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## *Liolaemus jamesi* (Boulenger, 1891): restriction of the type locality and holotype characterization (Squamata: Liolaemidae)

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*Liolaemus* is one of the most diverse genus of lizards in the world (Esquerré *et al.* 2013), with 257 species listed in the last review focusing on its diversity (Abdala & Quinteros 2014). Certain species within this genus, especially the earlier ones, were described in very little detail, even lacking an appropriate description of the holotype and/or type locality. This has created uncertainties in the taxonomic identity of several *Liolaemus* species (Espinoza *et al.* 2011; Quinteros *et al.* 2008; Troncoso-Palacios & Garin 2013; Langstroth 2011).

*Liolaemus jamesi* (Boulenger, 1891) belongs to the *L. montanus* group of the *Eulaemus* subgenus (Aguilar-Puntriano *et al.* 2018; Lobo *et al.* 2010) and is believed by some authors to be widely distributed in northern Chile (e.g., Pincheira-Donoso & Núñez 2005). However, its taxonomic history is among one of the most confusing issues in the family Liolaemidae. It was given a single page description by Boulenger (1891), as *Ctenoblepharis jamesi* from the “Province of Tarapaca, Chili, at an altitude of 10,000 to 12,000 feet” (3050-3660 m), which is a quite imprecise type locality. The description is based on a single male specimen collected by Ambrose A. Lane in 1890, currently deposited in the Natural History Museum, London (NHMUK 1946.8.12.39). We point out that in 1890, the Tarapacá Province included the territories that currently belong to the Tarapacá Region of Chile, but in 1929 was expanded to include the territories that currently belong to the Arica-Parinacota Region of Chile, being subsequently split again in 2007.

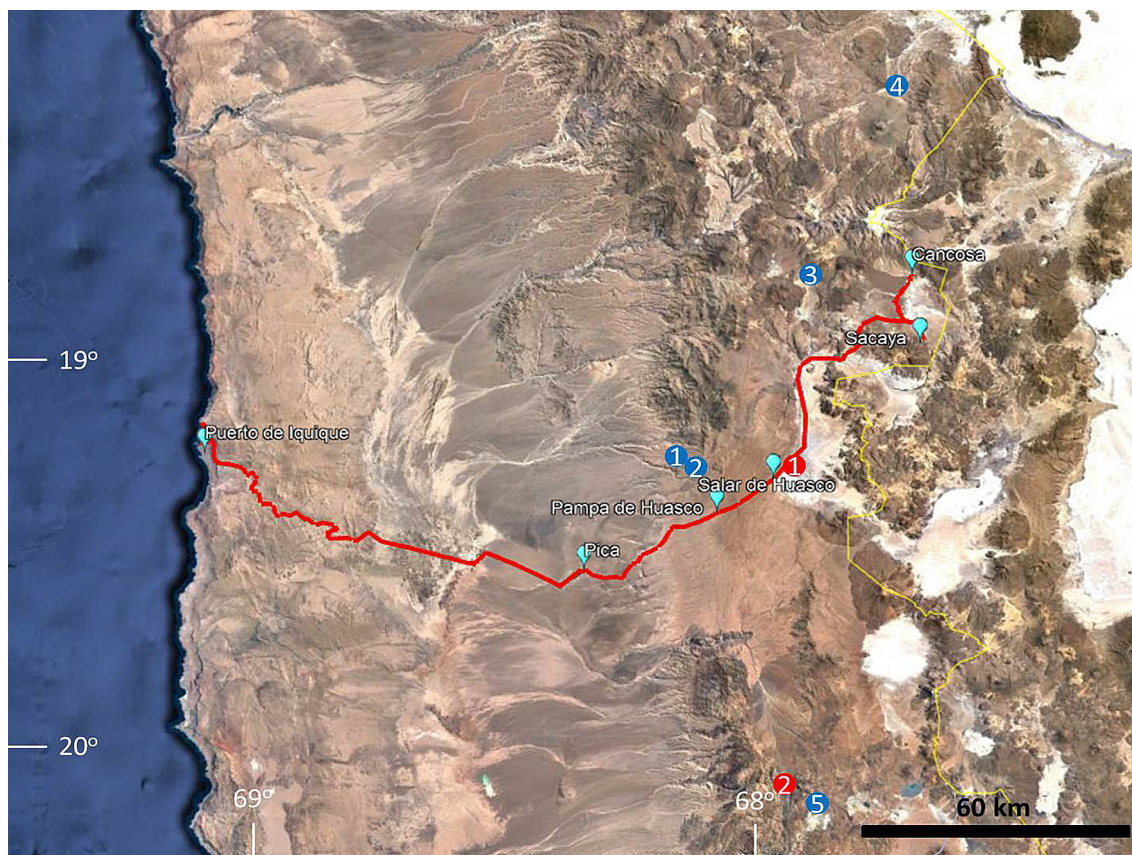
Donoso-Barros (1958) characterized *Ctenoblepharis jamesi* based on several specimens from northern Chile: Parinacota, Chapiquiña, Ticomar (Tignamar) and Putre, localities from the Arica-Parinacota Region from Chile. However, none of these specimens came from within the limits of the Tarapacá Province as of 1890. Cei (1979) reassigned this species to *Liolaemus*, but Núñez and Yáñez (1984) included it in *Velosaura*. Finally, Etheridge (1995) stated that *Velosaura* is a junior synonym of *Liolaemus*, incorporating *L. jamesi* in it. However, most of the published studies dealing with *L. jamesi* are based on specimens from the Arica-Parinacota Region (Quinteros *et al.* 2008; Veloso *et al.* 1982), few records are known from the present-day Tarapacá Region. Moreno *et al.* (2001) provided one record from the Tarapacá Region, Laguna del Huasco (Salar de Huasco, missing elevation data), and Pincheira-Donoso and Garin (2003) added a record from Quebrada Copaquiri at 3850 masl.

Troncoso-Palacios (2014) in the Fifth Chilean Herpetology Congress proposed a restriction to the type locality for *Liolaemus jamesi*, based on the field notes of Ambrose A. Lane (Lane & Sclater 1897) and provided details of the features of the holotype, but without a supporting voucher specimen, this was not published. Here we provide the formal publication of this previous proposal and add geographical data from several voucher specimens.

We examined the *Liolaemus jamesi* holotype (NHMUK 1946.8.12.39) and 20 additional specimens from the Tarapacá Region (Appendix I). The characteristics for scalation were taken according to Etheridge (1995), Lobo (2005) and Quinteros *et al.* (2008). The lateral head scalation was taken from the left side. Historical data on the *L. jamesi* type locality was taken from published field notes of the Ambrose A. Lane field trip (Lane & Sclater 1897); the elevation and locality coordinates were estimated using Google Earth.

In regards to the type locality, according to Lane and Sclater (1897, p. 10) the journey of Lane in the Tarapacá Province began at Iquique Port (20°13' S – 70°08' W, 30 masl) and then he travelled by the following trajectory outward and by way of return (Fig. 1): Pica (20°28' S – 69°18' W, 1300 masl), Pampa de Huasco (20°21' S – 69°01' W, 4000 masl), Laguna

(Salar) de Huasco (20°17'S – 68°54'W, 3900 masl), Pampa de Sacaya (20°00'S – 68°35'W, 4300 masl) and Cancosa (19°51'S – 68°36'W, 3950 m). Neither Boulenger (1891) nor Lane and Sclater (1897) stated the specific location from which the holotype *L. jamesi* was collected and there had been no new records of this species recorded from this area for more than 100 years.



**FIGURE 1.** Map of the Lane's journey by Tarapacá province and records of *L. jamesi*. Main localities are indicated with sky-blue gloves. Previous *L. jamesi* records in the ancient Tarapacá province are in red: 1 = Salar de Huasco (3900 masl) and 2 = Copaquiri (3850 masl). New records are in blue: 1 = Altos de Pica (3545 masl), 2 = Altos de Pica (3800 masl), 3 = Lirima (4100 masl), 4 = Cariquima (3800 masl) and 5 = Quebrada Blanca (4300 masl).

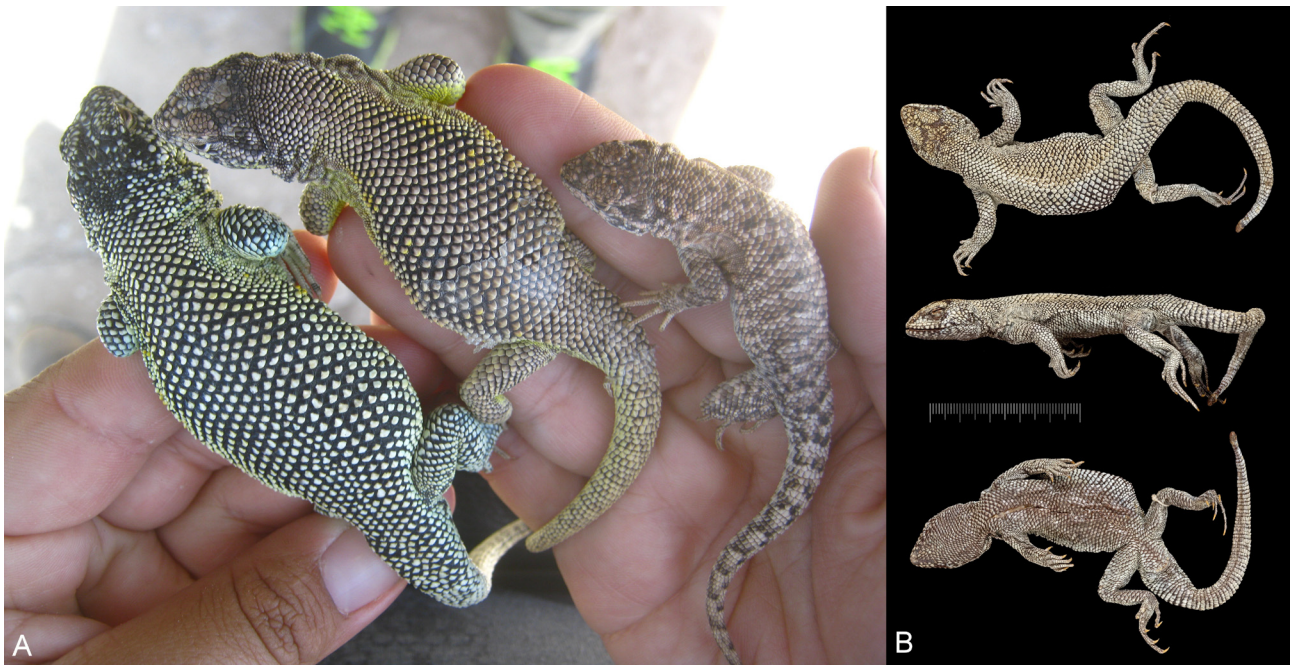
In fact, the first and only mention of *L. jamesi* specimens collected from this area is the record from Salar del Huasco (Moreno *et al.* 2001), which is at 3900 masl, Boulenger (1891) did however estimate the altitude in which the holotype was collected at 3050-3660 masl. Ruiz De Gamboa and Ortiz (2016) reviewed specimens of *L. jamesi* from all known distributions, among them one voucher specimen from Altos de Pica (20°17'S – 69°05'W, 3545 masl), road to Salar del Huasco, which matched Boulenger's (1891) altitude range. Moreover, we collected specimens of *L. jamesi* (MUAP 122–24, Fig. 2) at 17 km W from Laguna del Huasco at 3800 masl (20°17'S – 69°03'W). Hence, we are certain that this species occurs in this region at higher elevations.

We propose a restriction of the type locality of *L. jamesi* to: road to Salar del Huasco, between 3545 and 3660 masl, Tarapacá Region, Chile, because 1) this transect was explored by the holotype collector Ambrose A. Lane; 2) the other places visited by Lane are out of the elevation range provided by Boulenger (1891); 3) There are records of this species from the Tarapacá Region in Salar del Huasco (Moreno *et al.* 2001) and the road to this place (Ruiz De Gamboa and Ortiz, 2016); and 4) we found specimens at this altitude range matching with the data provided by Boulenger (1891).

In regards to the holotype (Fig. 2), the measurements and scalation according to Boulenger (1891) are: Adult male. SVL: 100 mm. Tail length (end lost): 90 mm. Head length: 23 mm. Head width: 20 mm. Forelimb length: 47 mm. Hindlimb length: 66 mm. Midbody scales: 52.

The features observed from digital photographs are as follows: Two postrostrals. Two internasals. Hexagonal interparietal scale, with a central, small, and opaque "parietal eye" in the center. The interparietal scale is smaller than the parietals and is surrounded by seven scales. Ten scales between the interparietal scale and the rostral scale. Twenty one scales between the occiput and the rostral. Orbital semicircle incomplete on the right side and formed by 16 scales on the

left side; nine supraoculars (enlarged) on right side and seven on the left side; seven supercilliaris. Frontal divided into five scales (1–1–1–2, anterior to posterior). Two scales between the nasal and the canthal. Unfragmented preocular, separated from supralabials by one row of lorilabials. The nasal is separated from the rostral by one scale and is surrounded by seven scales. There is one row of lorilabials between the supralabials and the subocular. There are nine supralabials and seven infralabial scales. The mental shape is irregular. There are five pairs of postmental shields; but the first postmental scale on the right side is not discernible. Temporal scales are juxtaposed, smooth and with some interstitial granules. There are nine temporal scales between the level of the supercilliaris and commissure of the mouth. There are two small scales slightly projected to the auditory meatus, which do not cover it. The auricular scale is not differentiated. There is a well-developed “Y” shaped lateral neck fold, well-developed antehumeral fold and dorso-lateral fold. No gular fold. Dorsal scales are rounded, subimbricate, smooth or slightly keeled, with interstitial granules. The interstitial granules are more abundant on the flanks. Dorsal scales are larger than the ventrals. Dorsal scales: 45, 46 according to Boulenger (1891). Ventral scales are rounded to rhomboidal, smooth, imbricated, with some interstitial granules. Ventral scales: 88. There are six precloacal pores. There is a ventral incision, probably for organ examination, running from the chest to the midpoint of the belly. Suprafemoral and infra-femoral scales are rounded, imbricate, and smooth. Supraantibrachials scales are rounded, imbricate, and smooth. Infraantibrachials scales are rounded, imbricate, and smooth to conical towards the axilla. The dorsal scales of the tail are rounded, subimbricate, weakly keeled, with interstitial granules. The ventral scales of the tail vary from rounded to rhomboidal or triangular, and are imbricate and smooth. Lamellae of fourth finger 23 and lamellae of fourth toe 29 (right hand).



**FIGURE 2.** Specimens of *L. jamesi*. A) Collected in Altos de Pica, near Salar del Huasco. From left to right: male (MUAP 124), female (MUAP 123) and juvenile (MUAP 122). B) Holotype (NHMUK 1946.8.12.39, Photographs © The Trustees of the Natural History Museum, London).

Light brown head, with dark brown spots on the snout, occipital and circumorbital zones. The loreal and temporal zones are light grey. The anterior and middle zones of the subocular scale are grey, but there is a dark brown vertical stripe running from the eighth supralabial to the postocular scale (passing over the posterior zone of the subocular). The dorsal colour is light brown on the right hand side and grey on the left hand side (by deterioration). Some dorsal scales have black spots on the anterior border and there is a black coloured space between the dorsal scales. The keel on the dorsal scales (when it is present) is not black spotted. The flanks are light grey, with a black in between the scales. The dorsal surface of the limbs and the dorsal surface of the tail are both light grey, with black in between the scales. Some scales on the tail (especially in the middle of the tail) is brown shaded in colour. The tip of the tail is brown. The throat, chest and belly are dark brown, with a few light grey scales dispersed. The ventral surface of the hind limbs is light grey in colour with some brown spots. The cloaca is light grey with dark brown in the middle. Precloacal pores are orange. The ventral surface of the tail is light grey with some dark brown spots and a complete dark brown vertebral stripe.

While it is not possible determine the exact type locality, this has also been the case for many other old descriptions of *Liolaemus* and other South American lizards, the reason being because the descriptions commonly tended to be

incomplete or imprecise. Recent publications have been successful in restricting the type locality of some poorly known southernmost South American lizards to bounded geographical ranges, based on the historical data of the field notes, with the goal of producing characterizations and delimitations of the species and their ranges (Lobo & Etheridge 2013; Quinteros *et al.* 2008; Troncoso-Palacios & Garin 2013; Troncoso-Palacios *et al.* 2013; Troncoso-Palacios 2018). In this case, the restriction of the type locality of *L. jamesi* will allow determination of further morphological and molecular characterization of this taxon, such that it can be compared to species which show some morphological similarity, especially with the taxa previously considered to be subspecies of *L. jamesi* or currently considered synonyms of it: *L. aymararum* Veloso, Sallaberry, Navarro, Iturra, Valencia, Penna & Díaz, 1982, considered to be a junior synonym of *L. jamesi* by Pincheira-Donoso and Núñez (2005) and *L. jamesi pachecoi* Laurent, 1995, later raised to full species by Langstroth (2011). Moreover, Langstroth (2011), based on the mtDNA data by Schulte and Moreno-Roark (2010), pointed out that mtDNA divergence between *L. aymararum* and *L. pachecoi* is enough to recognize both as full species. Furthermore, a recent mt + nuclear DNA phylogeny (Aguilar-Puntriano *et al.* 2018) found that *L. jamesi* is neither the sister species of *L. aymararum* nor *L. pachecoi*. We hope that our proposed restriction of the type locality of *L. jamesi* and the characterization of additional material from its vicinity will facilitate further research on these issues.

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**APPENDIX I.** Specimens reviewed. Acronyms are: British Museum of Natural History (BMNH), Museo Nacional de Historia Natural de Chile (MNHCL), Museo del Mar de la Universidad Arturo Prat (MUAP) and Museo de Zoología de la Universidad de Concepción (MZUC).

*Liolaemus jamesi*. NHMUK 1946.8.12.39, holotype. Tarapacá Province, Chile, 10,000–12,000 feet; here restricted to road to Salar del Huasco, Tarapacá Region, Chile. MNHNCL 2612–14. Copaquiri (20°55'S – 68°52'W, 3850 masl), Tarapacá Region, Chile. MUAP 122–24. Camino a Salar del Huasco, Altos de Pica (20°17'S – 69°03'W, 3800 masl), Tarapacá Region, Chile. MZUC 23318–22. Lirima (19°52'S – 68°49'W, 4100 masl), Colchane, Tarapacá Region, Chile. MZUC 23326–27. Cariquima (19°28'S – 68°38'W, 3800 masl), Tarapacá Region, Chile. MZUC 33460. Camino a Salar del Huasco, Altos de Pica (20°17'S – 69°05'W, 3545 masl), Tarapacá Region, Chile. MZUC 33480, 33483–87. Quebrada Blanca (20°58'S – 68°48'W, 4300 masl), Tarapacá Region, Chile.