

## A new locality record for *Phoenicolacerta laevis* (Gray, 1838) (Squamata: Lacertidae) in western Anatolia

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**Abstract:** During fieldwork in western Anatolia 4 specimens (1 adult male, 2 subadult males, and 1 subadult female) of *Phoenicolacerta laevis* from Dalaman, Muğla Province, were collected in November 2014. The results including meristic pholidolial characteristics, metric measurements, and color-pattern features of specimens are compared with the data given in the previous literature. The occurrence of *P. laevis* in southern and western Anatolia is discussed.

**Key words:** *Phoenicolacerta laevis*, distribution, new locality, lizard, Turkey

The Lebanon lizard, *Phoenicolacerta laevis*, was first described by Gray (1838) from Lebanon as *Lacerta laevis*. It is known from southern Turkey, western Syria, throughout Lebanon, northern Israel, and northwestern Jordan (Baran and Atatür, 1998; Arnold et al., 2007; Baran et al., 2012). Arnold et al. (2007) conducted comprehensive molecular and morphological analysis on the subfamily Lacertinae and described 7 new genera. Four species (*Lacerta laevis*, *L. kulzeri*, *L. cyanisparsa*, and *L. troodica*) formerly considered as part of the genus *Lacerta* were elevated to a distinct genus by Arnold et al. (2007) as *Phoenicolacerta*. The first report of the occurrence of *P. laevis* in Turkey was from the Taurus Mountains (Werner, 1899). Later on, the occurrence of the species from other localities in Turkey was confirmed by Venzmer (1918, 1922), Bird (1936), Bodenheimer (1944), and Mertens (1952). Budak (1976) examined the morphology of *P. laevis* populations of Anatolia and concluded that they belonged to the nominal subspecies. Budak and Göçmen (1995) compared individuals from the Beşparmak Mountains in Cyprus with populations from Anatolia based on morphological characters and stated that the Anatolian populations could be distinguished from Cypriot ones in having small gular scales with higher numbers, subocular band extending below the temporal band, and an orange-red-colored site being present in the lower part of this region. Bischoff and Franzen (1993) and Bischoff and Schmidtler (1999) supported that *P. laevis* from Mersin differed in color patterns from *P. laevis* from Hatay. Tosunoğlu et al. (2001)

compared the populations of *L. laevis* from Mersin and Hatay in terms of morphological characters and serological approaches and found that the 2 populations showed great intra- and interpopulation variation in their pattern and color characteristics. They stated that the Mersin and Hatay populations showed no differences with which to evaluate different taxa. Until 2008, *P. laevis* had a continuous distribution in southern Turkey, including the provinces of Hatay, Adana, Mersin, and Kahramanmaraş (Budak, 1976; Baran and Atatür, 1998; Bischoff and Schmidtler, 1999; Tosunoğlu et al., 1999; Uğurtaş et al., 2000). Several recent works (Troidl and Troidl, 2008; Bruekers, 2010; Troidl and Troidl, 2011; Karış and Göçmen, 2014) documented the species' presence along the southern and western Turkish coast reaching Özdere, İzmir, to the west, extending the species' distribution by more than 650 km. The northeastern-most record of the species is Adıran, Kahramanmaraş (Bischoff and Schmidtler, 1999). A new locality for *P. laevis* in Dalaman, Muğla Province (Turkey) is reported in the present paper. Additionally, some data are given on the ecological features of its habitat.

On 8 November 2014, 4 specimens (1 adult male, 2 subadult males, and 1 subadult female) of *P. laevis* were collected from Dalaman, Muğla Province (Figure 1). The specimens were fixed in 96% ethanol and later stored in 70% ethanol (Başoğlu and Baran, 1977) in the Zoology Lab of the Department of Biology at the Faculty of Science, Dokuz Eylül University. The locality from which specimens were collected is shown in Figure 1. Color and pattern

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**Figure 1.** Distribution of *Phoenicolacerta laevis* in Turkey, showing the known distribution according to literature, with a star for the new locality. Data from Karış and Göçmen (2014). (1. 4 km NW Yayladağı, Hatay; 2. 15 km S Harbiye, Hatay; 3. Kozkalesi, S Antakya, Hatay; 4. Harbiye, Hatay; 5. Çevlik, Samandağ, Hatay; 6. Teknepinar (Batiayaz), W Antakya, Hatay; 7. Antakya, Hatay; 8. Demirköprü, E Antakya, Hatay; 9. Yenişehir Lake, 5 km S Reyhanlı, Hatay; 10. Reyhanlı, Hatay; 11. Muratpaşa, E Kırıkhan, Hatay; 12. Kırıkhan, Hatay; 13. Güzelce, N Kırıkhan, Hatay; 14. 5 km NE Belen, Hatay; 15. NW Soğukoluk (Hatay); 16. Akbez, Hassa, Hatay; 17. Yarpuz, E Osmaniye; 18. Kırıklı, W Hasanbeyli, Osmaniye; 19. Karatepe, N Osmaniye; 20. Andırın, W Kahramanmaraş; 21. Kozan dam, N Kozan, Adana; 22. 5 km N Karaisalı, Adana; 23. Sebil village, Çamlıyayla, Mersin; 24. Fındıkpinar plateau, Mersin; 25. Akarca village, N Mezitli, Mersin; 26. Limonlu, SE Erdemli, Mersin; 27. Koçaşlı, SE Gülnar, Mersin; 28. Anamur, Mersin; 29. Titreyengöl, Side, Antalya; 30. Kumköy, Side, Antalya; 31. Boğazkent, SE Serik, Antalya; 32. Beldibi, SW Antalya; 33. Tekirova, S Kemer, Antalya; 34–35. İçmeler and Marmaris, Muğla; 36. Özdere, S Menderes, İzmir; star (new locality): Dalaman, Muğla).

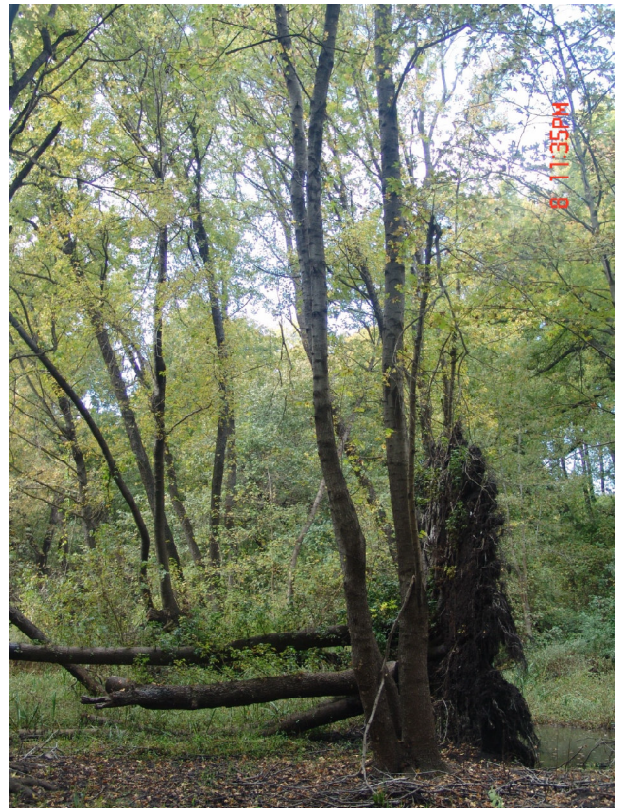
characteristics were recorded while the specimens were still alive, and color slides were taken from live animals and utilized in the study.

The terminology used in describing the specimens conforms to that of Budak (1976), Schmidtler and Bischoff (1999), and Tosunoğlu et al. (2001). Morphological measurements, except for snout–vent length (SVL), were recorded using a digital caliper with an accuracy of 0.01 mm. SVL was measured to the nearest millimeter using a ruler. Nineteen metric measurements and 8 dimensions were used in describing specimens (Table 1). All meristic pholidolial characteristics (see Table 2) were determined under a stereomicroscope.

The specimens were found during a day excursion between 1135 and 1200 hours; the temperature was about 22 °C. The habitat in which the specimens were captured is a “thermophilous deciduous woodland zone” according to the EUNIS Habitat Code with G1.7. The locality in which the specimens were found showed a rich diversity of ligneous plants (Figure 2), the dominant species being sweetgum trees (*Liquidambar orientalis*) (Figure 2). Sympatric amphibian and reptile species observed were *Bufotes variabilis* (Pallas, 1769) and *Ophisops elegans* Ménétrié, 1832.

In none of the specimens was the supranasal plate in contact with the anterior loreal plate. The rostral plate was in contact with the internasal plate in only the adult male specimen. The nostril was bordered by 5 plates. Two postnasal plates, 1 preocular plate, and 1 preanal were present in all specimens. Supraciliary granules were often incomplete (75%). A large and visible masseteric plate was

in the temporal area in all specimens. The tympanic was of 4 or 5 temporal scales equal in size and well developed. The temporal region was covered by small scales of the



**Figure 2.** A general view of a new locality for *Phoenicolacerta laevis*, Dalaman, Muğla.

**Table 1.** Data on meristic pholidolial characters obtained from *Phoenicolacerta laevis* specimens collected from Dalaman, Muğla.

Characters	1	2	3	4	
Sex	♂	subad. ♂	subad. ♂	subad. ♀	Mean ± SD
DS	58	58	54	49	54.75 ± 4.27
TVP	25	25	24	25	24.75 ± 0.50
LVP	6	6	6	6	6.00 ± 0.00
SRLAa	6	5	5	5	5.25 ± 0.50
SRLAb	5	6	5	6	5.50 ± 0.58
SRLPa	3	3	3	2	2.75 ± 0.50
SRLPb	3	3	3	3	3.00 ± 0.00
SLa	6	6	6	6	6.00 ± 0.00
SLb	6	6	6	5	5.75 ± 0.50
SCPa	6	5	7	6	6.00 ± 0.82
SCPb	6	5	7	6	6.25 ± 0.50
SCGa	12	11	7	5	8.75 ± 3.30
SCGb	11	10	9	6	9.25 ± 2.36
T (left)	31	43	42	20	34.00 ± 10.80
T1 (left)	11	12	9	10	10.50 ± 1.29
T4 (left)	6	6	7	4	5.75 ± 1.26
T2 (left)	2	3	3	2	2.50 ± 0.58
T3 (left)	1	1	2	----	1.33 ± 0.58
T5 (left)	6	4	3	3	4.00 ± 1.41
MG	20	20	20	19	19.75 ± 0.50
C	8	10	11	11	10.00 ± 1.41
FPa	19	20	17	19	18.75 ± 1.26
FPb	19	20	17	19	18.75 ± 1.26
SDLa	28	34	34	32	32.00 ± 2.83
SDLb	28	34	34	32	32.00 ± 2.83
WTS	28	27	26	22	25.75 ± 2.63
PA	7	8	7	8	7.50 ± 0.58
PO	1	1	1	1	1 ± 0.00
PN	2	2	2	2	2 ± 0.00

[SD: standard deviation; SCGa–SCGb: Supraciliar granules (left–right); SCPa–SCPb: Supraciliar plates (left–right); SRLAa–SRLAb: Supralabial plates (left–right; number of labials anterior to center of eye); SRLPa–SRLPb: Supralabial plates (left–right; number of labials posterior to center of eye); SLa–SLb: Sublabial plates (left–right); POa–POb: Preocular plates (left–right); PNa–PNb: Postnasal plates (left–right); T: Temporals (left); T1: Temporals-1 (temporal surrounding of masseteric) (left); T2: Temporals-2 (temporals between masseteric and tympanic plates) (left); T3: Temporals-3 (temporals in the shortest row between first supratemporal and masseteric plates) (left); T4: Temporals-4 (temporals between tympanic and postocular) (left); T5: Temporals-5 (temporals between supratemporal and supralabial) (left); WTS: The number of scales at sixth whorl of tail; MG: Transversal series of gular scales between inframaxillary symphysis and collar; C: Collar; TVP and LVP: Ventral plates (transversal and longitudinal); FPa–FPb: Femoral pores (left–right); SDLa–SDLb: Subdigital lamellae in the 4th toe (left–right); DS: Transversal series of dorsal scales at the midtrunk; PA: Number of preanal scales surrounding anals.]

**Table 2.** Data on metric characters obtained from *Phoenicolacerta laevis* specimens collected from Dalaman, Muğla.

Characters	1	2	3	4	
Sex	♂	subad. ♂	subad. ♂	subad. ♀	Mean ± SD
SVL	69.44	41.42	33.61	35.16	44.91 ± 16.70
HL	19.41	11.40	10.00	9.53	12.59 ± 4.62
HW	10.88	5.86	4.77	4.91	6.61 ± 2.89
PL	18.31	10.61	9.39	9.06	11.84 ± 4.36
PW	8.81	5.10	4.61	4.59	5.78 ± 2.04
HD	8.36	4.11	3.50	3.75	4.93 ± 2.30
TL	130	----	----	78	104.00 ± 36.77
FLL	24.34	15.06	12.00	13.53	16.23 ± 5.55
HLL	40.51	25.44	20.32	21.31	26.90 ± 9.34
AW	3.90	1.80	1.62	1.81	2.28 ± 1.08
AL	3.23	1.33	1.32	1.61	1.87 ± 0.91
IPL	3.46	2.27	2.31	1.86	2.48 ± 0.69
IPW	1.81	1.74	1.78	1.68	1.75 ± 0.06
OL	1.46	0.87	0.87	0.79	1.00 ± 0.31
OW	1.94	1.52	1.25	1.43	1.54 ± 0.29
PAL	6.58	3.58	3.26	2.98	4.10 ± 1.67
STL	3.65	1.39	1.19	1.19	1.86 ± 1.20
POL	1.24	0.75	0.58	0.67	0.81 ± 0.29
MD	1.82	1.29	0.66	1.13	1.23 ± 0.48
PW/PL	0.48	0.48	0.49	0.51	0.49 ± 0.01
PL/SVL	0.26	0.26	0.28	0.26	0.27 ± 0.01
STLI	55.47	38.83	36.50	39.93	42.68 ± 8.64
PWI	45.39	44.74	46.1	48.16	46.10 ± 1.49
HLI	27.95	27.52	29.75	27.1	28.08 ± 1.17
MDI	9.38	11.32	6.6	11.86	9.79 ± 2.38
PI	48.12	48.07	49.09	50.66	48.99 ± 1.21
HI	56.05	51.40	47.70	51.52	51.67 ± 3.42

[SD: standard deviation; SVL: Snout-vent length; TL: Tail length; PW: Pileus width; PL: Pileus length; HW: Head width; HL: Head length; HD: Head depth; FLL: Forelimb length; HLL: Hindlimb length; AL: Anal length; AW: Anal width; IPL: Interparietal length; IPW: Interparietal width; OL: Occipital length; OW: Occipital width; STL: 1. Supratemporal length; PAL: Parietal length; POL: Postocular length; MD: Masseteric diameter; STLI: 1. Supratemporal length index [STLI: (STL / PAL) × 100]; PWI: Pileus width index [(PW / HL) × 100]; HLI: Head length index [(HL / SVL) × 100]; MDI: Masseteric diameter index: [(MD / HL) × 100]; PI: Pileus index [(PW / PL) × 100]; HI: Head index [ (HW / HL) × 100.]



same size as dorsal scales. IM were always 5; first 3 pairs in complete contact, last 2 pairs completely separated. Developed sulcus gularis was present. Postocular separated from parietals. Collar was more or less smooth. Dorsal body scales were small and clearly keeled. Scales under toes were tubercular; whorls of scales on tail were of similar shape and size. SRLA (number of labials anterior to center of eye) were usually 5–6 (50%) or rarely 6–5 (25%) or 5–5 (25%). SRLP (number of labials posterior to center of eye) were usually 3–3 (75%) or rarely 2–3 (25%). SCP (supraciliary plates) were usually 6–6 (50.0%) or rarely 7–7 (25%) or 5–5 (25%), and the first one was always longest. SL (sublabial plates) were always 6–6 (100%). Anal was single in all specimens. Data of meristic pholidolial characteristics of our specimens with their mean values are given in Table 1.

Mean values of SVL and HL of our specimens were calculated as 44.91 and 12.59 mm (Table 2).

The ground color of the top of the head is brown with dark spots in the male specimen (Figure 3). The coloration of the vertebral band situated at the dorsal side

of body is lighter brown than the head and it has small black dots, especially along the middle. The temporal band situated on both right and left sides of the body is bright in coloration from the posterior part of the nostril to the ear openings, while the rest of the temporal band is up to the base of the tail. The temporal band has white ocelli, which are located at the base of legs. The coloration of the outer ventrals between front and hind limbs is blue. The inframaxillary plates, gular regions, lower part of front legs, and outer ventrals are orange, while the rest of the ventrals, lower part of hind limbs, anal region, and lower part of tail up to the eighth whorls are yellow (Figure 4). The color and pattern characteristics of the 3 semiadults are simpler. The ground color of the head, dorsum, and flank is brownish (Figure 5). The temporal band situated at the sides of body is dark blackish up to the base of the foreleg, while it is brown up to the base of the hind limb. There are no white ocelli or blue spots at the temporal band. The outer ventrals are brown, the gular region is yellowish-orange, and the rest of the lower part of the body is dirty white (Figure 6).



**Figure 3.** Dorsolateral view of male specimen of *Phoenicolacerta laevis* from Dalaman, Muğla.



**Figure 4.** Ventral view of male specimen of *Phoenicolacerta laevis* from Dalaman, Muğla.



**Figure 5.** Dorsolateral view of subadult male specimen of *Phoenicolacerta laevis* from Dalaman, Muğla.



**Figure 6.** Ventral view of subadult male specimen of *Phoenicolacerta laevis* from Dalaman, Muğla.

**Table 3.** Comparison of meristic pholidolial and metric characters of our specimens with those given by Budak (1976), Schmidtler and Bischoff (1999), Tosunoğlu et al. (2001), and Karış and Göçmen (2014).

Characters	Budak (1976)	Schmidtler and Bischoff (1999)	Tosunoğlu et al. (2001-Harbiye)	Tosunoğlu et al. (2001-Mezitli)	Karış and Göçmen (2014)	This study
HW	♂♂ + ♀♀	----	----	----	6.58	6.61
PL	♂♂ + ♀♀	----	----	----	10.48	11.84
PW	♂♂ + ♀♀	----	----	----	5.12	5.78
FLL	♂♂ + ♀♀	----	----	----	13.91	16.23
HLL	♂♂ + ♀♀	----	----	----	23.50	26.90
PW/PL	♂♂ + ♀♀	----	----	----	0.49	0.49
PWI	♂♂ + ♀♀	----	----	49.05	48.00	46.10
HLI	♂♂ ♀♀	----	----	26.93 23.24	26.69 22.83	28.08
MDI	♂♂ + ♀♀	----	----	13.48	11.33	9.79
PI	♂♂ + ♀♀	50.06	----	----	49.10	48.99
HI	♂♂ + ♀♀	59.73	----	62.02	61.93	51.67
STI	♂♂ ♀♀ ♂♂ + ♀♀	37.8 43.8	----	----	----	42.68
DS	♂♂ ♀♀ ♂♂ + ♀♀	----	52.7 57.4 ----	----	----	54.75
TVP	♂♂ ♀♀ ♂♂ + ♀♀	25.00 26.89 ----	23.60 24.80 ----	24.40 26.64 ----	24.67 26.80 ----	24.75
SCP	♂♂ + ♀♀	6.02	----	----	----	6.00*
SCG	♂♂ + ♀♀	9.94	----	10.38	10.47	8.75*
T	♂♂ + ♀♀	----	----	45.33	46.13	34.00
T1	♂♂ + ♀♀	----	----	11.86	10.93	10.50
MG	♂♂ ♀♀ ♂♂ + ♀♀	----	20.2 22.0 ----	----	----	19.75
C	♂♂ + ♀♀	----	----	10.76	10.93	10.00
FP	♂♂ ♀♀ ♂♂ + ♀♀	----	19.4 21.4 ----	----	----	18.75*
SDL	♂♂ ♀♀ ♂♂ + ♀♀	----	29.0 35.1 ----	----	----	32.00*
PO	♂♂ + ♀♀	2	----	----	----	1*
PN	♂♂ + ♀♀	2	----	----	----	2*
WTS	♂♂ ♀♀ ♂♂ + ♀♀	----	25.8 28.0 ----	----	----	25.75
PA	♂♂ ♀♀ ♂♂ + ♀♀	----	6.4 8.0 ----	----	----	7.50

[n: number of specimens; Range: Extreme values; \*: the values are used for the left side of the body.]

In conclusion, regarding meristic pholidolial characters, metric measurements, and color-pattern features, the specimens of *P. laevis* from Dalaman, Muğla, western Anatolia, examined in this study are within the variation limits mentioned for the taxon in the literature (Budak, 1976; Schmidtler and Bischoff, 1999; Tosunoğlu et al., 2001; Karış and Göçmen, 2014) (Table 3). This study revealed that *P. laevis* spreads through the northernmost known locality, Özdere (İzmir), without interruption

along the Mediterranean coast of Anatolia. We think that the presence of *P. laevis* in western and southern Anatolia might be anthropogenic in origin, as stated in previous study (Karış and Göçmen, 2014). However, phylogenetic and phylogeographic information obtained from different molecular techniques can be added to the knowledge of its morphology and distribution, producing a more accurate taxonomy for the studied species.

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