

**NEW DATA REGARDING THE DISTRIBUTION AND ICHTHYOCOENOLOGICAL
AFFINITIES OF THE UKRAINIAN BROOK LAMPREY, *LAMPETRA (EUDONTOMYZON)
MARIAE* (CEPHALASPIDOMORPHI: PETROMYZONTIFORMES: PETROMYZONTIDAE),
IN SOUTHERN POLAND**

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Drąg-Kozak E., Nowak M., Szerbik P., Klaczak A., Mikołajczyk T., Fałowska B., Socha M., Popek W.
2011. New data regarding the distribution and ichthyocoenological affinities of the Ukrainian brook
lamprey, *Lampetra (Eudontomyzon) mariae* (Cephalaspidomorphi: Petromyzontiformes:
Petromyzontidae), in southern Poland. Acta Ichthyol. Piscat. 41 (2): 123–127.

Abstract. Fifteen new localities of the Ukrainian brook lamprey, *Lampetra (Eudontomyzon) mariae*, were found within 2008–2010. The majority of them are located in the Nida River drainage. Additionally, the occurrence of that species in the Strwiąż River, a tributary of the Dniester, was confirmed. The cluster analysis performed suggests, that *L. mariae* exhibits strong affinity to the stone loach, *Barbatula barbatula*, and the Eurasian minnow, *Phoxinus phoxinus*. We believe that the distribution of *L. mariae* on the territory of Poland seems to be strongly underestimated.

Keywords: *Lampetra (Eudontomyzon) mariae*, biodiversity, fish communities, ichthyocoenoses, protected species

The Ukrainian brook lamprey, *Lampetra (Eudontomyzon) mariae* (Berg, 1931), is one of five lamprey species known to occur in Poland (Rembiszewski 1967, Witkowski 2001). The remaining four are: European brook lamprey, *Lampetra planeri* (Bloch, 1784); river lamprey, *Lampetra fluviatilis* (L.); sea lamprey, *Petromyzon marinus* L.; and Danubian brook lamprey, *Lampetra (Eudontomyzon) vladykovi* Oliva et Zanandrea, 1959. The last one was reported only from the Czarna Orawa River by Balon and Holčík (1964). The systematic position of the Ukrainian brook lamprey is obscure (Blank et al. 2008), thus in the present work both generic names, *Lampetra* and *Eudontomyzon*, were applied, the latter in subgeneric rank.

Lampetra mariae is a non-parasitic, freshwater species, inhabiting the mountain and foothill zones of watercourses with clear water, strong current, and the bottom consisting of sand and gravel. The ammocoetes live in detritus-rich parts of the streams with weak current and sandy bottom. Spawning takes place on gravel and sandy substrates (Witkowski 2001, Kottelat and Freyhof 2007).

On the Polish territory *L. mariae* was discovered in the Rudawa and Skawa rivers (the Vistula River drainage) near Krakow (Oliva and Hensel 1962). Since then the species has been found on a number of localities, mainly in the eastern and southern parts of the Vistula River

drainage (Fig. 1). Until present, some 100 localities of this species have been known in Poland (Witkowski 2001). The majority of the known localities are scattered within the river systems of Narew, Bug, and Biebrza (Penczak et al. 1992, Witkowski 1995, 2001). Furthermore, its presence was recorded in several left-bank tributaries of the middle Vistula (i.e., Pilica River with some tributaries, Radomka and Rawka rivers) (Marszał 2001, Zięba et al. 2001, Pietraszewski et al. 2008). Some sites of this species were also discovered in the Odra River drainage, namely in Widawka, Grabia, Dobrzyńka, Pisa, and Warta rivers (Marszał et al. 1993, Zięba et al. 2001, Kruk et al. 2009). Moreover, *L. mariae* was recorded in the Czarna Orawa River within the small Polish part of the Danube drainage (Balon and Holčík 1964) and in the Strwiąż River with its tributaries within the Dniester drainage (Rembiszewski 1971).

Despite many ichthyological surveys conducted in the drainage areas of both the Vistula and the Odra Rivers, the current knowledge on the distribution of lampreys, especially *L. mariae*, seems scarce and incomplete. Rembiszewski (1967) suggested that it could be at least partially due to incorrect identification of the lamprey species. It seems probable that in many cases it has been confused with similar *L. planeri*. On the other hand Marszał (2001) admits that *L. mariae* has substituted *L. planeri* in a number of localities.

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Data on coenological affinities of *L. mariae* are even less available. As far as the authors are aware, any single study regarding the ichthyocoenological preferences of that lamprey species on the territory of Poland has been carried out so far.

In the present study certain new findings of *L. mariae* in southern Poland are presented together with results of the investigation on coenological affinities of that species.

Ichthyological surveys were carried out in the period of 2008–2010 in the upper Vistula River drainage. Fish were sampled by upstream electrofishing with a back-pack electroshocker (IG-600T, Hans Grassl GmbH). Lampreys are difficult to catch during the electrofishing targeting on fish monitoring and thus their occurrence is often missed or underestimated (Moser et al. 2007, Szczerbik and Nowak, personal observation). After capture and identification, all the specimens were promptly released.

Species identification was based on certain key characters: pigmentation of the caudal fin and shape of caudal fins in both ammocoetes and adults, body colouration pattern in ammocoetes and relative eye size in adults (Rembiszewski 1967, 1968, 1971, Marszał et al. 1993, Holčík and Delić 2000, Kottelat and Freyhof 2007, Stefanov and Holčík 2007, Naseka et al. 2009).

The ichthyocoenological affinities were ascertained by cluster analysis. The presence or absence of a species on localities was coded by 1 or 0, respectively, and such a matrix was used for clustering with Ward's method and Euclidean distance. All the analyses were performed using the R ver. 2.9.2 software (The R Foundation for Statistical Computing, 2009).

New data on occurrence and identification. During the period 2008–2010 a total of 15 new localities of *L. mariae* were discovered. Two of them, on the Krzywica River, a tributary of the Wilga River, were localised in the surroundings of the city of Kraków. Remaining 13 sites were found within the Nida River drainage: in Belnianka, Bobrza, Czarna Nida, Mierzawa, Sufraganiec and Nida rivers (Fig. 1). Additionally, the presence of *L. mariae* was also confirmed in the Strwiąż River, from where the species has been known for over 40 years Rembiszewski (1971).

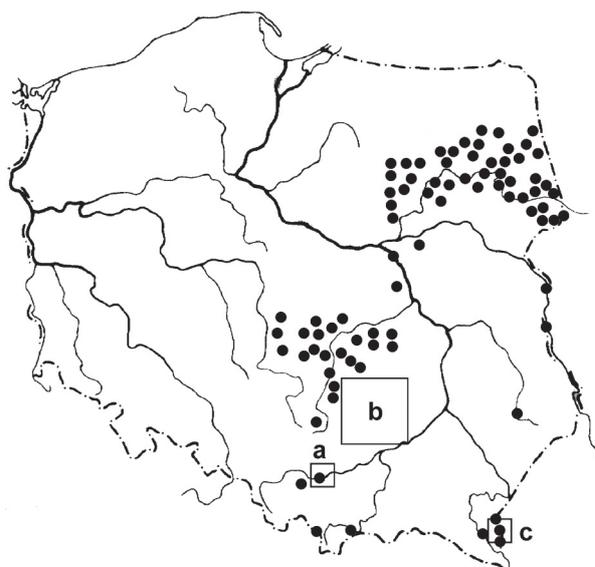


Fig. 1. Map of Poland with marked known occurrences of *Lampetra (Eudontomyzon) mariae* according to the literature cited (filled dots) and the study areas (boxes): a, Kraków City agglomeration and surroundings; b, the Nida River drainage; c, the Strwiąż River drainage

On these 15 localities a total number of 98 specimens of *L. mariae* (73 ammocoetes, 3 subadults and 22 adults) were collected. In gross majority of these localities *L. mariae* was very rare species, not exceeding 1% of the total fish abundance. Only in two sites on the Sufraganiec Stream in Kielce City the lampreys were more frequent, reaching ca. 10% of the total fish caught. All the adults and subadults had notable dark pigmentation of the caudal fin (this trait is lacking in *L. planeri*) and relatively small eye diameter. Dark colouration of the dorsum was contrasting with bright lateral sides. The ammocoetes had mottled colouration of the body and dark pigmented caudal fin, too (Fig. 2). Dark pigmentation of the branchial area reached the branchial vents, as described by Rembiszewski (1971). Any single ammocoete deviated

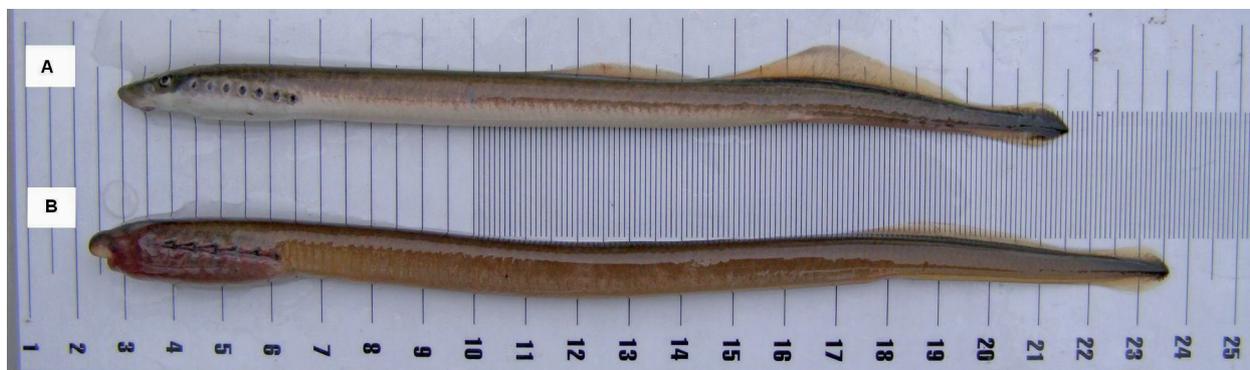


Fig. 2. A) Adult *Lampetra (Eudontomyzon) mariae* from the Czarna Nida River; Well visible are relatively small eye diameter and dark pigmentation of the caudal fin; B) Ammocoete of *Lampetra (Eudontomyzon) mariae* from the Czarna Nida River; Well visible are dark pigmentation of the caudal fin and mottled colouration of the body; Photo by M. Nowak

from this colour pattern. The caudal fin was spade-like, in contrast to *L. planeri* in which this fin is more rounded (Rembiszewski 1971, Stefanov and Holčík 2007). Due to the fact, that all the lampreys occurring in Poland are protected by law (Anonymous 2004), they were released into water immediately after collection and identification in the field. Thus, the teeth formula has not been investigated. However, the external traits, as body colouration and eye diameter have been considered valid and crucial for the identification of both *L. mariae* and *L. planeri* by a number of authors (Rembiszewski 1967, 1968, 1971, Marszał et al. 1993, Holčík and Delić 2000, Stefanov and Holčík 2007, Naseka et al. 2009). According to Rembiszewski (1971), dark pigmentation of the caudal fin is fully developed in specimens larger than 60 mm in total length. All of the specimens collected were larger than 100 mm in total length.

Thirteen out of 15 new localities of *L. mariae* reported in the current study were within the Nida River drainage, a largest left-bank tributary of the upper Vistula drainage (Sufraganie, Silnica, Bobrza, Lubrzanka, Belniana, Czarna Nida and Nida). This river system was thoroughly investigated in the past twice: in 1968–1969 (Penczak 1971) and 1998–1999 (Buras et al. 2001). Neither Penczak (1971), nor Buras et al. (2001) reported the occurrence of *L. mariae* in that territory. On the other hand these authors recorded on a number of sites other lamprey species, *L. planeri*. Our surveys revealed pres-

ence of *L. mariae* on a majority of localities reported previously for *L. planeri*. It should be noted that sympatric occurrence of the both species is found extremely rare (Marszał et al. 1993). Thus, we concluded that either *L. mariae* has invaded the Nida River drainage in recent years, or in the earlier papers it was confused with *L. planeri*. The former hypothesis seems far less probable than the latter, especially considering a short time, namely 10 years, since the last report of *L. planeri* (see Buras et al. 2001). It seems hardly impossible that *L. mariae* could successfully colonised and totally replaced *L. planeri* in a number of localities within a large river system. Of course, one cannot definitely exclude the opinion of Marszał (2001), that *L. mariae* has substituted *L. planeri* in certain water courses, however, it does not seem in the case of the Nida River drainage. The hypothesis of incorrect identification has already been stated by Rembiszewski (1967). Also the first records of *L. mariae* on the Polish territory were as well verifications of earlier misidentifications (Oliva and Hensel 1962). Unexpected numerous findings of *L. mariae* in the middle Vistula River drainage prompted Rembiszewski (1967) to the conclusion, that this species might be much wider distributed throughout Poland, than it has been previously considered. Despite the subsequent ichthyological surveys performed since then, it should be definitely considered, that *L. mariae* is still a poorly known species and data on its distribution remains scarce.

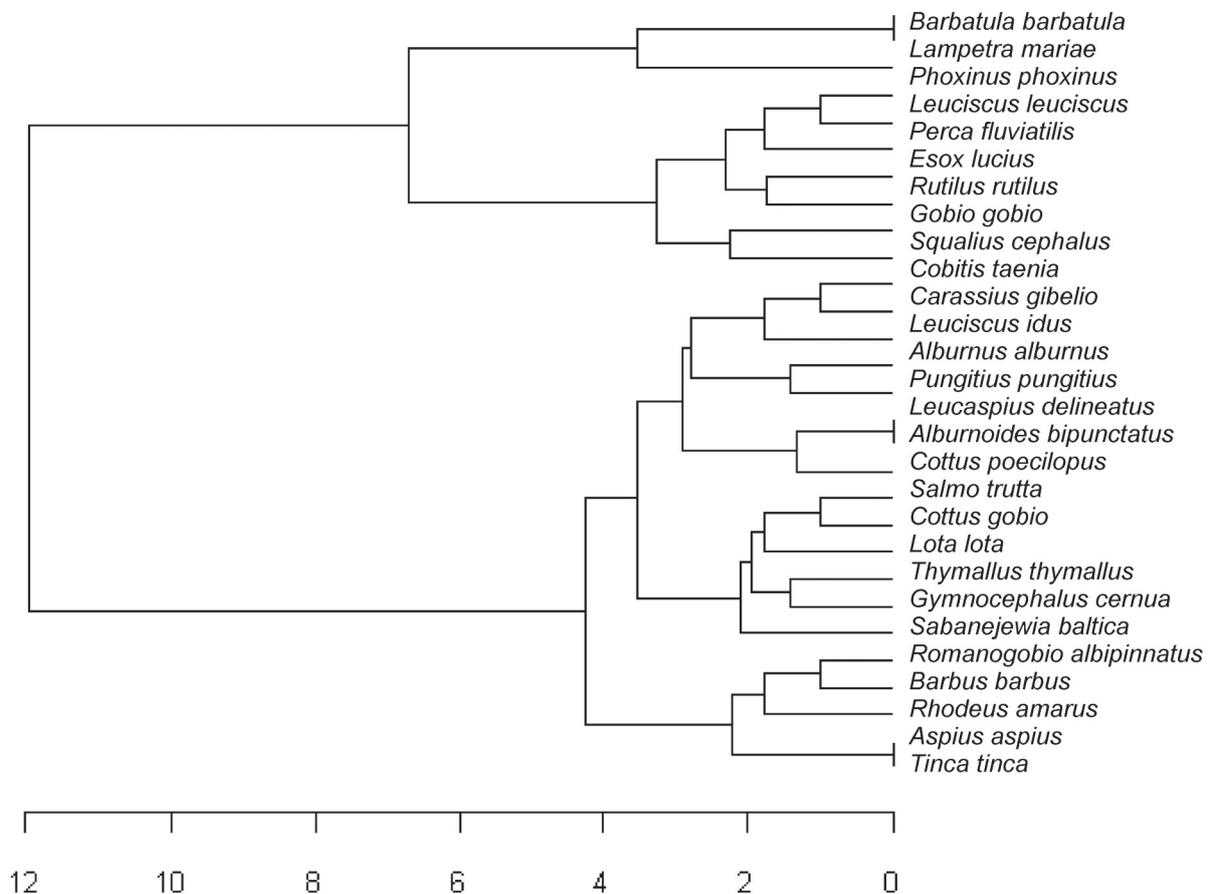


Fig. 3. Cluster analysis based solely on the results of the authors' own sampling

Coenological affinities. On the sampled localities a total number of 28 species were found to co-occur with *L. mariae*. Performed cluster analysis showed that *L. mariae* has the strongest affinity to the stone loach, *Barbatula barbatula* (L.), and the Eurasian minnow, *Phoxinus phoxinus* (L.) (Fig. 3). The former species shared with *L. mariae* all the sites studied. Further fish species that were often accompanied the lampreys were: common dace, *Leuciscus leuciscus* (L.); European perch, *Perca fluviatilis* L.; northern pike, *Esox lucius* L.; roach, *Rutilus rutilus* (L.); gudgeon, *Gobio gobio* (L.); chub, *Squalius cephalus* (L.); and spined loach, *Cobitis cf. taenia* (L.).

As far as the authors are aware, there is a significant lack of comparative data on ichthyocoenological affinities of lampreys, especially *L. mariae*. Irrespectively, Ševc and Koščo (unpublished data) found that *L. planeri* in the Poprad River system preferred habitats shared with brown trout, *Salmo trutta "fario"* L.; European grayling, *Thymallus thymallus* (L.); and *P. phoxinus*. In comparison to the results of the presently reported study, as well as regarding the literature on the habitat preferences of lampreys and the present authors' own field observations, it could be concluded that both "brook" lampreys choose shallow parts of streams and rivers, with sandy bottom covered with a thin layer of organic sediments. The same sites are preferred by common eurytopic fishes with some affinities to water current, as *B. barbatula*, *G. gobio*, *P. phoxinus*, or *L. leuciscus*, what was revealed by our cluster analysis.

ACKNOWLEDGEMENTS

The study was partially supported by the fund BW 2201/KIiR/2010. We are obliged to Stanisław Deptuła, Konrad Ozga, Jakub Popek, Marta Śmietana (Kraków), Roch Dobrowolski and Maksymilian Przybylski (Kielce) for their help during the field work.

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Received: 26 July 2010

Accepted: 1 February 2011

Published electronically: 30 June 2011