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New data on the geographic distribution and ecology of the Ukrainian brook lamprey, *Eudontomyzon mariae* (Berg, 1931)

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A b s t r a c t . New records of the Ukrainian brook lamprey *Eudontomyzon mariae* (Berg, 1931) from the upper tributaries of the both Volga (Caspian Sea watershed) and Don (Black Sea watershed) river basins are documented. This significantly extends the range of the Ukrainian brook lamprey eastwards. The Ukrainian brook lamprey and the genus *Eudontomyzon* are the most distributed species and genus of the lampreys in Europe, respectively.

Key words: *Eudontomyzon mariae,* geographic distribution, Volga R. basin, Don R.basin, spawning substrate

Introduction

The surprising discovery of the Ukrainian brook lamprey *Eudontomyzon mariae* (Berg, 1931) in the Elan'-Kadada and Sura rivers in the Volga River basin (L e v i n 2001) indicated that the geographical distribution of this species can be far more east than it has been initially assumed (H o l č í k & R e n a u d 1986). New specimens gathered in the Volga and Don River basins confirm this assumption. The purpose of this paper is to update the geographic distribution and ecology of *Eudontomyzon mariae*.

Material and Study Sites

During the period 1998-2005 samples of the Ukrainian brook lamprey, both adults and ammocoetes, were obtained from the Volga and the Don rivers. The following list contains description of adult specimens only. Data shown after the number of specimens represent their total length in mm.

Volga R. samples: 1) Elan'-Kadada R. – 2 ♂, 175.0–198.1; 1 ♀, 157.1; 2) Sura R. – 1 ♂, 199.5; 3); Chardym R. – 12 ♂, 140.1–170.2; 22 ♀, 136.1–167.0; 4) Uza R. – 1 ♂, 146.0; 14 ♀, 133.0–171.6; 5) Verkhozimka R. – 4 ♂, 137.9–139.1; 5 ♀, 132.5–157.3; 6) Tersa R. – 5 ♀, 140.6–157.5; 7) Ardym R. – 19 ♂, 128.0–175.2, 9 ♀, 136.6–175.2; 8) Muromka R. – 2 ♂, 152.0–164.4 mm; 1 ♀, 159.8 mm.

Don R. samples: 9) Sineomutovka R. – 6 ♂, 140.0–177.4; 14 ♀, 157.0–195.5; 10) Serdoba R. – 4 ♂, 157.1–175.1; 1♀, 157.3; 11) Tauza R. – 6 ♂, 133.6–159.4; 5 ♀, 134.4–155.8.

Most of the lamprey samples are deposited in the A.N. Severtsov Institute of Ecology and Evolution, Russian Academy of Sciences, Moscow.

Results and Discussion

Geographic distribution

Several species of lamprey are known from the Volga River basin. One of them is the Caspian lamprey *Caspiomyzon wagneri* (Kessler, 1870) – an anadromous species endemic to the Caspian Sea basin formerly common and economically important, at present rare, endangered and included in the Red Book of Russian Federation (Pavlov 2001). Recently the resident form of the European river parasitic lamprey *Lampetra fluviatilis* (Linnaeus, 1758) was found in the Volga R. system (the Bol'shaya Kokshaga basin) (Vasil'eva & Sotnikov 2004). In addition, there are two freshwater non-parasitic lamprey species. The European brook lamprey *Lampetra planeri* (Bloch, 1784) has been found both in the upper (Kessler 1870, Berg 1948, Alekseev 1982, Shatunovskij et al. 1988) and the middle part of the Volga basin (Klimova 1997, Reshetnikov et al. 2004). Our recent findings of *E. mariae* increase the number of the lamprey species in the Volga R. basin to four.

In the middle part of the Volga basin, quite extensive distribution of *Eudontomyzon mariae* was revealed (Fig. 1). At the present time, the Ukrainian brook lamprey has been found in eight rivers of the Middle Volga basin. The Ukrainian brook lamprey inhabits

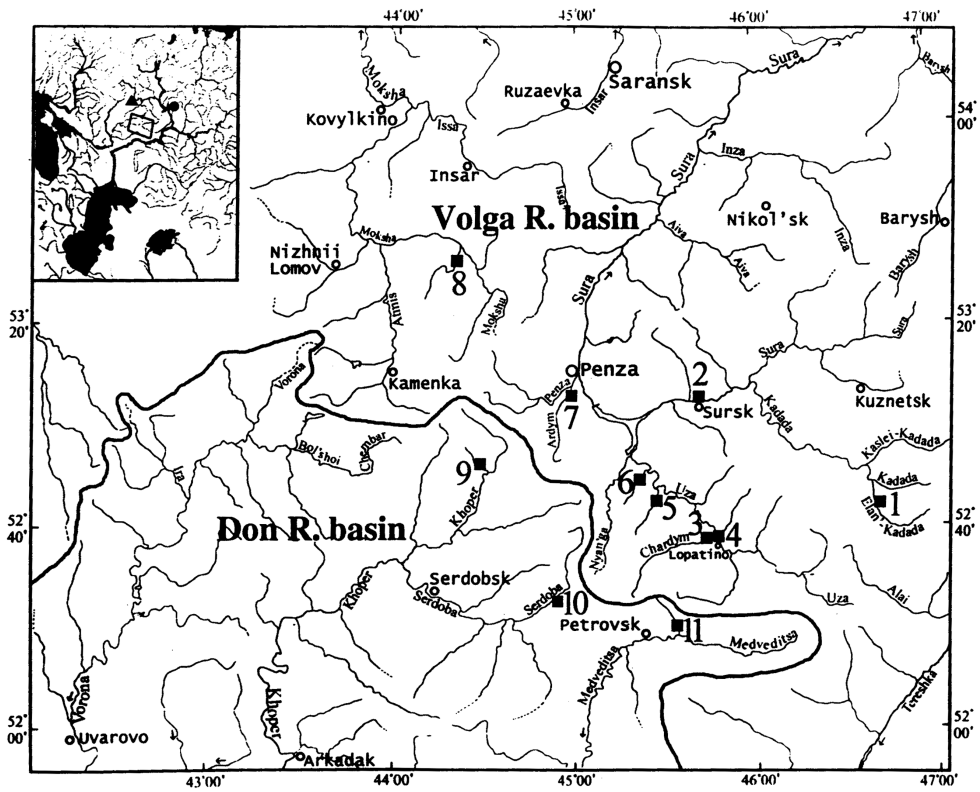

Fig.1. Distribution of the *Eudontomyzon mariae* in streams of the Volga and Don R. basins. Locations numbered as in the text. Inside the map inset: ▲ = nearest occurrence of *Lampetra planeri* , ● = nearest presence of the resident population of *Lampetra fluviatilis* (according to Reshetnikov et al. 2004 and Vasil'eva & Sotnikov 2004).

the upper part of the Sura River and its tributaries. In the Sura basin, no resident lampreys were recorded. Magnitskij (1928) mentioned the anadromous Caspian lamprey *Caspiomyzon wagneri*, which migrated for a spawning to the Sura River and its tributaries (the Penza, Aiva, and Inza Rivers) as far as Penza city and upstream from it in 1920s.

For the Oka River basin, Dushin (1978) refers to the European brook lamprey *Lampetra planeri* from the Atmis River, a left tributary of the Moksha River. This description is probably incorrect, because he described the occurrence of *L. planeri* in the basin of the Vorona River (the Don basin), where *E. mariae*, but not *L. planeri*, is found (Sokolov 1995). We did not study any lampreys described by Dushin. Nevertheless, we disagree with his classification since he only studied ammocoetes and did not present any taxonomic characteristics of these lampreys.

Three adult specimens of *E. mariae* were sampled in the Muromka River which is close to the Atmis River (20–25 km). It means that in the Oka River basin two non-parasitic species of lampreys were recorded: *E. mariae* and *L. planeri* (Klimova 1997, Reshetnikov et al. 2004). The latter was found in the Ranova River (right tributary of the Pronya River), the Zhizdra and Ugra rivers (tributaries of the Oka R.). Therefore, the Oka River basin is a sympatric zone of these two non-parasitic lamprey species. However, it remains to be investigated if there is some spatial overlap between *L. planeri* and *E. mariae*. In some river basins, both the Ukrainian and the European brook lampreys exist together; for example, in the Danube River basin (the Hornád and Morava rivers) and the Baltic Sea basin (the upper Neman River basin and the Vistula R.) (Zhukov 1965, Rembiszewski 1968, Holčík 1970, 1995, Kappus et al. 1995). If this is the case the existence of hybrids may be expected. Such hybrids were described by Rembiszewski (l.c.) from the Jeziorka brook in the Vistula R. basin. However, the existence of these hybrids is questionable because of great variation of morphological characteristics of *E. mariae,* and the absence of data on velar tentacles, which is the only reliable diagnostic feature (Holčík & Renaud l.c., Holčík & Delić 2000). According to Zhukov (l.c.) the spawning period of both species in the tributaries of the Neman R. basin were different for each species and no hybrids were found.

It is noteworthy that the findings of the Ukrainian lamprey in the Volga basin are concentrated in the upper right tributaries bordering the rivers flowing to the Don. This confirms the opinion of Lindberg (1955, 1972) that both the Volga R. basin and the Don R. basin were re-settled by the Danubian fish fauna after their original fish fauna has been destroyed by the transgression of the World Ocean at the end of Pleistocene. It also confirms the possible penetration of *E. mariae* into the Volga R. basin from the Don R. basin due to interconnections of the upper courses of these river basins streams (Lindberg l.c., Levin l.c., Reshetnikov 2003).

Considering the data on the occurrence of the Ukrainian brook lamprey and also other species of this genus gathered by Holčík & Renaud (l.c.), Kappus et al. (1995), Holčík (1995), Witkowski (1996), and Holčík & Delić (l.c.) we suggest that both of the species studied and the entire genus *Eudontomyzon* are the most distributed lampreys in Europe. *E. mariae* is known from the watersheds of the Baltic Sea (river basins Oder, Vistula, Neman), the Black Sea (Sava, Drava, Danube [excluding the Tisza, Timiş and Cerna rivers], Prut, Dnieper, Dniester, Don, Kuban, and in rivers of Georgia from Bzyb‘ in south to Chorokhi in north), the Aegean Sea (Vardar) and the Caspian Sea (Volga R. basin). Other two non-parasitic species of this genus found in Europe are *Eudontomyzon stankokaramani* (Karaman, 1974) distributed in the Drin R. basin (the Adriatic Sea watershed; Holčík & Šorić 2004) and *E. hellenicus* (Vladykov, Renaud, Kott et

Economidis, 1982), recorded from both the Strymon R. basin (Aegean Sea watershed) and the Louros R. basin (Ionian Sea Watershed; R e n a u d 1986). The parasitic species *E. danfordi* (Regan, 1911) is limited to the Tisza, Timiş and Cerna river drainages (Danube R. basin, Black Sea watershed; R e n a u d & H o l č í k 1986).

N o t e s o n a b u n d a n c e a n d e c o l o g y

E. mariae is considered an endangered species both by the Russian Federation (P a v l o v 2001) and IUCN (B a i l l i e et al. 2004). However, in eastern rivers of the Volga R.basin R. basin *E. mariae* is abundant. We found three spawning sites in the Chardym River, and at one of them we observed about one hundred individuals in 2004. About fifty spawning specimens of the Ukrainian lamprey were observed at a spawning site in the Ardym River near Penza city in 2001. The high density of *E. mariae* may be explained by the weak development of industry in watersheds of the inspected rivers. Moreover, chemical fertilizers, pesticides, and weed killers have not been used in this region since 1991. The good water quality of these rivers is confirmed by the occurrence of the schneider *Alburnoides bipunctatus rossicus* Berg, 1924, the dace *Leuciscus leuciscus* (Linnaeus, 1758) and the chub *L. cephalus* (Linnaeus, 1758) which do not tolerate polluted water. The abundance of *E. mariae* is also confirmed by observations of the local anglers that the chub refuses to take any bait in the period of the lamprey spawning (i.e. the beginning of May to the beginning of June). We found three specimens of adult *E. mariae* in the intestinal tract of a chub caught in the Chardym River. These observations indicate that the chub, and probably also other predators, consume the lampreys in the period of their spawning.

The Ukrainian brook lamprey usually spawns on the gravel and sand substrates (H o l č í k & R e n a u d l.c.). Such substrates were found at most of the explored spawning sites. However, in the Sineomutovka R. (Don R. basin) a different type of spawning substrate was found. About forty specimens of *E. mariae* spawned on the bottom covered by hard white clay in 2002. Spawning group did not build any nests in this clay. It is possible that the fertilized eggs were washed downstream and laid into small depressions located below the spawning place. If this is true it indicates the ability of the Ukrainian brook lamprey to adjust to the different spawning grounds. This possibility will need to be examined by proper study of the spawning habit of the Ukrainian brook lamprey in this river.

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