

Short scientific note

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Field observation of the predation of an adult of *Podarcis muralis* (Laurenti, 1768) (Squamata: Lacertidae) by *Mantis religiosa religiosa* (Linnaeus, 1758) (Mantodea: Mantidae)

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Abstract

A case of predation on an adult *Podarcis muralis* by *Mantis religiosa religiosa* in Italy, is here recorded. Published records related to predatory activity of this mantis on saurians are summarized, and the possible cause of such an unusual behaviour is discussed.

Key words: Mantinae, Gekkonidae, predator, prey, aliens, Po Plain, minor islands, Habitats Directive.

Introduction

Thirteen species of mantises occur in Italy, of which, 10 are native and 3 are alien. They belong to 5 families: Amelidae, Empusidae, Eremiaphilidae, Mantidae and Rivetinidae (Battiston 2021). These species are thermophilic insects inhabiting shrubs or low-growing plants, in various kinds of environment such as grassland, Mediterranean maquis, garigue, etc. (Fontana et al. 2007; Battiston et al. 2010, 2019).

Mantises are carnivorous during both the juvenile and adult stages; they feed on a large variety of terrestrial arthropods, especially insects (cf. Reitze & Nentwig 1991; Benrekaa & Doumandji 1997; Prete et al. 1999; Fontana et al. 2007; Battiston et al. 2018; Tinker & Ottesen 2018; Tesche 2019). Some large-sized species (such as *Sphodromantis viridis* Forskal, 1775, *Tenodera aridifolia* (Stoll, 1813)) may also catch small vertebrates, mostly birds, but there are few records detailing predations on reptiles (cf. Massana et al. 2008; Lardner et al. 2011; Mienis 2015; Fukudome & Yamawaki 2016; Sato 2017; Lonsdale & Brown 2019; Tesche 2019; Valdez 2020). In this framework, a case of predation observed in Italy is here reported. The involved taxa (predator/prey) are the European mantis, *Mantis religiosa religiosa* (Linnaeus, 1758) (Insecta, Mantodea, Mantidae) and the common wall lizard, *Podarcis muralis* (Laurenti, 1768) (Reptilia, Squamata, Lacertidae).

The European mantis, 41–77 mm in body length, is widespread in the Palaearctic Region (introduced in North America) and it is the commonest mantis in Italy, where it occurs in all regions and in many minor islands (Fontana et al. 2002, 2007; Cianferoni & Terzani 2012). This species is particularly sensitive to climatic changes, and in Europe, it is expanding its geographical range northwards and is being observed more in many central European countries (cf. Schwarz & Ehrmann 2018; Tesche 2019). From a conservation point of view, in Italy, at a global level, it is evaluated as “Least Concern (LC)” (Fontana et al. 2007; Battiston 2016).

The common wall lizard, 160–230 mm in total length, is a polymorphic euryoecious species that feeds mainly on a wide variety of invertebrates; it is distributed in most of central, southern, and eastern Europe, reaching eastward NW Turkey, moreover it has been often introduced across this continent and in Canada; in Italy it occurs from sea level to 2275 m, and it is widespread in mainland regions and many minor islands (Corti 2006; Balletto 2007; Richard 2007; Sindaco & Jeremčenko 2008; Corti et al. 2011; Sillero et al. 2014; Oskyrko et al. 2022). From a conservation point of view, it is evaluated as “Least Concern (LC)” at the Italian scale, and it is a species of European Community interest protected by the Habitats Directive 92/43/EEC (All. IV) (cf. Balletto 2007; Corti et al. 2011; Sillero et al. 2014).



Figs 1-2 – *Mantis religiosa religiosa* preys *Podarcis muralis* (Photos L. Spada).

Material and methods

The study area is in the Valeggio sul Mincio municipality (Verona province, Veneto region, N Italy); it is the small garden (25 m²) of the authors' domicile (45.20.57N, 10.43.41E, 87 m), in a recently build neighbourhood located at the foot of a small (120 m), wooded morainic hill and on the outskirts of town, not far from the cultivated fields of the Po Plain.

The local distribution of *Mantis religiosa religiosa*, and the data on its predation on European saurians are based on Fontana (2007) and Valdez (2020), respectively. These papers were updated according to previously overlooked and subsequently published records.

The mantises and reptiles were identified in the field, according to Fontana et al. (2002), Battiston et al. (2019), and Corti et al. (2011), respectively.

Pictures (Figs 1-2) and related video (available at https://figshare.com/articles/journal_contribution/Mantis_religiosa_vs_Podarcis_muralis_wmv/24559186) were taken with a Nikon Coolpix A900 digital camera.

Results

A female individual of European mantis was observed (6 Oct 2022) in the above-mentioned small garden. This individual (Figs 1–2), during a sunny day (4.30 pm, air's temperature about 20°C), was resting on a spinous shrub (maximum height about 2.5 m) of *Pyracantha coccinea* M. Roem. (Rosaceae), full of red fruits, in front of a road and some private gardens. This praying mantis, on the basis of the volume of its abdomen, was probably full of eggs. The species is recorded also

from various neighbouring sites, including urban areas (Fontana 2002; Buzzetti & Fontana 2004; Fontana et al. 2007; Zanetti 2009; Sighele & Cavallini 2014; Buzzetti et al. 2021). The above individual was seen, as it held “hanged” a common wall lizard about 12 cm long (Figs. 1-2). The reptile was about 1.3 m above the ground, and was clearly visible from a few meters away.

The lizard, a male individual, had been firmly grasped by the head with its forelegs by the mantis, that with the apical spur of its right tibia was entered the cranial cavity of the prey, via the right eye, piercing the brain tissues, while the tibial spines of the other foreleg had pierced the left eye of the lizard; this *modus operandi* is the same used by this mantis species to kill passerines (Bigas et al. 2006). The lizard also had a laceration on the side of the body, just above the right leg, from which a small “bubble” of viscera came out. The lizard tried in vain to free itself, wriggling, but after few minutes it stopped moving and died (a short video is available at https://figshare.com/articles/journal_contribution/Mantis_religiosa_vs_Podarcis_muralis_wmv/24559186, as reported above). The mantis almost immediately began to nibble the head of the prey; it remained in the same position and activity at least until 6.30 pm, when the observation was suspended.

The left hind leg of the preyed lizard was reduced to a stump (Fig. 2), consisting of the sole thigh, probably due to a previous accident; this impairment probably facilitated its capture by the mantis.

The next morning there was no trace of the pair, nor was it possible to observe the predator or the remains of the prey on the intricate shrub or at its base.

In the previous days, the lizard regularly frequented such shrub, it had in fact been observed hunting insects (Nardi &

Spada, unpublished data). The sole other reptile observed in the same garden (Nardi & Spada, unpublished data) is the Moorish gecko, *Tarentola mauritanica* (Linnaeus, 1758) (Gekkonidae); also this species is known as a prey of adults and nymphs of *Mantis religiosa* (Tomasinelli & Mangoni 2000; FNM 2010; Scholer & Onrubi 2012).

Discussion

Arthropods are underestimated predators of vertebrates (Valdez 2020), those above represents the second documented observation of a mantis predating on a Lacertid species in Italy. Previously, a female individual of *Mantis religiosa religiosa*, in southern Sardinia, had been photographed devouring a small *Podarcis tiliguerta* (Gmelin, 1789) just caught (Rattu 2011), while, always in Italy, other vague observations of mantises preying on “lucertoline [= small young lizards]” have been recorded without photos (cf. Rattu 2011), and predation on “lizards, mostly *Podarcis muralis*” have also been observed in captivity (Tomasinelli & Mangoni 2000).

The new observation had made in autumn, and in the area during this season *Mantis religiosa religiosa*, probably, needs extra resources for egg production (cf. Bigas et al. 2006; Illa & Jutglà 2017), in fact also other females with large abdomens, which indicate they were producing eggs, were observed (Nardi & Spada, unpublished data); later adults die with the onset of cold weather, and oothecae over-winter in the field (Fontana et al. 2002; Battiston 2016). Moreover, also the above Sardinian predation (Rattu 2011) was observed in autumn (27 Sept 2011).

Further records could establish if these hunting events are just occasional, anyhow in other European countries, *Mantis religiosa* was already recorded in nature as a predator of *Podarcis muralis* (Mourgue 1909; Gruschwitz & Böhme 1986), of *P. hispanica* (Steindachner, 1870) (García et al. 1998) and of other species of Lacertidae and Gekkonidae (cf. Jehle et al. 1996; FNM 2010; Scholer & Onrubi 2012; Valdez 2020). In any cases, as observed in Japan (Fukudome & Yamawaki 2016), these records suggest a reciprocal predation between the lizards and the mantises.

From a conservation point of view, also the alien giant mantises (Battiston et al. 2019, 2020a, 2020b; Persico et al. 2021) can have the above predatory aptitude (Mienis 2015), so they could have a negative impact on small and/or isolated populations of lizards, as, for example, those of the minor Italian islands (cf. Reaser et al 2007). Unfortunately, one of these alien mantises was yet recorded from some minor Mediterranean islands (cf. Battiston et al. 2020b), so it is therefore necessary to monitor their possible arrival in the small Italian islands hosting endemic lizards (e.g., Corti et al. 2006; Lo Cascio et al. 2006; Bellati et al. 2011; Corti et al. 2011; Muscarella & Baragona

2017; Biaggini & Corti 2021). Fortunately, some of these minor islands are part of protected areas (e.g., National Parks, Nature Reserves, etc.), so the local technical staff will be able to promptly ascertain the arrival of these aliens, also making use of taxonomists on the various zoological photographic WEB forums.

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