

Research Article

Early Waking From Hibernation of Some Amphibian and Reptile Species in Gümüşhane Province of Turkey

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Abstract

It is a fact that the amphibians and reptiles respond to unfavourable weather conditions by searching an underground refuge to survive during winter. The current literature has shown that some species of reptilians and amphibians may become active before their known end of hibernation periods, especially in lowland areas. In the present study, it has been detected that the changing weather conditions in a highland area in Gümüşhane, Turkey can cause similar effects on *Lacerta media*, *Bufo bufo* and *Rana macrocnemis* that share the same habitats. One of the reasons of the early activities of some reptilian and amphibian species before their known end of hibernation periods may be the high sensitivity of these species to the changing temperature conditions. Effects of global warming on reptilians and amphibians obvious, and some members of these animals can even be active during winter. This conclusion brings into mind that *L. media*, *B. bufo* and *R. macrocnemis* can continue to be active at highland areas as long as air temperature values allow them.

Keywords: highland, East Black Sea Region, hibernation, Zigana

Türkiye'nin Gümüşhane İlindeki Bazı Amfibi ve Sürüngen Türlerinin Kış Uykusundan Erken Uyanması

Öz

Amfibi ve sürüngenlerin olumsuz hava koşullarına hibernasyon için toprak altında bir sığınak arayarak yanıt verdiği bir gerçekktir. Mevcut literatür, bazı sürüngen ve amfibi türlerinin bilinen hibernasyon bitimi dönemlerinden önce özellikle de düşük rakımlarda aktif olabildiğini göstermiştir. Bu çalışmada, Türkiye'nin Gümüşhane ilinde yüksek rakımda değişen hava koşullarının aynı habitatları paylaşan *Lacerta media*, *Bufo bufo* ve *Rana macrocnemis* üzerinde benzer etkilere neden olabileceği tespit edilmiştir. Bazı amfibi ve sürüngen türlerinde bilinen kış uykusu sonu dönemlerinden önceki aktivitelerinin nedenlerinden birisi söz konusu türlerin değişen sıcaklık koşullarına karşı çok hassas olmaları olabilir. Küresel ısınmanın amfibiler ve sürüngenler üzerindeki etkileri açıkça görülmektedir ve bu grupların bazı üyeleri kış aylarında dahi aktif olabilirler. Bu durum, yüksek rakımlardaki *L. media*, *B. bufo* ve *R. macrocnemis*'in hava sıcaklıklarını izin verdiği sürece aktif olmaya devam edebileceklerini akla getirmektedir.

Anahtar Kelimeler: yüksek rakım, Doğu Karadeniz Bölgesi, kış uykusu, Zigana

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Introduction

The amphibians [1-6] and reptiles [7-17] can be active and also reproduce in winter seasons, depending on changing air temperatures.

The Medium lizard, *Lacerta media* (Lantz and Cyrén, 1920) included in the “least concern” (LC) category in the IUCN Red List and has a widespread species. It is distributed in Armenia, Azerbaijan, Georgia, Iran - Islamic Republic of; Israel, Jordan, Lebanon, Russian Federation, Syrian Arab Republic and Turkey. It is common in the north of its range, and is rare in the south of its range. It is declining in Jordan [18]. Subpopulations distributed on the northern Black Sea coastline are declining [18]. The Lacertid lizards usually hibernate from middle of October to early April in lowland populations (up to about 500 m a.s.l.). However, the hibernation periods may be changed from late September to early May in colder highland populations above 2000 m a.s.l. [16]. Although there is no record about hibernation period of *L. media*, our personal observations confirm the general hibernation period (from middle of October to early April) for the specimens of *L. media* in Turkey living at the altitudes between 600-2000 m a.s.l.

The Common toad, *Bufo bufo* (L., 1758) is a widespread species with an extensive Euro-Asiatic distribution [19] and included in the “least concern” (LC) category in the IUCN Red List. Although the common toad is not a threatened animal in Norway [20] and it is very common for instance on the western coastland [21] some regional population of the species has declined unexplained reasons in the earth [22-25]. The toads hibernate from September - beginning of November to March - June, depending on the altitude and latitude. Hibernation occurs underground, under a stone and occasionally in streams and spring water. Usually, the hibernation is finished between April – May [26].

The Long-legged Wood Frog, *Rana macrocnemis* (Boulenger, 1885) is listed in the “least concern” (LC) category in the IUCN Red List. The species is found in the Caucasus Mountains and the commonly higher area from 1000 m. a.s.l. throughout from Anatolia, Turkey. An isolated population exists on the Strizhament Mountain in the Stavropolskii Region of Russia. It has been recorded from Iraq [27] but further details of this population are needed. Therefore it is not mapped in this study. The upper elevation limit of the species is 3000 m a.s.l. Although there are generally no major threats to this species,

populations of the species might be locally impacted through some effects such as deforestation, drainage of wetlands, pollution and agricultural intensification. The species has declined extensively in Spain due to habitat loss and aridity [28]. In Russia and Iran has been reported as a species that is in need of conservation [29]. The suitable living habitats are very important for the species nevertheless all frog populations may hibernate on land if suitable water areas are absent. The hibernation of *R. macrocnemis* occur from late September and beginning of November to February - May, depending on altitude [30].

In the present study, we present data on the extraordinary activities of *L. media*, *B. bufo* and *R. macrocnemis* in Gümüşhane, Turkey.

Material and Method

The specimens were observed edge of stream in Torul, Gümüşhane Province of Turkey (Figure 1) during day excursions. The air temperatures, coordinates, and altitudes of the localities were recorded. The sexes of the specimens were diagnosed based on their sexual characters. All specimens were photographed. No specimens were caught to avoid the disturbing the populations.



Figure 1. A general view of the habitat where the specimens were observed.

Results

Early of March

A male specimen of *L. media* was found during an excursion in Zigana Village, (Torul) between 14:21 and 15:46 on 6th March 2018 (Figure 2). The observation site was located at the 1400 m a.s.l. ($40^{\circ}36'48''$ N; $39^{\circ}22'69''$ E). The lizard was observed on the rock. The air temperature in the locality was 15°C in the observation time.



Figure 2. A general view of a male specimen of *Lacerta media*

Middle of March

A female specimen of *B. bufo* was found during an excursion in Zigana Village,

(Torul) between 10:37 and 11:24 on 17th March 2018 (Figure 3). The observation site was located at the 1400 m a.s.l. (40°36'50'' N; 39°22'64'' E). The specimen was observed between the green and yellow leaves on the edge of a stabilize road. The air temperature was 15°C in the observation time.



Figure 3. A general view of a female specimen of *Bufo bufo*.

Late of March

A female specimen of *R. macrocnemis* was found during an excursion in Zigana Village, (Torul) between 13:12 and 14:07 on 28th March 2018 (Figure 4). The observation site was located at the 1400 m a.s.l. (40°36'51'' N; 39°22'59'' E). The specimen was observed between the green leaves in a garden. The air temperature was 23°C in the observation time.



Figure 4. A general view of a female specimen of *Rana macrocnemis*.

Discussion

Seasonal activity of reptiles is principally influenced by climatic fluctuations [31]. Hibernation as a behavioural response to seasonal change is most likely a direct response to cold temperatures and secondarily to changes in resource availability [32]. One of the effective factors on hibernation of the lizards is cold environment. Certain vital activities (e.g. mobility, food availability and escaping behaviour) of the lizards mainly depend on air temperature and lower temperatures have negative effects on these activities [33].

Accordingly, the air temperature during the observation time of the specimens in the present study was not very low and it was sufficient to maintain the vital activity of the animals. Regular change of air temperature can be thought of as the reason for the early awakening from hibernation of some lizards [16]. On the

other hand, the influence of the photoperiod on seasonal acclimation seems to be significant as well [34]. The activity of *Lacerta viridis* (Laurenti, 1768) is more dependent on the photoperiod than on the temperature of the environment [34, 35]. However, our data are not enough to evaluate the influence of the photoperiod on *L. media*. Long-term observations are needed. In the present study, the observation date (6th March) showing that *L. media* was active corresponds to an early period according to the literature records. Similar to *L. media*, early activation was reported for some lizard species (*Podarcis erhardi* [7-8], *Sceloporus jarrovi* [9], *Podarcis muralis* [7, 8, 10, 11 and 12] *Lacerta viridis* [13], *Zootoca vivipara* [14] *Mediodactylus kotschyi* [15] *Darevskia derjugini* [16] and *Darevskia rudis* [17]).

The hibernation of *B. bufo* is finished usually between April-May according to current literature record [26]. We found an active specimen on 17th March. It is thought that the specimens of the species may early awake from hibernation according to ambient temperatures. *R. macrocnemis* finishes hibernation in February-May depends on altitude. Accordingly, we observed a specimen of *R. macrocnemis* in Zigana village. In accordance with our results, there

are several reports on the early activation of amphibians (*Lissotriton vulgaris* [1], *Pelophylax ridibundus* [2, 3 and 4], *Epidalea viridis* [3], *Bombina bombina* [4], *Salamandra salamandra* [5], *Ambystoma laterale*, *Ambystoma maculatum*, *Notophthalmus viridescens* and *Ambystoma tigrinum* [6]). Although the known fact that the duration of hibernation is generally longer in the highland areas, it is determined that the specimens of these species may have a short hibernation period in a highland area (Torul, Gümüşhane). However, hibernation periods may change from year to year. The duration of the hibernation depends on the temperature. Long term researches are necessary to define the effects of global warming on amphibians and reptiles in the study area.

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