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A new species of the genus *Phymaturus* of the *flagellifer* group from Central-Western Mendoza, Argentina (Reptilia: Iguania: Liolaemidae)

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Abstract

A new *Phymaturus* species of the *flagellifer* (= *palluma*) group inhabiting the Reserve Laguna del Diamante (San Carlos, Mendoza province) is described herein as *Phymaturus gynechlomus*. The meristic and morphometric characters of this new specie are compared to the equivalent set of traits of other geographically close species of the same group. The new species stands out for the uniform dorsal colour of females, with an absence of a pattern of spots, dark irregular ocellus or grooves which differentiate it from the females of the other known species of the group.

Key words: Rocky Lizard, Taxonomy, Laguna del Diamante Reserve, Reptiles, *Phymaturus*

Una nueva especie del género *Phymaturus* del grupo *flagelliger* del centro-oeste de Mendoza, Argentina (Reptilia: Iguania: Liolaemidae)

Resumen

Se describe una nueva especie de *Phymaturus* del grupo *flagellifer* (= *palluma*), que habita la Reserva Laguna del Diamante (San Carlos, provincia de Mendoza), bajo el binomio *Phymaturus gynechlomus.* Los caracteres merísticos y morfométricos son comparados con las especies vecinas geográficas del mismo grupo. La nueva especie se destaca por la coloración dorsal uniforme de la hembra, con ausencia del patrón de manchas, ocelos o estrías oscuras irregulares que la diferencia de las hembras de las restantes especies conocidas de este grupo.

Palabras claves: Lagarto de Rocas, Taxonomía, Reserva Laguna del Diamante, Reptiles, *Phymaturus*

Introduction

The genus *Phymaturus* (Liolaemidae) currently comprises 21 species of saxicolous, viviparous and mainly herbivorous lizards from Argentina. These species are widely spread in the highlands of the Andes, from Catamarca (25º 40' S) to the southern border of Chubut (45º 30' S), including the volcanic plateaus of Patagonia (Chebez *et al*. 2005; Scolaro 2005, 2006; Scolaro & Ibargüengoytía 2007). Only two of these species are currently known in the Andes of Chile (Pincheira-Donoso 2004; Pincheira-Donoso *et al.* 2008a).

The genus *Phymaturus* is characterized by robust lizards of stout, wide and flattened bodies that can squeeze into small rock crevices, thick tail with mucronate and spinose scales, lateral nuchal skin folds with fat-filled pouches, among other exclusive characters (Cei 1986; Etheridge 1995). Two groups of species (Cei

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1993; Etheridge 1995) based on morphological characters have been proposed: the *flagellifer* (= *palluma*), and the *patagonicus* groups. The *flagellifer* group includes seven forms: *P. flagellifer* (= *palluma*) (Molina 1782), *P. mallimacci* Cei 1980, *P. punae* Cei, Etheridge & Videla 1983, *P. antofagastensis* Pereyra 1985, *P. verdugo* Cei & Videla 2003, *P. vociferator* (= *dorsimaculatus*) Pincheira-Donoso 2004 (Pincheira-Donoso *et al*. 2008a), and *P. roigorum* Lobo & Abdala 2007. The *patagonicus* group is restricted to the Patagonian steppe and comprises fourteen species. The former *P. patagonicus* Koslowsky 1898, and several species previously described as subspecies of *P. patagonicus*: *P. indistinctus* Cei and Castro 1973, *P. nevadoi* Cei and Roig 1975, *P. somuncurensis* Cei and Castro 1973, *P. payuniae* Cei and Castro 1973, and *P. zapalensis* Cei and Castro 1973 (Espinoza *et al.* 2004; Pincheira-Donoso *et al.* 2007). Recently more species have been added like *P. excelsus* Lobo & Quinteros 2005a, *P. spectabilis* Lobo & Quinteros 2005a, *P. tenebrosus* Lobo & Quinteros 2005a, *P. calcogaster* Scolaro and Cei 2003 (formerly considered as intermediate status between both groups), *P. ceii* Scolaro & Ibargüengoytía 2007, *P. agilis* Scolaro, Ibargüengoytía & Pincheira-Donoso 2008 and *P. manuelae* Scolaro & Ibargüengoytía 2008. *Phymaturus spurcus* has been recently revalidated (Lobo & Quinteros 2005b) as a member of this group.

The *flagellifer* (= *palluma*) group is defined by the presence of non-imbricate superciliary scales, suboculars fragmented into five or more small scales, three to four rows of lorilabials, mental scale narrower than rostral and usually in contact with infralabials, well developed caudal spines (two annuli per segment), and a longitudinal central band in the dorsum of slightly enlarged scales (Cei 1986, 1993; Etheridge 1995; Lobo & Quinteros 2005a). The monophyly of this group was shown by Lobo and Quinteros (2005a). The *patagonicus* group, on the other hand, exhibits the presence of elongate superciliaries that are overlapped, a single elongate subocular, caudal smooth scales rather than keeled ones, and a fused and closed Meckel's groove (Cei 1986, Etheridge 1995).

The taxonomy of the genus has been characterized by a controversial history, especially in relation to the *Phymaturus flagellifer* (or *palluma*) type species (ICZN 2005; Cei & Scolaro 2006; Etheridge & Savage 2006; Pincheira-Donoso *et al.* 2008a). While several species have been described over the last years, other forms perhaps still await description. In this paper, we propose a further new species of the genus *Phymaturus* from Argentina. On the basis of morphological analyses, we provide a number of diagnostic traits that support the status of this population as a new species belonging to the *flagellifer* species group. Ecologically, this new taxon is found in the rocky outcrops of Central Western Mendoza.

Materials and methods

Ten adult specimens (5 males and 5 females) were captured by hand or loop during a January 2006 trip to the Water Reserve and Protected Landscape Laguna del Diamante, (San Carlos Department, Mendoza Province, Argentina). The samples were fixed in formalin 10% and preserved in 70% ethanol. In the laboratory, these specimens were measured using digital caliper (0.01 mm precision). In addition, meristic characters were obtained using a stereomicroscope. The characters used for description of the species were those frequently used in herpetological literature for this genus (Etheridge 1995; Lobo & Quinteros 2005a; Lobo & Abdala 2007). Colour in life was described on the basis of alive specimens and by using photographs taken in the field and in the laboratory.

We performed multiple statistical tests to quantitatively compare our new species with a series of *Phymaturus* species belonging to the *flagellifer* group, which inhabit geographical areas located close to the type locality. The need to perform these analyses also derives from the fact that these species appear to be the most morphologically similar to the new species. For these analyses, we included individuals of the species *P. verdugo* (n = 10) (Fig. 1A), *P. roigorum* (n = 6) (Fig. 1B) and *P. vociferator* (= *dorsimaculatus*) (n = 11) (Fig. 1C). The geographical areas where all these species have been recorded so far are shown in Fig 2.

The morphological variables used for the comparisons carried out among species were the same as those used for diagnosing the new species (see Table 1). Body measurements were highly correlated among them,

and cannot be considered as independent. To overcome this problem, we conducted a multivariate analysis of covariance (MANCOVA), using snout-vent length (SVL) as covariate to control for allometric effects of body size on body proportion variables (Garcia-Berthou 2001). SVL is widely used in lizard studies as a highly informative proxy for body mass, which therefore allows for an appropriate control procedure (Pincheira-Donoso *et al.* 2008a). Because of the low number of specimens per species, it was not possible to separate females and males in this analysis. For categorical variables (meristic data), we conducted Generalised Linear Models (GLM; McConway *et al.* 1999) using Poisson distribution and logarithm as link function. When the residual errors in the analysis showed overdispersion (*i.e.*, the variance of the residuals was significantly higher than that predicted by the Poisson distribution), data was rescaled to correct for biases in the statistical test of hypotheses (Crawley 1993). For these analyses, however, we permorfed comparisons using males and females as independent statistical units.

We then aimed to evaluate the magnitude of differentiation among species using an alternative approach that allows visualization these patterns of divergence. To do this, we performed Discriminant Analyses (also known as Canonical Variates Analysis) with all morphometric and meristic variables (except tail length and precloacal pores). The variables were previously standardized. Because some data was incomplete, sample sizes were lower compared to other analyses. Discriminant Analysis is appropriate when the units are classified into groups. The aim is to find linear combinations of the variables that represent most of the variation among the groups (rather than among the individual units, as in principal component analysis does).

Morphological variation between females and males of *Phymaturus* **sp. nov.** was evaluated using *t* test for continuous variables and GLM for discrete data. Statistical differences between sexes for some measurement ratios were evaluated using *t* test for unequal samples (see Liermann *et al*. 2004). Multivariate analysis of covariance, discriminant analysis, and *t* test were performed using InfoStat software (InfoStat 2008), whereas GLM analysis was conducted using GenStat DE3 software (GenStat 2007).

In addition to statistical analyses among *Phymaturus* species, predictive models of distribution were constructed from known localities of each species in order to evaluate niche separation among them. Thirty environmental variables were used as predictors and models were obtained using the logistic option of the MaxEnt software version 3.2.1 (Phillips *et al.* 2006). The environmental variables, at a resolution of 2.5 min, were obtained from the WorldClim database (Hijmans *et al.* 2005; www.worldclim.org) and from the Climate Research Unit (New *et al*. 2002). The logistic output format was converted to binary maps (Presence/Absence) using the minimun training threshold, provided by the software.

A male and two females of the new species were used for karyological studies, which were carried out in the Laboratory of Herpetology of the Facultad de Ciencias Exactas y Naturales y Agrimensura de la Universidad Nacional del Nordeste (Corrientes, Argentina). Furthermore, chromosomic analyses were made to a male and a female of *Phymaturus roigorum* collected in Cerro Nevado (Mendoza) for comparative purposes.

The specimens are housed in the Herpetology Collection of the Instituto Argentino de Investigaciones de las Zonas Aridas (CH-IADIZA, CONICET) and in the Museo de Ciencias Naturales de La Plata (MLP.R, U.N.L.P.).

Results

Multivariate Analysis of Covariance (using SVL as covariate) showed significant differences among the species analysed (Wilks' Lambda = 0.01; $F = 7.85$ $df = 24, 47$; $P < 0.0001$). Hotelling post-hoc test with corrected level of Bonferroni ($\alpha = 0.01$) indicated differences among all four species. Table 1 shows mean and standard errors for each variable, for each species studied.

Comparisons among species using discrete variables indicated that the number of ventral scales in females differ significantly ($\chi^2 = 15.758$; $df = 2$; $P < 0.001$). Specific contrasts showed that *Phymaturus* **sp. nov.** has lower number of ventral scales than *P. verdugo* ($t = 3.78$; $df = 10$;

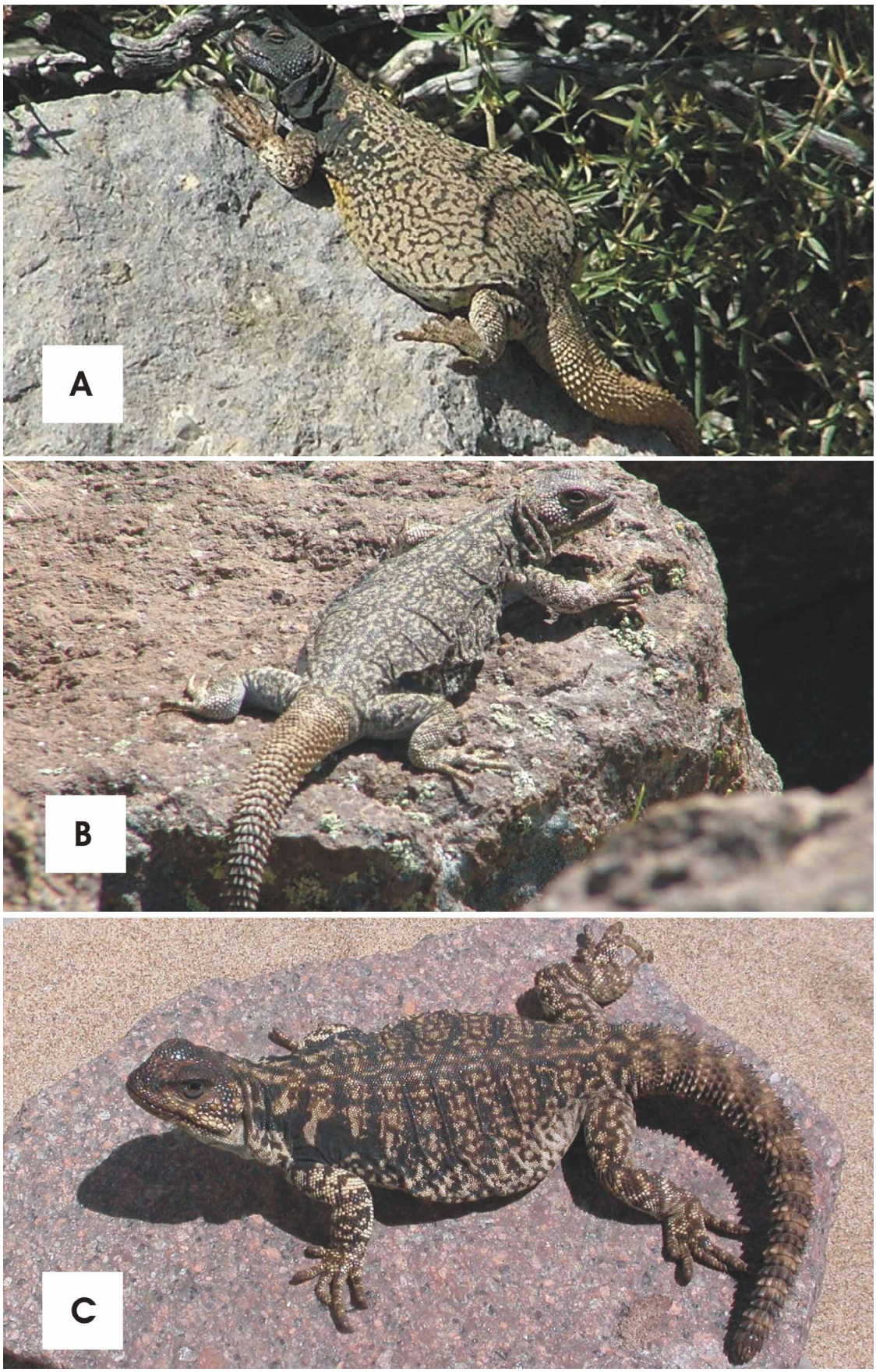

FIGURE 1. Dorsal coloration pattern comparisons between females of the nearby geographical species of the *Phymaturus flagellifer (palluma)* group: **A.** *P. verdugo*, **B.** *P. roigorum* and **C.** *P. vociferator.*

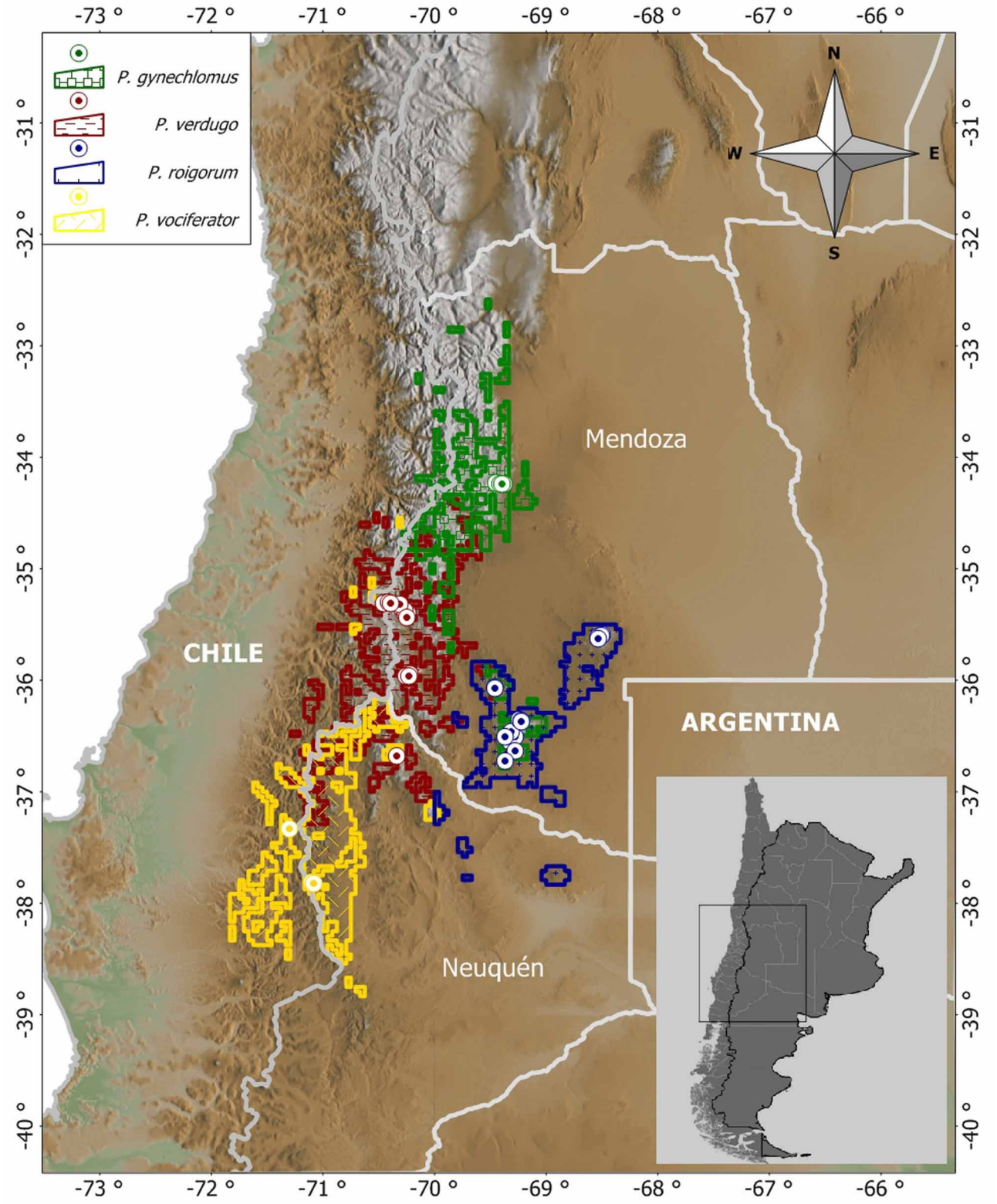

FIGURE 2. Map of distribution of examined species. Marked points indicate known localities for each species and colored areas, indicate the predicted distribution: Green, *Phymaturus gynechlomus* **sp. nov.**; Blue, *P. roigorum*; Red, *P. verdugo* and Yellow, *P. vociferator.*

$P < 0.001$). For males, scales around midbody showed significant differences among species ($\chi^2 = 44.51$; $df = 3$; $P < 0.001$), having *Phymaturus* **sp. nov.** a lower number of scales than *P. vociferator* ($t = 4.09$; d.f. = 15; $P < 0.001$). No differences were found among species in all the remaining categorical variables.

TABLE 1. Mean and standard deviation of the selected variables used to evaluate differences among *Phymaturus* **sp. nov.**, *P. verdugo*, *P. roigorum* and *P. vociferator.*

Variable	*Phymaturus* **sp. nov.**	*P. verdugo*	*P. roigorum*	*P. vociferator*
Snout-vent length (SVL)	96.58 ± 1.38	104.97 ± 2.01	97.99 ± 1.42	92.95 ± 1.68
Entire Tail length (TL)	94.79 ± 1.80	111.83 ± 6.02	96.58 ± 4.18	90.49 ± 2.75
Axilla-groin distance (AGD)	46.97 ± 0.98	54.33 ± 1.70	46.49 ± 1.04	48.90 ± 1.18
Head length (HL)	18.04 ± 0.36	18.69 ± 0.36	18.02 ± 0.42	19.09 ± 0.36
Head width (HW)	19.89 ± 0.40	20.25 ± 0.47	19.50 ± 0.47	19.14 ± 0.41
Eye-nose distance (END)	6.64 ± 0.18	7.05 ± 0.18	5.81 ± 0.12	6.36 ± 0.15
Forelimb length (FLL)	34.33 ± 1.07	36.72 ± 1.09	34.69 ± 0.73	34.51 ± 0.53
Hindlimb length (HLL)	45.04 ± 1.38	46.55 ± 1.54	44.91 ± 0.96	47.75 ± 0.89
Fourth finger length (FFL)	11.74 ± 0.26	11.96 ± 0.41	10.89 ± 0.38	11.13 ± 0.34
Fourth toe length (FTL)	14.87 ± 0.29	15.04 ± 0.34	13.52 ± 0.39	13.85 ± 0.62
Head dorsal scales (HDS)	17.33 ± 0.33	18.20 ± 0.66	16.00 ± 0.52	14.67 ± 0.24
Scales around interparietal	7.33 ± 0.37	7.30± 0.26	7.67 ± 0.33	7.33 ± 0.33
Scales around midbody	218.11 ± 6.04	230.22 ± 3.62	216 ± 5.34	254.10 ± 10.06
Ventral scales	180.22 ± 3.37	205.60 ± 2.95	182 ± 2.41	187.88 ± 4.08
4º finger subdigital lamellae	19.72 ± 0.39	20.30 ± 0.47	17.58 ± 0.20	20.80 ± 0.49
4º toe subdigital lamellae	23.72 ± 0.46	24.11 ± 0.59	20.58 ± 0.77	22.56 ± 0.63
Lorilabial rows	2.44 ± 0.15	2.35 ± 0.26	2.58 ± 0.20	2.75 ± 0.11
Subocular scales	4.83 ± 0.39	4.11 ± 0.34	2.50 ± 0.18	3.78 ± 0.17
Supralabial scale number	9.22 ± 0.30	9 ± 0.33	9.42 ± 0.33	7.80 ± 0.28
Infralabial scale number	8.28 ± 0.40	9.40 ± 0.42	8.75 ± 0.48	7.65 ± 0.15
Scales contacting mental	4.33 ± 0.17	4.78 ± 0.28	4.33 ± 0.21	6.00 ± 0.15
Precloacal pores in males	9.33 ± 0.67	10.25 ± 0.58	9.80 ± 0.58	9.14 ± 0.67

Discriminant analysis showed morphological separation among species, accounting the two first axes for the 88.75 % of the variance (Fig. 3). Centroids are 2.57 and -1.79 for *Phymaturus* **sp. nov.** in first and second axes respectively, 6.23 and -4.23 for *P. roigorum*, 3.18 and 7.69 for *P. verdugo*, and -11.37 and -0.67 for *P. vociferator.* Values of each variable for each discriminant function are shown in Table 2. The first canonical axis separate *P. vociferator* from the rest of species by having shorter SVL and longer head length (HL) and hindlimb length (HLL). The second axis separate the rest of species, having *P. verdugo* longer axilla-groin distance, longer eye-nose distance and head width, and *P. roigorum* shorter fourth toe length.

Results of the predictive models indicated that the most important environmental variable for all species was the type of soil. Other important variables (those that contributed more than 10% in the prediction of the distribution of species) are different for each species. For example, mean temperature of wettest quarter is important for the distribution of *Phymaturus* **sp. nov.**, altitude and precipitation of the driest month are important for *P. roigorum*, mean temperature of wettest quarter and wind are important for *P. verdugo*, whereas precipitation of the coldest quarter, mean temperature of wettest quarter and relative humidity are important for *P. vociferator.* Fig. 2 shows the potential distributions for each species, where the separation for each species is evident, being more similar in their requirements for *Phymaturus* **sp. nov.** and *P. roigorum*.

According to the information given in the bibliography and our karyotypic analyses, we found that the chromosome number of *Phymaturus* **sp. nov.** (2n = 28 in females, 2n = 27 in males) differs from *P. verdugo* (2n = 26 in males), from *P. flagellifer* (= *palluma*) from Chile (2n = 36 for females, 2n = 35 for males), from *P. vociferator* (Chilean populations, 2n = 36 in females) and from *P. adrianae* (*nomen nudum*) from Uspallata (2n = 30 in females, 2n = 29 in males) (Pereyra 1991; Cei & Videla 2002, 2003; Pincheira-Donoso 2004).

However, the same number of chromosomes (2n = 28 in females, 2n = 27 in males) was found for *P. mallimaccii* (from Famatina, La Rioja), *P. antofagastensis* (from Antofagasta de la Sierra, Catamarca) (Pereyra 1991) and *P. roigorum* (from Cerro Nevado, Mendoza).

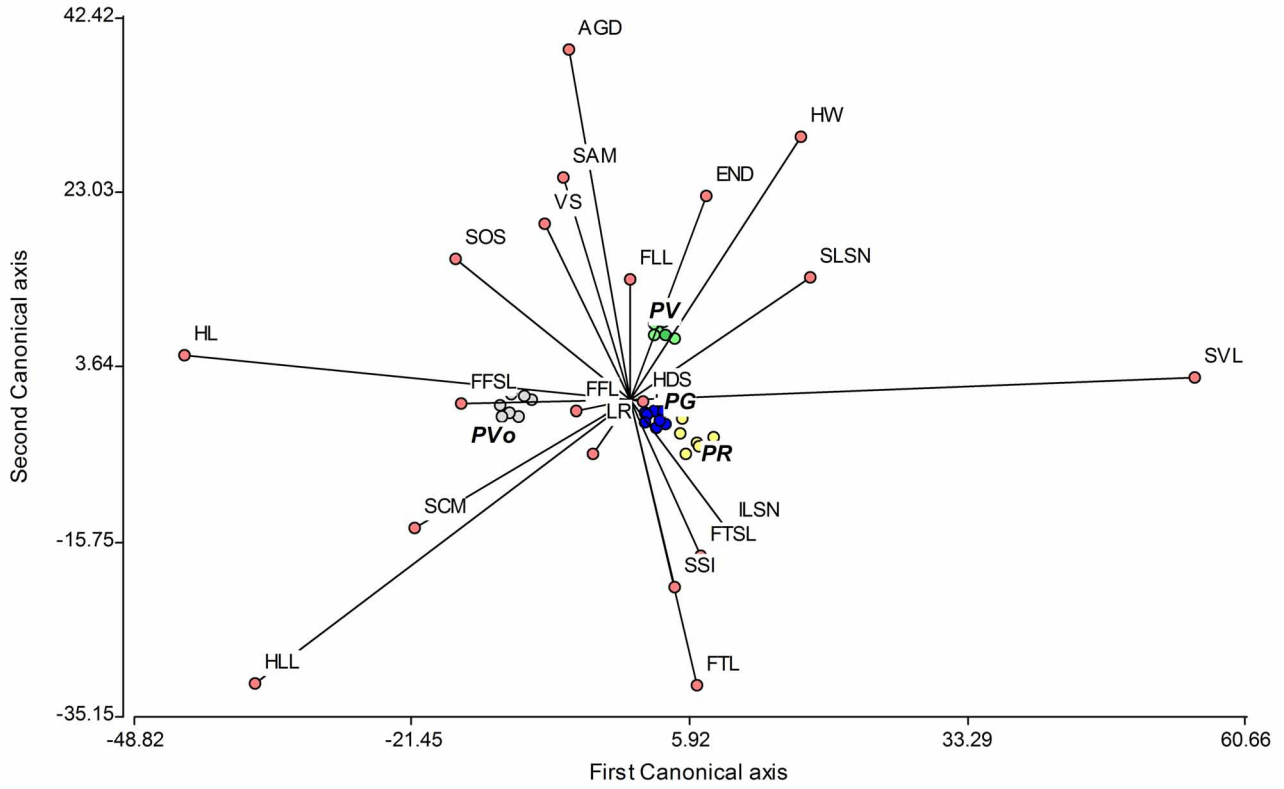

FIGURE 3. Discriminant Analysis showing the separation among species and the associated morphometric and meristic variables. Species: *PG*, *Phymaturus* **sp. nov.**; *PVo*, *P. vociferator*; *PV*, *P. verdugo*; *PR*: *P. roigorum*. Variables: SVL, Snout-vent length; AGD, Axilla-groin distance; HL, Head length; HW, Head width; END, Eye-nose distance; FLL, Forelimb length; HLL, Hindlimb length; FFL, Fourth finger length; FTL, Fourth toe length; HDS, Head dorsal scales; SSI, Scales sorrounding interparietal; SAM, Scales around midbody; VS, Ventral scales; FFSL, Fourth finger subdigital lamellae; FTSL, Fourth toe subdigital lamellae; LR, Lorilabial rows; SOS, Subocular scales; SLSN, Supralabial scale number; ILSN, Infralabial scale number and SCM, Scales contacting mental.

***Phymaturus gynechlomus* sp. nov.**
(Figure 4)

Type Material. Holotype: CH-IADIZA 330, adult male, collected in rocky slopes near Cruz de Piedra River, 2 km W of Alvarado Refuge of Laguna del Diamante Reserve, (2433 m of elevation), San Carlos Department, Mendoza province, Argentina. Collected by G. Debandi and V. Corbalán, 04 January 2006.

Paratypes: CH-IADIZA 331, adult female; CH-IADIZA 332, adult male; CH-IADIZA 333, adult female; MLP.R-5350, adult male; MLP.R.-5351, adult female. All specimens have the same collection data as the holotype.

Etymology. The species name derives from the peculiar dorsal coloration observed in females, in which the background is uniform and lacks any particular pattern of dark spots, as observed in other *Phymaturus* species.

Diagnosis. *Phymaturus gynechlomus* is a member of the *flagellifer* (= *palluma*) species group because it exhibits juxtaposed superciliary scales, which are small with a quadrangular shape; fragmented subocular scales; well developed caudal spines and more than two rows of lorilabial scales between supralabial and subocular scales. The dorsal colour pattern of males of *P. gynechlomus* as well as the unique dorsal colour

observed in females, which lacks dark spots, differentiate these species from the remaining members of the *flagellifer* group.

TABLE 2. Values of the three discriminant functions using standardized data with common variance.

Variable	Axis I	Axis II	Axis III
Snout-vent length	3.07	0.14	-1.86
Axilla-groin distance	-0.33	2.15	0.46
Head length	-2.42	0.28	-3.05
Head width	0.93	1.62	4.96
Eye-nose distance	0.42	1.25	0.5
Forelimb length	1.00E-03	0.74	1.12
Hindlimb length	-2.04	-1.73	0.02
Fourth finger length	-0.29	-0.07	-3.35
Fourth toe length	0.37	-1.74	0.74
Head dorsal scales	0.08	-0.01	1.81
Scales around midbody	-0.36	1.37	1.3
Fourth finger subdigital lamellae	-0.92	-0.02	-0.39
Fourth toe subdigital lamellae	0.39	-0.96	0.15
Scales contacting mental	-1.17	-0.78	1.70E-03
Subocular scales	-0.95	0.86	1.91
Lorilabial rows	-0.2	-0.33	0.45
Supralabial scale number	0.98	0.75	-0.84
Infralabial scale number	0.54	-0.8	-0.65
Scales surrounding interparietal	0.24	-1.15	0.17
Ventral scales	-0.46	1.08	-0.4

Description of the holotype. Adult male. Snout-vent length (SVL) 104.1 mm; head length 20.6 mm; head width 21.3 mm; head height 11.5 mm. Eye-nose distance 7.5 mm. Trunk width: 39.9 mm (38.29 % of SVL). Axilla-groin distance 43.5 mm. Twenty-one smooth dorsal head scales. Two to five scale organs on postrostrals. Subocular scales divided into five parts (5/5). Three rows of lorilabials between suboculars and supralabials. Four internasal scales. Nasals bordered by nine irregular scales of different size, not in contact with rostral, separated by three irregular scales of different size. Canthal separated from nasal by three scales. Loreal region flat. Supralabials 9/10; infralabials 9/10. Auditory meatus oval-sigmoideus, three/four notorious, triangular and sharp-pointed, lighter scales on anterior margin of auditory meatus. Eight rows of temporal scales, juxtaposed and wrinkled. Rostral scale undivided, wider than higher. Mental less wide but higher than rostral, subpentagonal in contact with six scales. Interparietal subpentagonal bordered by six small irregular parietal scales of different size. Frontal region without an azygous scale. Supraorbital semicircles are posteriorly incomplete on both sides. No distinctly enlarged supraoculars. Superciliars 9/10 clearly distinguishable. Sixteen lorilabials (first row at right side), the two latest in contact with subocular scales. Three scales between preocular and lorilabial row. Postmentals in two rows of three bilateral enlarged and subpentagonal scales decreasing in size behind. Gular scales round, small, flat and juxtaposed. Hemigular groove present. Two notorious gular folds; the first fold with posterior scales, which are subpentagonal, greater, smooth and juxtaposed. Second fold incomplete. Fifty-eight gular scales before the first fold. Nuchal folds notorious with granular scales, smaller than dorsals. Antehumeral tuft well developed. Number of ventral scales between mental and precloacal pores: 180. Scales around midbody: 228. Ten precloacal pores

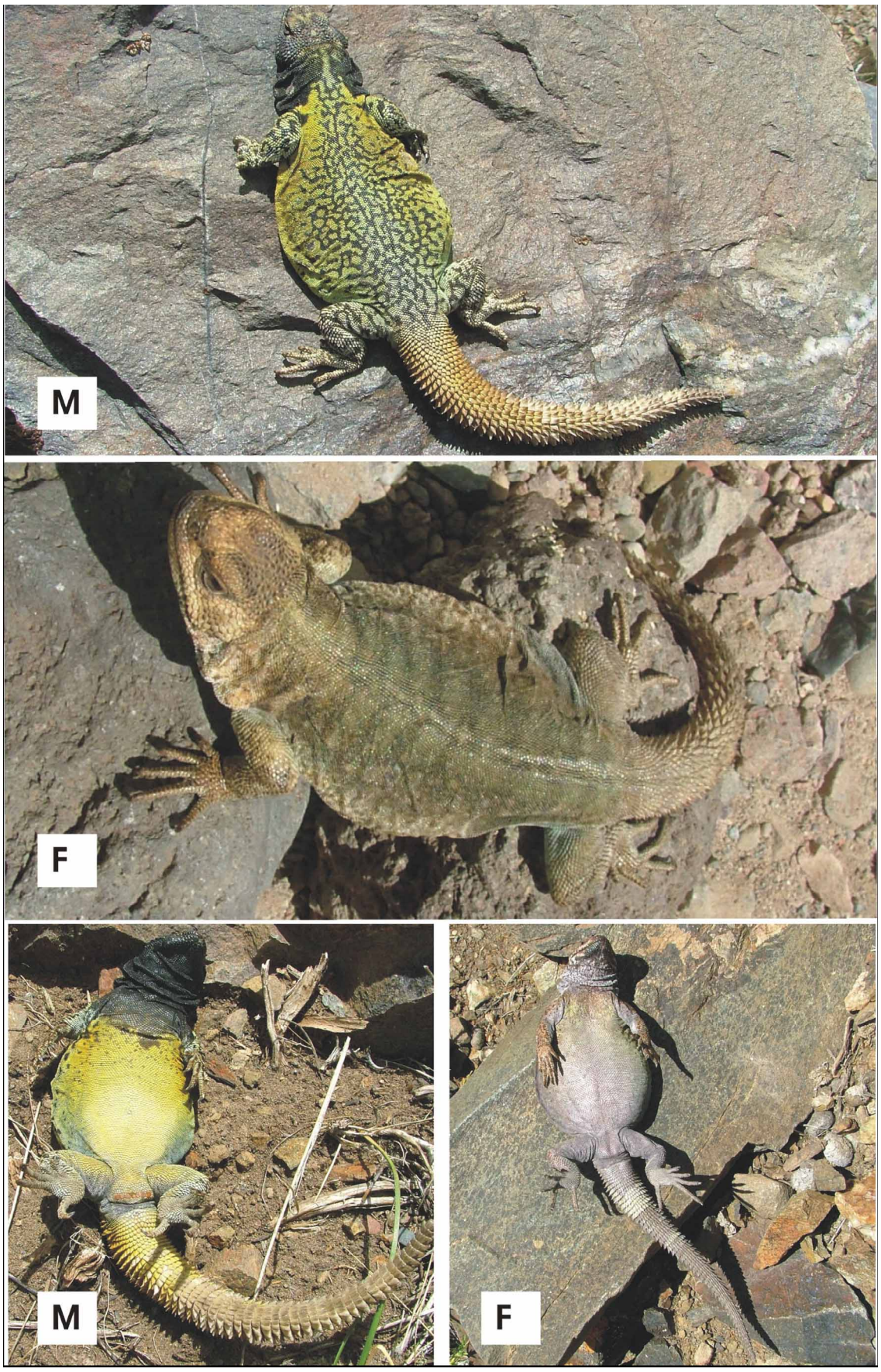

FIGURE 4. *Phymaturus gynechlomus*: dorsal and ventral view of live male (**M**) and female (**F**). Photos: dorsals, G. Debandi, 13 January 2006; ventrals, V. Corbalán, 3 February 2008.

and two very small supernumerary pores. Dorsal round scales subhexagonals, smooth, juxtaposed, each one bordered by 6 or 7 small scales. Forty-six dorsal scales along midline of the trunk in a distance equivalent to head length. Mid-dorsal scales enlarged in comparison to those on flanks. Ventral scales larger than dorsals. Brachial and antebrachial scales smooth with rounded posterior margins. Supracarpals round and smooth. Subdigital lamellae of finger IV: 19/20 (anterior) with 3 to 5 keels, 24/24 (posterior) with 3 or 4 keels. Claws well developed, prominent and curved. Supradigital lamellae convex, smooth, round and imbricated. Infracarpals and infratarsals with round margins. Infracarpals bi- or tri- keeled. Infratarsals keeled. Supracarpals and supratarsals smooth, with round margins, slightly keeled, more conspicuous in lateral margins. Caudal scales regularly verticillate, lateral and dorsally squared and with spines very well developed. Twenty-three scales by verticilles in the middle of the tail. Medial ventral furrow in the tail, with 2 or 3 scales slightly mucronated.

Coloration. In life, the new species shows conspicuous sexual dichromatism. Males exhibit a black head splashed with small irregular gray spots (Fig. 4). Black scales are very intense on lateral nuchal folds, lacking a small vertebral stripe of cream to greenish scales from the first nuchal scales to an early portion of the tail. The black coloration is more intense towards the shoulders. Lateral folds show irregular spots of intense light green colour. Dorsum and dorsal scales side of forelimbs show a brilliant light green background with yellow shades, with a marbled pattern of small, irregular black spots. The flanks, from the axillary to inguinal region are light green with scattered sky blue scales, without any black spots or grooves. The tail is intensely orange dorsally, and pale ventrally. From the ventral view, throat and chest are intensely black, shading towards the first portion of the flanks. The ventral surface is of intense yellow speckled with faint blackish spots on the flanks, which shade towards the cloacal region and ventral surface of limbs to pale yellow-greenish with light-blue scales. Precloacal pores are reddish to intense orange.

Interindividual variation. As previously stated, there is evident sexual dichromatism in this species (Fig. 4). Females show a dorsal head and dorsal light brown forelimbs with small irregular gray spots; without black grooves or spots. Temporal region is lighter than the rest of the head. Dorsally, they show vertebral light gray greenish scales almost in continuous line from the first nuchal scales to the first portion of the tail; the background changing from light brown to dark green, without any spotted pattern, stripes, ocelles or grooves. Some specimens show tenuous brown spots that are light, irregular and laterally more conspicuous. The inguinal region shows greenish or bluish tonalities. The tail is brown, with some specimens showing transversal pale light and dark bands. Ventrally, intense marbled gray and black, never melanic. Abdomen of intense gray, slightly spattered with dark small spots. The chest is slightly yellowish (Fig. 4). Some individuals show blue scales. Flanks are gray greenish with intense spattering of black spots. Precloacal pores are present only in males (8–10 with 1–2 supernumerarious pores). The statistical comparison between adult individuals showed that males have wider heads, longer heads, longer eye-nose distance and higher HLL/SVL ratio than females (Table 3). No significant differences were found for any discrete variables.

Adpressed hindlimb never reaches the shoulder either in males or females. Length of entire tail is 100.59% of snout-vent length in females (range = 98.73–103.64%) but it is 98.96% in the only male measured. Tail measurement is often impossible given the elevated number of broken or regenerated tails in the sample analyzed. Variations for some other metric and meristic characters are shown in Table 3.

Geographic distribution. *Phymaturus gynechlomus* was found only in isolated slopes of the type locality. This species was observed between 2400 and 2960 m of elevation. According to the potential distribution based on predictive models it is possible that the distribution of this species is greater, reaching Uspallata to the North and Payunia to the South. More explorations in neighbouring areas are necessary in order to validate the predictive models and to determine the whole species range.

Natural history. As the other species of the genus, *P. gynechlomus* inhabits rocky slopes, where they find refuge against predators and adverse climate conditions. The rocks of the area have volcanic origin. A photograph of the habitat of *P. gynechlomus* is shown in Fig. 5. Most lizards were found basking on the rocks, while some female specimens were observed near the Cruz de Piedra stream.

On the collecting day (January 4, 2006), we observed that the individuals of *P. gynechlomus* began the

activity at 10 hrs, when air temperature was 25.5 º C, temperature at 2 cm above ground was 28.8 ºC, and temperature of rocks was 27.7 ºC. The mean cloacal temperature of 5 individuals (3 males and 2 females) captured between 10:00 hrs and 11:45 hrs was 33.5 º C, whereas the mean temperature at 2 cm above ground during the same period of time was 29.7º C. Reaching midday, many individuals were also basking. The activity of the lizards finished at about of 19:00 hrs.

TABLE 3. Means and ranges of the main morphometric characters of *Phymaturus* **sp. nov.** Results of *t* test for continuous variables are given in the last column. Measurements in mm; n.s. = no significance.

Variable	Males (N = 4)		Females (N = 5)		Comparison		
	Mean	Range	Mean	Range	*t*	d.f.	*P*
Snout-vent length (SVL)	99.11	93.95–104.1	94.55	91.17–99.28	n.s.		
Entire Tail length (TL)	92.97		95.15	93.05–102.9	n.s.		
Axilla-groin distance (AGD)	46.8	43.49–50.05	47.1	43.91–52.44	n.s		
Head length (HL)	18.84	17.59–19.93	17.4	16.45–18.15	-2.61	7	0.035
Head width	20.75	19.07–21.91	19.19	18.59–20.11	-2.48	7	0.042
Eye-nose distance	7.09	6.45–7.5	6.28	5.93–6.6	-3.43	7	0.011
Forelimb length (FLL)	35.92	32.58–42.02	33.05	31.49–34.36	n.s		
Hindlimb length (HLL)	47.88	43.21–53.59	42.76	40.31–45.32	n.s		
Fourth finger length	12.09	11.49–13.25	11.45	10.73–12.43	n.s		
Fourth toe length	15.42	14.37–16.6	14.44	13.87–15.02	n.s.		
Head dorsal scales	17.75	7–19	17	16–18			
Surrounding interparietal	8	6–9	6.8	6–8			
4° finger subdigital lamellae	20.12	19–21	19.4	18–22			
4° toe subdigital lamellae	24	22–26	23.5	21–26			
Lorilabial rows	2.75	2–3	2.2	2–3			
Subocular scales	4.5	3–6	5.1	3–7			
Supralabial scale number	9.5	9–11	9	8–11			
Infralabial scale number	8.62	7–11	8	7–9			
Scales contacting mental	4.25	4–5	4.4	4–5			
Precloacal pore number	9.33	8–10	-				
Supernumerary pores	1.67	1–2	-				
Scales around midbody	218.8	195–230	217.6	196–248			
Ventral scales	188.3	180–196	173.8	165–185			
AGD/SVL ratio	0.47		0.5		n.s		
TL/SVL ratio	0.94		1.01		n.s		
FLL/AGD ratio	0.77		0.7		n.s.		
FLL/SVL ratio	0.36		0.35		n.s		
HLL/AGD ratio	1.02		0.91		n.s		
HLL/SVL ratio	0.48		0.45		-2.43	7	0.045
HL/SVL ratio	0.19		0.18		n.s.		

The vegetation of the area is mainly composed by *Grindelia chiloensis*, *Senecio subulatus*, *Senecio aff. filaginoides* var. *lobatus* (Asteraceae), *Junellia spathulata* var. *glauca* (Verbenaceae), *Poa aff. resinulosa*, *Elymus erianthus* (Poaceae), *Mulinum spinosum* (Apiaceae) and *Adesmia aff. aegiceras* (Fabaceae). These species were identified by botanists of IADIZA-CONICET, from samples collected on the site and date of

capture.

Other lizard species observed in sympatry with *P. gynechlomus* were *Liolaemus austromendocinus* Cei and *L. elongatus* Koslowsky.

FIGURE 5. Habitat of *Phymaturus gynechlomus*. Photo: V. Corbalán, 3 February 2008.

Discussion and conclusions

The genus *Phymaturus* has been extensively studied in the past ten years, increasing in the number of species since Donoso Barros (1966) and Peters and Donoso Barros (1970), from only one species with two subspecies, to about 21 species at present (Pincheira-Donoso *et al*. 2008a; Scolaro *et al.* 2008). The apparently increasing interest in the genus itself has derived in a complex and controversial taxonomical history involving many populations and species (Lobo & Abdala 2007). This problem, still unsolved in several aspects, has in part been explained by the lack of precise information on the Type Locality of the Holotype of *P. flagellifer* (Bell, 1843) *(= palluma),* collected during Darwin's expedition. The only information detailed for this individual states "Chile" (Cei & Scolaro 2006) as the area of collection. Pereyra (1991) and Cei and Scolaro (2006) have proposed designating this species as *Phymaturus flagellifer* for the Chilean population of Maule Valley-Curicó, which has morphological, cytogenetical and karyological characteristics different from the rest of Argentine populations of the group. However, this nomenclatural suggestion has not been broadly accepted by other authors (IZNC 2005; Etheridge & Savage 2006).

In a previous study, Lobo and Quinteros (2005a) reported one specimen as *Phymaturus cf. palluma* from the Collection of the Museum of Vertebrate Zoology, Berkeley, USA: MVZ 92902, 04, 08, R. Sage (data

locality: Quebrada Cruz de Piedra, San Carlos, 34º 26' S 68º 90' W). It is likely that this specimen represents an individual of *P. gynechlomus*, according to the geographic information provided by those authors.

Concerning the axilla-groin distance in *P. gynechlomus*, it was found to be larger in females than males but the difference is not statistically significant. This result coincides with findings of other *Phymaturus* species (Cei & Videla 2003; Scolaro *et al*. 2008).

Taking into account both morphological and karyological differences between the material from Laguna del Diamante Reserve and the remaining *Phymaturus* species of the *flagellifer* group, we concluded that *P. gynechlomus* is different from all described species, being an easily recognizable taxon. Although *P. verdugo* is the geographical closest relative species of the genus, the results presented in this work suggest that this new species has major affinities with *P. roigorum*, both in their ecological specializations and morphological traits. However, these latter species are easily recognizable for the dorsal pattern of females and the absence of black head and greater spots in males.

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