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On the occurrence of the *Synodontis eupterus* (Mochokidae) in the Adriatic drainage system of Croatia: a case of an introduced aquarium species and suggestions for alien species detection measures

by

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Résumé. – Sur la présence de *Synodontis eupterus* (Mochokidae) dans le système de drainage de l'Adriatique en Croatie : un cas d'introduction accidentelle d'une espèce d'aquarium et suggestions pour leur détection.

Le 8 novembre 2017, un spécimen du crieur de plumes *Synodontis eupterus* (Mochokidae) a été capturé dans la rivière Mala Neretva en Croatie (système de drainage de l'Adriatique). Ce nouveau cas d'espèce d'aquarium introduite appelle à la mise en place de mesures de détection et de prévention des introductions accidentelles.

Key words. – Mochokidae – *Synodontis eupterus* – Featherfin squeaker – Croatia – Neretva River – Introduced species – Ornamental.

The featherfin squeaker *Synodontis eupterus* Boulenger, 1901 is a freshwater species endemic in Africa. It is currently native in White Nile, Niger, Volta, Chad, Nigeria, Cameroon, Mali, Ghana, Sudan, Kwa Ibo and Cross basins (Oti, 2003; Paugy and Roberts, 2003). It inhabits muddy bottoms, but may also be found over rocks, where it mainly feeds on insect larvae but also on algae and is harvested for human consumption (Awaiss *et al.*, 2010). This 'upside-down' species is by far one of the most well-known species in the family Mochokidae, available in hobby aquariums due to their attractive ornamental colour patterning (Riehl and Baensch, 1996). Prior to this, no finding of this species in the European freshwaters was documented.

The aim of this paper is to present the first record of this ornamental fish species in the freshwaters of Croatia (Adriatic drainage system). We also suggest measures to prevent and detect accidental introductions of alien species.

MATERIAL AND METHODS

On 8 November 2017, one specimen of the featherfin squeaker (♂, total length, TL = 193 mm; weight, W = 109.4 g) (Fig. 1) was captured by local fishermen using fishing net near Opuzen, Croatia (43°00'30.59"N; 17°32'40.19"E). The depth at the site of the capture was 1.5 m and the bottom was muddy. The salinity and temperature at the location of capture were 0.8 PSU and 13.7°C, respectively. The specimen was deposited (preserved in 95% alcohol) in the Ichthyological collection of the Institute of Oceanogra-



Figure 1. – *Synodontis eupterus* (from Mala Neretva River) (TL = 193 mm) (catalogue number SE-IOR 8112017).

phy and Fisheries in Split (catalogue number SE-IOR 8112017). Body measures were taken using digital calliper with an accuracy of 0.1 mm. Meristic traits were counted under a binocular microscope. Meristic and morphometric features were taken following Biswass (1993).

Description of the specimen from Mala Neretva River (Fig. 1)

The specimen was identified as an adult featherfin squeaker *Synodontis eupterus*, following the description provided in Dankwa *et al.* (1999) and Paugy and Roberts (2003). The meristic counts and body dimensions are: dorsal fin rays I+8, anal fin rays III+9, pectoral fin rays I+8, pectoral fin rays 7, caudal fin rays II+10-II+10; eye diameter 29% of head length and 75% of snout length; standard length 79.3% of total length; caudal length 32.6% of total length; predorsal length 15% of total length; head length 21.8% of total length; post-orbital length 62.5% of snout length. The specimen features unbranched maxillary barbels (longer than the head) and outer mandibular barbels with thin and long ramifications. Inner mandibular barbels have shorter, subdivided and tuberculate branches. Dorsal fin spine and branched rays as well as pectoral fin spine are prolonged into filaments. Adipose fin is well developed. Coloration of the freshly defrosted specimen was dark brown with numerous spots present on body and fins. Maxillary barbels and fin filaments are almost black.

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DISCUSSION

Synodontis eupterus is an ornamental fish species usually sold as common aquarium cleaner/algae eater. It is also one of the most popular and common mochokid fish in the aquarium trade in Croatia (Tutman, Pers. Comm.) due to their attractive reticulated patterning and their role as cleaner fish. This patterning breaks up as the fish matures since adult specimens have a simple spotted ornamentation. The characteristic “feathered” dorsal fin develops with age, with the first few rays showing long extensions. This fish is usually offered for sale when a small (4–5 cm) juvenile fish with no information regarding its potential size.

No scientific publication has previously reported *Synodontis eupterus* in the Mala Neretva and Neretva River watershed, nor in any other rivers of the Adriatic and Black Sea drainage system or in any European freshwater. It seems that the most important pathways in such introductions are escape (aquaculture, aquarium, live bait, etc.) and human-mediated release (aquarium, fisheries/angling etc.) into freshwater ecosystems (Nunes *et al.*, 2015). Hobbyists are releasing exotic fishes from their aquariums into local waters for multiple reasons, potentially causing massive danger to the environment. Some common reasons include the increasing size of fish, boredom from a certain type of fish or relocation of aquarium owners. One of the possible explanations for herein reported record is local releasing from house hobby aquarium. The size of the mochokids usually depends on the size of the tank in which it was raised. The total length of the caught specimen (TL = 193 mm) is lower than maximum observed for this species (TL = 222 mm) (Paugy and Roberts, 2003). It possibly survived for a certain period of time after its release. However, optimal temperature range for this species is between 22 and 26°C (Riehl and Baensch, 1996) which is significantly higher than recorded temperature at the site of the capture (13.7°C), hence this hypothesis should be taken with caution.

Releasing aquarium fish into bigger water bodies allow them to grow in size, however, since many of these fishes are native from tropical regions, their thermal requirements usually prevent them from surviving for longer periods in temperate areas. Regardless of the fact that *Synodontis eupterus* is thus potentially a harmless species, the appearance of ornamental species should alert us on further invasion risks.

The wetland area of Neretva River Delta is known as an area of rich biodiversity and extraordinary biological and ecological importance, and is a home to many protected ornithological and ichthyological reserves. However, this area suffers from the uncontrolled introduction of alien species (Dulčić *et al.*, 2017). This poses a threat to the natural equilibrium of the delta community since non-native freshwater fish introductions are recognised as one of the major threats to worldwide biodiversity (Ribeiro and Leunda, 2012), leading to several significant disturbances in native ecosystem communities functioning. Therefore, recording and reporting species in non-native areas represent the initial step in the process of preventing invasions or mitigating their consequences (Banha *et al.*, 2015). To increase the probability of reporting of such occurrences by the local community, it is essential to spread the information about the importance of such findings to relevant institutions. Such step has already been initiated through contacts with local fishermen, to whom such information has been provided. Additionally, role of social networks in this sense should be emphasized as it is used increasingly to seek help for the identification of unknown species from community of people gathered around particular interest groups on social network. This, for example, was the case with previously reported occurrence of *Micropterus salmoides* (Centra-

chidae) (Dulčić *et al.*, 2017). Reports by local people may provide additional information, complementing other sources and improving monitoring and action plans in the field of aquatic invasions.

In any case, it is of paramount importance to establish a connection among the local community and the scientists, as well as the related government agencies, in order to enable a rapid information flow and quick response in the reporting of new fish species. As Banha *et al.* (2015) already concluded, this network will be important as a tool for raising the awareness about invasive species and overall environmental education, since the information easily reaches a great number of target people, preventing future introductions. To achieve the desired goal, raising awareness among local people about the non-native species spreading and their potential effect on environment and local fishery, through various modern communication channels, especially through social networks, is needed.

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