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Systematics and distribution of *Trachylepis septemtaeniata* (Reuss, 1834) (Sauria: Sincidae) in central and southern of Iraq

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Abstract

Iraq possesses varied climatic and geographical conditions includes eleven main terrestrial ecoregions, some of which can be classified as a key ecoregion that covers larger areas of the country that led to rich biodiversity and a considerable heterogeneity of the herpetofauna, little current information exists on globally important herpetofauna species of Iraq, in general and these are considered to be the least well known of the vertebrate groups, therefore an investigation on the occurrence of skinks in some provinces in central and southern Iraq was carried out from September 2013 to September 2015. Totally 46 adult specimens (15 male and 31 females) were collected from different localities in central and southern of Iraq. Statistical analysis were conducted on 19 metric and meristic characters were measured in *Trachylepis septemtaeniata*. The results of ANOVA test and Mann-Whitney U test showed that there are a significant differences ($P < 0.05$) in four metric characters between males and females: SVL: 60.64 ± 3.89 mm, 69 ± 1.86 mm; HLL: 24.52 ± 1.66 mm, 28.07 ± 0.8 mm; FLL: 15.87 ± 0.87 mm, 18.43 ± 0.58 mm and HL: 11.77 ± 0.53 mm, 13.45 ± 0.41 mm.

Key words: Systematics, Skinks, *Trachylepis*, Herpetofauna, Iraq.

1- Introduction

Trachylepis septemtaeniata (Reuss, 1834) Southern grass skink or *Mabuya aurata septemtaeniata* (Reuss, 1834) in traditionally literatures (1, 2) a subspecies of *Mabuya aurata* complex, recently the subspecies *septemtaeniata* was elevated to the specific level with changing its generic name into *Euprepis septemtaeniata* (3).

In the same year (4) changed *Euprepis* into *Trachylepis*. It diagnosed by lower eyelid with undivided, more or less transparent disc; 32-38 scales around body, 60-62 gulars plus ventrals; dorsals feebly tricarinate to smooth; prefrontals not in contact; 16-22 lamellae under 4th toe; parietals not in contact; no light vertebral stripe. According to (5), third supraocular shield being in contact with the frontal shield and by pattern of four longitudinal rows of small dark spots on the dorsum (the spots can fuse anteriorly and disappear posteriorly).

Light brown above, with four longitudinal dark brown stripes beginning at occiput, distinct on nape, breaking up into spots or disappearing on posterior part of back; broad, dark stripe, spotted with white, from nostril, on anterior half of flank, passing along upper half of flank, usually bordered above and below with light stripe, often breaking up and becoming indistinct on posterior half of flank; venter white (2).

Trachylepis septemtaeniata is extend throughout lowland Iraq; southern Iran, northeastern Saudi Arabia (Al Hasa South to Hofuf), Bahrain, northern Oman (Muscat), Eritrea, United Arab Emirates, Qatar, Syria, Armenia, Azerbaijan, and Turkmenistan (1,2,5). This species inhabits areas of the foothills region where rock crevices provide a retreat (6).

2- Materials and Methods

Totally 46 adult lizard specimens (15 male and 31 females) were collected from 14 different localities in some central and southern provinces of Iraq which ranged from (30°30'33.6" – 32 ° 32 ' 53.6 " N) and (44 ° 54 ' 12.6 " – 47° 48' 56.5" E) at elevation ranged from (1-235 m), for the time from 19th September 2013 to 4th September 2015. The locality data and habitat features were recorded for all the studied species. Most specimens were fixed by injection of 96% ethanol, and then preserved in 70% ethanol. Specimens were identified according to (1,2,7,8, 9) and using morphometric measurements, coloration, and pholidosis features (including number, structure, and range of scales and shields). Meristic and metric characters were measured for all collected lizard specimens, by using digital caliper to the nearest 0.01 mm (Table 1).

3- Statistical Analysis

All data of 19 measured metric and meristic characters in *Trachylepis septemtaeniata* were analyzed by employing: Shapiro- Wilk (normality) test, ANOVA test, independent sample T test, Mann-Whitney U test (10), and the significance level for all the statistical tests was set at $P < 0.05$. All measurement data were analyzed using computer software "Statistical Package for Social Sciences" (SPSS) version 20.

Table 1: The quantitative (metric and meristic) measured characters which used for *Trachylepis septemteaniata* identification.

Characters		Definition
Meristic	SDL4T	Subdigital lamellae under 4 th toe
	NSMAB	Number of scales across mid abdomen(in a single transverse row)
	SCA	Number of scales from collar to anal plate
	SAM	Number of scale around midbody
Metric (mm)	SVL	Length of snout to vent (from tip of snout to anterior edge of cloaca)
	TL	Tail length (from posterior edge of cloaca to tip of tail)
	HW	Head width (at the widest point of head)
	HH	Head height
	HL	Head length (from tip of snout to posterior edge of tympanum)
	SL (NED)	Snout length (nostril – eye distance)
	EED	Eye-Ear distance
	PW	Parietal width
	PL	Parietal length
	HLL	Hind limb length
	FLL	Fore limb length
	WBT	Width of base tail
	DFH	Distance between forelimb and hind limbs
	NL	Neck length from posterior edge of tympanum to anterior edge of shoulder
	IOD	Interorbital distance

4- Results

Totally 46 adult specimens (15 male and 31 females) were collected from different localities throughout study area, eight specimen were captured from Madhlum village-Najaf district\ Holy AL-Najaf with geographical coordinates: 31° 53' 37.6" N, 044°16'25.4" E, at elevation 15 m. Two specimens were

collected from Al-Jayir, Al-Mushkhab District\Holy AL-Najaf with geographical coordinates: 31°50'28.4"N, 044° 30'13.7" E, at elevation 22m from sea level. Four other specimens were collected from Al-Abbasiya, Al-Kufa district\Holy AL-Najaf with geographical coordinates: 32°07'00.2"N, 044°24'34.2"E, at elevation 19 m. Two specimens were collected from Kut-elguwam-Shatt al-Arab\AL-Basra with geographical coordinates: 30°30'33.6" N, 47° 53'12"E, at elevation 4m. Two specimens were captured from Al-Jubaila, Basrah District\ AL-Basra Province with geographical coordinates: 30°32'27.7"N, 47°48'56.5"E, at elevation 1m from sea level. Three specimens were captured from Al-Salman District\ AL-Muthanna Province with geographical coordinates: 30 33 8.96 N, 44 33 50.65 E, at elevation 235m from sea level. One specimen was captured from Al-Bdoor, fahad bridge, Al-Samawa District\AL-Muthanna Province with geographical coordinates: 31°8'50.8" N, 045°59' 09.8"E, at elevation 20 m. Three specimen were collected from Al-Muntazah- Nassriya District\Dhi Qar Province with geographical coordinates: 31°2'52"N, 046° 14'01.4"E, at elevation 9 m. Seven specimens were collected from Khagan village, Al-Showmali subdistrict- Hashimiya District\Babylon Province with geographical coordinates: 32° 22' 00.3" N, 044° 46' 07.4" E, at elevation 148 m. Three specimens were collected from Hilla city, Hilla District\Babylon Province with geographical coordinates: 32° 28' 43.2" N, 044°24'59.2"E, at elevation 159 m. Two specimens were collected from Al-Nikhealah village, Hilla District\Babylon Province with geographical coordinates: 32°25.776' N, 044°29.901' E, at elevation 14 m. Five specimens were collected from Al-Shamiya district\AL-Qadisiya Province with geographical coordinates: 31° 58' 17.1" N, 044° 36' 36.4" E, at elevation 55 m. Two specimens were collected from Diwaniya district\AL-Qadisiya Province with geographical coordinates: 31°56' 28.8"N, 044° 54'12.6"E, at elevation 40 m. Two specimens were collected from Al- Kafeel village, Kerbala District\Holy Karbala'a Province with geographical coordinates: 32°32' 53.6"N, 044° 05'39.4" E, at elevation 20 m (Figure 1). It found beneath rock slabs and under debris of fallen mud-brick. Also found in grassy areas near water, also this species inhabits area of the foothill region where rock crevices provide a retreat .

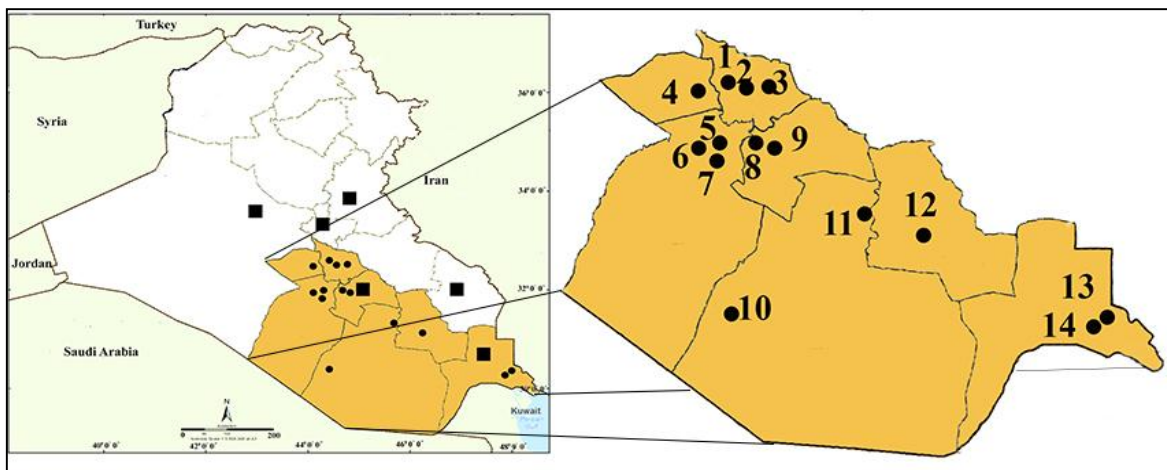


Figure 1. Map of Iraq and the localities where *Trachylepis septemtaeniata* was collected from 1: Hilla city, Hilla District\Babylon Province; 2: Khagan village, Al-Showmali subdistrict-Hashimiya District, and 3: Al-Nikhealah village, Hilla District\Babylon Province; 4: Al- Kafeel village, Kerbala District\Holy Karbala'a Province; 5: Al-Abbasiya subdistrict, Al-Kufa district, 6: Madhlum village, Bahr Al-Najaf- Najaf district, and 7: Al-Jayir, Al-Mushkhab District\Holy AL-Najaf Province; 8: Al-Shamiya district\AL-Qadisiya Province; 9: Diwaniya district\AL-Qadisiya Province; 10: Al-Salman District, and 11: Al-Bdoor, Fahad Bridge- Al-Samawa District\ AL-Muthanna Province; 12: Al-Muntazah, Nassriya District\ Dhi Qar Province; 13: Kut-elguwam village, Al-Salhiya county-Shatt al-

5- **Morphology:** In the head, the parietals usually entirely separated. Ear opening roundish with three minute lobules anteriorly. third supraocular shield being in contact with the frontal shield. Anterior loreal in contact with the first labial. Fifth upper labial is the largest, and forms the lower part of the orbit; two other labials behind it. Lower eyelid with a large transparent disc. One pair of nuchals. Dorsals tricarinate, smooth series of scales round the body. The scales on the flanks, neck, and limbs smooth or very feebly keeled. Dorsals a little larger than the laterals and ventrals. Color brownish; two bands lighter than the ground color extend along each side, the upper form the superciliary border, the lower form the upper labials below the eye; the interspace between these bands dark brown, and constitutes a broad band produced in front through the eye, with small whitish spots; four blackish longitudinal bands, along the back, distinct on the nape but they break up behind into spots. More or less numerous black spots on the head. Lower surfaces uniform whitish (Plate 1).



Plate 1. *Trachylepis septemtaeniata*, (A): dorsal view, (B): ventral view of male and female, and (C): alive specimen in habitat, captured by a noose.

6- **Morphometric Analysis:** Statistical analysis were conducted on 19 measured metric and meristic characters in *Trachylepis septemtaeniata* (Table 2). The results showed mean±standard error, maximum, and minimum of SVL and TL for males and females as follow: 60.64±3.89 mm, 84.28 mm, and 40.29 mm; 83.03±5.87 mm ,127.45 mm, and 54.96 mm for males respectively. For females: 69±1.86

mm, 81.29 mm, and 48.17 mm; 96.65 ± 4.23 mm, 116.66 mm, and 64.76 mm respectively. The results of ANOVA test and Mann-Whitney U test showed that there are a significant differences ($P < 0.05$) in four metric characters between males and females (Figure 2): SVL: 60.64 ± 3.89 mm, 69 ± 1.86 mm; HLL: 24.52 ± 1.66 mm, 28.07 ± 0.8 mm; FLL: 15.87 ± 0.87 mm, 18.43 ± 0.58 mm and HL: 11.77 ± 0.53 mm, 13.45 ± 0.41 mm.

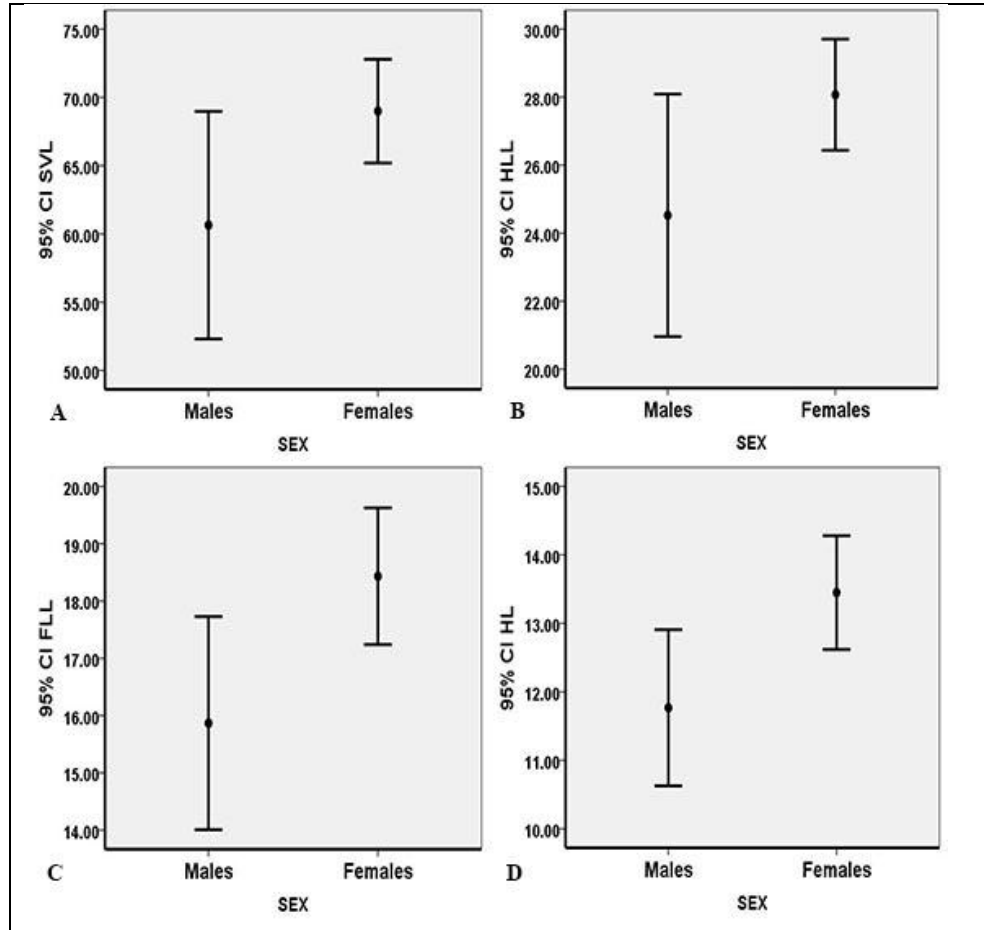


Figure 2. The mean and standard error for significantly different character between males and females of *Trachylepis septemtaeniata* revealed from the Analysis of Variance (ANOVA) and Mann-Whitney U test.

Table 2. Descriptive table including descriptive statistics (mean, standard error, standard deviation, maximum, and minimum), normality test, Mann-Whitney U test, and ANOVA test for 19 morphometric (mm) and meristic characters of *Trachylepis septemtaeniata* (N=46) included in the study.

Characters		Males					Females					Shapiro-Wilk (Normality Test)			P- Value	Used Test
		N	Mean	S. D.	Max.	Min.	N	Mean	S. D.	Max.	Min.	Statistic	d. f.	Sig.		
Metric	SVL	15	60.64	15.05	84.28	40.29	31	69	10.36	81.29	48.17	.924	46	.005	0.016	Mann-Whitney U test
	TL	13	83.03	21.15	127.5	54.96	20	96.7	18.92	116.7	64.76	.936	33	.053	0.065	
	SL	15	2.55	0.49	3.9	1.77	31	2.92	0.64	3.87	1.94	.932	46	.010	0.152	
	PL	15	2.95	0.65	4.16	2.12	31	2.64	0.56	3.82	1.84	.933	46	.011	0.124	
	FLL	15	15.87	3.36	23.71	12.44	31	18.4	3.25	23.07	13.21	.909	46	.002	0.008	
	WBT	15	9.5	6.33	22.43	3.37	31	10.4	5.38	23.86	5.55	.768	46	.000	0.231	
	DFH	15	23.87	11.58	47.09	7.97	31	29.5	10.94	41.04	7.45	.899	46	.001	0.085	
	NL	15	14.8	12.88	43.82	6.49	31	14	9.84	39.47	7.42	.613	46	.000	0.174	
	IOD	15	2.47	0.6	3.43	1.72	31	2.35	0.51	3.6	1.7	.929	46	.008	0.504	
Meristic	SDL4T	15	21.87	1.3	24	20	31	21.5	0.96	23	20	.890	46	.000	0.306	
	NSMAB	15	12.67	1.11	14	11	31	12.8	1.01	15	11	.878	46	.000	0.685	
	SAM	15	32.4	1.76	35	30	31	33.3	2.87	37	30	.801	46	.000	0.579	
	SCA	15	64.6	2.5	69	61	31	64.9	3.53	75	60	.936	46	.014	0.777	

Metric	HLL	15	24.52	6.44	35.36	16.11	31	28.1	4.46	35.74	20.28	.955	46	.075	0.035	ANOVA
	HL	15	11.77	2.06	15.85	8.75	31	13.5	2.26	17.04	9.93	.961	46	.123	0.049	
	HW	15	8.47	2.48	14.04	5.38	31	9.24	1.21	11.24	7.28	.975	46	.421	0.267	
	HH	15	6.48	2.01	10.37	3.85	31	6.94	1.07	8.82	5.31	.973	46	.345	0.673	
	EED	15	3.92	1	6.28	2.62	31	4.17	0.77	5.33	2.6	.967	46	.211	0.295	
	PW	15	3.43	1.09	6.08	2.17	31	3.81	0.88	5.55	2.33	.952	46	.055	0.743	

7- Discussion

Totally 46 adult specimens (15 male and 31 females) were collected from different localities throughout study area as previously mentioned in results, and according to (11) all of these areas are located in central and southern Iraq, and sharing the following ecoregion: Arabian Desert & East Sahero- Arabian Xeric Shrublands; Babylon, Dhi-Qar, and Basra located in further ecoregion: Tigris-Euphrates alluvial marsh, Basra alone is located in further two ecoregions: Persian Gulf desert & semi-desert and South Iran Nubo-Sindian desert & semi-desert. The zoogeographic affinity of *Trachylepis septemtaeniata* is Palearctic (12, 13,14 , 15 , 16,17).

According to (1), there are arguably two recognizable subspecies in Iraq: *Trachylepis* (formerly *Mabuya*) *aurata* in North, and *Trachylepis septemtaeniata* at the lower elevations of the Tigris- Euphrates Valley. *Trachylepis aurata* is found in Ethiopia, Eritrea, North –eastern Saudi Arab (Al Hasa south to Hofuf), Muscat, islands of the northeastern Mediterranean, Turkey, Lebanon, Syria, Jordan, Iraq, western and northern Iran, southern regions of Armenia, Nakhichevan, southern Turkmen, and Uzbekistan. It is of doubtful occurrence in Afghanistan, except perhaps in lowlands. Records for Sind and Baluchistan have not been confirmed. The subspecies of Eritrea and Ethiopia is *Trachylepis septemtaeniata*, and this is the name that frequently has been applied to the populations from eastern Iraq eastwards, while the form occupying the northwestern part of range is *Trachylepis aurata*. It found beneath rock slabs and under debris of fallen mud-brick. Also found in grassy areas near water (18), also this species inhabits area of the foothill region where rock crevices provide a retreat (6). (5) found *T. septemtaeniata* to occur in sympatry with *aurata* in southern Turkey (surroundings of Birecik, şanlıurfa), which supported the specific status of both these taxa. The third supraocular was separated from the parietal in *T. aurata* originating from various localities in southeast Anatolia. *T. septemtaeniata* and *T. aurata* share the same biotope) showed the third supratemporal separated from the frontal in five specimens.

(19) reported *Trachylepis (Mabuia) septemtaeniata* Reuss in Amara, Basra, Ramadi, and Euphrates. According to (20), this species were found in Amara, Baghdad, Diyala, and Halfaya. The occurrence of *Trachylepis septemtaeniata* was reported, but without mention of its precise locality (1,2,7,21,22). (23) reported the occurrence of this species in the study area in his study "the current status of the vertebrate diversity in Al-Dalmaj marsh, Al-Diwaniya Province", Al-Dalmaj marsh is a large wetland locate between Al-Qadisiya Province, West and Wasit Province, East. The global temperature increase may led to changes in the hydroclimatic parameters and have profound impacts on the physical and biological components of the ecosystems in the Euphrates-Tigris Basin as well as on the socio-economic developments of the basin countries (24). So, studying the biological components of Al-Dalmaj marsh area ecosystems seems necessary to provide a reliable data to compare with during next years which may have more obvious impacts of the global temperature increase. Al-Dalmaj marsh is a large isolated marsh situated at the heart of the Mesopotamian alluvial plain with estimated area of 100000 ha and altitude of less than 20 m (25). It constitutes an open water lake and marsh with dense reed beds of *Phragmites* and *Typha* in addition to the submerged plants and the plants along the edge of the marsh. Also, Al-Dalmaj marsh is an important area for the Iraqi biodiversity since it lies within a semi desert area and comprises terrestrial and aquatic habitats allowing a wide range of biodiversity components. The vertebrates are the most prominent group in the marsh especially birds and fishes and for a lesser extent reptiles and mammals. However, it is still poorly studied and further scientific work is required to understand the biodiversity and the relationships among the biotic and abiotic factors in the area (11,25, 26).

The result in the Table (2) showed the mean± standard error of SVL and TL for males and females as follow: 60.64±3.89 mm; 83.03±5.87 mm for males respectively, and 69±1.86 mm; 96.65±4.23 mm for females respectively. The results of Mann-Whitney test and ANOVA test showed that there were a significant differences ($P < 0.05$) in four metric characters between males and females: SVL: 60.64±3.89 mm, 69±1.86 mm; HLL: 24.52±1.66 mm, 28.07±0.8 mm; FLL: 15.87±0.87 mm, 43±0.58 mm and HL: 11.77±0.53 mm, 13.45±0.41 mm, but our result not agree with the results of the study of (27), "Analyses on male and female populations of *Trachylepis aurata transcaucasia* and *Trachylepis septemtaeniata* to investigation of sexual dimorphism" that this taxon don't show sexual dimorphism, and distinguishing between male and female of this taxon via basal of tail that it is thick in males than females, because to be placed hemipenises in this position, and also the form of anus is different between males and females. So, in all of latter analyses they will investigate male and female populations together and separate analysis of them are not necessary.

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