



## Description of a new species of *Hemigrammocapoeta* (Teleostei: Cyprinidae) from Lake Işıklı, Turkey

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### Abstract

*Hemigrammocapoeta menderesensis* is distinguished from all other species of *Hemigrammocapoeta* in Anatolia by the following combination of characters (none unique to the species): lateral line incomplete; 6–17 perforated scales and 36–41 +1–2 scales in lateral series; 7½–8½ scale rows between lateral line and dorsal-fin origin, 3–4 scale rows between lateral series and anal-fin origin; dorsal fin commonly with 7½ branched rays; anal fin with 5½ branched rays; 15–17 gill rakers on the first brachial arch; pharyngeal teeth 2.4.5–5.3.3; mouth small, subterminal, horseshoe shaped and without barbel; lips developed and somewhat fleshy; upper lip not covering nostril gape; lower lip with two lateral lobes and median pad; lateral lobes smaller and shorter than half width of median pad; numerous papillae on lower and upper lips.

**Key words:** *Hemigrammocapoeta menderesensis*, new species, taxonomy, Anatolia

### Introduction

*Hemigrammocapoeta* Pellegrin, 1927 is a genus differentiated by the shape of its mouth and incomplete lateral line. Pellegrin (1928) obtained samples of the type species *Hemigrammocapoeta culiciphaga* from Dr. E. Tok (Adana) and was able to discriminate two species in the genus using the presence or absence of barbels and the number of lateral line scales. *H. culiciphaga* has a pair barbels at the corner of the mouth and 29–32 scales at the lateral series while *H. kemali* (Hanko, 1925) has no barbels and 37–40 scales in the lateral series. Kosswig (1950) considered *Neotylognathus* a new subgenus of *Tylognathus* Heckel, 1843 from Asia Minor, and reported that *H. caudomaculata* (Battalgil, 1942) (Lake Amik near Hatay and Ceyhan River), *Tylognathus klatti* Kosswig, 1950 (Lake Eğirdir and Lake Gölcük near Isparta and Lake Işıklı) and *H. kemali* (only Akgöl near Ereğli) belong to the new subgenus (Kosswig, 1950: 407–412). Later, Karaman (1971) considered *Neotylognathus* a subgenus of *Hemigrammocapoeta* (1971: 236–239) and included *H. nasus culiciphaga* (Adana, Lake Amik and Ceyhan River), *H. (Neotylognathus) kemali* (Akgöl, Ereğli) and *H. (Neotylognathus) klatti* (Lakes Eğirdir, Lake Beyşehir and possibly Lake Gölcük near Isparta).

Records by some authors indicate discrepancies about the distribution of these species. According to Bostancı (2006) and Van Neer *et al.* (2008) for instance, *H. culiciphaga* is distributed in Seyhan, Ceyhan and Asi rivers. On the other hand, Erk'akan and Özdemir (2011) mentioned the presence of *H. caudomaculata* in parts of Seyhan and Ceyhan drainage systems. Lakes Eğirdir and Gölcük populations of *H. kemali*, referred to in some recent sources as *Crossocheilus klatti* (Fricke *et al.* 2007), went extinct from these lakes due to the introduced piscivore *Sander lucioperca* (Küçük *et al.* 2009).

We compared our materials from the Büyük Menderes basin (source of Lake Işıklı) with *Hemigrammocapoeta kemali* from Ereğli (type locality of *H. kemali*), Seydişehir, Beyşehir, and Köprüçay rivers, and *H. culiciphaga*

from Seyhan (type locality of *H. culiciphaga*), Ceyhan and Asi rivers. Through these comparisons it is concluded that they represent distinct, unnamed species, that we describe here as *H. menderesensis* from Lake Işıklı.

## Materials and methods

Fish specimens were caught by pulsed DC electrofishing equipment and fixed in 5% formalin following anaesthetization. Materials are deposited in Eğirdir Fisheries Faculty of Süleyman Demirel University (IFC-ESUF). Counts and measurements follow Hubbs & Lagler (1947), except as follows. Head depth<sub>1</sub>: head depth at eye; head depth<sub>2</sub>: head depth at occiput; head width<sub>1</sub>: distance between anterior margin of eyes; head width<sub>2</sub>: distance between posterior margin of eyes; head width<sub>3</sub>: head width at operculum; mouth width: measured between corners of mouth gape. Lateral line scales are only pored scales. Scales in lateral series are counted from the anterior-most scale (the first one to touch the shoulder girdle) to the end of the hypural complex. The last two branched dorsal and anal fin rays articulating on a single pterygiophore were counted as 1½.

### *Hemigrammocapoeta menderesensis*, sp. n.

(Fig. 1)

**Holotype.** IFC-ESUF 03-1300a, 52 mm SL; Turkey, Denizli, Lake Işıklı, Büyük Menderes River, F. Küçük & S.S. Güçlü. 20.06.2011.

**Paratypes.** IFC-ESUF 03-1300b, 12, 42–54 mm SL; data same as holotype

**Diagnosis.** *Hemigrammocapoeta menderesensis* is distinguished from all other species of *Hemigrammocapoeta* in Anatolia by the following unique combination of characters (none unique to the species): mouth small, subterminal, horseshoe shaped, arched and without barbel; lips developed, lower lip with two lateral lobes and median pad; lateral lobe small and shorter than half width of median pad; lower and upper lips with numerous papillae (Fig. 2a). Lateral line scales 6–17 (mean=10.1; SD=0.74) and scales in lateral series 36–41 + 1–2 (mean=38.5; SD=0.45) gill rakers on outer side of first gill arch 15–17 (mean=16; SD= 0.24); caudal fin slightly forked, lobes slightly pointed. Some flank scales with large black spots and numerous small black dots on each flank scale (Fig. 1).

**Description.** General appearance of the species is shown in Figure 1; morphometric and meristic data are given in Tables 1 and 2.

Body slender, its depth at dorsal fin origin 24.2–26.7% SL; upper profile markedly convex at predorsal area and straight or slightly convex at postdorsal area; ventral profile straight or slightly convex. Head somewhat long, length 26.9–29.0% SL, upper profile straight or very slightly convex at interorbital area, markedly convex on snout. Mouth small, width of mouth gape 18.8–22.5% HL, subterminal, horseshoe shaped, slightly arched and without barbels. Lower jaw well developed, slightly arched, covered by horny sheath, with sharp edge. Lips developed and lower lip with slightly fleshy lateral lobes and median pad. Lateral lobes small and approximately half of width of median pad. Papillae numerous on lower and upper lips (Fig. 2a); snout short and slightly pointed, its length 32.4–36.3% HL. Eye large, its diameter 24.7–28.8% HL.

Dorsal fin with 3-4 simple and 7½ branched rays; fin height 19.4–24.8% SL, and markedly greater than pectoral-fin length, outer margin of dorsal fin straight to convex. Pectoral fin short, its length 15.0–17.8% SL, outer margin rounded, and with 11–13 (mean=11.9; SD= 0.14) branched rays. Pelvic fin straight, with 1 simple and 7 branched rays. Anal fin slender, its height 14.6–16.7 %SL, with 3 simple and 5½ branched rays; outer margin of fin slightly concave. Caudal fin forked, lobes slightly pointed, with 15–17 branched rays (mean=16.3; SD=0.19). Lateral line with 6–17 (mean=10.1; SD=0.74) scales and lateral series with 36–41 + 1–2 scales (mean= 38.5; SD= 0.45); 6–7 rarely 8 scale rows between lateral line and dorsal-fin origin (mean =6.7; SD= 0.25); 4–5 scale rows between lateral series and pelvic-fin origin (mean=4.5; SD=0.12). Gill rakers 15–17 on outer side of first gill arch (mean=16; SD=0.24). Pharyngeal teeth 2.4.5-5.3.3.

**Sexual dimorphism.** There is no sexual dimorphism.

**Coloration.** Formalin fixed adults and juveniles greyish on back and upper part of flank; lower part of flank and belly yellowish. Dorsal and caudal fins grey; pectoral, pelvic and anal fins light greyish. Large black spot on some flank scales and numerous small black dots on each flank scale. Caudal peduncle with small irregular-shaped black spot (Fig. 1).

**Distribution.** *Hemigrammocapoeta menderesensis* is known from Lake Işıklı. This Lake is connected with the Büyük Menderes River (Fig. 3).

**Etymology.** The name of the species is derived from the Büyük Menderes River. An adjective.

**TABLE 1.** Morphometry of *Hemigrammocapoeta kemali* and *H.menderesensis* (mean values are given in parentheses).

	<i>H. kemali</i>	<i>H.menderesensis</i>	
Basin	Konya	Büyük Menderes	
Province	Konya	Denizli	
Locality	Ereğli and Seydişehir	Lake Işıklı	
Number of specimens	17	12	Holotype
Standard length (mm)	51-58	42-54	52
<b>In percent of standard length</b>			
Head length	24.6-29.8 (26.8)	26.9-29.0 (27.8)	27.2
Body depth at dorsal fin origin	23.4-32.0 (27.4)	24.2-26.7 (25.5)	24.7
Predorsal length	50.9-54.0 (52.2)	50.1-52.4 (51.3)	51.4
Prepelvic length	50.3-54.5 (52.2)	51.3-55.3 (53.4)	53.8
Preal length	73.1-76.8 (74.4)	74.1-81.3 (76.5)	76.0
Pectoral-fin origin to anal fin	48.8-56.3 (51.4)	49.2-56.7 (52.6)	52.2
Pectoral-fin origin to pelvic fin	26.1-38.5 (29.0)	24.9-30.7 (28.8)	29.7
Pelvic-fin origin to anal fin	21.8-24.7 (23.1)	21.8-26.2 (23.7)	22.9
Dorsal-fin height	23.8-26.3 (24.7)	19.4-24.8 (23.0)	24.6
Dorsal-fin length	12.5-16.2 (14.2)	12.1-14.9 (13.9)	14.6
Anal-fin height	15.9-18.1 (16.9)	14.6-16.7 (15.8)	16.4
Anal-fin length	7.5-10.5 (8.6)	5.2-7.8 (7.2)	7.5
Pectoral-fin length	16.8-19.7 (18.3)	15.0-17.8 (16.5)	17.8
Pelvic-fin length	15.9-18.4 (17.6)	15.5-17.6 (16.7)	16.1
Upper caudal-fin lobe	20.8-26.5 (24.4)	19.5-24.6 (22.5)	21.8
Caudal peduncle length	15.8-19.9 (17.5)	14.7-18.0 (16.5)	16.5
Caudal peduncle depth	10.4-12.8 (12.0)	11.0-12.6 (11.8)	11.6
<b>In percent of head length</b>			
Snout length	33.1-38.2 (36.3)	32.4-36.3 (34.4)	36.2
Eye diameter	20.1-24.2 (22.5)	24.7-28.8 (26.1)	28.6
Interorbital width	35.6-41.1 (37.6)	36.8-40.6 (37.6)	40.6
Head width <sub>1</sub> (ant. margin of eye)	36.8-42.6 (39.9)	35.4-40.5 (38.4)	38.8
Head width <sub>2</sub> (post. margin of eye)	42.8-49.7 (46.8)	45.0-50.3 (47.2)	50.3
Head width <sub>3</sub> (at opercle)	45.6-58.1 (52.0)	50.7-54.1 (52.4)	54.1
Head depth <sub>1</sub> at interorbital region	45.1-55.3 (52.4)	49.7-56.0 (52.8)	55.9
Head depth <sub>2</sub> (at occiput)	63.6-76.6 (70.0)	65.7-72.0 (68.8)	68.4
Distance between nostrils	21.6-26.8 (24.1)	19.6-24.2 (22.4)	24.2
Width of mouth	22.5-26.1 (23.4)	18.8-22.5 (20.3)	21.1

## Discussion

The genus *Hemigrammocapoeta* is characterized by small-sized fish with an incomplete lateral line, a subterminal, crescent or horseshoe-shaped mouth, a lower jaw covered by horny a sheath, and the lower lip with lateral lobes and without or only slightly developed median pad. *Hemigrammocapoeta* can be divided into two subgroups,

eastern Mediterranean species and central Anatolian species. *H. culiciphaga* Pellegrin, 1927 (Adana, Seyhan River) and *H. caudamaculatus* Battalgil, 1942 (Lake Amik, Asi River), were described from eastern Mediterranean. *H. kemali* (Hanko, 1295) (Ereğli) and *H. klatti* (Kosswig, 1950) (Lakes Eğirdir and Gölcük) were also described from Central Anatolia (Fig. 3). The Central Anatolian species is immediately distinguished from the eastern Mediterranean species by the absence maxillary barbels, the shape of mouth (Fig. 2a, b, vs. Fig. 2c, d) and having more scales in lateral series (36–47 vs. 29–34).

**TABLE 2.** Meristic features of *Hemigrammocapoeta kemali* and *H. menderesensis*.

Species	<i>H.kemali</i> (n=21)	<i>H. menderesensis</i> (n=16)
Total lateral line scales	6-13 (14)	6-17
Total scales in lateral series	36-45 +1-2	36-41+1-2
Branched dorsal-fin rays	7	7
Branched anal-fin rays	5	5
Branched pectoral-fin rays	11-12 (13)	11-13
Branched pelvic-fin rays	7	7
Gill rakers	9-15	15-17



**FIGURE 1.** *Hemigrammocapoeta menderesensis*, IFC-ESUF 03-1300b, 52 mm SL; Turkey: Denizli: Lake Işıklı, Büyük Menderes River Drainage.

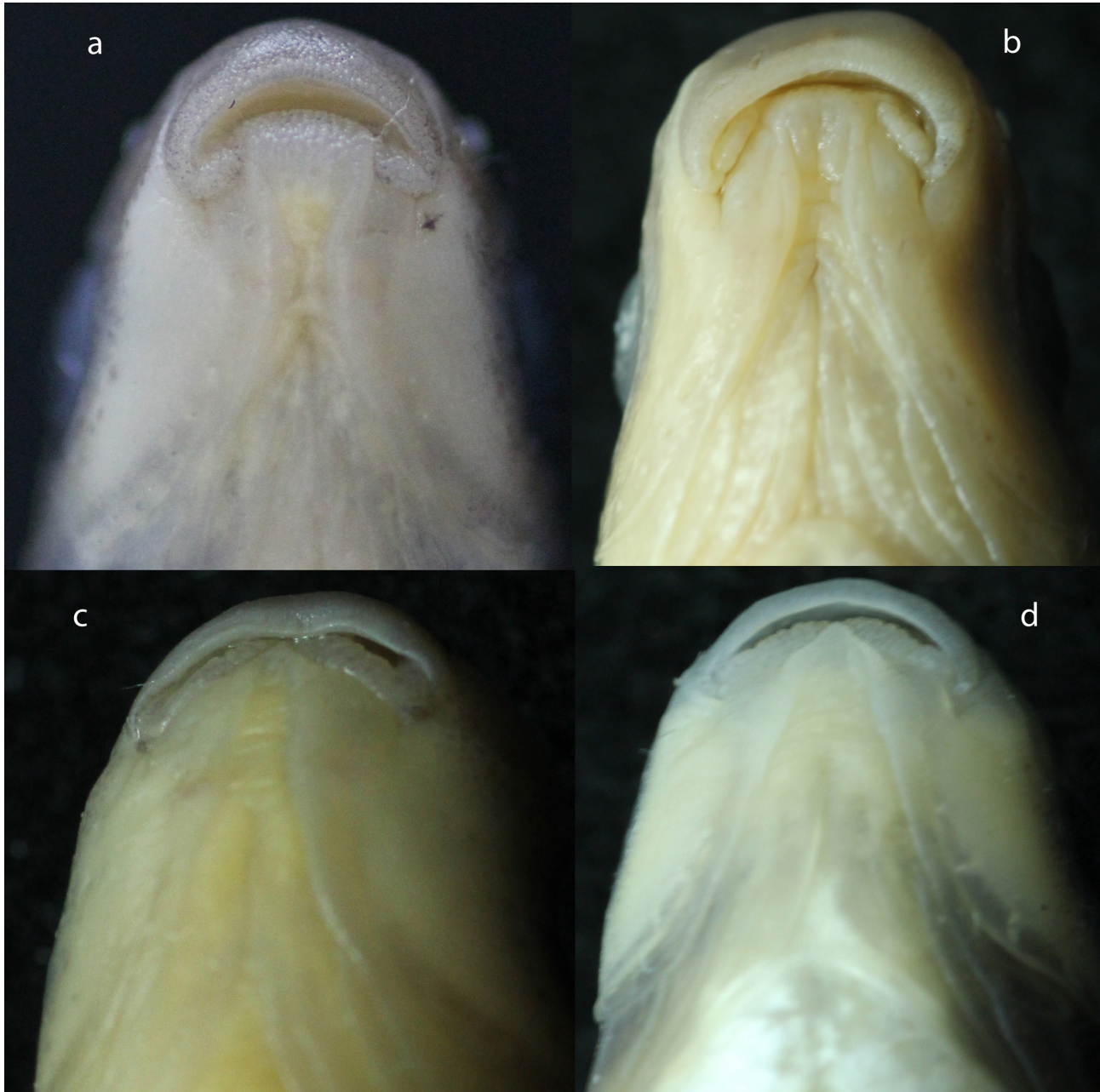
*Hemigrammocapoeta culiciphaga* was described from Seyhan River (city of Adana) and *H. caudamaculatus* from the Asi River. These species have one pair of barbels around the corner of the mouth, 29–32 (in *H. culiciphaga*) and 32–34 (in *H. caudamaculatus*) scales in the lateral series (data from Pellegrin, 1928: 50; data from Battalgil 1942: 296). We examined some specimens from Seyhan (n=3, sq. 30–31), Ceyhan (n=34, sq. 29–34) and Asi rivers (n=14, sq. 31–34). No significant differences were observed for number of scales in lateral series and the shape of mouth (Fig. 2c, d) among the basins. As a consequence, we considered *H. caudamaculatus* a synonym of *H. culiciphaga*.

The type locality of *Hemigrammocapoeta kemali* is Akgöl near Ereğli (Central Anatolia) while the type locality of *H. klatti* is Lake Eğirdir and (Mediterranean Sea basin) Lake Gölcük. *Hemigrammocapoeta kemali* has similar diagnostic characters with *H. klatti* such as the number of scales in lateral series (36–45 + 1–2 in *H. kemali*; 36–43 + 1–2 in *H. klatti*), number of gill rakers (9–15 in *H. kemali*; 13–15 in *H. klatti*), shape of mouth (Fig. 2a, b) and the absence or very few papillae on lips. We were not able to ascertain significant differences between these two species and therefore consider *H. klatti* a synonym of *H. kemali*.

*Hemigrammocapoeta menderesensis* is immediately distinguished from *H. kemali* by having more gill rakers on first gill arch (15–17 vs. 9–15), somewhat fewer scales in lateral series (36–41 + 1–2 vs. 36–45 + 1–2), a narrower mouth (width of mouth gape 18.8–22.5% HL vs. 22.5–26.1) and a larger eye (diameter 24.7–28.8% HL vs. 20.1–24.2). *H. menderesensis* further differs from *H. kemali* by mouth shape (Fig. 2a, b). In *H. menderesensis* the mouth is narrow, the lower lip is arched anteriorly, the length of lateral lobe is shorter than half width of median pad and there are numerous papillae on lower and upper lips. In *H. kemali*, the mouth is width, the lower lip is

usually straight anteriorly, the length of lateral lobe is greater than half width of median pad and there are no or very few papillae on lower and upper lips. Other than the differences listed above, the two species can be distinguished with their general body color and pattern. In *H. menderesensis*, the body is greyish dorsally and on upper part of flank, and yellowish on lower part of flank and belly; there are large black spots on some flank scales and numerous small black dots on each flank scale (Fig. 1). In *H. kemali*, the body is dark brown dorsally and on flanks, and light brownish on belly; there are a few small black dots on each flank scale (Fig. 4).

*Hemigrammocapoeta menderesensis* is immediately distinguished from *H. culiciphaga* by the absence maxillary barbels, mouth shape (Fig. 2a, b vs. Fig. 2c, d) and having more scales in lateral series (37–43 vs. 29–34).

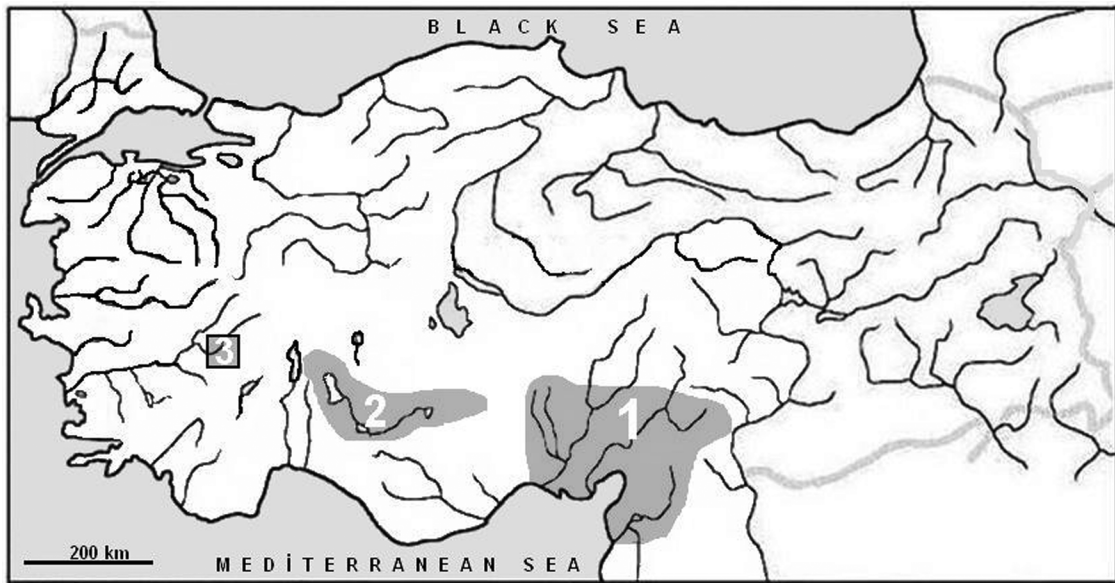


**FIGURE 2.** Ventral view of head of: **a**, *Hemigrammocapoeta menderesensis*, IFC-ESUF 03-1300b, 54 mm SL; **b**, *H. kemali*, IFC-ESUF 03-1306, 53 mm SL, Suğla Canal, Seydişehir; **c**, *Hemigrammocapoeta culiciphaga*, FFR 02483, 60 mm SL, Ceyhan River; **d**, *Hemigrammocapoeta culiciphaga*, FFR 02484, 60 mm SL, Asi River.

## Comparative material

*Hemigrammocapoeta kemali*: IFC-ESUF 03-1309a, 3, 51–57 mm SL; Turkey: Konya Prov.: Tatlıkuyu Canal Ereğli, F. Küçük, 15.04.2000.—IFC-ESUF 03-1309b, 7, 51–57 mm SL; Turkey: Konya Prov.: Aşıklar Village Ereğli, F. Küçük & S.S. Güçlü, 03.07. 2012.—IFC-ESUF 03-1307, 12, 49–58 mm SL; Turkey: Konya Prov.: Çarşamba Canal-Seydişehir, F. Küçük, 15.04.2000.—IFC-ESUF 03-1312, 6, 46–54 mm SL; Turkey: Isparta Prov.: Sütçüler Yeşilyurt Village, F. Küçük & İ.Gülle, 28.03.2014.

*Hemigrammocapoeta culiciphaga*; FFR 02480, 3, 31–44 mm SL; Turkey: Adana Prov.: Karaisalı, Üçürgene Stream, Seyhan River drainage; D. Turan & Z. Bostancı, 04.07.2007.—FFR 02481, 35, 35–53 mm SL; Turkey: Kahramanmaraş Prov.: Aksu Stream, Ceyhan River drainage, D. Turan & Z. Bostancı, 14.06.2005.—FFR 02486, 14, 41–60 mm SL; Turkey: Hatay Prov.: Afrin Stream, Asi River drainage; D. Turan, E. Doğan & C. Kaya, 08.06.2014.



**FIGURE 3.** Distribution of named species of *Hemigrammocapoeta* in Anatolia: *H. culiciphaga* (1), *H. kemali* (2) and *H. menderesensis* (3).



**FIGURE 4.** *Hemigrammocapoeta kemali*, FFR 02485, 61 mm SL; Turkey: Ereğli, Konya closed basin.

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## References

- Battalgil, F. (1942) Contribution a la connaissance des poissons des eaux douces de la Turquie. *Revue de la Faculte des Sciences de l'Université d'Istanbul*, 7, 287–306.
- Bostancı, Z. (2006) *Seyhan, Ceyhan ve Asi Nehirlerinde yaşayan Balıkların Sistemik Yönden incelenmesi. Karadeniz Teknik Üniversitesi Fen Bilimleri Enstitüsü, Balıkçılık Teknolojisi Mühendisliği Anabilim Dalı. Yüksek Lisans Tezi, Trabzon*, 113 pp.
- Erk'akan, F. & Özdemir, F. (2011) Revision of the Fish Fauna of the Seyhan and Ceyhan River Basins in Turkey. *Research Journal of Biological Sciences*, 6 (1), 1–8.
- Fricke, R., Bilecenoglu, M. & Sarı, H.M. (2007) Annotated Checklist of Fish and Lamprey Species (Gnathostoma and Petromyzontomorphi) of Turkey, Including a Red List of Threatened and Declining Species. *Stuttgarter Beiträge zur Naturkunde, Serie A (Biologie)*, 706, 1–172.
- Heckel, J.J. (1843) Ichthyologie. In: Russegger, J. (Ed.), *Reisen in Europa, Asien und Afrika mit besonderer Rücksicht auf die naturwissenschaftlichen Verhältnisse der betreffenden Länder, unternommen in den Jahren 1835 bis 1841. Erster Band. Reise in Griechenland, Unteregypten, im nördlichen Syrien und südöstlichen Kleinasien. Teil 2.* Schweizerbart, Stuttgart, pp. 991–1099.
- Hubbs, C.L. & Lagler, K.F. (1947) Fishes of the Great Lakes region. *Cranbrook Institute of Science Bulletin*, 26, i–xi, 1–186.
- Karaman, M.S. (1971) Revision der Barben Europas, Vorderasiens und Nordafrikas. *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut*, 67, 175–254.
- Kosswig, C. (1950) Die Gattung Tylognathus in Vorderasien. *Zoologischer Anzeiger*, 145, 406–415.
- Küçük, F., Sarı, H.M., Demir, O. & Güllü, İ. (2009) Review of the ichthyofaunal changes in Lake Eğirdir between 1915 and 2007. *Turkish Journal of Zoology*, 33, 277–286.
- Pellegrin, J. (1928) *Les Poissons des Eaux Douces d'Asie-Mineure*. Lab au Museum National d'Histoire Naturelle Paris, 150 pp.
- Van Neer, W., Wildekamp, R.H., Küçük, F. & Ünlüsayın, M. (2008) The 1997-1999 surveys of the Anatolian fish fauna and their relevance to the interpretation of trade at Sagalassos. In: Degryse, P. & Waelkens, M. (Eds.), *Geo-and Bio-Archeology at Sagalassos and in its Territory*. Leuven University Press, Leuven, pp. 299–323.