

## Scorpions as a prey for Ottoman viper, *Montivipera xanthina*: the first record from southwestern Anatolia, Turkey

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**Abstract.** Adults of *Montivipera xanthina* generally feed on small mammals, birds and lizards, although juveniles often prey on orthopterans and centipedes. During the fieldwork carried out on May 28, 2001, there were recorded parts of the scorpion body *Protoiurus kraepelini* (von Ubisch, 1922) in excrements of an adult female of *M. xanthina* in Muğla (southwestern Turkey). Similar observations of *M. xanthina* consuming scorpions have not been recorded in literature so far.

**Key words:** predation, arthropod feeding, food composition, Iuridae, Viperidae, Mediterranean.

The variability of food composition among snakes is quite high, including vertebrates as well as invertebrates with several feeding specialists (e.g. *Dysypselis*, *Stenorrhina*, *Tantilla* or *Ophiophagus*; Greene 2000). The snakes of the family Viperidae predominantly feed on small vertebrates; mainly mammals, reptiles or amphibians (Mallow et al. 2003). However, ontogenetic shift in food composition has been recorded in some *Vipera* species (e.g. Luiselli 1996). Juvenile vipers more often prey on invertebrates (e.g. Orthoptera, Scolopendromorpha; Arsovski et al. 2014). However, orthopterans were found to be the dominant food in all age stages of medium sized vipers, *Vipera ursinii-renardi* complex (Kramer 1961, Agrimi & Luiselli 1992). Feeding on other invertebrates has also been often recorded in species from genus *Echis* (Duff-Mackay 1965, Ionides & Pitman 1965, Sharma & Vazirani 1977, Spawls & Branch 1995, Revault 1996), where the toxicity of *Echis* venoms was found to be strongly positively associated with the degree of arthropod feeding, namely of scorpions (Barlow et al. 2009). However, in general, invertebrates can be considered to be atypical prey for vipers (Shine et al. 1998).

The genus *Montivipera* includes seven species extended approximately from the eastern Greece region to central Iran, where they inhabit mainly arid or mountains habitats (Stümpel & Joger 2009, Sindaco et al. 2013). Some of the species are endemic for small mountain areas (e.g. *M. kuhrangica*, *M. latifii*), while *M. xanthina* (Gray, 1849) has the largest distribution area located from northeastern Greece, through the some Aegean islands, western, southern and central Anatolian Turkey (Sindaco et al. 2013).

The food composition of *M. xanthina* was found to be consisted of rodents and other small mammals, birds or lizards (Joger & Nilson 2005). However, according to these authors, juvenile vipers also prey on orthopterans (Caelifera) and centipedes (Scolopendromorpha: Scolopendridae). So far there was no record reported in mentioned literature about predation on other kinds of invertebrates (e.g. Scorpiones) by any of the species from the genus *Montivipera*.

Turkey has rich scorpion fauna, consisting of 27 recorded species (Kovařík et al. 2010, Inanç & Arıkan 2014). In Province of Muğla, four scorpion species were recorded: *Mesobuthus gibbosus*, *Euscorpium* sp. *mingrelicus* complex, *E. lycius* and *Protoiurus kraepelini* (Inanç & Arıkan 2014). In this area,

we recorded the first case of *M. xanthina* to feed on a scorpion.

The field observation was made on May 28, 2001 in grass rocky habitat on the bank of the Küçükalyan Lake in southwestern Turkey (36.69040°N, 28.80351°E, 16 m a.s.l., Muğla Province). During morning time the second author (DZ) captured an adult female of *M. xanthina* (total length: 48 cm; Fig. 1A) on the bank of the lake. The individual showed very aggressive behavior consisted of attacks and hissing, thus was decided to move the viper to the cloth bag for brief time. After performing all basic measure procedures, the viper was released at the same locality.

However, in the cloth bag we found fresh excrements of *M. xanthina*, which were later examined and found it contained parts of a scorpion body (sections of metasoma and pedipalps, Fig. 1B). Based on morphology of remaining parts of the scorpion body, we diagnosed the prey as a female *Protoiurus kraepelini* (von Ubisch, 1922) (Kovařík et al. 2010, Soleglad et al. 2012, Inanç & Arıkan 2014).

According to the mentioned literature, scorpions are very rarely prey for snakes (see Duff-Mackay 1965, Ionides & Pitman 1965, Sharma & Vazirani 1977, Spawls & Branch 1995, Babb et al. 2005, Marques et al. 2006, Çiçek & Mermer 2007, Solórzano & Greene 2012). However, it is interesting that most of the observations were made in arid or semiarid zones where low prey availability and wide temperature fluctuations are common. According to theory of optimal foraging (MacArthur & Pianka 1966), a predator will select an item when profits eating it exceed the costs (e.g. Pyke et al. 1977). The two main strategies of foraging used by predators we can recognize: sit-and-wait and wide foraging (Huey & Pianka 1981) and both are used in arid areas. Wide foraging is energetically expensive but on the other hand main result is capture more prey per unit of time than in case sit-and-wait strategy. Scorpions or centipedes are very common in Mediterranean areas and often occurs in high densities. Therefore, speculative way to explain of similar cases is that they could be energetically easy obtained substitute for the lack of other prey, even though they are potentially dangerous with a developed defensive strategies (cf. Arsovski et al. 2014). A similar conclusion was also discussed by Castilla et al. (2008) and Castilla & Herrel (2009) about an island population of the lacertid lizard, *Podarcis atrata*, where they found



**Figure 1.** Adult female of *Montiviopera xanthina* found in southwestern Turkey (A.) and its excrement with body remains of *Protoiurus kraepelini* (B.).

significantly high predation rates on scorpions (Castilla et al. 2008, 2009). Besides, scorpions were observed in food composition only a small amount of the European lacertids (see Carretero 2004, Žagar et al. 2011) and therefore is difficult to compare it in a broader context. In the case of vipers scorpions are atypical prey but our observation shows that *M. xanthina* can feed on scorpions. In any event, scorpions as a prey for snakes represent an interesting phenomenon that deserves more attention with future clarification on species compositions of both prey and predators and its frequency in nature.

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