

## Early Pleistocene Herpetofauna of Rivoli Veronese (NE Italy): a window on the palaeoecology of the extinct allocaudates

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Among early Pleistocene fossil herpetofaunas of Italy, Rivoli Veronese is remarkable in having yielded the youngest representatives of the extinct lissamphibian clade Allocaudata known worldwide, together with a number of other remains of extant amphibians and reptiles.

Given that the presence of extant taxa together with an extinct one is an interesting opportunity to understand the ecological requirements of the latter, we present a palaeoclimatological and palaeoenvironmental study of Rivoli Veronese based on the fossil herpetofauna.

The herpetological assemblage of Rivoli Veronese is rather diverse, and is composed by at least 15 taxa other than the allocaudate *Albanerpeton pannonicus*. The faunal list includes at least two caudates (*Speleomantes* sp. and *Ichthyosaura alpestris*), four anurans (*Bombina* sp., *Bufo bufo*, *Hyla* gr. *H. arborea* and *Rana* sp.), five lizards (*Lacerta* gr. *L. viridis*, cf. *Zootoca vivipara*, a third, small-sized lacertid species, *Anguis* gr. *A. fragilis* and cf. *Pseudopus* sp.) and four snakes (*Coronella* sp., *Zamenis longissimus*, *Natrix* sp. and *Vipera* gr. *V. aspis*). Among others, the finding of *Speleomantes* is particularly interesting because it is one of a handful of fossil occurrences of this genus, being also only the second one outside its current distributional range.

As a whole, such an association does not present any modern analogue (excluding extinct genus *Albanerpeton*, of course), but would suggest, using the Mutual Ecogeographic Range Method, and taking apart *Speleomantes* because of its very restricted modern range, a Mean Annual Temperature rather similar or slightly colder than the present one in the Rivoli Veronese area, with much higher Mean Annual Precipitation (1326 mm contra the current 834 mm; +492 mm).

Given the high number of water-linked taxa (all amphibians and *Natrix*), the nearby environment should have included either permanent or temporary water bodies, in an area including both forested (*Speleomantes*, *Z. longissimus*) and more open (*Lacerta*, *Zootoca*) areas. A similar humid and forested landscape is also suggested by the mammal findings.

The analysis of the palaeoherpetofauna of Rivoli Veronese seems, therefore, to support the hypothesis of *Albanerpeton* favouring a moist environment, in contrast with the previous idea of it being adapted to dry areas.