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Predation by the Italian pool frog *Pelophylax lessonae bergeri* on the Valais shrew, *Sorex antinorii*

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Pelophylax lessonae Camerano, 1882 is a widespread species with a distribution spanning Italy and Central and Eastern Europe (Gasc et al., 1997). It occurs in a wide range of aquatic habitats, including shallow ponds, large lakes, small rivers, streams, and various artificial water bodies, mainly with abundant riparian vegetation. The Italian subspecies *P. lessonae bergeri* is a divergent lineage of pool frog endemic to peninsular Italy and the islands of Sicily and Corsica, which until recently was considered to be a separate species (see Canestrelli and Nascetti, 2008; Speybroeck, Beukema and Crochet, 2010; and references therein).

This frog species is an opportunistic and generalist feeder (Capula, Sacchi and Razzetti, 2007). It mainly eats invertebrates such as beetles, spiders, flies, grasshoppers, caterpillars, butterflies, and crustaceans (Chiminello and Generani, 1992; Antonelli, Guidali and Scalia, 2000; Guidali, Scalia and Carettonia, 2000; Capula, Sacchi and Razzetti, 2007). Occasionally, it has also been observed to feed on small vertebrates (e.g. Capula, Sacchi and Razzetti, 2007).

On June 24, 2011, around 4:00 p.m., we sampled several pool frog individuals from a small lake near Cuponello (municipality of Spezzano della Sila, Calabria region, southern Italy; latitude 39°22'24.31"N, longitude 16°32'9.7"E). Each individual sampled was anaesthetized using a 0.02% solution of MS222 (3-aminobenzoic acid ethyl ester) before being toe-clipped. During the anaesthesia, one pool frog (snout-vent

length 9.1 cm) regurgitated a partially digested shrew of approximately 5.0 cm in length (see Fig. 1), followed by two almost completely digested shrews of smaller size. Tissue samples from the pool frogs and the shrew remnants were transferred to the laboratory in liquid nitrogen and then stored at -80°C until further analysis.

To assess whether the frog individual belonged to *P. lessonae* or to its hybridogenetic hybrid *P. esculentus*, which is frequently syntopic with the parental species, we carried out an allozyme electrophoresis following Santucci et al. (2000) and assessed genotype variation at three loci (*G3pdh*, *Gapdh*, *Sod-1*) that have previously been shown to present alleles of diagnostic value between the two species (see Santucci et al., 2000). At all three loci, the individual presented genotypes typical of the parental species that are never found among individuals of the hybrid species.

Identification of the shrew species was based on the skull morphology of the single large individual, which still possessed a fully integral skull (Fig. 1B). Skull morphology unequivocally identified the shrew as an adult Valais shrew (*Sorex antinorii* Bonaparte, 1840), following characters reported by Aloise and Nappi (2008). This species inhabits peninsular Italy, southern Switzerland, and eastern France. In southern Italy (the Calabria region), where the subspecies *S. a. silanus* has been described, this shrew has been observed at altitudes above 1200 m, close to freshwater habitats (Aloise and Nappi, 2008).

The occurrence of one large Valais shrew with several smaller ones in the gut of a single frog could be explained by the so-called 'caravanning' behaviour displayed by this and many other shrews (Nowak, 1999). When a nest is disturbed or when young shrews begin exploring their surroundings, they form a caravan behind their mother, each individual grabbing the base of the tail of the sibling in front (see inset in Fig. 1). Therefore, a plausible explanation for our finding is that the pool frog encountered and fed upon one such caravan.

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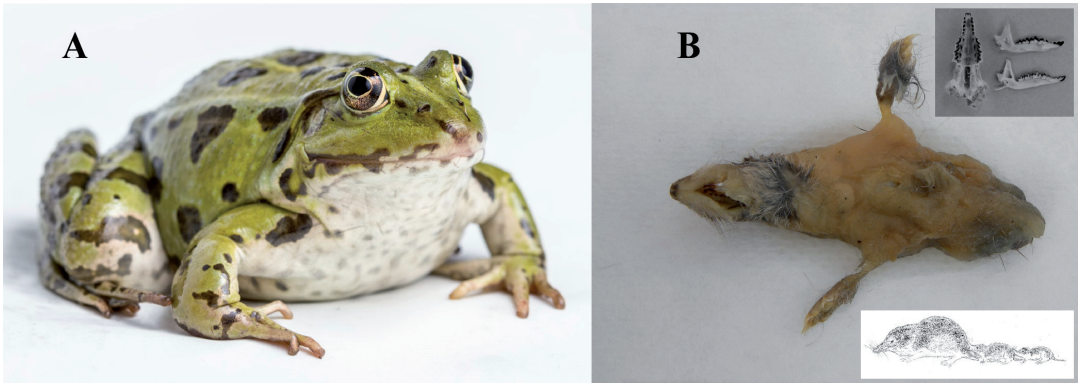


Figure 1 (A) The predator *Pelophylax lessonae*; (B) The prey *Soorex antinorii*. Insets show the skull morphology of *S. antinorii* individual analysed (upper right), and a representation of the caravanning behaviour (lower right).

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