



New data on the distribution of *Squalius seyhanensis* (Teleostei: Leuciscidae)

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Abstract: *Squalius seyhanensis* was described in the Sarız stream, a tributary of the Seyhan River, Mediterranean Sea basin the species was also found in western drainages of the Euphrates River. In this study, it was also recorded from the stream Kışla, a tributary of the Kızılırmak River, Black Sea basin. In this study, the Kışla population was compared with Sarız population, the type locality of *S. seyhanensis*. The key characters of *S. seyhanensis*, body depth at dorsal-fin origin (24.9-27.4% SL, vs. 24.8-28.1) and depth of caudal peduncle (11.8-13.3% SL, vs. 11.8-13.3) almost overlap.

Keywords: Anatolia, chub, ichthyofauna, freshwater fish.

Squalius seyhanensis (Teleostei: Leuciscidae)'in dağılımına ilişkin yeni veriler

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Öz: *Squalius seyhanensis* türü Akdeniz Havzasında Bulunan Seyhan Nehri'nin drenajı olan Sarız deresinden tanımlanmıştır, Türün dağılım alanı Seyhan Nehri ve Fırat Nehri'nin batı havzasıdır. Bu çalışmada türün bilinen dağılım alanlarının yanı sıra Kızılırmak Nehri'nin drenajı olan Kışla deresinden de kaydı verilmiştir. Bu çalışmada Kışla ve Sarız popülasyonlarını karşılaştırılmıştır. Ayırt edici karakterler olan vücut yüksekliği (24.9-27.4% SB, vd. 24.8-28.1) ve kuyruk sapı yüksekliği (11.8-13.3% SB, vd. 11.8-13.3) neredeyse tamamen örtüşmektedir.

Anahtar kelimeler: Anadolu, tatlı su kefalı, ihtiyofauna, tatlı su balığı.

INTRODUCTION

Squalius is a genus of freshwater fish belonging to the family Leuciscidae. It is commonly known as the chub (Turan, 2013; Bayçelebi, 2019). The chubs are medium-sized fish distributed in the middle and lower parts of the River systems. The body is moderately deep, and slightly compressed laterally (Turan et al., 2013). Anal fin colour (membrane and rays) usually of live and fixed individuals and characterized by pigmentation on the lateral scales (Turan 2013;Doğan, 2013).

Individuals of the genus *Squalius* have a wide distribution area from the whole of Europe to the Middle East, especially in the Mediterranean Basin. It was recently reported that there are about 50 species belonging to this genus, there are 21 known species of the genus in Türkiye. (Özuluğ ve Freyhof, 2011; Turan et al., 2009; 2013; 2017; Geiger et al., 2014; Bayçelebi, 2019, Turan 2022). One of

these species *S. seyhanensis* was originally described from the Seyhan River in Türkiye by Turan, Kottelat & Doğan (2013). *S. seyhanensis* is one of the endemic species of Türkiye. It was recorded from the Seyhan and western drainages of the Euphrates River (Turan et al., 2017). This study aims to reveal the new distribution area of *Squalius seyhanensis*.

MATERIAL AND METHOD

Data collection: Fish were caught by pulsed DC electrofishing equipment and killed by over-anaesthetization, fixed and stored in formaldehyde. The material examined is deposited in Recep Tayyip Erdogan University Zoology Museum of the Faculty of Fisheries, Rize and Measurements were taken with digital caliper (0.1 mm accuracy). Counts and measurements follow, Turan et al., (2017). The lateral-line scale count includes the scales

on the base of the caudal fin. The last two branched dorsal and anal-fin rays articulating on a single pterygiophore are counted as 1½. The map (Fig. 1) was created using the Qgis QGIS 3.22.

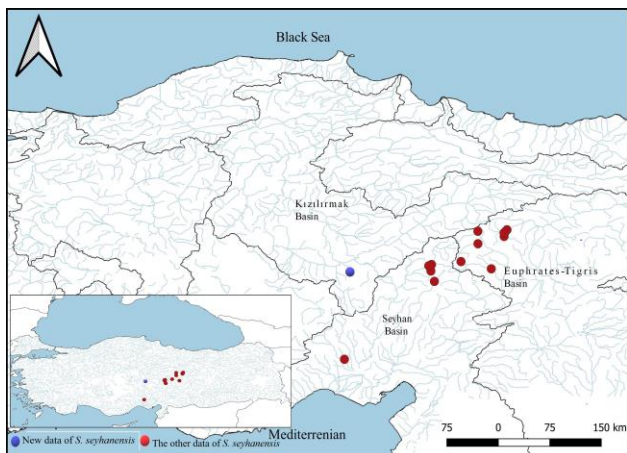


Figure 1. Records of *Squalius seyhanensis* based on this study (Table 1).

Table 1. Geographic information on the locations of *Squalius seyhanensis* listed in this study. All Material from Türkiye.

Station no	Location description	Sub- drainages	Main drainages	Coordinates	
1	Sivas, Kangal	Kangal	Euphrates	39.301100	37.674783
2	Sivas, Kangal	Kalkın	Euphrates	39.197350	37.628762
3	Sivas, Gürün	Tohma	Euphrates	38.690000	37.421944
4	Sivas, Kangal	Delihacı	Euphrates	39.278181	37.205200
5	Sivas, Kangal	Mancılık	Euphrates	39.082838	37.206622
6	Sivas, Kangal	Kangal	Euphrates	39.278000	37.653000
7	Sivas, Gürün	Tohma	Euphrates	38.803251	36.933931
8	Sivas, Kangal	Kangal	Euphrates	39.253117	37.626500
9	Kayseri, Pınarbaşı	Karagöz	Seyhan	38.757000	36.459000
10	Kayseri, Pınarbaşı	Sarız	Seyhan	38.493025	36.504732
11	Kayseri, Pınarbaşı	Zamantı	Seyhan	38.655900	36.448500
12	Kayseri, Pınarbaşı	Zamantı	Seyhan	38.736600	36.413100
14	Kayseri, İncesu	Kışla	Kızılırmak	38.643417	35.143583

RESULTS

Distribution and habitat: *Squalius seyhanensis* was presently known from Seyhan and the upper part of Euphrates river drainages (Figure 1, Table 1). The Kışla Stream in the Kızılırmak River basin constitutes a new distribution area for the species (Figures 1, Table 1). It inhabits swift and cold flowing water, with a cobble and pebble bottom (Turan et. al., 2017; Bayçelebi, 2020).

27 morphometric (Table 2) and five meristic characters (Table 3) were analysed. Both populations are nearly identical in all characters examined (Fig. 2).



Figure 2. *Squalius seyhanensis*, 155 mm SL; Kızılırmak River drainage; 150 mm SL; Seyhan River drainage.

Table 2. Morphometry of *Squalius seyhanensis* from Kızılırmak and Seyhan rRiver drainages.

	Stream Kışla, Kızılırmak River		Stream Sarız, Seyhan River	
	N	11	10	10
Standard length (mm)	136-189		128-234	
	Range	SD	Range	SD
In % SL				
Head length	24.4-28.4 (26.2)	0.12	25.0-26.7 (26.0)	0.06
Body depth at dorsal-fin origin	24.9-27.4 (26.2)	0.09	24.8-28.1 (27.0)	0.12
Predorsal length	53.2-57.1 (54.9)	0.08	53.5-58.1 (56.0)	0.09
Prepelvic length	47.7-53.0 (50.8)	0.12	50.4-54.0 (52.5)	0.14
Preeanal length	69.4-76.5 (72.5)	0.14	72.6-75.3 (73.9)	0.13
Pectoral-fin origin to anal fin	46.7-52.7 (49.5)	0.18	48.1-51.6 (50.2)	0.09
Pectoral-fin origin to pelvic fin	23.5-28.2 (27.0)	0.18	27.2-29.7 (28.3)	0.12
Pelvic-fin origin to anal fin	20.5-25.6 (22.8)	0.15	20.8-24.3 (22.4)	0.12
Dorsal-fin height	19.3-22.8 (20.6)	0.09	18.7-21.3 (20.2)	0.08
Anal-fin height	19.1-23.5 (20.6)	0.13	17.9-20.0 (18.8)	0.07
Pectoral-fin length	18.2-21.7 (19.9)	0.10	18.0-19.3 (18.0)	0.13
Pelvic-fin length	15.3-17.3 (16.5)	0.07	12.5-15.8 (14.9)	0.11
Length of upper caudal-fin lobe	23.1-27.0 (24.9)	0.12	21.2-24.0 (22.8)	0.09
Length of middle caudal-fin rays	14.7-18.8 (16.0)	0.12	12.5-16.9 (15.6)	0.15
Length of caudal peduncle	16.7-20.4 (18.9)	0.11	16.4-19.2 (18.0)	0.09
Depth of caudal peduncle	11.8-13.5 (12.4)	0.06	11.8-13.3 (12.5)	0.23
In % HL				
Snout length	29.6-33.9 (32.1)	0.13	32.1-34.7 (33.7)	0.10
Eye diameter	15.8-21.1 (18.5)	0.14	15.7-21.0 (17.4)	0.18
Interorbital width	38.4-41.3 (39.9)	0.09	38.0-40.9 (39.3)	0.10
Head width, at anterior margin of eyes	41.4-45.6 (43.1)	0.13	44.9-49.5 (46.9)	0.18
Head width, at posterior margin of eyes	49.0-54.6 (52.5)	0.17	54.3-56.8 (55.6)	0.11
Head width, at middle of opercle	60.7-67.8 (63.0)	0.21	62.7-69.5 (66.0)	0.27
Head depth, at through eye	48.9-53.0 (50.7)	0.14	49.6-56.3 (52.4)	0.21
Head depth, at nape	65.3-70.9 (68.1)	0.19	64.6-70.7 (68.3)	0.20
Snout width at nostrils	34.9-41.6 (37.6)	0.18	37.6-45.6 (40.9)	0.31
Width of mouth gape	24.1-29.7 (27.4)	0.16	27.1-31.1 (29.7)	0.11
Length of mouth gape	26.6-30.1 (28.4)	0.13	28.3-31.1 (29.7)	0.11

Table 3. Frequency distribution of meristic features of *Squalius seyhanensis* from Kızılırmak and Seyhan River drainages.

	Total lateral line scales					
	N	43	44	45	46	47
Kızılırmak	11	3	3	3	1	1
Seyhan	10	5	2	3	-	-
Transverse line scales						
		Above lateral line			Below lateral line	
	N	7	8		3	4
Kızılırmak	11	2	9		3	5
Seyhan	10	2	8		-	10
Branched dorsal-fin rays						
	N	7½	8½		7½	8½
Kızılırmak	11	-	11		3	4
Seyhan	10	1	9		-	8
Branched anal-fin rays						
	N	7½	8½		7½	8½
Kızılırmak	11	-	11		3	4
Seyhan	10	1	9		-	8

DISCUSSION AND CONCLUSION

Squalius seyhanensis was described from the Sarız stream, Seyhan River in Türkiye by Turan, Kottelat & Doğan (2013). In this study, *Squalius* individuals from Kışla Stream was examined and compared with individuals from Sarız Stream. Almost all metrics and meristic data belonging to the two populations were overlapped. Little differences between two populations were observed, which were the head width¹ at the anterior margin of the eyes (41-46% HL, mean 43.1 in Kızılırmak, vs. 45-50, mean 46.9 in Seyhan) and the head width² at the posterior margin of the eyes (49-55% HL, mean 52.5 in Kızılırmak, vs. 54-57, mean 5.6 in Seyhan). It also both of the localities' chub anal fin in life with orange pigments on rays. As a result of present data, the chub of the stream Kışla is identified as *S. seyhanensis* (Figure 2).

The degradation of rivers, pollution and habitat alteration are significant threats in freshwater. Efforts should be made to protect *Squalius seyhanensis* and its habitat, one of Türkiye's endemic species. These include the establishment of protected areas, monitoring programs, and raising awareness about the importance of preserving freshwater ecosystems. It is crucial to ensure the sustainable management of water resources and implement conservation measures to safeguard the future of *S. seyhanensis* and other species that depend on these fragile ecosystems.

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