Bülbül, U., Sarıkurt, S., Zaman, E. (2024). New Locality Record of the Italian Wall Lizard, Podarcis siculus (Rafinesque-Schmaltz, 1810) (Squamata: Lacertidae) from the Western Black Sea Region of Türkiye. *The Black Sea Journal of Sciences*, 14(1), 262-271.

The Black Sea Journal of Sciences, 14(1), 262-271, 2024. DOI: 10.31466/kfbd.1398485

KFBD

Karadeniz Fen Bilimleri Dergisi
The Black Sea Journal of Sciences
ISSN (Online): 2564-7377 https://dergipark.org.tr/tr/pub/kfbd

Araştırma Makalesi / Research Article

New Locality Record of the Italian Wall Lizard, *Podarcis siculus* (Rafinesque-Schmaltz, 1810) (Squamata: Lacertidae) from the Western Black Sea Region of Türkiye

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Abstract

The present study provides a new locality record (Hıdırlık Street in Safranbolu district of Karabük province) of *Podarcis siculus* from the western Black Sea region of Türkiye. Our findings show that the distribution of this species in Türkiye may cover more areas than known. It is possible that the species, which has not been reported to be distributed anywhere between Bolu and Samsun provinces so far, is also likely to be found in the areas between Karabük and Samsun provinces. Pholidolial and morphometric characteristics of the Safranbolu specimens were compared to those of the specimens reported in the literature from other parts of Türkiye. It was concluded that the samples from the Hıdırlık population were similar to the *P. siculus* samples reported in the literature.

Keywords: Distribution, Safranbolu, Pholidosis, Morphometry, Karabük, *Podarcis siculus*

İstanbul Kertenkelesi, *Podarcis siculus* (Rafinesque-Schmaltz, 1810) (Squamata: Lacertidae)'un Türkiye'nin Batı Karadeniz Bölgesi'nden Yeni Lokalite Kaydı

Öz

Bu çalışma, Türkiye'nin Batı Karadeniz bölgesindeki *Podarcis siculus*'un yeni bir lokalite kaydını (Karabük ili Safranbolu ilçesi Hıdırlık Caddesi) sunmaktadır. Bizim bulgularımız, bu türün Türkiye'deki yayılışının bilinenden daha fazla alanı kapsayabileceğini göstermektedir. Şu ana kadar Bolu ile Samsun illeri arasında herhangi bir yerde yayılış göstermediği bildirilen türün, Karabük ile Samsun illeri arasındaki bölgelerde de bulunması muhtemeldir. Safranbolu örneklerinin folidoliyal ve morfometrik özellikleri literatürde Türkiye'nin diğer bölgelerinden bildirilen örneklerle karşılaştırıldı. Hıdırlık populasyonuna ait örneklerin literatürde bildirilen *P. siculus* örneklerine benzer olduğu sonucuna varıldı.

Anahtar Kelimeler: Dağılış, Safranbolu, Folidosis, Morfometri, Karabük, *Podarcis siculus*

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Geliş/Received: 01.12.2023 **Kabul/Accepted:** 08.03.2024 **Yayın/Published:** 15.03.2024

1. Introduction

The Italian wall lizard, *Podarcis siculus* (Rafinesque-Schmaltz, 1810) is a lizard species living in the Mediterranean zones from the Iberian Peninsula to Tunisia (Corti et al., 2011).

Podarcis siculus is a medium-sized lizard species in the Lacertidae family. The adult individuals reach 25 cm in length (Grano et al., 2011). The dorsal color of *P. siculus* changes from green to brown. There were black individuals with blue ventral sides in the insular populations, while the mainland individuals of *P. siculus* have reticulated green patterns on the dorsal side. Nearly half of the outer ventral scales of males are blue. The ventral is greenish or whitish and it is unspotted (Speybroeck et al., 2016). Habitat of the species occurs in the walls of buildings, gardens, and cemeteries within cities. Besides, the species prefers to live in rocky and stony areas in the coastal regions. The woody areas in the city parks are other preferred habitats of the species. The species can be found from the sea level to about 1800 m altitudes (Baran and Atatür, 1998). However, it was found up to 2200 m in Etna, Sicily (Speybroeck et al., 2016). The existence of species near urban areas and the surviving ability in changed anthropogenic environments, without an important loss of biodiversity over time, allow the Italian wall lizard to be considered a non-threatened IUCN species (Rondinini et al., 2013). *P. siculus* has been classified in the LC (Least Concern) category of the IUCN Red List of Threatened Animals (Isailovic et al., 2009).

The distribution of *P. siculus* originates throughout the mainland areas in Italy and extends to the circumambient islands with the inclusion of Corsica, Sardinia, Sicily, and the East Adriatic coast from Italy to Croatia, additionally countless islands and islets. By the anthropogenic pathways, the species has spread to plenty of countries. It is frequently thought an invasive alien lizard harmful to the native species and a population of *P. siculus* was introduced to New York in 1967 (Speybroeck et al., 2016). In addition, a population was found in Russia (Tuniyev et al., 2020).

In Türkiye, *Podarcis siculus* is distributed in the Marmara region including Thrace, and the western and central Black Sea regions (Bird, 1936; Podnar et al., 2005; Tok et al., 2015; Kurnaz et al., 2019). It is found in the provinces of İstanbul (Asian and European parts) (Bird, 1936; Bodenheimer, 1944; Başoğlu and Baran, 1977; Franzen, 1990; Çevik, 1999; Jablonski and Stloukal, 2012; Matur et al., 2022) , Bursa (Uğurtaş et al., 2000; Mollov, 2009), Çanakkale [Ida Mountain (Hür et al., 2008) and Gelibolu (Tok and Çiçek, 2014; Kurnaz et al., 2019)], Balıkesir (Türkoğlu, 2023), Kocaeli (Kurnaz et al., 2019), Sakarya (Kurnaz et al., 2019), Düzce (Kurnaz et al., 2019), Bolu (Türkoğlu, 2023), Zonguldak (Ilgaz et al., 2013; Kurnaz et al., 2019; Matur et al., 2022), and Samsun (Tok et al., 2015; Kurnaz et al., 2019; Matur et al., 2022).

The first Turkish record of the Italian wall lizard was given from the Anatolian part of İstanbul province. It is thought that the Italian wall lizard was transported to the Marmara Region incidentally,

via ships or other ways caused by humans (Başoğlu and Baran, 1977; Uğurtaş et al., 2000). *P. siculus* is an extremely adaptable species. The specimens of the species from the Safranbolu district of the Karabük province in the Western Black Sea region of Türkiye are reported in the present study. In addition, the pholidolial and morphometric characteristics of the specimens belonging to the new locality are given.

2. Materials and Methods

2.1. Sampling

Two adult male individuals were caught from a locality; Hıdırlık street in the Safranbolu district of the Karabük province (N: 41° 14' 633'' and E: 32° 41' 666'', 445 m a.s.l.) on 24 April 2023 (Fig. 1).

Figure 1. The map indicating the localities of *P. siculus* in Türkiye: 1) İstanbul; 2) Beykoz-İstanbul; 3) Bosphorus-İstanbul; 4) Bursa; 5) İznik-Bursa; 6) Hamdibey-Çanakkale; 7) Çanakkale; 8) Çanakkale; 9) Çanakkale; 10) Atakum-Samsun; 11) Gelibolu-Çanakkale; 12) Mudanya-Bursa; 13) Marmara Islands; 14) Filyos-Zonguldak; 15) İstanbul; 16) Darıca-Kocaeli; 17) Serdivan-Sakarya; 18) Arifiye-Sakarya; 19) Maşukiye-Kocaeli; 20) Sapanca-Sakarya; 21) Arifiye-Sakarya; 22) Arifiye-Sakarya; 23) Ereğli-Zonguldak; 24) Devrek-Zonguldak; 25) Filyos-Zonguldak; 26) Çaycuma-Zonguldak; 27) Gelibolu Çanakkale; 28) Çaycuma-Zonguldak; 29) Kilimli-Zonguldak; 30) Filyos-Zonguldak; 31) Filyos-Zonguldak; 32) Filyos-Zonguldak; 33) Filyos-Zonguldak; 34) Akçakoca-Düzce; 35) Ereğli-Zonguldak; 36) Ereğli-Zonguldak; 37) Filyos-Zonguldak; 38) Güngören-İstanbul; 39) Üsküdar-İstanbul; 40) Tuzla-İstanbul; 41) Beyoğlu-İstanbul; 42) Samandıra-İstanbul; 43) Bursa; 44) Gebze-Kocaeli; 45) Gebze- Kocaeli; 46) Sakarya; 47) Adapazarı-Sakarya; 48) Karesi-Balıkesir; 49) Eskiçağa-Bolu; 50) NewLocality, Safranbolu, Karabük indicated by yellow star.

The individuals of *P. siculus* were taken from a stone wall from an area with sparse herbaceous plants without woody plants (Fig. 2). We observed the individuals during a day excursion between 16:40 and 17:00.

Figure 2. Habitat of *Podarcis siculus* in Hıdırlık street (Safranbolu-Karabük)

After pholidolial examinations and morphometric measurements, we released the lizards into their habitats where they were captured.

2.2. Morphological Data

We examined all pholidolial characters by a stereo microscope and morphometric features of all specimens were measured using a digital caliper with an accuracy of 0.01 mm. All mensural and meristic data were compared with the findings of Çevik (1999), Ilgaz et al. (2013), and Tok et al. (2015). The following pholidolial characteristics were evaluated: supraciliar granules (right–left, SCGa–SCGb), supraciliar plates (right–left, SCPa–SCPb), supralabial plates (right–left, SRLa–SRLb, number of labials anterior to center of eye), inframaxillar plates (right–left, IMa-IMb), transversal series of gular scales between inframaxillar symphysis and collar (MG), collar (C), supratemporals (right–left, STa–STb), ventral plates (transversal and longitudinal, TVP and LVP), femoral pores (right–left, FPa–FPb), subdigital lamellae in the 4th toe (right–left, SDLa-SDLb), transversal series of dorsal scales at the midbody (DS), and number of preanal scales surrounding anals (PA1) and all plates surrounding anals (PA2).

The morphometric measurements were: snout-vent length (SVL), tip of snout to anal cleft; tail length (TL), anal cleft to tip of tail; pileus width (PW), at the 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; total body length (TBL), tip of snout to tip of tail.

3. Results

3.1. Morphological Data

Pholidolial characteristics: The numbers of subralabial plates (SRL) were 4-4 (right-left) in both male specimens. The numbers of supraciliar plates (SCP) were 7-6 and 7-7 (right-left) in both specimens, respectively. Other pholidolial characteristics are shown in Table 1.

Morphometric measurements: The TBLs for two male specimens were 240.56 mm and 243.05 mm, respectively. The SVLs were 73.73 mm and 75.80 mm, respectively. In two male specimens, the TLs were 153.91 mm and 156.89 mm, respectively. Other morphometric measurements are shown in Table 1.

Table 1. Pholidolial and morphometric characters of the specimens *of Podarcis siculus* collected from Hıdırlık population (Safranbolu-Karabük)

Characters	1st♂	2nd♂	Characters	1st♂	2nd♂
SCGa	12	12	TVP	27	27
SCGb	13	12	LVP	6	6
SCPa	7	7	FPa	23	24
SCPb	6	7	FPb	23	24
SRLa	4	4	DS	66	70
SRLb	4	4	PA1	2	2
SDLa	27	28	PA2	6	6
SDLb	27	28	SVL	73.73	75.80
IMa	6	6	TL	153.91	156.89
IMb	6	6	PW	8.27	8.98
STa	5	5	PL	17.73	18.15
STb	4	5	HW	11.33	12.12
MG	25	26	HL	18.78	19.00
C	11	13	TBL	240.56	243.05

3.2. Color-Pattern Features

The color of the top of the head was brownish and gray in both male specimens. There was the same coloration on the laterals of the head in both specimens, except for green coloration on the supralabial plates (Fig. 3). In both male specimens, the dorsum was greenish up to hind limbs while

it was light brown after the hind limbs. The laterals of the body were brown. There were intensive and circular green spots in both specimens. The ventral was light greenish in both specimens.

Figure 3. The two male individuals of *Podarcis siculus* from Hıdırlık population (Safranbolu- Karabük)

4. Discussion

According to the results of this study, it is understood that the pholidosis and morphometric characteristics of Safranbolu samples are compatible with the characteristics of individuals of the species found in other parts of Türkiye whose information is reported by Bird (1936), Çevik (1999), Uğurtaş et al. (2000), Ilgaz et al. (2013), Tok et al. (2015), and Kurnaz et al. (2019). Based on partial sequences of two mitochondrial genes (16S rRNA and CytB), monophyly was revealed in the Turkish populations of *Podarcis siculus*. The nominate subspecies, *Podarcis siculus siculus* is representative of these lizards in Türkiye (Silva-Rocha et al., 2012; Koç et al., 2018). However, Matur et al. (2022) suggested that the specimens obtained from Türkiye were grouped into two different haplotypes (similar to their geographic isolation) based on their phylogenetic and species delimitation analyzes. The authors concluded that these two haplotype groups are different resource groups and the differentiation of these haplotypes may be at the subspecies level.

Field observations carried out in Türkiye in recent years have revealed that some amphibian and reptile species exist in the country (Bülbül et al., 2016). In addition, these studies have shown that some species known to exist in Türkiye are also found in different geographical regions where they were not previously distributed (Bülbül et al., 2015; Olgun et al., 2015; Candan et al., 2020).

In recent studies based on the *Podarcis siculus*, the presence of the species has been reported in Kocaeli, Sakarya, Düzce, Bolu, and Balıkesir provinces besides the provinces where the

distribution of the species is known (Kurnaz et al., 2019; Türkoğlu, 2023). The findings of our study showing that the species is also present in the Safranbolu district of Karabük province are an indication that the distribution of this species in Türkiye covers more areas than known. It is seen that the distribution of these lizards, which are thought to have come to Türkiye accidentally by ships many years ago and was first seen in İstanbul province and its surroundings, is gradually spreading in the country. It is possible that the species also exists in other provinces in the area from Karabük to Samsun. To reveal this, field studies need to be carried out. Introduction of *P. siculus* in different areas was indicated to be disturbing to autochthonous lacertids, particularly in micro-insular habitats (Nevo et al., 1972; Capula, 2002; Capula and Ceccarelli, 2003; Podnar et al., 2005; Valdeón et al., 2010; Mateo et al., 2011; Carretero and Silva-Rocha, 2015; Ribeiro and Sá-Sousa, 2018). *Podarcis siculus* is thought as both an opportunistic species and an accomplished exotic colonizer, having high ecological tolerance, associated with superior distribution ability (Nevo et al., 1972; Capula and Ceccarelli, 2003; Isailovic et al., 2009; Silva-Rocha et al., 2014; Ribeiro and Sá-Sousa, 2018). Invasive species symbolize one of the main distresses in nature conservation (Schulte, 2012; Ribeiro and Sá-Sousa, 2018). The detriment because of invasive reptiles mostly originates from deterioration and replacement in the local food chains and functions of the ecosystems. This affects sensitive species. Hybridization and competition with native species can happen, and vectorization of new parasites may occur (Kraus, 2009; Fujisaki et al., 2010; Ribeiro and Sá-Sousa, 2018).

It is important to determine the existing range of distribution belonging to the introduced *P. siculus* and evaluate the rate of spatial distinction enforced by the exotic species over the autochthonous species (Ribeiro and Sá-Sousa, 2018). Field observations made in recent years reveal that the distribution area of *Podarcis siculus* in Türkiye is expanding. There is a need to continue detailed field observations in the habitats of this species and other lizard species that are likely to be suppressed in the areas where they are distributed.

Authors' Contributions

Ufuk BÜLBÜL: Carrying out field study, planned and wrote the article.

Sema SARIKURT: Carrying out field study, determining pholidosis characteristics and performing morphometric measurements.

Engin ZAMAN: Carrying out field study.

Statement of Conflicts of Interest

There is no conflict of interest between the authors.

Statement of Research and Publication Ethics

The authors declare that all the rules required to be followed within the scope of "Higher Education Institutions Scientific Research and Publication Ethics Directive" have been complied with in all processes of the article, that The Black Sea Journal of Science and the editorial board have no responsibility for any ethical violations that may be encountered, and that this study has not been evaluated in any academic publication environment other than The Black Sea Journal of Science. No experimental procedures have been performed on animals.

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