

First Occurrence of *Heniochus intermedius* Steindachner, 1893 in The Syrian marine waters(Levantine basin)

Abstract

In the present paper, we document the first record of a Red Sea (Lessepsian migrant) species the Red Sea bannerfish, *Heniochus intermedius* (Steindachner, 1893), from the Syrian coast, which constitutes the seventh record in the entire Mediterranean. The fish of 140mm total length and 58.4 g total body weight, was caught by the trapon May 18th, 2022 at a depth of 14 m with bottom of mixed sand and rocks in front of the beach of Baniyas city (35° 7. 0.5' 17', E: 35° 54' 14.73"). With the present report, the number of Lessepsian fish migrants in the Syrian marine waters has reached 82 species. The ways of introduction and arrival of this species into the Mediterranean are also discussed.

Key words: invasive species, Lessepsian migration, *Heniochus intermedius*, Mediterranean sea, Syria.

Introduction

Butterfly fishes (Chaetodontidae) are easily recognizable by their deep compact body, small tip, extending mouth, and bright coloration patterns [1,2]. The butterflyfish species of the family Chaetodontidae are also called coral fish and banner fish. In this family, 12 genera consist of 129 species [3] found mainly in the tropical Indo-West Pacific [2]. *Heniochus intermedius* Steindachner, 1893 considered endemic to the Red Sea and Gulf of Aden [1]. Butterflyfish resemble smaller versions of angelfish in the family Pomacanthidae, but unlike them, chaetodontids do not have preopercular spines at the opercula [2]. The Chaetodontidae family is represented in Mediterranean by two genera and three species [4,5,6]: *Chaetodon austriacus* Ruppell, 1836; *Chaetodon larvatus* Cuvier, 1831; and *Heniochus intermedius* Steindachner, 1893. The species *H. intermedius* is diurnal and is usually observed in pairs or as solitary individuals and can be found down to 50 m depth [7]. It can reach 20 cm Total Length (TL) and is a benthic feeder living closely associated to coral reefs [4]. Recently, many species of Lessepsian fishes have invaded the coastal waters of the Mediterranean in Syria, many species have been established and are important components of the coastal ichthyofauna [8,9,10,11]. The species, *Chaetodon larvatus* Cuvier, 1831 of the same family, was previously recorded in the Syrian coast [6]. *H. intermedius* was first reported in June 2002 off the Gulf of Antalya, Turkey [12]; This species was also subsequently identified in Lebanon [13]; in

Haifa[14]; in Malta [15]; in the Gulf of Iskenderun [5] and off MersaMatruh, Egypt[16]. However, *H. intermedius* has not been reported along the Syrian coast.

With this report, the number of lessepsianmigratory fish in Syrian marine waters has reached 82 species. The cooperation between fishers and Ichthyologists (experts in fishery sciences) at Tishreen University enabled us to make the taxonomical definition and to evaluate the spatial distribution.

Materials and methods

On May 18th, One specimen of a new fish species (Figure 1) was caught by the trap at a depth of 14 m, and a mixed bottom (sand and rocks) in front of the beach of Baniyas city (35° 7. 0.5' 17", E: 35° 54' 14.73") (Figure 2). By examining the morphological characteristics of the specimen according to Gokoglu et al.[12]., it became clear to us that this specimen represents the species *H. intermedius*.



Figure 1. Specimen of *H. intermedius* caught from the coast of Baniyas on **May 28th2022**. The total body length: 14 cm, and the width of the fish body is 12 cm. Scale bar= 30 mm

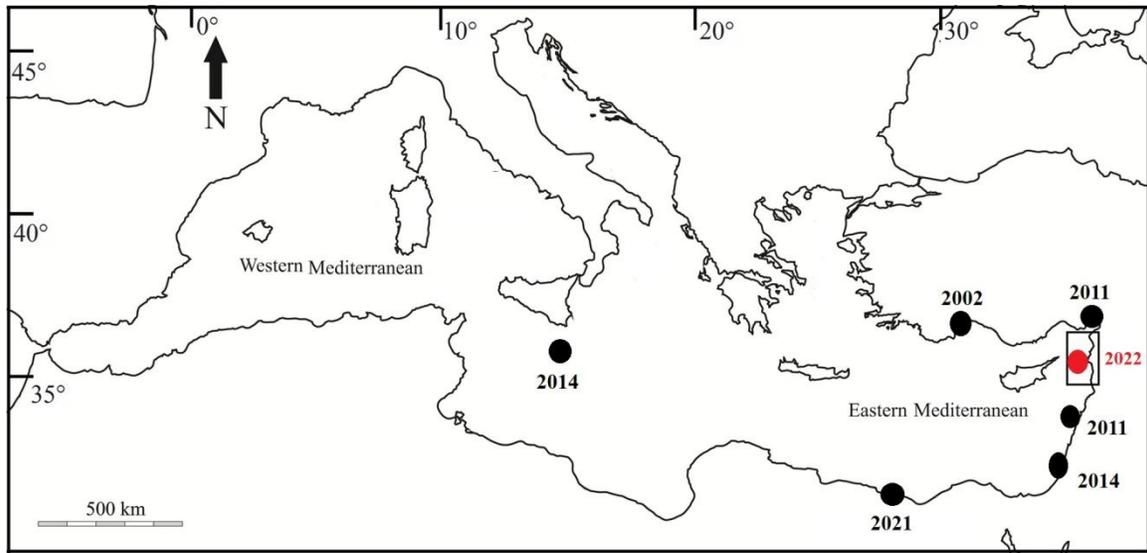


Figure2. Map of the Mediterranean Sea; the locations of *Heniochusintermedius* (●: present study; ●: previous studies) are indicated.

Results and Discussion

The fish color was yellowish ventrally and whitish dorsally, with the two typical black bands that characterize the species. Both bands were diffuse dorsally and more marked ventrally. The posterior and anterior parts of the dorsal fin, as well as the pectoral and caudal fins were yellow. The posterior and anterior parts of the anal and pelvic fins were black (Figure 1). Meristic counts (Table 1) agree with those given by Randall [1]

Table 1. Meristic counts, Total length and Total body weight of the specimen of *Heniochusintermedius* caught from the coast of Baniyas in May 2022.

Meristic counts	
Dorsal fin rays	XI + 25
Anal fin rays	III + 18
Pectoral fin rays	16
Pelvic fin rays	I + 5
Caudal fin rays	23
Total body Wight (g)	58.4
Total Length (mm)	140

Heniochus intermedius is distributed in the Indo-West Pacific Ocean throughout tropical waters of the Red Sea and the Gulf of Aden. It is found in rocky and reef slopes at depths of 3–50 m [17,18]. Adults are usually solitary or paired, and occasionally in groups [1,17]. It is suggested that climate change and increased anthropogenic actions are the main factors affecting the distribution pattern and species composition in the Mediterranean [19]; these combined effects caused an increase of the abundance of subtropical species in the warm-temperate Mediterranean [20,21]. The emigration of Red Sea fish species via the Suez Canal is an ongoing process, which is altering local fish community structure [22,23,24]. During the last 20 years *H. intermedius* has shown an expansion toward the eastern side of the Mediterranean sea. This situation is probably explained by biotic and abiotic factors, including food availability, competition with indigenous species, and water mass movements (currents). However, it is difficult to predict which of these factors will influence further the eastward movement of this Lessepsian species. Our finding of *H. intermedius* in the Baniyas coast is the first occurrence of this species on the Syrian territorial water. Since this species was recorded a few times in Alexandria, Haifa, Beirut, Iskenderun, and currently in Baniyas, this supports the hypothesis of migration through the Suez Canal and denies the hypothesis of its introduction into the eastern Mediterranean through ballast water only.

The Mediterranean Sea is the most globally impacted ecoregion by bioinvasions [25]. To date, more than 110 alien fish species have been recorded in the Mediterranean Sea [26], and their invasion rate seems to increase continuously, primarily due to the opening of the Suez Canal [25].

Since the first registration of this species in the Mediterranean took place in the Gulf of Antalya in 2002 [12], this leads to the belief that its entry into the Mediterranean did not take place in the form of a natural migration through the Suez Canal, but through the transfer of larvae within the ballast waters coming from the Indian Ocean or the Red Sea to a port Antalya, and from there it spread. Because if the first entry into the Mediterranean was through the Suez Canal, it is logical to first register its presence on the eastern coast of the Mediterranean before reaching the south of the southern coast of Turkey.

Monitoring programs, with the help of citizen scientists, appear to be an excellent low-cost support to study the dynamics of the biological invasions in the basin and to upgrade the checklist in the Syrian marine region [11,16].

Conclusion

The increasing number of alien fish, and in general alien species, in the Mediterranean Sea, and in particular in its eastern part, highlights a dramatic ecosystem change due to

the alteration of its biodiversity. Based on this, Lessepsian migration seems to be the most probable mode of introduction for *H. intermedius* to the Mediterranean, but the aquarium release hypothesis or ballast water transport cannot be completely ruled out.

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