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A new subspecies, *Ophisops elegans budakibarani* n. subsp. (Sauria: Lacertidae) from Mut (Mersin/Turkey)

Cemal Varol TOK[1], Murat AFSAR[2], Batuhan Yaman YAKIN[1], Dinçer AYAZ[3] and Kerim ÇİÇEK[3*]

1. Department of Biology, Faculty of Arts and Sciences, Çanakkale Onsekiz Mart University, 17100, Çanakkale, Turkey.
2. Department of Biology, Faculty of Arts and Sciences, Celal Bayar University, 45000, Manisa, Turkey.
3. Zoology Section, Department of Biology, Faculty of Science, Ege University, 35100, Izmir, Turkey,
*Corresponding author, K. Çiçek, E-mail: kerim.cicek@hotmail.com / kerim.cicek@ege.edu.tr

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Abstract. This study describes a new subspecies of *Ophisops elegans* from vicinity of Mut, Mersin, Turkey and named *Ophisops elegans budakibarani* **n. subsp.** The new subspecies is distinguished from geographically the closest subspecies *O. elegans basoglui*, found in the south of its distribution, by having higher number of the longitudinal row of scales+plates at mid-trunk (SPM) and a characteristic venter coloration (whitish coloration instead of lemon yellow color in venter of both sexes during the breeding season) and from *O. elegans centralanatoliae,* found in the north of its distribution, by having lower number of SPM and a characteristic dorsum color-pattern (less distinct tile reddish-brown coloration in the temporal band, missing large blackish spots in the vertebral and paravertebral area).

Key words: Lacertidae, new subspecies, *Ophisops elegans budakibarani* n. subsp., systematics, Anatolia.

Introduction

The genus *Ophisops* has an intermittent distribution range extending from North Africa, southeast Europe, over the Near and the Middle East to the India and Sri Lanka with eight species currently recognized (Kyriazi et al., 2008, www.lacerta.de 2017). The E-Mediterranean species, *Ophisops elegans*, was first described by Ménétriés (1832) from the vicinity of Baku (Azerbaijan) and is widely distributed in the Southeastern Balkans (Southern Bulgaria, Northeastern Greece, some Aegean Sea islands), Southwestern Asia (Turkey, Cyprus, Transcaucasian countries, Iran, Northern Pakistan, Iraq, Syria, Lebanon, Israel, Jordan), and Northern Africa (Egypt, Libya and Algeria) (Bodenheimer 1944, Baran & Budak 1978, Baran 1982, Chirio & Blanc 1993, Schleich et al. 1996, Frynta et al. 2000, Sindaco et al. 2000, Kyriazi et al., 2008, Oraie et al. 2012).

According to the recent study of Sindaco & Jeremčenko (2008), the species is represented by seven nominal subspecies [*O. e. elegans*, Ménétriés, 1832; *O. e. ehrenbergi* (Wiegman, 1835); *O. e. schlueteri* Boettger, 1880; *O. e. blanfordi* Schmidt, 1939; *O. e. macrodactylus* Berthold, 1842; *O. e. centralanatoliae* Bodenheimer, 1944; *O. e. basoglui* Baran & Budak, 1978], four of them occurring on the mainland of Turkey: *O. e. macrodactylus* spread from Eastern Europe up to the vicinity of Manavgat in Western and Southwestern Anatolia; *O. e. basoglui* between Manavgat River and Adana; the nominate subspecies in Hatay, Eastern and Southeastern Anatolia; and *O. e. centralanatoliae* in Central Anatolia (Berthold 1842, Bodenheimer 1944, Öktem 1963, Başoğlu & Hellmich 1970, Özeti et al. 1986, Özeti et al., 1987, Baran & Budak 1978, Baran 1982, Tok 1992, Tok 1993, Tok et al. 1997, Baran & Atatür 1998, Baran et al. 2013).

Besides, the presence of *O. e. ehrenbergii*, first identified in Syria and accepted to have had a vast distribution area in Turkey in 1978, was claimed to be dubious by Baran (1982) and Tok et al. (1997) and the Hatay specimens were reported to resemble nominate subspecies. It was suggested that new specimens should be collected from the Syria-neighboring regions of Southeastern Anatolia to clarify the taxonomic status of the subspecies. The studies by Disi & Böhme (1996), Moravec (1998) and Sindaco et al. (2006) report that two subspecies, *O. e. elegans* and *O. e. ehrenbergii,* are found in Syria. These authors note that the northeastern Syrian population is more similar to the nominate subspecies as stated by Tok et al. (1997). However, some authors (Kyriazi et al., 2008, www.lacerta.de 2017) accepted *O. e. ehrenbergii* (Wiegman, 1835) distributes in southeastern Anatolia (Turkish and Syrian border), west Syria, Lebanon, Israel and west Jordan, Egypt.

In the study by Arıkan et al. (2000), the specimens collected from Konya, Niğde and Kayseri in the Central Taurus Mountains were assigned to *O. e. centalanatoliae* while the specimens of Mezitli and Çamlıyayla in the east of Mersin were included into *O. e. basoglui*. The authors also pointed out that the population of Mut (Silifke, Mersin) is different to the known forms. Tok et al. (1997) claimed that *O. elegans* populations highly show variation in terms of the longitudinal row of scales+plates at mid-trunk (SPM) and temporal plates (T) that the discriminate variation limits are not characterized are considered to distinguish *O. e. centralanatoliae* and *O. e. elegans* having very similar color-pattern characteristics. They also stated that cline can be found in terms of these characters. This study aims to analyze the *O. elegans* population from vicinity of Mut (Mersin, Turkey) in terms of color-pattern and pholidolial characteristics and to reveal its difference from the other known subspecies.

Materials and Methods

A total of 17 specimens (8 males, 9 females) were collected from three localities (3 males, 2 females from Karaekşi National Park [Lat.= 36.678750°N, Long.= 33.467187°E, 486 m a.s.l.]; 3 males, 5 females from Elbeyli village [36.609129°N, 33.428569°E, 240 m. a.s.l.] and 2 males, 2 females from Geçimli village [36.812978°N, 33.319346°E, 1324 m a.s.l.]) during field studies on March and April 2017. The specimens were photographed while the lizards were alive in their natural environment and its color-pattern characteristics were recorded following the terminology of Tok et al. (1997). The specimens fixed in 96% ethanol and deposited at the Collection of the Molecular Zootaxonomy Laboratory of Çanakkale Onsekiz Mart University (COMU-ZDEU).

The morphological (mensural), meristic (pholidolial), and qualitative data were recorded following the terminology provided by Tok et al. (1997) (Table 1). The following metric measurements were taken using a digital caliper of 0.01 mm accuracy: snout-vent length (SVL), tip of snout to anal cleft; tail length (TaL), 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 occipital; head width (HW), at widest point of head; head length (HL), tip of snout to posterior margin of ear opening; total body length (TL), tip of snout to tip of tail. Besides, some morphometric ratios were calculated: TaL/TL, HW/HL, PW/PL, PL/SVL, TaL/SVL, HL/SVL. The following meristic characters were comprised the following counts: Supraciliar granules (SCG) (left side), Temporalia (T), Median gularia (MG), Latitudinal row of ventral plates (VP), Longitudinal row of dorsal scales + ventral plates at mid-trunk (SPM), Femoral pores (FP), Subdigital lamellae on 4th digit (SDL4th). The new *O. elegans* specimens were compared with literature (Öktem 1963, Başoğlu & Hellmich 1970, Baran & Budak 1978, Baran 1982, Tok 1992, Tok 1993, Tok et al. 1996).

Results

***Ophisops elegans budakibarani* n. spp**

Holotype and type locality: Male, collected by Batuhan Yaman YAKIN and Utku ŞAHİN on March 29, 2017, in the Karaekşi National Park, Mut, Mersin, Turkey 486 m. a.s.l.

Paratypes: 7 males and 9 females, collected by Batuhan Yaman YAKIN and Utku ŞAHİN on March 29 and April 1 2017, in the vicinity of Elbeyli Village (240 m a.s.l.), Karaekşi National Park (486 m. a.s.l.) and Geçimli Village (1324 m. a.s.l.), Mersin, Turkey (Fig. 3).

Diagnosis: This new subspecies can be distinguished from *Ophisops elegans basoglui* known from southern Anatolia and *O. e. macrodactylus* (in both sexes) mainly distributed in the western Anatolia by absence of coloration on the venter during the breeding season. *Ophisops elegans budakibarani* is differentiated from nominate subspecies and *O. e. centralanatolia* in the north of the its distribution by the presence of dark brown or less distinct reddish brown temporal band instead of very distinct reddish brown one. To take into the consideration the longitudinal row of dorsal scales + ventral plates at mid-trunk is the main diagnostic character among subspecies, *O. e. budakibarani* is easily distinguishable from the *O. e. basoglui* by having a higher value, while it has lower value than *O. e. centralanatoliae.*

Description of holotype: COMU-ZDEU 2017/10. Adult male with a broken tail; SVL 54.53 mm. HL and HW 12.16 and 6.79 mm, respectively. PL 12.83 mm and PW 5.12 mm. At both sides, the number of nasals is two, while that of freanale and freno-ocular plates is one. Temporalia 50, median gularia 17, latitudinal row of ventral plates 24, supraciliar granules 13, Longitudinal row of scales+plates at mid-trunk 36, femoral pores 11 and subdigital lamellae on 4th digit is 22 (Fig. 1, 2).

The base color of the dorsum is brown. Light color (off-white) supratemporal lines start at the supratemporal plates, lie through the body, and partially disappear around where the tail begins. The supratemporal and subocular lines have almost the same color, namely off-white. In the dorsum, the base colors of the paravertebral area, especially where the spots are observable, and the temporal band are in almost the same color, variably light brown and reddish brown.

Figure 1. The dorsolateral view of the Holotype (male) *O. elegans budakibarani* n. spp.

Figure 2. Dorsal (A) and ventral (B) view of the Holotype (male) *O. elegans budakibarani* n. spp.

Blackish spots in the paravertebral area, which are relatively small and sometimes touch each other, extend along the supratemporal lines to become slightly indistinct towards the tail. The blackish spots in the temporal band densely and sporadically contact and reach the tail. Relatively small blackish spots are densely arranged in the area between off-white subocular lines and ventralia, and do not touch the

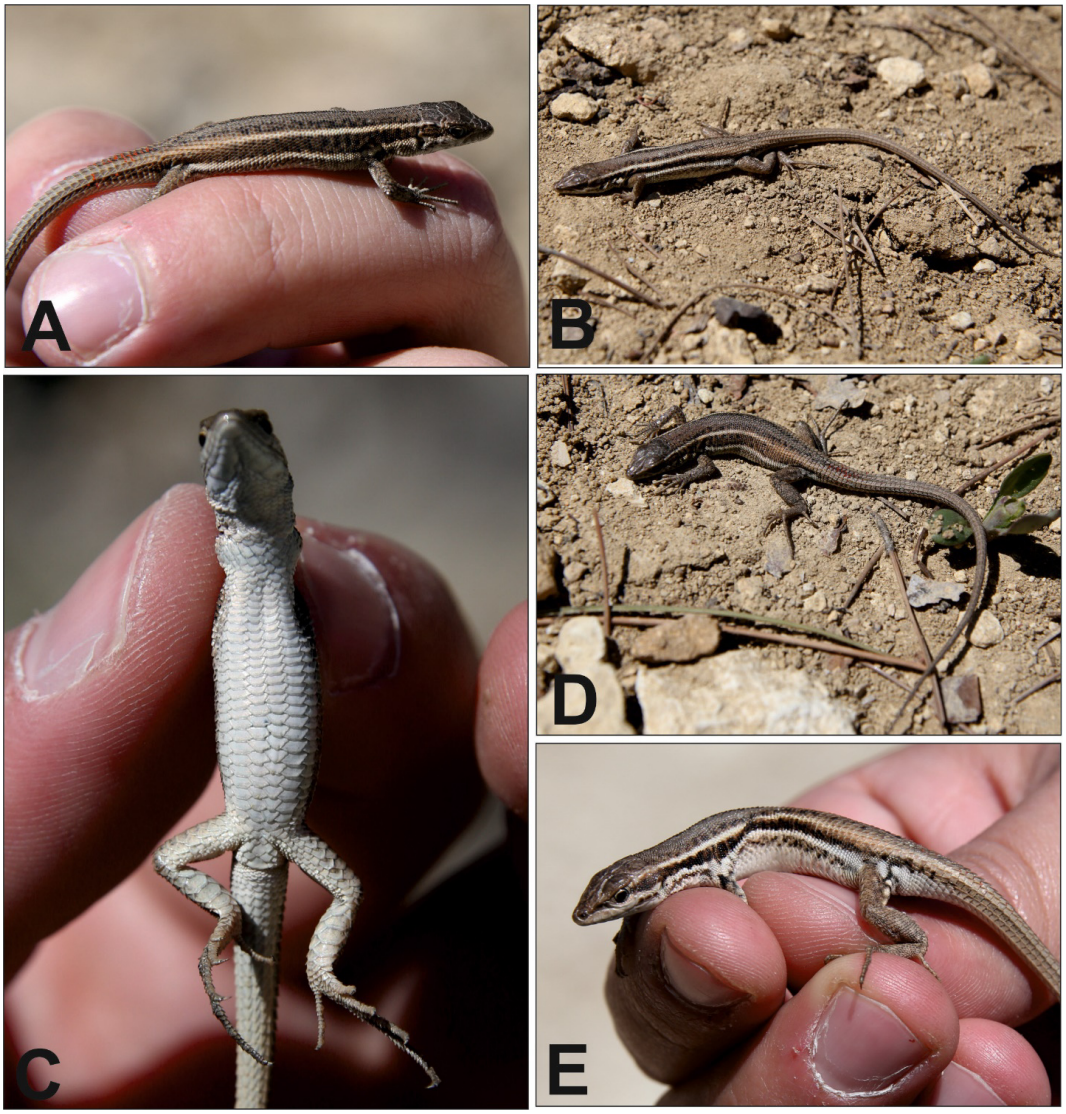

Figure 3. The general view of the paratypes of *O. elegans budakibarani* n. spp. (A, E= lateral, C= ventral, B, D= dorsolateral).

spots in the temporal band. These spots extend to the tail. The ventral side and sub-extremities are off-white.

Description of paratypes: COMU-ZDEU 2017/10, 2017/11, 2017/12. 7 male and 9 female specimens, collected around Elbeyli Village, Karaekşi National Park and Geçimli Village, were determined as paratypes (Fig. 3). Descriptive statistics and variation range of the morphometric and scalation characters are given in Table 1. Paratypic males: mean SVL 45.72 mm. (range: 39.82-48.99), TaL 99.67 (97-104), HL and HW 10.32 (9.37-11.34) and 5.93 (5.47-6.42) mm, respectively. Mean PL 10.82 mm (9.93-12.10) and PW 4.46 mm (3.92-5.05) respectively. Mean T 44.86 (38-49), MG 16.29 (15-17), VP 25.14 (23-26), SCG 12.86 (10-16), SPM 35.29 (34-37), FP 11 (10-12) and SDL4th is 23.14 (22-24). Females: mean SVL 40.21 mm. (35.74-46.83), HL and HW 8.75 mm (7.70-10.04) and 5.20 (4.61-6.61) mm, respectively. Mean PL 9.49 mm (8.60-11.23) and PW 4.06 mm (3.76-4.48) respectively. For both sexes, the number of nasals is two at both sides, while that of freanale and freno-ocular plates is one. Mean T 47.44 (34-64), MG 16.33 (15-17), VP 27.11 (25-28), SCG 11.89 (11-14), SPM 34.56 (range: 32-36), FP 11.22 (10-12) and SDL4th is 22.89 (21-24).

Coloration for the holotype shows similarities with that for paratypic males and females. Besides, the temporal band between supratemporal band and subocular lines is dark brown in the females. Because the spots in the temporal band are denser and touch each other, they look like a blackish band.

Habitat and Distribution: The specimens were collected in open and sparse vegetation in the vicinity of Mut windfree and sunny weather (Fig. 4). The subspecies sympatrically occurs with *Testudo graeca*, *Heremites vittatus*, *Platyceps najadum, Eirenis modestus* and *Hierophis nummifer*.

Derivatio nominis: The name of the newly described subspecies here is derived from the surnames of the Turkish herpetologists Prof. Dr. Abidin BUDAK and Prof. Dr. İbrahim BARAN, who made valuable contributions to Turkish Herpetofauna.

Discussion

A new subspecies of *O. elegans* exhibits distinct differences in terms of some morphological features and color-pattern

Table 1. Summary statistics of *O. e. budakibarani* from Mut (Mersin, Turkey) [n= number of specimens; SE= standard error of mean; Min= minimum value; Max= maximum value; SD= standard deviation] For abbreviations, see text.

	Males						Females						Overall					
	n	Mean	SE	Min	Max	SD	n	Mean	SE	Min	Max	SD	n	Mean	SE	Min	Max	SD
SCG (left side)	7	12.86	0.884	10	16	2.340	9	11.89	0.351	11	14	1.054	16	12.38	0.437	10	16	1.746
T	7	44.86	1.503	38	49	3.976	9	47.44	3.172	34.00	64.00	9.515	16	46.31	1.877	34.00	64.00	7.507
MG	7	16.29	0.286	15	17	0.756	9	16.33	0.236	15.00	17.00	0.707	16	16.31	0.176	15.00	17.00	0.704
VP	7	25.14	0.404	23	26	1.069	9	27.11	0.351	25.00	28.00	1.054	16	26.25	0.359	23.00	28.00	1.438
SPM	7	35.29	0.421	34	37	1.113	9	34.56	0.603	32.00	36.00	1.810	16	34.88	0.386	32.00	37.00	1.544
FP	7	11.00	0.218	10	12	0.557	9	11.22	0.222	10	12	0.667	16	11.13	0.155	10	12	0.619
SDL4th	7	23.14	0.261	22	24	0.690	9	22.89	0.389	21.00	24.00	1.167	16	23.00	0.242	21.00	24.00	0.966
SVL	7	45.72	1.230	39.82	48.99	3.255	9	40.21	1.476	35.74	46.83	4.427	16	42.62	1.190	35.74	48.99	4.760
TaL	3	99.67	2.186	97.00	104.00	3.786	5	83.20	4.259	74.00	99.00	9.524	8	89.38	4.009	74.00	104.00	11.338
TL	3	146.21	2.738	142.96	151.65	4.743	5	122.64	6.575	110.59	146.71	14.703	8	131.48	5.903	110.59	151.65	16.696
HL	7	10.32	0.255	9.37	11.34	0.675	9	8.75	0.320	7.70	10.04	0.960	16	9.44	0.287	7.70	11.34	1.148
HW	7	5.93	0.126	5.47	6.42	0.334	9	5.20	0.220	4.61	6.61	0.661	16	5.52	0.161	4.61	6.61	0.646
PL	7	10.82	0.269	9.93	12.10	0.713	9	9.49	0.306	8.60	11.23	0.918	16	10.07	0.264	8.60	12.10	1.057
PW	7	4.46	0.143	3.92	5.05	0.378	9	4.06	0.096	3.76	4.48	0.287	16	4.24	0.094	3.76	5.05	0.378
TaL/TL	3	144.88	3.327	141.53	151.53	5.762	5	122.50	6.320	109.80	145.83	14.133	8	130.89	5.676	109.80	151.53	16.053
HW/HL	7	1.33	0.025	1.26	1.44	0.065	9	1.28	0.033	1.19	1.49	0.099	16	1.30	0.022	1.19	1.49	0.088
PW/PL	7	0.41	0.010	0.38	0.45	0.026	9	0.43	0.006	0.39	0.44	0.018	16	0.42	0.006	0.38	0.45	0.023
PL/HBL	7	0.24	0.003	0.22	0.25	0.009	9	0.24	0.006	0.21	0.26	0.017	16	0.24	0.003	0.21	0.26	0.013
TaL/HBL	3	2.30	0.116	2.17	2.53	0.201	5	1.97	0.122	1.66	2.27	0.273	8	2.09	0.102	1.66	2.53	0.289
HL/HBL	7	0.23	0.003	0.21	0.24	0.008	9		0.005	0.19	0.24	0.015	16	0.22	0.003	0.19	0.24	0.012

Figure 4. The general view habitat of *O. elegans budakibarani* n. spp. (A= Geçimli Village, B= Elbeyli Village)

characteristics from the other subspecies. Color-pattern as a qualitative feature has been a very important criterion for the identified subspecies. While *O. e. macrodactylus*, which is distributed in the Western and Southwestern Anatolia, exhibit yellowish green coloration on the ventral side (particularly lower side of head and neck) of males especially during the breeding season (Tok 1993, Tok et al. 1996, Table 2), *O. e. basoglui*, commonly found in Alanya through Adana in Southern Anatolia, has lemon yellow coloration on almost entire venter, which is more distinct in males (Baran & Budak 1978). *O. e. centralanatoliae*, distributed in the Central Anatolia, is different from other subspecies (*macrodactylus*, *basoglui*) in having a white or off-white venter and distinct reddish brown temporal band (Tok et al. 1996, Tok et al. 1997). While *O. e. centralanatoliae* and nominate subspecies have similar coloration-pattern characteristics, they are distinguished more often by their pholidolial features (T and SPM) (Tok 1992, Olgun & Tok 1999, Table 3).

The Mut specimens are distinct from the subspecies (*O. e. centralanatoliae* and *O. e. basoglui*), similar in terms of coloration-particularly features, with an indistinct brown or reddish brown temporal band and missing lemon yellow coloration on the ventral side during breeding period. Although the Mut specimens were collected in late March and early April, similar coloration characteristics were observed in the specimens collected in April through July, regarded as the breeding period of the species, for the purpose of a previous study by Arıkan et al. (2000). The pattern similar to the one (with sporadically contacting the spots observable in temporal band and the area between subocular line and ventralia in some specimens, particularly in males, and vertebral and paravertebral area covered with large blackish spots sporadically touching the spots in the temporal band) on the dorsal side widely observable in some *O. e. centralanatoliae* specimens (73.08% of males, 42.86% of females; Tok 1993) was not detected in the Mut specimens.

Moreover, the Mut specimens have a higher SPM value (mean: 34.94) than the mean measurement of 28.72 provided for *O. e. basoglui* in Baran & Budak (1978). The figures concerning this characteristic were found lower in the Mut specimens than the mean SPM values of 37.53, 36.95 and 39.39 provided for Konya, Kayseri, Beyşehir *O. e. centralanatoliae* specimens by Tok (1992, 1993), respectively. In consideration of all these differences, we propose that *Ophisops*

Table 2. Comparison of some color-pattern features of *O. elegans budakibarani* to other populations in Turkey.

Subspecies / Color-Pattern	Lemon yellow ventrals*	Yellowish green ventrals**	Off-white ventrals	Distinct reddish brown temporal band
O.e. elegans	-	-	+	+
O.e. centralanatoliae	-	-	+	+
O.e. macrodactylus	-	+	-	-
O.e. basoglui	+	-	-	-
O.e. budakibarani	-	-	+	-

*In breeding season, especially in males, all over the ventrals and lower side of the head, ** In breeding season, especially in males, lower side of the head and first half of the ventrals.

Table 3. Comparison of some pholidolial features of *O. elegans budakibarani* to other populations in Turkey.

	Van (Öktem, 1963)		Konya (Tok 1992)				Kayseri (Tok 1992)				Gölkaşı, Künklüpınar (Tok 1993)				Alanya (Baran & Budak 1978)		Ahlat (Başoğlu & Hellmich 1970)	
n / sex	80 ♂♂+♀♀		43 ♂♂+♀♀				45 ♂♂+♀♀				47 ♂♂+♀♀				90 ♂♂+♀♀		30 ♂♂+♀♀	
	Extr.	Mean	Range	Mean	SD	SE.	Range	Mean	SD.	SE.	Range	Mean	SD	SE	Range	Mean	Range	Mean
SCG			9-17	12.33	1.647	0.251	9-16	11.42	1.653	0.246	8-19	11.77	2.159	0.315	8-14	11.43		
SPM	28-38	32.76	33-44	37.53	2.106	0.321	34-42	36.95	2.011	0.300	34-49	39.49	2.820	0.411	26-31	28.72	31-37	33.30
FP			9-13	10.60	0.968	0.148	9-13	10.80	0.777	0.116	9-14	10.94	0.987	0.144	7-10	8.60	8-12	9.50
SDL4th			21-25	23.29	1.017	0.159	20-27	23.51	1.455	0.216	20-26	22.54	1.410	0.208	19-27	23.58		
T	26-60	40.10	37-84	56.32	10.819	1.650	37-76	54.36	9.281	1.384	35-83	54.02	8.919	1.301			26-41	34.50
MG			15-21	17.26	1.331	0.203	14-21	17.82	1.321	0.197	15-21	17.55	1.212	0.177				

	Western Anatolia (Baran 1982)		Ankara (Öktem 1963)		İzmir (Öktem 1963)		Künklüpınar (Tok 1993)				Hatay (Tok et al. 1996)				Present study			
n / sex	209 ♂♂+♀♀		80 ♂♂+♀♀		80 ♂♂+♀♀		30 ♂♂+♀♀				64 ♂♂+♀♀				17 ♂♂+♀♀			
	Range	Mean	Range	Mean	Range	Mean	Range	Mean	SD	SE	Range	Mean	SD	SE	Range	Mean	SD	SE
SCG	6-18	11.09					8-15	11.24	1.662	0.309	2-16	11.37	1.990	0.249	10-16	12.35	1.693	0.411
SPM	27-38	32.16	34-43	38.24	28-34	31.30	29-36	33.13	1.570	0.287	29-40	33.34	2.662	0.333	32-37	34.94	1.519	0.369
FP	6-12	9.55					9-12	10.37	0.765	0.140	7-12	9.68	0.934	0.168	10-12	11.12	0.600	0.146
SDL4th	19-27	23.00					20-24	22.57	1.194	0.218	20-25	22.75	1.285	0.161	21-24	22.94	0.966	0.234
T			29-71	48.06	17-47	34.49	27-51	39.93	9.422	1.172	21-69	46.01	10.446	1.306	34-64	46.53	7.324	1.776
MG							14-18	16.27	0.907	0.166	13-20	16.85	1.609	0.201	15-17	16.35	0.702	0.170

elegans population in Mut (Mersin, Turkey) be listed as a new subspecies, namely as *Ophisops elegans budakibarani*.

Kyriazi et al. (2008) studied the partial mtDNA sequences (16S rRNA, COI, and cyt b) of *O. elegans* across its distributional range and they evaluated specimen no. 21 (Gülek, Mersin) as *O. e. basoglui* and no. 22 (Silifke, Göksu Delta, Mersin) as *O. e. cf. basoglui* in Mediterranean Turkey. However, the Mut population is far from 75 km air distance to the southern direction to specimen no. 21 and 135 km air distance to the northeastern direction in specimen no. 22. Further studies are necessary for evaluating both mitochondrial and nuclear DNA structure of *O. elegans* to emerging subspecific pattern in Turkey.

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