

An accumulation of bone remains of two *Liolaemus* species (Iguanidae) in an Holocene archaeological site of the Argentine Puna

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Abstract. An accumulation of iguanian bone remains was found inside a rodent burrow in an Holocene archaeological site of the Argentine southern Puna. Characters of the preserved bones suggest that a minimum of two species of the *Liolaemus* genus is represented. One of them is undoubtedly attributed to the *montanus* group, probably *L. poecilochromus* or *L. andinus*. The finding of *Liolaemus* bone remains in the Argentine Puna Region represents the first record of this genus in an archaeological site of South America and suggests that specimens of at least two *Liolaemus* species exploited the same refuge simultaneously, including both adult and juvenile individuals.

Reptile remains found in archaeological sites are relevant for understanding the relationship between indigenous groups and their environment as well as to interpret the taphonomy of microvertebrate fossil assemblages. The findings of small iguanids in South American archaeological sites are still scarce. For Argentina, Van Devender (1977) describes an isolated dentary belonging to the iguanid *Leiosaurus belli* (Gruta del Indio cave, eastern slopes of the Andes), whereas Mengoni Goñalons and Silveira (1976) mention the presence of indeterminate iguanids in Cueva de las Manos, Patagonian region.

Alero 12 is a rockshelter located at 3980 m asl in the Puna Region, Tinogasta Department, Catamarca Province, Argentina (68°07'W and 26°55'S). This archaeological site stands out by the presence of an unusual abundance of lizard bone remains (99.2% of the total microfaunal assemblage) found in an excavated surface of 4 m² (Kligmann et al., 1999). The only radiocarbon date available for the site (590 ± 45 BP, LP-880) comes from the same stratigraphic

layer where the microvertebrates were found (Kligmann et al., 1999). These remains, that according to the number of preserved right dentaries belong to at least 71 individuals (Kligmann et al., 1999), were concentrated in a surface smaller than 1 m² on the SW sector of the excavation. A rodent burrow, probably corresponding to *Ctenomys*, was observed in the same area.

Kligmann et al. (1999) preliminarily assigned the whole assemblage to the iguanid of the genus *Liolaemus*; however, they did not provide any unambiguous synapomorphy to support this assignation. They offered neither comparisons nor illustrations of the specimens. The aim of this note is to discuss the generic and species-group level systematic position of the lizard remains found at Alero 12.

The methodology followed for sample collection in the field and during sample analysis in the laboratory is explained in Kligmann et al. (1999). Stereoscopic microscope and camera lucida were used for the descriptions and illustrations presented in this note.

Skeletal materials used for fossil identification are listed in the Appendix. The systematic arrangement follows Schulte et al. (2003). An asterisk denotes a metataxon. The abbreviations used are: HAA, private herpetological collection of Adriana Albino; MCN, Museo de Ciencias Naturales, Universidad Nacional de Salta; SA-ICA/Ca, Sección Arqueología, Instituto de Ciencias Antropológicas, Facultad de Filosofía y Letras, Universidad de Buenos Aires.

The studied sample (SA-ICA/Ca 01) consists of 13 parietals, one pterygoid, 21 frontals, 33 jugals, one osteoderm, 19 quadrates, one braincase remain, 11 premaxillae, 80 maxillae, 151 dentaries, 39 mandible fragments, 428 ver-

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tebrae, 27 coracoids, 53 pelvic girdles, 848 long bones, six metatarsals and one phalanx.

The systematic position of the lizard remains from Alero 12 is the following:

Iguania Cope, 1864

Iguanidae Boulenger, 1885

Tropidurinae* Bell, 1843

Liolaemini Frost and Etheridge, 1989

Liolaemus Wiegmann, 1834

Most remains belong to mature individuals, although juvenile specimens are also present (Kligmann et al., 1999). The assignment of the specimens to the Liolaemini is based on the following combination of character states (Estes et al., 1988; Frost and Etheridge, 1989) (fig. 1): skull roof bones not strongly rugose; frontals fused and constricted between the orbits; trapezoidal parietal roof; pleurodont dentary and maxillary teeth, not fused to the underlying bones; dentaries not expanded onto the labial face of the coronoids; open Meckel's groove; well-developed labial blade of the coronoid; splenial extended anteriorly more than 1/6 of the tooth row length on the dentaries; transverse processes anterior to the caudal autotomy fracture planes and presence of a posterior coracoid fenestra. A posterior extension of the dentary to the level of the coronoid's superior apex is established in most remains (fig. 1B, C). This is a *Liolaemus* synapomorphy (Etheridge, 1995).

Liolaemus is the richest lizard genus in South America including more than 160 described species (Schulte et al., 2000). It ranges from the high Andean mountains of Peru and Bolivia in the north to northern Tierra del Fuego Island in the south, and from the Pacific beaches in the west to the sandy Atlantic beaches of Argentina, Uruguay, and Brazil in the east (Donoso Barros, 1966; Cei, 1993). The earliest fossil record of this genus comes from the early Miocene of Patagonia (Albino, unpublished data). It has also been recognized in the late Pleistocene-early Holocene of the Pampean Region (Albino, 2005). The finding of *Liolaemus* bone remains in the Argentine Puna Region represents the

first record of this genus in a South American archaeological site.

In some of the dentaries of Alero 12 the *Liolaemus* synapomorphy cannot be observed because the posterior part is either broken or of doubtful extension (fig. 1F). These dentaries bear an open Meckel's groove and flared and deeply cuspidate teeth as in some *Liolaemus* (Etheridge, 2000; Albino, unpublished data) and *Phymaturus* species (Etheridge, 1995). *P. antofagastensis* currently lives in Tinogasta Department, at 4000 m asl (Cei, 1993). As these remains are of uncertain generic filiation, they may belong to either a *Liolaemus* species or *Phymaturus* cf. *P. antofagastensis*.

Within the dentary remains undoubtedly assigned to *Liolaemus*, the open Meckel's grooves (fig. 1B, C) exclude them from the *chiliensis* group (Etheridge, 1995; Lobo, 2001). Among these dentaries, two typologies in the posterior teeth as well as in fragmentary maxillae have been recognized.

Typology 1. Tricuspidate, parallel tooth crown sides, central main cusp and moderate lateral cusps framed by short grooves (fig. 1B, Da). Most of the complete dentaries have this tooth typology.

Typology 2. Deeply tricuspidate, flared tooth crown sides, central main cusp and strongly defined lateral cusps framed by long and clear-cut grooves (fig. 1C, Db).

Montanucci (1968), who noted ontogenetic differences in the dentition of the iguanid lizard *Ctenosaura similis*, gave a possible explanation for this variation. In young animals, the teeth are highly cuspidate and occur more anteriorly along the tooth row than in older lizards. Nevertheless, ontogenetic variation in the *Liolaemus* tooth morphology has not been reported. Interspecific differences in the degree of cusp development were found to be statistically significant in the *Uma* genus (Zalusky et al., 1980). Among the species of the genus *Liolaemus*, the tooth morphology shows a great degree of interspecific variation (Albino, unpublished data), although they are not largely doc-

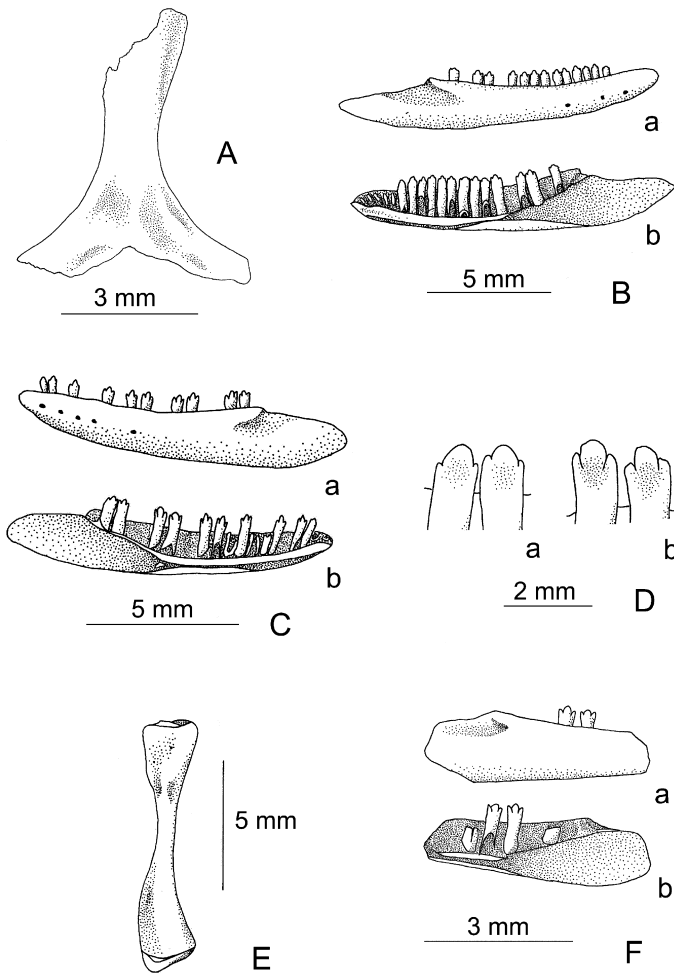


Figure 1. A, frontal in dorsal view; B, right dentary in labial (a) and lingual (b) views; C, left dentary in labial (a) and lingual (b) views; D, tooth typology 1 (a) and 2 (b); E, left tibia attributed to the *montanus* group in dorsal view; F, *Liolaemus* sp. or *Phymaturus* cf. *antofagastensis*, right dentary in labial (a) and lingual (b) views.

umented (Etheridge, 2000; Lobo and Abdala, 2001). Since the size of the dentaries with both tooth typology 1 and 2 is similar, thus ruling out age considerations, the presence of more than one species belonging to the *Liolaemus* genus is established.

All preserved tibiae have a posterior distal bladeli-like process (fig. 1E) (Keller and Krause, 1986), a synapomorphy of the *montanus* group (Etheridge, 1995). Hence, at least one of the species would belong to this group.

The fact that the radiocarbon date available for the archaeological site is very recent makes the absence of modifications in the taxa distrib-

ution quite likely. Therefore, it is highly probable that the *Liolaemus* species found in Alero 12 still live in the Puna of Tinogasta Department, at altitudes higher than 3500 m asl. The species of the *montanus* group (sensu Etheridge, 1995) that are distributed in the area of Alero 12 are *L. dorbignyi*, *L. poecilochromus* and *L. andinus* (Ceï, 1993). The size of the dentaries of the specimens recovered from Alero 12 is significantly smaller than that of the specimens of *L. dorbignyi*, while it is compatible with that of both *L. poecilochromus* and *L. andinus* species. The tooth typology 1 described for the dentaries of Alero 12 is shown by the teeth of *L. poe-*

cilochromus. The lack of available osteological material of *L. andinus* prevents a comparison with this species.

Kligmann et al. (1999) provided enough evidence to support that the lizards' death occurred simultaneously inside a rodent burrow and that a high concentration of individuals were accumulated in a small surface. In some iguanian species living in the Argentine and Chilean Puna, the use of rodent burrows as shelter has been recorded (Donoso Barros, 1966; Cei, 1993; Etheridge, 1993). In particular, *L. ornatus* and *L. multicolor*, two common lizards in high altitude sites, exploit sandy soils where there are abundant rodent burrows that both species share to protect themselves from predators (Etheridge, 1993). This supports the possibility for the use of the Alero 12 burrows by two lizard species, although this assumption cannot be supported by observational evidence because it has not still been reported in *L. poecilochromus* nor *L. andinus*. The high concentration of individuals suggests an aggregational behaviour, probably during hibernation.

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Appendix

Comparative specimens

Liolaemus argentinus: HAA 37 to 47; *L. bibroni*: HAA 53 to 55; *L. boulengeri*: HAA 76, HAA 86-87, HAA 95-97, HAA 102, HAA 107 to 109; *L. darwini*: HAA 88-89; *L. dorbignyi*: MCN 272 to 274; *L. elongatus*: HAA 33 to 36, HAA 48 to 52, HAA 56; *L. gracilis*: HAA 80, HAA 101; *L. grosseorum*: MCN 508-509; *L. lineomaculatus*: HAA 79; *L. melanopus*: HAA 98 to 100; *L. multimaculatus*: HAA 71

to 73, HAA 75, HAA 90-91; *L. ornatus*: MCN 773-775; *L. petrophilus*: HAA 84, HAA 112; *L. poecilochromus*: MCN 249-250, MCN 280; *L. rothi*: HAA 81; *L. somuncurae*: HAA 82; *L. wiegmanni*: HAA 74, HAA 104 to 106; *Phymaturus somuncurensis*: HAA 77, HAA 111.

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