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SOME NEW DATA TO MORPHOLOGY OF *RHODEUS SERICEUS* (CYPRINIDAE: ACHEILOGNATHINAE) AND A DESCRIPTION OF A NEW SPECIES, *RHODEUS COLCHICUS*, FROM WEST TRANSCAUCASIA

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Rhodeus sericeus is revised with a use of new characters – cephalic sensory canal pattern, configuration of infraorbitals, and vertebral structure along with some traditional ones. No characters were found which clearly confirm the specific status of *R. sericeus amarus*. *Rhodeus colchicus,* new species, is described from the rivers in West Transcaucasia, Georgia. It is distinguished from congeners by a suite of characters which includes large scales (34 to 37, commonly 35, in the lateral row), a low number of vertebrae (33 to 36, commonly 35, total, and 16 to 18, commonly 17, in the abdominal region), a deep shortened 2nd infraorbital, a broad 4th infraorbital and a well developed 5th one with a widened lamellate portion.

Introduction

The Amur common bitterling was described as *Cyprinus sericeus* by Pallas (1776) from River Onon (Upper Amur system) and the European bitterling, *Cyprinus amarus,* some years later by Bloch (1782) from River Elbe. They were considered to be close or conspecific by many authors, for example, Dybowski (1869, 1877) and Warpachowski (1887). The study by Svetovidov and Eremeyev (1935) showed that European and Asian bitterlings are slightly different in some characters and proposed to give them a rank of subspecies of one and the same species. According to their data, *Rhodeus sericeus sericeus* is characterized by *D* III 9, 10 (11); *A* III 8-10; *sq. l.* 36-40; *l. l.* 5-10 (on the average 6.58), while *Rhodeus sericeus amarus* has a lower number of pored scales (*l. l.* 4 to 6, averaging 5.24) as well as a slightly longer and deeper head and a longer caudal peduncle. Besides these, Svetovidov and Eremeyev (1935) considered *Rhodeus sinensis* Günther, 1868 to be a subspecies of *R. sericeus* which is only different in having a wider 3rd infraorbital bone.

Berg (1949) retained a subspecific rank for *R. s. sericeus* and *R. s. amarus*, but re-established *R. sinensis* as a distinct species. Besides this, Berg (1949) synonymized *R. s. amarus* and *Rhodeus amarus* var. *meridionalis,* a new variety with eleven pored scales in the lateral line described by Karaman (1924) from River Vardar. Berg (1949) noted that the Asian bitterling is only slightly different from the European one in having an average number of pored lateral line scales of 6.6 vs. 5.2 in the latter, and a shorter caudal peduncle. He supposed that the former range of *R. sericeus* was interrupted during the Quaternery glaciation time and after that both forms have been evolving independently. Many authors followed this point of view while some others considered *R. sericeus sericeus* and *R. sericeus amarus* as distinct species (Hubbs, Kuronuma, 1943; Bauch, 1955; Duyvené de Wit, 1955).

Later, some new forms were described: *R. sericeus sericeus* Pallas f. *strumicae* from River Struma at Skoplje (Karaman, 1955), *R. sericeus amarus* natio *danubicus* from Danube in Slovakia (Holčík, 1959) and *R. sericeus amarus* natio *svetovidovi* from rivers Dnieper and Bug in Ukraine (Holčík, 1959). These names are not available being infrasubspecific. The differences between them are very slight, for example, *R. seriseus amarus* n. *danubicus* is characterized by *D* II-IV (7-8)9-10(11), *A* III (7)8-10, *sq. l.* 37-42, *l. l.* 0-7 while *R. sericeus amarus* n. *svetovidovi* by *D* III 9(10), *A* III 8-9, *sq. l.* 36-40, *l. l.* 4-6. These forms did not receive a subspecific rank and only two subspecies, *sericeus* and *amarus,* were usually considered within *R. sericeus* sensu lato (Holčík, Duyvené de Wit, 1964; Arai, Akai, 1988).

Holčík and Jedlička (1994) discussed the variability of three characters (the number of pored scales, transversal rows of scales and gill-rakers) in the samples from Europe (from the British Isles and Elbe to the Black Sea and Caspian Sea basins) and the Far East (the Amur and Sakhalin Island), and concluded that the two stocks are conspecific and that there is a West-East clinal variation. This particular case is already discussed in details by Kottelat (1997) who analyzed clinal variation in freshwater fish in a more general contex as well. The main result taken from the data of Holčík and Jedlička (1994) is that the European and Asian bitterlings are very close in three characters mentioned above.

Rhodeus sericeus and *R. amarus* are treated again as distinct species by Kottelat (1997) since the Europen and East Asian stocks are unarguably distinct lineages separated for an estimated 2 to 4 million years (data from Holčík, Jedlička, 1994) by 4000 km. Having based on data of these authors, Kottelat considered them to be diagnosable by modal values of lateral line pored scales (4-6 in *R. amarus* vs. 6-7 in *R. sericeus,* ranges 0-9 and 4-10 respectively) and gill-rakers (10-12, vs. 12-14; ranges 9-13, vs. 9-16). The author realizes that the differences between the two stocks are slight but, to his opinion, when taken together with the huge geographic distance they give enough reason for considering both stocks as two species under the Phylogenetic Species Concept.

All data of different aspects of taxonomy and mode of life of *R. sericeus* sensu lato are summarized in the most recent publication by Holčík (1999) who again synonymizes *R. sericeus* and *R. amarus* emphasizing that the variations in the measurements and counts (this author examined number of rays in the dorsal and anal fins, number of lateral line scales, number of transversal rows of scales and gill-rakers) are subjected to almost a fluent clinal variation with longitude.

Whatever the taxonomic rank of the European bitterling is, its native range is usually considered as including rivers of the Atlantic Ocean in France (from the Braye River to the upper Loire); rivers flowing into the English channel and southern North Sea (from the Seine to Elb River systems), into the southern Baltic Sea (from the Oder to Neva systems); rivers of the Black Sea and the Sea of Azov (from Kamchia and Danube to Kuban' as well as those along the Caucasian coast and the Turkish coast including Lakes Terme and Sapanca); rivers of the western and southern Caspian Sea coast (from River Volga to rivers emptying into the Anzali Lagoon in Iran); European and Asiatic water bodies in the basins if the Sea of Marmara and the Aegean Sea; Skadar Lake (Adriatic Sea) and the Middle Rhone (Mediterranean Sea).

The objective of this study was to revise taxonomic relationships of *R. s. sericeus* and *R. s. amarus* using new characters for examination of materials from different localities all over their ranges.

Material and Methods

There were examined 302 specimens of *Rhodeus sericeus* from collections of the Zoological Institute, Russian Academy of Sciences (ZISP) and Zoological Museum of the Moscow State University (ZM MGU), seven specimens were cleared and stained with alizarin red S

(C&S): ZISP 4879 (1, Dnieper), ZISP 5631 (1, Danube), ZISP 8910 (3, Don), ZISP 15362 (1, Don), ZISP 15550 (9, Lake Khanka), ZISP 16836 (6, Lake Khasan), ZISP 18451 (6, South Bug), ZISP 19344 (6, Amur), ZISP 19636 (6, Amur), ZISP 24752 (5, Dnieper; 2 C&S), ZISP 24753 (3, Dnieper), ZISP 24755 (19, South Bug), ZISP 24756 (3, South Bug), ZISP 25147 (4, Sakhalin), ZISP 25477 (12, Sakhalin), ZISP 29491 (2, Amur), ZISP 29493 (20, Amur), ZISP 37246 (10, Danube), ZISP 37318 (9, Tisza), ZISP 37606 (13, Tisza), ZISP 38297 (15, Lake Khasan), ZISP 38421 (10, Danube), ZISP 40919 (5, River Venta), ZISP 40920 (25, Dnieper), ZISP 41998 (13, Sakhalin), ZISP 51079 (10, Lake Khanka), ZISP 51080 (80, Lake Khanka), ZISP uncat. (Lake Khanka, 1 C&S), ZISP uncat. (Sea of Okhotsk, 2 C&S), ZISP uncat. (River Tym', 2 C&S).

Fourty six specimens from West Transcaucasia identified as *R. sericeus amarus* (*R. colchicus* sp. n. below): ZISP 15164 (19, Notanebi, 2 C&S), ZISP 15166 (1, Lake Paleostomi), ZM MGU P-17589 (15, River Kureba), ZM MGU P-19049 (4, River Supsa), ZM MGU P-16718 (3, River Nochela), ZM MGU P-1782 (2, Lake Paleostomi).

For comparison, there were examined also specimens of some other *Rhodeus* species: *R. amurensis* – ZISP 42616 (2, Khanka), ZISP uncat. (2, Khanka); *R. sinensis* – ZISP 4469 (1, China), ZISP 19897 (1, Korea); *R. ocellatus* – ZISP 26512 (2, China).

All specimens were radiographed. The two last branched dorsal and anal fin rays are counted as one. Lateral line scales as well as cephalic canal pores were calculated on both sides of the head.

Description of *R. sericeus*

The present study confirms the data of some earlier publications on external morphological characters in *R. sericeus sericeus* and *R. sericeus amarus*. Both European and Asian bitterlings have a small subterminal mouth with a horse-shoe-like mouth cleft. The lower lip is well developed but not thick, interrupted in the middle. The barbels are absent in all specimens examined.

Both **the dorsal and anal fins** have no spine or rigid ray but the third (the last) simple ray is slightly thickened in particular in large specimens and flexible only on the top.

All samples examined do not differ in the number of dorsal and anal fin rays. The most frequent number in each river basin is III 9 in both fins. Eight dorsal branched rays (*D*) are only found in two specimens and ten – in 6. The number of anal branched rays (*A*) is more variable – eight rays are found in 12 specimens and 10 - in 16.

The lateral line (*l. l.*) is incomplete. The number of pored scales does not exceed 10 varying from 4 to 7 with a modal value of 5 in the European bitterling and from 3 to 9, commonly 5 or 6, in the Asian one. According to Holинк (1999), the number of lateral line scales in the European bitterling averages from 3.62 to 5.06 depending on a sample.

No marked variation was found also in the number of transversal rows of scales: in both forms it ranges between 34 and 41 with modal values from 36 to 40. According to Holинк (1999), the number of transversal rows (*sq. l.*) in samples from the main European river drainages varies from 34 to 45 averaging about 38 and 39.

Cephalic sensory canals are characterized by a marked reduction: all canals are fragmented, some segments are lacking, canal walls are thin and slightly ossified, canaliculi are shortened.

The supraorbital canal (*CSO*) goes through the nasal and frontal and terminates at the frontal-pterotic border by a free pore. In all specimens examined the *CSO* does not communicate with the infraorbital canal. The parietal *CSO* segment is always lacking. In all specimens examined the *CSO* is interrupted between the nasal and the frontal. There are two pores on the nasal (in 100% of the canals). The number of pores on the frontal varies from 5 to 9, commonly 7 (54%). In both European and Asian groups of samples, the most frequently occured numbers of the *CSO* pores are 2 +6 and 2+7. However, in some European drainages this reduced to 2+5 in 10 and 25% of specimens (the South Bug and Dnieper respectively) while in the Asian group it is increased to 2+9 in 5% of specimens in the Khasan Lake sample and to 2+8 in 63% of specimens in the Sea of Okhotsk samples.

The infraorbital canal (*CIO*) is the most variable due to fragmentation. In all specimens examined the *CIO* is interrupted in at least two places. The most frequently occurred positions of interruption is between the 1st and the 2nd infraorbitals and between the 4th infraorbital and the pterotic (the 5th one is lacking in this case and a gap may be quite wide). The number of *CIO* pores varies from 11 to 19. The least number is found in the samples from the Danube (11 in 50% of the canals and 12 in 50%) and South Bug (12 in 84% and both 11 and 13 each in 8%). The other European samples commonly have from 13 to 15 pores. In general, the number of *CIO* pores in the Asian group is higher than that in the European one (which means that the *CIO* in the Asian form is fragmented to the greater extent): only here 19 pores are found (in 5 and 7% of the canals in the Amur and Khasan samples respectively). However, the Asian samples are more diverse by this character: modal values vary from 13 (Sakhalin, 52%) and 14 (the Sea of Okhotsk, 80%) to 16 (Khasan, 40%).

The preopercular-mandibular canal (*CPM*) is not so variable. It is always interrupted between the lower jaw (the anguloarticular) and the preoperculum. There is no connection to the *CIO*, and *CPM* always terminates below the upper extremety of the preoperculum. The *CPM* fragment on the preoperculum is the only cephalic canal section which bears long well developed canaliculi. The number of pores is usually 3+6 (lower jaw + preoperculum). Eight pores, 3+5, are found in only about 1% of the specimens examined in the samples from the South Bug and Timis (the Danube basin), and 8 and 12% in the samples form the Khasan and Amur respectively. Ten to twelve pores (3+7, 3+8 or 3+9) are rare in both the European and Asian groups with exceptions for the sample from the South Bug where 17% of the specimens had 3+7, one sample from the Danube with 100% of the specimens with 3+7, and the Sea of Okhotsk sample with 3+7 in 63%.

The supratemporal canal (*CST*) is absent in the most specimens examined. This canal is only found in the Khasan (50%) and the Timis (20%) samples where it is presented by two lateral widely disjuncted branches each with one or two pores.

The vertebral structure is variable to some extent and displays geographic variations. Vertebral counts in different river drainages are given in Tabl. 1. In general, the total number of vertebrae (*Vert*.) is 34 to 38. The number of abdominal vertebrae (*Abd. vert.*) is 16 to 19, that of caudal vertebrae (*Caud. vert*.) 17 to 20. The number of predorsal abdominal vertebrae (*PreD vert.*) is 10 to 13, that of intermediate abdominal vertebrae *(Interm. vert.*) – 2 to 4.

In the European group, the modal values for total vertebrae is 36 or 37, 36 being the most frequent count (Fig. 1*b*) . Total vertebrae average from 36.1 (Danube) to 36.8 (South Bug) and display no West-East trend in differences. The variability of the number of total vertebrae is mainly due to difference in the caudal region – the number of caudal vertebrae is higher in the South Bug and Don samples (a modal value is 19) while the modal value of the number of abdominal vertebrae is 18 in all samples and the differences in the average values are quite slight. The most frequent vertebral formulae are 18+18 (Dnieper, Danube, Venta) or 18+19 (South Bug, Don). The number of predorsal vertebrae is commonly 11 in all samples.

In the Asian group, the modal value for total vertebrae is 37 (all samples from the Amur and the Sakhalin) (Fig. 1*c*). Total vertebrae count averages from 35.7 (Tumen'-Ula including Lake Khasan) to 36.8 (Amur and Sakhalin). In the sample from Tumen'-Ula basin 36 is the most frequent count. In this sample, the shortest abdominal region is found (17.2 on the

Table 1.

Vertebral counts of *Rhodeus sericeus* (European and Asian samples) and *Rhodeus colchicus* sp.n.

Character		*Vert.*							*Abd. vert.*					*Caud. vert.*					*PreD. vert.*				
Species and river drainage	n	33	34	35	36	37	38	*M*	16	17	18	19	*M*	17	18	19	20	*M*	10	11	12	13	*M*
R. sericeus Dnieper	37			1	25	9	2	36.3		1	28	8	18.1	1	28	8		18.1		26	11		11.2
South Bug	28				6	20	2	36.8			21	7	18.2	1	10	16	1	18.6					
Danube	43		1	2	29	11		36.1		8	35		17.8	3	24	17		18.3	1	31	11		11.2
Don	4				1	3		36.7			4		18.0		1	3		18.7		4			11.0
Venta	5				4	1		36.2		1	4		17.8		3	2		18.4		5			11.0
Tumen’-Ula	15		1	4	8	2		35.7	4	4	7		17.2		10	5		18.3	4	8	3		10.9
Amur	90		2	3	38	45	2	36.4		9	55	7	17.9	5	35	31		18.3	2	26	40	3	11.6
Tym'	25				6	16	3	36.8			22	3	18.1	1	5	18	1	18.7		4	21		11.8
R. colchicus Notanebi	21			13	8			35.3		13	8		17.4	1	19	1		18.0	1	16	3	1	11.2
Kureba	15	1	1	12	1			34.8	1	8	6		17.3	8	7			17.5	1	13	1		11.0
Supsa	4			3	1			35.3		3	1		17.3		4			18.0		4			11.0
Nochela	3			3				35.0		3			17.0		3			18.0		3			11.0

average while in the other samples it is about 18). The variability of the number of caudal vertebrae also occurs, modal values being 18 or 19. The most frequent vertebral formulae are 18+18 (Tumen'-Ula, Amur) or 18+19 (Sakhalin). When data for all specimens from the Asian group are summarized (including those absent from the Tabl. 1), the modal formulae will be 18+19. The number of predorsal vertebrae is commonly 12 (Amur, Sakhalin).

The infraorbitals (Fig. 2*b*) are comparatively small. Length of the 1st infraorbital averages 45.0 and 46.5% of the eye diameter in the European and Asian bitterling samples respectively. The 2nd infraorbital is shallow, usually its lamellate portion is so reduced in size that the bone is only represented by its canal portion and looks like a narrow bony tube; depth of the 2nd infraorbital averages 40% of its length. The 3rd infraorbital is broad in its central part but has narrowed anterior and upper ends according to size of the 2nd and 4th infraorbitals, respectively. The 4th one is not widened, sometimes it is also not deep and separated by a prominent gap from the 3rd infraorbital. The 5th one is often absent or present only on one side of the head being very small and tube-like.

Conclusions

Th European and Asian forms of the common bitterling, *R. s. sericeus* and *R. sericeus amarus* auctorum, are quite close in all the characters studied though there are some differences between the stocks and within each of them. Thus, the *CIO* in the Asian form is, in general, fragmented to the greater extent. Besides this, if all examined samples of *R. sericeus sericeus* is taken together, the Asian form is characterized by a slightly longer caudal region and a rather longer predorsal abdominal subregion (11.6-11.8 on the average in the samples from the Amur basin and Sakhalin vs. 11.0-11.2 in all European samples). However, the Asian group is not very uniform; for example, specimens from the Tumen'-Ula basin have comparatively low total and predorsal counts.

To evaluate a degree of differences between *R. s. sericeus* and *R. s. amarus* we compared them to some close forms of *Rhodeus* which are usually considered as valid species.

Rhodeus sinensis which was formerly placed in *R. sericeus* as a subspecies differs from the latter by a set of characters. First, *R. sinensis* has a higher number of branched rays in both the dorsal and anal fin (12-13 and 10 vs. commonly 9 and 9, respectively) and fewer lateral line scales (commonly 2, also 3 while in *R. sericeus* the number of pored scales less than 4 is found very rare). Besides this, *R. sinensis* is characterized by a

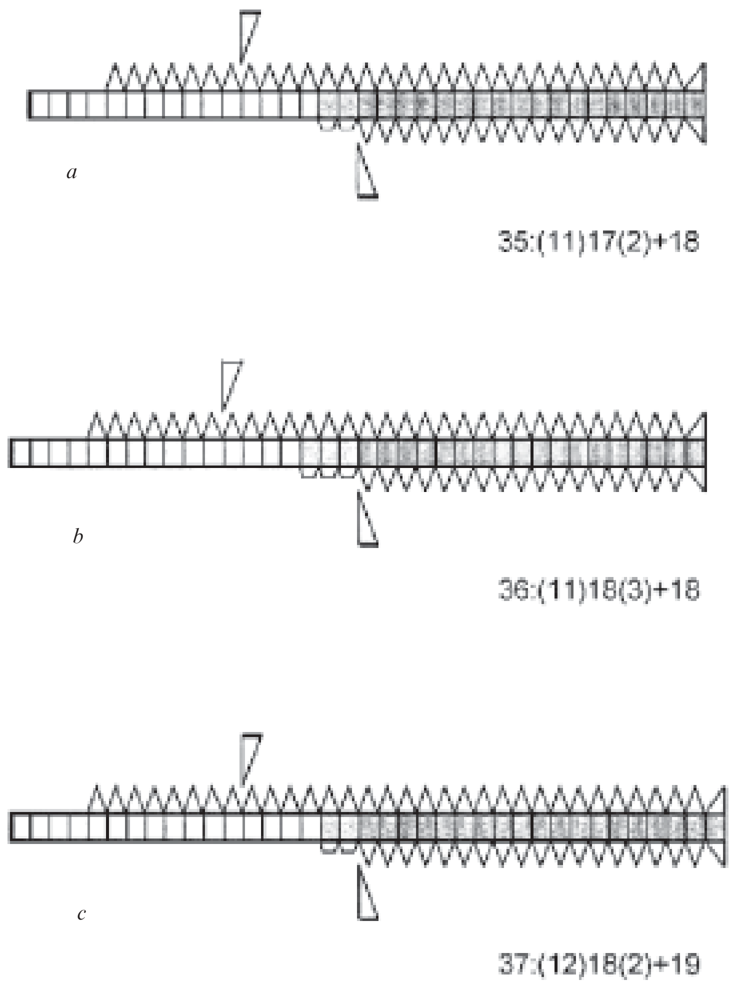

Fig. 1. Vertebral formulae (in modal values):
T*: *(Pred. Vert.)* *Abd. Vert.* (*Interm. Vert.*) + *Caud. Vert. of:

a – *R. colchicus* sp. n., *b* – *R. sericeus sericeus*, *c* – *R. sericeus amarus* markedly low total number of vertebrae – 32 or 33 (Fig. 1). All vertebral regions are comparatively shortened – there are 15 or 16 abdominal vertebrae, 17 caudal and 10 predorsal vertebrae. The peculiarities found confirm the specific rank of *R. sinensis.*

Rhodeus amurensis (Vronsky, 1967), formerly considered as a subspecies, *Pseudoperilampus lighti amurensis,* is markedly differ from all other *Rhodeus* species by small size (the maximum reported length is 38 mm) and bright coloration. Another distinguishing feature is feeding on animal food (mostly insect imagos) in contrast to other bitterlings feeding mainly on vegetable remains and detritus. Due to this, *R. amurensis* has a markedly shorter digestive tract – 97-115% of body length vs. 250-420 in other species. Besides these, it is characterized by a lower number of branched dorsal and anal fin rays (often 8, averaging 8.4 and 8.3, respectively), a lower number of pored scales (2 to 4), a low number of vertebrae (total 34: 16 abdominal and 18 caudal), and complete both *CSO* and *CIO* sensory canals. By the number of lateral line scales and vertebrae, it resembles *R. sinensis.*

Rhodeus ocellatus is clearly different by a larger eye and a specific shape of the dorsal and anal fins with almost equal in depth the first and the last rays. It possesses commonly 10 branched rays in both the dorsal and anal fins. Compared to *R. sericeus,* it has a lower number of vertebrae, which is though slightly higher than that in *R. sinensis* - 33 to 35 total, 16 or 17 abdominal, 17 or 18 caudal, and commonly 10 predorsal vertebrae. There are also some peculiar features in coloration, for example, a well-pronounced dark spot on the first four rays of the dorsal fin.

Within the samples of the common bitterling from Europe there were some from river systems belonging to the Black Sea basin in West Transcaucasia (Georgia). A comparison of these specimens with *R. sericeus* sensu lato from many localities in Europe and Asia and close species revealed that the specimens from the West Transcaucasia examined are clearly distinguishable from *R. sericeus* by a lower number of scales in the lateral series, deeper and relatively larger infraorbitals, and a lower number of vertebrae. This form is described below as a distinct species, *Rhodeus colchicus* sp. n..

Rhodeus colchicus, sp. n. (Fig. 3)

Holotype: ZISP 15164a, female, River Notanebi, coll. Satunin, 27-28.08.1909.

Paratypes: ZISP 15164, 18, River Notanebi,; coll. Satunin, 27-28.08.1909; ZM MGU P-17589, 15, River Kureba, Makharadze district, coll. R. Elanidze, 15.05.1951.

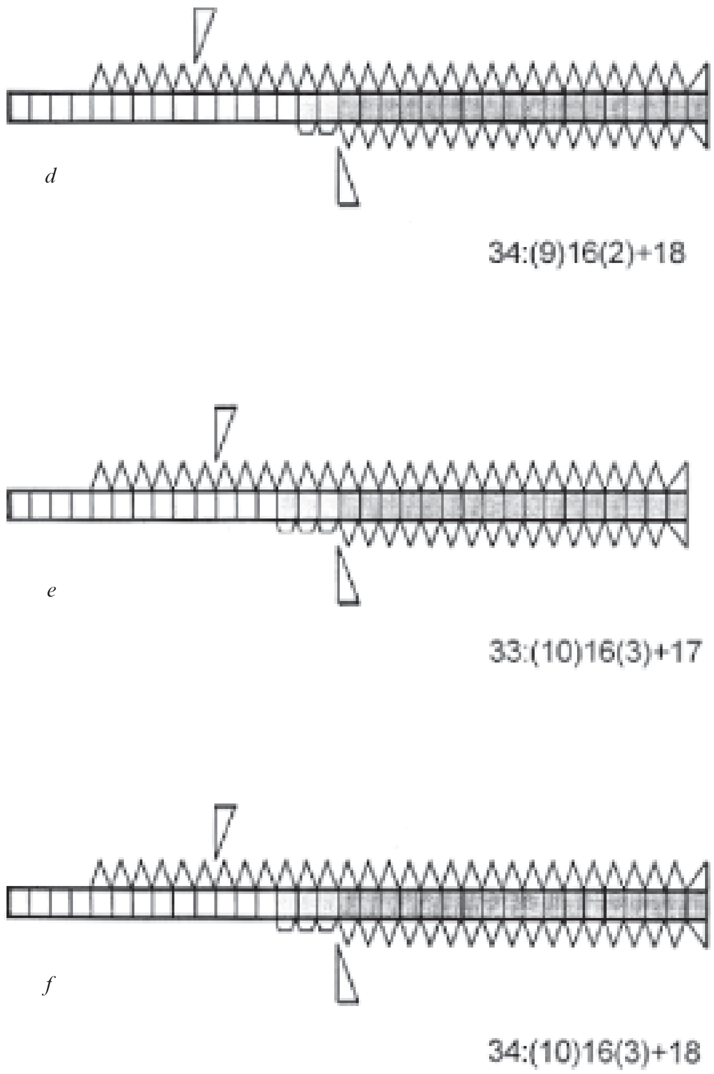

Fig. 1. Vertebral formulae (in modal values):
T*: (*Pred. Vert.*) *Abd. Vert.* (*Interm. Vert.*) + *Caud. Vert. of:

d – R. ocellatus, e – R. sinensis, f – R. amurensis.

Data for the holotype: S*L* 62.1 mm; *D* III9, *A* III9, *l. l.* 5, *squ. l.* 34, *sp.br.* 9, *vert*. 35, *abd. vert.* 17, *caud. vert.* 18, *preD. vert.* 11.

Data for the paratypes: *SL* 24.8-68.1, *D* III9 (10), *A* III (8)9(10), *l. l.* 3-7(9), *squ. l.* 34 -37, *vert.* (33)34-36, *abd. vert.* 16-18, *caud. vert.* 17, 18(19), *preD vert.* 10, 11(12). Two specimens C&S and dissected.

Additional material: ZM MGU P-19049, 4, River Supsa , coll. R. Elanidze, 16.05.1951; ZM MGU P-16718, 3, River Nochela, coll. V. Vasiliev, E. Vasilieva, 26.06.1985; ZM MGU P-1782, 2, Lake Paleostomi, coll. Daraselia, 28.01.1984.

Etymology

After the former Ancient Greek name of the area - type-locality of the species, Colchida.

Synonyms

Rhodeus sericeus amarus (non Bloch) – Berg, 1949: 814, fig. 558 (part.: West Transcaucasia from Bzyb' to Notanebi); Elanidze, 1983: 189 (Rivers Supsa, Rioni with tributaries, Khobi, Inguri, Dgamyshi, Kodori, Bzyb')

Diagnosis. It is distinguished from congeners by a suite of characters which includes large scales (34 to 37, commonly 35, in the lateral row), commonly 9 branched rays in both the dorsal and anal fins, a low number of vertebrae (33 to 36, commonly 35, total, and 16 to 18, commonly 17, in the abdominal region), a deep shortened 2nd infraorbital, a broad 4th infraorbital and a well developed 5th one with a widened lamellate portion.

Description. The body deep, markedly compressed. The head is relatively short, its length, 18-25% *SL*, is considerably less than the maximum body depth, 28-36% *SL*. The eye is rather large, its diameter, 23-41% *lc*, always exceeds the snout length, 15-33% *lc*. The snout is moderately stout, rounded at the very tip. The mouth is almost terminal. The uppermost point of the mouth cleft is about level with the lower margin of the pupil. The lower jaw-quadrate junction is on the vertical through the anterior margin of the pupil. The postorbital region is shortened, its length being 32-53, averaging 42-44, % *lc*. The head is deep, its depth at nape being 51-73% *lc*, and the operculum depth 53-70% *lc*. The lower jaw is short, its length, 24-34% *lc*, is about equal to 1/2 of the operculum depth.

The dorsal fin has 3 simple and 9 branched rays (10 found in only one specimen). Its outer margin is markedly convex. The dorsal fin origin is slightly behind the vertical through the posterior end of the pelvic fin base. The anal fin has 3 simple and 9 (in 28 specimens), 8 (in 3) or 10 (in 2) branched rays. Its outer margin is concave. The anal fin origin is slightly behind the vertical through the middle of the dorsal fin base. The caudal fin is clearly forked, with its lobes slightly pointed.

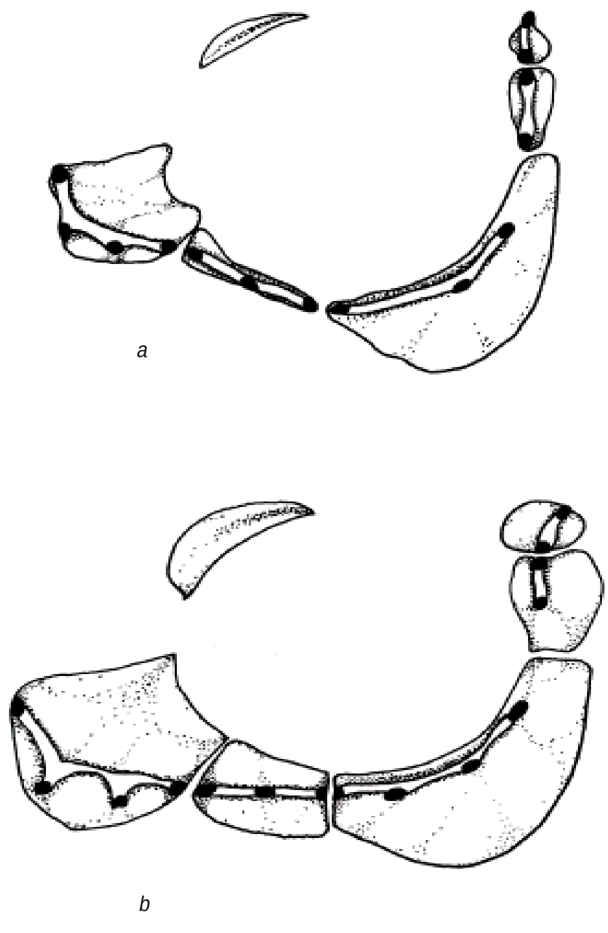

Fig. 2. Circum-orbitals of:
a – *R.sericeus amarus,* ZISP 24752, *SL* 61.0 mm, female, River Dnieper.
b - *R. colchicus*, ZISP 15164, *SL* 59.3 mm, female, River Notanebi at Notanebi.

The number of gill-rakers is 9 or 10 in total on the outer side of the first left gill arch.

The scales are quite large, and the lateral series includes 34-37 scales (37 found in only one specimen), commonly 35 (found in 20 specimens). The number of pored scales (the lateral line scales) is 3 to 7 (9 in one specimens) with a mode of 5 (found in 22 specimens).

The *CSO* is interrupted between the nasal (2 pores) and frontal (6 to 8, commonly 6, pores). The parietal supraorbital canal segment is lacking in all specimens. The *CIO* is incomplete. It is interrupted in one (between the 3rd and the 4th infraorbital) or two-three (also between the 1st and the 2nd infraorbitals and, not often between the last infraorbital and the pterotic) places. Compared to *R. sericeus,* the *CIO* in *R. colchicus* sp. n. is fragmented to a less degree, and the 5th infraorbital is usually present. There are 13 to 17 *CIO* pores with 4 openings on the 1st infraorbital. The *CPM* does not communicate with *CIO*, terminating below the upper end of the preoperculum. The *CPM* is always interrupted between the dentary and preoperculum. There are 3 pores on the dentary (in the first fragment of the canal) and commonly 6, also 7, pores on the preoperculum. The *CST* is lacking in 40 specimens.

Total number of vertebrae (Tabl. 1) 33 to 36, commonly 35, averaging 35.2. Number of abdominal vertebrae 16 to 18, often 17, averaging 17.3. Predorsal vertebrae 10 to 13 with a distinct mode of 11, averaging 11.1. Intermediate vertebrae 2 or 3. Number of caudal vertebrae 17 to 19 with a distinct mode of 18, averaging 17.8. Vertebral formulae 17+18 (24), 18+18 (9), 17+19 (7), 18+17 (7), rarely 16+17 (1) or 17+17 (1).

The infraorbitals (Fig. 2 *a*) are comparatively large. Length of the 1st infraorbital averages 63% of the eye diameter. The 2nd infraorbital is deep, its lamellate portion is well-developed and the bone is rectangular-like; its depth averages 75% of its length. The 3rd infraorbital is broad including its anterior and upper parts. The 4th and the 5th infraorbitals are also widened, possessing well-developed lamellate portions.

Distribution

We based the description of *R. colchicus* sp. n. on materials from rivers Notanebi, Kureba, Supsa, Nochela (a tributary of Rioni), and Lake Paleostomi.

Most probably, the common bitterling from West Geogria of other authors corresponds to the same species. The common bitterling was reported from Rioni, Notanebi and Paleostomi (Berg, 1949). Kessler (1878) noticed that the bitterling inhabits small lakes in the system of the Rioni tributary, Krasnaya Rechka, but avoids the river itself because of fast current. According

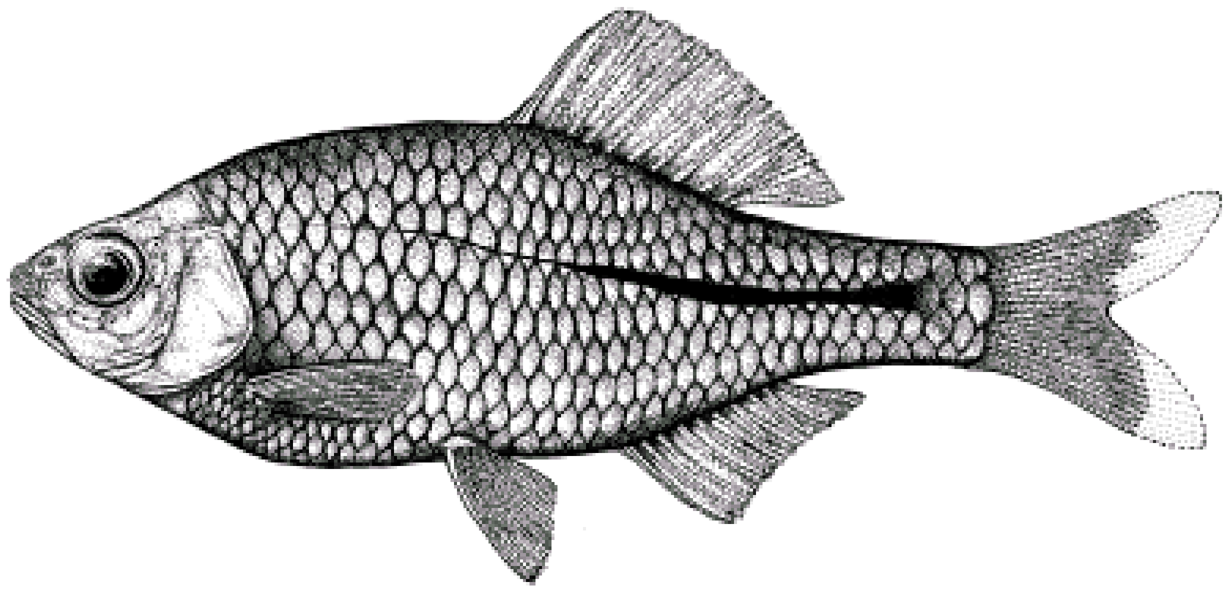

Fig. 3. *Rhodeus colchicus,* holotype, ZISP 15164a, *SL* 62.1 mm, female, River Notanebi. Drawn by A.M. Komlev.

to data of Baratch (1941), this bitterling was found by Shugurov in Rioni downstream from Samtredi, and by Satunin in River Choloki at Kobuleti. Baratch (1941) reported it from rivers Okhodzha and Chiornaya (Black River) in Abkhazia, and Elanidze (1983) – from rivers Supsa, Rioni (and at the mouth of its tributary Sulori), Khobi, Inguri (at the mouth), Dgamyshi, Kodori, Bzyb', and Lake Skurchia. Tuniev (1999) reported the common bitterling from rivers Kherota, Loo and others from the territory of the Sochi National Park.

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Literature

Arai, R., Y. Akai, Acheilognathus melanogaster, a senior synonym of *A. moriokae,* with a revision of the genera of the subfamily Acheilognathinae (Cypriniformes, Cyprinidae) // Bull. Natn. Sci. Mus., Ser. A., Zool., 1988. Vol. 14. P. 199-213.

Baratch, G.P. [Freshwater fishes. Fauna of Georgia. Vol. 1]. - Tbilisi: Izd. Akad. Nauk Gruz. SSR, 1941. 287 pp. (in Russian).

Berg, L.S. [Fishes of fresh waters of the USSR and adjacent countries]. Part 2, 3. - Moscow, Leningrad: Izd-vo AN SSSR, 1949. P. 467-1381 (in Russian).

Bloch, M.E. Naturgeschichte der auslandischen Fische. - Berlin, 1782. Vol. 7. S. i+xiv + 1-144.

Dybowski, B.N. Vorlaufige Mittheilungen uber die Fischfauna des Ononflusses und des Ingoda in Transbaikalien // Verh. K.-K. Zool.- Bot. Ver. Ges. Wien, 1869. Bd. 19. S. 945-958.

Dybowski, B.N. [Fishes of the Amur water system] // Izvestiya Sibirskogo Otdeleniya Russkogo Geograficheskogo Obshchestva, Vol. 8, N 1-2, 1877. P.1-29 (in Russian).

Elanidze, R.F. [Ichthyofauna of the rivers and lakes of Georgia]. - Tbilisi: Metzniereba, 1983. 318 pp. (in Russian).

Günther, A. Catalogue of the fishes in the British Museum. Catalogue of the Physostomi, containing the families Heteropygii, Cyprinidae, Gonorhynchidae, Hyondontidae, Osteoglossidae, Clupeidae,...etc. London, 1868. Vol. 7. P. 1-512.

Holčik, J. [Systematik position of thre european bitterling, *Rhodeus sericeus amarus* (Bloch, 1783)] // Voprosy Ikhtiologii, 1959. N 13. P. 39-50.

Holčik, J., J.J. Duyvené de Wit. Systematic status of the bitterling from Asia Minor and notes on the geographical variability of *Rhodeus sericeus* (Pallas, 1776) in the area of its distribution // Zeitschr. F. Wessenschaft. Zoologie 169, 1964. P. 396-412.

Holčik, J. *Rhodeus sericeus* // The freshwater fishes of Europe. Vol. 5/1. Cyprinidae 2/ 1. - Wiebelsheim: AULA-Verl., 1999. P. 1-32.

Holčik, J. & L. Jedlička. Geographical variation of some taxonomically important characters in fishes: the case of the bitterling *Rhodeus sericeus* // Invironm. Biol. Fish. , 1994. Vol. 41. P. 147-170.

Karaman, S. Pisces Macedoniae. - Split: Hrvatska Stampaija, 1924. 89 pp.
Kessler, K. [Travels in the Trancaucasian regions in 1876 with a zoological goal] // Tr. obtsch. Estestv., 1878. Vol. 8. P. 1-200 (in Russian).
Kottelat, M. European freshwater fishes. An heuristic cheklist of the freshwater fishes of Europe (exclusive of former USSR), with an introduction for nonsystematists and comments on nomenclature and conservation // Biologia (Bratislava) , Sect. Zool., 1997. V. 52. Suppl. 5. P. 1-271.
Pallas, P.S. Riese durch verschiedene Provinzen des Russischen Reichs. 3. Theil. - St.Petersburg: Kaiserlichen Academie der Wissenschaften, 1776. P. 760 .
Svetovidov, A.N., G.K. Eremeev. O evropeiskom i amurskom gorchakakh [On the european and amur bitterlings (*Rhodeus sericeus*)] // Doklady Akadem. Nauk SSSR, 1935. Vol. 1. P. 582-587 (in Russian).
Tuniev, B.S. [Cyclostomata and fishes] // Flora i fauna zapovednikov, 1999. N 81. P. 39-43 (in Russian).
Warpachowski, N. A. Über die Gattung *Hemiculter* Bleek. und über eine neue Gattung *Hemiculterella* // Bull. Acad. Imp. Sci, 1887. Bd. 32. N 1. P. 13-24.

АННОТАЦИЯ

УДК. 597.5.Cyprinidae

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НОВЫЕ ДАННЫЕ К МОРФОЛОГИИ ОБЫКНОВЕННОГО ГОРЧАКА, *RHODEUS SERICEUS* (CYPRINIDAE: ACHEILOGNATHINAE), С ОПИСАНИЕМ НОВОГО ВИДА, *RHODEUS COLCHICUS*, ИЗ ЗАПАДНОГО ЗАКАВКАЗЬЯ

Проведена ревизия *Rhodeus sericeus* с использованием, наряду с традиционными признаками, не употреблявшихся ранее для систематики горчаков – каналов сейсмосенсорной системы на голове, формы и размеров подглазничных костей и структуры позвоночника. Не обнаружено признаков, которые подтверждали бы придание *R. sericeus amarus* видового статуса. С другой стороны, выборки горчака из Закавказья обнаружили отличия от всего комплекса выборок *R. sericeus* по ареалу (европейской и азиатской частей). Этот горчак описывается как новый вид, *R. colchicus.* Он отличается от изученных видов рода *Rhodeus* комплексом признаков, который включает: сравнительно крупные чешуи (34-37 поперечных рядов с модой 35), невысокое число позвонков (33-36 с модой 35 для общего числа и 16-18 с модой 17 для туловищных позвонков), очень высокое относительно короткое второе infraorbitale, широкие четвертое и пятое infraorbitalia (последнее обычно имеется, его пластинчатая часть нормально развита).