



## Short communication

# First confirmed record of *Pomatoschistus canestrinii* (Ninni, 1883) (Gobiidae) from Bosnia and Herzegovina

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## Introduction

The black-spot goby *Pomatoschistus canestrinii* (Ninni, 1883) is endemic to the Adriatic Sea basin (Miller, 1986). It inhabits brackish and freshwaters from the Po River Delta (Italy) to the Neretva River in Croatia (Kottelat and Freyhof, 2007). Occurrence of the black-spot goby in the Ionian Sea (Gulf of Taranto) (Gandolfi et al., 1982), the Trasimeno Lake (Freyhof, 1988) and reservoir on the River Ričica (Croatia) (Stelbrink and Freyhof, 2006) is probably the result of recent introductions. This small epibenthic goby occurs in the shallow waters of lagoons, river-mouths and lower stretches of rivers, on unvegetated sand or mud habitats (Miller, 1986).

Data on the distribution of the black-spot goby in Bosnia and Herzegovina are remarkably scarce and based only on general notes from the Neretva River (Vuković, 1977; Sofradžija, 2009). Although these notes suggest the lower Neretva River in Bosnia and Herzegovina as a potential distribution area for *P. canestrinii*, the fact is that this fish species has never been recorded there (Kosorić, 1978; Kosorić et al., 1983; Mikavica, 1998; Šanda and Kovačić, 2009). The exact data on its distribution were recorded only for the Croatian part of the Neretva River (Mrakovčić et al., 2006; Šanda and Kovačić, 2009).

The aim of this paper is to establish the first reliable record of *P. canestrinii* and confirm its presence in waters of Bosnia and Herzegovina.

## Materials and methods

On 25 May 2010, twenty-three specimens of *Pomatoschistus canestrinii* were collected at 0.1–0.3 m depth in shallow coastal waters of Lake Svitava (Hutovo Blato wetland, Neretva River basin) in Bosnia and Herzegovina (43°00'53.92" N; 17°48'03.78"E). Captured gobies were immediately euthanized by over-anaesthetization with Quinaldine and preserved in 4% unbuffered formaldehyde. A few weeks after capture, all specimens were transferred to 70% ethanol for later analyses. Preservation techniques, however, have been reported to cause inconsistent effects on the lengths and weights of fishes (Martinez et al., 2013). Healey (1971) gave information about the effects of formalin on the size of some goby species measured before and after fixation in 10% formalin solution and reported an average shrinkage in total length (TL) of 0.9%. Additional storage in 70% alcohol has the effect of 0.88% further shrinkage in the

average size (Jawad, 2003). In this study, specimens from Hutovo Blato shrank from 0.48 to 0.80 mm TL; shrinkage was probably smaller because a lower concentration of formaldehyde was used. Accordingly, the total lengths were adjusted for shrinkage. The specimens are deposited in the Ichthyological Collection of the Institute of Oceanography and Fisheries in Split, Croatia, catalogue number IOR-PoCa 2010.

Meristic methods and terminology of lateral-line system follows Sanzo (1911) and Miller (1986). Species identification was based on the head and body coloration having numerous tiny but very intense black spots, sub-orbital row *a* with 2 transverse rows and pore  $\delta$  absent (Miller, 1986). Each ethanol-preserved specimen was measured using a mechanical caliper to 0.1 mm and weighed with an accuracy to 0.01 g. Sex was determined from the shape of the urogenital papillae: long and pointed in males and short and wide in females (Miller, 1986). Length-weight relationship was calculated by applying the exponential regression:

$$W = aL^b$$

where *W* is the fish weight in g, *L* is the total length (TL) in cm and *a* and *b* are parameters (Froese, 2006). Growth type (isometric and allometric) was determined by the Student's *t*-test (*P* < 0.05). The condition factor (CF) was calculated as:

$$CF = W L^{-3} 100$$

where *W* is weight in grams and *L* is total length (TL) in cm.

## Results

The collected specimens differ from all other sand-goby genera and match well with the known characters of *P. canestrinii* presented in Miller (1986, 2004). Head canal system and body squamation are variable and express the same variability as observed by Kovačić (2005) for a population from the Baćinska Lake system (lower Neretva) in Croatia.

*Pomatoschistus canestrinii* caught in Lake Svitava (Bosnia and Herzegovina) consisted of 7 (30.43%) males and 16 (69.56%) females. Overall sizes ranged from 27.4 to 45.3 mm TL and 0.15–0.87 g; for males: 30.1–45.3 mm TL and females: 27.4–32.7 mm TL.

Length-weight relationship was calculated to include both sexes together,  $W = 0.0119 TL^{3.272}$ . Slope *b* differed significantly from 3.00 (*t*-test, *P* < 0.05), indicating positive allometric growth (Fig. 1). The calculated condition factor (CF) ranged from 1.20 to 1.97 (mean 1.54).

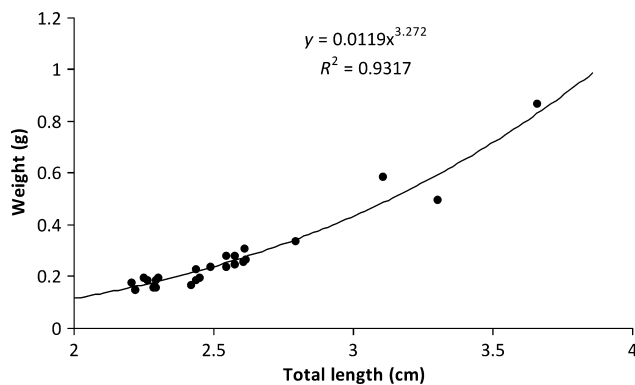


Fig. 1. Length-weight relationship of black-spot goby *Pomatoschistus canestrinii* (N = 23) sampled 25 May 2010, Lake Svitava (Hutovo Blato wetland, Neretva River basin) in Bosnia and Herzegovina

The collected specimens were present on an unvegetated artificial concrete bank of the lake Svitava covered with a muddy substratum. The species was relatively abundant on the investigated site. *P. canestrinii* occurs in sympatry with other goby species; *Knipowitschia croatica* Mrakovčić, Kerovec, Misetić & Schneider, 1996 and *Knipowitschia radovici* Kovačić, 2005.

## Discussion

The morphological description and meristic counts as well as ecological preferences match well with the distinctive characters of *P. canestrinii* (Miller, 1986, 2004) and confirms the first reliable record of this species for Bosnia and Herzegovina freshwaters. The observed specimens from Hutovo Blato displays the same body squamation and head canal types that were observed within the population from the lower Neretva in Croatia (Kovačić, 2005; Stelbrink and Freyhof, 2006). Miller (2004) already speculated that the process of reduction of squamation and head canals could be correlated with the invasion of sand gobies into freshwater. Accordingly to Stelbrink and Freyhof (2006), the observed pattern in reduction can indicate the same isolation period for the Hutovo Blato population as that for the populations from the Croatian part of the Neretva River basin.

There are no previous data on length-weight relationship or the condition factor of any *P. canestrinii* population. Females were heavier than males within the same length, probably due to the current reproduction season which takes place from March to July (Kottelat and Freyhof, 2007). The black-spot goby is a small sized fish; the observed maximum length SL = 3.8 cm in this study is lower than the observed values in the range area reaching a maximum standard size length (SL) of 6.7 cm (Miller, 1986). As the species from the genus *Pomatoschistus* are thought to live up to 2 years (Kottelat and Freyhof, 2007), according to length categories we can assume that the specimens were in the beginning of their second year of life (1+). This data coincides with the Matica River (Croatia) population of *Knipowitschia croatica*, a similar short-lived goby (Zanella et al., 2011).

Despite numerous investigations of the Bosnia and Herzegovina freshwater ichthyofauna during the past 30 years, the fact is that fish fauna has not yet been systematically investigated. Previous data on gobies are very scarce and based only on species lists, which lack detailed species

descriptions and localities (Vuković, 1977; Sofradžija, 2009) and making the data unreliable. The physical presence of some species therefore is very doubtful (Kottelat and Freyhof, 2007). Currently, three species of gobies were undoubtedly confirmed from the Neretva River drainage in Bosnia and Herzegovina: *P. canestrinii* (this study), *K. croatica* and *K. radovici* (Šanda and Kovačić, 2009).

In this paper we do not assume that its occurrence is a consequence of a recent range expansion, but more likely was previously overlooked due to the lack of adequate targeted research techniques. As there is a lack of goby-oriented research, future studies may reveal a larger distribution range for *P. canestrinii*. Studies should also be focused on more detailed genetic population research to explain the taxonomical status of goby species present in the lower Neretva River drainage. Although *P. canestrinii* has no economical value, it is significant from the aspect of ichthyofauna conservation and overall fish diversity. It is considered to be of least concern (LC) in the entire area of distribution (IUCN, 2012), yet endangered (EN) in Croatia (Mrakovčić et al., 2006). Kovačić (2005) discuss the implications of the potential loss of this population and its risks. This highlights the importance of establishing conservation measures, considering the high faunistic and scientific value of *P. canestrinii*.

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