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THE FIRST MARINE RECORD OF NORTHERN PIKE *ESOX LUCIUS* LINNAEUS, 1758 IN THE MEDITERRANEAN SEA

Alen SOLDÓ

University of Split, Department of Marine Studies, Ulica Ruđera Boškovića 37, 21000 Split, Croatia
e-mail: soldo@unist.hr

ABSTRACT

Near the coast of Stobreč, Central Adriatic Sea, a recreational fisher caught a strange fish specimen at a depth of 5 m, using a fishing trident. Upon the arrival of the fisher in the harbor the specimen was taken away for analysis. This revealed that the specimen's morphological characteristics matched those of the northern pike *Esox lucius* Linnaeus, 1758. As the northern pike is a stenohaline freshwater fish, it had never been recorded before in the high salinity marine conditions of the Adriatic Sea or anywhere else in the Mediterranean. The collected specimen most likely originated from the nearby short river Žrnovnica. This paper discusses the possibility that the northern pike introduced to some rivers emptying into the Adriatic Sea may possess the local ability to withstand short trips to high salinity waters.

Key words: *Esox lucius*, northern pike, salinity tolerance, hypo-osmoregulatory process, Adriatic Sea, area expansion

PRIMO RITROVAMENTO MARINO DEL LUCCIO *ESOX LUCIUS* LINNAEUS, 1758 NEL MARE MEDITERRANEO

SINTESI

Lungo la costa di Stobreč, nell'Adriatico centrale, un pescatore sportivo ha catturato uno strano esemplare di pesce a 5 m di profondità, utilizzando un tridente da pesca. All'arrivo del pescatore in porto, l'esemplare è stato portato via per essere analizzato. Le caratteristiche morfologiche dell'esemplare corrispondevano a quelle del luccio *Esox lucius* Linnaeus, 1758. Essendo un pesce d'acqua dolce stenoalina, il luccio non era mai stato trovato prima d'ora in condizioni marine ad alta salinità dell'Adriatico o in qualsiasi altra parte del Mediterraneo. L'esemplare raccolto proveniva molto probabilmente dal vicino fiume Žrnovnica. Il presente lavoro esamina la possibilità che il luccio introdotto in alcuni fiumi che sfociano nel mare Adriatico possa resistere a brevi spostamenti in acque ad alta salinità.

Parole chiave: *Esox lucius*, luccio, tolleranza alla salinità, processo ipo-osmoregolatore, mare Adriatico, espansione dell'area

INTRODUCTION

The northern pike *Esox lucius* Linnaeus, 1758 is spread in the temperate and subtropical areas of the northern hemisphere (Raatt, 1988). It is found in all kinds of freshwater habitats (Raatt, 1988) and in some brackish areas such as the Baltic Sea, where salinities vary from 4 to 7 (Jakobsen *et al.*, 2007). The distribution range of the northern pike extends to the western part of the Baltic Proper in the south-eastern part of Denmark, where the salinity gradient rises steeply and varies between 8 and 12, with peaks of up to 20 during periods of Major Baltic Inflows of North Sea water. According to Karås & Lethonen (1993) adult pike individuals can momentarily survive short term fluctuations of up to 12 to 15. Nevertheless, sudden exposures to salinities higher than 11 have shown that an increase in excretion of salt and salinities from 11.3 to 12.4 cause immobilisation and inclination of

the body (Raatt, 1988). Similar results were obtained during the study of a northern pike fry that was hatched and raised in fresh water and could tolerate salinities up to 11, whereas salinities more than 12 proved lethal for it (Jakobsen *et al.*, 2007).

Freshwater fish are occasionally found in brackish waters, either as a result of migration between fresh and saltwater or as more obligate brackish water populations. The fish have to adjust their body salinity to the salinity of the surrounding environment, but non-anadromous freshwater fish are not able to adjust their body salinity to the degree that marine fish species can. The northern pike is a stenohaline freshwater fish, and these are supposedly unable to cope with highly saline water through hypo-osmoregulatory processes (Jakobsen *et al.*, 2007). As such, the northern pike had never before been recorded in the high salinity environment of the Adriatic Sea or anywhere else in the Mediterranean.



Fig. 1: Map of the capture (★ indicates the exact location).

Sl. 1: Zemljevid ulova ščuke (★ označuje natančno lokaliteto ulova).

MATERIAL AND METHODS

The author was contacted by a recreational fisher at sea about the catch of a strange fish specimen near the coast of Stobreč, Central Adriatic Sea, at a depth of 5 m, using a fishing trident (Fig. 1). Upon the arrival of the fishermen in the harbour the specimen was taken away and deposited in the ichthyological collection of the Department of Marine Studies, University of Split, where it was measured to the nearest mm using a measuring board ichthyometer and weighed to the nearest gram. The fish was dissected, its stomach content removed and immediately analysed.

The identification of the specimen was made according to Fickling (1982), Habeković and Pažur (1998) and Lucentini *et al.* (2011).

RESULTS AND DISCUSSION

The northern pike is the only species of the Esocidae family living in rivers and lakes of the Adriatic drainage area and has been introduced into some lakes close to the coast as well as into some freshwater lakes on the Adriatic islands (Čaleta *et al.*, 2019). An analysis of the collected specimen (Fig. 2) revealed that its morphological and coloration characters, including the skin coloration pattern, which are qualitative characters useful for discriminating the Esocidae species, matched the diagnostic features of *Esox lucius* (Fickling, 1982; Habeković & Pažur, 1998; Lucentini *et al.*, 2011). The total length of the specimen was 635 mm, the weight 2,074 g. The stomach content was analyzed to determine the feeding habit of the caught northern pike but the content was nearly digested, so the prey was identified only as a fish, without genus or family level.

Although this record represents the first confirmed report of the northern pike in the Mediterranean Sea, it has to be noted that Šoljan (1948) also reported *E. lucius* as an Adriatic Sea species. His listing was based on an old record by Canestrini (1874), who reported the presence of this species in Venice lagoons. Still, although Šoljan (1948) allowed for such a report to have been based on an exceptional occurrence during a big flood, he nevertheless considered it doubtful and, consequently, omitted the northern pike from all further listings of the Adriatic ichthyofauna.

Lucentini *et al.* (2011) suggested the existence of a new species *Esox flaviae* (synonym for *Esox cisalpinus* Bianco & Delmastro, 2011), the southern pike, occupying central and northern Italy and, potentially, other European water bodies in the Mediterranean area, including the north-eastern shores of the Adriatic and Mediterranean France. They reported that the southern pike is very varied and displays four different colour patterns (a stellate spot, diagonal bars, longitudinal bars and vertical bars), but never the colour pattern with a round spot, which is typical of *E. lucius* (Lucentini *et al.*, 2011) and was visible in the specimen described herein.

The current distribution of the northern pike along the eastern Adriatic drainage area ranges from northern Adriatic rivers and lakes to the Neretva River in the south (Habeković & Pažur, 1998; Čaleta *et al.*, 2019). Of the rivers with a published record of *E. lucius*, the one situated closest to the present locality of collecting in the coastal area of central Adriatic is the Cetina (Čaleta *et al.*, 2019).

The particular location where the specimen was collected has an average salinity of 36 to 38 (Barić *et al.*, 1998). The northern pike is a freshwater fish



Fig. 2: The captured specimen of the northern pike *Esox lucius* with typical colour pattern.
Sl. 2: Ujeti primerek ščuke *Esox lucius* z značilnim barvnim vzorcem.

able to withstand moderately brackish water, most notably in the Baltic Sea, which is one of the largest brackish water (estuarine) areas on Earth (Raatt, 1988; Jakobsen *et al.*, 2007), but, so far, it has never been observed to tolerate salinities as high as in the present location of collecting. In the vicinity of the location where the specimen was caught (2 NM northeast) lies the mouth of a short river named Žrnovnica. While the northern pike has never been officially recorded in that river, from an interview of the local population it has transpired that the northern pike had probably been introduced to the Žrnovnica and is still present in it. Therefore, the collected specimen most likely originated from this nearby river of Žrnovnica.

Due to the seasonal inflow of high salinity marine water, a large part of the river is brackish and even saline. Previous studies have revealed that the pike fry of brackish water origin exhibit a higher salinity tolerance and that certain populations, e.g., those living in the Danish part of the Baltic Sea, have a unique ability to adapt to external changes in salinity that other populations lack (Jakobsen *et al.*, 2007). Moreover, the acclimatisation period is likely to increase the salinity tolerance of the fish (Brown *et al.*, 2001), while it is known that some freshwater fish, when exposed to saline water, developed an apical crypt with of a denser network of anastomosed tubules containing chloride cells with a high level of mitochondria that was denser in specimens feeding on a saline diet than in those feeding on a neutral diet (Jørgensen, 2009). This could indicate that the northern pike living in brackish water can adapt to

increases in salinity faster than the pike originating from freshwater. Therefore, it can be hypothesised that a northern pike that spent its entire life in the brackish water of the Žrnovnica and fed on a saline diet exited the river and after swimming through the surface layers of brackish and saline water arrived at the place where it was caught. It has to be noted that this record of the northern pike in a high salinity marine environment is not an exception for the region of the Adriatic Sea, as similar cases were also observed with some other species that are generally considered freshwater (Soldo, 2013). Hence, this record coincides with the results of Sunde *et al.* (2018), who concluded that some subpopulations of the northern pike exhibit large genetic variations in salinity tolerance and appear to be preadapted to future changes in salinity regimes. It is presumed that high functional genetic diversity increases establishment success in novel areas and the capacity by which some populations adapt to new conditions using evolutionary modifications, ultimately resulting in range expansions (Sunde *et al.*, 2018).

In addition, the author of this paper has recently received information that another northern pike was caught in the northern Adriatic Sea area close to the mouth of the Dragonja River. Therefore, it can be concluded that the northern pike introduced into some rivers that empty into the Adriatic Sea has a local ability to withstand short trips to high salinity waters and that the brackish waters of the Adriatic Sea can be considered an area of potential further northern pike presence.

PRVI MORSKI ZAPIS O POJAVLJANJU ŠČUKE *ESOX LUCIUS* LINNAEUS,
1758 V SREDOZEMSKEM MORJU

Alen SOLDÓ

University of Split, Department of Marine Studies, Ulica Ruđera Boškovića 37, 21000 Split, Croatia
e-mail: soldo@unist.hr

POVZETEK

Blizu obale Stobreča v srednjem Jadranu je rekreacijski ribič na 5 metrih globine s trizobom ujel nenavadno ribo. Po prihodu v pristanišče so ribo poslali na analizo. Izkazalo se je, da gre za ščuko *Esox lucius* Linnaeus, 1758. Ščuka je stenohalina vrsta, ki je doslej še niso ujeli v slanovodnih razmerah v Jadranu ali kjerkoli v Sredozemskem morju. Ujeti primerek je verjetno izviral iz bližnje reke Žrnovnice. Avtor razpravlja o možnosti, da je ščuka, ki so jo naselili v reke jadranskega povodja, sposobna preživeti krajše izlete v slanovodna okolja.

Ključne besede: *Esox lucius*, ščuka, toleranca na slanost, hipo-osmoregulatorni procesi, Jadransko morje, širjenje

REFERENCES

- Barić, A., M. Carić, V. Dadić, B. Grbec, F. Kršinić, D. Lučić, N. Krstulović, G. Kušpilić, Ž. Ninčević, I. Marasović & M. Šolić (1998):** Results of marine research for the purpose of designing submarine outfalls Split- Stobreč. Study of the Institute of Oceanography and Fisheries, Split.
- Brown, J.A., W.M. Moore & E.S. Quabius (2001):** Physiological effects of saline waters on zander. J. Fish. Biol., 59, 1544-1555.
- Canestrini, G. (1874):** Fauna d'Italia. Parte terza. Pesci. Milano: Vallardi, Milano, 208 pp.
- Čaleta, M., Z. Marčić, I. Buj, D. Zanella, P. Mustafić, A. Duplić & S. Horvatić (2019):** A review of extant Croatian freshwater fish and lampreys. Annotated list and distribution. Ribarstvo, 77, 137-234.
- Fickling, N.J. (1982):** The identification of pike by means of characteristic marks. Aquac. Res., 13, 79-82.
- Habeković, D. & K. Pažur (1998):** Pike (*Esox Lucius* L.), its characteristics and importance. Ribarstvo, 56(2), 55-60.
- Jakobsen, L., C. Skov, A. Koed & S. Berg (2007):** Short term salinity tolerance of northern Pike, *Esox lucius*, fry, related to temperature and size. Fish. Manag. Ecol., 14, 1-6.
- Jørgensen, A.T. (2009):** Salinity tolerance of fertilized eggs and fry of the brackish water northern pike, *Esox lucius* L. MSc thesis. The Department of Environmental, Social and Spatial Change. Roskilde University, 40 pp.
- Karås, P. & H. Lethonen (1993):** Patterns of movement and migration of Pike (*Esox lucius* L.) in the Baltic Sea. Nord. J. Freshw. Res., 68, 72-79.
- Lucentini, L., M.E. Puletti, C. Ricciolini, L. Gigliarelli, D. Fontaneto, L. Lanfaloni, F. Bilò, M. Natali & F. Panara (2011):** Molecular and Phenotypic Evidence of a New Species of Genus *Esox* (Esocidae, Esociformes, Actinopterygii): The Southern Pike, *Esox flaviae*. PLoS ONE, 6(12), e25218.
- Raat, A.J. (1988):** Synopsis of the biological data on the Northern Pike *Esox lucius* Linnaeus, 1758. FAO Fisheries Synopsis (30) Review 2: Food and Agriculture Organization of the United Nations, FAO, Rome, 178 pp.
- Soldo, A. (2013):** First marine record of marble trout *Salmo marmoratus*. J. Fish. Biol., 82(2), 700-702.
- Sunde, J., C. Tamaro, P. Tibblin, P. Larsson & A. Forsman (2018):** Variation in salinity tolerance between and within anadromous subpopulations of pike (*Esox lucius*). Sci. Rep., 8, 22.