THE OCCURRENCE OF CARPATHIAN BROOK LAMPREY *EUDONTOMYZON DANFORDI* REGAN 1911 (PETROMYZONTES, PETROMYZONTIDAE) IN THE UPPER TISA TRIBUTARIES FROM NORTHERN ROMANIA

A TISZAI INGOLA *EUDONTOMYZON DANFORDI* REGAN 1911 (PETROMYZONTES, PETROMYZONTIDAE) ELŐFORDULÁSA A FELSŐ-TISZA ÉSZAK-ROMÁNIAI MELLÉKFOLYÓIBAN

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Summary

Recent studies carried out on the upper Tisa and its left hand tributaries from north Romania, Vişeu, Iza, Săpânţa and Runc rivers, reveals the present distribution of this species. The data show that the Carpathian Brook Lamprey *Eudontomyzon danfordi* occurs only in headwaters of five rivers or brooks and in some of these they have also the spawning areas. The species is extinct in numerous sub-tributaries which are affected mainly by the mining activities and also retain its populations in others localities despite of the apparent human impact.

Összefoglalás

Az utóbbi időben számos tanulmány jelent meg a Felső-Tisza romániai mellékfolyóinak (Visó, Iza, Szaplonca, Runc) halfaunájáról, feltárva a tiszai ingola (*Eudontomyzon danfordi*) elterjedését e területen. Az adatok szerint csupán öt vízfolyás felső szakaszán fordul elő, ívóhelye pedig mindössze három ismert. A faj számos másodrendű mellékpatakból kihalt, főként azokból, amelyek a bányászati tevékenység következtében szennyeződtek, de néhány helyen az emberi hatás ellenére is életképes populációval rendelkezik.

Introduction

The Carpathian brook lamprey *Eudontomyzon danfordi* is besides the congener *Eudontomyzon mori* one of the few predator lampreys sedentary in rivers. Most of the others predatory lamprey are anadromous species (migratory) and all of the non-predatory species (*Eudontomyzon vladykovi, E. mariae* and *E. hellenicus*) are sedentary (Bănărescu, 2002-a). Recently, the congener *E. mariae* (Ukrainean brook lamprey) was recorded from the upper tributaries of Bug and Volga river basins, thus the *Eudontomyzon* genus are the most distributed in Europe (Levin & Holčik, 2006).

Until the present, the data regarding to the occurrence of *E. danfordi* in the upper Tisa and tributary are scarce and inconsistent. The first record of the species in the upper Tisa belongs to Vladykov (1931). He mentions the species in the upper Tisa and in the tributaries Teresovka, Tereblia and Ricka (from the Ukrainian drainage of the river). The first data on the occurrence of *Eudontomyzon danfordi* from the Romanian tributary of Tisa are pertaining to Bănărescu, who mention the species as generally distributed in the upper Tisa and its tributary including the southernmost Timiş River drainage (Bănărescu et al. 1960, Bănărescu, 1969). From the main channel of Tisa, the species is recorded from their uppermost brooks Black Tisa and White Tisa, thereafter between the localities Rahiv and Hust (on the Ukrainian territory). It becomes a very rare species downstream, close to the Hungarian border, at Tiszabecs and Tiszacsécse (Harka et al. 1999, Harka & Sallai 2004). *Eudontomyzon danfordi* is presumed to live also in the Cerna River, a direct Danube tributary from south-western Romania (Bănărescu, 2002-a). Further recent records of species are referring to the singular brooks which are tributary or sub-tributary from the upper Tisa River system. From the upper Iza tributary, the species is recorded close to the source area (Bacalu, 1997). Two specimens of *Eudontomyzon danfordi* are mentioned in the year 1999 from the sub-tributary Mara River (Györe et al. 1999) which belongs to the drainage of Iza

River. The species was recorded also from the main tributaries Vişeu, Iza and their sub-tributaries Mara and Ruscova (Harka et al. 2002).

Observations regarding to the distribution of *Eudontomyzon danfordi* on the upper Tisa and in the Romanian tributaries prove that it has underwent a strong numerical decline and must be considered endangered (Bănărescu, 2002-b). Our recent investigations try to find out the present distribution of this lamprey species, the remaining spawning areas from the mountain brooks, and to identify the major threats.

Material and methods

During the period 2007-2010 samples of Carpathian brook lamprey *Eudontomyzon danfordi*, both adults and ammocoetes were obtained from the upper Tisa River and its direct tributary Vişeu, Iza, Săpânţa and Runc rivers. Supplementary studies were conducted on the sub-tributaries brooks in the Vişeu River drainage (Cisla, Bălăsâna, Vaser, Ruscova, Repedea, Frumuşeaua and Bistra) and also those from the drainage of Iza River system (Mara, Cosău and Baicu).

The fishing methods used both electro-narcosis and the fishing net. A stationary electro-fisher type FEG 5000 (manufactured by EFKO- Germany) was used in the deep section of the rivers. In the wade able rivers was helpful the small portable device type IUP 12 supplied by 12V accumulator. The fishing net with small meshes (6mm) was successful employed to retain the lampreys hauled downstream. All the captured specimens of *Eudontomyzon danfordi* was counted at the sampling sites and then released at the same places alive. The specimens sampled comprise both adults and ammocoetes stages. No specimens were preserved.

Results

The distribution of *Eudontomyzon danfordi* in the drainage area of direct tributaries of Tisa River has a pronounced discontinuous character (Fig. 1). This fact is on a certain contradiction of adult specimens' mobility. The less number of brooks and rivulets in which the species was captured proved the numerical decline of this species.

The main tributaries in which the species is distributed are those from the right riverside of the Vişeu River and those on the left riverside of Iza River (Fig.1). Another direct tributary of Tisa in which the species live is the rivulet Runc located close to the Ukrainian border. The lamprey is scarce also in the main channel of Tisa River and its adjacent ponds connected directly to the river. Two adult specimens were captured in such of ponds or backwaters near the villages Sarasău and Remeţi (downstream Sighetu Marmaţiei).

The Viseu drainage:

Upstream to the river sources the populations of *Eudontomyzon danfordi* are probably extinct because of the effect of the mining waste waters that spill into the river. The sub-tributaries Cisla and Valea Vinişoru located near locality Borşa have the same situation. The entire aquatic fauna is extinct from there.

Eudontomyzon danfordi maintains its populations only in four locations (Tab.1) from Viseu drainage:

-The proper Viseu River -upstream the locality Vişeul de Sus

-The sub-tributaries Vaser, Ruscova, Repedea and Frumuşeaua.

A special remark is necessary for the latter sub-tributary (brook) Frumuşeaua near the village Crasna Vişeului where is one of the only three spawning areas identified on the tributaries drainage. There was captured five ammocoetes of E. *danfordi* in a short stretch of the brook and probably the number of it in the area is larger.

The Iza drainage:

The populations of *Eudontomyzon danfordi* is surviving in the main channel of Iza River only in the spring area (upstream the village Săcel). There were captured also adults and ammocoetes, thus the locality being the second spawning area identified. It is also occurred in the drainage of Mara River including the sub-tributary Cosău River (Tab.1). The species was not found in the tributary Baicu (Fig.1) because of the negative influences of some derelict mines from the drainage area.

Regarding to the distribution of the species in the Mara River system we suppose that it is the largest drainage area in which the species are distributed and spawn. Here is the third spawning area and probably the most important regarding the number of ammocoetes observed. The entire system of rivulets and mountain brooks that belongs to the Igniş Mountain is suitable for *Eudontomyzon danfordi*.

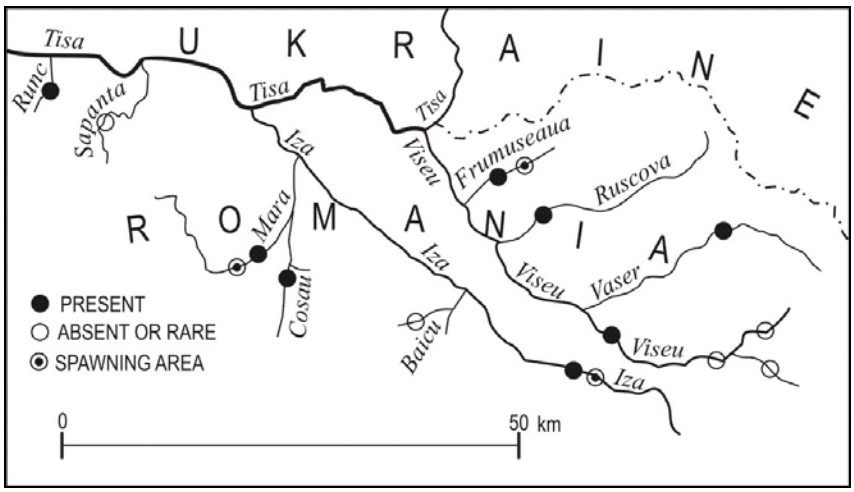

Fig. 1. Distribution of Eudontomyzon danfordi in the upper Tisa tributaries from Maramureş
1. ábra. A tiszai ingola elterjedése a Felső-Tisza máramarosi mellékfolyóiban

Notes on the abundance and ecology

As generally survey on the distribution and abundance of *Eudontomyzon danfordi* in the tributaries of the upper Tisa River, the discontinuity of distribution is prevailing. The local populations of lampreys comprise a less number of specimens, excepting the case of the upper Iza River (upstream village Săcel) and the Mara River. Another remarks necessary regarding to the evaluation of lamprey population density is referring to its life specific behavior. The predator adults are always solitary and the number of specimens captured is generally less than the real number that exists. The larva and ammocoetes live usually as small communities close to the spawning area. As a rule observed in such of spawning areas is the presence of thickness layer of sediments on the bottom and slow flow of the water. In all the rivulet and brooks in there the adults was observed, the stone surfaces was clear, bereaved by plants or other algal layer.

A less number of specimens were encountered in Vişeu River near locality Vişeu de Sus and also in the Vaser River. In both of cases the human impact is generating the population decline. The extraction of gravel directly from the riverbed is a usually practice along these rivers which affecting the aquatic fauna. There exist some rivers in which the species was not captured. The Săpânța River has apparently suitable conditions for this species and contrary of expectations it doesn't found there. Another case is the sub-tributary Bistra, a rivulet in the

lower stretch of Vişeu River located close to the Frumuşeaua brook in which the lampreys are present.

Regarding to the miss-samples of Eudontomyzon danfordi from the direct tributary Săpânța it is presumably that the specimens from there are quite rare. It is supported by the natural conditions from there in which the longitudinal connectivity of the river is interrupted by a waterfall. Additionally, close upstream the village Săpânța a trout-farm act as a lamprey-trap. The adults able to spawn probably are attracted here and then are destroyed by the farmers. Whatever can be the explanation, the species seems doesn't live on this river.

Table 1. Samples of Eudontomyzon danfordi on the upper Tisa tributaries from Maramureş
1. táblázat. A tiszai ingola észlelési adatai a Felső-Tisza máramarosi mellékfolyóiban

Drainage of Vişeu River				
Locality		Adults	Ammocoetes	Observations
Main channel of Vişeu River	Borşa	-	-	Extinct
	Vişeu de Sus	+	-	Previous samples (1995)*
Sub-tributaries	Cisla and Bălăsâna	-	-	Extinct
	Vaser	+	-	Previous samples (1995)*
	Ruscova and Repedea	+	-	Previous samples (1995)*
	Frumuşeaua	+	+	Spawning area
	Bistra	-	-	Probably extinct
Drainage of Iza River				
Main channel of Iza River	Upstream village Săcel	+	+	Previous data for ammocoetes (spawning area)
Sub-tributaries	Baicu	-	-	Extinct
	Mara	+	+	Spawning area
	Cosău	+	-	Previous samples
Drainage of Săpânța River				
Main channel of River	Upstream village of Săpânța	(?)	-	No previous data
Sub-tributaries	Mireş	-	-	No previous data
	Săpâncioara	-	-	No previous data

+ present; - absent; (?) ambiguous data – need confirmation; (*) data refers to the anterior studies of the same author

Discussion

The Carpathian brook lamprey *Eudontomyzon danfordi* was classified as a sensitive species which is adapted to a specific habitat restricted to the mountain brooks and rivulets (Telcean & Bănărescu, 2002). Our recent results sustain this classification because in almost all the cases of population regress is correlated with a modification of its specific habitat. The regress of populations which affecting *E. danfordi* can be observed in the entire upper Tisa basin .For instance, the former data regarding to the presence of *Eudontomyzon danfordi* (Vladykov, 1931) in the tributary Tereblia (Ukraine) was not confirmed by recent investigations (Harka et al. 1999) and probably the population from there has underwent a drastically numerical decline or quite it is extinct. The formerly records of the species from the tributary Vişeu, Vaser and Ruscova (Telcean & Györe, 2000) was confirmed by recent surveys with remarks of loss abundance of the population distributed in Vaser River.

Contrary of the previous ascertains we observe a tendency of survival of some lamprey populations that live in river stretches affected by human activities. This case is that of *E. danfordi* from the upper Iza near the village Săcel. The riversides on this stretch are covered by sawdust which occasionally falls into the river. In the same area are deposited by local people other wastes. On spite of these detrimental factors the local population of lampreys still survives. Therefore of the absence of gravel extraction from the riverbed the species retain its population there.

There is a singular case in which the human activity has a positive effect upon the population of *E. danfordi*. It was observed in the Mara River on a stretch in which the riverbed was dredged and the slow waters favored the sediments accumulation. In this place the lamprey has found a suitable spawning site in which was observed the largest number of ammocoetes than the other similar river stretches. However the human implication on the natural habitats remains destructive in the majority of case. The *E. danfordi* populations from Mara River drainage need to be protected especially against the habitats modification.

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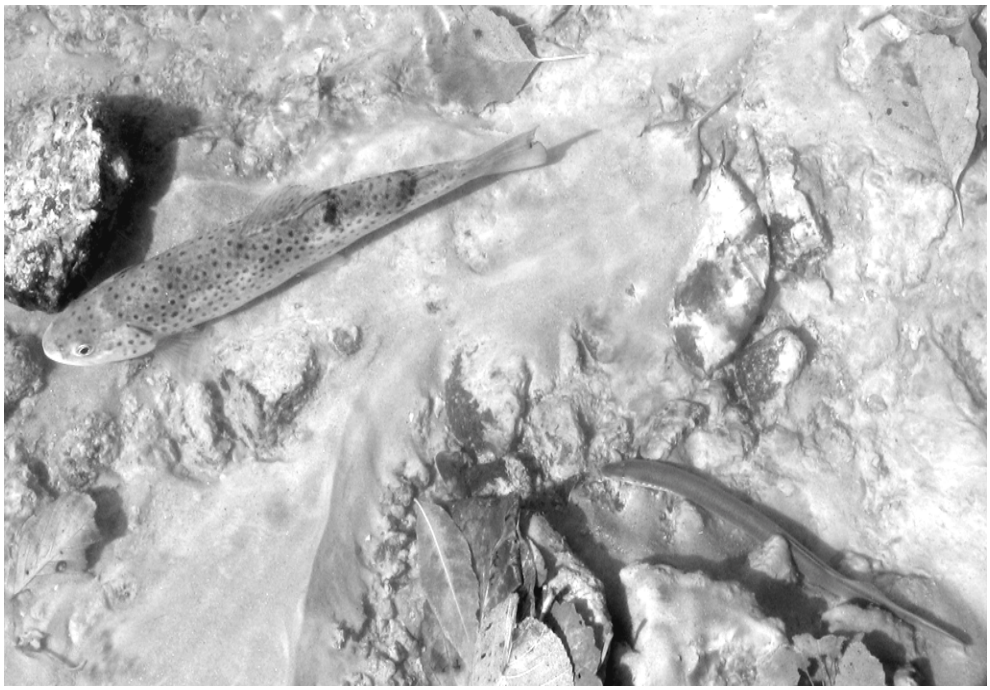
A máramarosi Mára folyó (Harka Ákos felvétele)



Pisztrángra leső tiszai ingola (Antal László felvétele)