

## A description of two new species of the genus *Gobio* from Central Anatolia (Turkey) (Teleostei: Cyprinidae)

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The gudgeons of the genus *Gobio* from Anatolia are reviewed based upon the historical collection of the Hamburg Zoological Institute and Museum, Hamburg University, and recently collected materials. Fishes previously referred to subspecies of *Gobio gobio* belong to at least 8 species. Among them, two new species are described: *G. battalgilae* from northern Bey°ehir Lake system (a Central Anatolian endorheic basin) and *G. maeandricus* from the headwaters of Great Menderes River (Aegean Sea basin). These species are distinguished by a combination of the number of lateral line scales, predorsal and circumpeduncular scale counts, scale pattern on belly, vertebral counts, length of barbel, shape of lower lip, and details of colour pattern.

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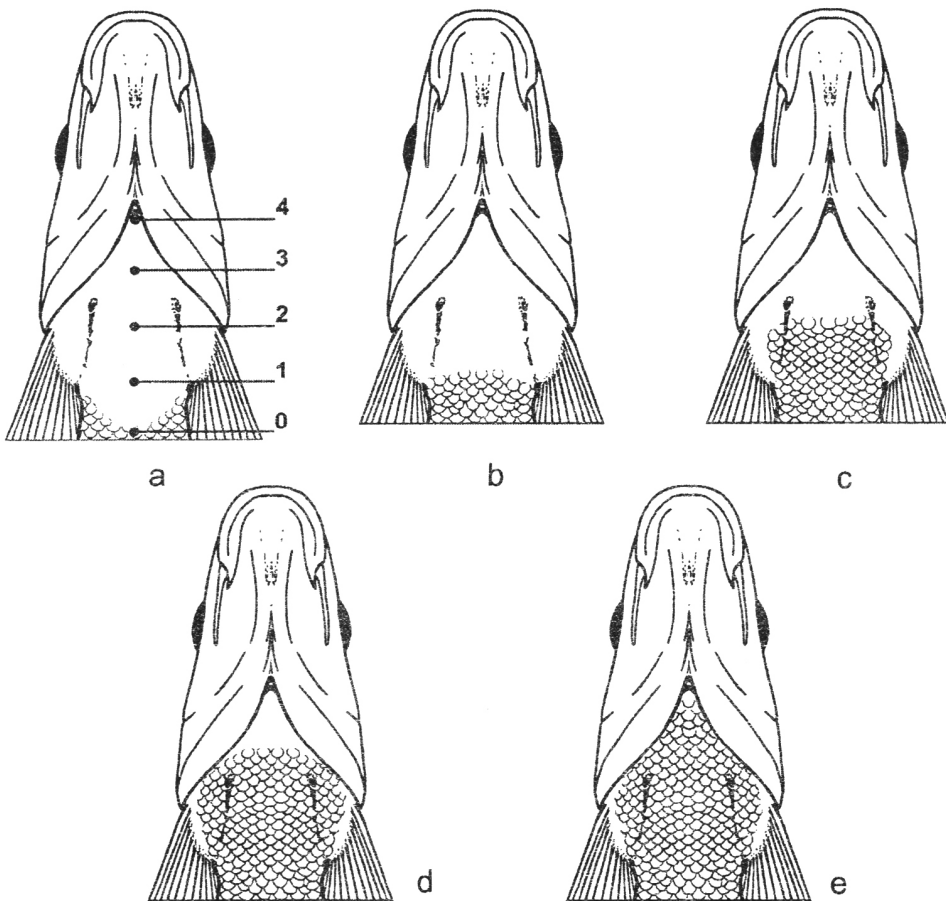
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### Introduction

*Gobio gobio* had long been considered to be a morphologically variable species widely distributed throughout most of Northern Eurasia from Ebro drainage in Spain to the Far East rivers (see the review by Bănărescu et al., 1999). However, it was shown that this large distribution of *G. gobio* as well as ranges of a number of other "pan-palaearctic" species are usually artefacts resulting from a combination of poor material, discrepancy in taxonomic concepts, linguistic barriers and disregard to detailed morphological studies (see a review of the problem in Kottelat, 1997, and Kottelat & Persat, 2005). In recent years, some groups of populations and/or subspecies of *G. gobio* were recognized as distinct species, e.g. *G. banacensis* in the Po drainage (Bianco, 1995; Kottelat, 1997), *G. kubanicus* in the Kuban River (Vasilieva et al., 2004), *G. lozanoi* in the Duero basin, Spain and south France (Doadrio & Madeira, 2004), *G. delyamurei* in the Chornaya River, Crimea (Freyhof & Naseka, 2005), *G. alverinae* from rivers of the Massif Central in France and *G. occitaniae* from rivers of the Mediterranean and Atlantic coasts in France (Kottelat & Persat, 2005). In addition to these species, *G. gobio* (Linnaeus, 1758) was redescribed by the latter authors and its neotype designated (type

locality: stream Sieg at Eitorf, Rhine River drainage in Germany). A further revision of *G. gobio* sensu lato should be addressed to a comparison of material from different drainages within its whole range based on a sound revision of museum collections, mainly type specimens, and freshly preserved materials.

It has been commonly considered that the following species and subspecies are distributed in Turkey: *G. hettitorum* Ladiges, 1960 (Göldere stream, Eregli Plain closed drainage, south Central Anatolia), *G. gobio gobio* (rivers of northwest and west coasts of Asia Minor), *G. gobio obtusirostris* Valenciennes, 1844 (Kizilirmak to Sakarya drainages, Black Sea basin), *G. gobio microlepidotus* Battalgil, 1942 (Bay°ehir Lake, Central Anatolia), *G. gobio intermedius* Battalgil, 1943 (Eber and Ak°ehir lakes, Central Anatolia), *G. gobio gymnotethus* Ladiges, 1960 (Kizilirmak, Central Anatolia), *G. gobio insuyanus* Ladiges, 1960 (Tuz Lake basin, Central Anatolia) (Ladiges, 1960; Bănărescu & Nalbant, 1973; Geldiay & Balik, 1988; Bănărescu, 1992). It was shown recently that *G. gobio insuyanus* can be considered a distinct species because of some morphometric differences from other Anatolian *G. gobio* subspecies studied (Erk'akan et al., 2005). Relatively well pronounced differences in the general appearance and some anatomical fea-



**Fig. 1.** Schematized ventral view of anterior part of body to show character states of scale pattern on belly, scales extending to: **a**, behind posterior end of pectoral-fin base (0); **b**, about posterior end of pectoral-fin base level (1); **c**, about anterior end of pectoral-fin base level (2); **d**, half-distance between pectoral fin and isthmus (3); **e**, isthmus (4).

tures found during the comparative studies (Naseka, 1996; Freyhof & Naseka, 2005) among the subspecies and newly caught “forms” as well as the fact of redescription of *G. gobio* (Kottelat & Persat, 2005) led to the conclusion that Turkish “subspecies” represent distinct species, and two more species are involved, which are described here as new ones.

### Material and methods

Individual measurements were taken as given by Naseka & Freyhof (2004). All measurements are made point-to-point with dial callipers and recorded to the nearest of 0.1 mm. Osteological characters are examined from radiographs. Vertebrae counts are given according to Naseka (1996). All characters given are obtained from

male and female specimens. The species concept adopted here is the phylogenetic species concept as an operational tool (Kottelat, 1997; Kullander, 1999) within the Eurasian fish fauna context. Standard length (SL) is measured from the tip of the snout to the end of the hypural complex; lateral head length (HL) includes skin flap; mouth length is lateral length of maxillar; the lateral line scale count includes all pored scales behind the pectoral girdle; transverse scales above and below the lateral line are counted as scale horizontal rows below the dorsal fin origin and above the pelvic fin origin, respectively; predorsal scales are all scales along the midline in front of dorsal-fin origin; the last two branched rays articulated on a single pterygiophore in the dorsal and anal fins are noted as “1½”. In order to formalize scale pattern on the belly, we distinguish five

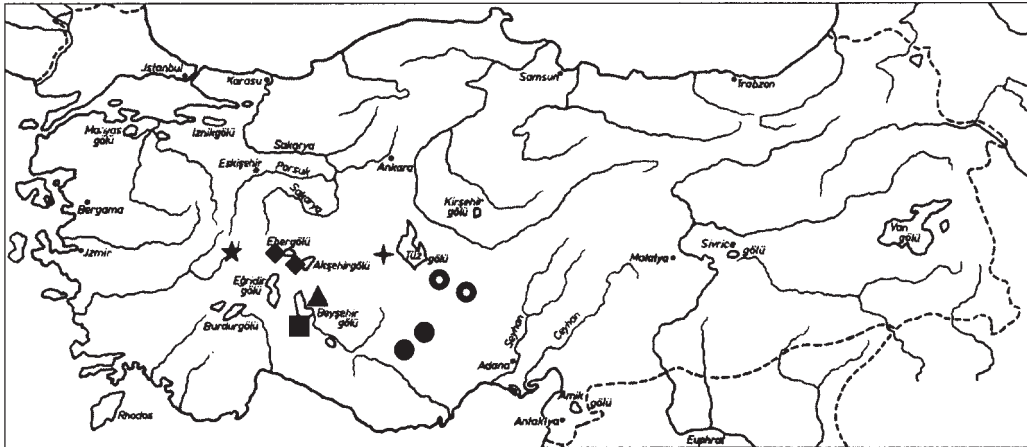


Fig. 2. Distribution of *Gobio* species in Central Anatolia: ★ – *Gobio maeandricus*; ▲ – *Gobio battalgilae*; ■ – *Gobio microlepidotus*; ◆ – *Gobio intermedius*; + – *Gobio insuyanus*; ◐ – *Gobio gymnostethus*; ◑ – *Gobio hettitorum*

character states (0 to 4), which are presented in Fig. 1. Abbreviations: HUICNN, Hacettepe University Ichthyological collection, Ankara; NMW, Naturhistorisches Museum Wien; SDU SCFK, collection of F. Küçük in Suleyman Demirel University, Egirdir; ZMH, Zoological Institute and Museum, Hamburg University.

***Gobio battalgilae* sp. n.**  
(Fig. 3)

*Holotype.* HUICNN KKB-7 (SL 103.4 mm; Eyilikler Deresi, northern Beyoehir Lake basin; coll. Erk'akan, 28.09.1998).

*Paratypes.* HUICNN KKB-7a (3 specs SL 73.5-89.8 mm; same data as for holotype), SDU SCFK 136 (3 specs SL 83.0-105.5 mm; Eyilikler, coll. Küçük, 14.05.1997).

*Diagnosis.* *Gobio battalgilae* is distinguished from other species of the genus by the combination of the following character states (none unique to the species): belly scaled between pectorals, scales extending forward to half-distance between pectoral fin and isthmus; barbel long, reaching to or slightly in front of posterior eye margin, its length, 29.7-33.7% HL, markedly greater than mouth length; snout length markedly less than postorbital distance; interorbital area flat to slightly convex, its width 29.2-31.3% HL; eye diameter 18.9-23.2% HL, 1.3-1.6 times in interorbital width; ratio caudal peduncle depth to its length 2.0-2.4; lips thin, lower one widely interrupted; 41-44 lateral line scales; 7-8 (rarely 6) scales between anus and anal-fin origin; 20-22 circumpeduncular scales; 24-26 predorsal scales; 39-41 total vertebrae, modally 21+19.

*Description.* See Fig. 3 for general appearance and Tables 1-3 for morphometric and some mer-

istic data of holotype and paratypes. Largest recorded specimen 105.5 mm SL.

Moderately shallow-bodied gudgeon. Head wide, distance between lateral margins of pterotics (posterior neurocranium width) 58-66% cranium roof length, that between lateral margins of sphenotics 56-64%. Mouth horseshoe-shaped. Lips thin, lower one widely interrupted in middle, interruption about as long as or longer than grooved section of lip (Fig. 5a). Pelvic fin origin below second or third branched dorsal-fin ray. Pectoral fin long, reaching only 1 scale in front of pelvic-fin origin in males. Pelvic fin reaching anus. Anus located closer to anal fin, at one-third of distance between pelvic and anal-fin origins. Dorsal fin with 3 simple and 7½ branched rays; last simple ray as long as first branched ray; margin of dorsal fin clearly concave. Anal fin with 3 simple and 6½ branched rays. Pectoral fin with 15 (6) or 16 (1) branched rays, and pelvic fin with 7 branched rays.

Scales on belly in front of pectoral-fin bases present to about half-distance between pectoral fin and isthmus (in 5 specimens, character state 3, Fig. 1d) or slightly beyond (in 2 specimens, between 2 and 3 as in Figs 1c and 1d). Lateral line complete or slightly incomplete, with 43-45 total scales in lateral row, and 41 (2), 42 (1), 43 (1) or 44 (3) pierced scales; 8 transverse scales above lateral line and 6 (5 in 1 specimen) scales below lateral line. 20 (2), 21 (3) or 22 (2) circumpeduncular scale rows. 6 (1), 7 (2) or 8 (4) scales between anus and anal-fin origin. Gill rakers 1 (1), 2 (2), 3 (3) or 4 (1) in outer side of first arch. Supraorbital and infraorbital cephalic sensory canals disconnected. Total vertebrae (Table 2) 39-41 (mode 41), 21-22 abdominal and 18-

20 (mode 19) caudal vertebrae, including 0-2, commonly 1, preanal caudal vertebrae. Vertebral formulae 21+18 (1), 21+19 (1), 21+20 (1), 22+18 (1) or 22+19 (3).

**Coloration (in ethanol).** Head and body pale silvery, laterally with 9 (2), 10 (2) or 11 (3) roundish dark blotches. Lateral blotches situated slightly above lateral line, except for 2-3 posterior ones located along lateral line. Blotches well separated from each other or one or two anterior blotches may be fused. Pectoral, dorsal and caudal rays with faint dark spots forming several dark rows (irregular on caudal fin).

**Distribution.** *Gobio battalgilae* was collected only in Eyllikler brook in the north of the Bey°ehir Lake endorheic basin of Central Anatolia in Turkey (see the map in Fig. 2).

**Etymology.** The new species is named after Fahire Battalgil in appreciation of her contribution to the knowledge of the Turkish freshwater fishes.

**Remarks.** *Gobio battalgilae* belongs to the group of gudgeons with high number of vertebrae (Table 2): *G. microlepidotus*, *G. hettitorum*, *G. insuyanus*, *G. gymnostethus* (Central Anatolia closed basins), with modally 40 and 41 total vertebrae, 22 abdominal and 19 caudal ones, in contrast to species from the river drainages of the Aegean and Black Sea basins with modally 39 total vertebrae, 21 abdominal and 18 caudal ones (Table 2; also in Freyhof & Naseka, 2005). In the Bey°ehir Lake basin, the new species is distinguished from its only congener here, *G. microlepidotus* (Fig. 4), in having larger scales (41-44 vs. 43-48), relatively longer barbel (longer than mouth, 29.7-33.7 HL, vs. about equal to mouth length, 19.1-30.1), widely interrupted lower lip (vs. narrowly interrupted, Fig. 5b), convex interorbital area (vs. markedly concave) and, accordingly, a deeper head, its depth at centre of eye 44.5-46.3, mean 45.3% HL (vs. 39.9-45.4, mean 43.4). *G. battalgilae* is distinguished from *G. hettitorum* by having larger scales, 41-44 in lateral line (vs. 45-47, Table 3), and markedly spotted head and body with clear blotches on sides (vs. absence of both spots and indistinct blotches). It further differs from *G. insuyanus* (Fig. 6) and *G. gymnostethus* (Fig. 7), which also have large scales (41-44 in lateral line), in the longer distance between anus and anal-fin origin, 6-8 (vs. 4-7 and 5-6, respectively), higher number of circumpeduncular scale rows, 20-22 (vs. 17-19 and 15-20, respectively), and more anteriorly placed dorsal fin (commonly 10, also 11, predorsal vertebrae, vs. commonly 11, also 12, in *G. insuyanus* and *G. gymnostethus*) (see Tables 2 and 3). From *G. gymnostethus*, it is also different in having relatively larger eye (ratio horizontal diameter to interorbital width 1.3-1.6 vs. 1.6-2.1).

***Gobio maeandricus* sp. n.**  
(Fig. 8)

*Gobio gobio intermedius* (non Battalgil): Ladiges, 1960: 120 (partim: I°ikli).

**Holotype.** ZMH 1132 (SL 79.1 mm; Great Menderes R. at I°ikli; coll. Kosswig, ded. 1945).

**Paratypes.** ZMH 2440 (3 specs, SL 23.0-42.2 mm; Great Menderes R. at I°ikli; Exkursion des Zool. Inst. u. Zool. Museum Hamburg, 08-09.1964).

**Diagnosis.** *Gobio maeandricus* is distinguished from other species of the genus by the combination of the following character states (none unique to the species): belly scaled between pectorals, scales extending forward almost to isthmus; barbel very long, reaching to or slightly behind posterior eye margin, its length, 32.4-35.4% HL, about equal to mouth length and less than 1.5 times in snout length; snout length slightly less than postorbital distance; interorbital area slightly to markedly concave, its width 32.0-32.6% HL; eye diameter 19.6-23.2% HL, 1.4-1.7 times in interorbital width; ratio caudal peduncle depth to its length 1.7-2.0; lips thin, lower lip narrowly interrupted; 48-49 lateral line scales; 7 scales between anus and anal-fin origin; 18-19 circumpeduncular scales; 25-29 predorsal scales; 38-39 total vertebrae, modally 21+18.

**Description.** See Fig. 8 for general appearance and Tables 1-3 for morphometric and some meristic data. Largest recorded specimen (uncat.) 130 mm SL.

Moderately shallow-bodied gudgeon. Head wide, distance between lateral margins of pterotics 64-68% cranium roof length, that between lateral margins of sphenotics 57-63%. Mouth horseshoe-shaped. Lips thin, lower one narrowly interrupted in middle. Pelvic-fin origin below second or third branched dorsal-fin ray. Pectoral fin reaching about 2 scales in front of pelvic-fin origin. Pelvic fin reaching anus. Anus located closer to anal fin, at one-third of distance between pelvic and anal-fin origins. Dorsal fin with 3 simple and 7½ branched rays; last simple ray as long as first branched ray; margin of dorsal fin clearly concave. Anal fin with 3 simple and 6½ branched rays. Pectoral fin with 14 (2) or 15 (2) branched rays, and pelvic fin with 7 branched rays.

Scales on belly in front of pectoral-fin bases present to almost entire distance between pectoral fin and isthmus (character state 4, Fig. 1e). Lateral line with 49 (2) or 50 (2) total scales in lateral row and 48 (2) or 49 (2) pierced scales; 9 transverse scales above lateral line and 6 scales below lateral line (in all specimens); 18 (2) or 19 (2) circumpeduncular scale rows; 7 scales between anus and anal-fin origin. Gill rakers 1 (1), 2 (1), 3 (2) in outer side of first arch. Supraorbital and infraorbital sensory canals disconnect-



ed. Total vertebrae (Table 2) 38 (1) or 39 (3), 21 (4) abdominal and 17 (1) and 18 (3) caudal vertebrae, including 1 preanal caudal vertebrae. Vertebral formulae 21+17 (1) and 21+18 (3).

**Coloration (in ethanol).** Head and body pale silvery to yellowish, laterally with 6 (1) or 7 (3) dark blotches. Lateral blotches situated slightly above lateral line, except for 2-3 posterior ones located along lateral line. Blotches not well separated from each other, adjacent blotches may be fused. Pectoral, dorsal and caudal rays with faint dark spots forming several dark rows (irregular on caudal fin).

**Distribution.** *Gobio maeandricus* is only known from the headwaters of Great Menderes (= Maeander, Büyük Menderes) at I'ikli in eastern Central Anatolia in Turkey (see the map in Fig. 2).

**Etymology.** The new species is named after its type locality, Great Menderes (Maeander) River; an adjective. This name as *G. gobio maeandricus* was given on the label of the holotype, ZMH 1132, most probably by C. Kosswig.

**Remarks.** *Gobio maeandricus* belongs to the group of gudgeons with low number of vertebrae, total vertebrae modally 39, abdominal 21 and 18 caudal (Table 2): *G. intermedius* and two hitherto undescribed species, *Gobio* cf. *caucasicus* (rivers of Black Sea basin in Northern Anatolia from Sakarya to (?) Çoruh) and *Gobio* cf. *bulgaricus* (rivers at Bosphorus and in Thrace). *G. maeandricus* is clearly distinguished from the last two species in having smaller scales, 25-29 predorsal ones and 48-49 in lateral line (vs. 18-21 and 39-42, Table 3). The new species is similar to *G. intermedius* (Fig. 9) from Eber Lake basin, which also has small scales (21-25 predorsal and 45-51 in lateral line) and almost completely scaled breast. But *G. maeandricus* has a more posteriorly placed dorsal fin, 11 predorsal abdominal vertebrae (vs. commonly 10), concave and wider interorbital area (32.0-32.6% HL vs. convex, 28.4-32.0), a longer barbel (reaching to behind posterior eye margin, its length 32.4-35.4% HL vs. reaching to slightly behind middle of eye and 24.7-30.4% HL), a shallow body (maximum depth 21.7-24.0% SL vs. 23.6-28.2% SL), 6-7 blotches on sides, which may be fused (vs. 7-9 distinct blotches).

## Comparison Material

*Gobio gymnostethus* Ladiges, 1960, **stat. n.**: ZMH 3735 (probably, holotype with former number 1131<sup>1</sup>; Kızılcak creek, Niğde; coll. Kosswig, 08.1947; SL 63.8 mm), ZMH 3736 (3, probably paratypes with former number 1154, same data as for holotype; SL 40.5-61.1 mm), HUICN KK-M-1 (5 specs; Melediz, Aksaray; coll. Erk'akan, 6.07.1992; SL 105.5-113.5 mm); *G. hettitorum* Ladiges, 1960: ZMH 1129 (holotype; Gökdere, Karaman; coll. Kosswig, no dates; SL 114.0 mm), ZMH 1130 (paratype, same data as for holotype; SL 124.0 mm), ZMH 1930 (1 spec, Eregli, east Central Anatolia; ded. Kosswig, 29.08.1957; SL 67.0 mm); *G. insuyanus* Ladiges, 1960, **stat. n.**: ZMH 3734<sup>2</sup> (probably, paratype; Insuyu creek, Cihanbeyli [Tuz Lake basin]; coll. Kosswig, 07.1945; SL 66.5 mm), HUICN KK-1 (12 specs; Cihanbeyli [Tuz Lake basin], coll. Erk'akan, 28.08.2003; SL 72.9-110.9 mm); *G. intermedius* Battalgiç, 1943, **stat. n.**: ZMH 1135 (lectotype designated by Bănărescu & Nalbant, 1973: 119, Eber Lake, Vilâyet Afyon, Karahisar; coll. Kosswig, 15.04.1942; SL 75.2 mm), ZMH 1128 (paralectotype, same data as for lectotype; SL 65.3 mm); HUICN KKA-2 (5 specs; Ak'ehir Lake; coll. Erk'akan, 10.10.1992; SL 71.6-87.6 mm); *G. microlepidotus* Battalgiç, 1943, **stat. n.**: ZMH 1127 (lectotype designated herein<sup>3</sup>; Bey'ehir Lake; coll. Kosswig, 1941; SL 74.9 mm), ZMH 25426 (paralectotype, same data as for lectotype; SL 75.6 mm), ZMH 1125 (3 specs; Bey'ehir Lake; ded. Kosswig, 25.VIII.1955; SL 66.9-99.3 mm), 2438 (17 specs, Bey'ehir Lake; Exkursion des Zool. Inst. u. Zool. Museum Hamburg, 08-09.1964; SL 41.4-91.4 mm), ZMH 2439 (20 specs; same data as for 2438; SL 42.5-113.0 mm), HUICN KKB-8 (8 specs; Bey'ehir Lake basin: Sevindikçay; coll. Erk'akan, 22.07.1998); *Gobio* cf. *caucasicus*: HUICN SA-9 (7 specs; Sakarya R. drainage: Porsuk ba'ı; coll. Erk'akan, 8.07.1987; SL 69.7-90.1 mm), HUICNN BK-5 (5 specs; Camtur, Gerede; coll. Erk'akan, 4.07.1987; SL 67.3-96.5 mm); *Gobio* cf. *bulgaricus*: NMW 53369 (10 specs; Riva R.; SL 49.0-74.2 mm), NMW 53398 (8 specs; Mariza R., SL 54.2-72.0 mm). See Freyhof & Naseka, 2005 for the material of *G. brevicirris*, *G. bulgaricus*, *G. caucasicus*, *G. delyamurei*, *G. gobio*, *G. holurus*, *G. krymensis*, *G. kubanicus*, *G. carpathicus*, *G. sarmaticus*.

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<sup>1</sup>Numbers ZMH 1131 and 1154, which had contained the holotype and paratypes of *G. gobio gymnostethus* (Ladiges, 1960: 137; Wilkens, 1977: 157), were not found in the collection (I. Eidus, pers. comm.); numbers 3735 and 3736, which have the same label data, are present instead.

<sup>2</sup>Number ZMH 1133, which had contained the holotype of *G. gobio insuyanus* (Ladiges, 1960: 136; Wilkens, 1977: 157), was not found in the collection (I. Eidus, pers. comm.); the number 3734 is present, which has the same label data as those given for the holotype; however, the holotype had 119 mm total length (Ladiges, 1960: 137), while the 3734 specimen has 80 mm (66.5 mm SL); the latter specimen may represent a paratype since, judging from the original description, there were more than one specimen in the type series.

<sup>3</sup>As it is evident from morphometric and meristic features, this very specimen is figured by Ladiges (1960, Abb. 2).

**Table 1.** Morphometric data of holotypes, lectotypes and other examined specimens of six Anatolian *Gobio* species.

Character	<i>Gobio battalgilae</i>			<i>Gobio microlepidotus</i>		
	holotype, HUCN KKB-7	range	mean	lectotype, ZMH 1127	range	mean
SL, mm	103.4	73.5-105.5	90.81	75.2	41.4-128.5	82.10
Percents of SL						
Body depth at dorsal-fin origin	21.6	18.4-22.6	21.10	25.8	18.7-28.0	22.88
Caudal peduncle depth	9.7	8.4-10.1	9.44	10.1	8.2-11.0	9.43
Body width at dorsal-fin origin	14.4	12.8-15.4	14.19	15.8	11.6-16.2	13.97
Caudal peduncle width	4.1	3.7-5.5	4.66	4.8	3.2-5.1	4.19
Predorsal length	46.8	45.8-47.8	46.91	48.5	46.6-49.7	47.91
Postdorsal length	43.2	40.4-43.8	42.66	44.0	37.9-44.8	42.33
Prepelvic length	48.4	47.2-49.0	48.38	51.3	47.6-52.7	49.22
Preanal length	71.4	70.6-71.8	71.34	74.1	68.8-74.9	71.93
Pectoral – pelvic-fin origin distance	22.9	22.3-23.7	22.90	23.7	18.5-26.2	22.05
Pelvic – anal-fin origin distance	24.0	21.8-25.1	23.48	24.1	20.0-25.5	23.37
Anus – anal-fin origin distance	7.7	6.0-8.4	7.29	6.8	6.2-7.9	6.87
Caudal peduncle length	21.1	19.8-21.1	20.65	22.2	19.1-22.2	20.81
Dorsal-fin base length	15.1	14.0-15.1	14.42	14.5	12.2-15.4	14.03
Dorsal fin depth	23.3	21.3-25.9	23.92	21.1	19.9-26.9	22.76
Anal-fin base length	8.7	8.4-9.8	8.96	8.8	8.0-9.5	8.55
Anal fin depth	16.5	14.7-17.5	16.49	14.9	14.0-19.6	16.51
Pectoral fin length	20.1	20.0-22.0	20.97	18.9	18.2-24.0	20.02
Pelvic fin length	16.2	16.2-18.6	16.88	17.0	15.5-19.0	16.95
Head length	27.6	26.2-28.7	27.58	29.5	25.7-30.7	28.55
Percents of HL						
Head depth at nape	58.2	57.7-60.6	58.70	57.7	52.0-64.2	56.99
Head depth at centre of eye	44.6	44.5-46.3	45.28	44.1	39.9-45.4	43.40
Snout length	40.4	38.9-44.7	40.74	38.7	35.8-40.4	38.68
Eye diameter	18.9	18.9-23.2	20.41	21.6	18.8-25.6	21.73
Postorbital distance	45.3	41.7-46.7	44.71	44.1	41.9-46.7	44.02
Maximum head width	59.3	53.7-59.3	56.78	50.9	44.6-56.9	50.88
Interorbital width	30.5	29.2-31.3	30.34	29.7	24.9-33.8	28.64
Barbel length	32.6	29.7-33.7	31.56	31.1	19.1-30.1	25.71
Percents of cranial roof length:						
Cranial width in ethmoid region	25.5	21.7-25.5	23.40	21.5	21.5-25.8	23.44
Cranial width in sphenotic region	61.2	56.1-63.8	60.82	59.7	56.6-65.1	60.20
Cranial width in pterotic region	66.5	57.7-66.5	63.78	62.4	60.3-67.7	63.58
Ratios						
Interorbital width/eye diameter	1.6	1.3-1.6	1.09	1.4	1.2-1.7	1.33
Snout length/eye diameter	2.1	1.7-2.3	2.01	1.8	1.5-2.1	1.80
Head depth at nape/eye diameter	3.1	2.6-3.1	2.89	2.7	2.1-3.2	2.64
Caudal peduncle length/depth	2.2	2.0-2.4	2.19	2.2	1.8-2.6	2.22

**Table 1** (cont.).

Character	<i>Gobio maeandricus</i>			<i>Gobio intermedius</i>		
	holotype, ZMH 1132	range	mean	lectotype, ZMH 1135	range	mean
SL, mm	79.1	23.0-79.1	47.50	75.2	65.3-87.6	76.90
Percents of SL						
Body depth at dorsal-fin origin	24.0	21.7-24.0	22.81	23.6	23.6-28.2	25.65
Caudal peduncle depth	11.1	9.5-11.1	10.31	10.1	10.1-11.5	10.75
Body width at dorsal-fin origin	15.0	15.0-15.9	15.56	14.8	13.0-16.3	14.50
Caudal peduncle width	5.4	5.4-5.9	5.52	4.7	3.2-5.4	4.26
Predorsal length	48.7	48.7-52.5	50.94	46.8	46.8-51.1	48.57
Postdorsal length	40.6	37.1-40.6	39.29	42.4	39.5-43.2	41.40
Prepelvic length	52.3	50.8-53.2	52.36	50.4	50.4-54.5	51.76
Preanal length	73.6	73.0-74.2	73.50	72.5	72.5-74.3	73.63
Pectoral – pelvic-fin origin distance	25.8	22.5-25.8	23.69	24.7	23.6-25.8	24.76
Pelvic – anal-fin origin distance	24.7	20.9-24.7	22.96	22.9	22.1-24.8	23.28
Anus – anal-fin origin distance	10.2	6.6-10.2	8.26	6.3	5.0-7.3	6.24
Caudal peduncle length	19.0	18.3-19.0	18.72	21.4	17.6-21.4	20.08
Dorsal-fin base length	13.1	12.0-13.1	12.58	13.3	13.3-15.6	14.57
Dorsal fin depth	22.9	22.9-24.4	23.64	22.1	22.1-27.1	24.44
Anal-fin base length	7.6	7.6-8.3	7.95	7.6	7.2-9.5	8.12
Anal fin depth	17.7	17.6-17.7	17.63	17.8	16.8-19.2	18.07
Pectoral fin length	23.4	20.7-23.4	22.05	19.0	19.0-23.7	21.91
Pelvic fin length	18.6	17.2-18.6	17.89	16.8	16.8-19.0	18.13
Head length	27.8	27.8-32.0	30.52	27.4	26.5-29.8	28.43
Percents of HL						
Head depth at nape	62.3	56.0-62.3	57.82	62.6	59.0-62.6	60.88
Head depth at centre of eye	46.8	43.0-46.8	44.27	47.6	45.6-49.4	47.84
Snout length	40.9	37.6-41.5	39.99	39.8	36.0-40.9	38.82
Eye diameter	19.6	19.6-23.2	21.63	22.8	19.2-23.3	21.75
Postorbital distance	45.9	44.5-45.9	45.30	44.2	43.2-47.9	45.64
Maximum head width	54.1	48.8-54.3	51.70	55.3	52.6-57.3	55.14
Interorbital width	32.3	32.0-32.6	32.30	30.1	28.4-32.0	30.45
Barbel length	32.7	32.4-35.4	33.90	26.2	24.7-30.4	27.36
Percents of cranial roof length:						
Cranial width in ethmoid region	23.6	23.6-25.8	24.50	21.6	20.2-24.6	22.44
Cranial width in sphenotic region	58.8	58.8-63.3	61.40	61.2	58.3-63.0	60.50
Cranial width in pterotic region	64.2	60.0-68.4	65.55	65.5	63.0-66.7	64.90
Ratios						
Interorbital width/eye diameter	1.7	1.4-1.7	1.50	1.3	1.3-1.6	1.41
Snout length/eye diameter	2.1	1.7-2.1	1.86	1.7	1.6-2.1	1.79
Head depth at nape/eye diameter	3.2	2.5-3.2	2.69	2.7	2.6-3.1	2.81
Caudal peduncle length/depth	1.7	1.7-2.0	1.83	2.1	1.6-2.1	1.84

Table 1 (end).

Character	<i>Gobio insuayanus</i>			<i>Gobio gymnostethus</i>		
	?holotype, ZMH 3734	range	mean	holotype, ZMH 3735	range	mean
SL, mm	66.5	66.5-110.9	85.75	63.8	63.8-113.5	102.47
Percents of SL						
Body depth at dorsal-fin origin	25.1	21.0-25.4	23.62	23.7	22.5-23.7	23.19
Caudal peduncle depth	11.9	11.0-12.9	11.88	10.7	10.2-11.7	11.11
Body width at dorsal-fin origin	15.5	12.7-16.0	14.33	13.6	13.6-16.3	14.84
Caudal peduncle width	6.5	3.5-6.5	4.77	4.1	4.1-5.1	4.51
Predorsal length	49.2	47.6-51.7	49.57	49.4	47.4-49.7	48.93
Postdorsal length	39.6	38.1-42.6	40.40	40.1	40.1-42.5	41.63
Prepelvic length	52.0	51.0-53.9	52.82	50.8	49.1-53.7	51.53
Preanal length	72.6	70.8-76.0	74.13	72.7	71.2-74.4	72.84
Pectoral – pelvic-fin origin distance	26.2	25.7-28.9	27.19	24.6	24.6-28.4	26.11
Pelvic – anal-fin origin distance	21.2	20.4-24.4	22.31	22.9	22.0-25.2	23.31
Anus – anal-fin origin distance	6.0	5.3-7.7	6.33	7.5	5.6-7.5	6.77
Caudal peduncle length	19.7	17.9-20.9	19.02	20.5	17.4-22.1	20.53
Dorsal-fin base length	14.0	13.4-15.1	14.33	13.6	12.2-14.1	13.03
Dorsal fin depth	19.9	19.8-25.7	23.63	21.9	21.3-23.9	22.20
Anal-fin base length	8.0	7.6-9.6	8.56	8.2	7.2-8.7	7.96
Anal fin depth	16.7	15.4-19.5	17.69	16.6	15.5-17.6	16.75
Pectoral fin length	18.8	18.8-23.8	22.05	21.9	19.0-23.5	21.41
Pelvic fin length	15.8	15.8-18.2	17.19	17.2	14.3-17.2	16.19
Head length	29.0	26.3-29.3	27.63	27.3	26.4-27.3	26.84
Percents of HL						
Head depth at nape	60.1	58.3-64.8	61.37	57.5	56.2-60.3	58.01
Head depth at centre of eye	46.6	45.0-48.8	46.92	48.9	43.6-48.9	45.40
Snout length	38.3	36.6-42.6	39.46	35.6	35.6-44.0	40.52
Eye diameter	21.2	17.8-22.0	19.65	20.1	15.3-20.1	17.66
Postorbital distance	44.6	44.3-51.1	47.68	45.4	45.4-50.5	47.79
Maximum head width	52.8	52.3-59.0	55.18	55.7	51.9-57.1	54.95
Interorbital width	30.6	30.6-36.6	33.98	32.8	28.9-32.8	30.94
Barbel length	23.8	23.8-38.7	31.80	19.5	19.5-30.2	26.45
Percents of cranial roof length						
Cranial width in ethmoid region	23.6	21.1-29.7	25.44	23.3	23.3-28.5	26.00
Cranial width in sphenotic region	58.3	56.0-65.7	61.20	57.8	57.8-64.8	60.30
Cranial width in pterotic region	63.8	62.9-69.2	66.30	62.9	62.9-67.6	65.00
Ratios						
Interorbital width/eye diameter	1.4	1.4-1.9	1.74	1.6	1.6-2.1	1.76
Snout length/eye diameter	1.8	1.8-2.3	2.01	1.8	1.8-2.9	2.32
Head depth at nape/eye diameter	2.8	2.8-3.5	3.14	2.9	2.9-3.9	3.31
Caudal peduncle length/depth	1.7	1.4-1.8	1.60	1.9	1.5-2.1	1.86



**Table 2.** Frequency distribution of vertebral counts in nine Anatolian *Gobio* species.

Species	Total vertebrae					Abdominal vertebrae				Caudal vertebrae				Predorsal vertebrae			Preanal caudal vertebrae				
	38	39	40	41	42	20	21	22	23	17	18	19	20	10	11	12	0	1	2	3	
<i>G. microlepidotus</i>			9	30	11		13	36			3	28	18	11	39					31	16
<i>G. battalgilae</i>		1	2	4			3	4			2	4	1	5	2		1	4	2		
<i>G. intermedius</i>	2	5				2	5			1	5	1		4	3				4	2	1
<i>G. insuyanus</i>			9	4			3	10			6	7			6	7			4	8	1
<i>G. gymnostethus</i>		1	3	5			2	6	1	1	3	4	1		7	2			5	3	1
<i>G. hettitorum</i>				2	1			1	2		2		1		2	1	1	1	1	1	1
<i>Gobio</i> cf. <i>caucasicus</i>	1	9	2			1	7	4		1	7	4			9	3				9	3
<i>G. maeandricus</i>		1	3					3		1	3				4					4	
<i>Gobio</i> cf. <i>bulgaricus</i>	2	7	1			1	9			3	5	2			10		1	3	6		

**Table 3.** Scale counts in nine Anatolian *Gobio* species.

Species	Lateral line	Total lateral row	Predorsal	Between anus and anal fin	Circumpeduncular row
<i>G. microlepidotus</i>	43-48	45-50	22-32	6-11	20-24
<i>G. battalgilae</i>	41-44	43-45	24-28	6-8	20-22
<i>G. intermedius</i>	45-51	47-51	21-25	5-7	18-20
<i>G. insuyanus</i>	41-44	42-45	20-26	4-7	17-19
<i>G. gymnostethus</i>	41-43	42-45	22-26	5-6	15-20
<i>G. hettitorum</i>	45-47	46-49	23-30	6-8	18-20
<i>Gobio</i> cf. <i>caucasicus</i>	(39)40-42	40-43	18-21	5-7	15-19
<i>G. maeandricus</i>	48-49	50	25-29	7	18-19
<i>Gobio</i> cf. <i>bulgaricus</i>	39-41	39-42	18-20	5-7	14-16

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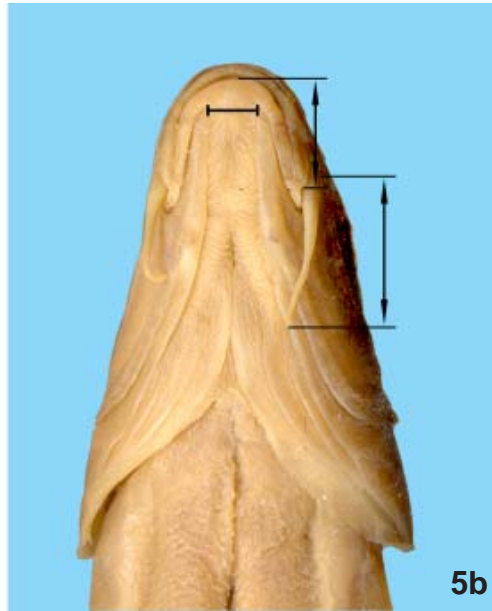
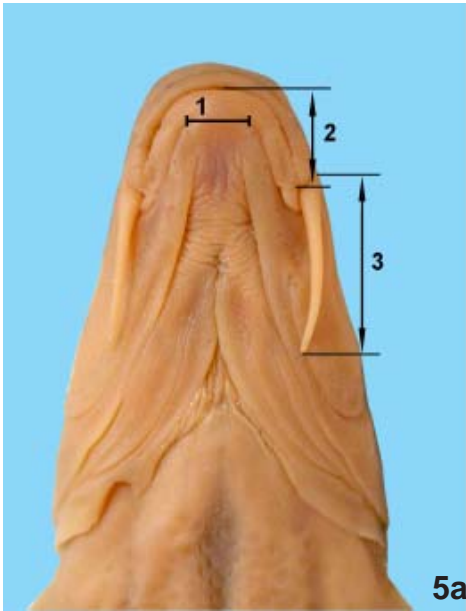
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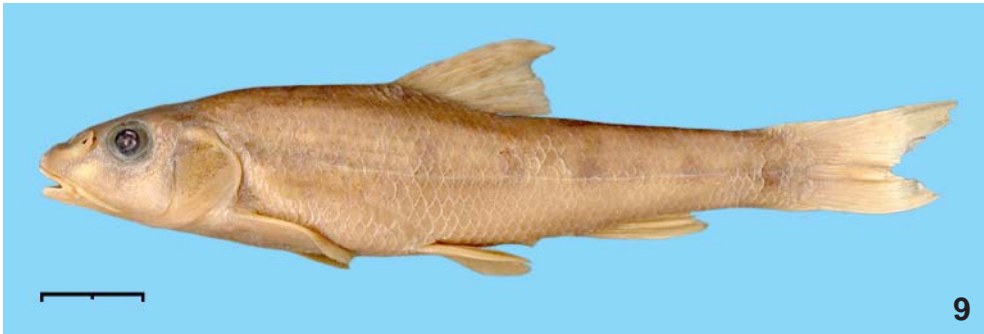
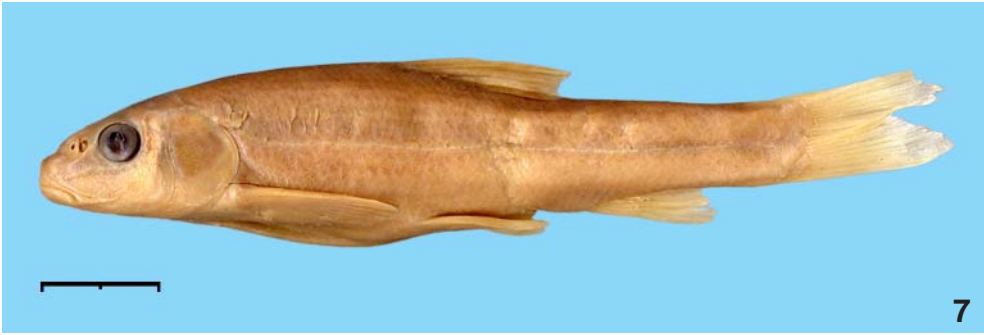
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**Figs 3-5.** 3, *Gobio battalgilae*, HUICN KKB-7a, paratype, SL 89.8 mm; Eyilikler Deresi, Bey°ehir Lake basin; 4, *G. microlepidotus*, ZMH 1127, lectotype, SL 74.9 mm, Bey°ehir Lake; 5, ventral view of head of *G. battalgilae* (a) and *G. microlepidotus* (b) to show relative length of barbel and shape of lower lip (specimens as in Figs 3 and 4; 1 – length of lower lip interruption, 2 – mouth length, 3 – barbel length). Scale: 1 cm.



**Figs 6-9.** 6, *Gobio insuyanus*, ZMH 3734, ? holotype, SL 66.5 mm, Insuyu creek, Cihanbeyli; 7, *G. gymnostethus*, ZMH 3735, ? holotype, SL 63.8 mm, Kızılçak creek, Nigde; 8, *G. maeandricus*, ZMH 1132, holotype, SL 79.1 mm, Great Menderes R. at I'ikli; 9, *G. intermedius*, ZMH 1135, lectotype, SL 75.2 mm, Eber Lake. Scale: 1 cm.