

A revision of the species of the *Cyprinion macrostomus*-group

(Pisces: Cyprinidae)

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Abstract

Syntypeseries and other material of the five nominal species of the *Cyprinion macrostomus*-group have been critically examined. On the basis of counts of branched rays in the dorsal fin and number of scales in the lateral line, the shape of the mouth opening and of the dorsal fin, three species are regarded as valid in this group: *Cyprinion macrostomus* HECKEL, *C. kais* HECKEL, and *C. tenuiradius* HECKEL. A lectotype is designated for each of these species.

Key words: Cyprinidae, *Cyprinion macrostomus*-group, revision, lectotype designation.

Zusammenfassung

Syntypenserien und anderes Material von fünf Arten der *Cyprinion macrostomus*-Gruppe sind untersucht worden. Auf der Basis der Anzahl der Gabelstrahlen in der Dorsalflosse und der Zahl der Schuppen in der Seitenlinie sowie der Maulform und Ausbildung der Dorsalflosse werden drei Arten in dieser Gruppe anerkannt: *Cyprinion macrostomus* HECKEL, *C. kais* HECKEL und *C. tenuiradius* HECKEL. Für jede dieser Arten wird ein Lectotypus festgelegt.

Introduction

Cyprinion HECKEL, 1843 (type species: *Cyprinion macrostomus* HECKEL, 1843) is a western Asian genus of minnows, distributed from western Syria and the south of the Arabian Peninsula to the western tributaries of Indus River in Punjab (Pakistan). Based on some osteological characters, HOWES (1982) includes two nominal southern Asian genera within *Cyprinion*, considered by the earlier authors as distinct: the southern Himalayan *Semiplotus* BLEEKER, 1866, with two or three species in the northern tributaries of the Ganges and Brahmaputra, and the Indochinese *Scaphiodonichthys* VINCIGUERRA, 1890 (= *Scaphiodontopsis* FOWLER, 1934) which comprises two vicariant species: *Scaphiodonichthys burmanicus* VINCIGUERRA, 1890, in the basin of Salween River, and *S. acanthopterus* (FOWLER, 1934) in that of Chao Phraya ("Menam") River.

The position of *Semiplotus* must be verified with the help of other characters, including osteological ones; its species differ sharply from those of *Cyprinion* s.str. in the absence of barbels, a higher number of branched dorsal rays (20 - 25, as against (12)13 -

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15(17) in the species of the *C. macrostomus*-group, and 9 - 11 in those of the *C. watsoni-microphthalmus*-group), and in the number of branched anal rays: five as in most other genera of the subfamily Cyprininae or Barbinae, while *Cyprinion* is one of the few genera of the subfamily having a higher number of rays: constantly seven.

Scaphiodonichthys, which has two pairs of barbels (as against one in *Cyprinion*) and five branched anal rays (like *Semiplotus*), differs from these two genera in two important characters: a lower position of the lateral line (which lies, contrary to all other genera of Cyprininae, closer to the ventral than to the dorsal margin of the caudal peduncle, as in several genera of Rasborinae and Cultrinae) and the divergent orientation of the striae on the scales, as in the European and western Asian genera *Barbus* and *Capoeta*, while in *Cyprinion*, *Semiplotus* and most other western, southern, and eastern Asian genera of Cyprinidae the striae are parallel (BANARESCU 1980). Both characters justify the generical independence of *Scaphiodonichthys*.

It is worth mentioning that HOWES (1982) considers the two species of *Scaphiodonichthys*, *S. burmanicus* and *S. acanthopterus*, as synonymous, and KOTTELAT (1989) follows him. Actually there is a sharp difference between them: the pharyngeal teeth are on two rows in *S. burmanicus*, a character already mentioned by VINCIGUERRA (1890) and verified in all four available specimens by BANARESCU (1980), and on three rows in *S. acanthopterus* as described by FOWLER (1934), the character has been verified in 12 of the 23 available specimens by BANARESCU (1980). The numbers of branched dorsal rays, of lateral line scales, and of gill rakers vary too, but show an overlap of the extreme values:

S. burmanicus: D IV 9 - 11, L.lat. 36 - 39; Sp.br. 30 - 32

S. acanthopterus: D IV 11 - 12; L.lat. (39) 40 - 42, Sp.br. 27 - 31

Further minor differences in body proportions of both species are mentioned by BANARESCU (1980).

The vicariant ranges of both species (Burma versus Chao-Phraya/Mekong) have zoogeographical significance, since they correspond to the two main subdivisions of the southern Asian aquatic fauna: Burma/India on the one hand, Chao Phraya/Mekong/western Indonesia on the other hand (KOTTELAT 1989, BANARESCU 1992).

The range of *Cyprinion* as restricted here comprises two areas, each inhabited by another group of interrelated species:

(1) The Orontes, Qweiq and Tigris-Euphrates basin, and western Iran (from Karun to Kor River) inhabited by the *C. macrostomus*-group.

(2) The south of the Arabian Peninsula (the western, southern, and south-eastern slopes), southern and central Iran, Afghanistan, and the part of Pakistan west of the Indus River, inhabited by the *C. watsoni-microphthalmus*-group.

The genus is absent from the Jordan River basin, from the north of Saudi Arabia, from the Caspian and Aral seas slopes of Iran and Afghanistan, from the Tedjen and Murghab basins, apparently also from most inner drainages of Iran (Qom River, etc.), and from Mand River basin in the Persian Gulf drainage area, that lies between Hablerud and Kor rivers (inhabited by *C. tenuiradius* HECKEL, 1846, of the *C. macrostomus*-group) and Kul River (inhabited by members of the *C. watsoni*-group).

The species of the *C. macrostomus*-group are characterized by 13 - 15, rarely 16, branched rays in the dorsal fin, as against 9 - 11 in those of the *C. watsoni* - *C. microphthalmus*-group.

Five nominal species have been described in this group, four of them from western Syria/Tigris Euphrates drainage and one from western Iran:

Cyprinion macrostomus HECKEL, 1843, from Kueik or Qweiq River at Aleppo, western slope of Syria, and from the upper Tigris River at Mosul, Iraq; the recently selected lectotype is from Aleppo.

Cyprinion kais HECKEL, 1843, from Kueik (Qweiq) River at Aleppo.

Cyprinion neglectus HECKEL, 1843, and *C. cypris* HECKEL, 1843, from the Tigris River at Mosul, Iraq.

C. tenuiradius HECKEL, 1846, from Kara Agatsch, Persian Golf drainage area and lake Niris basin, both localities in western Iran.

BERG (1949) considers that the four former species are synonymous; the same opinion has been adopted by KARAMAN (1971). They have been followed by BANNISTER (1980) and KRUPP (1987) who, without mentioning synonyms, list only *C. macrostomus* from the Tigris-Euphrates (BANNISTER 1980) and from Orontes basin (KRUPP 1987). HOWES (1982) is the only recent author listing *C. macrostomus* and *C. kais* as distinct, based on differences in jaw and mouth characters.

Material and Methods

The present study is based on the examination of the syntypes of the five nominal species, all preserved in the ichthyological collection of the Natural History Museum in Vienna (Naturhistorisches Museum Wien, NMW), of the numerous specimens from the Tigris-Euphrates basin collected by the Austrian Pietschmann's Expeditions in "Mesopotamia" and "Armenia" ("Österreichische Mesopotamien Expedition", 1910, and "Österreichische Armenien Expedition", 1914) preserved in the same museum, and of other specimens belonging to the following museum collections:

BMNH	The Natural History Museum, London (= British Museum of Natural History)
HZM	Zoologisches Institut und Museum der Universität Hamburg
ISBB	Institutul de Biologie, Bucuresti
IZA	Instituto di Zoologia, Aquila
MNHN	Muséum National d'Histoire Naturelle, Paris
RMNH	National Museum of Natural History, Leiden (= Rijksmuseum van Natuurlijke Historie)
SMF	Senckenberg Museum, Frankfurt a. M.
USNM	National Museum of Natural History, Washington

Numbers and further details of specimens examined are given with each species described below.

Examination of specimens included counts of branched rays in the dorsal fin and scales in the lateral line, form of the dorsal fin and shape of the mouth.

Results

The study of this rich material enabled us to recognize three distinct species of the *C. macrostomus*-group:

1. *Cyprinion macrostomus* HECKEL, 1843

(Figs. 1, 3, 5a, 6)

Synonym: *Cyprinion neglectus* HECKEL, 1846.

Types examined:

Syntypes of *C. macrostomus*: NMW-52805, five specimens, 82.0 - 133.3 mm SL from Kueik (Qweiq) River at Aleppo; NMW-52806, four specimens, 59.1 - 122.3 mm SL from the Tigris River at Mosul; SFM-70, one specimen 82.3 mm SL from Kueik (Qweiq) River at Aleppo. The specimen NMW-52805:1, 133.3 mm SL, had once been selected as **lectotype** by Dr. F. Krupp in 1984 and is designated as such by present publication, all other syntypes becoming **paralectotypes**; Aleppo is thus the type locality.

Tab. 1: Number of branched dorsal rays and scales in lateral line of different populations of *C. macrostomus*.

Locality	Number of branched D rays (\bar{x})	Scales in l.lat. (\bar{x})
Kueik (Qweiq) River, Aleppo		
syntypes only	13 - 15 (14.00)	41 - 44 (42.40)
all specimens	13 - 16 (13.75)	40 - 44 (42.09)
Tigris River, Mosul		
syntypes of <i>C. macrostomus</i>	14 - 16 (15.00)	40 - 43 (41.37)
syntypes of <i>C. neglectus</i>	13 - 16 (14.57)	40 - 43 (41.29)
all specimens	13 - 16 (14.73)	40 - 43 (41.32)
Tigris River basin, Ambar Cayi	14 - 17 (15.14)	41 - 44 (42.70)
Tigris River basin, Batman Cayi	13 - 16 (14.56)	41 - 44 (42.81)

Tab. 2: Number of branched dorsal rays and scales in lateral line of different populations of *C. kais*.

Locality	Number of branched D rays (\bar{x})	Scales in l. lat. (\bar{x})
Kueik (Qweiq) River, Aleppo		
syntypes only	14 - 15 (14.50)	41 - 42 (41.25)
all specimens	12 - 15 (13.75)	40 - 43 (41.00)
Tigris River, Mosul		
syntypes of <i>C. cypris</i>	13 - 15 (14.10)	40 - 43 (41.65)
all specimens	13 - 15 (14.00)	40 - 43 (41.00)
Tigris River basin, Batman Cayi	14 - 16 (14.93)	40 - 43 (41.75)
Euphrates River basin, Qumbar-ed-Din	14 - 16 (14.25)	42 - 43 (42.25)

Syntypes of *C. neglectus*: NMW-52807, seven specimens from the Tigris River at Mosul, 53.1 - 128.2 mm SL; the specimen NMW-52807:1 was once selected as (forthcoming) lectotype by Dr. F. Krupp in 1984.

Further specimens examined:

MNHN A 3896 and A 3867, Kueik (Qweiq) River at Aleppo, seven specimens; MNHN 3896 A, Orontes River, two specimens; ISBB 3174, Tigris River basin at Narcis Cayi, two specimens; ISBB 3174, Tigris at Ambar Cayi, seven specimens; NMW-91038 (19 specs.), 90379 (22 specs.), 90376 (25 specs.), 90380 (8 specs.), 90377 (10 specs.), and ISBB 3071 (1 spec.) from Batman Cayi River, tributary of the Tigris, Turkey (Armenia Expedition); NMW-90387, Tigris River at Mosul, Iraq, 29 specs. (Mesopotamia Expedition); NMW-90381, Haso River, tributary of the Tigris, Turkey, 3 specs. (Armenia Expedition); NMW-90384 and 90383, Murat, headwaters of Euphrates River, Turkey, 2 specs. (Armenia Expedition); NMW-90381 and 90361, Euphrates River at Dscherablis (Jerablus), 2 specs. (Armenia Expedition); NMW-90375, Cermik on a tributary of Euphrates River, Turkey, 1 specimen (Armenia Expedition); NMW-91037, Nesibin, Euphrates River basin, 35 specimens (Armenia Expedition); BMNH 1968.12.13: 268 - 269, Rasel ein Khabur, Euphrates River basin in Syria, two specimens; ZMH 4211 and 2628, upper Tigris River basin in Turkey, two specimens.

Cyprinion macrostomus is characterized by 14 - 15, rarely 13 or 16 branched rays in the dorsal fin and 41 - 44, rarely 40 or 45 scales in the lateral line. The dorsal fin is moderately notched, the height of the fourth branched ray of the fin corresponding to 55 - 81 % of the first, longest ray (Fig. 1). The most striking distinctive character of the species, which distinguishes it sharply from *C. kais*, is the very wide and almost straight mouth opening (Fig. 6); the width of the mouth represents 26 - 44 % of the head length and the "height" of the mouth arch (i.e. the line connecting the middle of the distance between the two corners of the mouth with the middle of the lower jaw: Fig. 5a) represents 19 - 31 % of the mouth width.

There is however a group of specimens in which the mouth is more curved and not as wide as in the others, the width of the mouth representing only 22 - 27 % of the head length and the height of the arch 29 - 47 % of the width. This group includes just the syntypes of *C. neglectus* from the Tigris River at Mosul, these specimens being to a certain degree intermediate between "typical" *C. macrostomus* and *C. kais*, being closer to the former. This intermediate character is however not proper to the upper Tigris River populations; the numerous specimens from other localities on the upper Tigris, some of which lie in the vicinity of Mosul, have a wide and straight mouth.

It is quite difficult to give a credible interpretation to the peculiarities of this set of specimens. Possibly they are from some tributary of the Tigris River, or from isolated ponds, where an introgression with *C. kais* has taken place in the past.

Large, well developed breeding tubercles are present in several males deposited in the Natural History Museum in Vienna: on the top of the snout, above the upper lip; on the sides of the head below the eyes extending to the posterior margin of the preopercles. Smaller breeding tubercles develop on the branched rays of the anal fin, on the posterior scales of the lateral line and on the posterior scales above and below the lateral line (Fig. 3).

The average number of branched dorsal rays and scales in the lateral line is subject to a certain geographical variability, too small however to justify the splitting of the species in several subspecies (Tab. 1).

2. *Cyprinion kais* HECKEL, 1843

(Figs. 4, 5b, 7)

Synonym: *Cyprinion cypris* HECKEL, 1843.

Types examined:

Syntypes of *C. kais*: NMW-52803, two specimens, Kueik (Qweiq) River at Aleppo (Halep), Syria, 148.1 and 151.9 mm SL; the former has been selected as **lectotype** by Dr. F. Krupp in 1984, being designated as such now, the latter and following syntypes thus becoming **paralectotypes**; NMW-82802, two specimens, 160.0 and 124 mm; NMW-52801, three specimens, 99.6, 73.9 and 68.2 mm.

Syntypes of *Cyprinion cypris*: NMW-52804, Tigris River at Mosul, ten specimens, 44.1 - 110.0 mm SL; the specimen NMW-52804:1, 99.8 mm SL, had been selected as (forthcoming) lectotype by Dr. F. Krupp in 1984.

Further specimens examined:

BMNH 1972.2.22.115-118 (4 spcs.) and 1930.12.21.3 (1 spec.), MNHN 1641 (2 spcs.), RMNH 2485 (2 spcs.), all from Tigris River at Mosul; NMW-90374, Baskaia on Batman River (1 spec.) (Armenia Expedition); ZMH 1117 (15 spcs.), Batman Cayi, Tigris basin; NMW-90373 (3 spcs.), 90371 (1 spec.), and 91035 (4 spcs.) Djerablis (Jerablus), Euphrates River basin (Armenia Expedition); ISBB 3176, Nerciz Cayi, Tigris basin (2 spcs.); BMNH 1968.12.13.240-241 (8 spcs.), Qumbar ed Din, Euphrates River basin in Syria; RMNH 2489 (1 spec.) and 2487 (1 spec.), Kueik (Qweiq) River, Aleppo; MNHN 1977.265, Orontes River basin at Antakia (4 spcs.).

The number of dorsal fin rays and of lateral line scales are the same as in *C. macrostomus*. The differences between both species concern the shape of the mouth and of the dorsal fin (Fig. 4, 7). The mouth opening is narrower and much more arched in *C. kais*: the width of the mouth represent only 13.5 - 22.0 % of the head length and the "height" of the mouth opening represents 48 - 80 % of the width of the mouth (Fig. 5b and 7; compare with Fig. 5a and 6). These values do not overlap with those in *C. macrostomus*. The edge of the dorsal fin is more notched in *C. kais* than in *C. macrostomus*, the length of the fourth branched ray representing 48 - 62 % of the length of the first ray (in *C. macrostomus* 55 - 79 %, i.e with an overlap of extreme values). The extreme and average values of the number of branched dorsal rays and of lateral line scales vary as given in Tab. 2.

Remarkable are the differences between the average number of dorsal rays in both Tigris basin populations (in spite of the fact that these are not too distant) and the higher value of the number of scales in the only available Euphrates basin population comparatively to the rather similar values in Qweiq and Tigris basin, in spite of the geographical intermediate position of the Euphrates River.

3. *Cyprinion tenuiradius* HECKEL, 1846

(Figs. 2, 8)

Types examined:

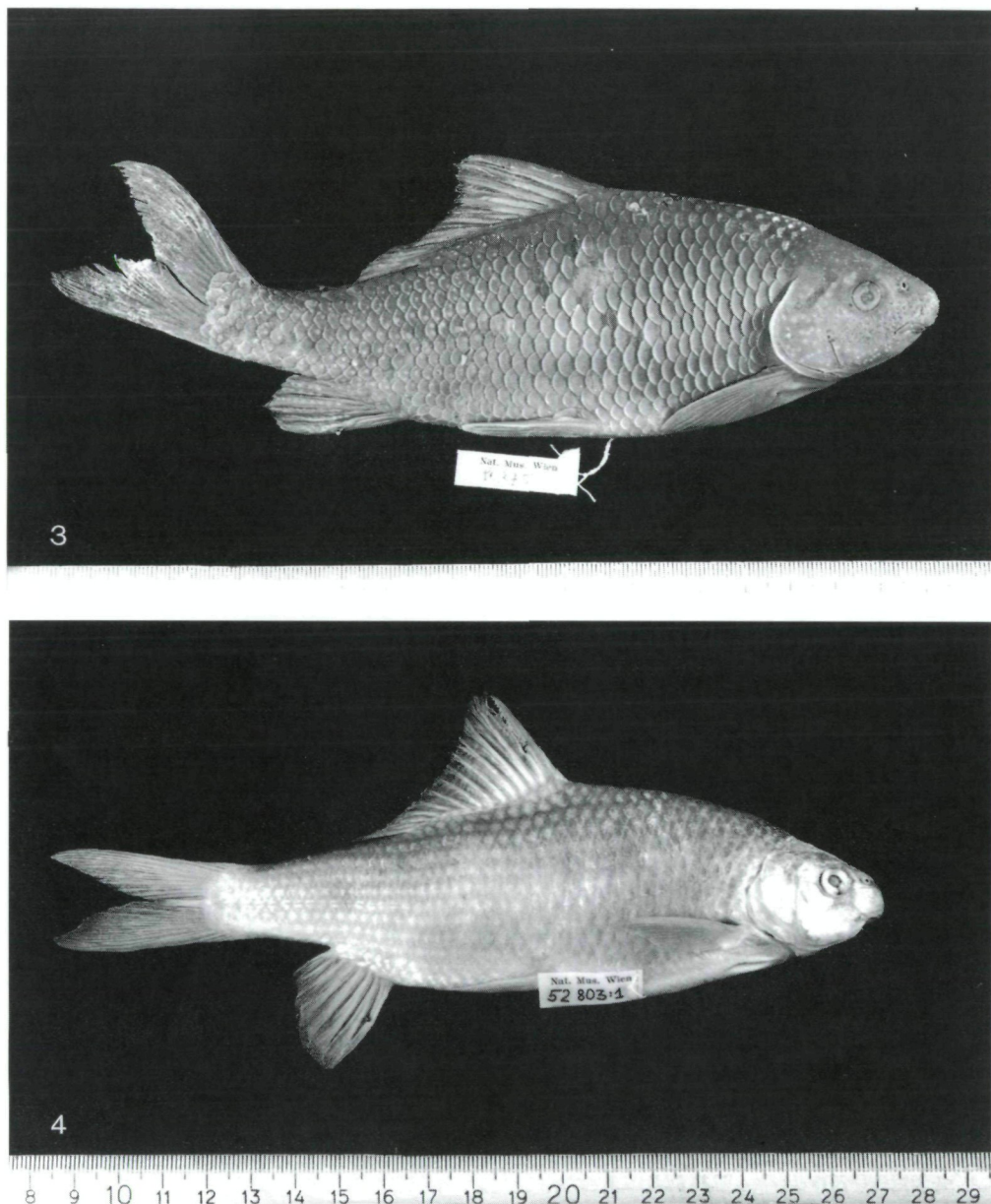
Syntypes: NMW-52814 (1 spec.), 52808 (1 spec.), 52813 (2 spcs.), 52810 (2 spcs.), 52812 (2 spcs.), 52815 (1 spec.), 52816 (2 spcs.), 52809 (2 spcs.), 52811 (4 spcs.), 17 specimens in all, from Kara-Agasch, Iran; the largest of them, NMW-52814, 113 mm SL to the hypural bone, has been selected as **lectotype** by Dr. F. Krupp in 1984 and is herewith designated, the others becoming **paralectotypes**.



Figs. 1 - 2: Lateral view of (1) *C. macrostomus*, lectotype NMW-52805:1, and (2) *C. tenuiradius*, lectotype NMW-52814.

Further specimens examined:

USNM 205890, Parishan Lake, Fars, Iran, two specs., 45.0 and 48.5 mm; RMNH 2486, Iran, two specs., 74.0 and 119 mm; MNHN 1640, Iran, three specs., 70.0 and 86.0 mm; IZA 7862, Hablerud River, Iran, 14 specs., 62.0 - 103.0 mm.



Figs. 3 - 4: Lateral view of (3) *C. macrostomus*, specimen NMW-90375, showing breeding tubercles, and (4) *C. kais*, lectotype NMW-52803:1.

This species differs from the preceeding ones in having a slendered dorsal spine (although ossified and denticulated) and fewer lateral line scales: 36 - 38, rarely 35 or 39. The population of Kara-Agasch (type locality) is characterized by (12)13 - 15 branched dorsal rays ($\bar{x} = 13.88 \pm 0.18$) and (35) 36 - 39 scales ($\bar{x} = 37.13 \pm 0.23$).

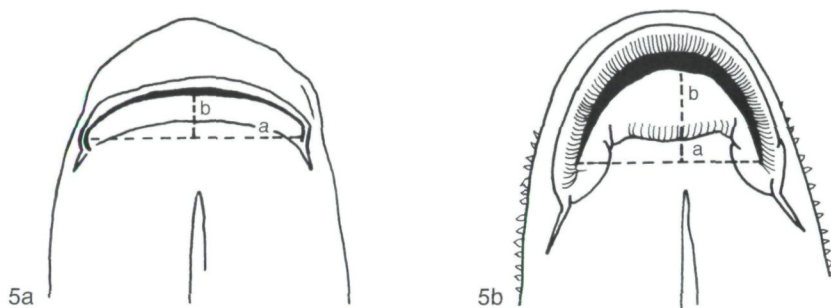


Fig. 5: Mouth shapes of (a) *C. macrostomus* and (b) *C. kais*, measurements taken: a ... mouth width, b ... "height" of the mouth arch.

The mouth opening is wide and almost straight (Fig. 8), somewhat similar to that of *C. macrostomus* (Fig. 6), the latter however showing a more prominent labial surface on the lower jaw than it is found in *C. tenuiradius*.

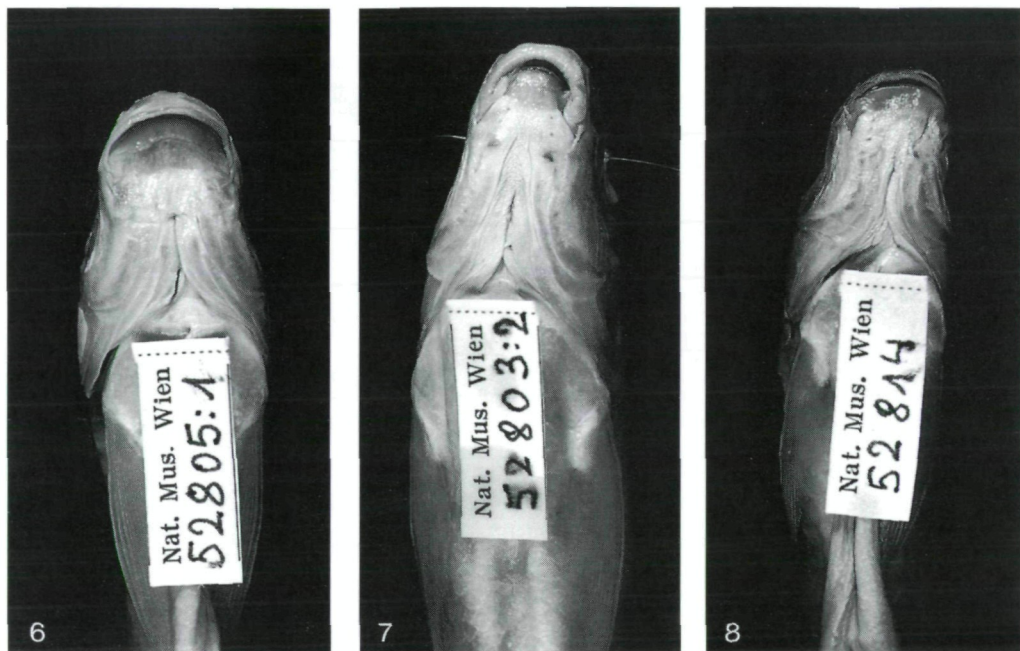
BIANCO & BANARESCU (1982) list this minnow as *C. tenuiradius*, mentioning however that it may be a subspecies of *C. macrostomus*. Actually in the shape of the mouth it is closer to *C. macrostomus* than to *C. kais*, but in other characters (number of scales and the degree of ossification of the last unbranched dorsal ray), *C. macrostomus* is more similar to *C. kais* than to *C. tenuiradius*. Since no intergrading populations between *C. tenuiradius* and *C. macrostomus* have been found, it is considered better to treat them as distinct species.

Acknowledgements

The authors are indepted to N.G. Bogutskaya, St. Petersburg, and P.G. Bianco, Napoli, for critically reading and commenting the manuscript.

References

- BANARESCU, P. 1980: Remarks on the genera *Scaphiodonichthys*, *Barbichthys* and *Cosmocheilus* (Pisces, Cyprinidae). – Rev. Roum. Biol., Biol. Anim. 28: 13-17.
- BANARESCU, P. 1992: Zoogeography of Fresh Waters. Vol. 2. Distribution and dispersal of fresh-water animals in North America and Eurasia. – Wiesbaden, Aula Verlag, pp. 524 - 1091.
- BANISTER, K.E. 1980: The fishes of the Tigris and Euphrates rivers. In RZOSKA, J. (ed.): Euphrates and Tigris. - Mesopotamian ecology and destiny. Monographiae Biol. 38, The Hague: W. Junk, pp. 95-108.
- BERG, L.S. 1949: Prenovodnye ryby Iran i sopredelnykh stran. – Trudy Inst. Zool. Akad. Nauk SSSR 8: 782-858.
- BIANCO, P.G. & P. BANARESCU 1982: A contribution to the knowledge of the Cyprinidae of Iran (Pisces, Cypriniformes). – Cybium, 3-e. série, 6(2): 75-91.
- FOWLER, H.W. 1939: Zoological results of the third De Schauensee Siamese Expedition. Part I. Fishes. – Proc. Acad. Nat. Sci. Phila. 86: 67-163.



Figs. 6 - 8: Close up view of mouth of (6) *C. macrostomus*, lectotype NMW-52805:1, (7) *C. kais*, paratype NMW-52803:2, and (8) *C. tenuiradius*, lectotype NMW-52814.

- HECKEL, J.J. 1843: Abbildungen und Beschreibungen der Fische Syriens. In RUSSEGGER, J.: Reisen in Europa, Asien und Afrika Bd. 1, T. 2. – Stuttgart, Schweizerbart'sche Verlagsbuchhandlung, pp. 991-1099.
- HECKEL, J.J. 1846: Zweite Reise durch Nubien und Ägypten. Naturhistorischer Anhang. In RUSSEGGER, J.: Reisen in Europa, Asien und Afrika Bd. 2, T. 3. – Stuttgart, Schweizerbart'sche Verlagsbuchhandlung, pp. 209-254.
- HECKEL, J.J. 1846: Fische Persiens gesammelt von Theodor Kotschy. In RUSSEGGER, J.: Reisen in Europa, Asien und Afrika Bd. 2, T. 3. – Stuttgart, Schweizerbart'sche Verlagsbuchhandlung, pp. 255-272.
- HOWES, G.J. 1982: Anatomy and evolution of the jaw in the semiplotine carps with a review of the genus *Cyprinion* HECKEL, 1843 (Teleostei: Cyprinidae). – Bull. Br. Mus. Nat. Hist. (Zool.) 42(4): 299-335.
- KARAMAN, M.S. 1971: Süßwasserfische der Türkei. 8. Teil. Revision der Barben Europas, Vorderasiens und Nordafrikas. – Mitt. Hamburg. Zool. Mus. Inst. 67: 175-254.
- KOTTELAT, M. 1989: Zoogeography of the fishes from Indochinese inland waters with an annotated checklist. – Bull. Zool. Mus. Amsterdam 12(1): 1-56.
- KRUPP, F. 1987: Freshwater ichthyogeography in the Levant. In KRUPP, F., W. SCHNEIDER & R. KINZELBACH (eds.). – Proc. Symp. Fauna and Zoogeography of the Middle East, Mainz, pp. 229-237.
- VINCIGUERRA, D. 1890: Viaggio di Leonardo Fea in Birmania e regioni vicine. XXIV. Pesci. – Ann. Mus. Viv. Storia Nat. Genova, ser. 2, 9: 129-362.