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SHORT COMMUNICATION

When did the black bullhead, *Ameiurus melas* (Teleostei: Ictaluridae), arrive in Poland?

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Abstract. One specimen of the non-native ictalurid catfish the black bullhead, *Ameiurus melas*, was found in the collection of the Museum and Institute of Zoology of the Polish Academy of Sciences in Warsaw, Poland. This finding strongly supports the hypothesis that the black bullhead was co-introduced into Polish waters with the brown bullhead, *Ameiurus nebulosus*, at the end of the nineteenth century. The species might be distributed widely throughout Poland, thus careful investigation on the identity of the ictalurid catfish population throughout the country should be carried out.

Keywords: alien fish, Ictaluridae, introduction, invasive species, xenodiversity

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Many years ago it was established that the brown bullhead, *Ameiurus nebulosus* (Lesueur), was the only ictalurid species introduced into Polish waters from North America (Horoszewicz 1971, Witkowski 2002). However, in 2007 another catfish from the family Ictaluridae – the black bullhead, *Ameiurus melas* (Rafinesque) – was recorded in the Szydłówek Dam Reservoir in Kielce, Świętokrzyskie District (Nowak et al. 2010). Ten specimens were obtained from recreational fishers in summer 2007, and the species has been noted consistently in subsequent years (Nowak, unpubl.). These observations permit the supposition that the black bullhead has established a self-sustaining population in this reservoir.

Presumably, the occurrence of *A. melas* in Szydłówek Dam Reservoir is the result of unregistered, illegal introduction by recreational fishers (Nowak et al. 2010). Nonetheless, the origin and introduction pathways of the black bullhead to the Vistula River drainage basin remains unclear (Nowak et al. 2010). Two leading hypotheses are proposed; either the species reached Poland in recent years from adjacent countries where it was recorded previously (i.e., Ukraine, Slovakia, Czech Republic, or Germany) or it was co-introduced in the late nineteenth century with *A. nebulosus*, and remained unknown until 2007 (Nowak et al. 2010).

In March 2010, three ictalurid catfish were found in the fish collection of the Museum and Institute of Zoology of Polish Academy of Sciences in Warsaw. The specimens are labeled MIZ 212733-

Table 1
Certain identification features of the investigated specimens (MIZ 212733-212735), *Ameiurus melas* and *Ameiurus nebulosus* (according to the literature cited in the text). Abbreviations: TL, total length; SL, standard length; *C*, caudal fin; *A*, anal fin; *D*, dorsal fin; *P*, pectoral fin

Feature	MIZ 212733	MIZ 212734	MIZ 212735	*A. melas*	*A. nebulosus*
TL (mm)	139	113	135	< 660 (usually < 250)	< 550 (usually < 250)
SL (mm)	106	95	113.5	-	-
C ray count	17	17	17	15-18	18-19
A ray count	22	20	21	17-21 (usually 18-20)	21-24 (usually 22-23)
D ray count	I 6	I 6	I 6	I 5-6	I 6-7
A base enlargement	none	present	none	present	none
Spine in *P*	short	short	long	short	long
Serration on *P*-spine	weak, tip of the spine lacks serration	weak, tip of the spine lacks serration	strong, spine serrated along the full length	weak, last 1/3 of the spine smooth	strong, along the full length of the spine

-212735 and are 95.0-113.5 mm in standard length (SL). According to the original label, the specimens were caught in the Jeziorka River near the village of Konstancin (Vistula River drainage basin, currently the Mazowieckie District, central Poland; leg. Z. Lorec) in 1953. The specimens were held in an aquarium for some time before they were sacrificed and fixed on November 6, 1953. The fish were labeled *Amiurus nebulosus* Rafinesque. Since such a combination is not available (Ferraris 2007), the labeling should be treated as a misspelling of the scientific name of the brown bullhead. The specimens are currently in poor condition probably because of the time lag between sacrificing and fixing or possibly because of an inadequate concentration of formaldehyde in the original fixing solution. Moreover, because of the long storage period, the catfish have lost their original coloring. Thus, it is very difficult to identify these specimens properly. Nonetheless, at least one of them (MIZ 212734, 95.0 mm SL) appears to have been identified incorrectly. Based on its main meristic (Hubbs 1926, Scott and Crossman 1974, Wheeler 1978) and qualitative features (Nowak et al. 2010), it should be classified as *A. melas* (Table 1). Firstly, specimen MIZ 212734 has a fatty enlargement at the anal fin base which makes it poorly distinguished from the body; there are no such enlargements in *A. nebulosus*, in which the fin base is clearly divided from the belly (Nowak et al. 2010). This is the most useful trait for rapid identification of the both species in the field and fixed specimens (Koščo and Nowak, unpubl.). Moreover, specimen MIZ 212734 has a small number of caudal fin rays (i.e. a total of 17 with two principal unbranched rays and 15 branched rays), which is typical of *A. melas* and not *A. nebulosus* (Table 1). In the latter species, the caudal fin ray count is 18-19 (Hubbs 1926, Scott and Crossman 1973, Wheeler 1978). The low anal fin ray count is indicative of the black rather than the brown bullhead (Table 1). In *A. nebulosus* it ranges from 21 to 24, usually 22-23, whereas in *A. melas* it is 17-20, usually 18-19 (Hubbs 1926, Scott and Crossman 1973, Wheeler 1978). In specimen MIZ 212734 the count is 20, while in the other two specimens (MIZ 212733, MIZ 212735), it is 21 and 22, respectively (Table 1). Thus, specimen MIZ 212734 is most probably a black bullhead, and specimens MIZ 212733 and MIZ 212735 are probably brown bullheads; however, their poor condition makes these identifications questionable.

This finding sheds new light on the origin of the black bullhead inhabiting Poland. It was ascertained that *A. melas* occurred in the Vistula River drainage

basin in the early 1950s. As far as the authors are aware, there have been no imports of ictalurid catfishes from abroad since the end of the nineteenth century when the brown bullhead was first introduced (Horoszewicz 1971). Thus, it is possible that the black bullhead was accidentally co-introduced with the brown bullhead in ponds in Barnówek near the city of Szczecin (currently in the West Pomeranian District, but formerly in Germany), when, in 1885, some 50 juvenile bullheads, which were thought to be *A. nebulosus*, were imported (Kulmatycki 1938, Horoszewicz 1971). Alternatively, it could have been introduced into the waters of Greater Poland before World War II by German fishermen (Kulmatycki 1938). Later introductions seem far less probable since all hopes regarding the brown bullhead as a potentially attractive object of aquaculture or recreational fishing were abandoned as early as the 1930s (Horoszewicz 1971, Witkowski 2002).

Of course, the possibility of a recent re-invasion of *A. melas* from an adjacent area cannot be excluded, but this hypothesis seems highly improbable. It is more likely that the black bullhead has persisted unrecognized for over a century. The brown bullhead had been considered the only introduced ictalurid catfish in Europe until Wheeler (1978) concluded that both bullheads, *A. nebulosus* and *A. melas*, had been introduced simultaneously at the end of the nineteenth century.

On the other hand, the black bullhead is currently spreading within the Danube River drainage basin. It was recorded in the Tisa River drainage basin in Hungary (Pintér 1991), then in Romania (Wilhelm 1998), Slovakia (Koščo et al. 2000), and in the Ukrainian part of this drainage basin (Koščo 2003). In 2005, the black bullhead was noted in the Czech Republic (Třeboň district) in the Elbe River drainage basin, where it was imported along with carp stocking material from Croatia (Hartvich and Lusk 2006). Two years later it was recorded in Poland (Nowak et al. 2010).

Regardless of the origin or pathways of spreading of *A. melas*, it is a potentially invasive fish species. It is known to increase water turbidity (Braig and Johnson 2003) and decrease the predation efficiency of pike, *Esox lucius* L. (Kreutzenberger et al. 2008) and negatively affect limnophilic fish species through direct predation (Leunda et al. 2008).

Consequently, reopening the investigation of the identity of the ictalurid catfish populations in different regions of Poland is urgent. Since *A. melas* occurred in Poland in the early 1950s, it is reasonable to assume that the species might be widely distributed throughout the country. The misidentification of black bullhead specimens for such a long time is not surprising because the two ictalurid catfish, *A. melas* and *A. nebulosus*, are very similar (Hubbs 1926, Scott and Crossman 1973, Wheeler 1978, Nowak et al. 2010). When identifying either living fish or specimens that have been stored in formaldehyde solutions for short periods, the most useful identification traits are color pattern and presence or lack of the fatty enlargement of the caudal fin base (Koščo and Nowak, unpubl.), as presented in Fig. 1. Further investigations on the relative length and serration of

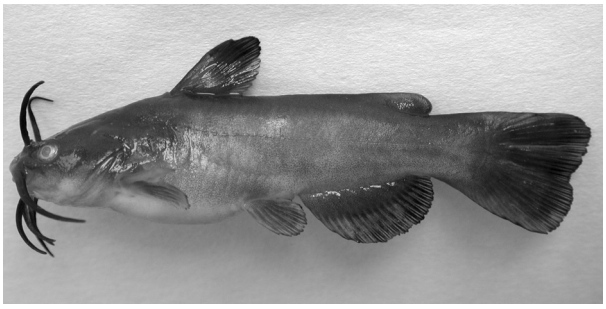

Figure 1. *Ameiurus melas* (Szydłówek Dam Reservoir in Kielce, Poland, specimen fixed in 4% formaldehyde solution) with notable fatty enlargement of anal fin base. Dark pigmentation of anal and caudal fin membranes is also visible (Photo by M. Nowak, 2007).

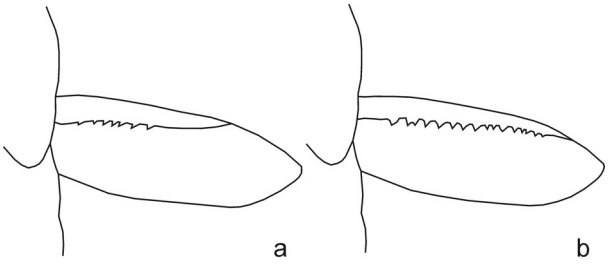

Figure 2. Identification of (a) *Ameiurus melas* and (b) *Ameiurus nebulosus* according to relative length and serration of pectoral fin spine. Right pectoral fin, dorsal view. Drawn by M. Nowak.

pectoral fin spines (Fig. 2) and certain meristic features, such as ray counts in dorsal, anal and caudal fins, could provide additive proofs for identification (Table 1).

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Streszczenie

Kiedy sumik czarny, *Ameiurus melas* (Teleostei: Ictaluridae), pojawił się w Polsce?

Sumik czarny, *Ameiurus melas* (Lesueur), został znaleziony na terenie Polski po raz pierwszy w 2006 r. w zbiorniku zaporowym „Szydłówek" w Kielcach. Nie można było wówczas odpowiedzieć jednoznacznie na pytanie o pochodzenie i drogi przedostania się tego gatunku do naszego kraju. Pod uwagę brano dwie możliwości: (i) sumik czarny stosunkowo niedawno przedostał się do Polski z sąsiednich krajów, w których jego obecność stwierdzono w również w ostatnich latach; albo (ii) gatunek ten został introdukowany do polskich wód znacznie wcześniej, zapewne w końcu XIX w. wraz z sumikiem karłowatym, *Ameiurus nebulosus* (Rafinesque), który był do tej pory uważany za jedynego przedstawiciela rodziny sumikowatych Ictaluridae w kraju. W zbiorach Muzeum i Instytutu Zoologii PAN w Warszawie odnaleziono jednego osobnika odłowionego w rzece Jeziorce koło Konstancina w 1953 r., którego można bez wątpliwości zaklasyfikować do gatunku *A. melas*. Znalezisko to bardzo mocno wspiera drugą z przedstawionych hipotez i każe przypuszczać, że sumik czarny jest gatunkiem od dawna zamieszkującym wody Polski, a pozostającym do tej pory nierozpoznanym. W związku z dużymi trudnościami w identyfikacji obu gatunków w niniejszej pracy zestawiono główne cechy pozwalające odróżnić *A. melas* od *A. nebulosus* (tab. 1). Wydaje się, że wobec zaistniałej sytuacji należy przedsięwziąć prace nad ponowną, dokładniejszą identyfikacją sumików rodziny Ictaluridae zamieszkujących terytorium Polski.