

Leech presence on Iberian Brown Frog, *Rana iberica*, (Amphibia: Anura: Ranidae) from north-western Spain

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Abstract. The authors describe a case of parasitism on *Rana iberica* by two species of leeches, *Batracobdella* sp. and *Hirudo medicinalis*, in a mountainous area of north-western Spain. Conservation implications of high parasite load on small and isolated populations are discussed.

Keywords. Amphibia, *Rana iberica*, leech parasitism, Spain.

Leeches are known to parasitize many freshwater species including invertebrates (Kutshera, 2003), fishes (Pearse, 1924), amphibians (Fontaneto et al., 1999, Romano and Di Cerbo, 2007), turtles (MacCoy et al., 2007; Ayres and Alvarez, in press), and mammals (Davies and MacLoughlin, 1996). Trophic relationships with amphibians are very complex, leeches predate or parasitize over all life stages of amphibians, including eggs (Romano and Di Cerbo, 2007), larvae (Gunzburger and Travis, 2005) and also adults (Merilä and Sterner, 2002).

Rana iberica inhabits cold streams, ponds and mountain lakes in the North and West of the Iberian Peninsula, with some isolated spots in the Sistema Central mountains (Salvador and García-París, 2001). Our work reports an episode of parasitism by two species of leeches on *R. iberica* found in Serra do Suido Mountains, Galicia region, north-western Spain. The site of collection is located near the top of the mountain at an altitude of 851 m a.s.l. The commonest vegetation is shrubs with dense cover of *Erica* sp. and *Ulex* sp.; arboreal species are restricted to stream and river beds, with *Betula* sp. and *Salix* sp.

On 6th November 2007 one male of *R. iberica* was captured in a small stream in Barriqueira de Casariños. This stream is used as a water reservoir for free-ranging cattle and horses. Due to the severe draught that Galicia suffered during 2007 the stream was almost dry, with the exception of some ponds. The individual of *R. iberica* was captured resting in one shallow pond of the stream, in seemingly poor condition as indicated by the apathetic behaviour. When we examined the frog we found ten leeches attached to its body. Most

of them were attached in the inguinal and axilar area (see Fig. 1), but one big leech was attached in the middle of the body. The smallest ones belong to *Batracobdella* sp., which is known to parasite on Iberian brown frogs (Almaça, 1964; García-París, 1985; Galán and Fernandez Arias, 1993), but the biggest one belongs to *Hirudo medicinalis*, the medicinal leech, a typical parasite of mammals (Keim, 1993; Davies and MacLoughlin, 1996). In the Iberian Peninsula *Batracobdella* sp. is a common ectoparasite of some amphibian species, including *Discoglossus galganoi* and *Rana iberica* (García-París, 1985; Galán and Fernandez Arias, 1993, Galán pers. comm.). But to our knowledge there are few reports about amphibian predation by medicinal leeches in the Iberian Peninsula.

As Merilä and Sterner (2002) stated, medicinal leeches could act as important source of mortality for adult amphibians. In our case, it seems that warm temperatures, 25 °C max. on 6th November, and low water level, it was the driest autumn in the last fifty years, rise the possibility of dangerous interactions between leeches and amphibians. Also recent changes in cattle management, using troughs or watering places during drought, could lead to an increase of leech parasitism on amphibians, due to scarcely presence of mammals.

In our study area it seems that some factors are influencing negatively on *R. iberica* and other amphibians. Habitat modification and fragmentation, due to human activity (i.e., road construction, windmills), intentional fires, and cattle pressure (i.e., eutrophication); seem to have a negative effect on amphibian populations (Vos and Chardon, 1998; Ayllon-Lopez and Dominguez-Gonzalo, 2001; Hels and Buchwald, 2001; Jansen and Healey, 2003; Knutsom et al., 2004; Cushman, 2006; Nyström et al., 2007). Serra do Suido mountains suffer intentional fires each year in order to create new pastures for cattle, this problem causes habitat loss and changes in vegetation cover. Additionally, construction of windmill parks caused habitat fragmentation, changing natural drainages due to creation of tracks; this problem is more problematic in the last years due to the severe



Fig. 1. Leeches attached to *R. iberica*.

draught that Galicia region is suffering. All this human pressure limits available habitat for *R. iberica*, restricting the species to small drainages, with less possibilities for dispersal and colonization of new areas or gene flow between populations. Martínez-Solano et al. (2005) stated that the combination of both reduced genetic variability and increasing isolation of populations is likely to result in local and regional extinction of populations in Sistema Central mountains. But maybe leech infestation could also have a negative effect on small isolated populations. Fontaneto et al. (1999), Merilä and Sterner (2002) reported attacks from *H. medicinalis*, and indirect predation by *Haemopis sanguisuga*, which caused high mortality. Also it's possible to affect indirectly by transmission of blood parasites by non lethal parasitism. Another effect that it's not been evaluated is the possible impact on eggs and larvae by leeches, as is reported by Gunzburger and Travis (2005) and Romano and Di Cerbo (2007).

At a conservational point of view both species, *R. iberica* and *H. medicinalis*, are protected under different laws. *R. iberica* is protected by regional and national laws, catalogued as VU in both Red Books. Medicinal leeches are protected under european laws, including Annex V of Bern Convention, IUCN, and also CITES. In Spain the current situation of the species is unknown, but García Más and Muñoz Araujo (2001) stated that this species could potentially occur in almost all Iberian Peninsula inland waters, but its populations face such threats that its range is drastically decreasing, due to habitat loss and overexploitation.

Also in *R. iberica* it's been reported negative influence from human disturbance (Rodríguez-Prieto and Fernández-Juricic, 2005), as this species show high fidelity to stream beds and low dispersal, effects on the habitat quality could have a higher effect on survival rates. Martínez-Solano et al. (2003) stated that *R. iberica* is restricted in its possible expansion to suitable breeding habitat because it breeds almost exclusively in permanent streams. This species also avoid the use of deep ponds or streams inhabited by predatory fishes, which not only reduce amphibian population size but also increase fragmentation and isolation, which could reduce genetic flow or local extinction of small populations. Salmonid presence has a strong negative effect on tadpole presence, not only by direct predation but also by altering behaviour due to chemical cues (Bosch et al., 2006). In Barranqueira de Casarinos stream some deep ponds are occupied by salmonids, so tadpoles and adults seem to be restricted to shallower marginal areas avoiding central deeper zones with faster current. Maybe this behaviour could increase the risk of being parasitized by leeches, as we found most individuals of *Batracobdella* sp. attached under stones in shallow water.

It seems that both species, Iberian Brown Frog and medicinal leeches, are suffering dramatic changes in an area that remained quite undisturbed until recent years. These changes made possible more interactions between both species.

Further monitoring will be necessary to quantify leech infestation and to assess the real impact of leech infestation over mountain populations of amphibians in north-western Spain.

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