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The first record of insular populations of the Western Peloponnese Wall Lizard, *Podarcis peloponnesiacus* (Bibron & Bory, 1833) and the herpetofauna of three satellite islands of Peloponnese, Greece

Alexios Panagiotopoulos[1,*], Philippos Katsiyiannis[2], and Sinos Giokas[1]

The Western Peloponnese Wall Lizard, *Podarcis peloponnesiacus*, is an endemic species of the western Peloponnese peninsula in southern Greece. Its sister cryptic species, *Podarcis thais*, is found on the eastern Peloponnese peninsula, on the islet Psili in the Argolic Gulf, and Elafonisos island in Lakonia Prefecture (Broggi, 2016; Kiourtsoglou et al., 2021). Since the separation of these two cryptic species, no insular populations of *P. peloponnesiacus* are known.

The Messenian Oinousses Island complex (Fig. 1) consists of 25 uninhabited islands and islets located near (minimum distance ~1500 m) the mainland of Messenia Prefecture (Alexopoulos et al., 2013). The depths between these islands and the coastline are less than 50 meters. It has been estimated that they were probably connected to the mainland ~11,800 years before present (YBP), when sea level was 60 meters lower than today (Perissoratis and Conispoliatis, 2003). The islands are included in the Natura 2000 protected area "Nisoi Sapientza and Schiza, Akrotirio Akritas" coded GR2550003.

Sapientza Island, the closest to the mainland; ~1500 meters away. It is the second largest island (9 km²) in the complex, with a rocky terrain and dense Mediterranean vegetation. Its highest elevation is 219 m. The main habitat types are maquis dominated by *Quercus coccifera* and *Pistacia lentiscus*. Additionally, a unique broadleaf evergreen forest of *Arbutus unedo*, *Phillyrea angustifolia*, *Olea europaea oleaster*, *Quercus coccifera*, *Pistacia lentiscus*, and *Quercus ilex* covers 0.24 km² of the island and is recognised as a preserved nature monument by the Greek state (Act B/656/01-10-1986). The island's only building is an abandoned lighthouse, and the dense vegetation can only be traversed via a few trails. Sapientza is also a hunting destination, with introduced Cretan Ibexes (*Carpa hircus cretica*) and Mouflons (*Ovis gmelina*) that are legally hunted under the auspices of the Kalamata Forestry Services.

Schiza Island is the largest (12 km²) of the Oinousses complex. It also has a rocky terrain and dense maquis habitat dominated by *Quercus coccifera* and *Pistacia lentiscus*. The highest elevation on the island is 201 m. Schiza is a restricted area used by the Greek Army, with access only possible from the north side.

Agia Marina, the fourth largest island (0.5 km²) in the complex, is significantly smaller than the previous two and located between them. Its maximum elevation is 30 m, and it has a rocky terrain and dense maquis vegetation. The only path on Agia Marina leads to a church in the middle of the island, the sole building there. Alternatively, the island can be circumnavigated via its rocky coastline.

The herpetofauna communities on these islands have not been extensively investigated. Chondropoulos and Chiras (1997) documented the presence of the Marginated Tortoise (*Testudo marginata*) on Sapientza Island. Dimitropoulos and Ioannides (2002) mentioned *T. marginata* and the Greek Keeled Lizard (*Algyroides moreoticus*) on Sapientza, but there is no publication in scientific journals for the latter. Additionally, no other terrestrial reptile species have been documented in the Standard Data Form (SDF) of the Natura 2000 site GR2550003.

Therefore, the aim of our survey was to investigate the aforementioned three islands (Schiza, Sapientza, and Agia Marina) for the possible presence of *Podarcis peloponnesiacus* and other reptile species in general.

We conducted a herpetological survey on all three

[1] Department of Biology, University of Patras, Panepistimioupoli Rio, Patras GR 26500, Greece.
[2] Kato Platanovrysi, Chalandritsa, Achaia GR-25008, Greece.
[*] Corresponding author. E-mail: alexispan556677@gmail.com

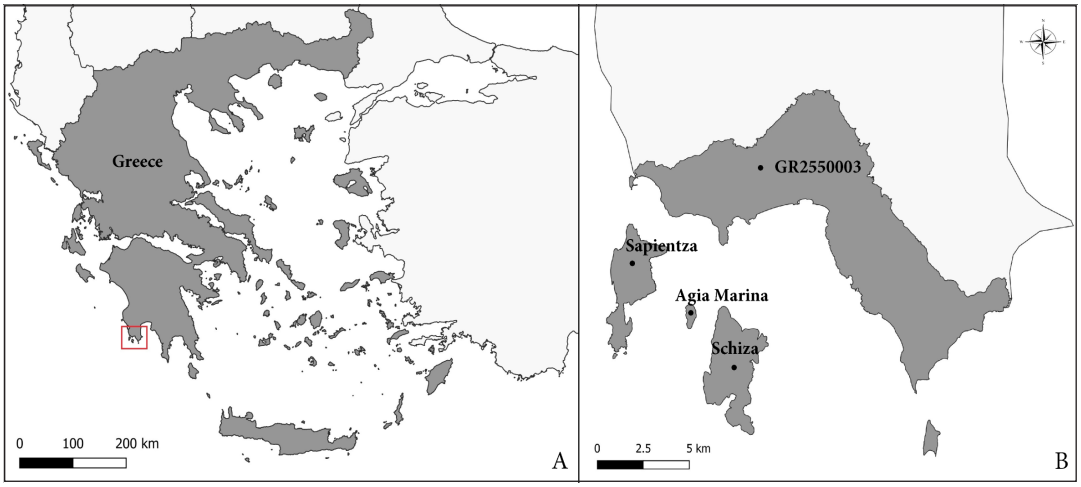

Figure 1. (A) Map of Greece; the red box denotes the study area. (B) Study area: Messenian Oinousses island complex (dark grey colour denotes the Natura2000 protected area GR2550003).

islands on 7 and 8 May 2024. Sapientza was surveyed on both days, while Agia Marina and Schiza were only surveyed on the last day. During the surveys we actively searched for reptiles. On the first day, the survey on Sapientza Island started at 07:40 h and ended at 13:30 h. On the second day, the survey at Agia Marina began at 08:00 h and lasted 90 minutes. We then moved to Schiza and began surveying at 10:15 h, which lasted for only 10 minutes because of the wavey sea that did not permit to access the island for a longer periode. Lastly, the survey at Sapientza began at 11:00 h and lasted 120 minutes. The weather was sunny on both days, with temperatures ranging between 17–30°C.

Table 1. Species and occurrences detected during surveys on three islands of the Messenian Oinousses Island complex.

Species	Islands		
	Sapientza	Agia Marina	Schiza
Ablepharus kitaibelii	-	+	-
Algyroides moreoticus	+	+	-
Hemidactylus turcicus	+	+	-
Mediodactylus kotschyi	-	+	-
Malpolon insignitus	-	+	-
Mauremys rivualta	+	-	-
Platyceps najadum	+	-	-
Podarcis peloponnesiacus	+	-	+
Pseudopus apodus	+	-	-
Testudo marginata	+	-	-

Species diversity. A total of 114 reptile specimens, belonging to ten species, were recorded across the three islands. The results are presented per island in Table 1.

Sapientza.—Podarcis peloponnesiacus: Recorded for the first time on Sapientza, this was the most common species on the island, with 77 individuals found in both maquis and broadleaf evergreen forest habitats. *Algyroides moreoticus*: The presence of the Greek Keeled Lizard on Sapientza was confirmed, with three individuals observed moving through the leaf litter in the broadleaf evergreen forest. *Hemidactylus turcicus*: Four individuals were recorded in three locations: one in a ruin, two at a small, prefabricated building, and one in a water tank building. *Platyceps najadum*: Two Dahl's Whip Snakes were found, the only snake species recorded on the island. Both were seen basking in the maquis habitat along the trail to the lighthouse. *Pseudopus apodus*: One European Glass Lizard was observed moving on the ground in the broadleaf evergreen forest. *Testudo marginata*: The presence of the Marginated Tortoise on Sapientza was confirmed with one dead adult male found in an open valley called "Spartolakka" which also contained some *Pistacia lentiscus*. Additionally, two tortoise eggs, probably of the same species, were found, one of which was intact.

Mauremys rivulata: One dead specimen of the Balkan Terrapin was also found in Spartolakka.

Agia Marina.—Ablepharus kitaibelii: Three Snake-eyed Skinks were observed moving on the ground. *Algyroides moreoticus*: The Greek Keeled Lizard was

Figure 2. (A) The emblematic broadleaf evergreen forest in Sapientza Island, (B) Arboreal behaviour of an adult male *Podarcis peloponnesiacus* basking. Photos by Philippos Katsiyiannis.

also recorded on Agia Marina. It was the most abundant reptile species on the island, with ten individuals observed. This suggests a denser population compared to Sapientza, despite the smaller size of Agia Marina and the shorter survey period. *Hemidactylus turcicus*: Three Mediterranean House Geckos were recorded around the church. *Mediodactylus kotschyi*: Kotschy's Gecko was the second most abundant reptile on the island, with six individuals recorded. Most were found near the church, with others basking on piles of stones along the trail. *Malpolon insignitus*: The Eastern Montpellier Snake was the only snake species found on Agia Marina. One large adult male was observed basking on the trail.

Schiza.—Podarcis peloponnesiacus: Although the survey on Schiza was brief, lasting only ten minutes, it was sufficient to achieve the main goal. Two individuals of *P. peloponnesiacus* were observed basking on rocks near the coast.

In our survey we recorded for the first time the occurrence of *P. peloponnesiacus* on Sapientza and Schiza. The presence of this species on these islands was anticipated due to their geographic location, habitat suitability, recent isolation from the mainland, and the abundance of the species in Messenia Prefecture. We believe the absence of the Western Peloponnese Wall Lizard from Agia Marina is due to the island's small area, which may not support this species, and the very dense vegetation that covers the island, preventing the formation of suitable microhabitats for thermoregulation. However, by just visiting the island for such a short period, it is not excluded that we might not have detected the species, and future investigations should be done. For example, its sister species, *P. thais*, has been recorded on Psili Islet, which, although small (2.1 km², four times larger than Agia Marina), has an elevation above 210 m, about seven times higher than Agia Marina.

A notable observation on Sapientza Island was the increased arboreal behaviour of *P. peloponnesiacus*. Maragou (1997) recorded that around Stymfalia Lake (Korinthia pref. Peloponnese), 5% of 167 adult specimens were found on vegetation substrates, whereas Sagonas et al. (2017) did not record any of 85 specimens on trees or shrubs at Doxa Lake (Korinthia pref.). During our extensive research on the species' ecology, including observations of about 600 individuals from numerous sites in Peloponnese, only ~2% of the individuals were found climbing on bushes and/or trees (unpublished data, Panagiotopoulos). In contrast, on Sapientza Island, 13 of 77 individuals (~17%) exhibited arboreal activity, particularly in the broadleaf evergreen forest. The limited light reaching the forest floor may force the lizards to climb trees to thermoregulate. Tree hollows could provide shelter from predators. Such thermoregulatory behaviours have been observed in lizard species such as Hispaniolan anoles that show arboreal behaviour at lower elevation and ground-dwelling behaviour at high elevation (Adolph, 1990). Another explanation could be the absence of certain predators or competitive species, allowing *P. peloponnesiacus* to exploit trees as microhabitats. Further investigation is necessary as the data from Sapientza are insufficient to provide a reliable explanation for this behaviour.

The case of a dead *Mauremys rivulata* on Sapientza is controversial because, to our knowledge, there is no water body on the island. A reasonable explanation for

the specimen's presence could be that it was passively transferred as a prey by a predatory bird. Alternatively, it could have entered the sea from the Messenia mainland in search of estuaries and suitable habitats, been swept away, and died on Sapientza from exhaustion and lack of freshwater.

Regarding the species richness of Sapientza, we believe more species are yet to be discovered. The area's variety of habitats is sufficient to support species found in Messenia Prefecture and/or Agia Marina Island, such as *Ablepharus kitaibelii*, *Malpolon insignitus*, *Mediodactylus kotschyi*, and *Telescopus fallax*. Species richness on Agia Marina Island is quite high for its small area. However, we expect more herpetofauna species to be found there due to limited time of investigation of our survey. More surveys are needed to complete our understanding of herpetofauna on these islands.

This is the first time a targeted herpetological survey was undertaken on the three islands of the Messenian Oinousses archipelago, resulting in new species records and adding new insular areas to the currently known distribution of herpetofaunal species. The ten species recorded on the three islands are also new records for the Natura2000 site GR2550003. As shown in recent literature (e.g., Strachinis, 2022; Foufopoulos et al., 2023), our findings point out that herpetofauna on many Greek islands and islets are still overlooked or underexplored, and thus, additional future discoveries are likely.

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