

A NEW SPECIES OF *LIOLAEMUS* (REPTILIA: SQUAMATA: TROPIDURIDAE) FROM MENDOZA PROVINCE, ARGENTINA

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RESUMEN. Una nueva especie del complejo *Liolaemus darwini* es descrita para el centro de la provincia de Mendoza, Argentina. Se parece más a *L. olongasta* y *L. laurenti* en que los machos adultos tienen pigmento negro en el pliegue antehumeral y manchas escapulares que no son agrandadas. Difiere de estas especies en tener un cuerpo adulto menor, un número mayor de escamas en la mitad del cuerpo, una cola más corta y un mayor número de poros precloacales en machos, y un patrón ventral distinto en machos adultos. En el norte de su distribución se encuentra *L. darwini* en el norte de la provincia de Mendoza y en la provincia de San Luis, y en el sur en el oeste de la provincia de La Pampa, en el noroeste de la provincia de Neuquén y en la provincia de Río Negro, pero se desconoce si estas poblaciones del norte y del sur de *L. darwini* están separadas por la distribución de la nueva especie. Análisis cladísticos basados en comportamiento, morfología y secuencias de DNA muestran filogenias conflictivas, pero concuerdan en que la nueva especie es un miembro del grupo *boulengeri*, con afinidades más cercanas a *L. darwini*, *L. olongasta* y *L. laurenti*.

ABSTRACT. A new species of the *Liolaemus darwini* complex is described from central Mendoza Province, Argentina. It most closely resembles *L. olongasta* and *L. laurenti* in that adult males have black pigment in the antehumeral fold and scapular spots that are not enlarged. It differs from these species in having a smaller adult body size, a higher number of midbody scales, a shorter tail, more precloacal pores in males, and a different adult male ventral body pattern. Its range is bordered by *L. darwini* on the north in northern Mendoza and San Luis provinces, and on the south in western La Pampa and northwestern Neuquén and Río Negro provinces, but it is unknown whether these northern and southern populations of *L. darwini* are separated by the range of the new species. Cladistic analyses based on behavior, morphology, and DNA sequences yield conflicting phylogenies, but agree that the new species is a member of the *boulengeri* group, with closest affinities to *L. darwini*, *L. olongasta*, and *L. laurenti*.

Keywords: *Liolaemus grosseorum*, lizard, taxonomy, Mendoza, Tropiduridae.

INTRODUCTION

Populations of the iguanian lizard genus *Liolaemus* formerly referred to *Liolaemus darwini* in Salta, Tucumán, Catamarca, La Rioja, and San Juan provinces in northern Argentina, have been shown to represent several species, i.e., *L. abaucan*, *L. calchaqui*, *L. koslowskyi*, *L. laurenti*, *L. olongasta*, and *L. quilmes* (Etheridge, 1992, 1993; Lobo and Kretzschmar, 1996). *Liolaemus telsen* was recently described from Chubut Province at the southern extremity of the range of this group (Ceï and Sclaro, 1999). All of the above species belong to an assemblage of species referred to as the *darwini*

complex (Etheridge, 1993), including also *L. albiceps*, *L. irregularis*, *L. ornatus*, and *L. uspallatensis*. An additional unnamed member of the *darwini* complex has now been identified in Mendoza Province.

METHODS

Descriptions of color in life were based on notes taken in the field and color photographs of recently captured individuals. All specimens were initially preserved in 10% formalin and later transferred to 70% etha-



Figure 1. Adult male topotype of *Liolaemus grosseorum*. Note the dark pigment within the white-bordered antehumeral fold, the dorsolateral light stripes which are continuous to the base of the tail, and the absence of enlargement of the dark lateral pre- and post-scapular spots, which in combination are diagnostic for the species.

Species	Midbody Scales					Middorsal Scales				
	<i>N</i>	Mean	Range	<i>SD</i>	<i>P</i>	<i>N</i>	Mean	Range	<i>SD</i>	<i>P</i>
<i>grosseorum</i>	26	58.7	51-72	5.37	-	35	66.1	57-76	5.47	-
<i>olongasta</i>	30	55.3	49-62	3.88	<0.01	46	71.5	60-83	4.97	<0.01
<i>laurenti</i>	157	54.9	48-69	3.34	<0.01	159	62.1	52-81	4.54	<0.01
<i>darwinii</i> north	29	57.3	49-66	4.06	0.13	29	68.4	61-82	5.84	0.05
<i>darwinii</i> south	55	59.4	50-68	4.51	0.26	53	71.5	61-88	6.49	<0.01

Table 2. Number of scales around midbody halfway between limb insertions, and number of middorsal body scales, counted from occiput to level of hind limb insertion for *Liolaemus grosseorum* and related species. Northern *L. darwinii* data based on specimens from northern Mendoza Province, southern *L. darwinii* based on specimens from northern Neuquén, northern Río Negro, and western La Pampa provinces. *N* = number of specimens examined; Mean = mean number of scales; Range = minimum and maximum number of scales; *SD* = standard deviation; *P* = Student's *t*-test for significance of differences between *L. grosseorum* and the species indicated.

1), distinguish the new species from *L. laurenti* (Etheridge, 1992; Plate I and II). In addition, *L. laurenti* and *L. cuyanus* lack the ventral bifurcation of the dark pigment of the antehumeral fold found in *L. grosseorum* and *L. olongasta*. The dorsal color pattern of *L. grosseorum* most closely resembles that of *L. olongasta*, but the ventral pattern of adult male *L. grosseorum* lacks the bold reticulation on the throat and chest of adult male *L. olongasta* (Etheridge, 1993; Plate 2.6). Compared with *L. olongasta*, *L. grosseorum* has a significantly lower mean number of midbody and middorsal scales (Table 2) and azygous frontal scales (Table 3). Black pigment may be present on the sides of the neck in *L. canqueli*, *L. fitzingerii*, *L. melanops*, and *L. xanthoviridis*, but it is entirely or mostly anterior to the antehumeral fold (Etheridge, 2000). These species also have a much greater maximum SVL (83 - 102 mm) than *L. grosseorum*, and have expanded rather than straight-sided marginal tooth crowns. *Liolaemus telsen* exhibits some superficial resemblance to *L. grosseorum*, but differs in lacking black pigment within the antehumeral fold, and in having a greater number (74 - 78) scales around midbody.

Description of the holotype. Adult male, 50.6 mm snout-vent length; tail complete, unregenerated, 80.3 mm long. All head scales including temporals smooth; parietals slightly swollen. Rostral 2.6 times wider than long, bordered by 4 postrostrals, the

lateral pair overlapping the anterior supralabials. Nasals polygonal, narrowing anteromedially, with nostril in posterior half of scale. Two pair of internasals, flanked by elongate supranasals, the right one in contact with postrostrals. One pair of lateral frontonasals twice or more times as large as other frontonasals. Supraorbital semi-circles distinct and complete, 12 scales in each; interparietal octagonal, with a distinct "eye," posteriorly flanked by paired parietals 1.5 times larger than interparietal. Supraorbitals in 3 rows, those of the median row 1.5 to 2.0 times wider than long, separated from frontals by a complete arc of circumorbitals. Two canthals, anterior canthals in broad contact with nasals; canthal ridge distinct but blunt; loreal-preocular region below canthal ridge slightly concave. Loreals 4 - 4; lorilabials 5 - 5, in a single row; supralabials 5 - 6. External auditory meatus 1.5 times higher than wide, with convex scales slightly projecting posteriorly over anterior margin. Mental scale 1.8 times wider than long, bordered posteriorly by postmentals and anterior infralabials, not contacting anterior sublabials. Infralabials 5 - 5. Gulars smooth, flat, all but the anterior gulars with a posterior apical notch. Dorsal nuchals keeled and imbricate, in 14 longitudinal rows; those of the dorsolateral light stripes each with one or more rounded granules below the apex, distally elevating the scales to form a slight crest. Lateral nuchals small, smooth, convex, juxtaposed. Lateral neck folds (postau-

Species	Male Preloacal Pores					Azygous Frontal Scales				
	N	Mean	Range	SD	P	N	Mean	Range	SD	P
<i>grosseorum</i>	21	7.7	6-10	1.35	-	36	1.11	1-2	0.71	-
<i>olongasta</i>	50	6.6	5-9	1.10	<0.01	48	2.04	0-3	0.68	<0.01
<i>laurenti</i>	75	7.0	5-9	0.91	<0.01	115	1.32	0-3	0.85	0.10
<i>darwinii</i> north	29	6.4	5-8	1.07	<0.01	44	1.32	0-3	0.52	0.04
<i>darwinii</i> south	38	6.5	5-8	0.86	<0.01	58	1.34	0-3	0.81	0.08

Table 3. Number of male preloacal pores and azygous frontal scales in *Liolaemus grosseorum*, and related species. Northern *L. darwinii* data based on specimens from northern Mendoza Province, southern *L. darwinii* based on specimens from northern Neuquén, northern Río Negro, and western La Pampa provinces. N = number of specimens examined; Mean = mean of counts; Range = maximum and minimum counts; SD = standard deviation; P = Student's *t*-test for significance of differences between *L. grosseorum* and the species indicated.

ricular, supra-auricular, longitudinal neck, oblique neck) moderately developed, antehumeral folds distinct, enclosing small granules; 11 posterior gulars between inferior apexes of antehumeral folds. Dorsal body scales keeled, imbricate, obovate, in about 15 longitudinal rows, grading into smaller, smooth, subimbricate to juxtaposed lateral scales; a zone of granular scales above and posterior to forelimb insertion and anterior to hind limb insertion. Ventral body scales smooth, imbricate; most ventrolateral and ventral scales at midbody with a posterior notch, ventrals of pectoral and preloacal regions without notches. Preloacal scales about as large as posterior ventrals; 7 preloacal pores. Scales around midbody 57; middorsal scales, from occiput to anterior margin of hind limb insertions 58. Dorsal and lateral caudals keeled, imbricate, posteriorly becoming asymmetrically rhombic; ventral caudals smooth anteriorly, keeled posteriorly. Dorsal limb scales keeled, imbricate; supracarpals, supratarsals, and supradigitals smooth. Proximal, posterior surface of thighs with a conspicuous patch of large, bluntly keeled and projecting scales. Infracarpals and infratarsals keeled, imbricate, and tridentate. Subdigital lamellae of manus with 3 or 4 distinct keels terminating in sharp mucrons; subdigital lamellae of pes mostly with 2, sometimes 3 weak keels terminating in short mucrons; proximal lamellae of digit I enlarged, with a serrate margin. Pre- and postdigital scales of digits III, IV, and V, and postdigitals of digit II of pes com-

pressed, sharply keeled, pointed and projecting to form distinct combs.

Dorsal ground color of head and body tan to the naked eye, but on close inspection (15X) is seen to be pale gray minutely speckled with brown. Upper head surface with irregular but more-or-less symmetrically arranged brown markings, one of which crosses the supraocular region and continues down the side of the head, crossing the eye, subocular and posterior labials. Body with a bold "standard pattern" (sensu Etheridge, 1993: 145-7), of light stripes and dark brown and white spots, with clumped and scattered scales colored iridescent blue. Dorsolateral stripes white, about 1.5 scales wide, continuous from temporal region to base of tail, brightest on the neck and shoulders. Middorsal stripe absent as such, represented by a median zone of ground color. Ventrolateral stripes continuous on the neck from just above ear to antehumeral fold, white, 1 - 2 granules wide, with a dark brown ventral border, broken on sides of body into series of light spots between axilla and groin. Paravertebral spots irregular in shape on neck, prominent on body and base of tail, more-or-less quadrangular, dark brown anteriorly, with a more-or-less semilunar white spot posteriorly; 9 pairs of spots between shoulder and pelvic region. On side of neck, dark pigment of lateral prescapular spot extends downward into antehumeral fold, the white pigment of spot forming a narrow border posterior to fold; pre- and postscapular spots not larger than other paravertebral spots. Ventrolate-

Species	Supralabials					Infralabials				
	<i>N</i>	Mean	Range	<i>SD</i>	<i>P</i>	<i>N</i>	Mean	Range	<i>SD</i>	<i>P</i>
<i>grosseorum</i>	73	4.9	3-6	0.59	-	74	5.3	5-6	0.47	-
<i>olongasta</i>	100	4.9	4-6	0.41	0.31	98	5.1	4-6	0.52	0.01
<i>laurenti</i>	129	4.7	3-6	0.50	<0.01	128	5.0	3-6	0.55	<0.00
<i>darwinii</i> north	85	5.2	4-6	0.43	<0.01	95	5.4	4-6	0.61	0.05
<i>darwinii</i> south	113	5.0	4-6	0.37	0.15	123	5.5	4-6	0.51	0.15

Table 4. Number of supralabials and infralabials scales in *Liolaemus grosseorum* and related species. Northern *L. darwinii* data based on specimens from northern Mendoza Province; southern *L. darwinii* based on specimens from northern Neuquén, northern Río Negro, and western La Pampa provinces. *N* = number of specimens examined; Mean = mean number of counts; Range = minimum and maximum counts; *SD* = standard deviation; *P* = Student's *t*-test for significance of differences between *L. grosseorum* and the species indicated.

ral surfaces of body with dark and light gray variegations, extending onto the sides of the venter. Dorsal surfaces of limbs with dark and light gray markings that tend to form obscure bands. A bold white stripe, bordered above and below with dark brown, extends across posterodorsal surface of thighs between base of tail and knee. Paravertebral and lateral spots distinct on anterior one fourth of tail, gradually becoming obscure transverse bands posteriorly.

Ventral surface of throat and abdomen white, extensively mottled with brown markings, darker on the throat and chest. Ventral surface of tail and limbs with faint markings.

Variation. Variation in the tail/total length ratio is given in Table 1; the sexes are not significantly different in tail/total length ratios. Variation in midbody scales, middorsal scales, supralabials and infralabials, male precloacal pores, number of azygous frontal scales, and supra- and infralabials are given in Tables 2 - 4. As in other *Liolaemus*, scales of the pygal region (anterior to cloacal aperture) are smaller in females. A bold standard dorsal color pattern is present in male and female neonates, both with dark pigment in the antehumeral fold, but darker in neonatal males. The pigmented fold becomes even more conspicuous (black) and the dorsolateral stripes become somewhat less bold posteriorly, though remaining distinct, and scattered blue scales are acquired by adult males. Photographs of adult males from life

show yellow pigmentation on the sides of the neck just anterior to the forelimb insertions, and iridescent blue scales on the sides and back of the body and anterior third of the tail. Precloacal pores are orange. In females, the overall dorsal pattern becomes slightly less distinct due to loss of brightness of the dorsolateral stripes and fading of the paravertebral and lateral spots. Yellow pigment may also be present on the sides of the neck just anterior to the forelimb insertion in adult females.

In the smallest individuals of both sexes (male 24.6; female 25.2 mm SVL) the throat is marked with brown irregular spots or a broken reticulum. Larger males acquire similar markings on the chest and abdomen, whereas in adult females the abdomen remains unmarked or has indistinct spots.

Natural History. On February 11, 1995, Robert Espinoza, Sebastián Torres and I visited the type locality. The bare, sandy beach that forms the southeastern shore of Lago Nihuil is bordered by a series of low dunes, beyond which is a flat area of sandy soil. The dunes and sand flats are vegetated by wiry grass (*Sporobolus riges*), low herbs, and spiny bushes (Rubiaceae and Asteraceae), as well as abundant Russian thistle (*Salsola kali tenuifolia*), the latter apparently a recent import. There is evidence of considerable damage by large domestic herbivores in the area. Only a few small areas of open sand remain. The beach itself is a popular tourist attraction, and motorcycles ply the trails that course

through the sand flats behind the dunes. This site is also the type locality of *Liolaemus rabinoi* (Cei, 1974), and had been visited by myself and Dr. Cei in 1982. At that time the sky was overcast and no lizards were seen. The habitat appears to be considerably modified since then, and *L. rabinoi* probably is extinct there (Bertonatti, 1994; Etheridge, 2000; Avila *et al.*, 2000). *Liolaemus gracilis*, *L. boulengeri*, and *L. grosseorum* were found to be moderately abundant. No obvious differences in their behavior were noted, but the time spent was limited to a single day. The dorsal pattern of *Liolaemus boulengeri* and *L. grosseorum* are similar, and these species, especially females, were difficult to distinguish prior to capture.

Monique Halloy (field notes, personal communication), describes the habitat at 7 km SW of Cortadera as small sand dunes, mostly of fine, loose sand, with small shrubs, where *Liolaemus grosseorum* occurs with *L. boulengeri*. The habitat at 18 km NE Cueva del Tigre has flat, crusty, consolidated, sandy soil, with volcanic rocks, and abundant small spiny bushes; *L. boulengeri* and *L. gracilis* were also present. At 4 km NW of Matancilla, the ground is flat, with a firm substrate, stones, and small spiny bushes; *L. boulengeri* and *L. gracilis* were also present. *Liolaemus grosseorum* also occurs syntopically with *L. boulengeri* and *L. gracilis* at El Sosneado (R. Sage, field catalogue, 1970).

Distribution. All records for *Liolaemus grosseorum* are from Mendoza Province in the departments of San Rafael and Malargüe (Fig. 2). *Liolaemus darwinii* occurs to the north in Mendoza Province, to the south in Neuquén Province, and to the southeast in northwestern Río Negro and western La Pampa provinces. Records for both species are lacking from eastern central Mendoza Province east of San Rafael, and from adjacent southern San Luis Province. Thus, it is uncertain whether or not the range of *L. darwinii* is continuous, north-to-south, east of the range of *L. grosseorum*.

Comparisons. As indicated in the diagnosis, *Liolaemus grosseorum* most closely re-

sembles *L. darwinii*, *L. laurenti*, and *L. olongasta*. Its dorsal color pattern is most similar to that of *L. laurenti* and *L. olongasta* in that adult males have black pigment within the antehumeral folds, but lack enlarged pre- and postscapular spots. Ventral markings of *L. grosseorum* and *L. olongasta* are similar, but the pattern is much bolder and sexual differences more marked in the latter, i.e., the markings are darker and more extensive in males (Etheridge, 1993, Pl. 2.6). The ventral pattern of *L. laurenti* differs from *L. olongasta* and *L. grosseorum* in that the posterior throat may become heavily pigmented and the chest and abdomen remain immaculate or nearly so (Etheridge, 1992; Plates I.3 and II.3). Additionally, *L. grosseorum* has a significantly greater ($P < 0.01$) mean number of midbody and middorsal scales and significantly more ($P < 0.01$) male precloacal pores than *L. olongasta* and *L. laurenti*. It also has a significantly higher mean number of upper and lower labials, and a shorter tail than *L. laurenti*.

Liolaemus darwinii north of the range of *L. grosseorum* in northern Mendoza Province exhibit differences, in color pattern and some scale counts, from *L. darwinii* to the south in La Pampa and Río Negro provinces. Adult male *L. darwinii* from northern Mendoza show considerable variation in the extent of enlargement of the scapular spots, but they are always noticeably larger and more intensely pigmented than other lateral or paravertebral spots. Only four large adult males (50 - 60 mm SVL) from La Pampa and Río Negro provinces are available for study. In these the scapular spots are also enlarged, but are not as large or as dark as in individuals from the north. In northern Mendoza, the presence of conspicuous areas of intensely black pigment across the throat, in the middle of the abdomen, and on the anterior surface of the thighs is likewise variable in adult males, but at least some males always exhibit development of this pigmentation to some degree. Males of southern populations characteristically have the throat and abdomen densely mottled with brown similar to the pattern found in *L. grosseorum*, but few exhibit the black throat bar and

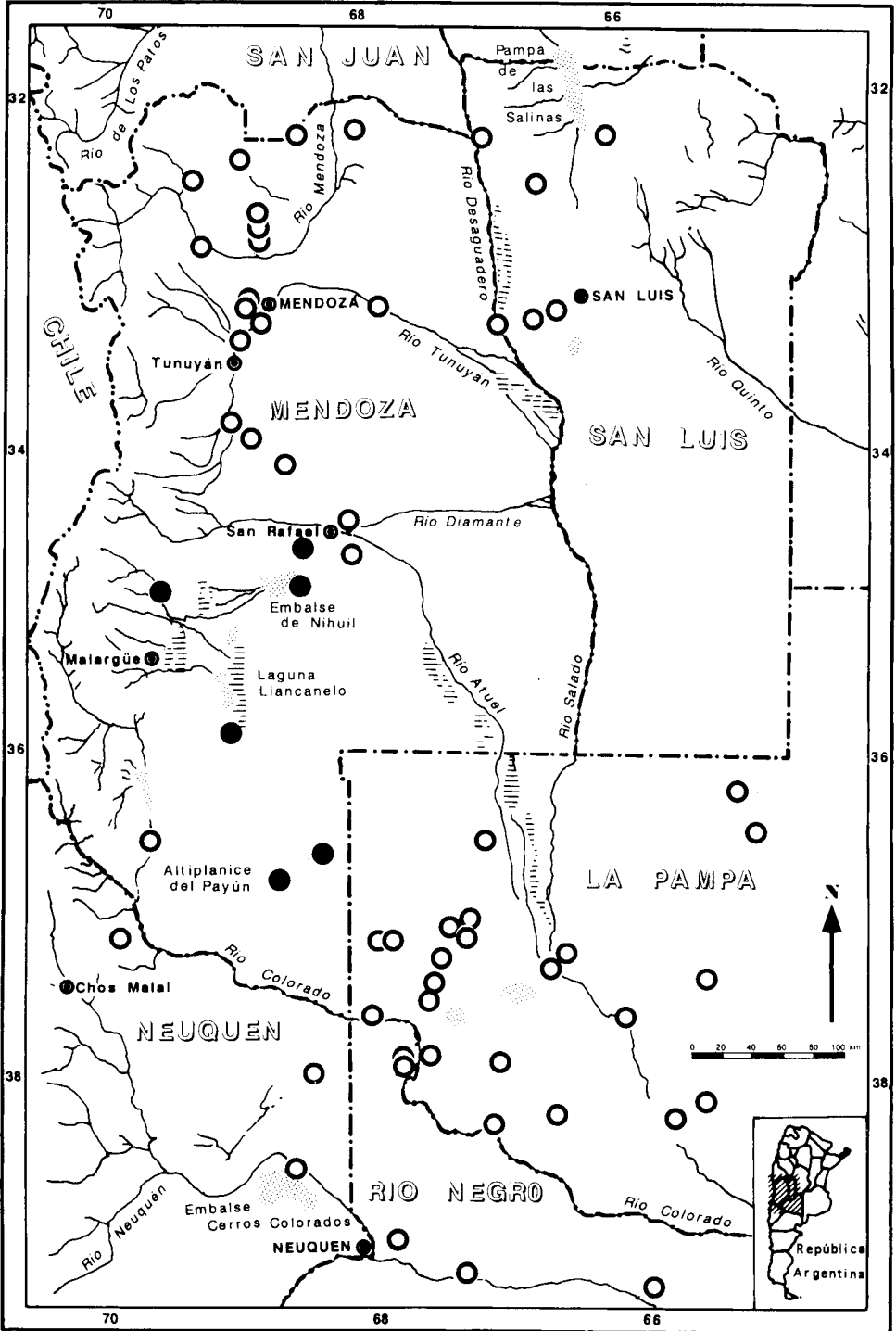


Figure 2. Map of western central Argentina showing the locality records for *Liolaemus grosseorum* (black circles) and *L. darwini* (white circles).

abdominal patch frequently found in individuals from northern Mendoza Province.

Dorsolateral stripes remain continuous and conspicuous in adult male *L. grosseorum*, but in male *L. darwinii* from both regions they tend to fade posteriorly while becoming bolder on the neck and anterior body. In females of both species the dorsal pattern fades in intensity, but much more so in *L. darwinii* than in *L. grosseorum*.

Relationships. In a phylogeny based on a cladistic analysis of the characteristics of burying behavior of 19 species of the *boulengeri* group (Halloy *et al.*, 1998), *Liolaemus grosseorum* (= *L. sp.*) was found to be the sister taxon of a large clade consisting of all *boulengeri* group species except *L. ornatus* and *L. darwinii*. However, this relationship had a bootstrap value of 38%. A recent cladistic analysis of 27 species of the *boulengeri* group (Etheridge, 2000), based on one behavioral and 39 morphological characters, found *L. grosseorum* (= *L. sp.*) to be the sister taxon of *L. ornatus* (*L. albiceps* + *L. irregularis*), which in turn is the sister taxon of *L. darwinii* (*L. laurenti* + *L. olongasta*). The bootstrap value for this relationship was 54%. Schulte *et al.* (2000), in a phylogenetic analysis of 65 species of *Liolaemus*, including 23 species of the *boulengeri* group, using mitochondrial DNA sequences, found *L. grosseorum* (= *L. darwinii* - Mendoza) the sister taxon of an unresolved tritomy with *L. darwinii*, *L. laurenti*, and *L. boulengeri* with a bootstrap value of 96%. This clade formed an unresolved tritomy with *L. chacoensis* and *L. olongasta*, i.e., *L. chacoensis* + *L. olongasta* (*L. grosseorum* (*L. darwinii* + *L. laurenti* + *L. boulengeri*)). Although the three analyses are in conflict, they agree that *L. grosseorum* is embedded within the *boulengeri* group (Etheridge, 1995, 2000), and has a close relationship with *L. darwinii*, *L. laurenti*, *L. olongasta*, all members of the *darwinii* complex (Etheridge, 1993).

DISCUSSION

The discovery of *Liolaemus grosseorum* in Mendoza Province brings to eight the

number of species that formerly had been identified as *L. darwinii*: *L. abaucan*, *L. calchaqui*, *L. grosseorum*, *L. koslowskyi*, *L. laurenti*, *L. olongasta*, *L. quilmes*, *L. telsen* (Etheridge, 1992, 1993; Lobo and Kretzschmar, 1996; Cei and Scolaro, 1999). The distributions of *L. grosseorum* and *L. darwinii* in Mendoza Province are still incompletely known. Records of *Liolaemus* are conspicuously absent from eastern Mendoza and southern San Luis provinces, and it is not known whether this is due to the lack of collecting or if they do not occur in these regions. Likewise, it is not known whether *L. darwinii* occurs to the west of *L. grosseorum* in western central Mendoza Province. If not, *L. darwinii* from northern Mendoza and northern San Luis may be disjunct from *L. darwinii* in northern Neuquén, Rio Negro, and western La Pampa provinces.

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APPENDIX

Specimens examined from Mendoza Province and adjacent parts of San Luis, western La Pampa and Río Negro, and northern Neuquén provinces, Argentina, are listed below, with literature records from the same areas. Specimens of other species of the *darwinii* complex (*L. laurenti*, *L. quilmes*, *L. abaucan*, *L. koslowskyi*, *L. uspallatensis*, *L. albiceps*, *L. ornatus*, *L. irregularis*, and *L. olongasta*) examined were listed in Etheridge (1992, 1993). Degrees and minutes South Latitude and West Longitude are given in parentheses. Parentheses following specimen numbers indicate number of individuals in a lot. Museum symbolic codes are those listed by Leviton *et al.* (1985); RVP is the acronym for the Museo Provincial de Ciencias Naturales y Antropológicas, Santa Rosa, La Pampa Province, Argentina.

Liolaemus grosseorum

Mendoza: *Depto San Rafael:* SE shore Embalse Nihuil, (35°02'S - 68°40'W; 1380 m), FML 2972(9), 3444 (Holotype), 9711-26 (Paratypes); Lago Nihuil, 1 km W Nihuil (35°02'S - 68°40'W; 1260 m), KU 161037; El Sosneado (35°05'S - 69°34'W), MVZ 126364-71, 126387-88, MLP S.297, S.301, S.1148-9; Estación de las Terneras (34°42'S - 68°35'W), MVZ 126436-47.

Depto Malargüe: 7 km SW La Cortadera on Ruta Prov. 190 (36°36'S - 68°32'W), FML 2749 (2); 18 km NE Cueva del Tigre on Ruta Prov. 183 (35°50'S - 69°06'W), FML 2736; 4 km NW Matancilla on Ruta Prov. 180 (36°46'S - 68°50'W), FML 3427(1).

Liolaemus darwinii

La Pampa: *Depto Chical-Co:* Cerro Centinela (36°37'S - 67°15'W), RVP 100-01, 103, 105-06. *Depto Curacó:* 9 km E Puelches, Ruta Nac. 152 (38°08'S - 65°48'W), FML 8373-74; 40 km N Casa de Piedra on Ruta Prov. 23 (37°51'S - 67°06'W), FML 8306-07; 34 km NE Casa de Piedra between Casa de Piedra and Puelches on Ruta

80 (38°08'S - 66°45'W), FML 8367; (38°08'S - 66°31'W) FML 8369-70; Casa de Piedra, RVP 215-6. *Depto Leventué:* Carro Quemado (36°28'S - 65°20'W), Aravena, 1979; Victorica (36°13'S - 65°27'W), USNM 63948-9, MCZ 49622. *Depto Lihuel Calel:* Lihuel Calel (38°02'S - 65°33'W), MACN 11235; km 205 on Ruta 21, Gallardo, 1966. *Depto Limay Mahuida:* Estancia Médanos Blancos, RVP 29; Laguna Quiroga (37°30'S - 66°25'W), RVP 12; La Reforma (37°33'S - 66°14'W), RVP 4; Limay Mahuida (37°12'S - 66°57'W), Aravena, 1979. *Depto Puelén:* Puesto Los Carrizales, Buta Ranquil (37°02'S - 67°52'W), RVP 135-36; Cerro Bayos (Calera Puelén) (37°35'S - 67°38'W), RVP 157-9; Cerro Colón (36°57'S - 67°24'W), RVP 173; Gobernador Ayala, RVP 199-200; Cochicó (Altos de Cochicó) (37°16'S - 67°23'W), Aravena, 1979; Los Parajitos (36°57'S - 67°54'W), RVP 56, 138; 25 km SE Puelén (37°22'S - 67°37'W), RVP 143-147; 59 km S Algarrobo de Aguila, Km 250, Ruta Nac. 151 (36°52'S - 67°26'W), FML 8352; 41 km N Puelén, Km 238, Ruta Nac. 251 (36°58'S - 67°29'W), FML 8338-46, 8349-50; 21 km N Puelén, Km 210 Ruta Nac. 151 (37°21'S - 67°34'W), FML 8351; 25 de Mayo (37°47'S - 67°42'W), FML 8569; (38°07'S - 67°06'W) FML 8311-12. *Depto Toay:* Toay (36°40'S - 64°21'W), Aravena, 1979. *Depto Utracán:* 25 km SE Chacharramendi, RVP 187.

Mendoza: *Depto La Paz:* Desaguadero (33°25'S - 67°11'W), USNM 38122; 0.5 km W Desaguadero via Ruta 7, MVZ 126309-23. *Depto Las Heras:* vicinity of Mendoza, FML 1102(10); Villavicencio (32°35'S - 68°58'W), MVZ 126020, 126089; 10 km N, 1 km E Villavicencio, MVZ 126103; Uspallata (32°35'S - 69°20'W), MVZ 125929-32, 126029-31; 6 km N, 4.5 km E Uspallata, MVZ 126868; vicinity of Mendoza (32°53'S - 68°49'W), FML 934(2); 40 km S Mendoza, KU 182029; 17 km N Mendoza, MVZ 125840; Mina Alta, 7 km W S Mendoza, MCZ 15905-6, 58119; Agua de Las Avispas, 8 km SSW Estación Cacheuta (33°01'S - 69°07'W), MCZ 58136; base of Cerro de Cal (32°44'S - 68°51'W), MVZ 125896, 125928, 125953; 10.7 km NW Capdevilla (32°45'S - 68°48'W) via Hwy 7, MVZ 125915-921; 6

km N Las Heras (32°51' S - 68°49' W), KU 182028; 12.5 km NE Ramblón (32°18' S - 68°39' W), MVZ 126114. *Depto Lavalle*: Reserva Florística y Faunística de Tolteca, FML 3617. *Depto Luján de Cuyo*: El Carrizal (33°16' S - 68°45' W), MACN 7168; Ugarteche (33°13' S - 68°53' W), FML 540(12); Cacheuta (33° 06' S - 69°07' W), MVZ 126389-90; Potrerillos (32°57' S - 69°11' W), USNM 64131, MCZ 169262, MVZ 126184-85, 126391-414; 4 km SE Potrerillos (32°57' S - 69°12' W), via Ruta Nac. 7, MVZ 126403-14; 27 km W Mendoza, FML 2733(2). *Depto Maipú*: Maipú (32°58' S - 68°47' W) near Río Mendoza, CAS 18415-26, 18428. 18430-32, 18434-6, 18438-9. *Depto Malargüe*: 50 km S Manzano on Ruta Nac. 40 (36°28' S - 69°39' W; 1080 m), SDSU 3411-3415. *Depto Rivadavia*: El Carrizal de Abajo (33°18' S - 68°42' W), MVZ 126115-6, 126456-72; Rodeo el Medio (32°59' S - 68°41' W), FML 263(2). *Depto Santa Rosa*: Las Catitas, MVZ 126167. *Depto San Carlos*: 80 km N San Rafael, KU 18026-27; Vilucó (33°55' S - 69°01' W), MLP S.299, S.367; Pareditas (33°56' S - 69°04' W), MVZ 126429-35; 15 km SE Pareditas via Ruta 143, MVZ 127878. *Depto Tupungato*: near Río Tunuyán (34°16' S - 68°18' W) at Zapata, MVZ 126184-5. *Depto San Rafael*: Médanos de Picardo (34°51' S - 68°15' W) at Las Malvinas, MVZ 126330-48; near Cerro de La Gloria, MVZ 125877; 7 km NW Pto. La Tosca (34°14' S - 68°40' W) via Ruta Nac. 143, 53 km NW San Rafael

(34°36' S - 68°20' W), MVZ 126077-87, 126089; between Dique de Valle Grande and Rama Caída, near San Rafael, SDSU 3188-96.

Neuquén: *Depto Añelo*: Auca Mahuida (37°50' S - 68°50' W; 800 - 900 m), IBAUNC 965; near Embalse Cerro Colorado (38°36' S - 68°18' W; 300 - 400 m), IBAUNC 988.

Depto Pehuenches: 12 km S Buta Ranquil (37°10' S - 69°50' W; 800 - 900 m), IBAUNC 716. *Depto Zapala*: between Amarga and Bosque Petrificado (39°06' S - 69°34' W), FML 8316-7; Cerro Lotera, FML 8579.

Río Negro: *Depto Avellaneda*: Chimpay (39°00' S - 66°09' W), FML 8410-12; Chelforó (39°05' S - 66°32' W), FML 8294-95, 8298. *Depto El Cuy*: El Cuy (39°54' S - 65°49' W), FML 8383-87. *Depto General Roca*: 20 km N General Roca (39°02' S - 67°32' W; 300 m), MVZ 126351-63; Catriel, near Río Colorado (38°05' S - 67°50'), IBAUNC 964; Ruta Nac. 151, 5 km N Catriel FML 8570-71; 20 km N Cervantes (38°47' S - 67°07' W) FML 8313.

San Luis: *Depto Belgrano*: El Gigante (32°53' S - 66°56' W), MACN 31.884; San Antonio, MVZ 125983; La Tranka, MVZ 125984-5. *Depto Capital*: 1 km W Balde (33°20' S - 66°38' W; 440 m) via Ruta 7, MVZ 126324-7; Alto Pencoso (33°26' S - 65°56' W), MLP S.249, 294, 296, 369, 388-90, 393-5, 398, 400, 402; 2 km W Alto Pencoso, 1650 m, MVZ 126452.