Mugla Journal of Science and Technology

NEW RECORD OF THE KIZILIRMAK KILLIFISH (*Aphanius marassantensis* Pfleiderer, Geiger & Herder, 2014) FROM SÜREYYABEY DAM LAKE IN YEŞİLIRMAK BASIN

Semra BENZER
Department of Science Education, Education Faculty, Gazi University, Turkey, sbenzer@gazi.edu.tr
https://orcid.org/0000-0002-8548-8994

Received: 19.12.2017, Accepted: 21.03.2018 Research Article
*Corresponding author DOI: 10.22531/muglajsci.396426

Abstract

The aim of this study was carried out in 2016 to quantify morphometric characteristics of Aphanius marassantensis from Süreyyabey Dam Lake. Some morphometric characters of samples were measured. These characteristics were standard length (SL), total length (TL) body weight (W), head length, preorbital distance, eye diameter, postorbital distance, head depth, predorsal distance, prepelvic distance, preanal distance, pectoral fin - pelvic fin distance, pelvic fin - anal fin distance, body depth, dorsal fin (anterior end) – anal fin distance, dorsal fin (posterior end) – anal fin distance, postdorsal distance, postanal distance, caudal peduncle length (dorsal), caudal peduncle length (ventral), caudal peduncle depth, dorsal fin base length, anal fin base length, pectoral fin length, pelvic fin length, dorsal fin length, anal fin length. The SL of 100 individuals ranged from 22 to 38 mm. The TL of individuals were between 28 and 45 mm, and W ranged between 0.37 and 1.91 g. Total fish examined, 30 % were males, 70 % females.

Keywords: *Aphanius marassantensis*, Kızılırmak killifish, morphometric characteristic, Süreyyabey Dam Lake

YEŞİLIRMAK HAVZASI SÜREYYABEY BARAJ GÖLÜ'NDEN KIZILIRMAK KILLIFISH (*Aphanius marassantensis* Pfleiderer, Geiger & Herder, 2014)'İN YENİ KAYDI

Öz

Bu çalışmanın amacı, 2016 yılında Süreyyabey Baraj Gölü'ndeki Aphanius marassantensis'in morfometrilerini belirlemektir. Balık örneklerinin bazı morfometrik karakterleri ölçülmüştür. Standart boy (SL), toplam boy (TL), vücud ağırlığı (W), baş boyu, preorbital mesafe, göz çapı, postorbital mesafe, baş yüksekliği, predorsal mesafe, prepelvik mesafe, preanal mesafe, pektöral yüzgeç, pelvik yüzgeç arası mesafe, pelvik yüzgeç anal yüzgeç mearası mesafe, vücud yüksekliği, dorsal yüzgeç (anterior sonu) – anal yüzgeç arası mesafe, dorsal yüzgeç (posterior sonu) anal yüzgeç mesafe, postdorsal mesafe, postanal mesafe, kaudal sap boyu (dorsal), kaudal sap boyu (ventral), kaudal sap yüksekliği, dorsal yüzgeç taban boyu, anal yüzgeç taban boyu, pektoral yüzgeç özellikleri ele alınmıştır. 100 adet balık örneklerinin standart boy, tam boy ve ağırlık değerleri sırasıyla 22 - 38 mm; 28 – 45 mm; 0,37 -1,91 g olarak tespit edilmiştir. İncelenen tüm bireylerin %30 erkek %70'i dişidir.

Anahtar Kelimeler: *Aphanius marassantensis*, Kızılırmak killifish, morfometrik karekter, Süreyyabey Baraj Gölü

Cite

Benzer, S., (2018). "New Record of The Kizilirmak Killifish (*Aphanius marassantensis* Pfleiderer, Geiger & Herder, 2014) From Süreyyabey Dam Lake in Yeşilırmak Basin", Mugla Journal of Science and Technology, 4(1), 41-45.

1. Introduction

Anatolia; geologic events are characterized by a diversity of living organisms due to their presence in the continents as well as climate characteristics [1]. In most of the Cyprinodontidae species, a large salinity and temperature tolerance are observed. Because of their small size, they can successfully populate in restricted habitats [2].

While sexual dimorphism is weak in size, it is apparent in terms of size, coloring and fin size [3-5]. *Aphanius* belongs to the family Cyprinodontidae. *Aphanius* species are generally omnivorous [5]. It is under threat in many types *Aphanius* in Turkey and world [6].

Aphanius is represented by at minimum 14 existing species in Anatolia for the present, 12 of which are indigenous [7-8]. Hrbek et al. [9] reported on an *Aphanius* population from lower Yeşilırmak River. It was found that one population of *Aphanius marassantensis* from central Yeşilırmak Basin [10].

Morphometric characters of fish represent one of the main keys for identifying their systematics, growth changefulness, ontogenetic trajectories [11] and several growth parameters. Both, taxonomic classification of

organisms and comprehending the variety of biological life, were ground on descriptions of morphological forms from a historical perspective [12].

Population diversity might also be caused by sexual dimorphism, which is prevalent across the animal universe. The disparity between males and females is not only in reproductive organs, but also in outer structures that are not directly pertain to reproduction [13].

Despite the fact that the *Aphanius* genus does not have economic precaution, it has been subject to many researches. There are many national and international studies on various properties of *Aphanius* species [3,7,9, 14-34].

There are many studies on various characteristics of *Aphanius* species both at global studies and international studies. However, this is the first record of the species from Süreyyabey Dam Lake.

Located in inland water resources in Turkey, the life cycle of fish species and determination of biological characteristics are important. In this paper, we report first occurrence from Süreyyabey Dam Lake in Yeşilırmak Basin. The main purpose of this study is to determine whether there is a difference between morphological characters between male and female. This paper describes the area where this fish was found and recorded morphometric data of the population.

2. Material and Methods

Süreyyabey Dam Lake is located approximately 82 km northeast of Yozgat (35º28' N and 35º33' N latitudes and 39º55' E and 40º03' E longitudes) (Fig. 1). Süreyyabey Dam, Yozgat province on the Çekerek Creek, irrigation, energy and flood control was done. The area of lake is 41,34 km^2 with a rock body fill type dam. The Çekerek River, one of the important branches of Yeşilırmak, is located between the Deveci Mountains (1892 m) and Dagni Mountain (1755 m) [35].

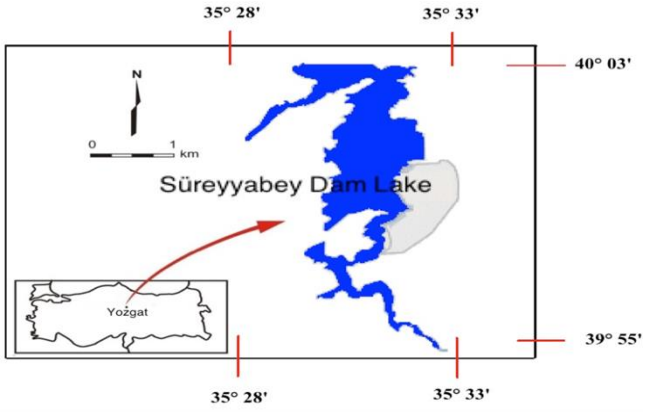

Figure 1. Map of Süreyyabey Dam Lake

Fish specimens (n=100; males=30; females=70) were captured by commercial fisherman from Süreyyabey Dam Lake in 2016. Sex determination was based on external coloration of individuals. The samples were preserved in 4% formaldehyde solution and transported to the laboratory; weight was measured to the nearest 0.001g and total and standard length to the nearest 0.01 mm. In total, Twenty-seven (27) morphometric characters of samples were measured. These characteristics were standard length (SL), total length (TL) body weight (W), head length, preorbital distance, eye diameter, postorbital distance, head depth, predorsal distance, prepelvic distance, preanal distance, pectoral fin - pelvic fin distance, pelvic fin - anal fin distance, body depth, dorsal fin (anterior end) – anal fin distance, dorsal fin (posterior end)–anal fin distance, postdorsal distance, postanal distance, caudal peduncle length (dorsal), caudal peduncle length (ventral), caudal peduncle depth, dorsal fin base length, anal fin base fin length, pectoral fin length, pelvic fin length, dorsal fin length, anal fin length. The SL of 100 individuals ranged from 20 to 38 mm. The TL of individuals were between 28 and 45 cm, and W ranged between 0.37 and 1.91 g. subsequently.

3. Results and Discussion

Aphanius marassantensis, previously included in *A. danfordii*. Male *A. marassantensis* has 8-13 dark-brown sidelong bars than *A. meridionali* and *A. sureyanus*, has 2-3 upright rows of spots on the back fin, and predominantly has 8-13 sidelong bars than *A. villwocki*. *A. marassantensis* is separated from *A. saldae* by having a less slim and lengthen body shape (Body depth/Standard length 28.2-39.6% vs. 20.1-21.3%), body with whole scale cover, and 25-28 scales along the sidelong series [8]. Pfleiderer et al. [8] reports the diagnostic properties of *A. marasantensis* as Dorsal soft rays (total): 9-11; Anal soft rays: 9-11; Vertebrae: 25 – 27.

In this research, some morphometric characters were examined and the minimum, maximum, mean, standard deviation values are given in Table 1. Measurements and counts of the 100 specimens are given Table 1. Total fish examined, 30 % were males, 70 % females. Total lengths and weights of the examined specimens ranged 2.80 and 4.5 cm; 0.37 and 1.91 g respectively.

The fish in the vertebrate group are represented by 33200 species identified to date in the World [36]. Küçük [37] noted that 10% of the endemic freshwater fish belong to the Cyprinodontidae family and that the endemism rate of the family is 78%, taking into account the red-listed situations of endemic freshwater fish. When IUCN red list of 2013 is examined; 9 *Aphanius* species ranging in Turkey, where the list of 7, critically endangered of 2 of them (CR) where, endangered a species (EN) where insufficient data on other species (DDR) seems to be found [38]. They live in freshwaters, brackish waters and marine coastal regions. They are scattered all over the world in the USA, Central America, West Indies, northern parts of South America, North Africa, Southern Europe and Anatolia [39].

Table 1. Metric characters of *Aphanius marasantensis* specimens

Nu	PARAMETERS	Female					Male				
		min	max	mean	SD	CI	min	max	mean	SD	CI
1	Standard Length	2.50	3.80	2.980	0.3047	0.0714	2.20	3.0	2.67	0.1988	0.0711
2	Total Length	2.90	4.50	3.487	0.3379	0.0792	2.80	3.6	3.16	0.2016	0.0721
3	Body Weight	0.41	1.91	0.846	0.3036	0.0711	0.37	1.0	0.60	0.1307	0.0468
4	Head Length	0.40	1.10	0.829	0.1416	0.0332	0.60	0.9	0.75	0.0900	0.0322
5	Preorbital Distance	0.10	0.40	0.272	0.0623	0.0146	0.20	0.4	0.24	0.0553	0.0198
6	Eye Diameter	0.20	0.30	0.217	0.0339	0.0079	0.15	0.3	0.22	0.0351	0.0126
7	Postorbital Distance	0.30	1.00	0.443	0.1430	0.0335	0.30	0.5	0.36	0.0706	0.0253
8	Head Depth	0.50	1.00	0.726	0.0973	0.0228	0.60	7.0	0.90	1.1558	0.4136
9	Predorsal Distance	0.20	2.50	1.931	0.3197	0.0749	1.50	2.9	1.78	0.3174	0.1136
10	Prepelvic Distance	0.50	2.20	1.625	0.2730	0.0644	1.20	1.7	1.49	0.1337	0.0478
11	Preanal Distance	1.00	3.00	2.184	0.3335	0.0781	1.70	2.2	1.96	0.1628	0.0582
12	Pectoral Fin-pelvic fin Distance	0.60	1.20	0.849	0.1472	0.0347	0.50	1.7	0.75	0.2686	0.0961
13	Pelvic Fin- Anal Fin Distance	0.30	0.90	0.529	0.1226	0.0289	0.20	0.6	0.47	0.0844	0.0302
14	Body Depth	0.70	1.30	0.961	0.1438	0.0337	0.70	1.2	0.86	0.1082	0.0387
15	Dorsal Fin (Anterior End) – Anal Fin Distance	0.40	1.10	0.824	0.1401	0.0328	0.60	1.1	0.80	0.1220	0.0437
16	Dorsal Fin (Posterior End) – Anal Fin Distance	0.30	1.00	0.729	0.1483	0.0347	0.50	1.0	0.70	0.1238	0.0443
17	Postdorsal Distance	0.70	1.90	0.956	0.2256	0.0529	0.60	1.0	0.78	0.1112	0.0398
18	Postanal Distance	0.50	0.90	0.741	0.1195	0.0280	0.50	0.8	0.65	0.0922	0.0330
19	Caudal Peduncle Length (Dorsal)	0.60	1.10	0.787	0.1141	0.0267	0.50	0.9	0.67	0.1028	0.0368
20	Caudal Peduncle Length (Ventral)	0.30	0.90	0.638	0.1320	0.0309	0.40	0.7	0.59	0.1062	0.0380
21	Caudal Peduncle Depth	0.30	0.60	0.413	0.0711	0.0166	0.30	0.7	0.42	0.0939	0.0336
22	Dorsal Fin Base Length	0.10	0.60	0.329	0.1024	0.0240	0.10	0.5	0.36	0.0894	0.0320
23	Anal Fin Base Length	0.20	0.60	0.314	0.0885	0.0207	0.20	0.4	0.30	0.0676	0.0242
24	Pectoral Fin Length	0.30	0.70	0.514	0.0993	0.0233	0.20	0.7	0.45	0.1013	0.0362
25	Pelvic Fin Length	0.10	2.30	0.272	0.2676	0.0631	0.10	0.4	0.23	0.0807	0.0289
26	Dorsal Fin Length	0.30	0.70	0.484	0.1072	0.0251	0.30	0.7	0.55	0.1118	0.0400
27	Anal Fin Length	0.30	0.70	0.503	0.0989	0.0232	0.30	0.7	0.52	0.0834	0.0298

SD: Std Deviation; CI: Confidence Interval

In this paper, we report first occurrence from Süreyyabey Dam Lake in Yeşilırmak Basin. This paper describes the area where this fish was found and recorded morphometric data of the population. Findings obtained in this study are very important because the previous studies about the morphometric properties of *A. marassantensis* have not been found. It is considered that the data obtained in this study will also contribute to future studies.

4. Acknowledgment

This study has been accepted for oral presentation at The International Conference on Civil and Environmental Engineering (ICOCEE-Cappadocia 2017), Nevşehir, Turkey.

5. References

[1] Demirsoy, A., "Genel Zoocoğrafya ve Türkiye Zoocoğrafyası - Hayvan Coğrafyası", Meteksan A. Ş. Ankara, 1007 s. 2002.

[2] Parker, A., Kornfield I., "Molecular perpective on evolution and zoogeography of *Cyprinodontid killifishes* (Teleostei; Atherinomorpha)", *Copeia*, Vol. 1995, pp 8-21. 1995.

[3] Hrbek, T. & Meyer, A. "Closing of the Tethys Sea and the phylogeny of *Eurasian killifishes* (Cyprinodontiformes: Cyprinodontidae)", *Journal of Evolutionary Biology*, 16, 17–36., 2003.

[4] Kottelat, M & Freyhoff, J., "The Handbook of the Eeuropean Freshwater Fishes", Steven Simpson Books, Norwich. 2007.

[5] Leonardos, I. "The feeding ecology of *Aphanius fasciatus* (Valenciennes, 1821) in the lagoonal system of Messolongi (western Greece)", *Sci Mar*, 72:393-401, 2008.

[6] Freyhof, J. & Brooks, E., "European red List of Freshwater Fishes", Luxembourg: Publications Office of the european Union. 2011.

[7] Geiger, M.F., Herder, F., Monaghan, M.T., Almada, V., Barbieri, R., Bariche, M., Berrebi, P., Bohlen, J., Casal-Lopez, M., Delmastro, G.B., Denys, G. P.J., Dettai, A., Doadrio, I., Kalogianni, E., Kärst, H., Kottelat, M., Kovačić, M., Laporte, M., Lorenzoni, M., Marčić, Z., Özuluğ, M., Perdices, A., Perea, S., Persat, H., Porcellotti, S., Puzzi, C., Robalo, J., Šanda, R., Schneider, M., Šlechtová, V., Stoumboudi, M., Walter,

S. & Freyhof, J. "Spatial heterogeneity in the Mediterranean Biodiversity Hotspot affects barcoding accuracy of its freshwater fishes", *Molecular Ecology Resources*, 14 (6): 1210–1221, 2014.

[8] Pfleiderer, S., Geiger, M. & Herder, F. "*Aphanius marassantensis*, a new toothcarp from the Kızılırmak drainage in northern Anatolia (Cyprinodontiformes: Cyprinodontidae)", *Zootaxa*. 3887(5):569–582, 2014.

[9] Hrbek, T., Küçük, F., Frickey, T., Stölting, K.N., Wildekamp, R.H. & Meyer, A. "Molecular phylogeny and historical biogeography of the *Aphanius* (Pisces, Cyprinodontiformes) species complex of central Anatolia, Turkey", *Molecular Phylogenetics and Evolution*. 25(1):125–137, 2002.

[10] Yoğurtçuoğlu, B., & Ekmekçi, F. G. "New Records of Kızılırmak Toothcarp, *Aphanius marassantensis* from Central Yeşilırmak River Basin (Turkey)" *Turkish Journal of Fisheries and Aquatic Sciences*, 17(1), 205-208, 2017.

[11] Kovac V, Copp GH, Francis MP, "Morphometry of the stone loach *Barbatula barbatula*: do mensural characters reflect the species' life history thresholds?", *Environmental Biology of Fishes* 56: 105-115, 1999.

[12] Dean, C.A., Rholf, F.J. and Dennis, E.S. "Geometric morphometrics: Ten years of progress following the revolution", *Ital. J. Zool*., 71: 5-16, 2004.

[13] Kitano J, Mori S, Peichel CL. "Sexual dimorphism in the external morphology of the threespine stickleback (Gasterosteus aculeatus)", *Copeia*. 2007:336–349. 2007.

[14] Pellegrin, D. J. "Les Poissons Des Eaux Douces d'asie-Mineure". Voy. Zool. Gedeau de Kerville, Tome II, Paris, 150 p. 1928.

[15] Sözer, F. "Contributions a la connaissance des Cyprinodontides de la Turquie" Rev. Fac. Sci. Univ. Istanbul Série B, Tome VII, Fasc. 4, 308- 316. 1942.

[16] Akşiray, F. "Türkische Cyprinodontiden I", İstanbul Üniversitesi Fen Fakültesi Mecmuası Seri B, XIII (2): 98-142. 1948.

[17] Wildekamp, R.H., Kücük, F., Ünlüsayin, M. & Van Neer, W. "Species and subspecies of the genus *Aphanius* Nardo 1897 (Pisces: Cyprinodontidae) in Turkey", *Turkish Journal of Zoology*, 23, 23–44, 1999.

[18] Leonardos, I, A. Sinis. "Population age and sex structure of *Aphanius fasciatus* Nardo, 1827 (Pisces: Cyprinodontidae) in the Mesolongi and Etolikon lagoons (W. Greece)", *Fisheries Research* (40): 227-235. 1999.

[19] Hrbek, T., R. H. Wildekamp. "*Aphanius willwocki*, a new species from the Sakarya River basin of central Anatolian plain, Turkey (Teleostei: Cyprinodontiformes)", *Ichthyological Exploration Freshwaters*, 14 (2): 137-144, 2003.

[20] Esmaeili, H.R. and Shiva, A.H. "Reproductive biology of the Persian Tooth-carp, *Aphanius persicus* (Jenkins, 1910) (Cyprinodontidae) in southern Iran", *Zool. Mid. East*. 37: 39-46. 2006.

[21] Sari, M, H., Ilhan, A., Yesilova, B., "Some biological features of mediterranean toothcarp *Aphanius fasciatus* (Valenciennes, 1821)", *Ege University Faculty of Fisheries Journal of Fisheries and Aquatic Sciences* 24(3-4):311-314. 2007.

[22] Güçlü, S.S., Turna, İ.İ., Güçlü, Z. and Gülle, İ. "Population Structure and Growth of *Aphanius anatoliae* sureyanus Neu, 1937 (Osteichthyes: Cyprinodontidae), Endemic to Burdur Lake, Turkey" *Zoology in the Middle East*, 41: 63-69. 2007.

[23] Güçlü, S. S., & Küçük, F. "Population Age, Sex Structure, Growth and Diet of *Aphanius mento* Heckel in: Russegger, 1843 (Cyprinodontidae: Teleostei), to Kırkgöz Spring, Antalya-Türkiye", *Turkish Journal of Fisheries and Aquatic Sciences*, 8(2), 2008.

[24] Karslı, Z. and Aral, O., "Population age, sex structure and growth of *Aphanius danfordii* (Boulenger, 1890) to Sirakaraağaçlar Stream, Turkey" *Journal and Animal Veterinary Advances*, 9(10), 1427-1431, 2010.

[25] Yoğurtçuoğlu, B. & Ekmekçi, F.G. "Life-history traits of *Aphanius danfordii* (Boulenger, 1890) (Pisces: Cyprinodontidae), endemic to Kızılırmak Basin (Turkey)" *Journal of Applied Ichthyology*. 29(4):866– 871, 2013.

[26] Golmoradizadeh A., Kamrani E., Sajjadi M.M., "Life story traits of *Aphanius ginaonis* Holly,1929 (Cyprinodontidae) and potential risks of extinction in the Geno hot spring Iran population", *Journal Applied Ichthyol*. 28:31-33, 2012.

[27] Yoğurtçuoğlu, B. Ekmekçi, F.G, "First Attempt at Conservation of a Critically Engangered Cyprinodontid in Turkey", *J. Biol. Environ. SCI*, 8(24), 159-163, 2014.

[28] Esmaeili, H.R., Teimori, A., Gholami, Z. & Reichenbacher, B. "Two new species of the tooth-carp *Aphanius* (Teleostei: Cyprinodontidae) and the evolutionary history of the Iranian inland and inland-related *Aphanius* species" *Zootaxa*, 3786 (3), 246–268, 2014.

[29] Erbay, F.K., "Endemik Bir Balık Türü Olan *Aphanius villwocki*'nin Özdere (Sakarya Nehri Havzasi) Populasyonunun Büyüme ve Üreme Özellikleri", Hacettepe Üniv. Yüksek Lisans Tezi. 2014.

[30] Teimori, A., Esmaeili, H.R., Erpenbeck, D. & Reichenbacher, B. "A new and unique species of the genus *Aphanius Nardo*, 1827 (Teleostei: Cyprinodontidae) from Southern Iran: A case of regressive evolution. Zoologischer Anzeiger - *A Journal of Comparative Zoology*, 253, 327–337, 2014.

[31] Ergüden, S. A. "Seyhan Baraj Gölü (Adana)'ndeki Aphanius mento (Heckel, 1843)'nun Bazı Morfometrik Özellikleri", *Düzce Üniversitesi Bilim ve Teknoloji Dergisi*, 3(1), 2014.

[32] Yoğurtçuoğlu, B., & Ekmekçi, F. G. "Length–weight and length–length relationships of eight endemic *Aphanius* species from Turkey", *Journal of applied ichthyology,* 31(4), 811-813, 2015.

[33] Keivany, Y., & Zamani-Faradonbeh, M. "Length–weight and length–length relationships for four fish species from Talkhehrud River, Urmia Lake Basin, Iran", *Journal of Applied Ichthyology*, 32(6), 1368-1370, 2016.

[34] Freyhof, J., Weissenbacher, A. and Geiger, M., "*Aphanius kruppi*, a new killifish from Oman with comments on the A. dispar species group (Cyprinodontiformes: Aphaniidae)", *Zootaxa* 4338 (3), pp. 557-573, 2017.

[35] Anonymous, "Yeşilırmak Havzası Toprakları", Köy İşleri Bakanlığı, Toprak Su Genel Müdürlüğü, Havzo nu: 14, Raporlar Serisi: 29. Ankara. 1970.

[36] Froese, R. and D. Pauly. Editors. FishBase. Retrieved October 10, 2015, from World Wide Web electronic publication: http://www.fishbase.org/. 2015.

[37] Küçük,F., "Türkiye'deki Bazı İçsu Balıklarının Dünya Doğayı Koruma Birliği (IUCN) Ölçütlerine Göre Değerlendirilmesi", *I. Balıklandırma ve Rezervuar Yönetimi Sempozyumu*, Şubat. 2006.

[38] Anonymous "IUCN Red List", www.iucnredlist.org (Haziran 2014) 2014.

[39] Nelson, J.S., "Fishes of the World", Fourth Edition, New York,U.S.A., 2006.