

## Correspondence

Communal oviposition of *Iberolacerta aurelioi*  
(Squamata: Lacertidae) in the Spanish PyreneesROBERTO GARCÍA-ROA<sup>1</sup>, MAIDER IGLESIAS-CARRASCO<sup>1,2</sup>, ION GARIN-BARRIO<sup>2</sup> & CARLOS CABIDO<sup>2</sup><sup>1</sup>) Department of Evolutionary Ecology, National Museum of Natural Science – Spanish Research Council (MNCN-CSIC). José Gutiérrez Abascal, 2, 28006, Madrid, Spain<sup>2</sup>) Departamento de Herpetología, Sociedad de Ciencias Aranzadi. Alto de Zorroaga 11. Donostia-San Sebastián, Spain

Corresponding author: ROBERTO GARCÍA ROA, e-mail: r.garcia-roa@mncn.csic.es

Manuscript received: 24 February 2014

Accepted: 7 April 2014 by ALEXANDER KUPFER

Reproduction is one of the most important evolutionary challenges faced by living organisms. Oviposition in reptiles is a crucial step in the reproductive process, and the choice of a suitable egg-laying site can influence embryo development and offspring survival (BIRCHARD 2004, IRAETA et al. 2006). Thermal and hydric requirements and the avoidance of potential predators are some of the factors to be considered by females when choosing suitable oviposition sites. Additionally, the success of oviposition is highly dependent on local climatic conditions and the availability of resources (oviposition sites, soil characteristics, microclimatic conditions; GALÁN 2009). Oviposition behaviour may vary interspecifically, but also on the population level of the same species (SHINE 1991, PERRY & DMI'EL 1994).

Scarcity of nesting sites and/or the communal benefit of incubating eggs from different females in the same place (e.g., by improving the microhydric situation; GALÁN 2009) may lead to communal nesting (RADDER & SHINE 2007), defined as “the nonincidental deposition of eggs at a nest cavity shared by two or more conspecifics” (ESPINOZA & LOBO 1996). Communal egg-laying has been described for many lizards of the Iberian Peninsula such as *Psammotromus algirus*, *Podarcis bocagei* or *Zootoca vivipara* (BRAÑA 1996, GALÁN 1996, PLEGUEZUELOS et al. 2004).

During fieldwork in the L'Alt Pirineu Natural Park (near Pica d'Estats, 42°39'0.3" N, 01°23'00.9" E, 2,346 m asl; Catalunya, Spain) in July of 2013, we found a communal oviposition site under a rock, measuring about 700 mm in height, 300 mm in width and 150 mm in depth. It was located on a south-facing slope with sparse vegetation on a wet and clayey substrate. The only reptile species present in the surrounding area was *Iberolacerta aurelioi* (ARRIBAS 1994) and some females of this species were sighted within less than 10 metres from the rock. The ovipository contained 42

fresh eggs, 5 infertile eggs, 6 recently broken eggs, and remains of 13 eggs from a previous reproductive cycle (Fig. 1). Some eggs were found to lie exposed on the surface when the stone was raised, but others were covered by substrate.

Reports of communal egg-laying in *Iberolacerta* spp. are scarce, with only ARIBAS & GALÁN (2005) reporting on 29 *Iberolacerta aranica* eggs, confirming communal egg-laying for the genus. Clutch sizes of  $4.2 \pm 0.7$  eggs (mean = 3; range: 2–12; n = 14 clutches; ARIBAS 2004, ARIBAS & GALÁN 2005) have been described for *I. aurelioi*, which suggests our find to comprise more than 10 clutches. However, the mean values described from the field were one or two clutches per nest and interpreted as a strategy to reduce possible predation risks (ARRIBAS & GALÁN, 2005). The environmental conditions of the place where we found the nest were similar to those observed by GALÁN (1996) in *P. bocagei*. Eggs deposited under large rocks has them benefit from a stable environment for incubation (HUEY et al. 1989, KEARNEY 2002). However, the choice of a cavity beneath a rock as a nesting site used by many female *Iberolacerta* spp. is rather uncommon (ARRIBAS & GALÁN, 2005). Unfavourable climatic conditions (it was particularly cold in 2013, resulting in some areas being under snow until late July) may influence nest site selection and timing (usually mating and oviposition occurs from May to July). The scarcity of suitable nest sites may lead to communal egg-laying (DOODY et al. 2009). Nevertheless, the existence of eggs from previous years, when seasonal conditions were not so unfavourable, might suggest that communal egg-laying in *I. aurelioi* is not exceptional.

*Iberolacerta aurelioi* has a limited distribution (8 UTM 10 × 10 km; PLEGUEZUELOS et al. 2004), and it is important to stress the high fragmentation and vulnerability of mountain species to climate change (SINERVO et al. 2010,

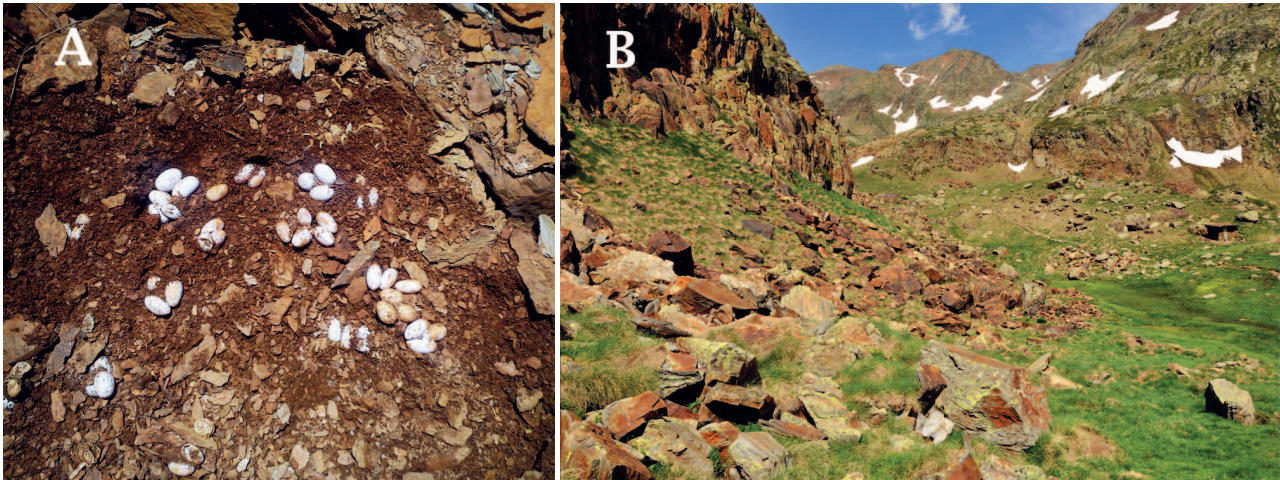


Figure 1. (A) Communal oviposition in *Iberolacerta aurelioi*; (B) representative habitat of *I. aurelioi* in the L'Alt Pirineu Natural Park (near to Pica d'Estats; Cataluña, Spain).

MCCAIN & COLWELL, 2011). Moreover, climate change has been demonstrated to affect oviposition in other lizards (MONASTERIO et al. 2013). Concerning the species' conservation status, i.e., "Endangered" as per the IUCN Red List of Threatened Species (PÉREZ-MELLADO et al. 2009), it would be very important to conduct further studies on the reproductive ecology of *I. aurelioi*.

#### Acknowledgements

We are grateful to A. KUPFER for constructive criticism on the manuscript. Financial support was provided by the Fundación Biodiversidad and the project MICIIN-CGL2011-24150/BOS.

#### References

- ARRIBAS, O. (1994): Una nueva especie de lagartija de los Pirineos Orientales: *Lacerta (Archaeolacerta) aurelioi* sp. nov. (Reptilia: Lacertidae). – *Bollettino Museo regionale Scienze naturali Torino*, **12**: 327–351.
- ARRIBAS, O. J. & P. GALÁN (2005): Reproductive characteristics of the Pyrenean High-Mountain Lizards: *Iberolacerta aranica* (Arribas, 1993), *Iberolacerta aurelioi* (Arribas, 1994) and *Iberolacerta bonnali* (Lantz, 1927). – *Animal Biology*, **55**: 163–190.
- ARRIBAS, O. (2004): Characteristics of the reproductive biology of *Iberolacerta aurelioi* (Arribas, 1994) (Squamata: Sauria: Lacertidae). – *Herpetozoa*, **17**: 3–18.
- BIRCHARD G. F. (2004): Effects of incubation temperature. – pp. 103–123 in: DEEMING, D. C. (ed.): *Reptilian Incubation: Environment, Evolution, and Behavior*. – Nottingham University Press, Nottingham, UK.
- BRAÑA, F. (1996): Sexual dimorphism in lacertid lizards: male head increase vs female abdomen increase? – *Oikos*, **75**: 511–523.
- DOODY, J. S., S. FREEDBERG & J. S. KEOGH (2009): Communal egg-laying in reptiles and amphibians: evolutionary patterns and hypotheses. – *The Quarterly review of biology*, **84**: 229–51.
- ESPINOZA, R. E. & F. LOBO (1996): Possible communal nesting in two species of *Liolaemus* lizards (Iguania: Tropiduridae) from Northern Argentina. *Herpetological Natural History*, **4**: 65–68.
- GALÁN, P. (1996): Selección de lugares de puesta en una población del lacértido *Podarcis bocagei*. – *Revista Española de Herpetología*, **10**: 97–108.
- GALÁN, P. (2009): Ecología de la reproducción de los saurios ibéricos. – *Boletín Asociación Herpetológica Española*, **20**: 2–34.
- IRAETA, P., C. MONASTERIO, A. SALVADOR & J. A. DÍAZ (2006): Mediterranean hatchling lizards grow faster at higher altitude: a reciprocal transplant experiment. – *Functional Ecology*, **20**: 865–872.
- MCCAIN, C. M. & R. K. COLWELL (2011): Assessing the threat to montane biodiversity from discordant shifts in temperature and precipitation in a changing climate. – *Ecology Letters*, **14**: 1236–1245, doi: 10.1111/j.1461-0248.2011.01695.x
- MONASTERIO, C., L. P. SHOO, A. SALVADOR, P. IRAETA & J. A. DÍAZ (2013): High temperature constrains reproductive success in a temperate lizard: implications for distribution range limits and the impacts of climate change. – *Journal of Zoology*, **291**: 136–145.
- PÉREZ-MELLADO, V., M. CHEYLAN & I. MARTÍNEZ-SOLANO (2009): *Iberolacerta aurelioi*. – in: IUCN Red List of Threatened Species. Version 2009.1. – Available at [www.iucnredlist.org](http://www.iucnredlist.org).
- PERRY G. & R. DMI'EL (1994): Needles and haystacks: searching for lizard eggs in a coastal sand dune. – *Amphibia-Reptilia*, **15**: 395–401.
- PLEGUEZUELOS, J. M., P. GALÁN & J. R. FERNÁNDEZ-CARDENETE (2004): Communal nesting of *Psammodromus algirus* (Linnaeus, 1758), under extreme environmental conditions. – *Amphibia-Reptilia*, **25**: 333–336.
- RADDER, R. S. & R. SHINE (2007): Why do female lizards lay their eggs in communal nests? – *Journal of Animal Ecology*, **76**: 881–887. doi: 10.1111/j.1365-2656.2007.01279.x
- SHINE R. (1991): Strangers in a strange land: ecology of the Australian colubrid snakes. – *Copeia*, **1991**: 120–131.
- SINERVO, B., F. MENDEZ-DE-LA-CRUZ, D. B. MILES, B. HEULIN, E. BASTIAANS, M. VILLAGRAN-SANTA CRUZ, R. LARA-RESENDIZ, N. MARTINEZ-MENDEZ, M. CALDERON-ESPINOZA & L. R. N. MEZA-LAZARO (2010): Erosion of lizard diversity by climate change and altered thermal niches. – *Science*, **328**: 894–899.