

New locality records of the snake-eyed lizard, *Ophisops elegans* Ménétriés, 1832 (Squamata: Lacertidae), in the western Black Sea region of Anatolia

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Abstract: We report 18 specimens of *Ophisops elegans* from Kastamonu and Sinop provinces in the western Black Sea region of Anatolia. Previously, the northernmost known locality for *O. elegans* in Anatolia was Sinop Province. These new records extend the known distribution area of the species and fill the gaps in the distribution range of the species in the Black Sea region. The specimens were compared with the geographically closest subspecies, *O. e. centralanatoliae* from Ulukışla, Niğde. On the basis of pholidosis, coloration, and pattern, the new specimens can be included in the subspecies *O. e. centralanatoliae*.

Key words: *Ophisops elegans centralanatoliae*, distribution range, herpetofauna, Turkey

Anadolu'nun Batı Karadeniz Bölgesinden Yılan Gözlu Kertenkele, *Ophisops elegans* Ménétriés, 1832 (Squamata: Lacertidae) için yeni lokalite kayıtları

Özet: Bu çalışmada, Batı Karadeniz bölgesinde Kastamonu ve Sinop'tan 18 *Ophisops elegans* örneği kaydedilmiştir. Daha önce *Ophisops elegans* için Anadolu'da en kuzey nokta Sinop olarak biliniyordu. Yeni kayıtlar, türün dağılıp sahasını genişletmiş ve Karadeniz Bölgesi dağılıpındaki boşlukları doldurmuştur. Bu örnekler, Ulukışla, Niğde'den toplanan ve coğrafik olarak en yakın alttür olan *O. e. centralanatoliae* ile karşılaştırılmıştır. Yeni örnekler pholidosis, renk ve desen özellikleri açısından değerlendirilerek *O. e. centralanatoliae* alt türüne dahil edilmiştir.

Anahtar sözcükler: *Ophisops elegans centralanatoliae*, dağılıp sahası, herpetofauna, Türkiye

Specimens of the snake-eyed lizard, *Ophisops* Ménétriés, 1832 (Lacertidae), are distributed in southeastern Europe, North Africa, and Asia, with 8 species currently recognized (Kyriazi et al., 2008). *Ophisops elegans* Ménétriés, 1832 is widely distributed throughout the eastern Mediterranean region and

southwestern Asia, and it has also been recorded from North Africa (Chirio and Blanc, 1993; Schleich et al., 1996; Frynta et al., 2000; Sindaco et al., 2000; Göçmen et al., 2008). In Anatolia, *O. elegans* includes 5 subspecies: *O. e. elegans* in the Mediterranean region from Hatay to eastern and northeastern Anatolia;

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O. e. ehrenbergi (Wiegman, 1835) in southeastern Anatolia, the region of Turkey neighboring Syria, although its occurrence in other parts of Anatolia is still disputed (Tok et al., 1997); *O. e. basoglui* Baran and Budak, 1978 in the Mediterranean region from Alanya-Antalya to Adana Province (Baran and Budak, 1978; Baran, 1982); *O. e. centralanatoliae* Bodenheimer, 1944 in central Anatolia; and *O. e. macrodactylus* Berthold, 1842 in the Thrace region, the western and southwestern regions of Anatolia, and the Aegean and Mediterranean islands (Başoğlu and Baran, 1977; Baran, 1982; Özeti et al., 1986, 1987; Tok, 1992, 1993; Tok et al., 1996).

O. e. centralanatoliae was described from Ankara, Kayseri, and Kahramanmaraş in central Anatolia by Bodenheimer (1944), who suggested that this new subspecies may be distributed throughout central Anatolia. This theory was supported by Öktem (1963), who included specimens from Konya in *O. e. centralanatoliae*. Tok (1992) confirmed this distribution but pointed out that some specimens from Beyşehir-Konya looked like *O. e. macrodactylus*. After examining more specimens, he concluded that these 2 subspecies live sympatrically in Beyşehir-Konya (Tok, 1993). Olgun and Tok (1999) compared specimens from Aksaray (Ihlara Valley) with those from Kayseri and Karaman and included the Aksaray specimens in *O. e. centralanatoliae*. While some researchers have accepted all specimens from Anatolia as the nominate race (Mertens, 1952; Eiselt, 1965), many others stated that the *O. elegans* living in Turkey require detailed revision (Clark and Clark, 1973; Baran, 1982; Baran et al., 1992; Tok, 1992; Mulder, 1995).

In this paper, we evaluate the external features of all specimens and present new distribution sites, extending the distribution boundaries of *O. elegans*. We also determine the taxonomical status of the specimens from the western Black Sea region.

A scientific excursion was conducted in the Black Sea region of Anatolia, 22-30 July 2009. All specimens were anesthetized with ether, fixed with a 96% ethanol injection, and deposited in 96% ethanol. This method enables the specimens to be used for DNA studies in the future (Göçmen et al., 2007). Later, they were numbered and deposited in the Zoology Department of Ege University (ZDEU). Collection at 6 localities yielded 37 specimens.

Material list (n = 37):

ZDEU 105/2009 (n = 5), 62 km SE Kastamonu Province, Sirke village, Hanönü, 577 m a.s.l (41°37'23.25"N, 34°21'48.62"E), 24 July 2009, Leg. B. Göçmen, B. Akman.

ZDEU 106/2009 (n = 2), 10 km N Boyabat, Bektaş village, Sinop Province, 344 m a.s.l (41°31'58.04"N, 34°46'29.37"E), 24 July 2009, Leg. B. Göçmen, B. Akman.

ZDEU 107/2009 (n = 2), 25 km NE Devrekani, Akdoğan village, Kastamonu Province, 1365 m a.s.l (41°44'05.03"N, 33°59'54.38"E), 24 July 2009, Leg. B. Göçmen, B. Akman.

ZDEU 108/2009 (n = 1), 5 km N Boyabat, Karacaören village, Sinop Province 337 m a.s.l (41°29'52.86"N, 34°45'45.43"E), 24 July 2009, Leg. B. Göçmen, B. Akman.

ZDEU 109-110/2009 (n = 8), 22 km NE Kastamonu Province, Yukarıbatak village, 683 m a.s.l (41°29'02.49"N, 33°56'22.52"E), 24 July 2009, Leg. B. Göçmen, B. Akman.

ZDEU 128/2009 (n = 19), 8 km W Ulukışla, Niğde Province, 1313 m a.s.l (37°35'20.55"N, 34°25'02.12"E), 10 October 2009, Leg. M. Z. Yıldız, B. Akman.

All localities are shown in Figure 1. The exact locality of the specimens was determined using a GPS receiver (Magellan XL). Data on color patterns and photos were recorded from living animals.

Mensural, meristic, and qualitative data were recorded following the system of Tok (1992, 1993). All measurements were determined under a stereo microscope.

Morphological measurements, except snout-vent length (SVL), were recorded using a digital caliper (Mitutoyo 500-181 U) with an accuracy of 0.02 mm. SVL was measured to the nearest millimeter using a ruler. The following mensural characteristics were taken: head + body length (distance from the tip of the snout to the cloaca), tail length (from the cloaca to the tip of the tail, if not injured), total length (from the tip of the snout to the tip of the tail), and pileus length (from the tip of the snout to the posterior of the parietals).

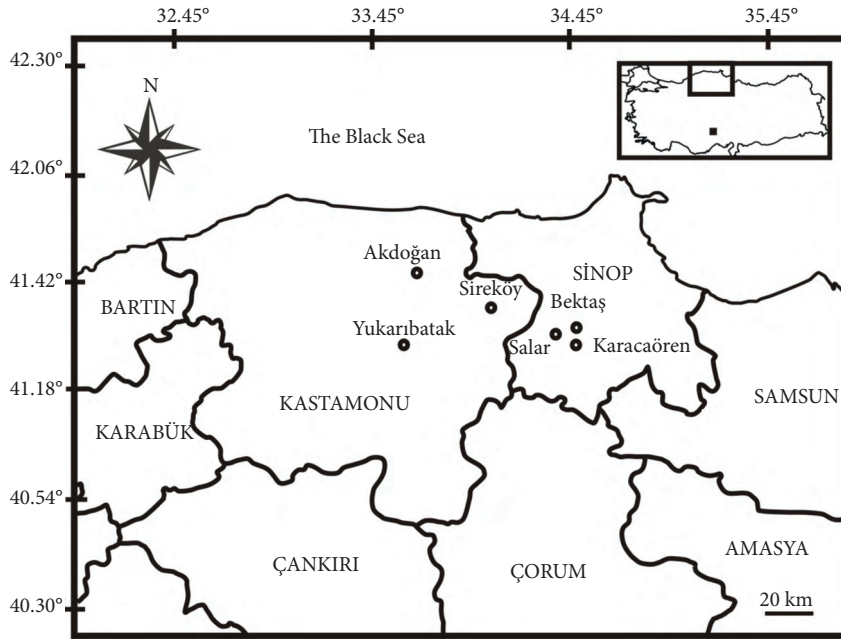


Figure 1. The localities of *O. e. centralanatoliae* from the western Black Sea region. Circles indicate the new localities, square indicates Ulukışla, Niğde.

For bilateral pholidotic features, counts were taken individually on both the left and right sides (L, R) before the L and R were pooled together. These features included the number of scales in the longest row across belly (ventrals), supraciliars, supraciliar granules, sublabials, supralabials, supratemporals, temporals, gulars, collars, dorsal scales + ventral plates at mid-trunk (the number of dorsal scales and ventral plates that constituted a circle across the mid-body), subdigital lamellae (along the underside of the fourth toe, from the base of the toe to one touching claw), femoral pores, preanals, anal plate, postnasals, preoculars, frenals, and inframaxilars.

In order to determine the similarities or differences between populations, data were analyzed using SPSS 18.0 for Windows. The Mann-Whitney U test was utilized for nonparametric data (such as the ventrals, supraciliars, supraciliar granules, and sublabials). Student's t-test was used for parametric data (head + body length, tail length, total length, and pileus length) and ratios (tail length to head + body length, tail length to total length) to compare the western Black Sea specimens with the geographically nearest subspecies, *O. e. centralanatoliae* from the Ulukışla, Niğde populations.

We collected the Kastamonu and Sinop specimens ($n = 18$; 4♀♀, 12♂♂, 2 juveniles) between 1100 and 1600 hours, generally in semiarid flat valleys with rocky slopes and stone-strewn bottoms covered with sparse stands of grasses and herbs (Figure 2). Specimens were active amongst these herbs. Conditions were clear and sunny, with air temperatures ranging between 20 and 24 °C at both the Kastamonu and Sinop localities.



Figure 2. A general view of a new locality for *O. e. centralanatoliae*, 4 km northeast of Yukarıbatak village, Kastamonu, 24 July 2009. Photo: BG.

Male and female specimens were taxonomically evaluated separately, then pooled and compared again statistically (Tables 1 and 2). Male and female individuals differed in color and pattern. The ground color of the back between the bluish grey supratemporal lines is gray, brown, or olive green in both sexes. The supratemporal lines extend to

the tail but in some specimens are indistinct at mid-body. The ventral side, including the lower side of the head and extremities, is dirty white in all specimens. The black spots on the dorsal sides and between the light supratemporal and subocular lines are scattered more or less regularly and are fewer in females than in males, and supratemporal lines are more clearly

Table 1. Some metric (mm) characters and derived ratios of investigated specimens and results of Student's t-test. SD: standard deviation, T: total, L: length.

	Sex	Kastamonu and Sinop provinces					Ulukışla, Niğde Province					P
		N	Mean	Min.	Max.	SD	N	Mean	Min.	Max.	SD	
Head + Body L.	♀♀	4	52	50	54	1.63	5	48.20	42	64	9.44	0.424
	♂♂	12	49	45	50	1.83	5	45.60	41	49	3.78	0.165
	Juv.	2	21	21	21	0.00	13	33.15	24	39	4.78	
	T	16	49	45	54	2.33	10	46.90	41	64	6.92	0.299
Tail L.	♀♀	4	80	57	110	24.49	4	75.75	57	85	12.74	0.785
	♂♂	5	82	65	101	16.48	5	86.20	74	112	15.21	0.673
	Juv.	2	33	32	34	1.41	6	64.33	40	76	13.00	
	T	9	81	57	110	19.02	9	81.56	57	112	14.38	0.934
Total L.	♀♀	4	132	109	164	25.79	4	125.50	107	146	16.22	0.698
	♂♂	5	130	114	150	15.65	5	131.80	115	160	17.15	0.896
	Juv.	2	54	53	55	1.41	6	98.83	64	113	17.65	
	T	9	131	109	164	19.29	9	129.00	107	160	16.02	0.814
Pileus L.	♀♀	4	10.49	9.89	11.26	0.57	5	9.58	8.68	10.90	0.81	0.090
	♂♂	12	10.58	9.75	11.28	0.50	5	10.47	9.01	11.54	1.13	0.844
	Juv.	2	6.14	6.07	6.20	0.09	13	7.99	6.28	8.90	0.77	
	T	16	10.56	9.75	11.28	0.50	10	10.03	8.68	11.54	1.04	0.156
Tail L. / Head + Body L.	♀♀	4	1.53	1.10	2.04	0.43	4	1.57	1.14	1.98	0.42	0.889
	♂♂	5	1.69	1.33	2.13	0.38	5	1.89	1.58	2.33	0.29	0.372
	Juv.	2	1.57	1.52	1.62	0.07	6	1.86	1.67	2.21	0.22	
	T	9	1.62	1.10	2.13	0.38	9	1.75	1.14	2.33	0.37	0.470
Tail L. / Total L.	♀♀	4	0.60	0.52	0.67	0.07	4	0.60	0.53	0.66	0.07	0.883
	♂♂	5	0.62	0.57	0.68	0.05	5	0.65	0.61	0.70	0.03	0.322
	Juv.	2	0.61	0.60	0.62	0.01	6	0.65	0.63	0.69	0.03	
	T	9	0.61	0.52	0.68	0.06	9	0.63	0.53	0.70	0.05	0.466
Pileus L. / Head + Body L.	♀♀	4	0.20	0.19	0.22	0.01	5	0.20	0.15	0.22	0.03	0.923
	♂♂	12	0.22	0.20	0.24	0.01	5	0.23	0.21	0.24	0.01	0.059
	Juv.	2	0.29	0.29	0.30	0.00	13	0.24	0.21	0.28	0.02	
	T	16	0.21	0.19	0.24	0.01	10	0.22	0.15	0.24	0.03	0.824

Table 2. Some meristic characters of investigated specimens and results of the Mann-Whitney U test. SD: standard deviation, T: total.

	Sex	Kastamonu and Sinop provinces					Ulukışla, Niğde Province					P
		N	Mean	Min.	Max.	SD	N	Mean	Min.	Max.	SD	
Ventrals	♀♀	4	31.75	30	35	2.22	5	30	28	32	1.58	0.26
	♂♂	12	28.92	26	32	1.93	5	28	27	29	1	0.285
	Juv.	2	28.5	27	30	2.12	13	28.92	26	31	1.66	0.73
	T	18	29.5	26	35	2.26	23	28.96	26	32	1.61	0.417
Supraciliars	T	35	4.54	4	7	0.74	46	4.43	4	6	0.62	0.566
Supraciliar granules	T	35	10.69	7	13	1.68	46	11.35	9	14	1.08	0.107
Sublabials	T	36	6.08	6	7	0.28	46	6.28	5	7	0.5	0.03
Supralabials	T	36	4.06	4	5	0.23	46	4	3	5	0.3	0.362
Supratemporals	T	36	2.03	1	3	0.38	46	2.13	1	4	0.45	0.33
Temporals	T	36	56.31	43	68	8.63	46	52.43	35	73	9.75	0.037
Gulars	T	18	17.44	16	19	0.86	23	17.65	16	20	1.07	0.473
Collars	T	18	9.5	8	11	0.92	23	10.35	9	11	0.83	0.005
Dorsal scales + ventral plates at mid-trunk	T	18	37.83	33	45	3.19	23	37.09	34	45	2.19	0.441
Subdigital lamellae	T	36	22.83	21	25	1.3	46	22.52	19	26	1.67	0.501
Femoral pores	T	34	10.88	9	13	1.2	46	10.04	9	12	0.87	0.002
Preanals	T	17	4.65	4	5	0.49	23	4.87	3	6	0.55	0.096
Anal plate	T	17	1	1	1	0	23	1	1	1	0	1
Postnasals	T	36	2	2	2	0	46	1.96	1	2	0.21	0.208
Preoculars	T	36	1.06	1	2	0.23	46	1.02	1	2	0.15	0.421
Frenals	T	36	1.06	1	2	0.23	46	1.02	1	2	0.15	0.421
Inframaxilars	T	36	5.89	5	6	0.32	46	6	6	6	0	0.021

pronounced in females (Figure 3). The temporal band, between the supratemporal and subocular lines (from the back of the eye to the base of the tail), is reddish brown, but it looks paler and has no blackish spots in females. Males have many blackish spots, in contact with the temporal line, on the temporal band (Figure 3).

In none of the specimens were the nostrils in contact with the nasal plate. The occipital plate was in contact with the interparietal plate in 7 specimens (38.9%), while in 6 specimens (33.3%), the occipital plate had no contact with the interparietal plate; in 5 further specimens (27.8%), a small scale was found to be present between the occipital and interparietal



Figure 3. A general view of male (upper) and female specimens from Yukarıbatak village. Photo: BG.

plates. The last supralabial plate, behind the eye, touches the tympanicum on the right side in 15 specimens (83.3%). On the left side, 16 specimens (88.9%) had contact between the supralabial plate and the tympanicum. The supralabial plate had no contact with the tympanicum on the right side in 3 specimens (16.7%) or on the left side in 2 specimens (11.1%).

The results of the Mann-Whitney U test showed that sublabials, temporals, collars, femoral pores, and inframaxilars were significantly different between the Kastamonu and Sinop specimens and the Ulukışla specimens ($P < 0.05$). Their ranges widely overlapped, however, and we suggest that these differences could be caused by the low numbers of specimens involved in this study.

The important character used in recognizing the subspecies of *O. elegans* is the number of dorsal scales and ventral plates at the mid-trunk (Öktem, 1963; Tok et al, 1997). Tok (1992, 1993) recorded the dorsal scales + ventral plates at mid-trunk for *O. e. centralanatoliae* at 33-49, while Öktem (1963) gave a range of 34-43 and Olgun and Tok (1999) reported 32-44. Our obtained data are compatible with these literature findings (Table 2).

All of the characters of the Kastamonu and Sinop specimens are compatible with the data ranges published for *O. e. centralanatoliae* (Bodenheimer, 1944; Tok, 1992, 1993; Olgun and Tok, 1999). Although the ranges are compatible, the averages of sublabials, temporals, collars, femoral pores, and inframaxilars are statistically significantly different between the Kastamonu and Sinop specimens and

those from Ulukışla (*O. e. centralanatoliae*). We suggest that this difference was probably caused by the low number of specimens.

Tok (1992) showed that in *O. e. centralanatoliae*, there are no differences between the sexes in color and pattern, and that all specimens have reddish brown temporal bands on the flanks of the lateral sides of the body and a tapestry pattern created by the connection of large dark spots with supratemporal lines. The Ulukışla specimens are compatible with the coloration and pattern described by Tok (1992), but in the Kastamonu and Sinop specimens, although the coloration and pattern of males are the same, the females have no blackish spots on the temporal bands and have fewer spots dorsally between the temporal lines (Figure 3).

Previously, the northernmost known locality for *O. elegans* in Anatolia was Sinop Province (Dinçaslan, 2010), and for specimens identified as *O. e. centralanatoliae*, it was Ankara Province (Öktem, 1963; Tok, 1992; Tok et al., 1997). The new locality records from Kastamonu and Sinop extend the known range of *O. e. centralanatoliae* approximately 230 km (air distance) to the north, as measured from Ankara Province. The present study has also confirmed the findings of Dinçaslan et al. (2010) on the distribution of *O. elegans* in Sinop, as well as determining the subspecies status.

We diagnose the Kastamonu and Sinop specimens as the subspecies *O. e. centralanatoliae* on the basis of detailed morphological characters and color and pattern, although our western Black Sea specimens show sexual dichromatism. As a result, this paper represents the first record of this species north of the Ilgaz Mountains, a dispersal barrier for animals (Demirsoy, 1996). The new distribution boundary of *O. e. centralanatoliae* is extended 230 km (air distance) to the north, into the western Black Sea region, and the subspecies status was determined.

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