

New locality record for *Podarcis siculus hieroglyphicus* (Berthold, 1842) (Squamata: Lacertidae) in the western Black Sea region of Anatolia

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Abstract: Six specimens of *Podarcis siculus hieroglyphicus* from Filyos, Zonguldak Province, in the western Black Sea region were collected. This new record extended eastward seriously (ca. 250 km) the known distribution area of the subspecies in Turkey. The meristic (pholidolial) and metric (morphometric) characters and color-pattern features of specimens collected from Filyos, Zonguldak, are given in detail and compared with the specimens from other known Turkish localities with regard to the literature. The specimens examined were similar to *P. siculus hieroglyphicus* specimens mentioned in the literature.

Key words: *Podarcis siculus hieroglyphicus*, distribution range, lizard, Turkey

The genus *Podarcis*, wall lizards, comprises 21 currently recognized species, all of which occur in the Mediterranean region, where they are the dominant reptile group (Harris, 1999; Harris and Arnold, 1999; Poulakakis et al., 2003). Three species of the genus *Podarcis* are found in northwestern Turkey: *Podarcis siculus* (Rafinesque-Schmaltz, 1810), *P. muralis* (Laurenti, 1768), and *P. tauricus* (Pallas, 1814) (Başoğlu and Baran, 1977; Baran and Atatür, 1998; Sindaco et al., 2000).

Podarcis siculus, the Italian wall lizard, ranges throughout Italy south of the Alps, including on Sicily, Sardinia, and many other islands in the Tyrrhenian Sea, in far southern Switzerland, Corsica (France), and along the Adriatic coastal area from southwestern Slovenia, through western and southern Croatia and far southern Bosnia Herzegovina to Montenegro. It also occurs as isolated introduced populations in southern France, the Iberian Peninsula (Spain and Portugal), Menorca in the Balearic Islands (Spain), northwestern of Turkey, Ile La Galite (Tunisia), and Isola di Lampedusa (Italy). It has been also introduced to a number of sites in the United States, and may have been introduced to Libya and Tunisia (Podnar et al., 2005; Isailovic et al., 2009). *Podarcis siculus* is a polytypic species having a considerable number of subspecies in its distribution range. Mertens and Wermuth (1960) stated that it includes 39 subspecies. Additional subspecies of *P. siculus* were described by Arnold (1973). According to the review covering morphological characters done by Henle and Klaver (1986), *P. siculus* comprises a total of 52

subspecies. In order to elucidate the taxonomic position of *P. siculus*, molecular studies were performed using allozyme electrophoresis (Gorman et al., 1975; Capula and Ceccarelli, 2003) or sequencing of mitochondrial DNA (mtDNA) segments (Oliverio et al., 1998, 2001; Podnar et al., 2005). According to the results of these studies, the validity of several subspecies distinguished only by morphological characters was found doubtful. Podnar et al. (2005) stated that the exact taxonomic position of the subspecies of *P. siculus* will be solved using other molecular technique such as nuclear DNA markers in further investigations. *Podarcis siculus hieroglyphicus* was first described in İstanbul (Berthold, 1842). After the discovery of this taxon in İstanbul, the known localities of this subspecies were recorded only from some islands in the Marmara Sea and in İstanbul (Bird, 1936; Bodenheimer, 1944; Başoğlu and Baran, 1977; Çevik, 1999). Uğurtaş et al. (2000) reported this taxon in the center of Bursa and Çakırca, a village about 10 km west of İznik. The occurrence of *P. siculus hieroglyphicus* in Kazdağları (Hamdibey village) was mentioned by Hür et al. (2008). Finally, Mollov (2009) stated that it also lives in Güzelyalı Municipality Resort, southwest of Mudanya.

The present paper includes the pholidolial and metric characters and color-pattern features of *P. siculus hieroglyphicus* specimens captured from a locality outside of the known range area of *P. siculus hieroglyphicus*. Moreover, some data are given on the ecological features of its habitat.

The specimens (2 ♂♂, 1 ♀, 2 subadults ♂♂, 1 subadult ♀) were collected from Filyos, Zonguldak, on 25 April 2012

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(leg. Mustafa Sözen). All specimens were anesthetized with ether, fixed with a 96% ethanol injection, and deposited in 96% ethanol. They were deposited in the Zoology Lab. of the Department of Biology at the Faculty of Science, Dokuz Eylül University. The locality is shown in Figure 1. Color and pattern characteristics were recorded while the specimens were still alive, and color slides were taken from live animals and utilized in the study.

Mensural, meristic, and qualitative data were recorded following the system of Çevik (1999) and Uğurtaş et al. (2000). All measurements were determined under a stereomicroscope. Morphological measurements, except snout-vent length (SVL), were recorded using a digital caliper with an accuracy of 0.02 mm. SVL was measured to the nearest millimeter using a ruler. The following mensural characteristics were taken: snout-vent length (SVL), tip of snout to anal cleft; tail length (TL), anal cleft to tip of tail; pileus width (PW), at widest point between parietal plates; pileus length (PL), tip of snout to posterior margins of parietals; head width (HW), at widest point of head; head length (HL), tip of snout to posterior margin of ear opening; head depth (HD), greatest depth of head; total body length (TBL), tip of snout to tip of tail. Furthermore, some morphometric ratios were calculated: PW/PL, PL/SVL, and PL/TBL.

Meristic (pholidolial) characteristics considered here comprised the following counts: supraciliar granules (left–right, SCGa–SCGb), supraciliar plates (left–right, SCPa–SCPb), supraocular plates (left–right, SOa–SOb), supralabial plates (left–right, SRLa–SRLb, number of labials both anterior and posterior to center of eye), postnasal plates (left–right, PNa–PNb), loreal plates (left–right, LOa–LOb), masseteric plate (left–right, Ma–Mb), tympanic plate (left–right, TYa–TYb), inframaxillar plates (IM), transversal series of gular scales between inframaxillar symphysis and collar (MG), collar (C), supratemporals (left–right, STa–STb), ventral plates (transversal and longitudinal, TVP and LVP), femoral pores (left–right, FPa–FPb), subdigital lamellae in the 4th toe (left–right, SDLa–SDLb), transversal series of dorsal scales at the midtrunk (DS), and number of preanal scales surrounding anals (PA).

The samples were collected from rock backgrounds at Filyos harbor. In the area where the specimens were collected annual grasses were sparsely encountered (Figure 2). The samples were sunbathing out on the stones. When pursued, the specimens ran away under the stones. In addition, rocky areas were common at the estuary of the river Filyos having grasslands. The specimens were found during a day excursion between 0900 and 1100 and the temperature was about 20–25 °C. Altitude was between 1 and 10 m.

In none of the specimens was the rostral plate in contact with the frontonasal plate. Supranasal was separated from anterior loreal plates above nostrils. The occipital plate was in contact with the interparietal plate in 3 specimens (50.0%); in 3 further specimens (50.0%) 2 or 3 small

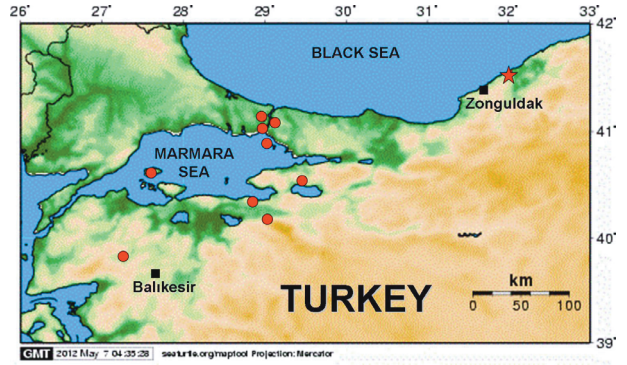


Figure 1. Distribution of *Podarcis siculus hieroglyphicus* in Turkey, showing the known distribution according to the literature, with a star for the new locality. Data from Bird (1936), Bodenheimer (1944), Başoğlu and Baran (1977), Çevik (1999), Uğurtaş et al. (2000), Hür et al. (2008), and Mollov (2009).



Figure 2. A general view of a new locality for *Podarcis siculus hieroglyphicus*, Filyos, Zonguldak.

scales were found to be present between the occipital and interparietal. The postnasal plate was single on each side in all specimens. A large and clear masseteric plate was seen in the temporal area in all specimens. The masseteric was divided into 3 parts only on 1 side of the head in 2 specimens (33.3%), 2 parts on both sides in 1 specimen (16.7%), and 1 part in the rest. SRLs were usually 4–4 (83.3%) and rarely 4–5 (16.7%). SCs were usually 6–6 (50.0%) and rarely 7–6 (33.3%) and 7–7 (16.7%). LOs were always 2 on both sides of the head. In all specimens a large and clear tympanicum was present on both sides of the head. Collars were usually smooth-edged (66.7%) and rarely serrated (33.3%). Four supraocular plates were present on both sides of the head in all specimens. The row of supraciliary granules was always complete. STs were large and narrow; the first one was longest in 4 specimens (66.7%) while in 2 specimens (33.3%) the second one was longest. Dorsal body scales were small and smooth. IMs were usually 5–5 (50.0%), rarely 5–6 (33.3%) and 6–5 (16.7%), and the first 3 of them were in contact in all specimens. Subdigital lamellae in the 4th toe were smooth. Anal plate was single in all specimens. Descriptive statistics of meristic (pholidolial) characteristics of our specimens are given in Table 1. Maximum TBL for a male

Table 1. Descriptive statistics of meristic and metric characters obtained from *Podarcis siculus hieroglyphicus* specimens collected from Filyos, Zonguldak. For abbreviations, see text (n: number of specimens; min: minimum value; max: maximum value; SD: standard deviation; SE: standard error of the mean).

Characters	n	Mean	Min.	Max.	SD	SE	Characters	n	Mean	Min.	Max.	SD	SE
SVL	3	68.64	67.42	70.18	1.38	0.80	SOB	6	4.00	4.00	4.00	0.00	0.00
TL	2	132.50	131	134	2.12	1.50	SRLa	6	4.17	4.00	5.00	0.41	0.17
PW	3	7.49	6.54	8.00	0.83	0.48	SRLb	6	4.00	4.00	4.00	0.00	0.00
PL	3	17.16	14.76	18.56	2.09	1.21	PNa	6	1.00	1.00	1.00	0.00	0.00
HW	3	9.45	8.38	10.18	0.95	0.55	PNb	6	1.00	1.00	1.00	0.00	0.00
HL	3	18.51	16.40	19.74	1.84	1.06	Ma	6	1.50	1.00	3.00	0.84	0.34
HD	3	7.79	6.58	8.48	1.05	0.61	IM	6	5.33	5.00	6.00	0.52	0.21
TBL	2	202.05	199.92	204.18	3.01	2.13	MG	6	28.00	27.00	30.00	1.26	0.52
PW/PL	3	0.44	0.43	0.44	0.01	0.00	C	6	11.83	11.00	13.00	0.98	0.40
PL/SVL (♂)	2	0.27	0.26	0.27	0.01	0.01	STa	6	4.83	4.00	6.00	0.75	0.31
(♀)	1	0.22	0.22	0.22	0.00	0.00	STb	6	5.17	5.00	6.00	0.40	0.17
TL/SVL	2	1.91	1.90	1.91	0.01	0.01	TVP	6	27.17	25.00	29.00	1.47	0.60
TL/TBL	2	0.66	0.66	0.66	0.00	0.00	FPa	6	24.67	22.00	26.00	1.51	0.61
SCGa	6	9.67	8.00	12.00	1.37	0.56	FPb	6	24.50	22.00	26.00	1.64	0.67
SCGb	6	10.17	9.00	11.00	0.98	0.40	SDLa	6	31.17	30.00	32.00	0.75	0.31
SCa	6	6.50	6.00	7.00	0.55	0.22	SDLb	6	31.83	30.00	33.00	0.98	0.40
SCb	6	6.17	6.00	7.00	0.41	0.17	DS	6	71.50	69.00	74.00	1.76	0.72
SOa	6	4.00	4.00	4.00	0.00	0.00	PA	6	6.17	6.00	7.00	0.41	0.17

specimen was 204.18 mm. The mean PL was 17.16 (range: 14.76–18.56). Descriptive statistics of metric measurements of the specimens are given in Table 1.

The top of the head of the adult male and female specimens is brownish. The lateral side of the head, especially supralabials, is light green (Figure 3). The back sides are light yellowish greenish and this coloration continues until the half of the body. The rest of the back is brown as is the root of the tail, hindlimbs, and tail. The lateral side of the body is brown with dense rounded green spots. The ventral side is light greenish as is the lower side of the head. Sometimes the outer ventral plates are covered with rounded light greenish or bluish spots. Subadult male specimens generally share the same coloration as the adult ones. However, the basic color of the back side is light greenish and the reticulated pattern is less. The top of the head of the subadult female is light brownish without spots. The lateral side of the head, especially supralabials, is light yellow. Light yellowish coloration is present along the dorsal side of the body. The rest of the back side is light grayish-brownish without spots. The fore and hindlimbs are light yellowish brownish. The ventral side is dirty white without spots (Figure 4).



Figure 3. General view of male specimen of *Podarcis siculus hieroglyphicus* from Filyos, Zonguldak.



Figure 4. General view of subadult female specimen of *Podarcis siculus hieroglyphicus* from Filyos, Zonguldak.

Morphological characters support *Podarcis* as a clade (Arnold, 1973), and suggest that the closest relatives are *Lacerta andreanskyi* and then the sister species *L. perspicillata* and *L. dugesii* (Harris and Arnold, 1999). Molecular data indicate that the species of *Podarcis* can be separated into 4 main groups that are geographically coherent: Western Island group (*P. filfolensis*, *P. lilfordi*, *P. pityusensis*, and *P. tiliguerta*), Balkan group (*P. gaigae*, *P. milensis*, *P. melilensis*, and *P. taurica*), Italian group (*P. muralis* and *P. sicula*), and Southwestern group (*P. atrata*, *P. bocagei*, and *P. hispanica*) (Harris and Arnold, 1999). There is substantial morphological and genetic evidence that *Podarcis* is a monophyletic group (Arnold, 1973; Harris et al., 1998; Fu, 2000; Oliverio et al., 2000) and that its closest relative, as derived from morphology, is the Moroccan *Lacerta* (*Teira*) *andreanskyi* (Arnold, 1973; Poulakakis et al., 2003).

All of the mensural, meristic (pholidolial), and color pattern features of our specimens were in agreement with the values given in previous studies on the subspecies *P. siculus hieroglyphicus* (Başoğlu and Baran, 1977; Çevik, 1999; Uğurtaş et al., 2000) (Table 2). With recording the specimens from Filyos, Zonguldak, the known range of *P.*

Table 2. Comparison of meristic and metric characters of our specimens with those given by Bird (1936), Çevik (1999), and Uğurtaş et al. (2000). For abbreviations, see text (n: number of specimens; Range: Extreme values, * the values are used for left side of the body).

Characters	Bird (1936)			Çevik (1999)			Uğurtaş et al. (2000)			This study		
	n	Mean	Range	n	Mean	Range	n	Mean	Range	n	Mean	Range
SCG				42	9.21	7–12	6	10.17	9–11	6	10.17	9–11*
MG	6	28.33	26–31	41	29.39	25–34	6	28.00	27–30	6	28.00	27–30
C				42	11.12	10–13	6	11.83	11–13	6	11.83	11–13
DS	6	69.67	64–76	43	71.84	62–80	6	71.50	69–74	6	71.50	69–74
LVP (♂)				18	26.00	25–28	4	26.50	25–28	4	26.50	25–28
LVP (♀)				14	28.84	27–30	2	28.50	28–29	2	28.50	28–29
LVP (♂+♀)	6	27.83	26–29							6	11.83	11–13
C	6	10.67	10–11									
FP				42	24.12	21–27	6	24.67	22–26	6	24.67	22–26*
SDL	6	27.67	24–31	42	32.62	26–36	6	31.17	30–32	6	31.17	30–32*
PW/PL				43	0.47	0.43–0.50	3	0.44	0.43–0.44	3	0.44	0.43–0.44
PL/SVL (♂)				20	0.26	0.25–0.28	2	0.27	0.26–0.27	2	0.27	0.26–0.27
PL/SVL (♀)				16	0.24	0.22–0.25	1	0.22		1	0.22	
TL/SVL				20	2.04	1.83–2.31	2	1.91	1.90–1.91	2	1.91	1.90–1.91
TL/TBL				20	0.70	0.64–0.70	10	0.66	0.61–0.70	2	0.66	0.66–0.66

siculus hieroglyphicus was extended as far as the middle part of the western Black Sea region of Turkey (approximately 250 km air distance to the east).

The presence of this subspecies in Turkey reveals an interesting situation, as mentioned in previous studies (Bird, 1936; Bodenheimer, 1944; Başoğlu and Baran, 1977; Çevik, 1999; Uğurtaş et al., 2000; Mollov, 2009) because there is no record of *P. siculus* from the Western Balkans and Thrace and there is a huge break among other populations of *P. siculus* and this subspecies. According to previous studies (Başoğlu and Baran, 1977; Çevik, 1999; Uğurtaş et al., 2000; Mollov, 2009) most probably this form might have been

brought to Turkey accidentally by people or trade ships. However, this interesting question regarding this subspecies will be solved in the future by the application of different molecular techniques that supply the biogeographic history of the taxon distributed in northwestern Turkey.

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