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Abstract

The Aegean Sea contains thousands of islands that harbor many isolated, and therefore unique populations of herpetofauna. Despite herpetological survey efforts that stretch back over 150 years, many islands still have incomplete species lists. Despotiko is a small, largely uninhabited island with a significant archaeological site. A recent survey performed by Poole *et al*. in 2024 added two new records (*Eryx jaculus*, *Lacerta citrovittata*) since the last published survey by Gruber and Fuchs in 1977, but they failed to find a few snake and lizard species previously known to inhabit the island. Here, we report recent sightings and provide first-hand observations of species missing from the Poole *et al.* survey and add the first known record of *Vipera ammodytes* from Despotiko. These observations increase the documented reptile diversity of the island and highlight the importance of continued biodiversity surveys in the Cyclades, where species inventories remain incomplete despite growing research effort.

Keywords: Aegean, Archaeological Site, Biodiversity, Eryx, Laudakia, Reptiles, Vipera

Introduction

Mediterranean islands are renowned for their unique biodiversity and complex biogeographic histories (Lymberakis & Poulakakis, 2010; Poulakakis *et al.,* 2015). The Cyclades archipelago in the central Aegean Sea, in particular, contains numerous islands that remain incompletely surveyed despite their ecological and conservation importance. Recent work by Poole *et al*. (2025) provided an updated assessment of the herpetofauna of Despotiko island, providing two new records (*Eryx jaculus* and *Lacerta citrovittata*) and contributing valuable information on the distribution of reptiles within the region.

Despotiko is a small, uninhabited island located off the southwest coast of Antiparos where it is separated by a narrow channel (Fig. 1). Although archaeological investigations have received considerable attention due to the island's importance as an ancient sanctuary (Kourayos *et al.*, 2020), its fauna remains poorly documented. Only two surveys of the island have been published (Gruber & Fuchs, 1977; Poole *et al.*, 2025) wherein seven reptile species, five lizards and two snakes, were documented: *Abelpharus kitaibelli*, *Eryx jaculus*, *Hemidactylus turcicus*, *Lacerta citrovittata*, *Laudakia stellio*, *Mediodactylus kotschyi*, and *Natrix natrix*. These species were first documented by Gruber and Fuchs in 1977 with the exception of *Eryx jaculus* and *Lacerta citrovittata*, which were first recorded by Poole *et al*. in 2025. Here, we provide records of four reptile species, three snakes and one lizard, observed by us during recent field surveys that were not documented in the species inventory presented by Poole *et al*. (2025). Importantly, we confirm the presence of previously observed herpetofauna, including a cryptic water snake (*Natrix natrix*), and provide the first documented record of the Nose-horned Viper (*Vipera ammodytes*) from the island.

Study Area

Despotiko is a small, uninhabited island located in the central Cyclades archipelago of the southern Aegean Sea, Greece. It is situated immediately southwest of Antiparos and west of

Paros (36°57'45.3126"N, 25°0'12.1998"E, WGS84 datum). The island covers approximately 7.6 km^2 and forms part of the Cycladic island complex, a region shaped by repeated episodes of tectonic activity, sea-level fluctuation, and island fragmentation since the Pleistocene (Foufopoulos & Ives, 1999). Despotiko separated from Antiparos following post-glacial sea-level rise, and both islands were connected during periods of lower sea levels just about 4-5 thousand years ago (Kapsimalis *et al.*, 2009; Kolaiti & Mourtzas, 2020). The island is characterized by rugged topography, with elevations reaching approximately 227 m above sea level. The geological make up of the island is composed primarily of metamorphic rocks, including schists and marbles typical of the Cycladic crystalline basement. Freshwater resources are scarce and are limited to ephemeral pools that form following winter precipitation.

The climate of Despotiko is Mediterranean, characterized by long dry summers and mild, wet winters. During summer months, the island experiences strong northerly winds known as the *Meltemi*, which influence local temperature regimes and evapotranspiration rates.

Vegetation on Despotiko is dominated by phrygana and maquis, a drought-adapted shrub community characteristic of the eastern Mediterranean (Archibold, 1995). Patches of maquis vegetation occur in more sheltered areas of the island and in ravines, while coastal cliff and rocky shoreline areas harbor halophytic plant communities adapted to salt spray exposure. The island has experienced centuries of grazing and human land use, resulting in a mostly open landscape with limited tree cover.

Methods

Field surveys were conducted over several years (May 1 2012, August 7-9 2014, June 3 2015, May 15 and 17 2016, May 14 2017, June 3 2025, May 15 2026). Permits to survey outside of the archaeological site were issued by the Greek Ministry of Environment and Energy (ΥΠΕΝ/ΔΔΔ/166991/484, ΥΠΕΝ/ΔΔΔ/178738/3396, ΥΠΕΝ/ΔΔΔ/138583/836; ΥΠΕΝ/ΔΔΔ/125363/4715, ΥΠΕΝ/ΔΔΔ/4955/185). Reptiles were detected through rock flipping and visual encounter surveys conducted across the entire island with the exception of the interior of the archaeological site. We searched all available habitat types including rocky slopes, phrygana shrublands, beaches, abandoned agricultural fields, and stone walls. Surveys were

conducted during periods of peak daily reptile activity (0800-1630) under suitable weather conditions.

We identified species using external morphological characteristics and regional field guides (Pafilis & Maragou, 2020). We recorded geographic coordinates, habitat characteristics, and photographic vouchers when possible. We compared our observations with published records reviewed in Poole *et al.* (2025) to identify taxa not previously included in their most recent inventory.

Results

We documented four reptile species that were not directly observed or reported by Poole *et al.* (2025): the Javelin Sand Boa, *Eryx jaculus* (N = 11; Fig. 2A), the Starred Agama, *Laudakia stellio* (N = 5, no photo voucher), the Grass Snake, *Natrix natrix* (N = 1, Fig. 2B), and the Nose-horned Viper, *Vipera ammodytes* (N = 20, Fig. 3).

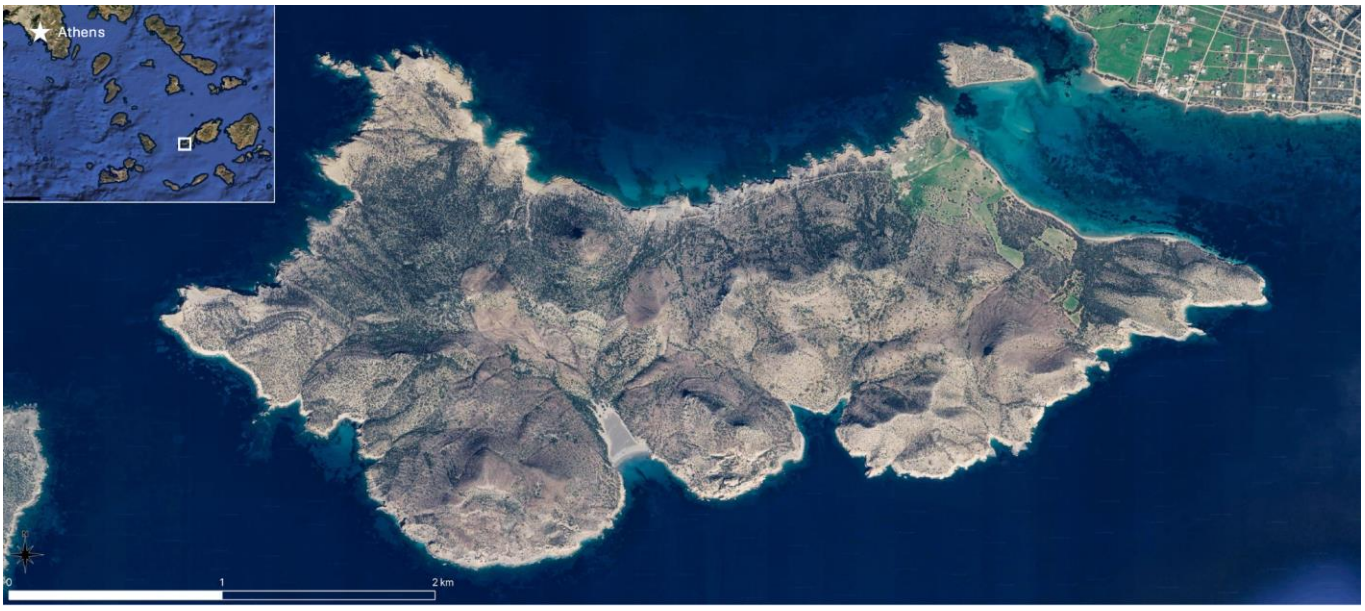

Figure 1. Despotiko island, Central Aegean Sea, Greece.

We observed *Eryx jaculus* during surveys in 2012 (N=4), 2016 (N=2), 2025 (N = 2), and 2026 (N = 3). This species was first reported by Poole *et al*. (2025), who did not find the snake during their surveys but reported a personal observation made by an archaeologist who unearthed this snake while digging at the archaeological site. This species is indeed rather cryptic and exhibits a semifossorial lifestyle. We observed all individuals in rocky areas throughout the island (Fig. 1).

We briefly saw *Laudakia stellio* during surveys in 2014 (N=1), 2017 (N = 1), 2025 (N = 2), and 2026 (N=1). Gruber and Fuchs only observed one individual in 1977, and the Poole *et al.* (2025) survey yielded no sightings of this species. Unfortunately, the *L. stellio* we encountered ran away quickly and we were unable to obtain photographic vouchers of this species. In 2014, one individual was observed on a rock bluff on the western part of the island by one of the authors and almost caught it. It jammed itself into a crevice and the observer could only grab a bit of its tail and was not able to tease the lizard out. In 2017 we observed one individual on a tree near the beach facing Tsimintiri. In 2025 and 2026, we found all three of these lizards on top of dry stone walls surrounding a goat paddock south of the archaeological site.

We observed *Natrix natrix* during a survey in 2017 (N = 1; see Fig. 2B). Gruber and Fuchs first observed this species in 1977, and the Poole et al. (2025) survey yielded no sightings of this water snake. The female individual, measuring 675 mm in total length (550 in SVL), was found on 14 May 2017 at 0822 under a rock in a field in the north-eastern tip of the island, in a pre-shedding state. This individual was larger than the individual recorded by Gruber and Fuchs (1977), which was 520 mm long.

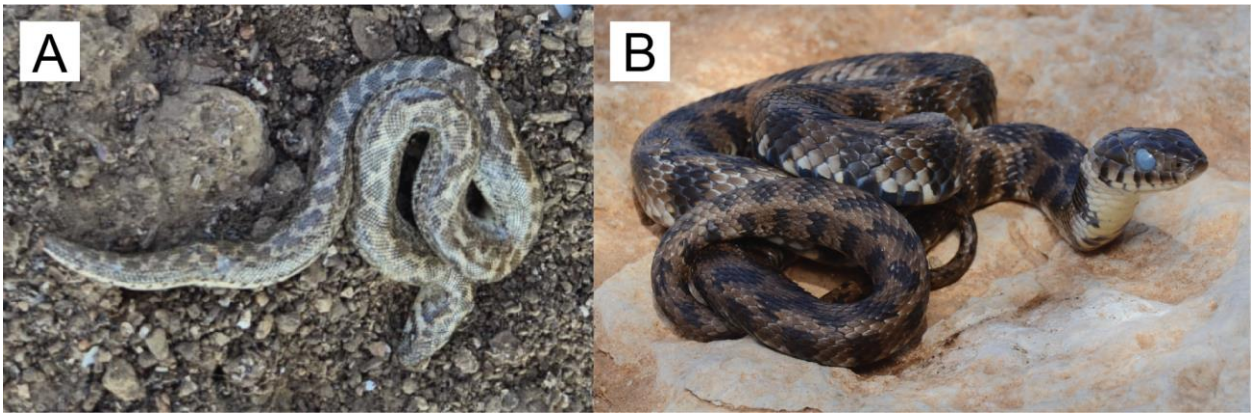

Figure 2. A) Javelin Sand Boa, *Eryx jaculus* from Despotiko (photo by Tucker C. Heptinstall). B) Grass Snake, *Natrix natrix* from Despotiko (photo by David David).

The occurrence of *E. jaculus*, *L. stellio*, and *N. natrix* corroborates observations made by others (Gruber & Fuchs, 1977; Poole *et al.*, 2025). Although these species were not directly observed during surveys conducted by Poole *et al*. (2025), their presence on the island is supported by multiple independent records, including our own recent observations.

We additionally documented *Vipera ammodytes*, representing the first known records of this species from Despotiko island (Fig. 3). We observed some color pattern variation in the vipers, though many individuals were found in shed and appeared more dull than they would post-shed. Phenotypically, these vipers resemble those from neighboring Antiparos. Individuals ranged in size from 168-335 mm total length (Fig. 3). In most cases we found these snakes curled under large rocks between 0800-1300. In total, we observed 20 *V. ammodytes* over 8 days surveying the island one day in May 2012 (N = 8, five females and three males), two days in August 2014 (N=0), one day in June 2015 (N = 4, one male and three females), one day in May 2016 (N = 3, two females and a male), one day in May 2017 (N = 1, female), one day in June 2025 (N = 3, one female and two males), and one day in 2026 (N = 1, a female). We pit-tagged all three individuals in 2025 for future identification, but failed to relocate any individuals in 2026, as the single individual captured in 2026 was untagged.

Figure 3. Nose-horned Vipers, *Vipera ammodytes*, from Despotiko.

Table 1. Observations of additional reptile diversity on Despotiko observed by the authors since 2017 that were not directly observed by Poole *et al.* (2025). The Nose-horned Viper (*V. ammodytes*) has never been reported from this island by previous surveyors.

Species	**Dates**	**Total N Observed**
Eryx jaculus	5/1/12, 5/17/16, 6/3/25, 5/15/26	11
Laudakia stellio	8/8/2014, 5/14/17, 6/3/25,	5

	5/15/26,	
Natrix natrix	5/14/17	1
Vipera ammodytes	5/1/12, 6/11/2015, 5/17/16, 5/14/17, 6/3/25, 5/15/26	20

Discussion

Though it is a small island that has been surveyed by biologists before (Gruber & Fuchs, 1977; Poole *et al*., 2025), Despotiko still offers some uncharted biodiversity yet to be discovered. Our observations demonstrate that the reptile fauna of Despotiko is more diverse than indicated by the recent inventory gathered by Poole *et al*. (2025). Though records of *Eryx jaculus*, *Laudakia stellio*, and *Natrix natrix* were previously available from other sources, their omission from Poole *et al*.'s recent multi-day survey highlights the challenges of compiling comprehensive species lists from even small islands. The discovery of what seems to be a healthy population of *Vipera ammodytes* further emphasizes the value of repeated field surveys and continued monitoring efforts across the Aegean archipelago.

Small Mediterranean islands frequently harbor undocumented populations of reptiles due to limited survey effort, seasonal variation in detectability, and the cryptic nature of many species, snakes in particular (Pafilis *et al*., 2020; Foufopoulos *et al.*, 2024). Although Despotiko is modest in area at only 7.6 km^2, its rough terrain with steep cliffs, open scrub and spiny vegetation, and peaks up to 187 m in elevation provide reptiles with suitable habitat that is difficult for surveyors to access. Even with a team of nine herpetologists deployed across the entire island in 2025, we failed to make many herpetological observations on the west side of the island, despite adequate habitat. It is also important to note that night-time surveys have rarely been conducted on the island, and it would not be surprising to find the nocturnal cat-eyed snake, *Telescopus fallax*, on Despotiko, considering its presence in near-by Antiparos and Tourlos (Gruber, 1974), and an un-vouchered record mentioned by Bruno and Magueri (1990). Additional surveys on Despotiko and neighboring islands will likely continue to refine our

understanding of reptile distributions and evolutionary history within the Cyclades and contribute to broader studies of island biogeography and conservation.

Conclusion

Our observations increase the known reptile diversity of Despotiko island and provide the first documented record of *Vipera ammodytes*. Though the biodiversity of the Aegean archipelago has been formally surveyed for over 150 years (Bedriaga, 1883; Lymberakis *et al.*, 2018; Foufopoulos *et al*., 2024), there is still much work to be done to document, study, and conserve the many unique, isolated island populations scattered throughout the region. As climate change and human impacts rapidly change environmental conditions, it is critical to catalog and conserve island biodiversity across the Aegean before it is lost.

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Author Contributions

KMB: conceptualization, investigation, resources, writing - original draft, visualization. TCH: writing - review and editing, investigation, visualization. YI: writing - review and editing, investigation, resources. SAR: writing - review and editing, investigation, resources.

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