

New reports on predation of *Salamandra algira* larvae in Morocco

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RESUMEN: Se describen dos casos de depredación sobre la salamandra norteafricana *Salamandra algira*, un anfibio endémico de Marruecos y Argelia del que se dispone de escasos datos sobre las interacciones que establece con otras especies. Asimismo se destaca la importancia que puede suponer la depredación sobre algunas poblaciones marginales de *S. algira*, particularmente en zonas donde los medios acuáticos son escasos y en condiciones donde los depredadores / presas se concentran.

Fire salamanders (genus *Salamandra*) are amphibians characteristic of the Western Palearctic ecoregion (Weisrock, 2001). These salamanders present aposematic coloration and noxious cutaneous secretions that reduce their risk of predation. Thus few predators prey regularly on these species (García-París *et al.*, 2004). However, predation was reported in several occasions e.g., adults of *Salamandra inframaculata* as prey of *Natrix tessellata* (Böhme *et al.*, 2013) and *Salamandra salamandra* adults predated by mammals (*Sus scrofa*, *Mustela putorius*,

Meles meles, *Lutra lutra*, *Erinaceus europaeus*, *Rattus rattus*), reptiles (*Natrix natrix*, *Natrix maura*, *Vipera seoanei*), birds (*Falco tinnunculus*, *Buteo buteo*, *Strix aluco*, *Pica pica*) and its larvae by fish (*Salmo trutta*, *Cottus gobio*), birds (*Cinclus cinclus*), mammals (*Neomys fodiens*), amphibians (*Lissotriton helveticus*, *Ichthyosaura alpestris*, *Triturus marmoratus*, *Calotriton asper*, *Calotriton arnoldi*, *Salamandra salamandra*), reptiles (*Natrix maura*) and invertebrates (*Haemopsis saguisuga*, coleoptera and odonata) (Braña, 1988; García-París *et al.*, 2004; Morales *et al.*,

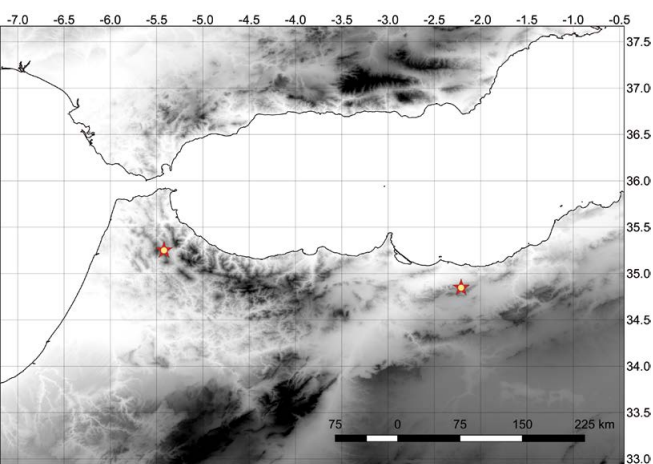


Figure 1: Map of the locations where the observations were made.

Figura 1: Mapa mostrando las localidades donde se realizaron las observaciones.



Figure 2: *Nepa cinerea* devouring a *S. algira spelaea* larvae.
Figura 2: *Nepa cinerea* devorando una larva de *S. algira spelaea*.

2004; Thiesmeier & Grossenbacher, 2004; Herrador *et al.*, 2006; Villero *et al.*, 2006; Velo-Antón & Cordero-Rivera, 2011; Amat & Carranza, 2014).

The North African fire salamander (*Salamanca algira* Bedriaga, 1883) is one of the southernmost species of the genus *Salamanca*, being confined to the humid regions of northern Morocco and Algeria (Schleich *et al.*, 1996; Escoriza & Ben Hassine, 2014). There are no records about predatory events on *S. algira*.

Here we describe two cases of predation on *S. algira* in Morocco (Figure 1). In November 2007 in the Beni Snassen massif we found an adult form of *Nepa cinerea* devouring a larva of *S. algira spelaea* (Figure 2) at 838 m of altitude in a natural spring. In May 2015 we found an individual of *Natrix maura* that regurgitated three *S. algira tingitana* larvae in a shallow stream in Moulay Abdesslam (Western Rif mountains; Figure 3) at 998 m of altitude. These larvae were likely in a premetamorphic stage because they showed yellow pigmentation.

Figure 3: *Natrix maura* and the regurgitated *S. algira tingitana* larvae.

Figura 3: *Natrix maura* y las larvas de *S. algira tingitana* regurgitadas.

Small water bodies such as springs and stream pools (typical reproductive habitat for *Salamanca* species; García-París *et al.*, 2004; Goldberg *et al.*, 2007) favor the interactions between predators and preys, particularly during the drying phase. Moreover, on these regions with scarcity of wetlands, they concentrate predators like *N. maura* and some macroinvertebrates.

Natrix maura is a widespread snake in Morocco, which occurs throughout the elevational range of *S. algira* (Bons & Geniez, 1996).

Amphibians represent a large portion of the diet of *N. maura*, which preys on both adult and larval forms (Braña, 1998). *Nepa cinerea* is also a common species in such aquatic habitats and heavily feeds upon amphibian larvae (Wager, 1965), possibly causing an important predatory pressure on salamander larvae.

The pronounced drying of wetlands caused by anthropogenic land use, especially in arid or semiarid environments such as Beni Snassen masif (D. Escoriza, unpublished data), could promote the concentration of these predators, which can adversely affect some marginal populations with low effectiveness, as observed in the case of other amphibians, like the Majorcan midwife toad *Alytes muletensis* (Guicking *et al.*, 2006).



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