



## The Herpetofauna of Karçal Mountains (Artvin/Turkey)

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### Abstract

Karçal Mountains are located in Artvin province (Turkey) that contains various types of ecosystems. Based on the results of herpetological surveys conducted between August 2014 and July 2015, totally 18 species were recorded from 11 different stations around Karçal Mountains of which 7 were amphibians (2 salamanders and 5 frogs) and 11 were reptiles (5 lizards and 6 snakes). Specimens were investigated in terms of some morphological characters like color and pattern features, number of scales and plates and body measurements. In addition, a zoogeographical assessment was also carried out by the chorotype classification of Karçal Mountains.

**Key words:** amphibia, reptilia, distribution, Herpetofauna, chorotype, Karçal Mountains

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### Karçal dağları (Artvin/Türkiye)'nin Herpetofaunası

### Özet

Temmuz 2015 tarihleri arasında Karçal dağları ve çevresinde yapılan herpetolojik araştırmalar neticesinde 11 istasyondan 7'si çift yaşar (2 semender ve 5 kurbağa) 11'i sürüngen (5 kertenkele ve 6 yılan) olmak üzere toplam 18 tür tespit edilmiştir. Örnekler renk-desen özellikleri, pul ve plak sayıları ve vücut ölçüleri gibi bazı morfolojik karakterler bakımından incelenmiştir. Buna ek olarak, Karçal Dağlarının korotip sınıflandırması ile zoocoğrafik bir değerlendirme yapılmıştır.

**Anahtar kelimeler:** amfibiler, Sürüngenler, dağılım, Herpetofauna, korotip, Karçal dağları

### 1. Introduction

Biodiversity is the basic of life on Earth, and all organisms play roles in ecosystems processes as part of the food web or otherwise (Steinke, 2016). Thanks to the different topographic and climatic properties resulting from its location and having almost entirely by the three of the world's 34 biodiversity hotspots (Caucasus, Irano-Anatolian and Mediterranean), Turkey has a rich biodiversity. According to online databases, 37 amphibian (Amphibiaweb, 2016) and 150 reptile (The reptile database, 2016) species have been recorded in Turkey until now. Therefore, the herpetofaunal biodiversity of Turkey is richer than many countries in Europe and the number of species is close to that of whole European continent.

In this species richness, mountains play important roles in Turkey: The Taurus mountains range in the south, the Northern Anatolian Mountains in the north, the Western Anatolian Mountains in the west, the Anatolian Diagonal and lots of smaller mountains from the northeast to the Mediterranean (Şekercioğlu et al., 2011). Particularly while glacial and postglacial times, these mountain ranges acted as barriers and induced notable population differentiations and/or limited distributions of the populations (Kosswig, 1955; Demirsoy, 1999).

Karçal Mountains (3431 m a.s.l.) range are in the border of Artvin province in the northeast of Turkey (Figure 1). Karçal Mountains with the Pleistocene glacial valleys that prove the glaciations and various glacial shapes and glacial lakes have partly debris covered glaciations which are still recognizable (Gürgen and Yeşilyurt, 2012). These

mountains extends throughout the Çoruh and Berta valleys to Georgia border and separate the Şavşat and Borçka towns of Artvin province. Georgia and Artvin are located in the east and west of Karçal Mountains, respectively.

Karçal Mountains are one of the most important areas by means of biodiversity and show the best examples of mixed deciduous forests of the temperate zone, high endemism rate and sudden altitude changes brought about by the ecosystem diversity. There are few streams in the Karçal Mountains. As is in Black Sea Region, climate of this mountain region is an oceanic climate with high and evenly distributed rainfall the year round (Url-1).

In recent years, the studies which investigate herpetofaunal biodiversity of a certain region have increased and they contribute to species distributions in Turkey (Baran et al., 1997; Özdemir and Baran, 2002; Kumlutaş et al., 2004; Afşar and Tok, 2011; Özcan and Üzüm, 2014; Cihan and Tok 2014; Ege et al., 2015). Although previous studies exist in the literature which deal with amphibians and reptiles of Artvin and its towns (Kutrup, 2001; Baran et al., 2002; Afşar et al., 2012), no data available on the herpetofauna of Karçal Mountains. This case encouraged us to investigate amphibian and reptile species of Karçal Mountains (Artvin) and contribute to the literature on the herpetofaunal biodiversity of Turkey.



Figure 1. Stations in which specimens were collected 9 village (1. Balcı, 2.Kaynarca, 4. Efeler, 5. Maral, 6. Uğur, 7. Mısırlı, 8. Maden, 9. Yağlı, 10. Oba) and 2 lakes (3. Karagöl (Borçka), 11. Karagöl (Şavşat))

## 2. Materials and methods

As a result of herpetological surveys, a total of 65 specimens (36 ♂♂, 23 ♀♀, 6 juveniles) were examined within the guidelines of the local ethics committee for animal experiments (Recep Tayyip Erdoğan University, approval reference number: 2014/33) between August 2014 and July 2015 in Karçal Mountains. For each individual, sex was determined by the examination of external secondary sexual characters, and their body measurements were measured using a digital caliper with an accuracy of 0.01 mm. In addition to this, specimens were investigated in terms of some morphological characters like color and pattern features including the number of scales and plates of reptiles. The photographs of all observed specimens were taken by a digital photo camera. After these processes, specimens were released at the place of capture.

The diagnosis of the detected specimens were performed by the present literatures (Baran and Atatür, 1998; Budak and Göçmen, 2005; Baran et al., 2013) and zoogeographical evaluations were done by classifying them into main chorotypes as determined by Vigna Taglianti et al. (1999) and Sindaco et al. (2000).

## 3. Results

The eleven stations where the specimens were captured and observed in the studied area are shown in the Figure 1. In Figure 2, number of the species with regard to the stations is demonstrated. Karagöl (Station 6) which has eight species is the richest station in terms of species diversity. The other stations have four (Stations 4 and 10), three (Stations 3, 5 and 11), two (Station 9) and one species (Stations 1, 2, 7, 8; Figure 2). In addition to this, distribution of species richness along elevation gradient in the studied area was given in Figure 3. As it can be seen from the graph (Figure 3), species richness is higher between 1200 and 1800 m a.s.l. compared to the other elevations.

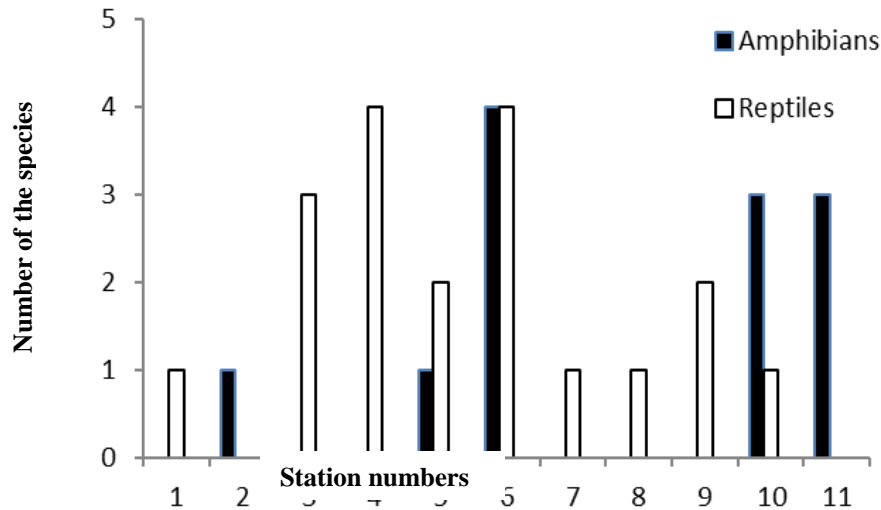


Figure 2. Number of the species according to the stations

According to the results of the herpetological survey in the study area, 18 species were observed. Of these, 7 were amphibians (*Mertensiella caucasica*, *Ommatotriton ophryticus*, *Pelophylax ridibundus*, *Bufo verrucosissimus*, *Rana macrocnemis*, *Hyla orientalis*, *Pelodytes causicus*) and 11 were reptiles (*Darevskia derjugini*, *Darevskia parvula*, *Darevskia rudis*, *Darevskia clarkorum*, *Anguis fragilis*, *Natrix natrix*, *Natrix tessellata*, *Eirenis modestus*, *Coronella austriaca*, *Vipera kaznakovi*, *Zamenis longissimus*). Although the taxonomic status of *Bufo verrucosissimus* has remained controversial, we have identified it as a valid species in our study, as supposed by Recuero et al. (2012) and IUCN (Url-2).

According to their distributions, the species found on Karçal Mountains were grouped into 12 chorotype categories in accordance with the checklist of Vigna Taglianti et al. (1999) and Sindaco et al. (2000). The most widespread chorotype in the area is Ponto-Caucasian Endemic (three species, 16.6%), followed by European (two species, 11.11%), Kolkhido-Caucasian endemic (two species, 11.11%), SW Asiatic (two species, 11.11%), Kolkhidian endemic (1 species, 5.11%), Kolkhido-Armenian endemic (1 species, 5.11%), S-European (1 species, 5.11%), Central Asiatic-Europeo-Mediterranean (1 species, 5.11%), Central Asiatic-European (1 species, 5.11%), Caucasian endemic (1 species, 5.11%), Turano-Europeo-Mediterranean (1 species, 5.11%), Europeo-Mediterranean (1 species, 5.11%) and Turano- European (1 species, 5.11%) (Table 1).

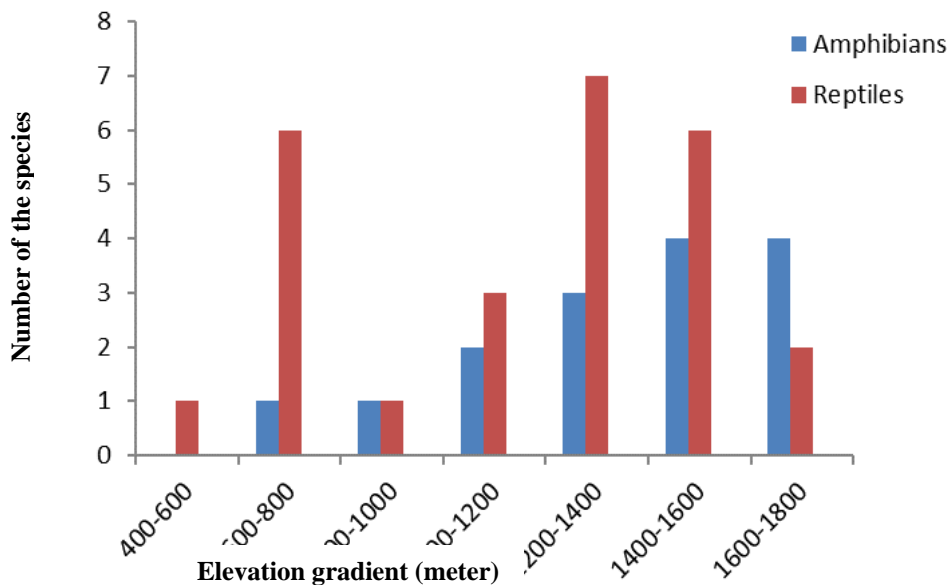


Figure 3. Number of the species according to elevation gradient

Table 1. The chorotype classification of the amphibian and reptile species in Karçal Mountains

Chorotype	Amphibia	Reptilia	Percentage	Species
European		2	11.11%	<i>Anguis fragilis</i> <i>Coronella austriaca</i>
Kolchidian endemic		1	5.55%	<i>Darevskia clarkorum</i>
Kolchido-Caucasian endemic	1	1	11.11%	<i>Bufo verrucosissimus</i> <i>Darevskia derjugini</i>
Kolchido-Armenian endemic		1	5.55%	<i>Darevskia parvula</i>
Ponto-Caucasian endemic	2	1	16.66%	<i>Mertensiella caucasica</i> <i>Pelodytes causicus</i> <i>Darevskia rudis</i>
S- European		1	5.55%	<i>Zamenis longissimus</i>
Central Asiatic-European-Mediterranean		1	5.55%	<i>Natrix natrix</i>
Central Asiatic-European		1	5.55%	<i>Natrix tessellata</i>
Caucasian endemic		1	5.55%	<i>Vipera kaznakovi</i>
SW Asiatic	1	1	11.11%	<i>Rana macrocnemis</i> <i>Eirenis modestus</i>
Turano-European-Mediterranean	1		5.55%	<i>Pelophylax ridibundus</i>
European-Mediterranean	1		5.55%	<i>Hyla orientalis</i>
Turano- European	1		5.55%	<i>Ommatotriton ophryticus</i>
Total species	7	11	100%	

#### 4. Conclusions and discussion

There are few herpetofaunal studies in the East Black Sea Region. In 1997, 14 species were recorded from Çamlıhemşin (Rize) (Baran et al., 1997). In Ordu-Giresun region, Kumlutaş et al. (1998) detected 17 species. In another study, Kutrup (2001) reported that 20 species were living in Murgul (Artvin). In addition to this, Baran et al. (2002), considering the previous records in the region, reported that 38 species are living in Rize, Artvin and Ardahan provinces and their environments. More recently, Afşar et al. (2012) notified that 15 species inhabiting at Camili Biosphere Reserve, known as the first and only biosphere site of Turkey. In the present study, 18 species of amphibians and reptiles were recorded on Karçal Mountains which occupies an area of about and covers Şavşat, Borçka and Camili regions, too.

*N. cf. megalcephala* is the only species which was reported previously (Afşar et al., 2012) for Camili Biosphere Reserve area but not encountered in this study. However, according to Hille (1997), there was no genetic difference between *Natrix n. natrix* and *N. megalcephala*. The validity of *N. megalcephala* is still debate according to Böhme (1999). Differently from Afşar et al. (2012)'s study, four species (*Darevskia clarkorum*, *Vipera kaznakovi*, *Eirenis modestus* and *Natrix tessellata*) were firstly detected in this study area.

Of the 18 species found on the Karçal Mountains, *Darevskia clarkorum* and *Vipera kaznakovi* are in the 'Endangered (EN)' category, *Mertensiella caucasica* is in the 'Vulnerable (V)' category and *Ommatotriton ophryticus*, *Bufo verrucosissimus* and *Darevskia derjugini* are in the 'Near threatened (NT)' category with regard to the IUCN Red List data, while the others are in the 'Least Concern (LC)' category.

Degradation and destruction of the habitats due to road construction works, disturbance by people especially in touristic areas (Borçka Karagöl and Şavşat Karagöl) and decrease in the available water resources depending on the ongoing hydroelectric power plants in the region are the main factors that threaten the amphibian and reptile species of Karçal Mountains. In addition to these factors, we also observed that some fish species were introduced by local people into several lakes on the mountains. Therefore, local authorities must ensure that the local people be informed of the conservation of the biological assets that they possess.

Since the study area is home to many venomous snake species under protection, present study demonstrates the importance of Karçal Mountains as a herpetological area. Moreover, that no detailed study was conducted on the herpetofauna of Karçal Mountains to date, underlines the necessity of this study. We consider that herpetological information obtained from this study will provide essential data for possible future conservation biology studies..

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