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SHORT COMMUNICATION

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Reptile behaviour in natural refuges - 1. Elevated-body posture of an ocellated lizard *Timon lepidus* walking near refuges occupied by Montpellier snakes *Malpolon monspessulanus* could be interpreted as chemical stealth, with a link to video evidence

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Since 2018, a reptile refuge in the Osona region of north-eastern Spain (42.01° N, 2.28° E) has been systematically monitored using infrared camera traps (Fig. 1). This refuge site is within a Mediterranean mosaic of shrubland, field margins and anthropogenic structures. The cameras had a 180° viewing angle and recorded 10-minute motion-triggered video segments; their small size (8 cm × 4.5 cm × 1.6 cm) and adjustable lens made them ideal for placement at the narrow openings of the refuge. Herein, is a report of an adult ocellated lizard *Timon lepidus* exhibiting a previously undocumented body posture while walking past the entrances to the refuge known to be occupied by Montpellier snakes *Malpolon monspessulanus*.

The study site offers vital thermal and hydric refuges for five reptile species: the lizard *T. lepidus* and the snakes *M. monspessulanus*, *Zamenis scalaris*, *Natrix astreptophora* and *Natrix maura*. What makes this location particularly interesting is the temporal partitioning observed. *Timon lepidus* actively modifies and maintains the refuge structures in early spring, but from mid-May onwards, the site becomes increasingly dominated by *M. monspessulanus*, generally coinciding with the courtship and oviposition period of both species (Serrano-Fochs, 2019). This seasonal overlap results in a dynamic predator-prey interaction as, during the spring and summer, lizards form a substantial proportion of the *M. monspessulanus* diet (Valverde, 1967; Pleguezuelos & Salvador Milla, 2021).

The behaviour observed consisted of a rigid, elevated gait where the lizard lifted its entire body off the substrate, maintaining contact only through its limbs and the mid-to-distal section of the tail, which appeared to provide additional support, while the ventral surface and both the base and tip of the tail remained completely clear of the ground (BHS video, 2026). This unusual posture was first observed on 10 October 2024, with the behaviour best documented on 26 May 2025 at 11:20 h, after an adult *M. monspessulanus* had been recorded exiting the same refuge entrance (last observed at 11:09 h). Camera-trap footage from the same and previous days confirmed that at least three adult *M. monspessulanus* (two males and one female) had been using the refuge during that period. The lizard's approach was notably cautious; it paused to perform tongue-flicking and visual scanning before adopting the elevated posture to traverse the two entrances to the main refuge. Later, on 2 June and 6 June 2025, the same individual repeated this behaviour when entering a second refuge, approximately 2 m away, that was also frequented by *M. monspessulanus*. On this occasion, the lizard supported itself solely on its limbs, with the tail completely lifted off the ground.

Figure 1. Placement of a camera trap at the entrace to a rock refuge to record the activities of reptiles in and around the shelter, relevant video footage can be seen in BHS video (2026)

The timing and context of this behaviour suggest a potential adaptive function related to predator avoidance. The behaviour occurred near refuge entrances known to be occupied by *M. monspessulanus*, during the morning hours and peak reproductive season, when chemical signalling is likely to be most intense. The lizard's cautious tongue-flicking and visual scanning indicate prior detection of the predator's presence, consistent with findings that lizards integrate chemical and visual cues to assess refuge safety (Amo et al., 2004b). A possible explanation of the behaviour is that the lizard was actively minimising scent trail deposition by lifting its body off the ground. Squamates rely heavily on chemical cues for predator detection and social communication (Mason & Parker, 2010). *Timon lepidus*, like many lacertids, possesses specialised femoral glands that secrete complex lipid mixtures used in intraspecific communication (Martín & López, 2014). These secretions, along with general integumental and cloacal chemicals, would typically be deposited on the substrate during standard ventral-dragging locomotion. By elevating its body, the lizard may be reducing this chemical signature and thus its detectability to *M. monspessulanus.*

This interpretation aligns with known antipredator responses in other lacertid species. For example, *Podarcis muralis* discriminates between scents of saurophagous and non-saurophagous snakes and adjusts refuge use accordingly (Amo et al., 2004a; 2004c). *Iberolacerta cyreni* modifies the

composition of femoral gland secretions when exposed to predator cues (Aragón et al., 2008; Martín & López, 2014). However, proactive scent minimisation through altered posture appears not to have been documented in wild reptiles, making this a potentially novel strategy.

While an elevated posture could theoretically serve multiple functions, such as visual deterrence, it would seem that visual intimidation is unlikely in the current context. Typically, lizard threat displays occur during sudden encounters (Martín, 2002; Cooper Jr & Blumstein, 2015), not when voluntarily approaching areas known to be used by predators, where avoidance would normally be the expected response (Martín, 2002; Martín & López, 2000; Cooper Jr et al., 2007). The lizard's pre-movement investigation (tongue-flicking, scanning) indicates awareness of predator presence (Amo et al., 2004a; 2006), making conspicuous visual displays behaviourally improbable in this situation.

The refuge's dual role as shelter and reproductive site may further explain this behavioural adjustment. This site is also used by *T. lepidus* for courtship and egg laying (Serrano-Fochs, unpublished data). For individuals, preserving an attractive chemical signature for mates while simultaneously minimising detection by a predator near a shared refuge poses a complex trade-off. Complete scent suppression could limit reproductive success, whereas prolonged refuge use may deter rivals but increase predation risk, especially under mate competition (Martín, 2002). The elevated posture may therefore reflect a context-dependent compromise: reducing chemical conspicuousness to predators while still permitting essential intraspecific signalling.

This behaviour had rarely been observed in over eight years of continuous monitoring at the site, suggesting it may be rare, context-specific or previously overlooked. Interestingly, *T. lepidus* typically avoids the refuges when snakes are present but quickly reoccupies them once they have left, sometimes even sharing cavities with snake eggs and hatchlings (Serrano-Fochs, 2019). This flexible risk-management mirrors findings in other lizards, which prioritise high-quality refuges despite transient predation risks, balancing survival costs with resource benefits (Amo et al., 2007).

In conclusion, this observation provides new insight into fine-scale behavioural plasticity in a lizard species. Further research could assess whether this posture is a specific response to snakes or to a broader range of predators, and the extent to which it is actually effective in reducing predation risk. Such research would contribute to our understanding of the behavioural adaptability of reptiles and the complex interplay between predator pressure and habitat use.

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