

Revision of the Patagonian Iguanids of the  
*Liolaemus elongatus* Complex

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**ABSTRACT**—Patagonian lizards of the *Liolaemus elongatus* complex are revised. The proposed taxonomic arrangement consists of the widespread subandean *L. elongatus elongatus* (Koslowsky) between 33° and 45° south latitude, *L. elongatus petrophilus* Donoso B. and Cei from Central Rio Negro uplands and Northern Chubut, and a new allosympatric, closely related form, *L. austromendocinus* sp.nov., here described, from southern Mendoza Province, Argentina. Geographical variation and clinal trends of *L. elongatus elongatus* are analyzed and discussed. Sympatry and serological relationships of *L. elongatus elongatus* and *L. austromendocinus* north of the Barrancas-Colorado river are reported and criticized.

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Since the careful original description of *Liolaemus elongatus* Koslowsky (1896), only a subspecific taxon of this patagonian lizard has been hitherto reported (*L. elongatus petrophilus* Donoso B. and Cei, 1971: Somuncura plateau, Rio Negro, Argentina). No attempt was made to analyse geographical variation or speciation processes of the widespread species, occurring between 33° and 45° south latitude. Several collections and field studies, extended over the whole area of distribution, between 1965 and 1973, have enabled us to make a more detailed study of the *elongatus* populational complex. Besides the morphological analysis and comparison of samples from southern Chubut province to the Mendoza uplands (Fig. 1), a closely related partly sympatric species has been identified in Mendoza province (Fig. 2).

## MATERIAL AND METHODS

The 81 samples examined (238 specimens, all from the Herpetological Collection of the Instituto Biología Animal, Universidad Nacional de Cuyo: IBA-UNC) cover the known distribution of the *elongatus* complex. Localities are indicated with the taxa reported hereinafter. The following descriptions and comparisons employ the usual distinguishing characters of the genus *Liolaemus*, such as

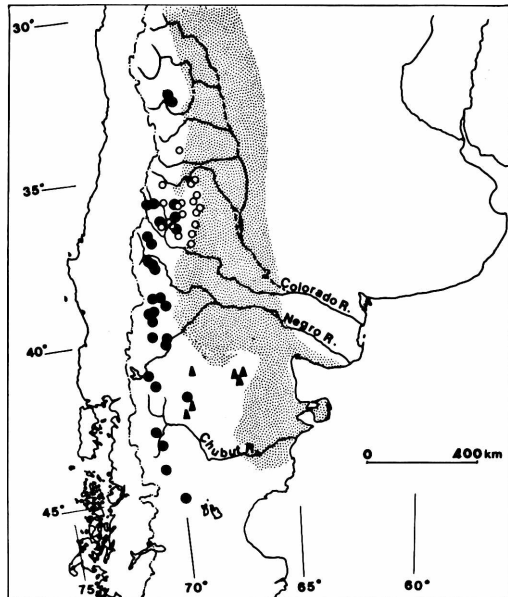


FIGURE 1. Reported localities of the *Liolaemus elongatus* complex. Black circles: *L. elongatus elongatus*; black triangles: *L. elongatus petrophilus*; white circles: *Liolaemus austromendocinus* sp.nov. Stippled area: geographic extension of the floristic "Monte" or "Creosote bush" formations.

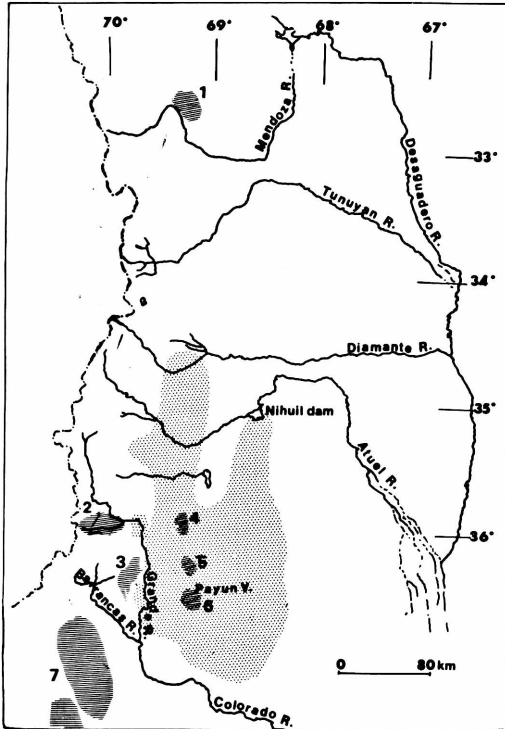


FIGURE 2. Distribution of the allosympatric species *Liolaemus elongatus elongatus* and *Liolaemus austromendocinus* in Mendoza province. Stippled area: *L. austromendocinus*; hatched areas: *L. elongatus elongatus* populations (1—Uspallata uplands, 2—Pehuenche valley, 3—Choique Pass, 4—70 km from Payún volcán, 5—50 km from Payún volcán, 6—5 km from Payún volcán, 7—Neuquén populations).

*Liolaemus elongatus elongatus* (Koslowsky), with a number of intergrading cordilleran and extracordilleran populations from Chubut to Mendoza, all regarded as conspecific;

*Liolaemus elongatus petrophilus* Donoso B. and Cei, from the plateaus and volcanic upland regions of Central Rio Negro province and Northern Chubut, Argentina;

*Liolaemus austromendocinus* sp.nov., from southern volcanic and eremic territories of Mendoza province, Argentina, sympatric with the nominal form in several localities.

Therefore the recognized taxonomic distinctions are analyzed below in accordance with the morphological criteria supported and the available serological data.

#### *Liolaemus elongatus elongatus* (Koslowsky)

*Holotype and paratypes*.—Herp. Coll. Museo La Plata; from "Chubut territory, near to Cordilleran mountains, in rocky environments". 37 specimens, collected by J. Koslowsky, summer 1896.

*Specimens studied*.—IBA-UNC: 549,1-3, Paramillo, 2700 m, Uspallata mountains, Mendoza, May, 1969, L. P. Castro; 576,1-4, Hornillos, near Cruz Paramillo, 3000 m, Uspallata mountains, Mendoza, December, 1969, L. P. Castro; 668,1-26, Paramillo, near 3000 m, Uspallata mountains, Mendoza, 25 May 1970, L. P. Castro; 249,1, Pehuenche Valley, 1700 m, 50 km from Bardas Blancas, Mendoza, 13 Feb. 1964, J. M. Cei and V. G. Roig; 268,1,

head and body measurements, lepidosis, coloration and patterns. All measurements were carried out by caliper (0.5 mm accuracy).

Samples for serological tests were obtained simultaneously, and processed at once in order to avoid any eventual decrease in antigenic activity as a result of aging of the preserved sera. Prompt preparation is of crucial importance because of the high sensitivity of the precipitin reactions, specially between closely related forms (Frair, 1969; Cei and Castro, 1970). After bleeding by cardiac puncture, the expressed sera were Seitz-filtered, centrifuged and stored at  $-20^{\circ}\text{C}$ . Antisera were prepared in rabbits, by reinforced serum antigens (Freund's Adjuvant). Crossed precipitin reactions were carried out by means of the photorefractometric technique, (Boyden, 1942). The homologous reaction (100 per cent) indicates the results of progressive tests of an antiserum with its own diluted antigens. Heterologous reactions indicate the relative percentage of precipitate of the same antiserum with different specific antigens, compared with the standard measurement of the homologous reaction.

## RESULTS

The somatic features and measurements considered suggest the following taxonomic arrangement of the *Liolaemus elongatus* complex in its Argentina range:

Pehuenche Valley, 5 km from El Salto, 1850 m, Mendoza, 13 Mar. 1964, J. M. Cei and V. G. Roig; 250,1, Pehuenche Valley, El Salto, 1900 m, Mendoza, 13 Mar. 1964, J. M. Cei and V. G. Roig; 900,1-21, Pehuenche Valley, 1650 m, Mendoza, 20 April 1973, J. M. Cei, L. P. Castro; 730,1, 70 km W Volcan Payún, 2000 m, Mendoza, 1 May, 1971, L. P. Castro; 725,1, 50 km W Volcán Payún, 1800 m, Mendoza, 1 May 1971, L. P. Castro; 785,1, 5 km W Volcan Payún, 2000 m, Mendoza, 7 Dec. 1971, J. M. Cei, L. P. Castro, T. Ferreyra; 149,1-2, El Choique Pass, 2400 m, southern Mendoza province, 22 Nov. 1961, J. M. Cei and V. G. Roig; 140,1, El Choique Pass, 2400 m, southern Mendoza province, 22 Nov. 1961, J. M. Cei and V. G. Roig; 708,1, 2 km NW Las Ovejas, 1800 m, Neuquén, 5 April 1970, J. M. Cei and L. P. Castro; 713,1, 55 km E Las Ovejas, 1300 m, Neuquén, 5 April 1970, J. M. Cei and L. P. Castro; 562,1, Las Ovejas, 90 km NW Chos Malal, 1800 m, Neuquén, 4 Oct 1969, L. P. Castro; 679,1-4, 10 km E Ñorquin, 1200 m, Neuquén, 6 April 1970, J. M. Cei and L. P. Castro; 707,1, 6 km E Ñorquin, 1200 m, Neuquén, 6 April 1970, J. M. Cei and L. P. Castro; 557,1, Buta Ranquil, 1100 m, near Caicayén, Ñorquin, Neuquén, 3 Oct. 1969, J. R. Contreras; 854,1-4, between Primeros Pinos and Kilka River, *Araucaria* woods, 1600-1800 m, Neuquén, 6 Jan. 1973, J. M. Cei, L. M. Cei and T. Ferreyra; 847,1, Covunco Stream, 1200 m, volcanic rocks, Neuquén, 6 Jan. 1973, J. M. Cei, L. M. Cei, T. Ferreyra; 444,1, Zapala, 1000 m, Neuquén, 12 Jan. 1967, J. M. Cei; 594,1-3, Laguna Blanca Lake, 1200 m, near Zapala, Neuquén, 7 Jan. 1970, J. M. Cei and L. M. Cei; 258,1-4, Laguna Blanca Lake, 1200 m, near Zapala, Neuquén, 18 Jan. 1964, J. M. Cei and R. Cei; 671,1-13, Laguna Blanca Lake, 1200 m, near Zapala, Neuquén, 5 April 1970, J. M. Cei and L. P. Castro; 202,1-5, Laguna Blanca Lake, 1200 m, near Zapala, Neuquén, 10 Feb. 1963, V. G. Roig, F. Benitez and L. P. Castro; 376,1, Laguna Blanca Lake, 1200 m, near Zapala, Neuquén, 17 Oct. 1966, J. M. Cei and V. G. Roig; 715,1-3, Burro and Teru Lagoons, 40 km SW Zapala, 1300 m, Neuquén, 7 April 1970, J. M. Cei and L. P. Castro; 348,1-2, Burro Lagoon, 40 km SW Zapala, 1300 m, Neuquén, 16 Oct. 1966, J. M. Cei and V. G. Roig; 591,1-9, Casa Piedra plateau, 70 km SW Zapala, 1500 m, Neuquén, 6 Jan. 1970, J. M. Cei and L. M. Cei; 610,1, Overá Lagoon, 12 km NW Catán Lil, 1150 m, Neuquén, 25 Jan. 1970, J. M. Cei and L. M. Cei; 701,1, 15 km E Santa Teresa, near Piedra del Aguila, 1200 m, Neuquén, 8 April, 1970, J. M. Cei and L. P. Castro; 890,1, 50 km SW Piedra del Aguila, near Limay River, 1300 m, Neuquén, 21 Jan. 1973, J. M. Cei, L. M. Cei, T. Ferreyra; 593,1, Fragua Stream, 950 m Rio Negro, 25 Jan. 1970, J. M. Cei, L. M. Cei; 596,1-2, Las Bayas Stream, 900 m, South Pilcaniyeu, Rio Negro, 10 Jan. 1970, J. M. Cei, L. M. Cei; 531-1, Las Bayas Stream, 900 m, South Pilcaniyeu, Rio Negro, 8 Jan. 1969, J. M. Cei, N. P. Tuzi; 839,1-4, Añueque mountains, 5 km from Moligue, 1400 m, Rio Negro, 20 Jan. 1973, J. M. Cei, L. M. Cei, T. Ferreyra; 598,1, Nahuel Pan, Esquel, 900 m, Chubut, 25 Jan. 1970, J. M. Cei, L. M. Cei; 602,1, 18 km N Tekka, 700 m, Chubut, 24 Jan. 1970, J. M. Cei, L. M. Cei; 855,1-2, 2 km N Costa, 900 m, Chubut, 8 Jan. 1973, J. M. Cei, L. M. Cei, T. Ferreyra; 609,1-2, 5 km SE Tamariscos, 800 m Chubut, 23 Jan. 1970, J. M. Cei and L. M. Cei. In all 135 specimens (22 males, 84 females, 29 juveniles). All localities have been plotted on the map (Fig. 1).

*Redescription*.—A slender lizard; head elongate; tail 1.5 as long as head and body, or more. Head longer than wide; adpressed hind limb reaching shoulder in males, crossing axilla in females; upper head scales large, smooth; rostral 3 times as long as high; 1-2 azygous frontals; two small postfrontals; interparietal slightly smaller than parietals; 5-6 supraoculars; 7-8 supralabials and 5 infralabials; subocular expanded; a single series of scales between subocular and supralabials; mental subtriangular, two diverging rows of 4 postmentals; temporal scales weakly carinate; ear opening large, quadrangular, with 2 prominent scales on anterior border. Sides of neck granular, with a V-shaped longitudinal fold; a large antehumeral fold. Dorsal scales imbricate, triangular, conspicuously keeled. Keels forming longitudinal lines; dorsolateral scales wider than the sharp-pointed dorsovertebral scales (7 dorsolateral scales contained in 0.5 mm versus 10 dorsovertebral scales) (Fig. 3, A); 72-90 scales around middle of body; length of head corresponding to length of 19-23 dorsal scales; ventral scales smooth, rounded, slightly larger than dorsals; limb scales keeled; caudal scales keeled at base of tail; elsewhere squarish with diagonal keels, verticillate; 27-30 lamellae under fourth toe; 3-4 preanal pores. Measure-

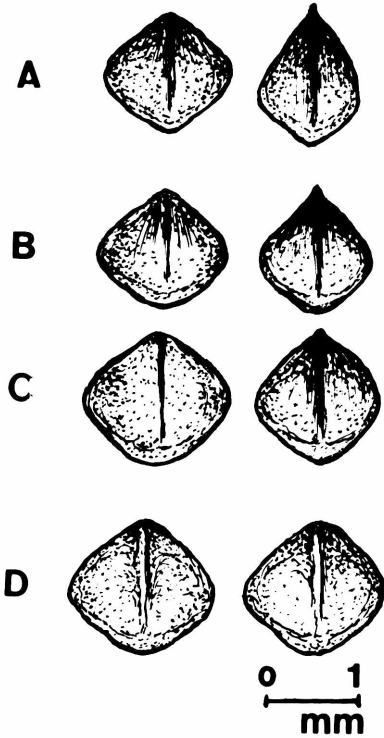


FIGURE 3. Dorsal scales of the *Liolaemus elongatus* forms. A—*L. elongatus elongatus* (Chubut); B—*L. elongatus petrophilus* (Somuncurá Mt.); C—*L. elongatus petrophilus* (Calcatapul Mt.); D—*L. austromendocinus* (holotype). (Left: lateral scales; right: vertebral scales).

small whitish or bluish spots, and mottled belly. Differences between the sharp-pointed vertebral scales and the wider lateral scales are still present, as in the lizards from the type area. Some characters exhibited by the Neuquén populations are further accentuated in intergrading specimens north of Barrancas river, in southern Mendoza province. Individuals from Choique Pass, 2400 m, are quite indistinguishable from Neuquén and Chubut lizards. But variable samples from the Pehuenche valley exhibit, beside a smaller body size, a paler olive or coppery ground coloration, broken and faint vertebral or lateral stripes, indistinct bands or dark spots on the tail, a more brilliant scattering of white-bluish small streaks on the dorsum, and a mottled belly. These somatic features and a remarkable polymorphism, as well as small size, are the rule in the extreme population from Paramillo uplands (Uspallata: 3000 m), facing Mendoza. A careful comparison of samples from that locality and the Pehuenche valley, easily demonstrates their striking similarity, except for the unmottled belly and the few preanal pores (1-3) of the Paramillo population. In short, unquestionable clinal trends exist in *L. elongatus elongatus*. The most evident clines, from south to north are a diminishing size, increasing minor differences between vertebral and lateral scales, increasing olive-brown or coppery ground color, a less distinctly ringed tail and a paler dorsal pattern of longitudinal dark stripes.

No geographical races could be segregated by usual morphological kinds of evidence. The latitudinally decreasing size may be illustrated by the following data. Head plus body length (mm), in males: 85-90 (2 specimens from Chubut-Rio Negro);  $70.81 \pm 1.19$ -90 (15 specimens from Neuquén);  $62.67 \pm 1.47$ -72 (7 specimens from Pehuenche valley, Mendoza);  $59.63 \pm 0.64$ -67 (14 specimens from Paramillo, Mendoza). The same measurements in females: 73-80  $\pm 1.75$ -86 (6 specimens from Chubut, Rio Negro);  $64.76 \pm 0.82$ -87 (35 specimens from Neuquén);

ments of male holotype (mm): head 18; body 63; tail 123; foreleg 27; hind leg 43.

**Coloration and pattern.**—Ground color grayish or pale brownish; three black, irregular, longitudinal stripes, one vertebral and two lateral, interconnected by irregular transverse dark bars; head speckled by minute black spots; limbs streaked; tail paler than body, with narrow black rings; belly grayish, unspotted.

**Geographical variation.**—Typical characters of the nominate form occur in somatic features and patterns of all observed populations from Chubut and Rio Negro. It is of interest that newborn or juvenile specimens of the nominate form (Fig. 4-3) present the transversal striped pattern shown by the adult specimens of *elongatus petrophilus*. The longitudinally black striped pattern is accentuated by a population from Añueque mountains, Rio Negro, lying at only 15 miles from a very different population of *elongatus petrophilus* from Calcatapul mountains, Chubut (Fig. 4-4,5). Populations from Neuquén, scattered between Limay River and the high Neuquén basin, do not deviate from the nominate form in somatic measurements and lepidosis. Black rings on the tail are very faint and dorsum and flanks turn up brightly spotted with whitish or bluish scales in some specimens. Melanism is often evident in populations from the dark basaltic ravines of volcanic landscapes of neighboring Zapala or Laguna Blanca lagoons. Intergradation of color and pattern is shown by samples from upper Neuquén, such as Ñorquin, Caicayén, or the Las Ovejas stream. Along with specimens similar to the Zapala samples, others occur of an olive brown color with a very narrow vertebral black stripe, conspicuous

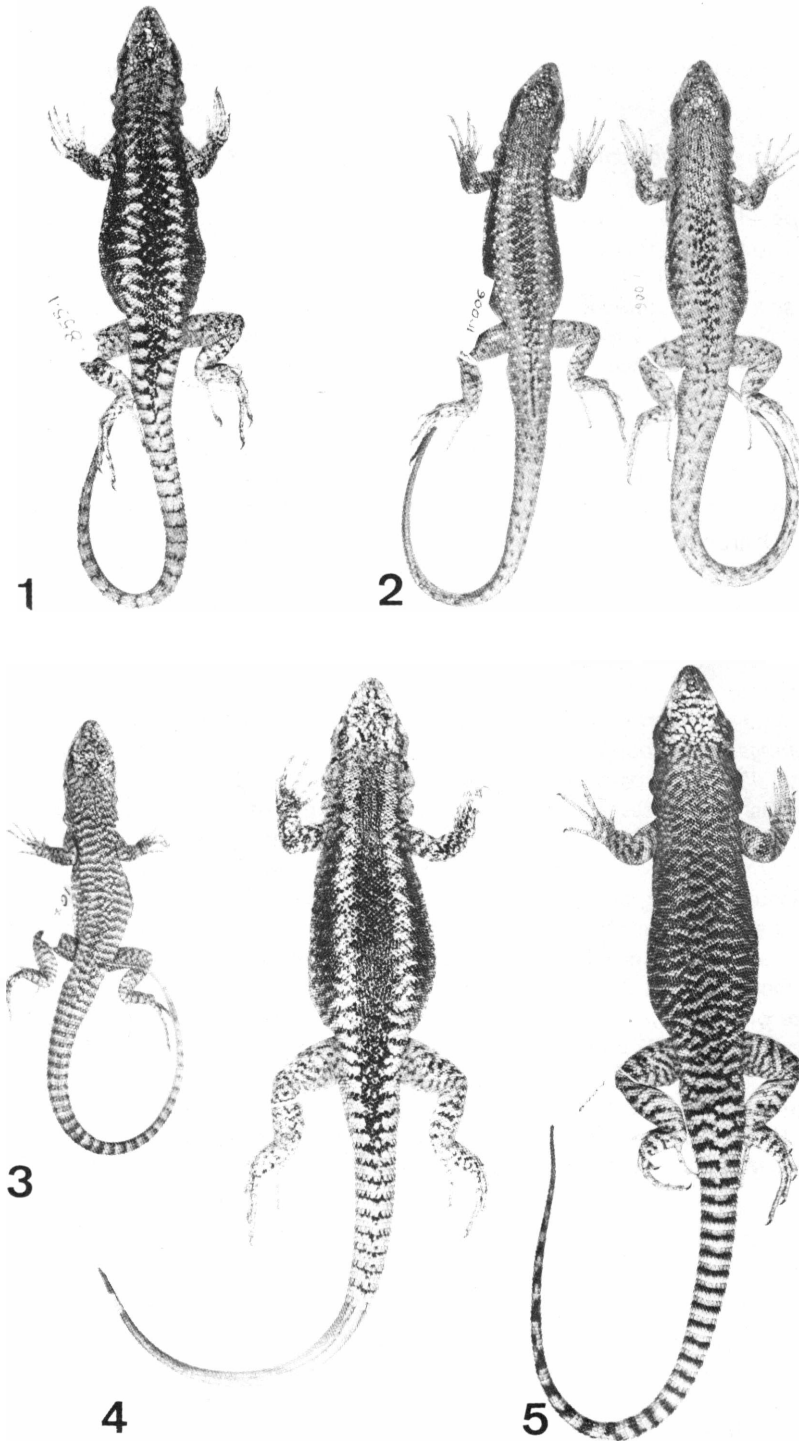


FIGURE 4. 1—*Liolaemus elongatus elongatus*, topotypic specimen from Costa, Chubut; 2—*L. elongatus elongatus* from Pehuenche valley, Mendoza; 3—juvenile specimen of *L. elongatus elongatus* from Piedra Aguila, Neuquén; 4—*L. elongatus elongatus* from Añueque Mt., Rio Negro; 5—*L. elongatus petrophilus* from Calcatapul Mt., Chubut. (Slightly reduced).

59-64  $\pm$  0.78-69 (13 specimens from Pehuenche valley, Mendoza); 56-59  $\pm$  0.65-64 (12 specimens from Paramillo, Mendoza). Average and standard error of each series are in italics. However, except for preanal pores, a moderate difference in size is the only apparent dimorphic sex-character of the species.

*Liolaemus elongatus petrophilus* Donoso B. and Cei

*Holotype*.—IBA-UNC 496-3, male, between Laguna Raimunda and Laguna Chara, Somuncurá Plateau, Rio Negro, 20 Dec. 1970, J. M. Cei.

*Paratypes*.—IBA-UNC 496,1,2,4,5, same locality.

*Other specimens studied*.—IBA-UNC 499,1-4, Laguna Raimunda, 1400 m, Somuncurá Plateau, Rio Negro, 17 Nov. 1968, J. M. Cei, L. P. Castro, N. P. Tuzi; 435,1, Laguna Raimunda, 1400 m, Somuncurá Plateau, Rio Negro, 20 Dec. 1967, J. M. Cei; 500,1-4, Miñuelo Lagoons, Somuncurá Plateau, 1400 m, Rio Negro, 17 Nov. 1968, J. M. Cei, L. P. Castro, N. P. Tuzi; 485, 1-3, near Cerro Corona, 1400 m, Somuncurá Plateau, Rio Negro, 16 Nov. 1968, J. M. Cei, L. P. Castro, N. P. Tuzi; 670,1, Cortaderas, 1100 m, Somuncurá Plateau, Rio Negro, 16 April 1970, J. M. Cei, L. P. Castro; 497,1, Cerro Merlo, 800 m, Somuncurá Plateau, Rio Negro, 17 Nov. 1968, J. M. Cei, L. P. Castro, N. P. Tuzi; 498,1, El Rincón, 600 m, Somuncurá Plateau, Rio Negro, 18 Nov. 1968, J. M. Cei, L. P. Castro, N. P. Tuzi. Other localities: IBA-UNC 456,1-3, Carri Lauquen Grande, 1000 m, 17 km Jacobaci, Rio Negro, 1 Jan. 1968, J. M. Cei; 840,1-7, Calcatapul mountains, 1200 m, 8 km NW Gastre, Chubut, 20 Jan. 1973, J. M. Cei, L. M. Cei, T. Ferreyra; 892,1, 55 km SW Gastre, 900 m, Chubut, 19 Jan. 1973, J. M. Cei, L. M. Cei, T. Ferreyra. In all 31 specimens (8 males, 16 females, 7 juveniles). All localities are plotted on the map (Fig. 1).

*Morphological remarks*.—In conformance with the original description (1971), differences between *L. elongatus petrophilus* and the nominate form are primarily the longer head and feet, and the dorsal "tigroid" pattern of transverse dark bars, without a vertebral black area (Fig. 4-5). Subspecific differences are not significant in number of scales around body (75-92) or in the lamellae under the fourth toe (28-32). The dorsolateral and dorsovertebral scales are somewhat dissimilar in *petrophilus*. The samples obtained from granitic ravines (Calcatapul hills), near Gastre, Chubut, possess a peculiar and brilliant yellow coloration. That population is far south of the topotypic area of the basaltic Somuncurá plateau (200 m), but in spite of its coloration no apparent morphological characters or lepidosis justify recognition of a distinct geographical race (Fig. 3 B,C).

The size of *L. elongatus petrophilus* is indicated by the following summary of average and individual variation: 81-87  $\pm$  0.25-100 (8 male specimens); 73-82  $\pm$  2.29-97 (16 female specimens).

No significant difference occurs in size of *L. elongatus petrophilus* and *L. elongatus elongatus* of Chubut and Rio Negro, but it does exist between *L. elongatus petrophilus* and *L. elongatus elongatus* populations from Neuquén and Mendoza.

*Liolaemus austromendocinus* sp.nov.

*Holotype*.—IBA-UNC 826-1, a male adult specimen, taken 20 Dec. 1972, 70 km South Nihuil dam, 1600 m, Mendoza, J. M. Cei, L. P. Castro, T. Ferreyra.

*Paratypes*.—IBA-UNC 826-2,3 two female adult specimens, same locality.

*Other specimens studied*.—IBA-UNC 251,1-3, Arroyo Hondo, S. Carlos, 1700 m, Mendoza, 12 Mar 1964, J. M. Cei, V. G. Roig; 895,1-4, Los Molles, South Sosneado, 1800 m, Mendoza, 20 April 1973, J. M. Cei, L. P. Castro; 480,1, El Nihuil dam, 900 m, Mendoza, 20 Sept. 1968, J. M. Cei; 502,1, El Nihuil dam, 1000 m, Mendoza, 20 Sept. 1968, J. M. Cei; 572,1-3, 4 km Cerro Negro, Nevado mountains, 2100 m, Mendoza, 8 Nov. 1969, J. M. Cei, C. Willaud; 828,1, Mina S. Cruz, near Agua Escondida, 1700 m, Mendoza, 18 Dec. 1972, J. M. Cei, L. P. Castro,

T. Ferreyra; 827,1-2, 1 km N Azufre, 1000 m, SE Mendoza province, 18 Dec. 1972, J. M. Cei, L. P. Castro, T. Ferreyra; 831,1, Salinillas, 1200 m, SE Mendoza province, 18 Dec. 1972, J. M. Cei, L. P. Castro, T. Ferreyra; 829,1-2, 5 km S Matancilla, 1000 m, SE Mendoza province, 18 Dec. 1972, J. M. Cei, L. P. Castro, T. Ferreyra; 830,1-5, Chachahuen mountains, 1500 m, Mendoza, 18 Dec. 1972, J. M. Cei, L. P. Castro, T. Ferreyra; 898,1, 60 km W Payún volcán, 1800 m, Mendoza, 5 Mar. 1973, C. V. Bottari, L. P. Castro; 872,1-9, 5 km Payún volcán, 2000 m, Mendoza, 5 Mar. 1973, C. V. Bottari, L. P. Castro; 728,1-12, 5 km Payún volcán, 2000 m, Mendoza, 5 Jan. 1971, L. P. Castro; 770,1-14, 5 km Payún volcán, 2000 m, Mendoza, 7 Dec. 1971, J. M. Cei, L. P. Castro, T. Ferreyra; 503,1, 10 km Payún volcán, 1900 m, Mendoza, 25 Oct. 1968, J. M. Cei, V. G. Roig; 871,1-5, Batra stream, 1800 m, Mendoza, 5 Mar. 1973, C. V. Bottari, L. P. Castro; 859,1-2, Zampal Bridge, Río Grande river, 1000 m, Mendoza, 5 Jan. 1973, J. M. Cei, L. M. Cei, T. Ferreyra; 863,1, near Bardas Blancas, 1300 m, Mendoza, 5 Jan. 1973, J. M. Cei, L. M. Cei, T. Ferreyra; 162,1, Calmuco stream, 1200 m, Mendoza, 10 Mar. 1962, J. M. Cei, V. G. Roig. In all 72 specimens (25 males, 32 females, 15 juveniles). All localities are plotted on the map (Fig. 1).

**Diagnosis.**—A large *Liolaemus* of the *elongatus* group, characterized by stout head and body, shorter hind limb, differences in shape and size of dorsal scales; without a definite dorsal pattern, with very diminute scattered, profuse irregular flecks (Fig. 5).

**Distribution.**—Southern Mendoza province, Argentina.

**Description.**—Head elongate, stout, longer than wide; tail more than one and one half times as long as head and body; adpressed limb reaching shoulder; upper head scales large, smooth; rostral three times as long as high; 2 large frontals; postfrontals slightly smaller than frontals; interparietal enlarged, smaller than parietals; 5 supraoculars; 7 supralabials and 6 infralabials; subocular expanded; a single series of scales between subocular and supralabials; mental subtriangular; two diverging rows of 5 postmentals; temporal scales weakly carinate; ear opening large, quadrangular, with 2-3 prominent scales on its anterior border. Sides of neck granular, with a V-shaped longitudinal fold and a moderate antehumeral fold. Dorsal scales imbricate, triangular, carinate; dorsolateral scales as wide as vertebral scales (Fig. 3,D); 76 scales around middle of the body; length of head corresponding to length of 23 dorsal scales; ventral scales smooth, rounded, slightly larger than dorsals; limb scales keeled; caudal scales as in *L. elongatus*, verticillate; 28

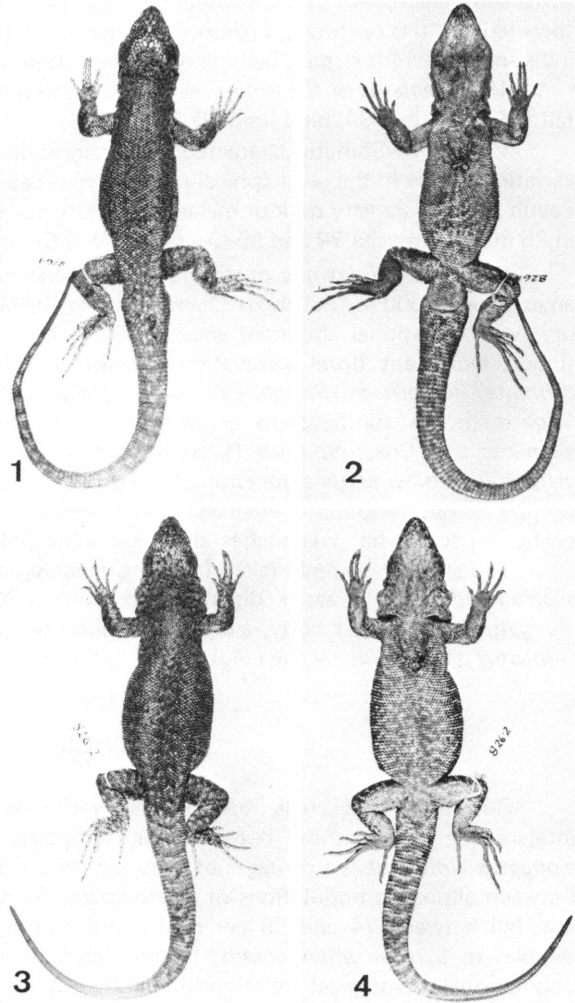


FIGURE 5. 1,2—Holotype of *Liolaemus austromendocinus*; 3,4—Paratype, female of *Liolaemus austromendocinus*. (Slightly reduced).

lamellae under fourth toe; 3 preanal pores. Ground color pale brownish without definite pattern, speckled with very small, profuse irregular brown spots; dark spots on limbs; tail ringed by indistinct brownish stripes; belly grayish, unspotted.

*Measurements of the holotype* (mm).—head length 21; head width 17; body (snout-vent) 85; tail 136; fore limb 34; hind limb 50.

*Variation*.—Somatic characters and coloration of paratypes are as in the holotype. Slight variation occurs in the geographical range of the species. Specimens from the basaltic ravines of the Payún plateau are very dark or melanic. The size varies between 79 and 98 mm (average  $90 \pm 1.00$ ) in 25 males, between 79 and 95 (average  $87 \pm 0.67$ ) in 32 females.

*Remarks*.—*Liolaemus austromendocinus* has an extensive range in semi-desert or volcanic areas above 1000 m, South of Diamante river, in Mendoza. Winters there are typically cold and dry, with occasional abundant snowfalls. The rainy season is in Summer, with irregular alluvial floods. Dominant floral associations consist of patagonian shrubs, such as *Mulinum*, *Ephedra ochreata*, *Berberis grevilleana*, etc., or stepparian flats with sparse vegetation made up of scattered *Stipa* turfs. In southeastern areas ecotonal associations are present, made up of patagonian elements and Creosote bush (*Larrea*) or other plants of the "Monte" formations. This stout viviparous *Liolaemus* is a voracious and aggressive lizard; its habitat preference which permits it to occupy a variety of arid environments is distinctive, in contrast with *L. elongatus elongatus*, preferring somewhat wet niches alongside subandean rocky streams.

The specific name is taken from the geographical distribution of the new iguanid. *Liolaemus austromendocinus* is easily distinguished from sympatric northern populations of *L. elongatus elongatus* by a stouter body, a different coloration, and size and shape of its dorsal scales; from *L. elongatus petrophilus* by the coloration and the absence of narrow vertebral scales.

## SEROLOGICAL RESULTS

Results of the cross reactions are reported in Table 1. They confirm the close but interspecific relationships between the sympatric taxa *Liolaemus austromendocinus* and *L. elongatus elongatus* (percentages of common precipitines ranging from 83 per cent to 86 per cent). Between allopatric populations of *L. elongatus elongatus* and *L. austromendocinus* cross-reactions also fall between 74 and 89 per cent. On the other hand precipitin reactions between different samples of *L. austromendocinus*, ranging from 91 to 96 per cent, stress a close intraspecific or populational serological relationship. Between the widespread populations of *L. elongatus elongatus* a noticeable serological variation may be noted. The neighboring samples from Sierra Añueque (*L. elongatus elongatus*) and Sierra Calcatapul (*L. elongatus petrophilus*) exhibit a very small serological difference (92-95 per cent), in spite of their striking morphological dissimilarity, although comparable to that of the Primeros Pinos population from Neuquén. On the contrary cross-reactions between extreme populations from Pehuenche Valley (Mendoza) and Gastre (Chubut) exhibit a striking serological difference, falling between 73 and 86 per cent, at a real interspecific level.

All precipitin tests carried out between the *elongatus* group antisera and antigens of different species of the iguanid genera *Liolaemus*, *Ctenoblepharis* and *Phymaturus*, ranging from 51 to 77 per cent, clearly suggest different evolutive and interspecific relationships.

## DISCUSSION

The *Liolaemus elongatus* complex forms a natural group of slender patagonian iguanids, inhabiting volcanic uplands or extending in andean valleys, between 1000 and 3000 m. They may be easily distinguished from other austral species groups of the genus, such as the *magellanicus*, *fitzingeri*, *kingi*, *boulengeri*, or *bibroni* groups, although the scarcity of information makes it difficult to ascertain the real biological or phylogenetic relationships of *L. elongatus* with the



TABLE 1. Crossed precipitin reactions between different populations of the *Liolaemus elongatus* group.

		1— <i>L. elongatus</i>	2— <i>L. elongatus</i>	3— <i>L. elongatus petrophilus</i>	5— <i>L. austromendocinus</i>	6— <i>L. austromendocinus</i>	7— <i>L. austromendocinus</i>
<i>L. e. elongatus</i>	1	100	—	73	86	—	85
<i>L. e. elongatus</i>	2	—	100	92	—	89	—
<i>L. e. petrophilus</i>	3	77	94	100	—	81	—
<i>L. e. elongatus</i>	4	—	95	—	—	—	—
<i>L. austromendocinus</i>	5	—	86	74	100	—	91
<i>L. austromendocinus</i>	6	—	87	79	—	100	—
<i>L. austromendocinus</i>	7	83	—	—	93	—	100
<i>L. austromendocinus</i>	8	—	—	—	—	96	—
<i>L. fitzingeri</i>	9	71	—	—	—	—	—
<i>L. boulengeri</i>	10	—	—	—	63	—	—
<i>L. rothi</i>	11	—	—	51	—	77	—
<i>L. tenuis</i>	12	—	66	60	—	—	—
<i>L. ceii</i>	13	—	74	70	—	—	—
<i>L. bibroni</i>	14	—	—	—	—	76	—
<i>Ctenoblepharis donosobarrosi</i>	15	—	—	—	—	74	—
<i>Phymaturus palluma</i>	16	54	—	—	53	—	—

Localities of the samples of antigens and antisera: 1—Pehuenche Valley, Mendoza; 2—Añueque Mt., Rio Negro; 3—Calcatapul Mt., Gastre, Chubut; 4—Primeros Pinos plateau, Neuquén; 5—Batra Stream, Mendoza; 6—Chachahuen Mt., Mendoza; 7—Payún Volcan, Mendoza; 8—South Nihuil dam, Mendoza; 9—Canquel plateau, 1000 m, Chubut; 10—Matancilla flats, Mendoza; 11—Añueque Mt., Rio Negro; 12—Primeros Pinos plateau, Neuquén; 13—Primeros Pinos plateau, Neuquén; 14—Mina Ethel uplands, 1600 m, Mendoza; 15—Matancilla flats, Mendoza; 16—Payún Volcan, 2000 m, Mendoza.

nearby chilean form *L. buergeri* Werner (1907) and with the sympatric *L. kriegi* complex. In consideration of *L. kriegi*, Müller and Hellmich's statement (1939) must be considered. According to these authors, even if the two taxa are clearly differentiated, a close relationship could be hypothesized on the basis of their widely overlapping area of distribution, in the Neuquén-Rio Negro territories. That conclusion is in agreement with our recent data (Ceí, 1972) concerning precipitating cross-reactions between populational units of both species. Although differences in albumin-globulin systems distinguish *L. elongatus* and *L. kriegi* at the specific level, ranging from 64 to 84 per cent, the wide populational variation of antigens in the both groups, ranging from 81 to 97 per cent in *elongatus* populations, from 82 to 94 per cent in *kriegi* populations, seems also to suggest a common speciation process, and a recent or active genetic divergence from some parental genetic backgrounds. But an increasing genetic divergence of *L. elongatus-kriegi* from all the above mentioned different patagonian groups of *Liolaemus* is serologically indicated by my former and present results, the precipitin cross-reactions ranging from 56 to 78 per cent (Ceí, 1972), and from 51 to 77 per cent (cf. Table I).

Comparison of our data in Figs. 1 and 2 reveals that the *L. elongatus* complex is limited northward and southward by the floristic "Monte" or "Creosote bush" formations. Patagonian climate and biocenosis are thus the prevalent environmental features over its own geographic range. In spite of such a remarkable spread the analysis of morphological characters of the three taxa here reported points out their structural homogeneity. Significant differences are mainly limited to size variation, shape and distribution of dorsal scales, hind limb length, and color pattern. No geographical or ecological barriers seem to break down the fundamental specific constitution of the nominate form, *L. elongatus elongatus*. Clinal tendencies are unmistakable from Chubut to Mendoza uplands. No evidence of isolating mechanisms in peripheral populations could be demonstrated at this stage of our taxonomic researches. Clines are specially evident from Chubut-Rio Negro to Mendoza by diminishing size and the paler black striped pattern of the

dorsum. *Liolaemus elongatus petrophilus* occurs in the western basaltic Somuncurá plateau, Rio Negro, a late Tertiary isolated region, remarkable for its endemism, probably in accordance with the volcanic unlifting of its central highlands and the harsh specialized environments. A probable subsequent westward and southwestward penetration of such peripheral isolates may be argued by collected samples from Carrilauquen lake and Calcatapul mountains (Chubut). In both cases the probable ancient interruption of the geographic range is now critically reduced, because of the moderate distance between localities of the nominate form and *elongatus petrophilus*. But the close serological relationships between the Añeque mountains population of *elongatus elongatus*, and the Calcatapul mountains population of *elongatus petrophilus* (92-94 per cent) may suggest a lack of genotypic differentiation at least for some of their biochemical systems, as proteins of the sera. That fact is in accordance with the subspecific status assigned, bearing in mind their allopatric occurrence.

The morphological features that distinguish *Liolaemus austromendocinus* from *L. elongatus elongatus*, in Mendoza province, are strengthened, on the other hand, by their constantly greater serological difference, with precipitin cross-reactions ranging from 83 to 86 per cent between *austromendocinus* and *elongatus elongatus* sympatric populations of Mendoza, and from 74 to 89 percent between *austromendocinus* and patagonian allopatric population of *elongatus elongatus* or *elongatus petrophilus*. Sympatry between the eastern stout form *austromendocinus* and the small western representative of *elongatus elongatus* is clearly indicated in Fig. 2. Lack of intermediate or "hybrid" individuals seems to be attributable to a definitive acquisition of reproductive isolation between the two related species. Dominance of *austromendocinus* in the southeastern arid landscape of Mendoza, South of Diamante river, and the prevalent western distribution of *elongatus elongatus*, above 1500 m, may suggest a prolonged period of geographic isolation. The dramatic volcanic activity of the Payún uplands during the late Tertiary and Pleistocenic times would have contributed to the topographic segregation of some parental populations of the *elongatus* stock. The acceleration of genetic changes and development of isolating mechanisms could have been carried out before later breakdown of the geographic barriers. The percent expansion of *austromendocinus* and its sympatry with the scattered, scarce populations of *elongatus elongatus*, east of the Rio Grande river, represents a further range extension of an adaptive or highly competitive form. Absence of interbreeding is however the natural expression of physiological genetic divergences, probably not perfected, for example, between the southern populations of the widespread nominate form and *elongatus petrophilus*.

Serological divergences between extreme samples of *L. elongatus*, such as in the case of the cross-reactions between Pehuenche and Calcatapul mountains populations, must be considered only in terms of genetic variation, under different ecological selection pressures. Continuous effects of gene flow may be expected to be nonexistent at the extremes of populational genetic divergence. Therefore the results of different gene arrangements in very distant populations and their physiological consequences would not properly be expressed in such a conventional taxonomic system as the specific or subspecific status of the whole *Liolaemus elongatus* complex. That classical example of the temperature races of *Rana pipiens* given by Moore (1946, 1957) may be pointed out, to emphasize the great difficulty in establishing the so-called "species border", except through an extremely accurate morphological and physiological approach.

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