

# Northern distribution limits of *Trachylepis vittata* and the locally apparent lack of polymorphism

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Attention is drawn to the overlooked occurrence of the Bridled skink in relatively northern provinces of central Turkey, viz. Sivas and Gümüşhane. Zoogeographical issues are discussed and ecological implications of living at high elevations are compared to those of lowland conditions. The apparent lack of uniform and bilineata colour pattern morphs, viz. the absence of polymorphism is indicated.

**Key words:** *distribution, polymorphism, Trachylepis vittata, Turkey.*

## INTRODUCTION

Skinks of the genus *Trachylepis* have well developed legs and a stout body. Of this genus three species occur in Turkey: *Trachylepis aurata*, *Trachylepis septemtaeniata* and *Trachylepis vittata*. The latter species has got a distribution from northern Africa to western Iran, and reaches its northernmost distribution in Turkey. Many records have been made in the southern parts of Turkey. Lately it has become clear that the species occurs much more northerly (Bischoff & Franzen, 1993; Mulder, 1995).

The Bridled skink is known for its pronounced colour polymorphism (Basoglu & Baran, 1977; Esterbauer, 1985; van der Winden et al., 1995; Fattahi et al., 2014b). Three types can be distinguished according to the dorsolateral colour pattern. The 'striped' type has a mid-dorsal longitudinal light stripe next to two stripes on the dorsolateral side. The 'bilineata' type is uniformly olive or light brown with only the dorsolateral stripes. The third type can be seen as a 'uniform' colour type: brownish all over the body. Populations consist of specimens with different colour types and ecological importance has been given to the different types by van der Winden et al. (1995). This study's objective is to draw attention to the sometimes neglected northern distribution, the ecological implications of high altitude occurrence and morphological appearance.

## MATERIAL AND METHODS

This study is strongly based on sight observations done by the author in the provinces of Sivas and Gümüşhane, most of which have been published before (Mulder, 1995). Two hitherto unpublished own observations are included in this analysis: Seyfebeli Geçidi, province of Sivas, 1500 m a.s.l., 1 May 1996, 4 striped animals; Karakaya East, province of Sivas, 1225 m a.s.l., 18 April 2000, 1 striped animal.

Next to these observations records and information published by others (e.g. Baran, 1977; Bischoff & Franzen, 1993 and online available georeferenced photographs (Turkherptil) were assembled.

A compilation of own sight observations and gathered data resulted in 24 records to be used in this study. The observations are from the central Anatolian region comprising the provinces of Tokat, Sivas, Gümüşhane and Erzincan. In case no altitude information was available, Google Earth has been consulted.

## RESULTS

Detailed geographical data were available of 13 localities, which are given in Table 1. In Figure 1 the localities and province boundaries are mapped. Next to the sources Table 1 also presents number of specimens, morphology and registered or derived altitude.

During visits to the provinces of Sivas and Gümüşhane at least 18 specimens were observed by the author. All specimens showed the mid-dorsal stripe. Every other available source (photographs) from this region resulted in the same observation. In total this concerns 23 specimens from 14 localities. Apparently the populations of the northern limits (Tokat, Sivas, Erzincan, Gümüşhane) do not show the striking colour and pattern polymorphism as can be seen in other populations.

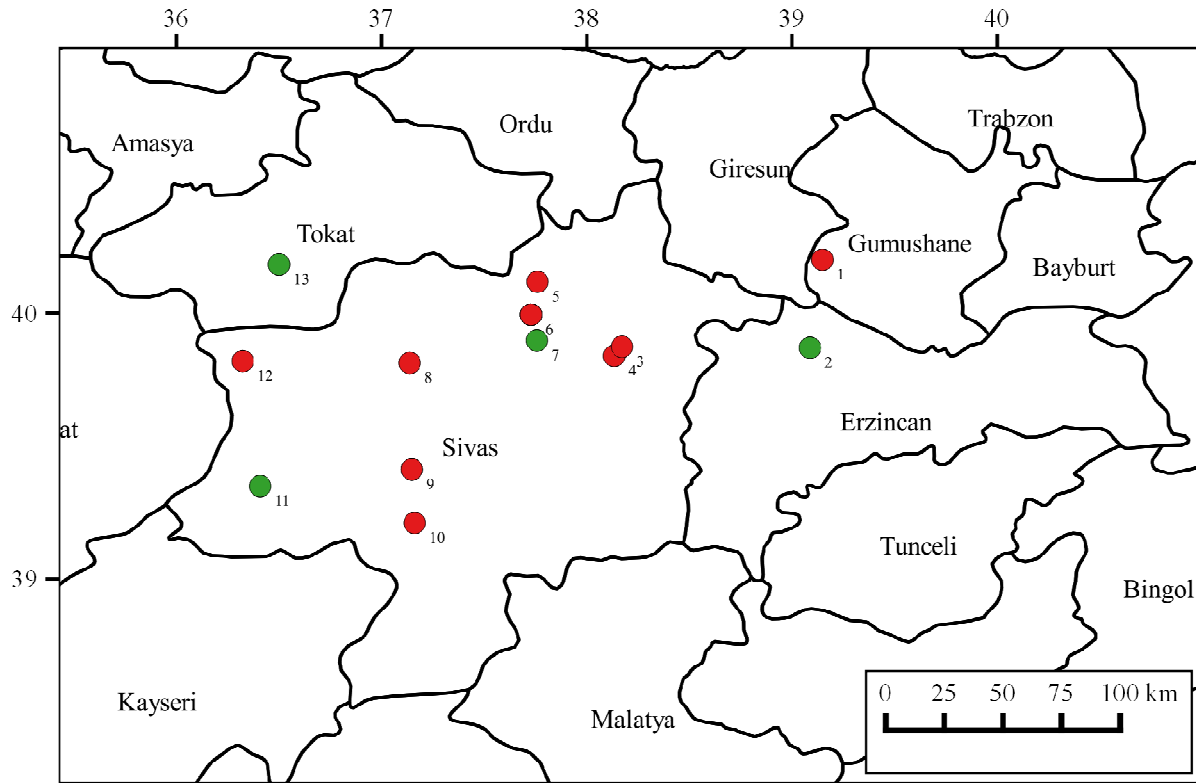
Altitudinal data on the records indicate a relatively high altitude range for the species in this region. The altitude range is 1225-2180 m a.s.l., while the populations in southern Turkey live from sea level until well below these high elevations (0-1200 m a.s.l.).

**Table 1.** Compilation of all records containing data on locality, altitude or morphology.

Records 1–13 used in the available distribution analysis. Repeated visits to the same locality or multiple observations on a site are not mentioned separately.

<sup>1</sup> derived from Google Earth; <sup>2</sup> info by M. Franzen, in litt. 2015

Nr.	Province	Locality	Source	n	Morphology	Altitude
1	Gümüşhane	Şiran E	Mulder, 1995	1	striped	1500
2	Erzincan	Sakaltutan Geçidi	Bischoff & Franzen, 1993	1	striped <sup>2</sup>	2000
3	Sivas	İmranlı E	Mulder, 1995	1	striped	1700
4	Sivas	Bulgurluk (İmranlı S)	Mulder, 1995	1	striped	1670 <sup>1</sup>
5	Sivas	Şerefiye	Mulder, 1995	1	striped	1550
6	Sivas	Kösedağ (N of Zara)	Mulder, 1995	6	striped	1550
7	Sivas	Zara	E. Şimşek in Turkherptil, 2011	1	striped	2180
8	Sivas	Seyfebeli Geçidi	J. Mulder, this publication	4	striped	1500
9	Sivas	KayapınarW (Tecer dağları)	Mulder, 1995	2	striped	1600
10	Sivas	Mısırören	Mulder, 1995	1	striped	1500 <sup>1</sup>
11	Sivas	Şarkışla Kümbet Köyü	C. Gönel in Turkherptil, 2011	1	striped	1250 <sup>1</sup>
12	Sivas	Karakaya E	J. Mulder, this publication	1	striped	1225
13	Tokat	Tekneli Köyü	Baran, 1977	1	not published	1300 <sup>1</sup>
14	Tokat	not published	M. Çakmak in Turkherptil, 2012	1	striped	unknown
15	Gümüşhane	not published	V. Yalçın in Turkherptil, 2013	1	striped	1700



**FIGURE 1.** Mapped localities with sufficient geographical information. Red: author's observations; Green: other sources (see table 1). 1: Şiran E, 2: Sakaltutan Geçidi, 3: İmranlı E, 4: Bulgurluk, 5: Şerefiye, 6: Köseadağ, 7: Zara, 8: Seyfebeli Geçidi, 9: Kayapınar W, 10: Mısıroren, 11: Şarkışla Kümbet Köyü, 12: Karakaya E, 13: Tekneli Köyü.

## DISCUSSION

The Bridled skink's species range is from Algeria in the west to Iran in the east. Turkey is at the northern limit. For reasons unknown the well-known occurrence in Iraq and Iran (Leviton et al., 1992) is not mentioned nor mapped by the IUCN species range map.

Historical distribution within Turkey started with the records given for Mersin (Werner, 1898) and Eskişehir, Adana, and Konya (Werner, 1902). Also Clark and Clark (1973) contributed to the distributional knowledge. Budak (1973) published several records, all except one situated in the southern parts of Anatolia. The only exception was 'between Alayunt and Sabuncupınar' in the province of Kütahya (39 degrees latitude). Baran (1977) listed additional records, among them a single record of the northern locality Tekneli Köyü, Tokat (40°10'N). Bisschof and Franzen (1993) published another fairly northern record from Erzincan: Sakaltutan Geçidi.

The species traditionally has been considered reaching its northern limits in southern Turkey, viz. van der Winden et al. (1995), overlooking the northern records or neglecting them as rarities. The Tokat record has often been neglected and by others have been declared to be the northernmost record (e.g. Fattahi et al., 2013, 2014a), although a record (40°12'N, east of Şiran in Gümüşhane) slightly more to the north has been published (Mulder, 1995). That publication has often been cited in relevant literature and has for instance been used to construct a well-known zoogeographical analysis concerning reptiles of Anatolia (Sindaco et al., 2000).

Fattahi et al. (2013), probably not aware of other records in the region, suggested the Tokat record to belong to a population isolated from the rest by the 'Anatolian diagonal'. They did not state which unfavourable conditions would create the barrier effect. High elevation alone for sure is not an insurmountable problem, as this presumed mountain ridge by far does not provide a continuous elevation above the maximum recorded altitude for the species.

Several records from Tokat and neighbouring provinces clearly show that the Tokat record does not represent an isolated population, but fits in the array of distribution records from Tokat, Sivas, Gümüşhane and Erzincan. The apparent absence of records from Kayseri and Malatya can still indicate an effect of the 'Anatolian diagonal' and the regions should be checked thoroughly before conclusions can be drawn.

A hundred percent of striped individuals in the dataset from the area under study is remarkable and in contrast to the striking polymorphism as known for the species throughout its range. The three main morphological types of dorsal coloration are uniform, bilineata and striped, but sometimes intermediate specimens are found, e.g. bilineata type animals sometimes show a vague mid-dorsal stripe. As long as this vague stripe is not bordered by dark brown or blackish borders or rows of dark spots they would be considered as non-striped in this study. Van der Winden et al., (1995) treat the bilineata type as 'effectively uniform'. According to Budak (1973) 40% of the specimens in Anatolia he analysed missed the vertebral stripe, e.g. were uniform or bilineata. Any substantial percentage of non-striped animals in the region under study would probably have been visual in the population sample of 23 specimens.

In a study on this species in the Göksu delta in southwest Turkey (van der Winden et al., 1995) strong correlations were found between the striped pattern and high grass coverage and between the uniform and effectively uniform (bilineata) pattern and a low grass coverage, assuming disruptive selection by visually hunting predators. That survey was performed in lowland habitat (dunes, hills and agricultural zone). The records used by the author in this study were done in natural habitat at higher altitudes, mainly rocky areas with scattered grasses, herbs and sometimes shrubs and trees. Probably these circumstances do not favor a less prominent striped, viz. uniform appearance.

Many sources, viz. Baran and Atatür (1998), Baran et al. (2012) and IUCN (2015) mention an occurrence in Turkey up to 1000 m a.s.l., probably all referring to the publication by Budak (1973). This in spite of the fact that some (e.g. Baran et al., 2012; IUCN, 2015) did use the high altitude Tokat–Sivas–Gümüşhane–Erzincan records for range map construction, thus having had access to the altitude information too.

In Lebanon the species also occurs from sea level (sandy beaches) to high altitudes in the Mount Lebanon chain (Nassar & Hraoui–Bloquet, 2014). It can be easily imagined that these altitudes entail long, cold winters and a long snow covered period. Much more harsh conditions are faced by the animals compared to those of near coastal, low altitude regions, e.g. a shorter reproductive season, lower nocturnal temperatures et cetera. In high altitude regions the species clearly benefits from ovoviviparity as female reproductive strategy.

In a study to the potential species distribution Fattahi et al. (2014a) used minimum and maximum temperatures, precipitation, solar radiation and vegetation to predict habitat suitability. High precipitation in winter was the most important factor for habitat prediction. The authors noticed the occurrence of the species in the province of Tokat to be not in concordance with their habitat suitability model as the region seems to be unsuitable, but refrained from suggesting any possible explanation. Probably, inserting the array of records presented here and their corresponding conditions would change the predicted habitat suitability and proposed potential distribution.

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