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Original research

The New Locality Records for *Eumeces schneideri* (Daudin, 1802), *Heremites vittatus* (Olivier, 1804) and *Ablepharus chernovi* (Darevsky, 1953) (Sauria: Scincidae) from Anatolia, Turkey

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Abstract: In present study, we report new locality records for *Eumeces schneideri*, *Heremites vittatus* and *Ablepharus chernovi* from Turkey during fieldwork in 2016-2017. In additionally, we present a summary of the morphological characters including meristic pholidolial characteristics, metric measurements and color-pattern features for our samples.

Keywords: New Records, *Eumeces schneideri, Heremites vittatus, Ablepharus chernovi,* Turkey.

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Introduction

Turkey, hosts more than 165 reptilian species (Baran et al., 2012), is one of the crucial zoogeographical region and a biodiversity hotspot due to its climate, vegetation, heterogeneous topography and geological history (Bilgin, 2011). The family Scincidae consists of 132 genus and Skinks lizards described more than 1600 species all over the distribution area (Uetz and Hosek, 2017). The ten species belonging to four genus of family Scincidae have lived in Turkey, and these species are *Heremites vittatus, H. auratus, H. septemtaeniatus Ablepharus chernovi, A. budaki, A. kitaibelii, A. bivittatus, Eumeces schneideri, Chalcides ocellatus* and *Ophiomorus punctatissimus*.

The genus *Eumeces* (Wiegmann, 1834) is known from the Holarctic Region including Northern Africa, Anatolia, Arabian Peninsula and Western Asia (Çiçek et al., 2015). Griffith et al. (2000) suggested that *Eumeces* could be divided into various taxa related to 50 recognized species considering their morphological and ecological features. One species of the genus *Eumeces* is found in the Turkey, *Eumeces schneideri* (Daudin, 1802), at ranging from 300 to 1800 m a.s.l. (Eiselt, 1940; Mertens, 1946; Baran, 1977; 1980; Disi and Böhme, 1996; Sindaco et al., 2000; Atatür et al., 2001; Göçmen et al., 2002; Kumlutaş et al., 2004a; 2004b; 2007; Ananjeva et al., 2006; Ayaz et al., 2011; Baran et al., 2012; Çiçek et al., 2015). Three subspecies are known from distribution region of *E. schneideri* in Anatolia (Baran and Atatür, 1998; Sindaco et al., 2000; Kumlutaş et al., 2007): The subspecies of *E. s. princeps* (Eichwald, 1839) is mainly distributed in central, southeast and eastern Anatolia, whereas *E. s. pavimentatus* (Geoffroy de St. Hilaire 1827) is found only in the eastern Mediterranean region (Mersin, Adana and Hatay provinces). Other subspecies, *E. s. barani* (Kumlutaş, Arıkan, Ilgaz and Kaska, 2007) is merely restricted to Denizli (Pamukkale), İzmir (Bozdağ) and Aydın (Buharkent and Başaran village) (Kumlutaş et al., 2007; Çiçek et al., 2015).

The genus *Heremites* inhabits throughout Africa and Madagascar, with a few species being found on other Indian Ocean islands, in the Middle East and Socotra Archipelago (Sindaco et al., 2012; Kumlutaş et al., 2015). The Bridled Skink, *H. vittatus* was described from sands west of Rosetta, Egypt by Olivier (1804) as *Scincus vittatus*. It is known from Mediterranean costs of North Africa, from Algeria through Egypt, Cyprus, Rhodes, Turkey, Lebanon, Israel, Syria, Jordan, Iraq, and Western Iran (Anderson, 1999). Its nomenclature has been changed from *Mabuya* to *Euprepis* (Mausfeld and Schmitz, 2003) and to *Trachylepis* (Bauer, 2003). Recently, Karin et al. (2016) suggested that it could be *Heremites* and all the Middle East species of *Trachylepis* grouped in *Heremites*. Three species of the genus *Heremites* are found in the Turkey, *Heremites auratus* (Linnaeus, 1758), *H. septemtaeniatus* (Reuss, 1834), and *H. vittatus* (Olivier, 1804) (Kumlutaş et al., 2015). The occurrence of the *H. vittatus* in Anatolia was first reported from Mersin, in southern Anatolia (Werner, 1898). Later on this species was found in central, southern, southeastern, northern and northeastern Anatolia, constitute the Northwestern range area of the skink with a vertical distribution with Gümüşhane which is northernmost record of the taxon (Budak, 1973; Baran, 1977; Mulder, 1995; Baran and Atatür, 1998; Baran et al., 2012; Fattahi et al., 2014; Kumlutaş et al., 2015).

The genus *Ablepharus,* snake-eyed skink, is commonly known from southeast Europe (Balkans, Hungary, Slovakia) to the Middle East. Four species of the genus *Ablepharus* are found in the Turkey, the Snake-eyed Skink *Ablepharus kitaibelii* Bibron and Bory, 1833, the Chernov's Snake-eyed Skink *A. chernovi* Darevsky, 1953, the Budak's Snake-eyed Skink *A. budaki* Göçmen, Kumlutaş and Tosunoğlu, 1996 and Twin-striped Skink *Ablepharus bivittatus* (Menetries, 1832). The *A. chernovi* was firstly described from Armenia by Darevsky (1953). Afterwards, many studies were conducted compared with others considered both morphologically and molecular data (Fuhn, 1969b; 1970; Eiselt, 1976; Baran, 1977; 1980; Kumlutaş, 1993; Schmidtler, 1997; Poulakakis et al., 2005; Arıkan and Çiçek, 2010; Skourtanioti et al., 2016).

In the current study, the authors aim to report new localities of relevant species for Turkey and to describe the morphological features including pholidosis characters, morphometric measurements and color-pattern characteristics of the lizard specimens collected from the localities outside the known distribution.

Materials and Methods

The lizard specimens were collected from Anatolia during field work between 2016 and 2017 years. The localities of collected specimens are shown in Figures 1C-2C-3C. The exact locality of the specimens was determined using Garmin eTrex® 30 Handheld GPS. Color and pattern characteristics were recorded and color slides were taken while the animals were alive. The specimens were euthanized using tricaine methanesulfonate (MS222) and then kept in 95% ethanol. The specimens were stored in the Zoology Lab of the Department of Biology at Science Faculty, Dokuz Eylül University. The metric measurements using a digital caliper with sensitivity of 0.01 mm were measured, and pholidosis characters were counted under a stereo microscope.

Results

Eumeces schneideri (Daudin, 1802)

Material: 2 ♂♂, Düzağaç village, Solhan, Bingöl Province, Eastern Anatolia, Turkey, 38.897045-40.938815, 1164 m elevation, 30.06.2017, Y. Kumlutaş.

The lizards were found in noon around 10.00-12:00 hours (air temperature 30-32°C) when active with grassy open field (Fig. 1B). The floristic species which live in the same area are *Verbascum calvum, Ranunculus arvensis, Nigella nigellastrum, Papaver rhoeas, Reseda lutea, Cirsium lappaceum* and *Urtica dioica*. It also was observed *Bufotes variabilis, Testudo greaca, Ophisops elegans, Lacerta media, Apathya cappadocica, Dolichophis jugularis* and *Platyceps najadum* as a sympatric reptile and amphibian species living in the same habitat in Düzağaç village.

The color of head plates is brown and continues to the upper limit of supralabial plates in both samples. The supralabials and sublabials are more lightly white. There are no dark spots on the head plates in both samples. The dorsal part is brown. On the right and left sides of our specimens are an orange colored band starting from the subocular plate under the eye and extending towards the back. This band is orange-colored to the front of forelimbs and ends weakly on the sides of the body after the forelimbs. The stains on the brick red color spread out towards the back of dorsal. Ventral side is spotless, white color (Fig. 1A).

Measurements for the specimens were as follows: Snout to vent length (SVL-from tip of snout to anterior edge of cloaca), 74.31 and 67.86 mm; Tail length (TL-from posterior edge of cloaca to tip of tail), 118 mm and missing; Head length (HL-from tip of snout to posterior edge of tympanum), 15.71 and 14.42 mm; Wide of head (WH-at the widest point of head), 8.90 and 9.19 mm; Height of head (HH), 7.23 and 6.84 mm; Length of forelimb (LFL), 20.06 and 18.73 mm; Length of hindlimb (LHL), 29.58 and 28.52 mm; Subdigital lamellae under the 4th toe (SL4T), 14/14 and 16/16; Number of subralabials (NSL), 8/7 and 8/7; Number of infralabials (NIL), 8/8 and 8/8; Number of scales round body (NSA-one complete row at midbody), 26 and 26; Number of ventral scales (NVS-from mental to anterior edge of cloaca), 67 and 67; Eye length (EYEL-from anterior to posterior edge of eye), 4,65 and 4.11 mm; Eye to ear length (EED-from posterior of eye to anterior edge of ear), 5.87 and 4.66 mm; Neck length (NL), 10.43 and 8.37 mm; Eye diameter (EYED-from up to down edge of eye) 2.77 and 2.81 mm; Ear diameter (ED-from top to down edge of ear opening), 2.89 and 2.48 mm; Distance between hindlimb and forelimb (DHF), 45.18 and 41.45 mm; Number of supraciliaries (SUC), 3/4 and 6/6; Number of supraoculars (SUO), 4/4 and 6/6.

Heremites vittatus (Olivier, 1804)

Material: 2 ♂♂, Harmanözü village, Bayburt Province, Eastern Anatolia, Turkey, 40.134575-40.269637, 1936 m elevation, 31.05.2017, S. Gül and K. Candan.

The lizards were found around 09.00-13:00 hours (air temperature 22-26°C) when active with grassy open field (Fig. 2B). The species which live in the same habitat are *Bufotes variabilis, Lacerta media, Darevskia valentini, Natrix natrix, Coronella austriaca* and *Hemorrhois ravergieri* as a sympatric reptile species in Harmanözü village.

The color of head plates is light brown with sparse dark spots in both specimens. The ground color of the dorsum is light brown. The vertebral stripe starts from nuchal scales and continues to the upper limit of tail. The light colored lateral and dorsolateral stripes are placed on the side of vertebral stripe. The transversely located rows of dark colored spots are present between vertebral stripe and lateral, dorsolateral stripes. The ventral side of the body is whitish yellow without maculation (Fig. 2A).

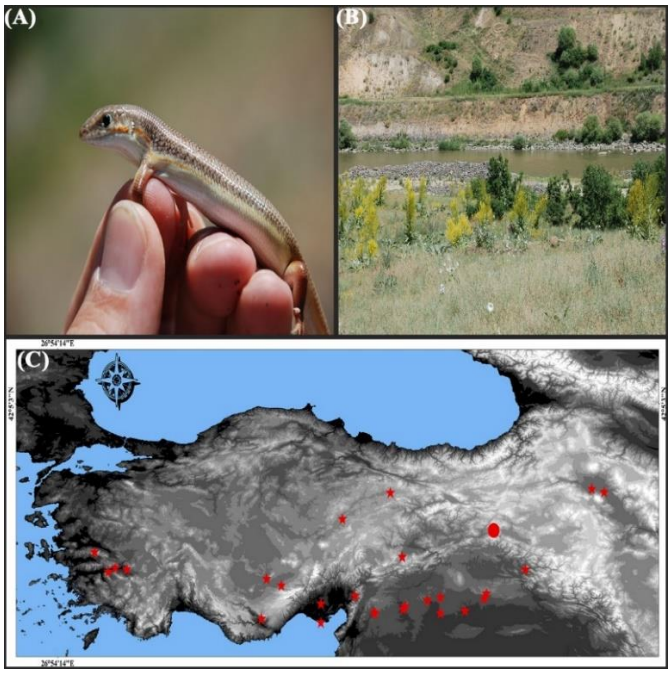

Figure 1. (A) is total view of the *Eumeces schneideri* and (B) is habitat of sample captured. The distribution map is shown at (C) based on references (Baran, 1977; 1980; Sindaco et al., 2000; Atatür et al., 2001; Kumlutaş et al., 2004a; 2004b; 2007; Ayaz et al., 2011; Çiçek et al., 2015; Baycan and Tosunoğlu, 2017). Circle represents the new one (Bingöl), while stars are known localities.

Measurements for the specimens were as follows: Snout to vent length (SVL-from tip of snout to anterior edge of cloaca), 81.18 and 78.27 mm; Head length (HL-from tip of snout to posterior edge of tympanum), 14.97 and 14.31 mm; Wide of head (HW-at the widest point of head), 9.05 and 8.73 mm; Height of head (HH), 6.93 and 6.85 mm; Length of fore limb (LFL), 17.44 and 18.17 mm; Length of hind limb (LHL), 25.25 and 25.01 mm; Length of eye (LE-from anterior corner to posterior corner of eye), 3.84 and 3.54 mm; Nostril eye distance (NED-from anterior corner of eye to posterior edge of nostril), 3.78 and 3.34 mm; Eye to ear distance (EED-from the posterior corner of eye to anterior edge of tympanum), 5.08 and 4.62 mm; Interorbital distance (IORD-between anterior corner of orbit), 5.47 and 5.15 mm; Snout width (SW), 2.68 and 2.61 mm; Tympanum diameter (TD-largest size), 1.49 and 1.43 mm; Fourth toe length (TOL), 8.19 and 8.47 mm; Fourth finger length (FIL), 3.84 and 4.08 mm; Maximum length of subocular (MSOL), 2.36 and 2.38 mm; Subdigital lamellae under the 4th toe (SDLT), 16/16 and 16/16; Subdigital lamellae under the 4th finger (SDLF), 12/12 and 12/12; Number of supralabials (NSL), 7/7 and

7/7; Number of infralabials (NIL), 7/7 and 7/7; Number of dorsal scales around body (NDS), 30 and 29; Number of ventral scales (NVS-from gular to anterior edge of cloaca), 40 and 40; Row of ventral scales (RVS-in longitudinal rows), 8 and 9; Number of scales between posterior corner of eye to tip of ear (NEE), 5 and 5; Length frontal to interparietal (FIPL-from anterior corner of frontal to posterior corner of interparietal), 8.20 and 7.65 mm; Width of interparietal (IPW), 2.07 and 1.92 mm; Parietal width (PW), 4.17 and 3.78 mm; Parietal length (PL), 2.72 and 2.92 mm.

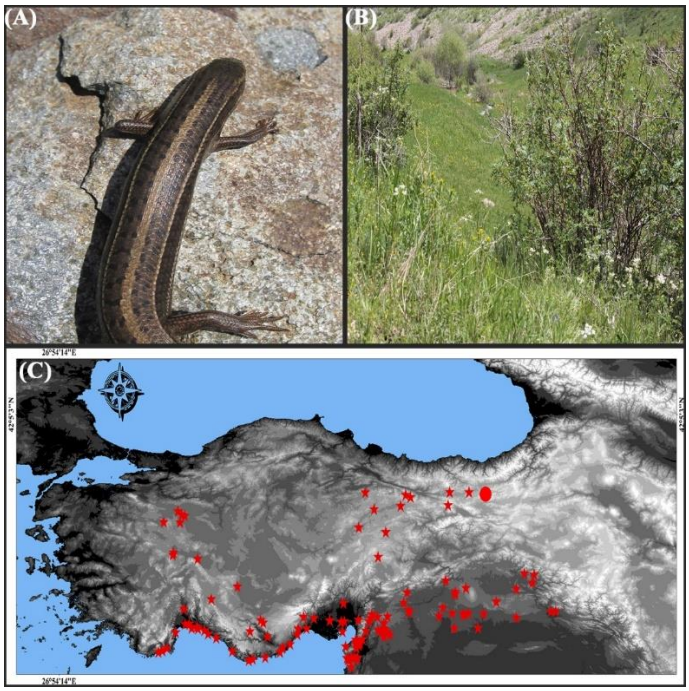

Figure 2. (A) is total view of the *Heremites vittatus* and (B) is habitat of sample captured. The distribution map is shown at (C) based on references (Werner, 1902; Venzmer, 1919; Mertens, 1924; Clark and Clark, 1973; Başoğlu and Baran, 1977; Baran, 1977; 1980; 1983; 1990; Budak, 1973; Teynie, 1987; 1991; Bischoff and Franzen, 1993; Mulder, 1995; Budak et al., 1998; Baran et al., 2001; Özdemir et al., 2001; Cihan et al., 2003; Kumlutaş et al., 2004c; 2011; 2015; Afsar and Tok, 2011; Cihan and Tok, 2014; Baycan and Tosunoğlu, 2017). Circle represents the new one (Bayburt), while stars are known localities.

Ablepharus chernovi (Darevsky, 1953)

Material: 1 ♂, Süleymaniye village, Gümüşhane Province, Eastern Anatolia, Turkey, 40.459423-39.453680, 1436 m elevation, 16.08.2016, S. Gül and K. Candan.

The lizard was found in noon around 10.00-13:00 hours (air temperature 23-25°C) when active with grassy open field (Fig. 3B). An observation for the herpetofaunal species is *Lacerta media* which live in the same habitat in Düzağaç village.

The dorsal color of the sample is dark brown with 4 rows of dark dots extending from the nuchal plates to the center of the tail. There are black lateral stripes around the body. Subtemporal band starts from the nostril and passes through the bottom of the eyes and through the ear hole, reaching the back of the body with a white colored. The ventral side of the body is orange-red because it is the breeding time. This coloring starts from the front of forelimb and continues to the back of the cloaca (Fig. 3A).

Measurements for the specimens were as follows: Snout to vent length (SVL), 41.41 mm; Tail length (TL), 60 mm; Head length (HL), 6.53 mm; Wide of head (WH), 3.71 mm; Length of fore limb (LFL), 7.05 mm; Length of hind limb (LHL), 10.32 mm; Fourth finger length (FIL), 3.72 mm; Number of lorealia (NL-preocularia), 3; Number of supraciliaries (SUC), 2/2; Supralabialia at infront of subocular (NSL), 3/3; Number of scales round body (NDS), 18; Subdigital lamellae under the 4th toe (SL4T), 15; Nasal scale (NS), absent; Scales between masseteric and ear opening (SMEO), 3/3. Additionally, off-white subtemporal band between rostral and ear opening and spots in 4 rows on dorsal are exist.

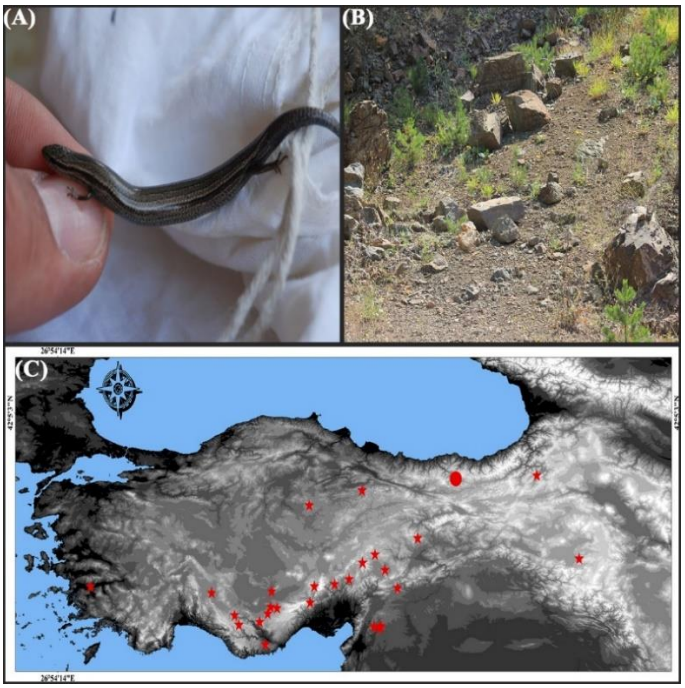

Figure 3. (A) is total view of the *Ablepharus chernovi* and (B) is habitat of sample captured. The distribution map is shown at (C) based on references (Fuhn, 1970; Eiselt, 1976; Baran 1977; 1980; Kumlutaş, 1993; Atatür et al., 2001; Arıkan and Çiçek, 2010; Skourtanioti et al., 2016; Yıldırım et al., 2017; Baycan

and Tosunoğlu, 2017). Circle represents the new one (Gümüşhane), while stars are known localities.

Discussion

Although *Eumeces schneideri* (Daudin, 1802) was commonly known from southeast part of Turkey, the new localities have been recorded from the southwest, central and east part of Turkey in recent years. One of them is the westernmost record for this species from Pamukkale (Denizli) that is type locality of *E. s. barani* in Bozdağ (İzmir) describing the new subspecies considering not only color-pattern and morphological characteristics and also electrophoretic analyses of the blood serum proteins (Kumlutaş et al., 2007). The authors suggested that the *E. s. barani* is differentiated from others by especially its the scales along the dorsal midline supporting the serologic distinction. Another study is suggested that *E. s. barani* is also exist in Aydın Province (Buharkent and Başaran villages) (Çiçek et al., 2015). On the other hand, Ayaz et al. (2011) showed a remarkable finding that its distributional region extends to Iğdır province which is the northern east record. Our new locality for *E. schneideri* is located in zone which is relevant to connection between southern and northern east populations. The specimens caught from Bingöl were similar to *E. s. princeps* subspecies considering coloration and pholidosis, even though two specimens were assessed (Eiselt, 1940; Mertens, 1946; Kumlutaş et al., 2007; Ayaz et al., 2011; Çiçek et al., 2015).

When the characters of the Bayburt specimens are compare with the data published for *H. vittatus* (Budak, 1973; Başoğlu and Baran, 1977; Özdemir et al., 2001; Rastegar-Pouyani and Fattahi, 2015; Kumlutaş et al., 2015), it seems that some of them are not compatible with others due to the low number of specimens examined in the present study. However, Bayburt specimens compared with samples in Gümüşhane populations that is the northernmost record show similarities considering some morphological characters such as HW, HH, LHL, NED, IORD, TD, FIL, MSOL, SDLT, SDLF, NSL, NIL, NEE, FIPL and PL (Kumlutaş et al., 2015). Harmanözü village is placed about 40 km away from Bizgili village (Gümüşhane) in bird's eye view. This show us the populations continue to stay at southern part of the North Anatolian Mountains that is a critical dispersal barrier for animals, and they continue to migrate along this line.

Many researchers have been performed to resolve the taxonomic status of *A. chernovi* considering morphological data due to its complexity (Fuhn, 1969a; 1969b; 1970; Eiselt, 1976; Baran, 1977; 1980; Kumlutaş, 1993; Schmidtler, 1997). Some researchers accepted the species as a subspecies of *A. kitaibelii* (Fuhn, 1969b; 1970; Eiselt, 1976; Baran, 1977; 1980). However, Schmidtler (1997) suggested that it was stepped up a species level as *A. chernovi* because its tympanum opening is very small or not, second supraciliar scale is narrower, number of scales along the dorsal midline is 18 and yellowish orange in the abdomen of male. Sindaco et al. (2000) stated that *A. chernovi* distributed in the area between Eastern Anatolia, Kayseri and western part of Niğde and Antalya coastline, and its chorotype was Armenian-Eastern Anatolia. When we consider this area, the locality that we caught the sample is the northernmost record for *A. chernovi* species. It seems that the species' distributional range reached to Black Sea Region and this verifies that is larger than known in eastern Anatolia.

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