

**ADDITIONAL RECORDS OF *LOBOTES SURINAMENSIS*, *CARANX CRYSOS*,
ENCHELICORE ANATINA, AND *LAGOCEPHALUS SCLELERATUS* (ACTINOPTERYGII)
IN THE ADRIATIC SEA**

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Abstract. Additional records of four fish species from the Adriatic Sea are reported: Atlantic tripletail, *Lobotes surinamensis* (Bloch, 1790) (Perciformes: Lobotidae); blue runner, *Caranx crysos* (Mitchill, 1815) (Perciformes: Carangidae); fangtooth moray, *Enchelycore anatina* (Lowe, 1838) (Anguilliformes: Muraenidae); and silver-cheeked toadfish, *Lagocephalus sceleratus* (Gmelin, 1789) (Tetraodontiformes: Tetraodontidae). More evidence is needed to indicate establishment of populations of these species in the Adriatic Sea. Lessepsian migrant *Lagocephalus sceleratus* is the third Lessepsian fish species from the Adriatic Sea with more than one record.

Keywords: non-indigenous, alien species, tropicalization, Lessepsian migration

The Mediterranean basin is considered a major recipient of non-indigenous marine species. Their number is estimated to range from 573 species (Galil 2009) to 986 species, of which 249 are associated with the Central Mediterranean region (Zenetos et al. 2012). According to Zenetos et al. (2010), 149 non-indigenous fish species have been recorded from the Mediterranean Sea. Of this number, approximately 80 species are Lessepsian fish migrants (Golani et al. 2011). In the Adriatic Sea, at least 24 non-indigenous fish species have been reported in the last two decades of which 13 are Lessepsian migrants (Dulčić and Dragičević 2011). Recently, two species of Atlantic origin, the queen angelfish, *Holocanthus ciliaris* (Linnaeus, 1758), and the creole-fish, *Paranthias furcifer* (Valenciennes, 1828), have been anthropogenically introduced to the Adriatic Sea (Dulčić and Dragičević 2013a, 2013b). Additionally, there are cases of shipping- and aquaculture-related introductions such as the cases of dwarf flathead, *Elates ransonnettii* (Steindachner, 1876), and red seabream, *Pagrus major* Temminck et Schlegel, 1843, respectively (Dulčić and Kraljević 2007, Dulčić et al. 2010).

Golani et al. (2011) emphasized that it is important that first records of alien fish species in new areas are followed by reports of subsequent records and that such addi-

tional records are needed to acknowledge the establishment and distribution in the new habitat. Subsequent records may indicate that previous occurrences were not just accidental and that the new region is included in the zoogeographic range of the species (Golani and Levy 2005). The aim of the present work is to report subsequent records of fishes which have only recently been recorded in the Adriatic Sea for the first time. In this paper we report subsequent records of the Atlantic tripletail, *Lobotes surinamensis* (Bloch, 1790) (Perciformes: Lobotidae); blue runner, *Caranx crysos* (Mitchill, 1815) (Perciformes: Carangidae); fangtooth moray, *Enchelycore anatina* (Lowe, 1838) (Anguilliformes: Muraenidae); and silver-cheeked toadfish, *Lagocephalus sceleratus* (Gmelin, 1789) (Tetraodontiformes: Tetraodontidae). Specimens of *Caranx crysos* and *Lagocephalus sceleratus* were caught by trammel net, while those of *Lobotes surinamensis* by seine net. The photograph of *Enchelycore anatina* and detailed information on it were obtained from Mr. Rok Korošec from the Feel Deep Diving Club, Slovenia. Photographs of *Caranx crysos* were obtained from the fisherman Mićo Kočović who caught it and determination of the species was based on them. The specimen of *Lobotes surinamensis* was deposited in the collection of

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the Institute for Marine and Coastal Research in Dubrovnik, Croatia, while of *Lagocephalus sceleratus* in the Ichthyological collection of the Institute of Oceanography and Fisheries in Split, Croatia.

LOBOTIDAE

Lobotes surinamensis (Bloch, 1790)

Material examined. One ♂ specimen, TL = 390 mm, *W* = 1400 g, 5 December 2011, from Mali Ston Bay (42°52'30"N; 17°37'30"E) (southern Adriatic Sea, Croatia) (Fig. 1).

Short description. Deep oval-shaped and compressed body with concave upper head profile and relatively small eyes. Mouth oblique and semi-superior, lower jaw slightly protruding. Posterior portions of dorsal and anal rays rounded and opposite to each other. Body colour grey brownish with irregularly shaped larger darker blotches. Posterior margins of dorsal, anal, and caudal fin darker.

Remarks. Atlantic tripletail, *L. surinamensis*, is a cosmopolitan species found in tropical and subtropical waters of all oceans (Tortonese 1990). Prior to this record, it was recorded once in the middle Adriatic on 21 June 2010 (5 NM SW from Biševo Island, Croatia) (TL = 380 mm, *W* = 1500 g) (Fig. 1) (Dulčić and Dragičević 2011). Findings of *L. surinamensis* in the Adriatic Sea are probably a consequence of increased abundance of this species in the southern Mediterranean waters amplified by the changes in hydrological conditions in the area. It seems that this species recently established its population in the area of Maltese islands which is indicated by the presence of juveniles in the area (Deidun et al. 2010).

CARANGIDAE

Caranx crysos (Mitchill, 1815)

Material examined. Photo of a specimen (245 mm TL), according to the fisherman, 4 other specimens were collected but no additional data or photograph were provided, 1 March 2013, Ulcinj (Montenegro coast, southern Adriatic) (Figs. 1 and 2).

Short description. (Based on photos provided by the fisherman who caught it.) Body compressed and elongated, moderately deep. Snout pointed and terminate. Lateral line arched anteriorly, above pectoral fin. Caudal fin forked, pectoral fins long and falcate. End of upper jaw reaching under mid-eye. Body colour silverish, black spot visible on upper posterior edge of operculum.

Remarks. Blue runner, *Caranx crysos*, is distributed in the eastern Atlantic from Senegal to Angola, including the western Mediterranean, St. Paul's Rock, and Ascension Island. It has also been reported from Mauritania and the western Atlantic from Nova Scotia in Canada to Brazil, including the Gulf of Mexico and the Caribbean. Fischer et al. (1987) reported its presence in the entire Mediterranean except for the Adriatic Sea and the coasts of Turkey. Prior to the presently reported finding, one specimen was recorded in the Northern Adriatic (western coast of Istra Peninsula, Croatia) (TL = 368 mm, *W* = 634 g) (Fig. 1) on 27 August 2008 (Dulčić et al. 2009). The find-

ing of additional specimens in the Adriatic Sea (southern Adriatic) suggests that this species extended its distribution in the Adriatic Sea. This is the first record of *C. crysos* from Montenegrin coast.

MURAENIDAE

Enchelycore anatina (Lowe, 1839)

Material examined. Photo of a specimen (Fig. 3); 22 September 2011, from Bijelac Islet near Lastovo Island (middle Adriatic, Croatian coast) (Figs. 1 and 3).

Short description. (Determination of the specimen was based on a single photograph. However, important diagnostic features were clearly visible and these are): Pointed head with a distinctly elevated occipital region, tubular anterior nostril, posterior nostril round to oval opening in front of eye, large mouth, with cleft extending well back behind eye, arched jaw, with many conical and sharp fang-like teeth, light brown snout and cheeks with yellow dots.

Remarks. The fangtooth moray, *Enchelycore anatina*, is a tropical Atlantic species distributed in the eastern Atlantic from St. Helena Island to the Azores (Golani et al. 2002). It is also recorded in the Mediterranean Sea (Ben-Tuvia and Golani 1984, Kalogirou 2010). Prior to

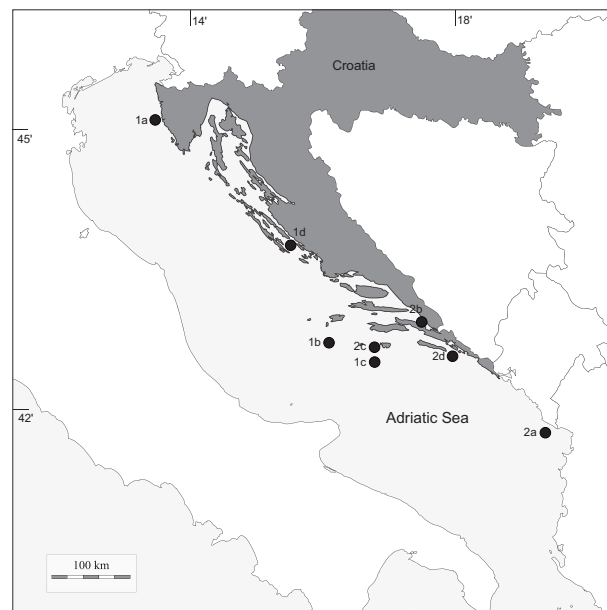


Fig. 1. Locations of first and additional records of *Caranx crysos* (a), *Lobotes surinamensis* (b), *Enchelycore anatina* (c), and *Lagocephalus sceleratus* (d)



Fig. 2. Specimen of blue runner, *Caranx crysos*, caught near Ulcinj, Montenegro (photo used with permission of Mr. Mićo Kočović)



Fig. 3. Specimen of fangtooth moray, *Enchelycore anatina*, sighted near island Lastovo, Croatia (Photo: Rok Korošec)

this finding, two specimens were observed (and determined from the photographs) in July of 2010 near Sušac Island, Croatia (Lipej et al. 2011). It is suggested that this species is an overlooked inhabitant of the Mediterranean rather than a recent colonizer (Kalogirou 2010). This hypothesis could also be applied to the Adriatic case.

TETRAODONTIDAE

Lagocephalus sceleratus (Gmelin, 1789)

Material examined. Specimen: LS-18313-IOR, TL = 492 mm; *W* = 1422 g, 17 March 2013, Tribunj (middle eastern Adriatic, Croatian coast) (Fig. 1).

Short description. Body elongated, cylindrical, and robust. Dorsal and anal fins with short base and situated opposite to each other, pectoral fins broad and relatively short. Small spinules present in dorsal and ventral area. Greyish-green colour dorsally with black spots, two silver bands extending from mouth to caudal fin on lateral side; ventral side of body white, silver blotch present in front of eyes.

Remarks. Lessepsian migrant—silver-cheeked toadfish, *Lagocephalus sceleratus*—is distributed in the tropical Indian and Pacific Oceans, from where it originates (Smith and Heemstra 1986). In the Mediterranean Sea this species was first recorded in 2003 on the south-eastern Aegean Sea coast of Turkey (Akyol et al. 2005). First specimen of *L. sceleratus* in the Adriatic Sea was caught in October 2012 on the northern side of Jakljan Island

(Croatia, southern Adriatic). It was a sexually mature female (TL = 66.3 cm) weighing 3.531 kg (Jadranka Sulić-Šprem, personal communication). The finding of additional specimen in the mid-eastern Adriatic (Fig. 2) in less than one year from its previous record suggests that this species extended its distribution to the Adriatic Sea.

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