

SHORT COMMUNICATION

The gecko's last dance: *Aegaeobuthus gibbosus* (Brullé, 1832) (Scorpiones: Buthidae) prey on *Mediodactylus kotschy* (Steindacher, 1870) (Squamata: Gekkonidae) in Greece

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Abstract. Scorpions mainly feed on insects and other invertebrates. However, several species include small vertebrates in their diets. Here, we report a case of lizard consumption by a Mediterranean scorpion. This is the first documented case of *Aegaeobuthus gibbosus* (Brullé, 1832) (Buthidae) preying on the gecko *Mediodactylus kotschy*, adding to a limited body of reports of lizard predation by European scorpions.

Keywords: Kotschy's gecko, Mediterranean, predation, saurophagy, scorpion

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Scorpions are commonly consumed by amphibians (Jared et al. 2020; Rodríguez-Cabrera et al. 2020) and reptiles (Castilla et al. 2008; Žagar et al. 2011; Jablonski et al. 2015; Akram et al. 2020; Vacheva & Naumov 2024). However, in some cases the roles are reversed and scorpions act as predators (Formanowicz et al. 1981; Castilla 1995; Roberts et al. 1999). In arid, oligotrophic habitats, insect prey may be scarce, and lizards could provide an important part of the scorpion diet (Williams 1971; Castilla et al. 2008). Several species of North American and African scorpions are known to prey on diurnal lizards (McCormick & Polis 1982).

The family Buthidae is the largest family of scorpions, with more than 90 genera and 1,100 species (Ojanguren-Affilastro et al. 2017). The members of this family colonized all the continents except for Antarctica and are mainly distributed in tropical, subtropical and some temperate regions (Fet et al. 2000). The species *Mesobuthus gibbosus* occurs in the southern Balkans and Turkey (Fet et al. 2000). Adults may reach a total length of 8.5 cm (Kinzelbach 1975). It is nocturnal (Kinzelbach 1975), aggressive and among the most toxic of the European scorpions (LD50: 0.4 mg in mice, 2.4 mg in rats) (Lebez et al. 1980). In a recent taxonomic review, the new genus *Aegaeobuthus* was created and thus the new name attributed to the species is *Aegaeobuthus gibbosus* (Brullé, 1832) (Kovářík et al. 2019).

Here, we report a case of predation of the Kotschy's gecko (*Mediodactylus kotschy*) by *A. gibbosus*. *Mediodactylus kotschy* is a small thin-toed gecko with a total length of up to 10 cm (Valakos et al. 2008). Historically, the species was considered native to southeastern Europe and the Levant (Sindaco & Jeremčenko 2008). Nonetheless, an impressive among-population variation was described, and an increasing number of new species were separated from the *M. kotschy* cluster (Kotsakiozi et al. 2018, 2024). As such, the distribution of the species is now limited to Greece, Albania, North Macedonia and Bulgaria (Kotsakiozi et al. 2018; Pafilis & Maragou 2020). *Mediodactylus kotschy* lives primarily in arid, rocky habitats up to 1,700 m above sea level, and is also found in shrubs and human-made structures (Çiçek et al. 2015; Lymberakis et al. 2018).

On 6 August 2022, at 23:47 hours, in Zevgolatio village (Achaea, Peloponnese, Greece, 37° 49' 55.704" N, 22° 7' 34.032" E; elevation 458 m), we observed the capture of a juvenile *M. kotschy* individual by an adult *A. gibbosus* (Fig. 1). The landscape in the area consists of maquis and phrygana shrubland, dominated by Kermes oak (*Quercus coccifera*), a seasonally inhabited settlement, with abandoned agricultural fields, surrounded by terraces and dry-stone walls. The night was overcast, with the temperature reaching 31°C, humidity 40% and the moon phase at waxing gibbous. We observed and photographed a predation event between *A. gibbosus* and *M. kotschy* on a rural house wall (Fig. 1). The scorpion stung the gecko and then grabbed it, first with its right and then its left

pedipalp. *A. gibbosus* started consuming its prey by the head, while it was still alive, but stopped and quickly retreated to its shelter.

Saurophagy (Greek: σαύρα, savra, “lizard” and φαγία, phagia, “to eat what the first part denotes”), or lizard consumption, by scorpions in Europe is known only from the Columbretes Archipelago in Spain (Castilla 1995;



Figure 1.—Adult *Aegaeobuthus gibbosus* holds its prey, a juvenile *Mediodactylus kotschy*, Zevgolatio Achaea, Peloponnese.

Castilla et al. 2008). Some incidents of vertebrate consumption by invertebrates have been reported from Greece in the recent past, for instance a case of *Scolopendra cingulata* (Myriapoda: Scolopendridae) consuming a *Podarcis erhardii* (Deimezis-Tsikoutas et al. 2020), a *Steatoda triangulosa* (Walckenaer, 1802) (Theridiidae) consuming a *M. kotschy* (Vitkauskaitė et al. 2021), a *Lethocerus patruelis* (Insecta: Belostomatidae) consuming a *Pelophylax kurtmuelleri* (Christopoulos et al. 2022), a *Potamon pelops* (Crustacea: Potamidae) consuming a *Natrix natrix* (Groen et al. 2023) and a *Potamon karpathos* consuming a *Pelophylax cerigensis* (Christopoulos et al. 2024). However, to the best of our knowledge, this is the first report of an *A. gibbosus* preying on *M. kotschy*. The activity of *A. gibbosus* is affected by the phases of the moon. According to Kaltsas et al. (2008) and Kaltsas & Mylonas (2010), the high moonlight negatively affects the general activity of *A. gibbosus*, while its foraging activity is highest between 22:00 and 01:00. The time and phase of the moon on the day of our observation are consistent with both of the above.

Several relevant reports of scorpions preying on lizards have been published throughout the world over the past years (Teruel & de Armas 2012; Teruel et al. 2020; Rodríguez-Cabrera et al. 2021; Cubas-Rodríguez et al. 2022). Consumption of vertebrate prey might provide an advantageous energetic profile for the predator, compared to that of invertebrate ones (Grayson et al. 2005; Tennie et al. 2014), even though some evidence suggests that invertebrate predators might be more efficient at extracting nutrients from arthropod prey (Wilder & Simpson 2022). It is unclear how widespread such behavior is among European scorpions. If our observation is not an isolated event, this behavior's impact on the area's trophic ecology could be significant. Interactions between scorpions and lizards require more thorough research to fully understand their role in the population dynamics of both taxonomic groups.

LITERATURE CITED

- Akram M, Mecke S, Dhakate PM, Vashistha G. 2020. Predation of a scorpion by a Kashmir rock agama (*Laudakia tuberculata*) in Nainital, India. *Herpetology Notes* 13:1095–1097.
- Castilla AM. 1995. Interactions between lizards (*Podarcis hispanica atrata*) and scorpions (*Buthus occitanus*) in the Columbretes Islands. *Bolletí de la Societat d' Història Natural de les Balears* 38:47–50.
- Castilla AM, Herrel A, Gosá A. 2008. Mainland versus island differences in behaviour of *Podarcis* lizards confronted with dangerous prey: the scorpion *Buthus occitanus*. *Journal of Natural History* 42:2331–2342.
- Christopoulos A, Daskalaki H, Vlachopoulos K, Pafilis P. 2022. Predation of the Balkan frog *Pelophylax kurtmuelleri* (Gayda, 1940) (Anura: Ranidae) by the giant water bug *Lethocerus patruelis* (Stål, 1854) (Hemiptera: Heteroptera: Belostomatidae). *Entomological Science* 25(1):e12499.
- Christopoulos A, Kotselis C, Protopappas D, Spaneli V, Pafilis P. 2024. Lethal grip for an endangered endemic frog: The freshwater crab *Potamon karpathos* (Decapoda, Potamidae) preys on Karpathos water frog *Pelophylax cerigensis* (Anura, Ranidae). *Herpetozoa* 37:295–298.
- Çiçek K, Afsar M, Kumas M, Ayaz D, Tok CV. 2015. Age, growth and longevity of Kotschy's gecko, *Mediodactylus kotschy* (Steindachner, 1870) (Reptilia, Gekkonidae) from Central Anatolia, Turkey. *Acta Zoologica Bulgarica* 67:399–404.
- Cubas-Rodríguez A, Teruel R. 2022. Predation by arachnids (Araneae, Scorpiones) on reptiles and amphibians (Anura, Squamata) in Costa Rica and Mexico. *Revista Ibérica de Aracnología* 41:153–157.
- Deimezis-Tsikoutas A, Kapsalas G, Pafilis P. 2020. A rare case of saurophagy by *Scolopendra cingulata* (Chilopoda: Scolopendridae) in the central Aegean Archipelago: a role for insularity? *Zoology and Ecology* 30:48–51.
- Fet V, Sissom WD, Lowe G, Braunwalder ME. 2000. Catalog of the scorpions of the world (1758–1998). The New York Entomological Society. New York.
- Formanowicz JDR, Stewart MM, Pough FH, Brussard PF. 1981. Predation by giant crab spiders on the Puerto Rican frog *Eleutherodactylus coqui*. *Herpetologica* 37:125–129.
- Grayson KL, Cook LW, Todd MJ, Pierce D, Hopkins WA, Gatten RE Jr, et al. 2005. Effects of prey type on specific dynamic action, growth, and mass conversion efficiencies in the horned frog, *Ceratophrys cranwelli*. *Comparative Biochemistry and Physiology Part A: Molecular & Integrative Physiology* 141:298–304.
- Groen J, Bok B, Tzoraz E. 2023. Predation of a grass snake *Natrix natrix* by a Peloponnesian freshwater crab *Potamon pelops*. *Herpetological Bulletin* 165:46–47.
- Jablonski D, Zerzán D, Çiçek K. 2015. Scorpions as a prey for Ottoman viper, *Montivipera xanthina*: The first record from southwestern Anatolia, Turkey. *Biharean Biologist* 9(1):78–79.
- Jared C, Alexandre C, Mailho-Fontana PL, Pimenta DC, Brodie ED, Antoniazzi MM. 2020. Toads prey upon scorpions and are resistant to their venom: A biological and ecological approach to scorpionism. *Toxicon* 178:4–7.
- Kaltsas D, Mylonas M. 2010. Locomotory activity and orientation of *Mesobuthus gibbosus* (Scorpiones: Buthidae) in central Aegean Archipelago. *Journal of Natural History* 44:1445–1459.
- Kaltsas D, Stathi I, Mylonas M. 2008. The foraging activity of *Mesobuthus gibbosus* (Scorpiones: Buthidae) in central and south Aegean archipelago. *Journal of Natural History* 42:513–527.
- Kinzelbach R. 1975. Die Skorpione der Aegäis. Beiträge zur Systematik, Phylogenie und Biogeographie. *Zoologische Jahrbücher, Abteilung für Systematik* 102:12–50.
- Kotsakiozi P, Antoniou A, Psonis N, Sagonas K, Karameta E, Ilgaz Ç, et al. 2024. Cryptic diversity and phylogeographic patterns of *Mediodactylus* species in the Eastern Mediterranean region. *Molecular Phylogenetics and Evolution* 197: 108091. <https://doi.org/10.1016/j.ympev.2024.108091>
- Kotsakiozi P, Jablonski D, Ilgaz Ç, Kumlutas Y, Avcı A, Meiri S, et al. 2018. Multilocus phylogeny and coalescent species delimitation in Kotschy's gecko, *Mediodactylus kotschy*: hidden diversity and cryptic species. *Molecular Phylogenetics and Evolution* 125:177–187.
- Kovářik F. 2019. Taxonomic reassessment of the genera *Lychas*, *Mesobuthus*, and *Olivierius*, with descriptions of four new genera (Scorpiones: Buthidae). *Euscorpius* 288:1–27.
- Lebez D, Maretic Z, Ladavac J, Meden M. 1980. *Mesobuthus gibbosus* – A potentially dangerous European scorpion. Pp. 187–190. *8Internationaler Arachnologen Kongress, Wien*.
- Lymberakis P, Pafilis P, Poulakakis N, Sotiropoulos K, Valakos ED. 2018. The amphibians and reptiles of the Aegean Sea. Pp. 169–189. In *Biogeography and Biodiversity of the Aegean*. In honour of Prof. Moysis Mylonas. (Sfenthourakis et al. (Eds.). Broken Hill Publishers Ltd, Nicosia, Cyprus.
- McCormick S, Polis GA. 1982. Arthropods that prey on vertebrates. *Biological Reviews* 57:29–58.
- Ojanguren-Affilastro AA, Adilardi RS, Mattoni CI, Ramírez MJ, Ceccarelli FS. 2017. Dated phylogenetic studies of the southernmost American buthids (Scorpiones; Buthidae). *Molecular Phylogenetics and Evolution* 110:39–49.
- Pafilis P, Maragou P. 2020. Atlas of Amphibian and Reptiles of Greece. Broken Hill Publishers Ltd, Nicosia.
- Roberts DT, Hartdegen RW, Formanowicz D. 1999. *Hemidactylus turcicus* (Mediterranean Gecko). Predation. *Herpetological Review* 30:41–42.
- Rodríguez-Cabrera TM, Savall EM, Teruel R. 2021. Amphibians and reptiles as prey of *Heterothenus junceus* (Scorpiones: Buthidae), with a summary of vertebrate predation by scorpions in the West Indies. *Euscorpius* 342:1–6.
- Rodríguez-Cabrera TM, Teruel R, Morell Savall E. 2020. Scorpion predation in Cuba: new cases and a review. *Euscorpius* 306:1–7.
- Sindaco R, Jeremčenko VK. 2008. The reptiles of the Western Palearctic I. Annotated checklist and distributional atlas of the turtles, crocodiles, amphisbaenians and lizards of Europe, North Africa, Middle East and Central Asia; Latina: Edizioni Belvedere.
- Tennie C, O'Malley RC, Gilby IC. 2014. Why do chimpanzees hunt? Considering the benefits and costs of acquiring and consuming vertebrate versus invertebrate prey. *Journal of Human Evolution* 71:38–45.

- Teruel R, de Armas LF. 2012. Redescrición de *Rhopalurus junceus* (Herbst, 1800) (Scorpiones: Buthidae). *Boletín de la Sociedad Entomológica Aragonesa* 50:153–174.
- Teruel R, Forcelledo J, Yong S. 2020. Otro caso de depredación de lagartos por escorpiones en Cuba. *Boletín del Grupo de Sistemática y Ecología de Artrópodos Caribeños* 7:1–4.
- Vacheva E, Naumov B. 2024. The common wall lizard *Podarcis muralis* (Reptilia: Lacertidae) shows diverse food preferences and intraspecific difference: a study case from Bulgaria. *Turkish Journal of Zoology* 48:188–197.
- Valakos ED, Pafilis P, Sotiropoulos K, Lymberakis P, Maragou P, Foufopoulos J. 2008. The Amphibians and Reptiles of Greece. Frankfurt am Main, Chimaira.
- Vitkauskaitė A, Dunbar JP, Lawton C, Dalagiorgos P, Allen MM, Dugon MM. 2021. Vertebrate prey capture by *Latrodectus mactans* (Walckenaer, 1805) and *Steatoda triangulosa* (Walckenaer, 1802) (Araneae, Theridiidae) provide further insights into the immobilization and hoisting mechanisms of large prey. *Food Webs* 29(2): e00210.
- Wilder SM. & Simpson SJ. 2022. A vertebrate, the fence skink, is a common but relatively low-quality prey for an invertebrate predator, the redback spider. *Food Webs* 32:e00236
- Williams SC. 1971. In search of scorpions. *Pacific Discovery* 24:1–10.
- Žagar A, Trilar T, Carretero MÁ. 2011. Horvath's rock lizard, *Iberolacerta horvathi* (Méhely, 1904), feeding on a scorpion in Slovenia. *Herpetology Notes* 4:307–309.

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