



Unusual mating behavior of *Apathya cappadocica* in the winter season from southeastern Anatolia

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Received: 13 February 2021 / Revised: 14 March 2021 / Accepted: 20 March 2021 / Published online: 28 March 2021.

How to cite: Şahin, M K (2021). Unusual mating behavior of *Apathya cappadocica* in the winter season from southeastern Anatolia, Scientific Reports in Life Sciences 2(2), 49-53. DOI: <http://dx.doi.org/10.22034/srls.2021.525110.1012>

Abstract

Ectothermic organisms, like terrestrial reptiles have very strong physiological tendency to maintain a stable internal environment with buffering the effects of outer conditions. However, they mostly tend to regulate their homeostasis in winter season via hibernation strategy. The members of family Lacertidae are hibernating reptiles, which have relatively rare winter activities. Although winter basking activity might serve a variety of biotic regulations in different species, the Anatolian lizards, *Apathya cappadocica* has not been documented for its winter activity so far. In this study, it is presented that the mating behavior of *A. cappadocica* in warming period in February 2019 from Siirt, Turkey. Any mating observation in this period has not been reported in literature in the Anatolian Peninsula up to date. The climatic oscillation with consequent extraordinarily warm days in winter might cause fluctuations in species phenology traits. However, this situation might also possess several risks in many aspects (i.e. early embryonic development, foraging, escaping from the predators) for the offsprings.

Keywords: Anatolian lizard, Lacertidae, phenology, Turkey

Introduction

The poikilothermic terrestrial vertebrates, such as amphibians, reptiles are strongly dependant to the thermal dynamics, that are involved in their micro and macro habitats (Vitt and Caldwell 2013). From this view, it is a wide-accepted phenomenon that the herptile species, especially reptiles are mostly active in



spring and summer seasons and their activity levels are gradually decreasing by autumn. When the season turns to winter, they tend to hibernate themselves for avoiding the risks of low environmental temperature to regulate their homeostasis (Vitt and Caldwell 2013).

Species that are evaluated within Lacertidae, which is one of the major lizard families in the Northern Hemisphere, have a hibernation strategy during the winter season (Kurnaz *et al.* 2016). One of the outer environmental drivers is the effect of photoperiod, that has a remarkable role in seasonal acclimation, observed in a Lacertid lizard (Rismiller and Heldmaier 1982). Therefore, it can be expressed that the general activity period for Lacertids begins in the early April and ends in the middle of October. Moreover, this period is getting shorter for highland populations (Kurnaz *et al.* 2016).

Even the general activity pattern is as mentioned above, some exceptional winter activities were reported for many lacertid species: i.e. *Zootaca vivipara* (Grenot *et al.* 2000), *Podarcis muralis* (Westerström 2003), *Lacerta viridis* (Vongrej *et al.* 2008) and *Anatololacerta danfordi* (Özkan and Bülbül 2021). However, there has been no winter activity report for the present observed species, *Apathya cappadocica* up to date. The genus *Apathya* Mehely, 1907 is distributed along the Western Asia, represented with two species, and only *A. cappadocica* (Werner, 1902) inhabits in the Anatolian Peninsula (Kapli *et al.* 2013; Gül *et al.* 2015). *A. cappadocica* is a species that prefers generally rocky and mountainous areas with remarkable oak (*Quercus* sp.) ensembles (Bahmani *et al.* 2014). Although there are several studies on different aspects in this species; such as electrophoretic comparison of blood-serum proteins of its subspecies (İlgaz *et al.* 2010), molecular phylogeny (Kapli *et al.* 2013), altitude based life history traits (Gül *et al.* 2015), helminthological survey (Birlik *et al.* 2015) and ecological niche differentiations among its subspecies (Yousefkhani *et al.* 2019), the field based ecological observations on this species are still quite rare.

Material and Methods

The specimens were found during the field survey in Yelkesen, Siirt (Lat: 37.6335, Long: 41.9711; 1159 m a.s.l.), between 12.00 and 13.30 (Figure 1). When the observation was made, the local air temperature was 13 °C and the wind had an Eastern (E) direction and its speed was 7 km/h. The monthly mean temperature in February 2019 was detected as 8.57 °C, when is the second cold month of the year (tr.freemeteo.com). Specimens were observed from a relatively distant point for avoiding the risks of human induced interference and photographed by Canon EOS 70D.

Results and Discussion

On 13.02.2019, one male and one female specimen of *A. cappadocica* were observed in the Southeastern Anatolia. The lizards represented a mating behavior for at least 25 minutes (Figure 2 a,b). To my knowledge, even there have been some winter activity reports for many lizards, the mating behavior in winter season has not been reported for any lacertid in the Palearctic Realm yet. This documentation might enlighten us for understanding the annual activity patterns of *A. cappadocica*. However, it is more probably that this exceptional mating behavior might be a result of global climate change in a restricted scale. Due to the climatic oscillation with consequent extraordinarily warm days in winter, there might be fluctuations in species phenology traits (Jablonski 2013).

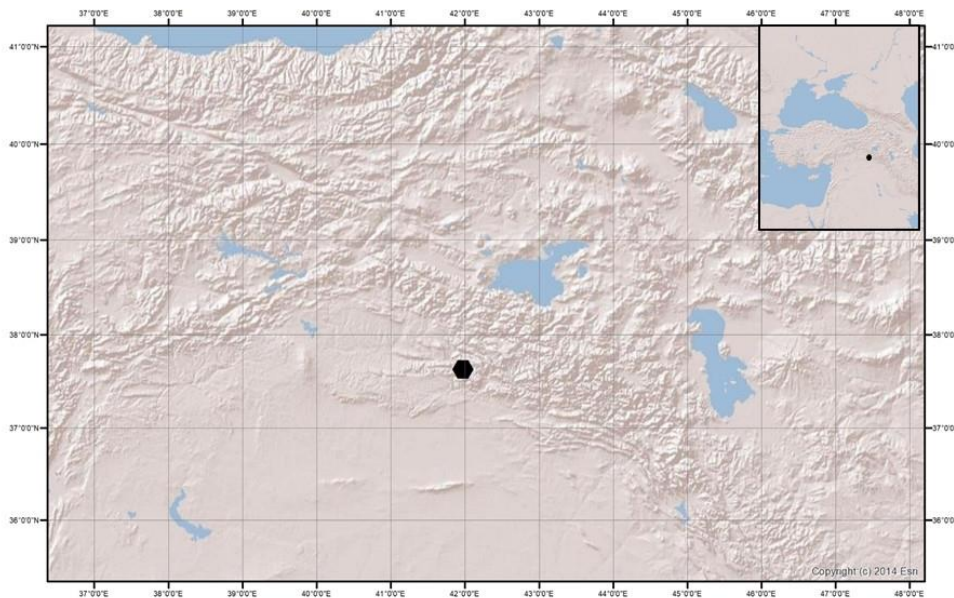


Figure 1: Map showing the observation area (black hexagon)

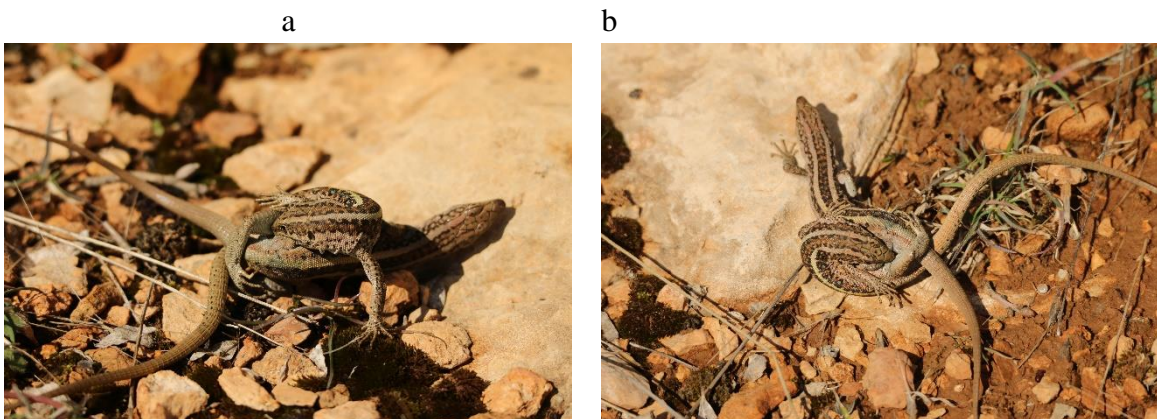


Figure 2: The observed Anatolian lizard specimens while they display mating behavior in Siirt, Turkey (a and b)

The locality of the observation, which is far from rural villages, provides a suitable microclimate for lizards with rocky substrates. Therefore, dynamic activities between hiding in the shelters and basking on the rocks enable lizards to display their life-cycle patterns without any effective local anthropogenic pressure. Nevertheless, early mating activities could cause the embryonic development of the hatchlings negatively and as a result it might effect the reproduction success dramatically (Taylor *et al.* 2020). The other risk of this mating activity might be the mortality of the offsprings. Because it is vital to survive for these young organisms about important activities, such as foraging and escaping from predators. However, if there are not enough nutrient sources, i.e. not many active insects in their microhabitats, they become more vulnerable for protecting themselves from predation. That's why it is strongly suggested that monitoring these lacertid lizards activity in a relatively long period. Thus, it provides us valuable behavioral data to interpret these lizards ecophysiological traits.



Acknowledgments

This work was undertaken by the EKOİZ Environmental Consultancy Company, the Directorate of Nature Conservation and National Parks of the Ministry of Agriculture and Forestry, and the Provincial Directorate of Siirt Nature Conservation and National Parks. I would also like to thank to Mr. Emin SAĞLAM for his participation to the field trip.

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