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A monographic catalogue on the systematics and phylogeny of the South American iguanian lizard family Liolaemidae (Squamata, Iguania)

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Abstract

Iguanian lizards comprise two of the most species-rich vertebrate genera on Earth (*Anolis* and *Liolaemus*). Therefore, studies with the aim of understanding their diversity and phylogenetic relationships may have major significance for ecological and evolutionary research. However, difficulties are often associated with these diverse groups. For example, adaptive radiations may lead to the evolution of conspicuous patterns of intraspecific (interpopulational) variation in response to local environmental conditions, in the absence of real speciation events. This can lead to the taxonomic recognition of new species in the absence of true reproductive isolation. In addition, although diverse taxa are appropriate models to evaluate comparatively the effects of selection on ecological and life-history traits, it is often a major challenge to gather all the available information on the distribution of these characteristics across species. This necessitates the development of synthetic works. Here we present a monographic catalogue of the diversity and phylogenetic structure of the entire South American iguanian family Liolaemidae, based on previously published studies. We also provide a complete table to summarize the distribution by country, elevational range, diet and reproductive mode of each species for which this information is available. The Liolaemidae family currently consists of a total of 229 species and subspecies belonging to the genera *Ctenoblepharys*, *Liolaemus* and *Phymaturus*. Remarkably, the genus *Liolaemus* alone comprises 209 of these taxa, consisting of 200 species, five of them polytypic, and recognized on the basis of 14 subspecies. *Liolaemus* species occur in Argentina, Bolivia, Brazil, Chile, Paraguay, Peru and Uruguay, representing the widest range of environments occupied by a single lizard genus. In contrast, the genus *Ctenoblepharys* is monotypic (*Ctenoblepharys adspersa*) and endemic to Peru, while 19 species of *Phymaturus* are distributed in Argentina and Chile. In these lizards, plant consumption and viviparity are strikingly common. Among *Liolaemus*, dietary information was available for 153 taxa. We found that 76 are arthropofagous, 71 omnivorous and six strictly herbivorous. Reproductive information was gathered for 136 species of this genus: 73 are viviparous and 63 oviparous. In *Phymaturus*, all species are viviparous and dietary information for 17 species revealed that 16 are herbivorous and only one omnivorous. *Ctenoblepharys adspersa* is arthropofagous and oviparous. As previously supported both theoretically and empirically, plant consumption and viviparity are associated with high latitudes and elevations. Finally, we suggest that the recently proposed species *Phymaturus dorsimaculatus* Lobo & Quinteros is conspecific to *P. vociferator* Pincheira-Donoso, from which the former taxon does not differ in morphology, coloration, patterns of sexual dimorphism or geographical distribution.

Key words: Systematics, taxonomic inflation, phylogeny, diet, oviparity, viviparity, lizards, Liolaemidae, *Ctenoblepharys*, *Liolaemus*, *Phymaturus*, South America

Resumen

Los lagartos iguanianos concentran dos de los géneros de vertebrados más diversificados del planeta (*Anolis* y *Liolaemus*). Por lo tanto, el desarrollo de estudios enfocados en conocer su diversidad y entender sus relaciones filogenéticas puede resultar de fundamental importancia para la investigación en ecología y biología evolutiva. Sin embargo, al mismo tiempo, numerosas dificultades están asociadas con grupos altamente especiosos. Por ejemplo, el impacto de la radiación adaptativa puede generar el surgimiento de notables patrones de variación intraespecífica (interpoblacional) en respuesta a condiciones ambientales locales, en ausencia de reales eventos de especiacion, que pueden llevar al reconocimiento taxonómico de nuevas especies carentes de claros signos de aislamiento reproductivo. Adicionalmente, aunque los grupos diversificados representan apropiados modelos para evaluar comparativamente los efectos de la selección sobre caracteres ecológicos e historias de vida, la reunión de información sobre la distribución de estas características a través de las especies conocidas suele resultar un desafío significativo. Esto hace deseable el desarrollo de trabajos de síntesis. En este estudio, presentamos un catálogo monográfico de la diversidad y estructura filogenética de la totalidad de la familia sudamericana de iguanianos Liolaemidae, sobre la base de previas publicaciones. Ademas, entregamos una tabla integradora para reunir la distribución por país, rango altitudinal, dieta y modo reproductivo de cada especie para la cual esta información está disponible. La familia Liolaemidae está compuesta de un total de 229 especies y subespecies pertenecientes a los géneros *Ctenoblepharys*, *Liolaemus* y *Phymaturus*. Notablemente, sin embargo, sólo el genero *Liolaemus* concentra 209 de estos taxa, estando conformado por 200 especies, cinco de ellas politípicas, y reconocidas sobre la base de 14 subespecies. *Liolaemus* se distribuye en Argentina, Bolivia, Brasil, Chile, Paraguay, Perú y Uruguay, representando la más amplia diversidad de condiciones ambientales registrada para cualquier linaje de lagartos. En contraste, el género *Ctenoblepharys* es monotípico (*Ctenoblepharys adspersa*) y endémico de Perú, mientras *Phymaturus* es conocido sobre la base of 19 especies distribuidas en Argentina y Chile. En estos lagartos, el consumo de plantas y la viv-