

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 140 mm total length, was caught by the trap on May 18th, 2022 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"). With the present report, the number of Lessepsian fish migrants in the Syrian marine waters has reached 82 species.

Key words: Non indigenous 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 fish 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 waters 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 in length and is a benthic feeder living closely associated to coral reefs [4]. To date, many species of Lessepsian fishes have entered 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]. Another 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]; The species was also subsequently identified in Lebanon by Bariche [13]; in Palestine [14]; in Malta [15]; in the Gulf of Iskenderun [5] and off

Mersa Matruh, Egypt [16]. However, *H. intermedius* has not been reported along the Syrian coast. With this report, the number of lessepsian migratory fish in Syrian marine waters has reached 82 species. The cooperation between fishermen and specialized researchers at Tishreen University allowed us to obtain the sample in order to study it and determine its taxonomic location, as well as discuss how it entered or reached the Mediterranean and its distribution.

Materials and methods

On May 18th, 2022, a professional hunter contacted one of the authors, saying that this species is new to him and his fellow hunters, and sent us a picture of the sample (Figure 1). Given the distance between Latakia and Baniyas (60 km), we asked the fisherman to keep the sample in the refrigerator until the next day so that we could send someone to bring the sample to the Marine Sciences Laboratory at Tishreen University to keep it within the fish collection in the lab, but the fisherman told us that the sample disappeared about him under unknown conditions, so we sufficed with determining the taxonomic position based on the morphological characteristics of the individual according to Gokoglu et al. [12]. The fish specimen 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, 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 28, 2022. The total body length: 14 cm, and the width of the fish body is about 12 cm (the length and width of the fish were estimated compared to the measurements of the hand (palm) of the fisherman holding the fish. Scale bar= 30 mm

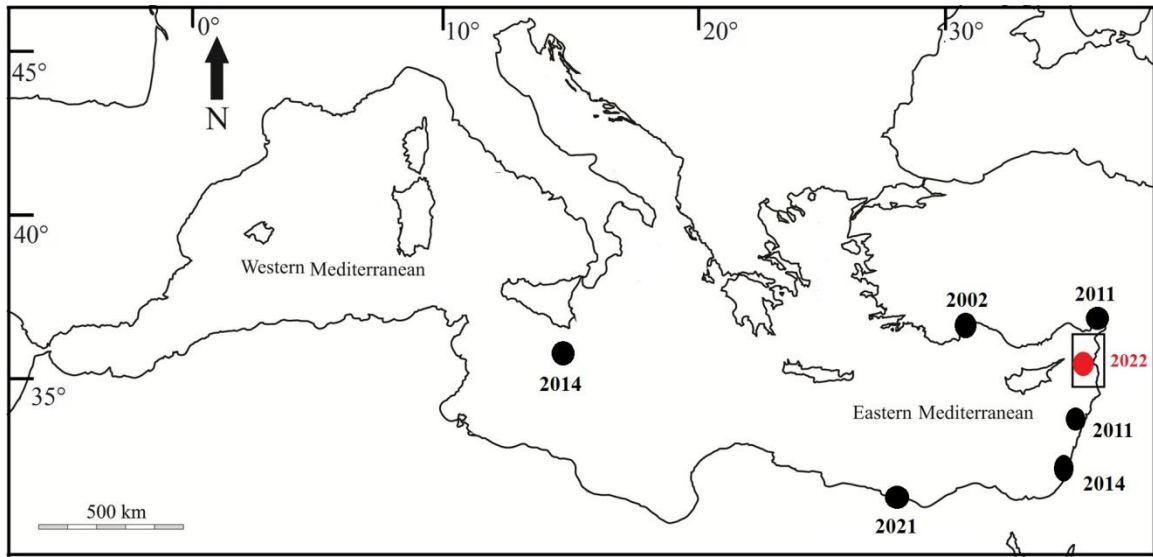


Figure2. Map of the Mediterranean Sea showing the locations of *Heniochus intermedius* (●: present study; ●: previous studies).

Results and Discussion

The ground color of the fish 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). *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 speculated that climate change and increased anthropogenic actions are the main factors affecting the distribution pattern and species composition in the Mediterranean [19]; the combined effects potentially increase 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 communities [22,23,24]. Within the past 20 years *H. intermedius* has shown an expansion toward the eastern side of the Mediterranean coast. This situation is probably explained by biotic and abiotic factors, including food availability, competition with indigenous species, and 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 introduction rate seems to increase continuously, primarily due to the opening of the Suez Canal [25].

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 a neglected country such as Syria [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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