THE SPREADING OF LESSEPSIAN FISH MIGRANTS INTO THE ADRIATIC SEA: A REVIEW

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Abstract
Eight Lessepsian fish migrants have reached the Adriatic Sea in the last 20 years (one in the 19th century). The Lessepsian migrants found along the eastern Adriatic coast are: *Pampus argenteus, Parexocoetus mento, Hemiramphus far, Saurida undosquamis, Sphyraena chrysotaenia, Epinephelus coioides, Leiognathus klunzingeri, Stephanolepis diaspros* and *Siganus rivulatus*. The Adriatic records constitute the northernmost occurrences of those species.

Key-words: fish, Lessepsian migrants, Adriatic Sea

Introduction

The term "Lessepsian migration" was first used to characterize a new phenomenon of unidirectional and successful biotic advance from the Red Sea to the Eastern Mediterranean (1). The term "Lessepsian migrant" for Red Sea species that have passed through the Suez Canal and settled in the Eastern Mediterranean was coined by Por (2).

Changes in the Adriatic ichthyofauna have been recorded and among that some Lessepsian fish species were recently recorded (3). The purpose of this paper is to examine the records, distribution and abundance of the fish Lessepsian immigrants in the Adriatic waters taking into account some new data on their presence.

Results and discussion

At least 8 Lessepsian fish migrants reached the Adriatic Sea in last 20 years (one in the 19 century). All records were along the eastern Adriatic coast: three species were found at the Albanian coast, one species at the Montenegro coast, four species at the Croatian coast and one species at the Italian coast. Lessepsian fish species may be characterized according to several traits, namely abundance, habitat, feeding habits and size (4). Characterization of Lessepsian fish species in the Adriatic is: *Pampus argenteus* (caught in 1896 near Rijeka; 5, 6) – abundance: VR – very rare, habitat: P – pelagic, feeding habits: PL – planktivores, size: M – medium; *Hemiraphus far* (caught at Albanian coast, 7) – abundance: unknown, habitat: IP – inshore pelagic; feeding habits: PL – planktivores, size: unknown; *Parexocoetus mento* (caught at Albanian coast, 8) – abundance: unknown, habitat: IP – inshore pelagic, feeding habits: PL – planktivores, size: unknown; *Saurida undosquamis* (caught at Albanian coast, 9) – abundance: VR – very rare, habitat: B – benthic, feeding habits: FI – feeders of fish and benthic invertebrates, size: M - medium; *Sphyraena chrysotaenia* (caught on 10 August 2000 in Molunat Bay, Croatian coast, 10) – abundance: VR – very rare, habitat: BP – bentho-pelagic, feeding habits: FI – feeders of fish and benthic invertebrates; size: M – medium; *E. coioides* (caught in the Trieste Bay, 16 May 1998, 11) – abundance: VR – very rare, habitat: B – benthic, feeding habits: FI – feeders of fish and benthic invertebrates, size: M – medium; *Leiognathus klunzingeri* (caught in Saplunara Bay, Island Mljet, 29 June 2000, 12) – abundance: VR – very rare, habitat: B – benthic, feeding habits: BI – benthic invertebrates, size: S – small; *Stephanolepis diaspros* (caught at Hrid Djeran, Montenegro coast, 23 August 2002, 13) – abundance: VR – very rare, habitat: R – rocky, feeding habits: BI – benthic invertebrates, size: S – small; *Siganus rivulatus* (caught near Cavtat, Croatian coast, 5 October 2002, 14) – abundance: VR – very rare, habitat: B – benthic, feeding habits: H – herbivores; size: M – medium.

Nine Lessepsian fish migrants brought up (together with previous mentioned species in 3) the number of species recorded for the Adriatic to 432 and 122 families. The record of *P. argenteus* dated from 1896 and represents the first Lessepsian migrant in the Mediterranean Sea. The occurrence of the orange-spotted grouper *E. coioides* in the Gulf of Trieste (11) is very interesting indeed, since it had been previously recorded only from the coast of Israel and considered a rare and recent invader (15). Other seven species were amongst the first Erythrean invaders of the Eastern Mediterranean more than thirty years ago, when recorded as common or very common fish species in the Aegean coast and off Anatolian coast (16).

It is not really known what is the impact of the Lessepsian migrants in the Adriatic environment and in this stage it is very hard to perform any direct study to assess possible impact.

The last decade has witnessed an upsurge of comprehensive studies on the phenomenon of Lessepsian fish migration. The Adriatic Sea is obviously becoming an area on the westward distribution path of Lessepsian migrants and has provided some important notes and studies of westward spreading of them. We are looking forward to the continuation of this scientific effort and hope for further cooperation among the ichthyologists of the Levant and Adriatic Sea in the study of Lessepsian migration.

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