

First documented attack of southern water vole *Arvicola sapidus* Miller, 1908 on a viperine snake *Natrix maura* (Linnaeus, 1758), on the Montsant river (NE Iberian Peninsula)

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The water vole *Arvicola sapidus* Miller, 1908 is a stenophagous herbivorous rodent (Ventura *et al.* 1989, Garde & Escala 2000, Román 2007) that may occasionally consume animal matter (Garde 1992, Anastácio 1993, López *et al.* 2002, Flechoso & Alarcos 2009), which mainly occurs in females during pregnancy and lactation, in response to a higher protein requirement (Strachan 1997).

The females are territorial (Román 2007), especially in the breeding season, which is a defence mechanism for spatial and trophic resources (Ostfeld 1990). Females defend offspring against conspecifics and other species through strategies such as moving pups to other nests when threatened. Presumably, given the references to the aggressiveness shown by some individuals of semi-aquatic species of *Arvicola* (Garde 1992, Strachan 1997, Forman & Brain 2006, Román 2007), the southern water vole is able to face enemies or competitors of comparable size.

The viperine snake *Natrix maura* (Linnaeus, 1758) is a medium-sized reptile of the suborder Serpentes with aquatic habits, whose diet is based mainly on fish and amphibians, but it occasionally preys on the southern water vole (Pleguezuelos & Moreno, 1989).

Within the framework of studies of the ecology of the Southern water vole in the Montsant River, one of the techniques used was camera trapping. At the Moli del Vilar sampling station (Margalef, Tarragona, UTM 31T-313383/4574420), two remote IR cameras were installed: one took still photographs and the other recorded video footage. The photographic camera (Scout Guard SG560, HCO, GA, USA) was programmed to take three pictures each time a subject was detected. The video camera

(Scout Guard SG565F, HCO, GA, USA) was programmed to record a video of 15 seconds after each contact.

On 29/08/2011 at 14:09 h, an attack by a female water vole on a viperine snake which was hunting fish at the trapping station, was recorded by both still photographs and video (Figure 1). The photographic sequence shows how the water vole, not paying attention to the bait in front of the cameras, went directly to the reptile, which could be glimpsed behind the stones that form the basis of the trapping station. The rest of the aggression is recorded in three video clips. In the first, the water vole jumps on the snake and disappears behind the rocks, while the snake begins to twist on itself, shaking its body. In the next two, the snake appears in the foreground, clearly demonstrating that it was swallowing a fish when it was attacked (half the fish and its tail are hanging out of the snake's dilated mouth), and it twists on itself while being dragged out of shot. Curiously enough, the snake did not regurgitate its prey, as usual when they are disturbed or manipulated. The whole sequence lasted about 45 minutes.

Because the sequence occurred an hour and a half after reviewing of the camera-trap station, no snake remains were found at the next review, 30 days later. As for the motivations behind the attack, there are two hypotheses, given the precedents discussed above. One hypothesis is defensive: the attacker was a female specimen with pups. We know this because a radio-tracking study was executed in this same area during the months of July and August. The female in question was easy to recognize due to their morphological characteristics. We found one of their nests,



Figure 1. Female water vole attacking a viperine snake which was ingesting fish behind the stones in the background. The diagram, below left, allows the position of both individuals to be seen more clearly. (Authors: Isabel Mate and Joan Barrull).

with two young pups (the eyes were not yet opened) in a reed bed of *Phragmites* and *Typha* about 120 m downstream from the trapping station, although it is probable that she had alternative nests near the site of the attack. It is possible that the rodent recognized the snake as a threat and wanted to drive it out or to kill it. The second hypothesis would be nutritional: in line with the authors who state that female water vole may seek additional protein intake of animal origin during the breeding season; our individual could have seized the opportunity of having found the snake at its helpless moment (while ingesting prey). The available data do not allow us, however, opt for either hypothesis; but they show the aggressive behaviour of the southern water vole toward the viperine snake.

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