

Eastern green lizard *Lacerta viridis* predation on adult wall lizard *Podarcis muralis* - another reason for tail loss in small lacertids?

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The green or eastern green lizard, *Lacerta viridis* (Laurenti, 1768), is a large and adaptable species of Lacertidae from south-eastern Europe and a sister taxon of the western green lizard *Lacerta bilineata* (Daudin, 1802). In Romania, which sits in the core distribution area, *L. viridis* is abundant and widespread and occupies a broad range of forest edges, clearings, and scrub habitats in lowland and hilly areas, extending generally to 400 m in altitude and with isolated records at 1000 m or more (Cogalniceanu et al., 2013). It can colonise sites impacted by roads or forestry and some recent observations suggest it might be expanding its altitudinal range in parts of the country due to climate change. *Lacerta viridis* can share habitat with most other lizard species from Romania, yet adults are rarely seen in the immediate vicinity of smaller lizard species or even small individuals of the same species, reportedly because it can be aggressively territorial and can predate small reptiles, birds or mice (Nettman & Rykena, 1984). Equally, they exhibit niche partitioning and can coexist with other species due to differences in fine spatial scale habitat choice such as the observed *L. viridis* preference for areas with shrubs compared to *L. agilis* selecting for more open, grass-dominated areas within the same urban habitat (Heltai et al., 2015).

The diet of *L. bilineata* is composed primarily of invertebrates, but small vertebrates and especially juvenile lizards such as young slow worms *Anguis fragilis*, are occasionally reported as prey (Vacher & Wendling, 2019), yet these are considered rare events (Angelici et al., 1997). The diet of *L. viridis* has not been studied extensively but reviewing records from different European countries Nettman & Rykena (1984) describe it as varied, opportunist and based on invertebrates, particularly Coleoptera, but sometimes including young vertebrates, such as a juvenile *L. agilis* in Germany (Peters, 1970). In a recent study from Greece, *L. viridis* diet comprised mainly arthropods, with Coleoptera, Orthoptera and various insect larvae as the most common prey; larger prey size was consumed by adults compared to juveniles and adult males consumed harder and more diverse prey items than females (Sagonas et al., 2018). In Bulgaria, stomach content of 110 individuals of *L. viridis* comprised mainly Orthoptera, Coleoptera and Hymenoptera, with the highest number of prey items recorded in July–August and a somewhat different diet composition in May and September (Mollov et al., 2012). Finally, 41 road-killed *L. viridis* analysed from Romania had consumed primarily Orthoptera, Araneida and undetermined Coleoptera (Maier et al., 2020).

Fragments of vegetation and inorganic elements were also recorded, but it was unclear if these might have been ingested accidentally during feeding. None of the studies of stomach contents identified vertebrate prey, suggesting that, as for *L. bilineata*, vertebrates are indeed rare in the diet of *L. viridis*.

On 24 April 2022 we recorded an instance of predation by an eastern green lizard on an adult wall lizard *Podarcis muralis* (Laurenti, 1768) on the edge of Semenici-Caras Gorges National Park (45° 15' 36" N, 21° 57' 16" E, 431 m a.s.l.), south-western Romania, in a clearing created by a clay embankment for an unpaved forestry road in mixed deciduous forest with *Betula* spp., *Fagus sylvatica* and some *Pinus nigra*. This is a common habitat type in the region and where both species are regularly found, often in sunny patches with bramble *Rubus* spp. vegetation, although wall lizards preferentially select such areas if the substrate is rocky. An adult male *L. viridis* was observed at 13:50 h, in sunny weather, 22 °C, as it was holding in its mouth a live adult male *P. muralis* which had a large part of its tail missing, with a fresh and still bleeding wound. The wall lizard had grabbed part of the head of the green lizard in defense (Fig. 1A) but both lizards were still and were observed from a distance for over 2 minutes until the wall lizard violently shook its own head and body for about 4 seconds, and then released the snout of the green lizard, followed by 2 minutes of rest and then another 3–4 seconds of shaking and biting the head of the green lizard. The *L. viridis* male released, then grabbed the tail stump and severed about 5 mm of the remaining wall lizard tail and swallowed it (Fig. 1B; Fig. 2); this allowed the wall lizard to escape to a nearby hole in the ground. The green lizard followed it rapidly into the hole only to reappear after a few seconds, with its head emerging from the hole. After about 5 minutes it went back into the burrow and neither lizard re-emerged in the following 15 minutes, at which time the observation was stopped. It is unclear if the green lizard managed to corner, kill, and consume the wall lizard inside the burrow but it seems plausible. Even if the wall lizard was not killed, the *L. viridis* male certainly consumed a part and probably its entire tail. This is a rare observation but instances of predation by this species, and lizards more generally, are inherently uncommon and, in the absence of additional studies, it remains unknown how frequent or not is such predatory behavior in areas where *L. viridis* coexist with other lizard species. The observed *L. viridis* had several visible parasites attached (tick nymphs) and this might be relevant as



Figure 1. A. and B. Adult male *Lacerta viridis* predation of adult *Podarcis muralis*

large or ectoparasite-free adult males were shown to be faster explorers than smaller or parasitised males during behavioral trials (Bajer et al., 2015). Both lizard species involved in this predation event are habitat generalists and opportunists, with wide spatial niche breadth (Vacheva et al., 2020), and as such the opportunities for direct interaction are probably higher than for other species. Sites where green lizards appear to be expanding into new areas due to habitat change or climate warming, where they might encroach the territory of other lizard species, could present interesting future research focus. Some European lizard populations have high percentages of individuals with missing or regenerating tails, something typically blamed on avian predators. In habitat where they coexist, predation from adult green lizards, particularly males, could represent another reason for tail loss.

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Figure 2. Adult male *Lacerta viridis* ingesting the tail stump of the *Podarcis muralis*. Several tick nymphs are visible on the green lizard head and body. Notice that plant matter (a dry leaf) was accidentally ingested during feeding.

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