	7.1 (0.99)	6–9	7.2 (0.84)	6–8	0.20	0.57
Subocular scales	2.2 (0.42)	2–3	1	1		
Supralabial scales	9.2 (0.63)	8–10	8.8 (0.45)	8–9	1.18	0.60
Infralabial scales	8.7 (0.48)	8–9	8	8		
Scales contacting mental	4.5 (0.86)	4–6	4.2 (0.45)	4–5	0.73	0.47
Scales around midbody	202.7 (4.49)	197–212	205 (9.29)	193–212	0.54	0.68
Ventral scales	172.5 (7.78)	165–188	179.2 (4.55)	174–186	1.76	0.10

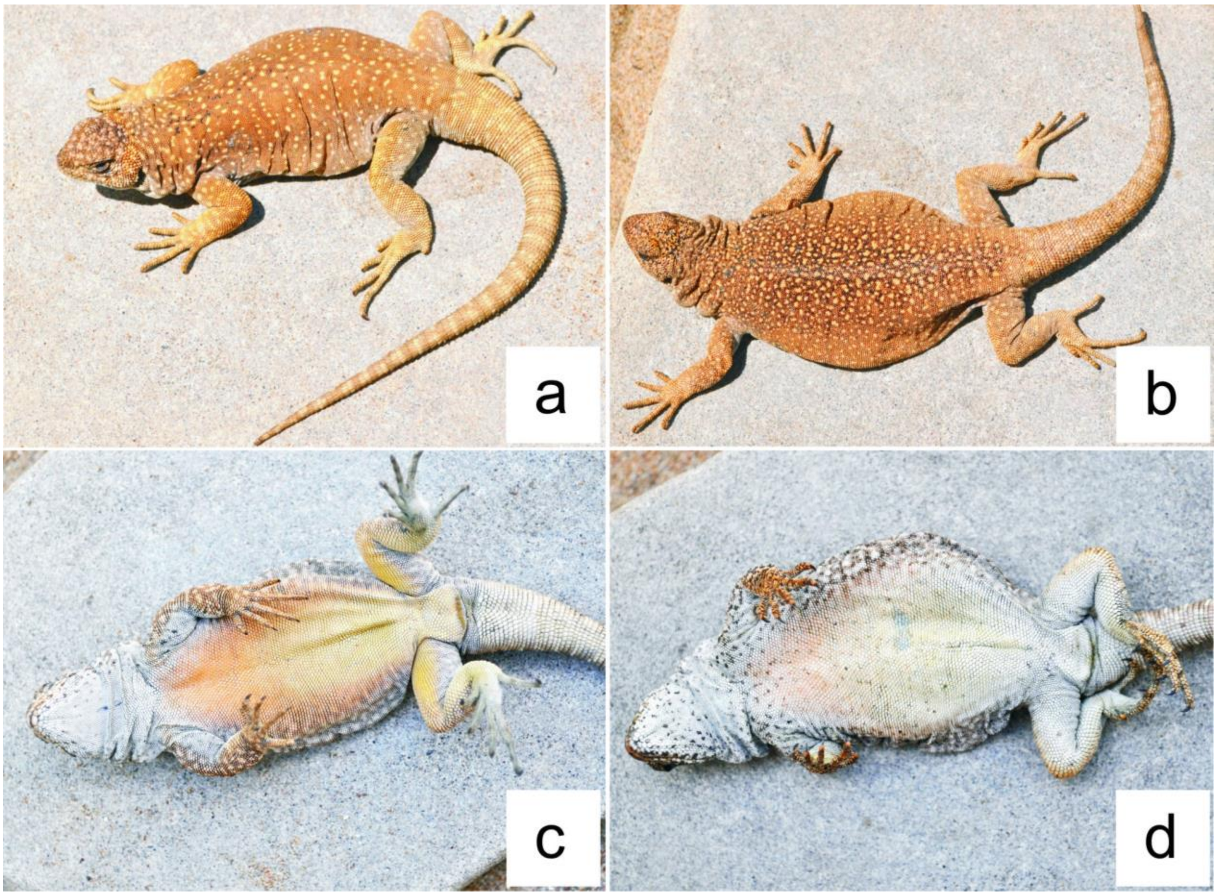

Figure 2. *Phymaturus katenke*: a live adult male (holotype, MLP.R 6593) (A) dorsal view, (C) ventral view; a live adult female (paratype, MLP.R 6594) (B) dorsal view, (D) ventral view. Photo: J.A. Scolaro, 11 November 2015.

68°53'22.8″ W; 830 m asl, datum = WGS84), Los Adobes, Paso de Indios Department, Chubut Province, Argentina. Collected by J.A. Scolaro and O.F. Tappari, 27 November 2015.

Paratypes. Adults. Males: MLP.R. 6595–6596, CH-IADIZA 836–838; females: MLP.R. 6593–6594, CH-IADIZA 839. Collection data same as the holotype.

Diagnosis. *Phymaturus katenke* is a member of the *patagonicus* group, distinguished from the *palluma* group by having superciliaries that are flat and imbricate rather than rectangular and non-overlapping; slightly spiny and non-rugose caudal scales in verticilles, and two rows of lorilabial scales between the subocular and supralabial scales.

Phymaturus katenke is distinguished from *P. spurcus*, *P. patagonicus*, *P. felixi* and *P. desuetus* by its larger adult body size (Tables 2, 3). Absence of sexual dichromatism differentiated *P. katenke* from the examined *P. camilae*, *P. spurcus* and *P. felixi,* and from *P. ceii* Scolaro & Ibargüengoytía 2007, *P. videlai* Scolaro & Pincheira-Donoso 2010, *P. castillensis* Scolaro & Pincheira-Donoso 2010 and *P. tenebrosus* Lobo & Quinteros 2005. Moreover, the color pattern of *P. katenke* is different from those observed in other monochromatic species such as *P. etheridgei* Lobo et al. (2010), *P. curivilcun*, *P. patagonicus* or *P. indistinctus* Cei & Castro (1973).

Three traits (number of supralabials, scales between rostral and interparietal, and scales around midbody) distinguish *P. katenke* from all examined species. Supralabial scales and scales between rostral and interparietal were more numerous in *P. katenke*, while scales around midbody were more numerous in *P. spurcus*, *P. manuelae*, *P. camilae*, *P. felixi* and *P. desuetus* (Table 2).

Phymaturus katenke differs from *P. spurcus*. *P. patagonicus*, *P. camilae*, *P. felixi, P. curivilcun* and *P. desuetus* in its larger axila-groin distance, head width and, with the exception of *P. patagonicus*, limbs length. A higher number of ventral scales distinguishes *P. katenke* from *P. patagonicus*, *P. curivilcun* and *P. camilae. Phymaturus katenke* has more infralabial and dorsal scales than *P. manuelae* and distinguishes it from *P. spurcus*. *P. patagonicus*, *P. curivilcun* and *P. felixi* (Tables 2, 3).

Phymaturus katenke has a fragmented into two subocular scale, a trait normally not present in *P. patagonicus*, *P. felixi* or *P. camilae*.

Holotype description. A medium-sized lizard; snout-vent length (SVL) 88.7 mm; tail length 113.2 mm (complete, not regenerated, 1.3 × SVL); head length 19.1 mm; head width 17.9 mm; eye-nose distance 5.9 mm; forelimb length 34.2 mm; hindlimb length 50.1 mm; axilla-groin distance 47.4 mm (53.4% of SVL); fourth finger length 12.6 mm; fourth toe length 15.2 mm; scales in dorsal head 22; scales around midbody 205; ventral scales between mental and precloacal pores 169; supra-labial scales 9-9; infralabial scales 9 (right) and 10 (left); 23 subdigital lamellae on fourth finger of the right hand; subdigital lamellae on fourth toe 27; precloacal pores 8; cephalic scales granular, almost smooth; supraorbital semicircles with large bulky scales in seven irregular

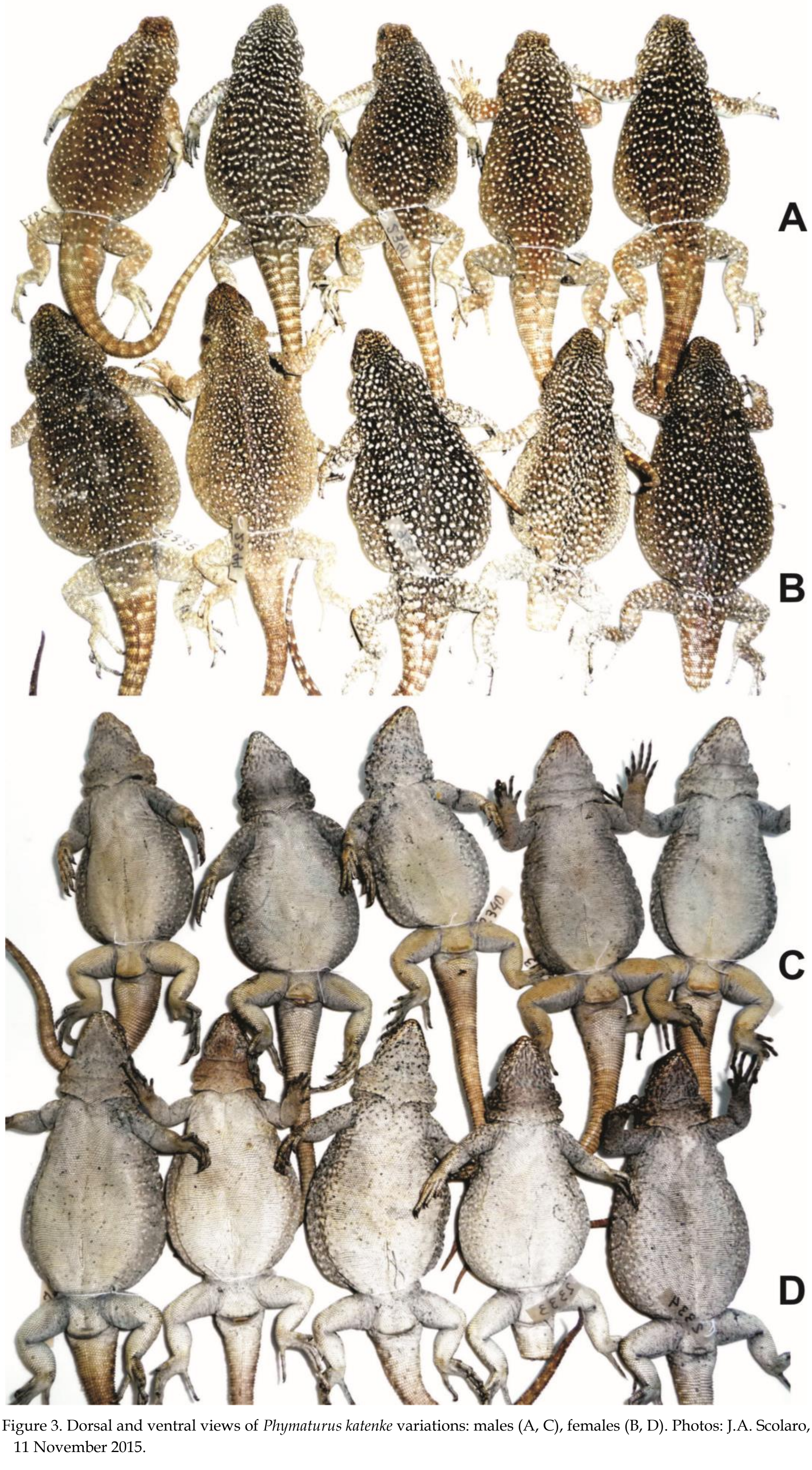

Figure 3. Dorsal and ventral views of *Phymaturus katenke* variations: males (A, C), females (B, D). Photos: J.A. Scolaro, 11 November 2015.

Table 2. Morphological variation in morphometric and meristic traits (mean, standard deviation and pair comparisons) among phylogenetically related species (*P. spurcus*, *P. patagonicus, P. manuelae*) of the *patagonicus* group. Significant statistical differences are in bold.

Trait	*P.* sp. nov. (*n*= 15)	*P. spurcus* (*n*= 90)			*P. patagonicus* (*n*= 27)			*P. manuelae* (*n*= 12)		
	Mean (SD)	Mean (SD)	statistic	*P*	Mean (SD)	statistic	*P*	Mean (SD)	statistic	*P*
Snout-vent length	93.2 (4.9)	84.1 (6.1)	*t* = 5.4	**< 0.001**	86.4 (4.2)	*t* = 4.7	**< 0.001**	89.7 (8.3)	*t* = 0.9	= 0.37
Axilla-groin distance	48.7 (4.1)	44.3 (4.6)	*t* = 3.5	**< 0.001**	44.0 (2.9)	*t* = 4.4	**< 0.001**	48.0 (5.9)	*t* = 0.3	= 0.78
Head length	18.3 (0.7)	16.3 (1.1)	*t* = 6.8	**< 0.001**	16.0 (0.7)	*t* = 10.1	**< 0.001**	18.7 (1.9)	*t* = 0.5	= 0.65
Head width	17.1 (0.9)	14.7 (1.1)	*t* = 8.1	**< 0.001**	15.4 (1.0)	*t* = 5.3	**< 0.001**	20.0 (0.6)	*t* = 1.2	= 0.28
Hindlimb length	33.4 (1.3)	30.6 (2.2)	*t* = 4.6	**< 0.001**	32.5 (1.7)	*t* = 1.3	= 0.20	33.9 (2.2)	*t* = 0.6	= 0.60
Forelimb length	48.5 (2.6)	45.1 (3.3)	*t* = 3.8	**< 0.001**	47.4 (2.8)	*t* = 1.6	= 0.11	47.7 (5.7)	*t* = 0.4	= 0.73
Fourth finger length	12.3 (0.9)	10.5 (1.2)	*t* = 5.7	**<0.001**	11.2 (0.9)	*t* = 3.6	**< 0.001**	11.3 (0.5)	*t* = 3.2	**< 0.01**
Fourth finger lamellae	23.7 (1.4)	22.7 (1.6)	*U* = 435	**< 0.02**	24.1 (1.3)	*U* = 144	= 0.11	22.5 (1.4)	*U* = 27	= 0.18
Four toe length	16.4 (1.1)	14.3 (1.4)	*t* = 5.6	**< 0.001**	15.6 (0.9)	*t* = 2.6	**< 0.01**	14.7 (1.3)	*t* = 2.7	**= 0.02**
Dorsal head scales	22.5 (1.5)	20.9 (1.0)	*U* = 237	**< 0.001**	21.0 (1.2)	*U* =87.0	**< 0.02**	18.3 (0.5)	*U* = 22	**< 0.001**
Scales around pineal	7.2 (0.9)	7.1 (0.8)	*U* = 643	= 0.81	7.1 (0.8)	*U* =196	= 0.87	7.3 (1.2)	*U* = 40.5	= 0.73
Subocular scales	2.1 (0.8)	3.4 (1.0)	*U* = 184	**< 0.001**	1.1 (0.3)	*U* = 58.5	**< 0.001**	2.8 (0.6)	*U* = 21.5	= 0.07
Supralabial scales	9.1 (0.6)	8.5 (0.7)	*U* = 386	**< 0.01**	7.9 (0.3)	*U* = 24	**< 0.001**	7.2 (0.4)	*U* = 22	**< 0.001**
Infralabial scales	8.5 (0.5)	8.3 (0.5)	*U* = 610	= 0.49	7.9 (0.7)	*U* = 113	**< 0.01**	7.0 (0.1)	*U* = 21	**< 0.001**
Rostral-interparietals	16.7 (1.0)	15.7 (0.9)	*U* = 338	**< 0.001**	15.4 (1.0)	*U* = 89	**< 0.01**	12.3 (0.5)	*U* = 21	**< 0.001**
Scales around midbody	203.3 (6.2)	227.2 (16.9)	*t* = 9.9	**< 0.001**	179.8 (8.1)	*t* = 9.7	**< 0.001**	230.5 (16.0)	*t* = 5.73	**< 0.001**
Ventral scales	174.7 (7.4)	170.4 (8.1)	*t* = 2.0	= 0.05	162.6 (8.0)	*t* = 4.8	**< 0.001**	180.7 (9.0)	*t* = 1.56	= 0.13

Table 3. Patterns of morphological variation in morphometric and meristic traits (mean, standard deviation and pair comparisons) among geographically neighbouring *Phymaturus* species (*P. camilae*, *P. felixi*, *P. curivilcun*) of the *patagonicus* group. Significant statistical differences are in bold.

Trait	*P.* sp. nov. (*n*= 15)	*P. camilae* (*n*= 30)			*P. felixi* (*n*= 33)			*P. Curivilcun* (*n*= 14)		
	Mean (SD)	Mean (SD)	statistic	*P*	Mean (SD)	statistic	*P*	Mean (SD)	statistic	*P*
Snout-vent length	93.2 (4.9)	90.3 (5.0)	*t* = 1.8	= 0.07	83.9 (3.9)	*t* = 7.0	**< 0.001**	91.4 (4.6)	*t* = 1.2	= 0.22
Axilla-groin distance	48.7 (4.1)	45.0 (3.5)	*t* = 3.2	**< 0.01**	43.2 (3.8)	*t* = 4.6	**< 0.001**	44.6 (3.6)	*t* = 2.9	**< 0.01**
Head length	18.3 (0.7)	16.2 (0.6)	*t* = 11.3	**< 0.001**	15.8 (1.2)	*t* = 7.9	**< 0.001**	17.6 (1.5)	*t* = 1.7	= 0.11
Head width	17.1 (0.9)	16.6 (0.7)	*t* = 2.9	**< 0.01**	15.1 (0.8)	*t* = 7.8	**< 0.001**	16.2 (0.9)	*t* = 2.7	**< 0.01**
Hindlimb length	33.4 (1.3)	32.4 (2.1)	*t* = 1.6	= 0.11	29.3 (2.1)	*t* = 6.9	**< 0.001**	32.4 (1.4)	*t* = 2.0	**< 0.05**
Forelimb length	48.5 (2.6)	45.9 (2.3)	*t* = 3.5	**< 0.001**	40.9 (3.3)	*t* = 7.8	**< 0.001**	48.3 (1.5)	*t* = 0.5	= 0.61
Fourth finger length	12.3 (0.9)	9.8 (0.7)	*t* = 10.2	**< 0.001**	10.7 (0.9)	*t* = 5.6	**< 0.001**	11.5 (1.5)	*t* = 1.8	= 0.09
Fourth finger lamellae	23.7 (1.4)	23.3 (1.5)	*U* = 218	= 0.87	21.8 (2.0)	*U* = 96	**< 0.001**	22.7 (1.2)	*U* = 63	= 0.07
Four toe length	16.4 (1.1)	13.2 (0.7)	*t* = 11.6	**< 0.001**	14.3 (1.1)	*t* = 5.8	**< 0.001**	16.4 (1.0)	*t* = 0.3	= 0.77
Dorsal head scales	22.5 (1.5)	22.2 (1.2)	*U* = 199.5	= 0.57	20.5 (1.6)	*U* = 71	**< 0.001**	20.4 (0.8)	*U* = 22	**< 0.001**
Scales around pineal	7.2 (0.9)	7.2 (0.8)	*U* = 210	= 0.69	7.3 (1.0)	*U* = 218	= 0.48	7.5 (0.7)	*U* = 79	= 0.27
Subocular scales	2.1 (0.8)	1.1 (0.2)	*U* = 58.5	**< 0.001**	1.2 (0.4)	*U* = 85.5	**< 0.001**	2.5 (0.6)	*U* = 70	= 0.08
Supralabial scales	9.1 (0.6)	8.5 (0.4)	*U* = 24	**< 0.001**	8.3 (0.7)	*U* = 113	**< 0.001**	8.1 (0.3)	*U* = 20	**< 0.001**
Infralabial scales	8.5 (0.5)	8.3 (0.6)	*U* = 113	**< 0.01**	7.4 (0.7)	*U* = 63	**< 0.001**	7.3 (0.5)	*U* = 12	**< 0.001**
Rostral-interparietals	16.7 (1.0)	12.3 (1.0)	*U* = 89	**< 0.002**	15.3 (1.3)	*U* = 101	**< 0.001**	15.1 (0.7)	*U* = 30	**< 0.001**
Scales around midbody	203.3 (6.2)	217.8 (8.4)	*t* = 5.87	**< 0.001**	218.7 (10.6)	*t* = 5.2	**< 0.001**	185.5 (4.6)	*t* = 8.7	**< 0.001**
Ventral scales	174.7 (7.4)	167.9 (8.6)	*t* = 2.74	**< 0.01**	177.2 (9.3)	*t* = 0.9	= 0.37	155.8 (8.3)	*t* = 6.5	**< 0.001**

rows, rounded, incomplete posteriorly on both sides; no distinct enlarged supraoculars; seven elongate and overlapping upper ciliary scales; two scales form the suboculars, elongate and almost concave, slightly shorter than eye diameter, separated from supralabials by two rows of lorilabials; preocular contacting lorilabial row; temporals smooth, irregularly quadrangular, in 7–8 rows from auditory opening to subocular; external auditory meatus enlarged, transverse, with minute granular scales on posterior border; rostral wider than taller, separated by one small scale from nasals; nasals large, central, surrounded by 9 small scales; parietals irregular and rough with evident interparietal scale, surrounded by 6 scales; nuchals granular in few irregular rows; post-auricular folds large, very distinct, with interposed transverse folds with round, almost granular scales; mental pentagonal, smaller than rostral, surrounded by four irregular rectangular scales; two rows of 8–9 bilateral postmentals decreasing in size posteriorly; dorsal scales small, round and juxtaposed; mid-dorsal scales slightly enlarged, growing smaller and granular toward ventro-lateral areas; ventrals larger than dorsals, pentagonal scales almost square and smooth; gulars rounded and smaller than surrounding scales; 58–60 gulars between auditory meatus; caudal scales quadrangular, regularly imbricate on verticils, proximally larger and smooth or softly keeled on dorsum, distally smaller, more rectangular and keeled; scales on limbs round and slightly keeled on dorsal side, granular and rounded in lateral region, larger and flat on ventral side, infracarpals and infratarsals almost pentagonal, with round margins, becoming triffid at the base of fingers and toes; subdigital lamellae of fingers keeled; claws robust.

Coloration (Figs. 2, 3). Coloration is similar between sexes. The entire dorsal coloration, including the dorsal side of the limbs, is light brownish to reddish, covered with scattered tiny light-cream or whitish spots mixed with a few small black spots. Laterally, the background coloration is pale grey with numerous cream-colored spots but no black spots. The entire ventral surface is consistently light, whitish or pale grey. The throat has scarce irregular blackish spots that rarely extend beyond the neck line. Sometimes the abdomen, ventral surface of tail and thighs may be pale orange over the grey background, possibly related to season or physiological conditions (breeding cycle). The tail is colored by alternating rings (2–3 scales wide) of soft light brown and dark brown and tends to be lighter than the rest of the dorsal surface, sometimes lacking color at the base. Juveniles (captured and immediately released in the field) showed a uniformly light grey color ventrally. Preserved specimens visibly loose the natural coloration, especially the orange shades on the ventral surface of the body.

Etymology. The specific epithet "katenke" (which means watercourse, or "corriente de agua¨ or "mucha agua" in Spanish) comes from the Tehuelche language and refers to the name of the farm where the holotype was found. As standard names we propose "Muchagua's lizards" in English and "lagartijas de Muchagua" in Spanish.

Distribution and characteristics of the type locality. *Phymaturus katenke* has only been found at the one outcrop at the type locality. It falls in the Patagonian Steppe Eco-region (Morello et al. 2012), a complex ecosystem of central flatlands and highlands. A basaltic tertiary outcrops of about 1,500 ha in size, within a cretaceous sedimentary basin, constitutes the exclusive biotope of *P. katenke* (Fig. 4). Nearby outcrops from type locality are distanced from others by five to fourteen kilometers. The outcrops are separated by deep cracks originated from occasional and alluvional rains that become its inaccessible by vehicle. Although we visited the neighboring outcrops during suitable conditions, such as the Solo hill (43°22′23′′ S, 68°42′30′′ W) on six occasions, and the Cóndor hill (43°25′04′′S, 69°10′57′′ W) on one occasion, and found no *Phymaturus* species, it is possible that the distribution of *P. katenke* extends beyond the type locality.

The climate is predominantly cold and arid, with a strongly marked lack of humidity (in spring and summer), and intense winds from the west (Morello et al. 2012). Annual rainfall in Paso de Indios, ca. 70 km away, is 145 mm (De Fina 1992). The range of the mean air temperature is 2.3 °C (July) to 15.9 °C (January) (De Fina 1992). In general, *Phymaturus* species in the region are active from late October to late March.

The vegetation is predominantly shrub-steppe, with scattered shrub cover (~50% of the area), with dwarf cushion shrubs and a few grassy patches. Shrubs are primarily represented by *Nassauvia glomerulosa*, *Senecio filaginoides*, *Ephedra frustillata*, *Adesmia volkmanii*, *Mulinum spinosum*, *Lycium chilense* and *L. gillesianum.*

Natural history. *Phymaturus katenke*, like its congenerics, is viviparous. Two females gave birth to two offspring each in captivity on 18 and 26 February 2016.

Figure 4. Representative habitat of *Phymaturus katenke*. Photo: J.A. Scolaro, 11 November 2015.

Known reptile species within the range of *P. katenke* include species of the genus *Liolaemus* (*L. bibroni, L. canqueli, L. rothi, L. petrophilus* and *L. boulengeri*), Leiosaurids (*Diplolaemus sexcinctus* and *Pristidactylus nigroiugulus*), the gecko *Homonota darwinii* (Phyllodactylidae) and the snakes *Bothrops ammodytoides* (Viperidae) and *Phylodrias patagoniensis* (Colubridae) (Scolaro 2005).

In situ observations of *P. katenke* feeding on different plants (*Lycium spp.* and *Adesmia boronioides*) suggests an essentially herbivorous diet, typical for the genus *Phymaturus*.

Discussion

Following the best practice in species delimitation that combines data from different sources (Funk & Omland 2003) here we supplement the genetic results of Corbalán et al. (2016) with a morphometric analysis. Although González Marín et al. (2018) found no interespecific differences in body size and head shape among species of the *patagonicus* group, the newly proposed species here exhibits differences in most traits. This evidence supports the designation of the population at Los Adobes as a new species, *P. katenke*. *Phymaturus katenke* is isolated from other known congenerics by at least 80–100 km in straight line. As most species of *Phymaturus*, *P. katenke* appears to have had an evolutionary history in isolation, with limited gene exchange with neighbouring species. The predominant allopatry in the genus could be due to lack of niche differentiation (Reaney et al. 2018). The predominant preference for rock microhabitats has likely limited their opportunities for adaptive diversification across novel environments (Debandi et al. 2012, Reaney et al. 2018). As a result of this non-adaptive radiation, limited phenotypic divergence has evolved among closely related species (Scolaro et al. 2013). In this context, molecular studies are a good complement to establishing species boundaries. In particular, DNA barcoding was an effective tool for discovering this new species. Despite the fact that several authors criticize the barcode methodology to delimit species because only one gene (COI) is used (González Marín et al. 2018, Lobo et al. 2018), other authors (Becker et al. 2019) reached similar conclusions to Corbalán et al. (2016) using more genes. Even Lobo et al. (2018) recognized that when mitochondrial markers (such as COI) are analyzed alone, a similar topology to the total evidence run is recovered.

The isolated distribution of *P. katenke* poses conservation implications, including lack of habitat protection. Due to it being a previously non-described species, it has not been included in conservation assessments (Corbalán et al. 2011, Chehébar et al. 2013). Therefore, we consider that an assessment of threats (especially of anthropogenic origin) and re-evaluation of conservation priorities should be carried out, given the recent description of lizards with at times limited distribution in Patagonia (such as *P. curivilcun*, *P. rahuensis* González Marín et al. 2016 and *P. cacivioi* Lobo & Nenda 2015), including the newly described *P. katenke*.

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Appendix 1

Specimens Examined.

Specimens are housed in the following collections in Argentina: IBA, Instituto de Biología Animal, Mendoza; MLP-R and MLP-S, Colección Herpetológica del Museo de La Plata, Buenos Aires; JAS-DC, J.A. Scolaro-Diagnostic Collection, CENPAT-CONICET, Puerto Madryn; LJA-MM Collection CENPAT-CONICET, Puerto Madryn; JMC-DC, J. M. Cei-Diagnostic Collection, Facultad de Ciencias Naturales, Universidad Nacional de San Luis; UNCo-PH, Universidad Nacional del Comahue, Colección Herpetológica, Bariloche, Río Negro; CH-IADIZA, Instituto Argentino de Investigaciones de las Zonas Áridas-CONICET.

Phymaturus camilae: Sacanana stream bridge, adjacent to Provincial Road 4, Chubut: MLP-R 5586 (Holotype), MLP-R 5587–89 (Paratypes), UNCo-PH 1614, 1308 (Paratypes); JAS-DC 1316, 1318, 1320, 1609 (Paratypes), 1306, 1307, 1309–1317, 1319, 1321, 1477, 1479, 1581, 1587, 1959, 1613, 1614.

Phymaturus curivilcun: Cushamen, Chubut: MLP.R. 6339 (Holotype), MLP.R. 6340–43 (Paratypes); JAS-DC 2258, 2260, 1210, 2293, 2237 (Paratypes), JAS-DC 1211, 2261–63.

Phymaturus desuetus: Ingeniero Jacobacci, Río Negro, 1100 m asl.: MLP.R. 5411 (Holotype).

Phymaturus felixi: Paso de Indios, Chubut, Provincial Road 24, at 110 km South of Paso de Indios town: LJA-MM 3717, 3823–28, 3830, 3832–34, 3882–83; Provincial Road 24 at 85–100 km south of Paso de Indios, Chubut, JAS-DC 1910–14, 1924, 1928, 1931–38, 1948, 1950–53.

Phymaturus katenke: Muchagua Farm, Los Adobes, Paso de Indios Department, Chubut Province, Argentina: MLP.R. 6592 (Holotype), MLP.R. 6593, 6594, 6595, 6596 (Paratypes); CH-IADIZA 836–839 (Paratypes), JAS-DC 2095–97, 2334, 2339, 2341.

Phymaturus manuelae: Comallo, Río Negro: MLP-R. 5370 (Holotype); MLP-R. 5371; UNCo-PH 201, 202 (Paratypes); JAS-DC 1098–1101, 1251, 1919–1921.

Phymaturus patagonicus: 40 km west Dolavon, Chubut: CH-IADIZA 00080; JAS-DC 813–820, 1160–64, 1124–1126; IBA-R 0789; JMC-DC 335–336, 760, 842–845, 1300.

Phymaturus spurcus: Estancia Huanuluán, Río Negro: JAS-DC 821–823, 825–831, 1284, 1257–63. Ojos de Agua, Río Negro: JAS-DC 1127–1136. Ruta provincial 6, Km 24, Ing. Jacobacci, Río Negro: JAS-DC 1033–38, 1041–1042, 1055–59, 1061–63, 1066, 1091. Ruta Provincial 6, Km 24, Ingeniero Jacobacci, Río Negro: MLP.R. 5343–46; JAS-DC 1039–40, 1043–46, 1053, 1064–65, 1067–71, 1073, 1078, 1081, 1084–85, 1087–90, 1119, 1644; JAS-DC PH212, PH202–08.