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PREDATION BY A MEDITERRANEAN HOUSE GECKO, *Hemidactylus turcicus* (LINNAEUS, 1758) ON A EUROPEAN DWARF MANTIS, *Ameles spallanzania* (ROSSI, 1792) WITH AN EMPHASIS ON THE GECKO'S DIET**Arnaud Roudil,¹ Przemysław Zdunek,^{2,3*} Paul Coquand,² Jérôme Maran,² and Grégory Deso⁴***Submitted October 7, 2023.*

The Mediterranean House Gecko, *Hemidactylus turcicus* (Linnaeus, 1758) is a small lizard (SVL 5 – 6 cm) belonging to the family Gekkonidae, rarely reaching 13 cm in total length. This species is widely distributed in the Mediterranean regions of Europe and neighbouring islands. The diet of *H. turcicus* is still relatively unknown in its natural habitat due to its nocturnal lifestyle, as is the case for its precise wild distribution. Previous sources have documented that the diet of the gecko includes mainly invertebrates, but also a large variety of arthropods, including chilopods, malacostracans, arachnids, entognaths, and insects, which make up the majority of its diet. We present here a literature review of *H. turcicus*'s diet, of all its range (including introductions), with the first documented observation of predation on the European dwarf mantis (*Ameles spallanzania*).

Keywords: *Hemidactylus turcicus*; diet; Mantodea; prey choice; predator-prey interactions.

The Mediterranean House Gecko, *Hemidactylus turcicus* (Linnaeus, 1758) is a small lizard (SVL 5 – 6 cm) belonging to the family Gekkonidae, rarely reaching 13 cm in total length. This species is widely distributed in the Mediterranean regions of Europe and neighboring islands, including Asia Minor and the Levant to the east (McCoy, 1970; Salvador, 1981; Moravec et al., 2011; Sillero et al., 2014; Speybroeck et al., 2016; Mizsei et al., 2017; Bassett and Forstner, 2023). This discrete species has been inadvertently introduced into many countries outside its natural range, particularly in the southern regions of the United States, Central America and various associated islands, and even in humid tropical zones (Auth, 1994; Kraus, 2009; Rödder and Lötters, 2009; Valdez-Villavicencio et al., 2021).

Hemidactylus turcicus is present in the department of Bouches-du-Rhône (France) since the late 1980s (Castanet and Guyétant, 1989). Our observation site takes place in a rocky environment on the Mediterranean rim (calanques), characterized by low scrubland vegetation (Fig. 1). Located in the Jonquier calanque, the commune of Rove bears an habitat characteristic of this region. The area in question is crisscrossed by a number of paths that are home to a variety of non-avian reptile species, including several lizard species: *Lacerta bilineata* (Daudin, 1802), *Podarcis muralis* (Laurenti, 1768), *Psammodromus edwardsianus* (Dugès, 1829), and *Timon lepidus* (Daudin, 1802), and snakes: *Coronella girondica* (Daudin, 1803), *Malpolon monspessulanus* (Hermann, 1804), and *Zamenis scalaris* (Schinz, 1822). Another species of nocturnal gecko is also present here, the Moorish Gecko, *Tarentola mauritanica* (Linnaeus, 1758) (Fig. 2).

The diet of *H. turcicus* consists mainly of invertebrates (Fretey, 1987; Salvador, 1978; Rato, 2015): molluscs, but also a large variety of arthropods, including chilopods, malacostracans, arachnids, entognaths, and insects, which make up the majority of its diet (Table 1).

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Fig. 1. General views of the characteristic Mediterranean coastal biotope, typical rocky environments locally called “calanques.” Photos by Przemysław Zdunek.



Fig. 2. *Tarentola mauritanica* in situ. One of the syntopic species with a potential dietary overlap in the study area. Photos by Arnaud Roudil.

TABLE 1. Summary of Published Records of Prey in the Diet of *Hemidactylus turcicus* of All Its Range (including introductions)

Phylum	Class	Order	Family	Genus	Species	Types	References
Mollusca	—	—	—	—	—	TDC	Escarré and Vericad, 1981
Mollusca	Gastropoda	—	—	—	—	SC	Klawinski et al., 1994; Punzo, 2001
Mollusca	Gastropoda	Stylomatophora	—	—	—	SC	Saenz, 1996
Arthropoda	Malacostraca	Isopoda	—	—	—	FC/SC/TDC	Escarré and Vericad, 1981; Klawinski et al., 1994; Saenz, 1996; Punzo, 2001
Arthropoda	Malacostraca	Isopoda	Armadiillidae	—	—	TDC	Escarré and Vericad, 1981
Arthropoda	Malacostraca	Isopoda	Porcellionidae	—	—	TDC	Escarré and Vericad, 1981
Arthropoda	Chilopoda	—	—	—	—	SC	Klawinski et al., 1994; Saenz, 1996; Punzo, 2001
Arthropoda	Arachnida	—	—	—	—	SC/TDC	Escarré and Vericad, 1981; Salvador, 1978
Arthropoda	Arachnida	Acari	—	—	—	SC	Saenz, 1996
Arthropoda	Arachnida	Pseudoscorpiones	—	—	—	FC	Bondi and Baragona, 2018
Arthropoda	Arachnida	Araneae	—	—	—	SC	Rose and Barbour, 1968; Klawinski et al., 1994; Saenz, 1996; Punzo, 2001
Arthropoda	Arachnida	Araneae	Dysderidae	—	—	FC	Bondi and Baragona, 2018
Arthropoda	Arachnida	Araneae	Salticidae	—	—	FC	Capulla and Luiselli, 1994
Arthropoda	Arachnida	Araneae	Thomisidae	—	—	FC	Capulla and Luiselli, 1994
Arthropoda	Entognatha	—	—	—	—	SC	Saenz, 1996
Arthropoda	Insecta	Zygentoma	—	—	—	SC	Salvador, 1978
Arthropoda	Insecta	Dermaptera	—	—	—	FC/SC/TDC	Rose and Barbour, 1968; Escarré and Vericad, 1981; Klawinski et al., 1994; Saenz, 1996; Punzo, 2001
Arthropoda	Insecta	Dermaptera	Anisolabididae	<i>Euborellia</i>	<i>annulipes</i>	FC	Bondi and Baragona, 2018
Arthropoda	Insecta	Dermaptera	Forficulidae	<i>Guanchia</i>	<i>pubescens</i>	FC	Bondi and Baragona, 2018
Arthropoda	Insecta	Orthoptera	—	—	—	SC	Rose and Barbour, 1968; Klawinski et al., 1994; Saenz, 1996
Arthropoda	Insecta	Orthoptera	Acrididae	—	—	SC	Punzo, 2001
Arthropoda	Insecta	Orthoptera	Tettigoniidae	—	—	SC	Punzo, 2001
Arthropoda	Insecta	Embiopoda	—	—	—	SC	Salvador, 1978
Arthropoda	Insecta	Mantodea	Amelidae	<i>Ameles</i>	<i>spallanzania</i>	PDE	This study
Arthropoda	Insecta	Blattodea	—	—	—	SC	Klawinski et al., 1994; Saenz, 1996; Punzo, 2001
Arthropoda	Insecta	Hemiptera	—	—	—	FC/SC/TDC	Rose and Barbour, 1968; Salvador, 1978; Escarré and Vericad, 1981; Capulla and Luiselli, 1994; Klawinski et al., 1994; Saenz, 1996; Punzo, 2001
Arthropoda	Insecta	Psocodea	—	—	—	SC	Saenz, 1996

TABLE 1 (continued)

Phylum	Class	Order	Family	Genus	Species	Types	References
Arthropoda	Insecta	Hymenoptera	—	—	—	FC/SC/TDC	Rose and Barbour, 1968; Salvador, 1978; Escarré and Vericad, 1981; Klawinski et al., 1994; Saenz, 1996
Arthropoda	Insecta	Hymenoptera	Formicidae	—	—	FC/SC	Salvador, 1978; Capulla and Luiselli, 1994; Punzo, 2001; Bondi and Baragona, 2018
Arthropoda	Insecta	Hymenoptera	Formicidae	<i>Aphaenogaster</i>	—	FC	Bondi and Baragona, 2018
Arthropoda	Insecta	Hymenoptera	Formicidae	<i>Camponotus</i>	<i>aethiops</i>	FC	Bondi and Baragona, 2018
Arthropoda	Insecta	Hymenoptera	Formicidae	<i>Camponotus</i>	<i>nylanderi</i>	FC	Bondi and Baragona, 2018
Arthropoda	Insecta	Hymenoptera	Formicidae	<i>Crematogaster</i>	<i>scutellaris</i>	FC	Bondi and Baragona, 2018
Arthropoda	Insecta	Hymenoptera	Formicidae	<i>Lasius</i>	—	FC	Bondi and Baragona, 2018
Arthropoda	Insecta	Hymenoptera	Formicidae	<i>Myrmica</i>	—	FC	Bondi and Baragona, 2018
Arthropoda	Insecta	Hymenoptera	Formicidae	<i>Pheidole</i>	<i>pallidula</i>	FC	Bondi and Baragona, 2018
Arthropoda	Insecta	Hymenoptera	Formicidae	<i>Tapinoma</i>	—	FC	Bondi and Baragona, 2018
Arthropoda	Insecta	Raphidioptera	Raphidiidae	<i>Xanthostigma</i>	<i>corsicum</i> (larvae)	FC	Bondi and Baragona, 2018
Arthropoda	Insecta	Neuroptera	—	—	—	FC/SC	Bondi and Baragona, 2018; Saenz, 1996; Punzo, 2001
Arthropoda	Insecta	Coleoptera	—	—	—	FC/SC/TDC	Rose and Barbour, 1968; Salvador, 1978; Escarré and Vericad, 1981; Klawinski et al., 1994; Saenz, 1996
Arthropoda	Insecta	Coleoptera	Carabidae	—	—	FC/SC	Capulla and Luiselli, 1994; Punzo, 2001; Bondi and Baragona, 2018
Arthropoda	Insecta	Coleoptera	Chrysomelidae	—	—	TDC	Escarré and Vericad, 1981
Arthropoda	Insecta	Coleoptera	Curculionidae	—	—	FC	Capulla and Luiselli, 1994
Arthropoda	Insecta	Coleoptera	Curculionidae	<i>Phleotribus</i>	<i>scarabaeoides</i>	FC	Bondi and Baragona, 2018
Arthropoda	Insecta	Coleoptera	Curculionidae	<i>Sitona</i>	—	FC	Bondi and Baragona, 2018
Arthropoda	Insecta	Coleoptera	Curculionidae	<i>Smicronyx</i>	<i>cyaneus</i>	FC	Bondi and Baragona, 2018
Arthropoda	Insecta	Coleoptera	Scarabaeidae	—	—	FC/SC	Capulla and Luiselli, 1994; Punzo, 2001
Arthropoda	Insecta	Coleoptera	Silphidae	—	—	SC	Punzo, 2001
Arthropoda	Insecta	Coleoptera	Tenebrionidae	—	—	FC/SC	Capulla and Luiselli, 1994; Punzo, 2001
Arthropoda	Insecta	Trichoptera	—	—	—	SC	Saenz, 1996
Arthropoda	Insecta	Lepidoptera	—	—	—	SC	Rose and Barbour, 1968; Salvador, 1978; Capulla and Luiselli, 1994; Klawinski et al., 1994; Saenz, 1996; Punzo, 2001
Arthropoda	Insecta	Diptera	—	—	—	FC/SC/TDC	Rose and Barbour, 1968; Salvador, 1978; Escarré and Vericad, 1981; Capulla and Luiselli, 1994; Klawinski et al., 1994; Saenz, 1996; Punzo, 2001
Chordata	Reptilia	—	—	—	—	SC	Salvador, 1978

Abbreviations: PDE, predation direct event; SC, stomach content; FC, fecal content; TDC, digestive tract content.

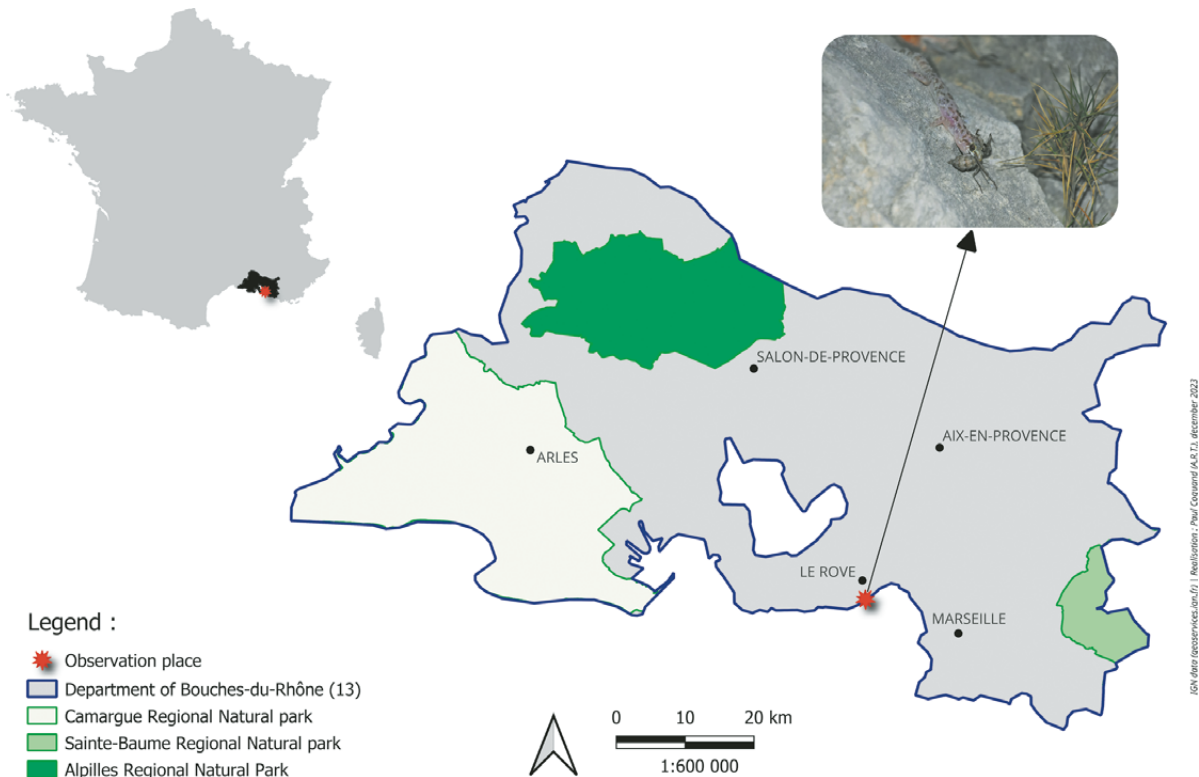


Fig. 3. Location of the site where predation by *H. turcicus* on *A. spallanzania* was observed. Map created by Paul Coquand.

According to Capula and Luiselli (1994), in urban areas of Italy, a high proportion of ants (55.2%), arachnids, beetles and hymenopterans, are also consumed. Because of its predominantly insectivorous diet, its presence has even been observed in the nests of the Common swift, *Apus apus* (Linnaeus, 1758) in Nîmes, south of France, where it has the opportunity to catch insects that escaped from the swift chicks (Gory, 2009). This gecko has the ability to acoustically locate male crickets singing in their hollows and capture female crickets attracted by the song of males (Sakaluk and Belwood, 1984). When it comes to saurophagy, Fretey (1987) writes about predation of *H. turcicus* on young lizards. Just like Salvador (1978) who documented traces of reptiles in the stomach of an individual, this data remains insufficient due to a lack of details. There have been documented cases of other species of geckos predating on reptiles, e.g., wall lizards (Pellitteri-Rosa et al., 2015). To the best of our knowledge, we present here the first documented observation of predation by *H. turcicus* on the European dwarf mantis, *Ameles spallanzania* (Rossi, 1792) in France.

On 12 May 2023, in the Jonquier calanque, along the customs path under the “côte bleue” T. E. R viaduct,

(43.336449° N 5.252317° E, elevation 30 m) at approximately 22:27, a sub-adult *H. turcicus* (ca. 10 cm total length) was observed on a tangle of rocks holding in its mouth an adult female *A. spallanzania* (Fig. 3), mainly diurnal species. Weather conditions were mild, with an air temperature of 18°C, clear skies, and a light wind from the south (around 20 km/h). The gecko was holding its prey firmly in its jaws, then it managed to cut the insect in half by violently and repeatedly striking it against the rock on which it was standing (Fig. 4). The gecko then began to consume the mantis, first swallowing the anterior portion of its prey before finishing its posterior parts. Once it had finished eating, the gecko returned to the rocks and continued to maraud. Approximately 7 or 8 min passed between the time of capture of the mantis and when the prey was fully consumed. Only a few voucher photos were taken at the onset of the predation to avoid possibly disturbing the event by artificial lights. Fifteen Mediterranean House Geckos were seen that evening (during the 1 h 30 min prospecting of 2 km of the trail), however, only one individual was observed feeding.

This predation observation indicates the ability of *H. turcicus* to prey on a sizeable (nearly 25% the size of



Fig. 4. On 12 May 2023, a Mediterranean house gecko (*Hemidactylus turcicus*) catches and eats a large and potentially dangerous European dwarf mantis (*Ameles spallanzania*), Calanque du Jonquier, Bouches-du-Rhône, France. Photo by Arnaud Roudil.

the gecko) and potentially dangerous prey, which is not common among representatives of the genus *Hemidactylus* (Tkaczenko et al., 2014; Mienis, 2015). Acosta-Chaves et al. (2015), have reported sightings of geckos (genus *Thecadactylus*) occasionally actively pursuing Mantodea, and other large prey. On the other hand, numerous observations of Mantodea predation on representatives of the Gekkonidae (e.g., in Australia) have been published, confirming the risks taken by the lizards that hunt them (McCormick and Polis, 1982; Wright, 1982; Bauer, 1990; Jehle et al., 1996; Valdez, 2020). In the Jonquier calanque, it is also possible to observe another mantis, the largest species present in France, the European mantis, *Mantis religiosa* (Linnaeus, 1758) but at the best of our knowledge, there is no reported case of predation by *H. turcicus* (Nardi and Spada, 2023).

The diet of *H. turcicus* is still relatively unknown in natural populations due to its nocturnal lifestyle, as is its distribution in the wild (Lescure and de Massary, 2012). Its capture technique, which consists of holding the prey

in its mouth in the middle of its body and slamming it violently against a rock until it dies, is an interesting novelty in the way to handle preys by lizards (O'Connell and Formanowicz, 1998). It allows the lizard to quickly dispatch its prey, deemed potentially dangerous, while reducing the mantis's chances of a counter-attack, by breaking the large prey into pieces that are easier to swallow. This technique is similar to how other lizards feed on dangerous preys, such as on scorpions or bees and wasps (Žagar et al., 2011; Whitford et al., 2022). Observations such as these, even as single events, broaden the scope of information about the understanding of the composition of gecko diets and their hunting behaviors. Future research, including DNA analysis of *H. turcicus* feces, could greatly improve our understanding of that gecko's diet.

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