

An additional population of *Lyciasalamandra atifi veithi* (Urodela: Salamandridae)

Mehmet Anıl OĞUZ¹, Mert KARIŞ¹, Bayram GÖÇMEN^{1*}, Michael VEITH² and Olaf GODMANN³

1. Ege University, Faculty of Science, Department of Biology, Zoology Section, 35100, Bornova-İzmir, Turkey.

2. Department of Biogeography, Trier University, Universitätsring 15, 54296 Trier, Germany.

3 Hauptstraße 33, 65527 Niedernhausen, Germany.

* Corresponding author, B. Göçmen, E-mail: cypriensis@yahoo.com

Tel: +90 (232) 311 17 95, Fax: +90 (232) 388 10 36

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Abstract. A new population of *Lyciasalamandra atifi* is presented from Ürünlü village, Ibradı district, based on fieldwork conducted in March 2015. After morphological and statistical investigation we conclude that the Ürünlü population has a morphology similar to that of *Lyciasalamandra atifi veithi* from Dikmen village, Akseki district. We also uncover the Manavgat river locality that could not be confirmed by previous studies.

Key words: Lycian salamander, *Lyciasalamandra atifi veithi*, new population, Manavgat River, Antalya, Turkey.

Lycian salamanders have a wide Turkish distribution (ca. 390 km air distance), from Akyaka/Muğla in the West to Gazipaşa/Antalya in the East (Göçmen et al. 2013, Göçmen & Karış 2017). Before their erection to a genus of their own based on detailed mitochondrial DNA and allozyme data (Veith & Steinfartz 2004), *Lyciasalamandra* was known as *Mertensiella*. Among the species of the genus *Lyciasalamandra*, *L. atifi* (Başoğlu, 1967) has the largest distribution, ranging from Selge in the North-West to Gazipaşa in the South-East (Göçmen et al. 2013). Based on morphological and serological data, *L. atifi* has been divided into six subspecies: the nominat subspecies in Türbelinaz, *L. a. godmanni* in Selge, *L. a. veithi* in Dikmen, *L. a. kunti* in Güzelbağ, *L. a. bayrami* in Cebireis, *L. a. oezi* in Gazipaşa (Yıldız & Akman 2015; Tok et al. 2016; Oğuz et al. 2016). The Dikmen population, type locality of *L. a. veithi*, was reported for the first time by Başoğlu & Baran (1977). Gebhard et al. (1990) mentioned a *Lyciasalamandra atifi* population at northern Manavgat stream, but there was no confirmation until the fieldwork conducted by us. During our research we found a new isolated population of *L. atifi* in Ürünlü/Antalya. We here compare the population's metric and colour-pattern characters with those of the subspecies *L. a. veithi*.

In March 2015 and based on a hint of two German colleagues who had observed a Lycian salamander in this area, we found the new population in Ürünlü, Antalya province. In total, 16 specimens (1♂, 4♀♀, 11 juv.) were found under stones during the day. We brought the specimens to the laboratory to define the metric and colour-pattern characters. Measurements of body proportions and ratios followed our previous studies and published methods on salamanders (Akman et al. 2011; Oğuz et al. 2016). They were as follows: Total Body Length - the length of the whole body including the tail (TBL), Rostrum-Anus Length - length from the snout to the posterior end of the cloacal opening (RA), Length of Trunk - length from gular fold to the anterior edge of cloacal opening (LT), Tail Length (TL), Nostril-Eye Distance (NED), Distance Between Nostrils (DBN), Eye Diameter (ED), Head Length - distance from the snout to the gular fold (HL), Head Width (HW), Parotoid Length (PL), Parotoid Width (PW), Fore Limb Length (FLL), Hind Limb Length (HLL), Distance between Fore and Hind Limbs (DFHL), Height of dorsal protuberance on base of the tail (HDPBT) only in males, standard deviation (SD) and standard error (SE) for each character were calculated with Excell 2010. We classified specimens with Rostrum-Anus Length \geq 65 mm as adult (see Oğuz et al. 2016). Index values involving PERCRA (= length (L) of parameter in percent of Rostrum-Cloaca (RC) length

[L/RC \times 100] according to Werner (1971) were calculated as well.

Ethical permission (Ege University Animal Experiments Ethics Committee, 2013#028) as well as special permission (2013#220762) for the field studies from the Republic of Turkey, Ministry of Forestry and Water Affairs were received.

In March 2015, 16 specimens (1♂, 4♀♀, 11j) were found near Ürünlü village circa 20 km north-west of the *Lyciasalamandra atifi veithi* type locality in Dikmen. The ground colouration of the new population is dark brown, and there are numerous small white spots on the dorsum of the male, females and juveniles (Fig. 1). The spots on the dorsum of the specimens spread intensely to the entire dorsal side including head, tail and limbs. Reddish fleshy coloured ventral part and dark brown coloured dorsal part combine on the lateral sides of the body uninterruptedly. Summarized statistics of the individuals by the raw data, ratios and PERCRA indices are given in Table 1. The abbreviations are given in the Materials and Methods section.

According to Gebhard et al. (1990), it was suspicious that whether any *Lyciasalamandra atifi* population exists or not north of the Manavgat stream. In our previous paper (Oğuz et al. 2016), we mentioned that we made two different excursions to the northern side of Manavgat stream in November 2013 and we could not to find any specimens. However, in March 2015 and based on a hint of two German colleagues, we found a population near Ürünlü village in Antalya district. This location is not far from the place where Gebhard et al. (1990) mentioned *L. atifi* from circa 26 km north-west of Dikmen. The Ürünlü population lives 20 km north-west of the *L. atifi veithi* population at Dikmen, so both localities are in rather close vicinity.

Colouration and pattern of the new population are similar to *Lyciasalamandra atifi veithi* from Dikmen. Dark brown ground colour and reddish fleshy coloured ventral part combine on lateral sides, but unlike in other *L. atifi* populations there are no uninterrupted white stripes on lateral sides. We found only one specimen that has got the uninterrupted white stripes between fore and hind limbs, but 94% (1/16) of the specimens are similar in this character with the ssp. *veithi*. Unpublished molecular data also show that the Ürünlü population shares mitochondrial multigene haplotypes with Dikmen but not with Selge (Veith et al. unpublished). Sexual dimorphism also appears between the single



Figure 1. Specimens of *Lyciasalamandra atifi veithi* from Ürünlü, a) Male, b) Female, c) Juvenile, d) Family.

Table 1/A. Descriptive statistics of measurements (mm) and ratios taken from male, females, juveniles and adults (combined with male and female) of Ürünlü population of *Lyciasalamandra atifi*. 1 - Raw data values; 2 - PERCRA values; SD - Standard Deviation; SE - Standard Error of the Mean.

	Male			Females					
	N	Measurements	N	Mean	Min.	Max.	SD	SE	
RA	1	1	75.00	4	72.00	67.00	87.00	10.00	5.00
TBL	1	1	137.00	4	134.00	123.00	163.00	19.43	9.72
	2	1	104.63	4	186.02	183.58	189.55	2.95	1.48
LT	1	1	53.74	4	52.25	46.22	61.61	7.24	3.62
	2	1	103.47	4	72.69	68.99	81.01	5.60	2.80
TL	1	1	62.00	4	62.00	56.00	76.00	9.52	4.76
	2	1	97.38	4	72.69	68.99	81.08	2.95	1.48
NED	1	1	2.92	4	3.24	2.47	3.71	0.54	0.27
	2	1	79.71	4	86.02	83.58	89.55	0.86	0.43
DBN	1	1	5.32	4	5.15	4.71	5.95	0.55	0.28
	2	1	102.74	4	4.54	3.69	5.54	0.33	0.16
ED	1	1	4.62	4	5.07	4.21	6.18	0.89	0.44
	2	1	92.08	4	7.18	6.84	7.60	0.72	0.36
HL	1	1	17.17	4	15.61	13.08	16.98	1.74	0.87
	2	1	91.83	4	7.03	6.28	7.99	3.19	1.60
HW	1	1	12.65	4	13.30	11.87	14.66	1.33	0.67
	2	1	93.30	4	21.89	18.86	25.34	1.86	0.93
PL	1	1	8.74	4	9.43	9.15	9.73	0.29	0.14
	2	1	90.68	4	13.23	11.18	14.34	1.40	0.70
PW	1	1	3.07	4	3.04	2.77	3.67	0.43	0.21
	2	1	81.05	4	4.30	3.18	5.48	0.94	0.47
FLL	1	1	23.31	4	23.39	21.13	26.67	3.77	1.88
	2	1	80.80	4	32.63	30.66	36.75	2.78	1.39
HLL	1	1	24.60	4	25.13	22.48	27.85	3.01	1.51
	2	1	74.47	4	35.12	32.01	41.24	4.15	2.07
DFHL	1	1	38.62	4	37.54	34.06	44.73	4.87	2.44
	2	1	71.66	4	52.19	50.84	54.00	1.39	0.70
HDPBT	1	1	2.40	0	-	-	-	-	-
	2	1	66.48	0	-	-	-	-	-
HW/HL	1	1	0.74	4	0.85	0.78	0.91	0.06	0.01
TL/TBL	1	1	0.45	4	0.46	0.46	0.47	0.01	0.00
PW/PL	1	1	0.35	4	0.32	0.28	0.40	0.05	0.01
NED/HL	1	1	0.17	4	0.21	0.15	0.25	0.04	0.01

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male and females. Females have got lesser spots on the dorsum than the male, nevertheless they are more intense in both females and the single male than in other *L. atifi* populations. Since *Lyciasalamandra atifi* has the largest

Table 1. - continued

	Juveniles							Adults					
	N	Mean	Min.	Maks.	SD	SE	N	Mean	Min.	Maks.	SD	SE	
RA	1	11	54.64	44.00	64.00	6.71	2.03	5	72.60	67.00	87.00	10.81	4.85
TBL	1	11	99.91	73.00	126.00	17.74	5.36	5	134.60	123.00	163.00	23.43	10.51
	2	11	181.79	165.91	200.00	11.87	3.59	5	185.35	182.67	189.55	2.96	1.33
LT	1	11	48.49	41.19	61.95	6.63	2.00	5	52.54	46.22	61.61	6.75	3.03
	2	11	89.12	68.38	98.07	9.01	2.72	5	72.48	68.99	81.01	4.87	2.18
TL	1	11	45.27	29.00	61.95	11.30	3.41	5	62.00	56.00	76.00	13.01	5.83
	2	11	81.79	65.91	100.00	11.87	3.59	5	85.35	82.67	89.55	2.96	1.33
NED	1	11	2.38	1.87	2.82	0.29	0.09	5	3.17	2.47	3.71	0.53	0.24
	2	11	4.39	3.45	5.84	0.67	0.20	5	4.41	3.69	5.54	0.80	0.36
DBN	1	11	4.04	2.64	5.09	0.81	0.25	5	5.19	4.71	5.95	0.89	0.40
	2	11	7.35	6.00	9.25	0.95	0.29	5	7.16	6.84	7.60	0.28	0.13
ED	1	11	3.98	3.20	4.54	0.39	0.12	5	4.98	4.21	6.18	0.72	0.32
	2	11	7.32	6.56	8.37	0.65	0.20	5	6.86	6.16	7.99	0.73	0.33
HL	1	11	13.60	10.91	16.86	1.98	0.60	5	15.92	13.08	17.17	2.08	0.93
	2	11	24.85	22.62	26.34	0.99	0.30	5	22.09	18.86	25.34	2.80	1.26
HW	1	11	10.74	8.85	13.35	1.45	0.44	5	13.17	11.87	14.66	1.80	0.81
	2	11	19.71	17.56	24.27	1.78	0.54	5	18.24	16.85	21.15	1.78	0.80
PL	1	11	7.27	5.56	8.52	1.02	0.31	5	9.29	8.74	9.73	1.32	0.59
	2	11	13.31	11.35	14.39	0.94	0.28	5	12.92	11.18	14.34	1.40	0.63
PW	1	11	2.61	2.24	3.27	0.30	0.09	5	3.05	2.77	3.67	0.38	0.17
	2	11	4.83	3.90	6.05	0.70	0.21	5	4.26	3.18	5.48	0.82	0.37
FLL	1	11	17.90	12.36	22.61	2.97	0.90	5	23.38	21.13	26.67	3.77	1.69
	2	11	32.64	27.47	35.33	2.21	0.67	5	32.32	30.66	36.75	2.50	1.12
HLL	1	11	18.99	15.04	24.51	2.70	0.82	5	25.03	22.48	27.85	3.88	1.74
	2	11	34.75	31.17	38.30	2.18	0.66	5	34.66	32.01	41.24	3.74	1.68
DFHL	1	11	29.61	24.00	38.42	4.35	1.32	5	37.76	34.06	44.73	5.64	2.53
	2	11	54.24	46.15	64.03	4.67	1.41	5	52.05	50.84	54.00	1.246	0.56
HDPBT	1	0	-	-	-	-	-	1	2.40	2.40	2.40	0	0
	2	0	-	-	-	-	-	1	66.48	66.48	66.48	0	0
HW/HL	1	11	0.79	0.73	1.00	0.08	0.02	5	0.83	0.74	0.91	0.08	0.03
TL/TBL	1	11	0.45	0.40	0.50	0.04	0.01	5	0.46	0.45	0.47	0.03	0.01
PW/PL	1	11	0.37	0.29	0.50	0.06	0.02	5	0.33	0.28	0.40	0.06	0.03
NED/HL	1	11	0.18	0.13	0.24	0.03	0.01	5	0.20	0.15	0.25	0.04	0.02

distribution of all *Lyciasalamandra* species, we are convinced that still new populations are to be discovered within and even outside their ranges.

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