

Ann. Naturhist. Mus. Wien	87	B	5-30	Wien, Mai 1986
---------------------------	----	---	------	----------------

## On some **BARBUS** Species from Western Asia (Cyprinidae, Pisces)

By CARLOS ALMAÇA<sup>1)</sup>

Manuskript eingelangt im November 1981

### Zusammenfassung

Beschreibung westasiatischer *Barbus*-Arten aus den Sammlungen des Naturhistorischen Museum Wien und des Muséum national d'Histoire naturelle Paris.

Elf Arten werden anerkannt, zwei davon mit je zwei Unterarten.

### Summary

Western-asiatic species of *Barbus* represented in the collections of the Naturhistorisches Museum Wien und Muséum national d'Histoire naturelle, Paris. Eleven species are recognized, two of them with two subspecies each one.

The taxonomy of Palearctic *Barbus* presents many difficulties which are, in author's opinion, mainly concerned with: (1) age variation, (2) ecophenotypic variation, and (3) insufficient information about the species in large areas. While in Europe and Northern Africa items (1) and (2) must be, from now on, specially considered, in Western Asia the item (3) is also of major interest.

Research on taxonomy of western asiatic *Barbus* is crucial for a better understanding of the zoogeography and speciation of western palearctic *Barbus*. But this only could be done after the examination of Heckel's type specimens which are kept, for the most part at least, in the collections of the Naturhistorisches Museum Wien. In the present paper all the western asiatic specimens of *Barbus* found (types and others) in Wien are considered. The same is true for the collection of the Muséum national d'Histoire naturelle (Paris), with the exception of seven specimens which must be re-examined.

The total of 115 specimens, 2/5 of which are or can be types, is studied in this paper. Their discrimination by collections is presented in Table I. Author's experience on *Barbus* taxonomy having shown that many problems in this field are due to age variation, it is also represented in Table I the total lengths of the examined specimens (if the sample has 1 to 3 specimens) or the mean total length and, in

<sup>1)</sup> Adress: Prof. Dr. Carlos Almaça, Laboratório de Zoologia, Centro de Fauna Portuguesa (INIC), Faculdade de Ciências, Rua da Escola Politécnica, 1294 Lisboa Codex, Portugal.

Table I. Taxa, number of specimens, and size of the specimens studied in the present paper

	Naturhistorisches Mus. Wien		Mus. nat. Histoire nat. Paris	
	Number of specimens	Total length (mm)	Number of specimens	Total length (mm)
<i>Barbus brachycephalus</i> Kessler, 1872	4	(122) 266 (282)	—	—
<i>B. capito conocephalus</i> (Kessler, 1872)	2	127; 147	—	—
<i>B. pectoralis</i> Heckel, 1843	3	129; 148; 182	5	(139) 177 (252)
<i>B. perniciosus</i> Heckel, 1843	5	(216) 226 (243)	—	—
<i>B. kersin</i> Heckel, 1843	2	≈160; 200	—	—
<i>B. mystaceus mystaceus</i> (Heckel, 1843)	7	(131) 268 (480)	2	≈550; 725
<i>B. mystaceus barbulus</i> (Heckel, 1847)	3	(152) 212 (279)	15	(154) 304 (599)
<i>B. xanthopterus</i> (Heckel, 1843)	11	(61) 112 (352)	—	—
<i>B. esocinus</i> (Heckel, 1843)	4	(72) 239 (420)	—	—
<i>B. scheich</i> (Heckel, 1843)	1	169	—	—
<i>B. plebejus scincus</i> (Heckel, 1843)	4	(88) 141 (182)	4	(62) 80 (109)
<i>B. plebejus cyri</i> (Pilippi, 1865)	3	246; 272; 277	—	—
<i>B. lacerta escherichi</i> (Steind., 1897)	40	(111) 167 (367)	—	—
Totals	89		26	

brackets, the lengths of the smallest and the largest specimens (if the sample is greater than 3 specimens). It is clear that these figures can give no precise ideas about the age of the specimens, but, at least, they show if the samples are mainly or only formed by juveniles, or adults, or old specimens.

For each taxon are presented a short description, nomenclatural remarks, and a discussion about the validity of the taxon and its taxonomic affinities and divergences.

I heartily thank Dr. R. Hacker and Mr. H. Ahnelt (Fisch Sammlung, Naturhistorisches Museum Wien), and Prof. J. Daget, Dr. M.-L. Bauchet and Mlle M. Desoutter (Laboratoire d'Ichtyologie générale et appliquée, Muséum national d'Histoire naturelle, Paris) for their help and assistance during my work in each Museum.

*Barbus brachycephalus* Kessler, 1872

*Barbus brachycephalus* Kessler, 1872 (according to Berg, 1964, Freshwater fishes of the USSR and adjacent countries, p. 249).

### Material

MNW 53971. — Areal Sea, 1874. I. 1904, Steind. don. 1 specimen (syntype?).

NMW 53972. — Amu-Darya, 1874. I. 1904 a. 2 specimens.

NMW 53973. — Amu-Darya, 1874. I. 1904 b., Steind. don. 1 specimen.

### Description

Head profile rectilinear and depressed forward the nostrils. Upper border of the eye near or tangent to the head profile. Mouth sub-terminal. Lips moderately thick, the lower lip without median lobe. Barbels slender and reaching, the

anterior, from the middle to the rear edge of the eye, and the posterior, the preopercle. Head comprised 5.4–5.9 times in the total length and including 2.9–3.2 times the nose.

Maximum body depth comprised 6.0–6.6 times in the total length.

Upper profile of the dorsal more or less concave and perpendicular to the back. Last unbranched dorsal ray very strong, its height being comprised 1.2–1.2 times in the head length. Rear edge of this ray with strong denticles, which spread over the 2/3–3/4 of its height and whose density is 1.4–1.8 denticles/mm. Tip of the dorsal far from the level of the anal origin. Dorsal: 3'–4' + 7, the last segmented ray bifurcated from its basis. Dorsal origin forward the level of the pelvics beginning.

Tip of the anal far from the outer rays of the caudal. Anal height comprising 0.7–0.8 times the height of the last unbranched dorsal ray. Anal: 3' + 5, the last segmented ray bifurcated from its basis.

Scales: 10–13/67–74/7–9

Gill rakers: 18–21;  $\bar{x}$  = 19.0

Pharyngeal teeth: 5 + 3 + 2, hooked, the fourth of the outer row bigger and blunt and the fifth the smaller of the row.

### Remarks

According the Berg (1964), the nominal subspecies of *B. brachycephalus* occurs in the Areal Sea and rivers Amu-Dar'ya, Sir-Dar'ya, and Chu. Coad (1981) refers to *B. brachycephalus* from Afghanistan (Panj River).

A different subspecies, *B. brachycephalus caspius* Berg, 1914, would live in the southern and western parts of the Caspian Sea, entering the rivers of that basin. Coad (1978) refers to this subspecies from Iran (south Caspian Sea rivers). Karaman (1971) believes that *caspius* is not a subspecies but only a *natio*.

One specimen of the Museum of Wien (NMW 53971) is labeled as type. In fact, by that time, the distribution of type specimens by several collections was usual. However, the date registered on the label, 1874, is posterior to the publication of the original description (1872) and the collecting place, Aral Sea, is not the same referred to by Kessler- Syr Daria (according to Berg, 1964).

### Discussion

*B. brachycephalus* is a very peculiar species, no doubts about its distinctness being expressed by any author.

According to their provenance, the examined specimens must be included in the nominal subspecies if the polytypic structure of *B. brachycephalus* is accepted. Anyway, I have no data to discuss this point.

*Barbus capito conocephalus* (Kessler, 1872)

*Barbus conocephalus* Kessler, 1872 (according to Berg, 1964, Freshwater fishes of the USSR and adjacent countries, p. 247).

*Barbus lacertoides* Kessler, 1872 (according to Berg, 1964, *ibid.*).

## Material

NMW 54235. – Tschinas (USRR), 1883, don. Steindachner, Mus. Petersbg. 2 specimens.

## Description

Head profile rectilinear or slightly convex. Mouth sub-terminal. Lips thin, the lower lip without median lobe. Barbels slender, the anterior one reaching or exceeding the fore edge of the eye, and the posterior reaching from the middle to the rear edge of the eye. Head included 4.8–4.9 times in the total length and comprising 2.9–3.1 times the nose.

The maximum body depth is comprised 5.2–5.3 times in the total length.

Upper profile of the dorsal slightly concave and almost perpendicular to the back. Last unbranched ray of the dorsal weak of moderate, its height being included 1.3 times in the head length. Rear margin of this ray with weak or moderate denticles, which spread over the 3/4 of its height and whose density equals 1.7 denticles/mm. Tip of the dorsal not reaching the level of the anal origin. Dorsal: 4' + 8, the last segmented ray bifurcated. The dorsal origin is slightly forward the level of the beginning of the pelvics.

Tip of the anal not reaching the outer rays of the caudal. Anal height including 0.8 times the height of the last unbranched ray of the dorsal. Anal: 3' + 5, the last segmented ray bifurcated from its basis.

Pectoral height comprising 0.9 times the height of the last unbranched dorsal ray.

Scales: 10–11/62–66/8–9

Gill rakers: 17

Pharyngeal teeth: 5 + 3 + 2, heeked, the fourth and the fifth of the outer row being, respectively, the larger and the smaller teeth.

## Remarks

According to Berg (1964), *B. capito conocephalus* lives in the Aral Sea and in the rivers Amu-Dar' Ya, Sir-Dar'ya, Pyandzh, Kafirnigen, Kunduz, Surkhan, Zeravshan, and Chu. Coad (1981) refers to *B. capito conocephalus* in Afghanistan.

Karaman (1971) considers *conocephalus* as a *natio* of *B. capito* and not as a subspecies.

## Discussion

Without the study of large samples the evaluation of the subspecific status becomes difficult or even impossible. However, some differences between *B. capito capito*, as defined by Berg (1964) and Almaça (1981), and *B. capito conocephalus*, as defined by Berg (1964), suggest the distinctness of both forms at the subspecific level. In fact, in *conocephalus* the head seems longer, the nose shorter, the last unbranched dorsal ray weaker but longer and its denticles weaker. The upper profile of the dorsal fin is almost perpendicular in *conocephalus*, while it is oblique in *capito*. The ratio height of pectorals/height of the last unbranched

dorsal ray is 0.9 in *conocephalus*, while, in *capito*, is 1.4–1.6. The number and kind of these differences make me follow Berg (1964), considering *conocephalus* as a subspecies of *B. capito*.

According to Karaman (1971), *conocephalus* would be a synonym of *B. capito capito*, while *pectoralis*, *perniciosus*, and *kersin* would be synonyms of *B. capito pectoralis*. The differences between *B. capito sensu* Berg (1964) and Almaça (1981) and *B. pectoralis*, *B. perniciosus*, and *B. kersin* will be furtherly referred to. Now, it will be demonstrated that the differences between *conocephalus* and *pectoralis*, *perniciosus*, and *kersin* suggest the specific level of distinction and not the subspecific one.

In *B. capito conocephalus* the barbels are longer, the body lower, the last unbranched dorsal ray weaker and shorter, the anal shorter, and the scales more numerous than in *B. pectoralis*. In *B. capito conocephalus* the upper profile of the dorsal is almost perpendicular and there are 5 + 3 + 2 pharyngeal teeth, while in *B. pectoralis* the dorsal profile is oblique and there are 4 + 3 + 2 pharyngeal teeth.

In *B. perniciosus* the fore barbel is shorter, the head longer, the body higher, the last unbranched dorsal ray and its denticles somewhat stronger, the denticulated height of this ray shorter, and the scales and the gill rakers less numerous than in *B. capito conocephalus*. Furthermore, in *B. perniciosus* the upper dorsal profile is oblique, the dorsal has 9 segmented rays and there are 4 or 5 pharyngeal teeth on the outer row, while in *B. capito conocephalus* the dorsal profile is almost perpendicular, the dorsal has 8 segmented rays and there are 5 outer pharyngeal teeth.

In *B. kersin* the rear barbel is shorter, the head smaller, the body higher, the last unbranched dorsal ray stronger and higher, its denticles stronger, and the scales less numerous than in *B. capito conocephalus*. Besides, in *B. kersin* the upper dorsal profile is concave and the density of the denticles 1.0–1.1 dent./mm, while in *B. capito conocephalus* the dorsal profile is just slightly concave and the density of the dorsal denticles higher (1.7 dent./mm).

### *Barbus pectoralis* Heckel, 1843

*Barbus pectoralis* Heckel in Russegger, 1843, 1 (2), pp. 1045–1047; 1845, Atlas, tabl. II, fig. 2.

### Material

NMW 54472. – Damascus (Syria), 1839, 1 specimen.

NMW 54474. – Damascus, 1839, 1 specimen.

NMW 54475. – Adana (Turkey), Kotschy, 1854, 1 specimen.

MP A.3864. – Orontes, Antakya (Turkey), E. Chantre, 1881, 3 specimens

MP 1977–291. – Orontes (Syria), W. Besnard, 1930, 1 specimen.

MP 1977–292. – Lake Antachia (Turkey), Coll. Lab. Pêches Outremer, 1 specimen.

### Description

Head profile slightly convex. Mouth sub-terminal. Lips generally thin, the lower one without median lobe. Barbels slender, the anterior reaching the rear

nostril or the fore edge of the eye and the posterior one a point situated between the fore and the rear edge of the eye. Head comprised 4.5–5.2 times in the total length and including 2.5–3.0 times the nose.

The maximum body depth is comprised 4.2–4.8 times in the total length.

Upper profile of the dorsal rectilinear or slightly concave and oblique to the back. Last unbranched dorsal ray regularly strong, its height being included 1.1–1.4 times in the head length. Rear border of this ray with regularly strong denticles, which spread over 3/4–4/5 of its height and whose density equals 1.5 denticles/mm. Tip of the dorsal generally reaching the level of the anal beginning. Dorsal: 4' + 8, the last segmented ray bifurcated. The origin of the dorsal is at the same level as the beginning of the pelvics.

Tip of the anal generally reaching the outer rays of the caudal. Height of the anal comprising 0.7–1.0 times the height of the last unbranched dorsal ray. Anal: 3' + 5, the last segmented ray bifurcated from its basis.

Scales: 9–10 (11)/48–54/6–7 (8).

Grill rakers: 15–17;  $\bar{x}$  = 16.1

Pharyngeal teeth: 4 + 3 + 2, pointed, the fourth of the outer row being globose and the larger. [One specimen (MP A. 3864) presents 5 teeth on the outer row of the left pharyngeal bone and 4 on the right bone].

### Remarks

The holotype of *B. pectoralis* (length: 158 mm; scales: 10/44/7; Orontes) was not found. The specimen NMW 54475, from Adana (Turkey) referred to by Karaman (1971) as type, cannot be accepted like the holotype, not only because Adana is far from the Orontes, but also because it was collected in 1854.

*B. pectoralis* was considered by Günther (1868) as scarcely different from *B. callensis* Valenciennes, 1842, a North-African species.

Pellegrin (1923) refers to *B. pectoralis* from the Orontes (mouth of Lake Homs), but the specimens he studied (total lengths: 124 and 132 mm) were not found in the collections of the Museum Paris. Berg (1949) considered these specimens (one of them was figured; Pellegrin, 1923, table IV, fig. 3) as belonging to *B. kersin*.

To Berg (1949) and Ladiges (1960), *B. perniciosus* would be synonym of *B. pectoralis*.

Geldiay and Kähnsbauer (1967) refer to *B. pectoralis* from Pinarbasi, Izmir (Turkey).

According to Karaman (1971), *pectoralis* would be a subspecies of *B. capito* (Güldenstädt, 1773). As synonyms of *B. capito pectoralis*, Karaman refers *B. perniciosus* Heckel, 1843, *B. kersin* Heckel, 1843, *Labeobarbus orontis* Sauvage, 1882, *B. lydianus* Boulenger, 1896, and *B. continii* Vinciguerra, 1926.

### Discussion

As can be seen in the nomenclatural history just outlined several forms have been considered as synonyms of *B. pectoralis*. With the exception of *B. lydianus*

and *B. continii*, about which I have no direct information, all of them will be here referred to. However, as Günther (1868) considered *B. pectoralis* close to *B. callensis*, both forms will be, at first, compared. Almaça (1969, 1970) will be followed for the definition of *B. callensis*.

In *B. callensis* the barbels are longer, the denticulated portion of the fourth dorsal ray shorter ( $1/2-7/10$  of its height), the scales less numerous in the lateral as in the transversal lines. The gill rakers seem also less numerous in *callensis*: 12–14 (Almaça, unpublished data). The kind and degree of these differences, the contiguity between the values expressed in each form (denticulated portion, scales and gill-rakers) and the allopatry of *callensis* do not *pectoralis* don't contradict the hypothesis of these forms being distinct at the subspecific level. This is the viewpoint of Karaman (1971) who considers *callensis* and *pectoralis*, both with a very enlarged meaning, as subspecies of *B. capito*. But Karaman's definition of this species has very wide taxonomic and geographical limits and has not been accepted by other authors (Almaça, 1972; 1981; Banareescu, 1977). However, the comparison between *pectoralis* and *capito s. s.* must also be done. Berg (1964) and Almaça (1981) will be followed for the definition of *B. capito*.

In *B. capito* the lips are thicker, the rear barbel longer, the anal shorter, and the scales more numerous in the lateral line and between that line and the beginning of the dorsal fin. The outer pharyngeal teeth row presents five teeth in *capito* (Heckel, 1843; Almaça, 1981) and four in *pectoralis*. The number of gill rakers seems also different in *capito* and *pectoralis*. But, while Berg (1964) refers 13–15 to *capito* (which is less than in *pectoralis*: 15–17), Almaça (1981) refers 17–19 to *capito*. The main difference between both forms concerns, in my opinion, the number of pharyngeal teeth, which seems, at least in West-Palearctic *Barbus*, very conservative. So, while this and other features will not be more deeply investigated in order to know their eventual variability, I will not consider the conspecificity of *capito* and *pectoralis*.

The identity of *pectoralis* with *perniciosus*, *kersin*, and *orontis*, which has been suggested by Karaman (1971), does not seem acceptable as the following comparisons will show.

In *B. perniciosus* as defined in the present paper the fourth dorsal ray is weaker and lower, the denticles are weaker and their density higher, and the denticulated portion shorter. The dorsal fin has 9 branched rays instead of 8. The anal is shorter. The scales in the lateral and transversal lines, and the gill rakers are less numerous. These differences, mainly those concerning the dorsal fin, are among the most important in the taxonomy of *Barbus*. Therefore, the conspecificity of *perniciosus* and *pectoralis* is not acceptable in my opinion.

In what concerns *B. kersin* the comparison must be based only on two type-specimens. In *B. kersin* the head is somewhat shorter, the body deeper, the dorsal profile concave and perpendicular, the fourth dorsal ray and its denticles stronger, the denticulated portion shorter, the density of the denticles lower, the anal shorter, and the gill rakers more numerous. In the outer row there are five pharyngeal teeth, number which seems exceptional in *petoralis*. *B. kersin* and *B.*

*pectoralis* are not identical, but without more information is impossible to know in what extent most of these differences do not refer to continuous variability and what are the geographical relationships between both forms.

*Labeobarbus orontis* is considered in the present paper as synonym of *B. mystaceus barbulus*, its description having been based on an old specimen of this last form. The main differences between *B. pectoralis* and *B. mystaceus barbulus* refer to the lips thickness, the presence of a median lobe in the lower lip, and more numerous gill rakers in *B. mystaceus barbulus*.

Summing up the discussion about *B. pectoralis* the following points must be underlined:

- a) *B. pectoralis* is not conspecific with *B. capito* or *B. perniciosus*.
- b) *pectoralis* is not identical with *callensis* or *kersin*, but the possibility of these forms being distinct at the subspecific level is suggested.

*Barbus perniciosus* Heckel, 1843

*Barbus perniciosus* Heckel in Russeger, 1843, 1 (2), pp. 1047–1048; 1845, Atlas, tabl. II, fig. 3.

#### Material

NMW 54473. – Lake Tiberias (Israel), Dec. 1867, Steindachner, 1 specimen.

NMW 54482. – Lake Tiberias, Dec. 1867, Steindachner, 1 specimen.

NMW 54483. – Lake Tiberias, Dec. 1867, Steindachner, 1 specimen.

NMW 54484. – Lake Tiberias, Dec. 1867, Steindachner, 2 specimens.

#### Description

Head profile rectilinear or slightly convex. Upper border of the eye tangent to or very near the head profile. Nose convex. Mouth subterminal. Lips thin, without median lobe in the lower lip. Barbels slender, the anterior reaching the nostrils and the posterior a point situated between the middle and the rear edge of the eye. Head comprised 4.4–4.8 times in the total length and including 3.0–3.1 times the nose.

Maximum body depth comprised 4.5–4.9 times in the total length.

Upper profile of the dorsal rectilinear and oblique to the back. Last unbranched dorsal ray moderate, its height being comprised 1.5–1.6 times in the head length. Rear edge of this ray with moderate denticles, which spread over the 1/2 of its height and whose density equals 1.7–1.8 denticles/mm. Tip of the dorsal not reaching the level of the anal origin. Dorsal: 4' + 9, the last segmented ray bifurcated. Origin of the dorsal at the same level or slightly forward the beginning of the pelvics.

Tip of the anal generally not reaching the outer rays of the caudal. Anal height comprising 0.8–1.0 times the height of the last unbranched ray of the dorsal. Anal: 3' + 5, the last segmented ray bifurcated.

Scales: 7–8 (9)/42–43/4(5)

Gill rakers: 12–14;  $\bar{x}$  = 13.0.

Pharyngeal teeth: 4–5 + 3 + 2, hooked, the fourth of the outer row being the larger tooth; the fifth, when present, is the smaller of the outer row.



### Remarks

Based on Heckel's description and figure, Günther (1868) refers to *B. perniciosus* as a species presenting the "third dorsal spine exceedingly strong, higher than the body, strongly serrated".

Berg (1949), Ladiges (1960), and Karaman (1971) consider *B. perniciosus* as a synonym of *B. pectoralis*.

### Discussion

The original description of *B. perniciosus* was based on a holotype from Damascus. Heckel (1843) did not mention any dimensions of the type. One specimen of the Museum of Wien (NMW 54472: Damascus, 1839) is labelled as type of *B. perniciosus*. However, this specimen is not in good conditions, the counting of the scales in lateral and transversal lines being not possible. In all the visible characters (robustness of the last unbranched dorsal ray and of its denticulations, number of rays of the dorsal fin, and number of gill rakers) this specimen agrees with *B. pectoralis*. Furthermore, Heckel (1843, p. 1048) states that *B. perniciosus* and *B. pectoralis* live together in the streams near Damascus. There is, however, a peculiar feature of *B. perniciosus* which allows its separation from *B. pectoralis*: its dorsal fin exhibits 13 rays ( $4' + 9$ ) while *B. pectoralis* and other related species present only 12 rays ( $4' + 8$ ). This has been seen by Heckel (1843), although in a wrong way, because he mentioned to *B. perniciosus* "D.5.8.". Also in this respect the supposed type of *B. perniciosus* (NMW 54472) does not agree with *B. perniciosus* description.

In the definition here accepted for *B. perniciosus*, this species is not characterized by an "exceedingly strong" dorsal spine (Günther, 1868). On the contrary, the fourth dorsal ray is moderately strong. What seems really important as diagnostic characters of *B. perniciosus* is the number of dorsal rays, scales, and gill rakers. The robustness of the fourth dorsal ray is, at least in West-palearctic *Barbus*, a most interesting diagnostic feature when specimens in the same phase (juvenile, mature, old) are compared. In these species the robustness of the fourth dorsal ray decreases with the age of the fishes (Almaça, 1981, and in print). The holotype of *B. perniciosus* was, presumably, a juvenile, while the examined specimens on which my description of *B. perniciosus* is based are animals longer than 215 mm. Unfortunately the size of the holotype is not known and so this hypothesis cannot be tested until the day it will be found.

The eventual conspecificity of *B. perniciosus* and *B. pectoralis* postulated by some authors has been previously discussed (see *B. pectoralis*).

*Barbus kersin* Heckel, 1843

*Barbus kersin* Heckel in Russegger, 1843, 1 (2), p. 1049; 2 (3), pp. 211–212; 1845, Atlas, tabl. 14, fig. 2.

### Material

NMW 54212. – Aleppo (Syria), Kotschy, 1842, 1 specimen (syntype).

NMW 54215. – Aleppo, 1842, 1 specimen (syntype).

### Description

Head profile rectilinear or slightly convex and depressed forward the nostrils. Mouth sub-terminal. Lips moderately thick, the lower one without median lobe. Barbels slender, the anterior reaching the nostrils or the fore edge of the eye and the posterior from the fore edge to the middle of the eye. Head comprised 5.3 times in the total length and including 2.9–3.0 times the nose.

Maximum body depth comprised 4.0 times in the total length.

Upper profile of the dorsal concave and almost perpendicular to the back. last unbranched dorsal ray strong, its height being included 1.1–1.2 times in the head length. Rear edge of this ray with strong denticles, which spread over the 2/3–3/4 of its height and whose density equals 1.0–1.1 denticles/mm. Tip of the dorsal reaching the level of the anal origin. Dorsal: 4' + 7–8, the last segmented ray bifurcated. Origin of the dorsal at the same level or slightly behind the beginning of the pelvics.

Tip of the anal not reaching the outer rays of the caudal. Anal height comprising 0.8 times the height of the last unbranched dorsal ray. Anal: 3' + 5, the last segmented ray bifurcated.

Scales: 9/56/7–8

Gill rakers: 19.

Pharyngeal teeth: 5 + 3 + 2, hooked, the fourth and the fifth of the outer row being, respectively, the larger and the smaller.

### Remarks

More or less detailed descriptions of *B. kersin* are presented by Günther (1868) based on Heckel's original description and figure, Sauvage (1884), Berg (1949), and Khalaf (1961). The specimen referred to by Sauvage (1882) and later described by the same author (Sauvage, 1884), from the Orontes, Hammah (Syria), which probably is the MP A.3934, actually belongs to *B. mystaceus barbulus*. Khalaf (1961) mentions *B. kersin* from the rivers of Irak, including Tigris tributaries. Berg (1949) refers to *B. kersin* specimens described and figured by Pellegrin (1923) as *B. pectoralis*. Karaman (1971) quotes *kersin* as a synonym of *B. capito pectoralis*.

### Discussion

The identity of *B. kersin* and *B. pectoralis*, postulated by Karaman (1971), as well as the hypothesis of both forms being distinct at the subspecific level have been previously discussed (see *B. pectoralis*). However, the available information, mainly in what concerns *B. kersin*, is not enough to make a sound decision. Therefore, it seems advisable to keep *pectoralis* and *kersin* as different species until

a better knowledge about the variability and geographical relationships of both forms will be achieved.

*Barbus mystaceus mystaceus* (Heckel, 1943)

*Luciobarbus mystaceus* Heckel in Russeger, 1843, *I* (2), pp. 1051–1052; 1845, Atlas, tabl. III, fig. 3.

Material

NMW 16472. – Tigris, Mossul (Iraq), Kotschy, 1843, 1 specimen, (syntype).

NMW 50394. – Tigris, Mossul, Kotschy, 1843, 2 specimens (syntypes).

NMW 54384. – Tigris, Mossul, Kotschy, 1843, 2 specimens (syntypes).

NMW 54385. – Aleppo (Syria), 1842, 2 specimens.

MP 1881–983. – Euphrates. Birecik (Turkey), Chantre, 1881, 1 specimen.

MP 1883–1132. – Euphrates, Mus. Hist. nat. Lyon, 1883, 1 specimen.

Description

Head profile slightly convex, thinning forward the nostrils. Mouth inferior. Lips very thick, the lower one with a well developed though soft and without defined shape median lobe. Barbels slender, the anterior reaching the rear nostril or the fore edge of the eye and the posterior one a point situated from the middle of the eye to the angle of the preopercle. Head comprised 4.7–5.0 times in the total length and including 2.3–2.8 times the nose.

The maximum body depth is comprised 4.7–5.3 times in the total length.

Upper profile of the dorsal concave and perpendicular, or almost to the back. Last unbranched dorsal ray very strong, its height being included in the head length 1.09–1.6 times. Along its rear edge there are strong denticles which spread over the 3/4–9/10 of the ray. Density of the denticles: 0.6–1.0 denticles/mm. Tip of the dorsal reaching or exceeding the level of the anal origin. In older animals the dorsal profile becomes oblique, the tip of the fin does not reach the anal beginning and the denticles are weaker and spreading over a much shorter length (1/4 of the ray in a fish longer than 700 mm). Dorsal: 4' + 8, the last segmented ray being bifurcated. The origin of the dorsal is at the same level or slightly behind the origin of the pelvics.

Tip of the anal not reaching the outer rays of the caudal. Height of the anal comprising 0.7–0.8 times the height of the last dorsal unbranched ray. Anal: 3' + 5, the last segmented ray being bifurcated.

Scales: 9–10 (11)/52–55(57)/6–7.

Gill rakers: 17–20;  $\bar{x}$  = 19. 1.

Pharyngeal teeth: 4–5 + 3 + 2, hooked or pointed, the fourth of the outer row pointed and the larger; the fifth, when present, is the smaller of the outer row.

Remarks

*B. mystaceus* has been described by Heckel (1843, pp. 1051–1052, pl. III, fig. 3) under the name *Luciobarbus mystaceus*. The genus *Luciobarbus* was also

described by Heckel in the first part of his book (1843, p. 1019) and would be characterized by the presence of *dentes cochleariformes* 2/3/4–4/3/2 (which is a mistake; in fact, it is the outer row which can have 4 teeth and the inner one 2 teeth). However, in p. 1002, where the formulations are detailed, Heckel refers that sometimes there is a fifth rudimentary tooth on the inner (outer) row, which disappears in older individuals. The genus *Barbus sensu* Heckel would also be characterised by the presence of *dentes cochleariformes*, but in this case 2/3/5–5/3/2.

As in the species of this last group the fifth outer tooth is generally much smaller than the fourth and is really difficult to differentiate between a normally small or a rudimentary fifth tooth, it is hard to say what is the characteristic number of pharyngeal teeth in the forms included by Heckel in *Luciobarbus*. In the particular case of the examined specimens of *B. mystaceus mystaceus*, those from the river Tigris present 5 teeth, while those from the Euphrates, which are larger, have only 4.

Anyway, the genus *Luciobarbus* was not accepted, being soon included in the synonymy of *Barbus* (e. g., Günther, 1868).

According to Günther (1868), *B. mystaceus* would not be different of *B. scheich*. To this author the presence of a median lobe in the lower lip is of no taxonomic value because its development is subject to great variation. Later on, Günther (1874) stated that *mystaceus* as *xanthopterus* were founded on individual variations of *B. scheich*.

Sauvage (1884) accepted the synonymy established by Günther (1874), adopting as valid name *B. xanthopterus*. This viewpoint, *ie* *mystaceus* and *scheich* as synonyms of *B. xanthopterus*, has been followed by other authors (Misra, 1947; Khalaf, 1961).

Battalgıl (1942, 1943) considered *B. mystaceus* as a species distinct from *scheich* and *xanthopterus*.

Berg (1949) included *mystaceus* and *scheich* as synonyms of *B. rajanorum* and this was followed by Ladiges (1960) and Karaman (1971). To Karaman (1971), two subspecies must be considered in *B. rajanorum*: *B. rajanorum rajanorum* (syn. *B. barbulus*) from Syria and *B. rajanorum mystaceus* (syn. *L. scheich*) from the basin of river Karun (Iran).

## Discussion

According to the different authors *B. mystaceus* (Heckel, 1843) has been identified with several species, *ie*, *B. scheich*, *B. xanthopterus*, and *B. rajanorum*. Therefore, the comparison of *mystaceus* with these three forms must be done. Unfortunately, no specimens of *B. rajanorum* were found in the Naturhistorisches Museum Wien and so Heckel's original description and figure of this species will be taken to the comparison.

In *B. scheich* there is no median lobe and the lips are thinner, the barbels shorter, and the head somewhat longer. There are 21 gill rakers and 4 + 3 + 2 pharyngeal teeth. The main differences relatively to *B. mystaceus* are, in my

opinion, the absence of median lobe in the lower lip and the presence of 4 pharyngeal teeth on the outer row (*B. mystaceus* of the same basin, river Tigris, present 5 teeth on the outer row). The comparison being solely based on one specimen of *B. scheich*, these differences would not perhaps justify the distinction of both forms at the specific level. However, while no more detailed information about the variability of each form is available it seems advisable to keep them as separate species.

In *B. xanthopterus* there is no median lobe, the barbels and the nose are somewhat shorter, the body higher, the scales more numerous, and the gill rakers less numerous. There are  $5 + 3 + 2$  pharyngeal teeth. The absence of median lobe and the differences concerning the number of scales and gill rakers amply justify, in my opinion, the specific separation of *mystaceus* and *xanthopterus*.

Heckel (1843, 1 (2), p. 1049; 1846–49, 2 (3), pp. 209–210; 1845, tabl. XIV, fig. 1) described *B. rajanorum* based on a holotype (total length: 243 mm; scales: 13/65/7), which was not found. However, the figure is quite detailed, the counting of scales and fin rays being possible. Other authors have referred to *B. rajanorum*, but the number of scales in the lateral line was always significantly lower than 65: Pellegrin (1923) mentions 57, Berg (1949) 58–59, and Karaman (1971) 49–60. Berg (1949), Ladiges (1960), and Karaman (1971) considered *B. scheich* and *B. mystaceus* as synonyms of *B. rajanorum*. Comparing Heckel's description and figure of *B. rajanorum* with *B. scheich* and *B. mystaceus* these species seem to be quite different. In *B. scheich* and *B. mystaceus mystaceus* (= *Luciobarbus mystaceus*) the last unbranched dorsal ray is stronger, and the dorsal profile concave and perpendicular to the back, while in *B. rajanorum* (cf. tabl. XIV, fig. 1) it is rectilinear and almost perpendicular. Also the scales are less numerous (11/53/6, in *scheich*; 9–10 (11)/52–55(57)/6–7 in *mystaceus*). Furthermore, *B. mystaceus* exhibit a very typical median lobe in the lower lip, which is not present in *B. rajanorum*. The importance of these differences in *Barbus* taxonomy points out to the specific distinction between *B. rajanorum* and *B. scheich*, and *B. mystaceus*. In fact, *B. rajanorum* seems closer to *B. pectoralis*, in spite of the difference in the number of scales (cf. Berg, 1949, for the number of gill rakers and pharyngeal teeth in *B. rajanorum*).

In the large area where *B. mystaceus* lives, I think that two different subspecies can be recognised: *B. mystaceus mystaceus* (Heckel, 1843), from the basins of the Tigris and Euphrates, and from Aleppo, and *B. mystaceus barbulus* (Heckel, 1846), from the basins of the Orontes and Jordan. Relatively to *B. mystaceus mystaceus*, in *B. mystaceus barbulus* the lips are thinner, the barbels somewhat shorter, the last unbranched ray weaker and lower, the denticles of this ray present a higher density and spread over a shorter height of the ray, the dorsal profile is rectilinear and oblique to the back, and the anal is higher. The gill rakers are slightly less numerous in *B. mystaceus barbulus*. The kind of these differences and the contiguity of most of the *vzhies* upon which they are based as well as the geographical separation of *mystaceus* and *barbulus* justify the distinction of both forms at the subspecific level.

*Barbus mystaceus barbulus* (Heckel, 1846)

*Barbus Barbulus* Heckel in Russeger, 1846, 2 (3), pp. 256–257.

### Material

NMW 54387. – Lake Tiberias (Israel), Steindachner, Dec. 1867, 1 specimen.

NMW 54388. – Lake Tiberias, Steindachner, Dec. 1867, 1 specimen.

MP 1881–997–998. – Lake Antakia (Turkey), E. Chantre, 1881, 2 specimens.

MP A. 3868. – Orontes, Antakya, E. Chantre, 1881, 1 specimen (holotype of *Labeobarbus orontis* Sauvage, 1882).

MP A. 3922. – Lake Antakya, E. Chantre, 1881, 2 specimens.

MP A. 3933. – Orontes, Hammah (Syria), Chantre, 1881, 2 specimens.

MP A. 3934. – Orontes, Hammah, Chantre, 1881, 1 specimen.

MP 1910-46-48. – Lake Homs (Syria), Gadeau de Kerville, 3 specimens.

MP 1910-49-51. – Lake Homs, Gadeau de Kerville, 3 specimens.

MP 1910-52. – Syria, Gadeau de Kerville, 1 specimen.

### Description

Head profile slightly convex, sometimes with the nose depressed. Mouth inferior. Lips thick, the lower with a median lobe more or less developed. Barbels slender, reaching, the anterior, a point situated between the nostrils and the fore edge of the eye, and the posterior, a point situated between the fore and the rear edge of the eye. Head comprised (4.1) 4.3–5.3 (5.6) times in the total length and including 2.4–3.0 times the nose.

Maximum body depth included 4.7–5.5 times in the total length.

Upper profile of the dorsal rectilinear (seldom slightly concave) and oblique to the back. Last unbranched dorsal ray strong, its height being comprised 1.6–2.1 times in the head length. Rear edge of this ray with strong denticles, which spread over the  $2/3$ – $3/4$  of its height and whose density equals 1.0–1.5 denticles/mm. In older animals the last unbranched dorsal ray and its denticles are weaker, these last spreading over a shorter height (from  $1/3$  to  $1/2$  in some fishes with total lengths comprised between 300 and 600 mm). Tip of the dorsal not reaching the level of the anal origin. Dorsal:  $4' + 8(9)$ , the last branched ray bifurcated. Origin of the dorsal at the same level or slightly forward the beginning of the pelvics.

Tip of the anal generally reaching the outer rays of the caudal. Anal height comprising 0.9–1.3 times the height of the last unbranched dorsal ray. Anal:  $3' + 5$ , the last branched ray bifurcated.

Scales: 9–10 (11)/(47) 50–54 (58)/6–7 (8).

Gill rakers: 15–19;  $\bar{x} = 16.9$ .

Pharyngeal teeth:  $4 + 3 + (1) 2$ , hooked or spoon-like, the fourth of the outer row bigger and globose.

### Remarks

In Heckel's original description of *B. barbulus* the affinities and differences between this species and *L. mystaceus* are pointed out. A syntype of *B. barbulus* was found in the Naturhistorische Museum Wien (NMW 53957: Kara Agatsch,

Kotschy, 1844). But this specimen is in so bad conditions that nothing can be recognized by its examination. Fortunately, Heckel's differential diagnosis of *B. barbulus* is of some help in the separation between the two forms. There is, however, a mistake in that diagnosis. Heckel states that in *B. barbulus*, as in the other *Barbus* species, there are 5 pharyngeal teeth on the inner (outer) row, while in *Luciobarbus mystaceus* there are only four teeth. Actually, I only found 4 outer teeth in the specimens belonging to *B. mystaceus barbulus*, and 4 or 5 in *B. mystaceus mystaceus*.

Günther (1868), based on Heckel's original description, Sauvage (1884) and Pellegrin (1923), based on specimens from the Orontes (Lake Homs, Hammah, and Antakya), Khalaf (1961) on specimens from Iraq (which probably belong to *B. mystaceus mystaceus*), present descriptions of *B. barbulus*. According to Karaman (1971) *B. barbulus* would be synonym of *B. rajanorum rajanorum*.

### Discussion

The presence of a median lobe in the lower lip and a significantly lower number of scales are sufficient differences to separate *barbulus* from *rajanorum*.

The reasons why *mystaceus* and *barbulus* must be distinguished at the subspecific level have been explained before (see *B. mystaceus mystaceus*).

*Labeobarbus Orontis* Sauvage, 1882, is a synonym of *B. mystaceus barbulus*. The holotype (MP A. 3868) is an old specimen (total length: 599 mm) and has been described twice, the second time (Sauvage, 1884) under the name *Barbus orontis*. In both descriptions Sauvage states that the third (which is actually the fourth) dorsal ray has no denticles which is wrong. In fact, the denticles are present, although they are weak as it is usual in old specimens of several species of West-palearctic *Barbus*. Besides, in the figure of *B. orontis* (Sauvage, 1884, pl. III, fig. 4) the denticles are represented.

*Barbus xanthopterus* (Heckel, 1843)

*Luciobarbus xanthopterus* Heckel in Russeger, 1843, 1 (2), pp. 1053–1054; 1845, Atlas, tabl. IV, fig. 1.

### Material

NMW 54786. – Tigris, Mossul (Iraq), Kotschy, 1843. 1 specimen (syntype).

NMW 54841. – Tigris, Mossul, 1843. 1 ad. specimen and 9 juv. (syntypes).

### Description

Head profile rectilinear and thinning forward the nostrils. Eyes closed to the upper profile but not tangent. Mouth terminal. Lips moderately thick, the lower lip without median lobe. Barbels slender and reaching, the anterior the nostrils, and the posterior the rear edge of the eye. Head comprised 5.0 times in the total length and including 3.0–3.1 times the nose.

Maximum body depth comprised 4.5–4.7 times in the total length.

Upper profile of the dorsal concave and almost perpendicular to the back. Last unbranched dorsal ray very strong, its height being included 1.1 times in the head length. Rear border of this ray with strong denticles, which spread over the 3/4 of its height and whose density equals 0.8–0.9 denticles/mm. Tip of the dorsal reaching or exceeding the level of the anal origin. Dorsal: 4' + 8, the last segmented ray bifurcated from its basis. The origin of the dorsal is slightly behind the origin of the pelvics.

Tip of the anal not reaching the outer caudal rays. Height of the anal comprising 0.7 times the height of the last unbranched dorsal ray. Anal: 3' + 5, the last segmented ray bifurcated from the basis.

Scales: 11/59–61/7

Gill rakers: 11–13;  $\bar{x}$  = 12.3.

Pharyngeal teeth: 5 + 3 + 2, hooked, the fourth and the fifth of the outer row being, respectively, the larger and the smaller.

### Remarks

Heckel's original description of *B. xanthopterus* is based on one specimen. But, when considering the coloration of the species and the number of specimens of the collection Heckel (1843) refers to several individuals and mentions their dimensions (52–1027 mm). Therefore, I consider the nominal species related to a type-series.

Günther (1874) considered *Luciobarbus xanthopterus* and *L. mystaceus* as individual variations of *B. scheich*.

Sauvage (1882, 1884) refers to *B. xanthopterus* from Birecik, Euphrates (Turkey) and describes (1884) two specimens whose total lengths are of 730 and 450 mm, respectively. Both specimens have been examined (M. P. 1881–983 and 1883–1132). They actually belong to *B. mystaceus mystaceus* as it could be deduced from Sauvage's descriptions (1884). Besides, in the description of the smaller one (M. P. 1881–983), Sauvage (1884, pp. 30–31) quotes Günther (1874) and considers *Luciobarbus scheich* and *L. mystaceus* as synonyms of *B. xanthopterus*. This viewpoint has been followed by other authors (Misra, 1947; Khalaf, 1961).

On the other hand, Battalgıl (1942), Berg (1949), Svetovidov (1949) Ladiges (1960) and Karaman (1971) considered *B. xanthopterus* as a well defined species and distinct from *mystaceus* or *scheich*.

### Discussion

The main difference between the examined specimens of *xanthopterus* and *scheich*, all of them types of each nominal species, concerns the number of gill rakers: 21 in *scheich*, 11–13 in *xanthopterus*. The number of pharyngeal teeth is also different (4 + 3 + 2 in *scheich*, 5 + 3 + 2 in *xanthopterus*), but is known that both formulae can be found in the species ranged by Heckel (1843) in *Luciobarbus*. Svetovidov (1949) refers 10 gill rakers and 5 + 3 + 2 pharyngeal teeth to *xanthopterus* and Karaman (1971) 12–13 gill rakers to the same species. The number of gill



rakers usually presenting but a small variation in the palearctic species of *Barbus* it seems not advisable to consider *scheich* as a synonym of *xanthopterus* before more information about both forms can be provided.

However, the comparison of *xanthopterus* with syntypes of *esocinus* suggests the possibility of both belonging to the same species. In fact, both share important taxonomic features (see descriptions), the same formulation of pharyngeal teeth ( $5 + 3 + 2$ ) and the meristic characters in continuity (scales  $11/59-61/7$  in *xanthopterus* and  $11-13/63-70/7-8$  in *esocinus*; gill rakers  $8-11$  in *esocinus*). The main differences between the two forms concern the ratio total length/head length ( $5.0$  in *xanthopterus* and  $3.9-4.1$  in *esocinus*), the length of the barbels (shorter in *esocinus*) and the coloration (uniform in *xanthopterus* and, according to Heckel, 1843, and Khalaf, 1961, dotted in *esocinus*). Once again the lack of information about the variability in both forms prevents me to include them in the same biological species.

*Barbus esocinus* (Heckel, 1843)

*Luciobarbus esocinus* Heckel in Russegger, 1843, 1 (2), pp. 1054–1055; 1845, Atlas, tabl. IV, fig. 2.

### Material

NMW 54088. – Tigris, Mossul (Iraq), Kotschy, 1843. 2 specimens (syntypes).

NMW 54091. – Tigris, Mossul, Kotschy, 1843. 1 specimen (syntype).

NMW 54092. – Tigris, Mossul, 1843. 1 specimen (syntype).

### Description

Head profile rectilinear or slightly concave. Upper edge of the eye tangent to the head profile. Mouth large and terminal. Lips thin, the lower one without median lobe. Barbels slender, the anterior reaching at most the fore nostril, and the posterior the fore edge or the middle of the eye. Head comprised  $3.9-4.1$  times in the total length and including  $3.1-3.3$  times the nose.

Upper profile of the dorsal concave and perpendicular to the back. Last unbranched dorsal ray very strong, its height being included  $1.2-1.9$  times in the head length. Rear edge of this ray with strong denticles, which spread over the  $3/4-4/5$  of its height and whose density equals  $0.8-1.5$  denticles/mm. Tip of the dorsal not reaching or exceeding the level of the anal origin. Dorsal:  $4' + 8$ , the last branched ray being bifurcated from its basis. Origin of the dorsal at the same level or slightly behind the beginning of the pelvics.

Tip of the anal not reaching the outer caudal rays. Height of the anal comprising  $0.7-0.9$  times the height of the last unbranched dorsal ray. Anal:  $3' + 5$ , the last branched ray bifurcated from its basis.

Scales:  $11-13/63-71/7-8$

Gill rakers:  $8-11$ ;  $\bar{x} = 9.3$

Pharyngeal teeth:  $5 + 3 + 2$ , hooked, the third and fourth of the outer row the larger teeth, and the fifth the smaller.

### Remarks

Günther (1868), Misra (1947), Khalaf (1961), and Karaman (1971) present descriptions of *B. esocinus*. The species is also referred by Berg (1949) and Ladiges (1960).

Karaman (1971) considers *Labeobarbus euphrati* Sauvage, 1882, as synonym of *B. esocinus*, and suggests the identity between this form and *B. xanthopterus*.

### Discussion

Misra (1947) and Khalaf (1961) mention 4 + 3 + 2 pharyngeal teeth to *B. esocinus*. This is perhaps due to the fact that they only examined old specimens (the specimen studied by Misra measured 1150 mm). All the specimens I examined (total lengths: 72–389 mm) exhibit 5 + 3 + 2 pharyngeal teeth. Another ageing feature of *B. esocinus*, which is very common in West-Palearctic *Barbus*, is visible in the specimen referred by Misra (1947, pl. I, fig. 2): the dorsal profile becomes rectilinear and less perpendicular to the back. Also the number of scales on the lateral line referred to by Heckel (1843), Misra (1947), and Khalaf (1961), which is 76–78, is considerably higher than that counted by myself (63–71). Different counting procedures will eventually explain that deviation.

The holotype of *Labeobarbus Euphrati* Sauvage, 1882, is in the Museum of Paris, but temporarily lost in the exhibition galleries. So, it cannot be examined for the moment. Sauvage's original description was published in 1882. The same description, but now under the name *Barbus euphrati*, was published by Sauvage (1884). Some of the characters of *Labeobarbus euphrati*, as, for instance, the ratio total length/head length and the scales (12/70/8), actually agree with *B. esocinus*. On the contrary, the absence of denticulations on the last unbranched dorsal ray is not characteristic of *B. esocinus*. It is, however, possible that in *B. esocinus*, as in other *Barbus* species, the weakness or loss of the denticles could be correlated with the ageing [according to Sauvage (1882), the total length of the holotype of *L. Euphrati* is 1650 mm]. But, it is also possible that Sauvage has omitted the presence of weak denticles, as he did for *Labeobarbus Orontis* and *Barbus Lorteti* [cf. the descriptions with the figures in Sauvage (1884)]. Anyway, the examination of the holotype of *Labeobarbus Euphratis* necessary to prove definitely its identity with *B. esocinus*.

The eventual identity between *B. xanthopterus* and *B. esocinus*, suggested by Karaman (1971), was anteriorly discussed (see *B. xanthopterus*).

### *Barbus scheich* (Heckel, 1843)

*Luciobarbus Scheich* Heckel in Russegger, 1843, 1 (2), pp. 1055–1056; 1845, Atlas, tabl. XV, fig. 1; 1846–1849, 2 (3), pp. 215–216.

### Material

NMW 50399. – Tigris. 1 specimen (syntype).

### Description

Head profile slightly convex, thinning forward the nostrils. Upper edge of the eye tangent to the head profile. Mouth sub-terminal. Lips thin, the lower one without median lobe. Barbels moderately thick, reaching, the anterior the fore nostril, and the posterior the middle of the eye. Head comprised 4.5 times in the total length and including 2.8 times the nose.

Maximum body depth comprised 4.7 times in the total length.

Upper profile of the dorsal slightly concave and perpendicular to the back.

Last unbranched ray of the dorsal very strong, its height being comprised 1.1 times in the head length. Rear border of this ray with very strong denticles, which spread over the 4/5 of its height and whose density equals 1.0 denticles/mm. Tip of the dorsal exceeding the level of the anal origin. Dorsal: 4' + 8, the last branched ray bifurcated since its basis. Origin of the dorsal slightly behind the beginning of the pelvics.

Tip of the anal not reaching the outer caudal rays. Height of the anal comprising 0.7 times the height of the last unbranched dorsal ray. Anal: 3' + 5, the last branched ray bifurcated since its basis.

Scales: 11/53/6.

Gill rakers: 21.

Pharyngeal teeth: 4 + 3 + 2, hooked, the fourth of the outer row being the larger and globose.

### Remarks

Günther (1868) considered *Luciobarbus mystaceus* as closely allied to *B. scheich* and, later on (Günther, 1874), the same form and *L. xanthopterus* as individual variations of *B. scheich*. Sauvage (1884) accepted Günther's viewpoint, indicating as valid name *B. xanthopterus*. Misra (1947) and Khalaf (1961) followed Sauvage (1884).

To Battalgıl (1942), *B. scheich*, *B. mystaceus*, and probably *B. xanthopterus* are distinct, well defined species.

Berg (1949) considered *scheich* and *mystaceus* as synonyms of *B. rajanorum*, and this was accepted by Ladiges (1960) and Karaman (1971). To this last author, *scheich* would be, particularly, synonym of *B. rajanorum mystaceus*.

### Discussion

The comparison between *B. scheich* and *B. mystaceus*, *B. rajanorum*, and *B. xanthopterus* was anteriorly discussed (cf. *B. mystaceus* and *B. xanthopterus*). *B. scheich* is perhaps close to *B. mystaceus mystaceus* but the lack of information about *scheich* makes advisable to keep it as a separate species.

*Barbus plebejus scincus* (Heckel, 1843)

*Barbus scincus* Heckel in Russegger, 1843, 1 (2), p. 1049; 1845, Atlas, tabl. XIV, fig. 3; 1846–1849, 2 (3), pp. 212–214.

*Barbus plebejus escherichi* – Almaça, 1981, *Bull. Mus. natn. Hist. nat., Paris*, 4° sér., 3, section A, no 1, p. 285.

### Material

- NMW 22272. – Aleppe (Syria), c. Kotschy, 1842. V. 5 (pt.). 2 specimens (syntypes).  
NMW 54526. – Aleppe, Kotschy, 1842. V. 5 (pt. d.). 1 specimen. (syntype).  
NMW 54523. – Tigris, 1843. IV. 4. 1 specimen.  
MP 1927–30. – R. Mèlès, Smyrne (Turkei), Gadeau de Kerville, May 1912. 2 specimens.  
MP 1927–82. – R. Kémer, Smyrne, Gadeau de Kerville. 2 specimens.

### Description

Head profile convex, often depressed forward the nostrils. Mouth inferior. Lips thick or moderate, reaching, the anterior, the nostrils and the posterior, from the fore to the rear edge of the eye. Head included 4.3–5.0 (5.6 in the larger examined species) times in the total length and comprising 2.4–2.8 (3.1 in a young specimen) times the nose.

Body with dark speckles. Maximum body depth included 4.1–4.7 (5.2 in the larger examined specimen) times in the total length.

Upper profile of the dorsal rectilinear and oblique to the back. Last unbranched dorsal ray weak, its height being included 1.4–1.5 (1.8 in a young specimen) times in the head length. Posterior border of this ray with weak denticles spreading over the  $3/10$ – $2/3$  of its height ( $3/10$ – $2/5$  and  $3/5$ – $2/3$  in animals, respectively, shorter and larger than 125 mm) and whose density equals 2.6–3.0 (3.4 in a young specimen) denticles/mm. Tip of the dorsal not reaching the level of the anal origin. Dorsal: 4' + 8, the last segmented ray bifurcated from the basis. Dorsal origin at the same level or slightly forward the pelvis origin.

Tip of the anal reaching or not reaching the outer rays of the caudal. Anal height including 1.0–1.1 times the height of the last unbranched dorsal ray. Anal: 3' + 5, the last segmented ray bifurcated from its basis.

Scales: 10–11/51–62/6–8

Gill rakers: 8–10

Pharyngeal teeth: 5 + 3 + 2, hooked.

### Remarks

*B. scincus* original description was based on a type-series from River Kueik (Aleppo). In the Museum of Wien three syntypes have been found, but unfortunately two of them (NMW 22272) in a bad condition. Heckel (1843) considers *B. Scincus* close to his *B. lacerta*, the differences between both species concerning the form of the body and head, the size of the mouth and the eyes, and the number of scales. Günther (1867) accepted the specific separation of *B. scincus* and *B. lacerta*.

Steindachner (1897) included *scincus* in *B. lacerta* and described the new var. *Escherichii* in this species. Hankó (1924), considering the differences between *escherichi* and typical *lacerta* of the same order and constancy as the differences

between *scincus* and typical *lacerta*, referred to *B. lacerta* var. *scincus*. This viewpoint was followed by Pellegrin (1928).

Berg (1949) referred to *scincus* as a synonym of *B. lacerta lacerta*, while Ladiges (1960) considered *scincus* as a subspecies of *B. lacerta*, and Karaman (1971) as a synonym of *B. plebejus lacerta*.

Before the examination of the types of *B. scincus* and *B. lacerta escherichi*, Almaça (1981) identified specimens of *B. plebejus scincus* (MP 1927–30 and 1928–82) with *B. plebejus escherichi*.

### Discussion

All the features of *scincus*, mainly the weakness of the last unbranched dorsal ray and the form of the dorsal upper profile, suggest its inclusion in *B. plebejus*. But, this species seems different from (although close to) *B. lacerta* (see Almaça 1981, and present paper).

*B. plebejus scincus* lives in Turkey and Syria; it also occurs in the Tigris. In the geographical area covered by the present paper other subspecies of *B. plebejus* seem to occur (Karaman, 1971). Specimens of one of them, *B. plebejus cyri*, have been examined and the differences between *scincus* and *cyri* are mentioned below.

In *B. plebejus scincus* the anal is shorter, the body higher, the scales less numerous, and the denticles of the last unbranched dorsal ray somewhat denser than in *B. plebejus cyri*. The kind of these differences and some overlapping between the features concerned suggest the subspecific level of distinction between *scincus* and *cyri*.

*Barbus plebejus cyri* (Filippi, 1865)

*Barbus cyri* Filippi, 1865 (according to Berg, 1964, Freshwater fishes of the USSR and adjacent countries, p. 240).

*Barbus caucasicus* Kessler, 1877 (according to Berg, 1964, *ibid.*)

### Material

NMW 54018. – Lake Tschaldyr (URSS), 1881, Schneider. 3 specimens.

### Description

Head profile rectilinear or slightly convex, sometimes slendered forward the nostrils. Mouth inferior. Lips thick, the lower one with a little developed median lobe. Barbels thick, reaching the anterior the fore nostril and the posterior from the middle to the rear border of the eye. Head comprised 4.5–4.7 times in the total length and including 2.5–2.6 times the nose.

Body with dark speckles. Maximum body depth comprised 6.0–6.1 times in the total length.

Upper profile of the dorsal rectilinear and oblique to the back. Last unbranched dorsal ray weak, its height being included 1.7 times in the head length. Rear edge of this ray with weak denticles spreading over  $1/5$ – $2/3$  of its height ( $2/3$  in

animals shorter than 250 mm) and whose density equals 2.5–2.8 denticles/mm. Tip of the dorsal not reaching the level of the anal beginning. Dorsal:  $4' + 8$ , the last segmented ray bifurcated from its basis. Dorsal origin at the same level or slightly forward the beginning of the pelvics.

Tip of the anal reaching the outer rays of the caudal. Anal height including 1.1–1.2 times the height of the last unbranched dorsal ray. Anal:  $3' + 4-5$ , the last segmented ray bifurcated from its basis.

Scales: 12–13/64–68/9–10

Gill rakers: 8–9

Pharyngeal teeth:  $5 + 3 + 2 (+1)$ , hooked, the fourth and the fifth of the outer row being, respectively, the larger and the smaller; one specimen (total length: 277mm) presents a fourth inner row with a small denticle.

### Remarks

Under the name *B. caucasicus* is referred to by Günther (1899) from the region of Lake Urmi (Northern Iran).

Berg (1964) refers to *B. lacerta cyri* from several Caucasian lakes and from the rivers Kura and Araks, and also from the basins of the Atrek and of the Tigris (see also Berg, 1949). This last reference must be reviewed because *B. plebejus scincus* is also referred from the basin of the Tigris.

Karaman (1971) considered *B. cyri* and *B. caucasicus* as synonyms of *B. plebejus lacerta*.

### Discussion

All the characters of *cyri*, mainly those concerning the dorsal fin (profile, last unbranched ray and denticles), point out to its inclusion in *B. plebejus*.

The differences between subspecies *scincus* and *cyri* have been previously mentioned (see *B. plebejus scincus*).

The geographical area of *B. plebejus cyri* is the Southern Caucasus and Northern Iran. It is also referred from the basin of the Tigris (see Remarks).

*Barbus lacerta escherichi* Steindachner, 1897

*Barbus lacerta* Heck., var. *Escherichii* Steindachner, 1897, *Denkschr. kais. Akad. Wiss. Wien*, 64, pp. 688–689, table IV.

*Non Barbus plebejus escherichi* Steindachner, 1897. – Almaça, 1981, *Bull. Mus. natn. Hist. nat., Paris*, 4° sér., 3, section A, no 1, p. 285.

*Barbus lacerta* Heckel, 1843. – Almaça, 1981 (*pro parte*), *ibid.*, pp. 285–286.

### Material

NMW 54086. – Eskischir (Turkey), 1894, 1 p., Steind. coll. & don. 4 specimens (syntypes).

NMW 54087. – Eskisher, 1894, 1 a., Steind. coll. & don. 4 specimens (syntypes).

NMW 54158. – Eskishir, 1894, 1 c., Steind. coll. & don. 7 specimens (syntypes).

NMW 54232. – Eskischehir, 1894, Steind. coll. & don. 1 specimen (syntype).

NMW 54233. – Kirmir Tschai, Kizildja Haman (Turkey), 1896, coll. Escherich. 3 specimens (syntypes).

NMW (without number). – Eskishir, 1894, 1, Steind. coll. & don. 2 specimens (syntypes).

NMW 50397. – Eski-Schehr, 1901, Gesellsch. z. Erf. d. Orients. 6 specimens.

NMW 54228. – Eski-Schehr, 1901, Ges. z. Erf. d. Orients, 1 specimen.

NMW 54229. – Eski Schehr, 1901, l. c. Gesellsch. z. Erf. d. Orients. 4 specimens.

NMW 54230. – Eski-Schehr, 1901 b., Gesellsch. z. Erf. d. Or. 4 specimens.

NMW 54231. – Pursak Fluss, Eski-Chehir, 1900, Coll. Ker. 1 specimen.

NMW 54234. – Eski Scher, 1901, 1 d, Ges. z. Erf. d. Or. 3 specimens.

### Description

Head profile slightly convex, often depressed forward the nostrils. Upper border of the eye near to the head profile or even tangent to it in smaller specimens. Mouth inferior. Lips thick, the lower one with a reduced median lobe. Barbels moderate and reaching, the anterior, the nostrils, and the posterior, from the middle to the rear edge of the eye. Head comprised 4.4–5.2 times in the total length and including 2.2–2.9 times the nose.

Body with dark speckles. Maximum body depth included 5.0–5.7 (4.5 in a specimen with 135 mm) times in the total length.

Upper profile of the dorsal, slightly concave and almost perpendicular to the back. Last unbranched dorsal ray moderate or strong, its height being comprised 1.2–1.5 times in the head length. Rear border of this ray with strong or moderate denticles which spread over the  $2/5$ – $3/4$  ( $3/5$ – $3/4$  and  $2/5$ – $3/5$ ) in specimens, respectively, smaller and larger than 250 mm of its height and whose density equals 1.8–2.4 denticles/mm. Tip of the dorsal reaching or not the level of the anal beginning. Dorsal:  $4' + 8$ , the last segmented ray bifurcated from its basis. Origin of the dorsal, generally, slightly behind the pelvic origin, sometimes at the same level as this.

Tip of the anal generally not reaching the outer rays of the caudal. Anal height comprising 0.8–1.0 times the height of the last unbranched dorsal ray (in a specimen with 367 mm this ratio equals 1.1).

Anal:  $3' + 5$ , the last segmented ray bifurcated from its basis. Height of the pectoral comprised 6.4–7.1 times in the total length

Scales: 11–13/53–59/7–9

Gill rakers: 7–12;  $\bar{x} = 10.2$

Pharyngeal teeth:  $5 + 3 + 2$ , hooked, the fourth, and sometimes also the third, of the outer row being the larger teeth and the fifth the smaller.

### Remarks

Steindachner (1897) described *B. lacerta* var. *escherichi* based on a type-series from Pursak (Eskischir), Kirmir Tschai (Kizildja Hammân), and Tschirik Izmak (Amasya). Under the same name it was referred to by Hankó (1924) from Eskischir, and by Pellegrin (1928) from Ankara. Ladiges (1960) refers to *B. lacerta escherichi* from Turkey.

*B. tauricus escherichi* is referred to by Tortonese (1951/52) from the Lake Abant (NW of Ankara) and by Berg (1964) from the Western Transcaucasia (north to Sochi) and rivers falling into the Black Sea coast of Asia Minor (westward to Sakarya basin).

Karaman (1971) considered *escherichi* as a subspecies of *B. plebejus*. Almaça (1981), before examining the types of *escherichi*, erroneously identified *B. plebejus scincus* from Smyrna with *B. plebejus escherichi*.

### Discussion

The differences between *B. lacerta lacerta* and *B. lacerta escherichi* concern the dorsal, anal, caudal and pectoral fins and, particularly, the last unbranched dorsal ray (Steindachner, 1897; Hankó, 1924; Berg, 1964). As the types of *B. lacerta lacerta* were not found in the Museum Wien the comparison between *lacerta* and *escherichi* becomes somewhat difficult. However, in the Museum of Paris there are 3 specimens of *B. lacerta* from Aleppo (MP B. 1361 and 1627; Almaça 1981), offered by the Museum of Wien in 1863, which could belong to the type-series of *B. lacerta*. Anyway, these specimens have been taken to the comparison with the syntypes of *escherichi*.

Relatively to *B. lacerta lacerta* the subspecies *escherichi* presents the last unbranched dorsal ray longer (head length/height of the last unbranched dorsal ray: 1.4–1.6 in *lacerta* and 1.2–1.5 in *escherichi*). In *escherichi* the denticles of this ray are somewhat stronger and the dorsal upper profile is slightly concave and almost perpendicular to the back, while in *lacerta* the profile is rectilinear and oblique. The pectorals are longer in *escherichi* (total body length/height of the pectorals: 7.2–7.4 in *lacerta* and 6.4–7.1 in *escherichi*). *B. lacerta lacerta* seems to live in the south Caspian Sea rivers and in the Tigris-Euphrates system. The distribution of *escherichi* has been previously referred to. The kind of these differences and their contiguity or overlapping clearly suggest the level of subspecific distinction between *lacerta* and *escherichi*.

In a previous paper (Almaça, 1981) the reasons why *lacerta* must be considered specifically distinct from *B. plebejus* have been mentioned.

Summing up the results of the present study, the main conclusions are the following:

- 1) At the present state of information about western-asiatic *Barbus*, most of the Heckel's species seem to be valid. This is namely the case of *B. pectoralis*, *B. perniciosus*, *B. kersin*, *B. mystaceus*, *B. xanthopterus*, *B. esocinus*, *B. scheich*, and *B. lacerta*.

- 2) The Heckel's species *B. seincus* seem in better accordance with the subspecific status, being named *B. plebejus scincus*.

- 3) One of Heckel's species, *B. rajanorum*, could not be recognized. The holotype was not found and no specimens or descriptions agree with Heckel's original description.



4) Western Transcaucasian and Northern Anatolian populations of *B. lacerta* seem to be different at the subspecific level from other populations of the same species. They are here included in *B. lacerta escherichi*.

5) The differences between the populations of *B. capito* named *capito* and *conocephalus* seem to justify the subspecific level of distinction.

#### References

- ALMAÇA, C. (1969): Révision critique de quelques types de Cyprinidés d'Europe et d'Afrique du Nord des collections du Muséum national d'Histoire naturelle. *Bull. Mus. natn. Hist. nat., Paris*, 2<sup>e</sup> sér., **40** (6), 1968: 1116–1144. – Paris.
- (1970): Sur les Barbeaux (Genre et Sous-genre *Barbus*) de l'Afrique du Nord. *Ibid.*, **42** (1): 141–158. – Paris.
- (1972): Sur la systématique des Barbeaux (Genre et Sous-genre *Barbus*) de la Péninsule Ibérique et de l'Afrique du Nord. *Arg. Mus. Boc.* (2<sup>e</sup> série), **3** (10): 319–346. – Lisboa.
- (1981): La collection de *Barbus* d'Europe du Muséum national d'Histoire naturelle (Cyprinidae, Pisces). *Bull. Mus. natn., Paris*, 4<sup>e</sup> sér., **3**, section A, no 1: 277–307. – Paris.
- (in print): Barbels of the Iberian Peninsula (Pisces, Cyprinidae, *Barbus*). I Jornadas de Ictiologia, Léon, España.
- BANARESCU, P. (1977): Position zoogéographique de l'ichthyofaune d'eau douce d'Asie occidentale. *Cybiun* 3<sup>e</sup> Série, 1977, 2: 35–55. – Paris.
- BATTALGİL, F. (1942): Contribution à la connaissance des poissons des eaux douces de la Turquie. *Rev. Fac. Sci.*, **7** (4): 287–306. – Istanbul.
- (1943): Nouveaux poissons des eaux douces de la Turquie. *Ibid.*, Série B, **9** (2): 126–133. – Istanbul.
- BERG, L.S. (1949): [Freshwater fishes of Iran and adjacent countries] *Trudy Zool. Inst. Akad. Nauk SSR*, **8**: 783–858. – Moskva.
- (1964): Freshwater fishes of the U.S.S.R. and adjacent countries. Israel Program for Scientific Translations. – Jerusalem.
- COAD, B. S. (1978): A provisional, annotated check-list of the freshwater fishes of Iran. *J. Bombay nat. Hist. Soc.*, **76** (2): 86–105. – Bombay.
- (1981): Fishes of Afghanistan, an annotated check-list. *National Museums of Canada, Publ. in Zoology*, no 14: 1–26. – Ottawa.
- GELDIAY, R. and P. KÄHSBAUER (1967): Beitrag zur Kenntnis der Fischfauna der Türkei. *Ann. Naturhistor. Mus. Wien*, **70**: 159–168. – Wien.
- GÜNTHER, A. (1868): Catalogue of the fishes in the British Museum, **7**: 1–512. – London.
- (1874): A contribution to the fauna of the River Tigris. *Ann. Mag. Nat. Hist.*, **14**, 4<sup>th</sup> ser.: 36–38. – London.
- (1899): Fishes. In: Contributions to the Natural History of Lake Urmi, N. W. Persia, and its neighbourhood, ed. R. T. Günther, *Journ. Linn. Soc., Zool.*, **27**: 381–391. – London.
- HANKÓ, B. (1924): Fische aus Klein-Asien. *Ann. Mus. Nat. Hung.*, **21**: 137–158. – Budapest.
- HECKEL, J. J. (1843): *Ichthyologie*. In: Reisen in Europa, Asien und Afrika, ed. J. Russeger, **1–2** (2): 991–1099. – Stuttgart.
- (1846): *Id. Ibid.*, **2** (3): 207–360. – Stuttgart.
- KARAMAN, M. S. (1971): Süßwasserfische der Turkey. 8. Teil. Revision der Barben Europas, Vorderasiens und Nordafrikas. *Mitt. Hamburg. Zool. Mus. Inst.*, **67**: 175–254. – Hamburg.
- KHALAF, K. T. (1961): The marine and fresh water fishes of Iraq. Ar-Rabitta Press. – Baghdad.
- LADIGES, W. (1960): Süßwasserfische der Türkei. 1. Teil. Cyprinidae. *Mitt. Hamburg. Zool. Mus. Inst.*, **58**: 105–150. – Hamburg.
- MISRA, K. S. (1947): On a second collection of fish from Iraq. *Rec. Ind. Mus.*, **45**: 115–127. – Bombay.
- PELLEGRIN, J. (1923): Etudes sur les Poissons rapportés par M. Henri Gadeau de Kerville de son voyage zoologique en Syrie, **4**: 5–37. – Paris.

- (1928): Les Poissons des eaux douces d'Asie-Mineure. *In*: Voyage zoologique d'Henri Gadeau de Kerville en Asie-Mineure (Avril-Mai, 1912), 2: 5–134. – Paris.
- SAUVAGE, H.-E. (1882): Catalogue des poissons recueillis par M. E. Chantre pendant son voyage en Syrie, Haute-Mésopotamie, Kurdistan et Caucase. *Bull. Soc. Philom.*, 7<sup>e</sup> série, 5 (1), 1880–1881: 163–169. – Paris.
- (1884): Notice sur la faune ichthyologique de l'ouest de l'Asie et plus particulièrement sur les Poissons recueillis par M. Chantre pendant son voyage dans cette région. *Nouv. Arch. Mus.*, 2<sup>e</sup> sér., 7: 1–42. – Paris.
- STEINDACHNER, F. (1897): Bericht über die von Dr. Escherich in der Umgebung von Angora gesammelten Fische und Reptilien. *Denks. kais. Akad. Wiss.*, 64: 685–699. – Wien.
- SVETOVIDOV, A. N. (1949): [Fishes of Iran from materials collected by Acad. E. N. Pavlovskii]. *Trudy Zool. Inst. Akad. Nauk SSSR*, 8: 859–869. – Moscow.
- TORTONESE, E. (1951–1952): Relazione preliminare di un viaggio a scope zoologico attraverso l'Asia Minore. *Boll. Ist. Mus. Zool. Univ. Torino*, 3 (5): 1–17. – Torino.

#### ADDENDA

Due to the unfortunate and premature death of Dr. R. HACKER the publication of this paper was delayed for several years. Meanwhile, I introduced some changes in *Barbus* taxonomy which refer to taxa dealt with in the present paper. These changes are as follows:

(1) The examination of other specimens and the consideration of the areas of distribution of *B. mystaceus mystaceus* and *B. mystaceus barbatus* and the troublesome zoogeographical problems they stir up made me reconsider the taxonomic status of both forms. I think now that they probably are distinct species [cf. ALMAÇA, C., 1983: Remarks on some HECKEL'S species of *Barbus* from Western Asia. *Arq. Mus. Boc.*, série B, 2 (12): 95–102. ALMAÇA, C., 1984: Notes on some species of Western Palearctic *Barbus* (Cyprinidae, Pisces). *Arq. Mus. Boc.*, série C, 2 (1): 1–76].

(2) Based on a revision of *Barbus* of the *plebejus* group, I concluded that *cyri* probably is a subspecies of *B. lacerta* and not of the close species *B. plebejus* (cf. ALMAÇA, 1984, op. cit.).