

On the first record of the genus *Heniochus* (Pisces: Chaetodontidae) in the Adriatic Sea

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ABSTRACT

The first record of an unidentified species of the genus *Heniochus* from the Adriatic Sea is reported. This non-indigenous species was observed on September 11, 2024, in a small bay near the city of Ploče along the Croatian coast. The observation was made by one of the authors during spearfishing activity. The fish was documented with an underwater camera, but the footage alone did not allow for precise species-level identification. However, key visible traits were sufficient to confirm identification at the genus level. The authors speculate that the fish may have been introduced through shipping activities, as a large cargo port is located near the area where it was observed.

Keywords: Non-indigenous species, introduced species, Chaetodontidae, Mediterranean Sea, butterflyfishes

INTRODUCTION

Numerous alien fish species have been observed throughout the Adriatic Sea in the recent decades (Dulčić & Dragičević, 2023). With the exception of some Lessepsian species, many of which are well-established, particularly in the eastern Mediterranean Sea, and whose presence in the Adriatic waters can primarily be attributed to active migration or propagule transport, determining the origin or mode of introduction of other non-indigenous species is often challenging. This is especially true for species whose closest known established populations are far from the introduced range. However, shipping still represents the most likely vector of introduction in the European Seas, except in

the Mediterranean, where Suez Canal represents the dominant pathway (Katsanevakis *et al.*, 2023). Furthermore, a great number of alien species has been discovered incidentally, often through observations by citizens (Tiralongo *et al.*, 2020), as is also case in the eastern Adriatic where citizen science has played an important role in their detection (Dulčić & Dragičević, 2023). Lastly, it is not always a simple task to identify such newcomers to the species level with high certainty, especially since many observations are based solely on underwater images or video material. This hampers proper identification, particularly when morphologically similar species are involved

and accurate identification requires the collection of specimens. Similar cases of ambiguity involving morphologically similar species were previously documented in the genus *Abudefduf* (Dragičević *et al.*, 2021). This study reports a record of an individual belonging to an undetermined species of the genus *Heniochus* of the family *Chaetodontidae*, observed in the eastern Adriatic Sea near the town of Ploče. Although a single species of this genus has been previously recorded in the Mediterranean on several occasions, the possibility of a shipping-mediated introduction prevents a presumptive approach to species identification.

MATERIALS AND METHODS

An unidentified species has been observed by one of the authors on September 11, 2024 in a small bay near the city of Ploče, Croatia (43.064292°N, 17.378911°E; Fig. 1a) while spearfishing. It was observed at a depth of 1.5 meters in a sublittoral sciaphillic rocky habitat,

swimming within a large crevice formed between two boulders, which were overgrown with algae and various other biogenic organisms. Throughout the observation, it was being filmed by underwater sport camera in 4K video quality mode. Unfortunately, due to the fish's anti-predatory behavior, characterized by unpredictable and vigorous movements and positioning itself in a way that minimized its visibility to the diver (rarely showing its sides), it was only possible to extract a single frame that allowed identification of the individual to the genus level (Fig. 1b).

RESULTS AND DISCUSSION

The body of the individual was laterally compressed. Distinctive coloring was visible with yellow tail area, followed by black-white-black stripes on the body and white lower head portion. A notable feature was the elongated white dorsal fin, which formed a crescent moon-like shape as part of the white band that extended across the body to the anal fin.

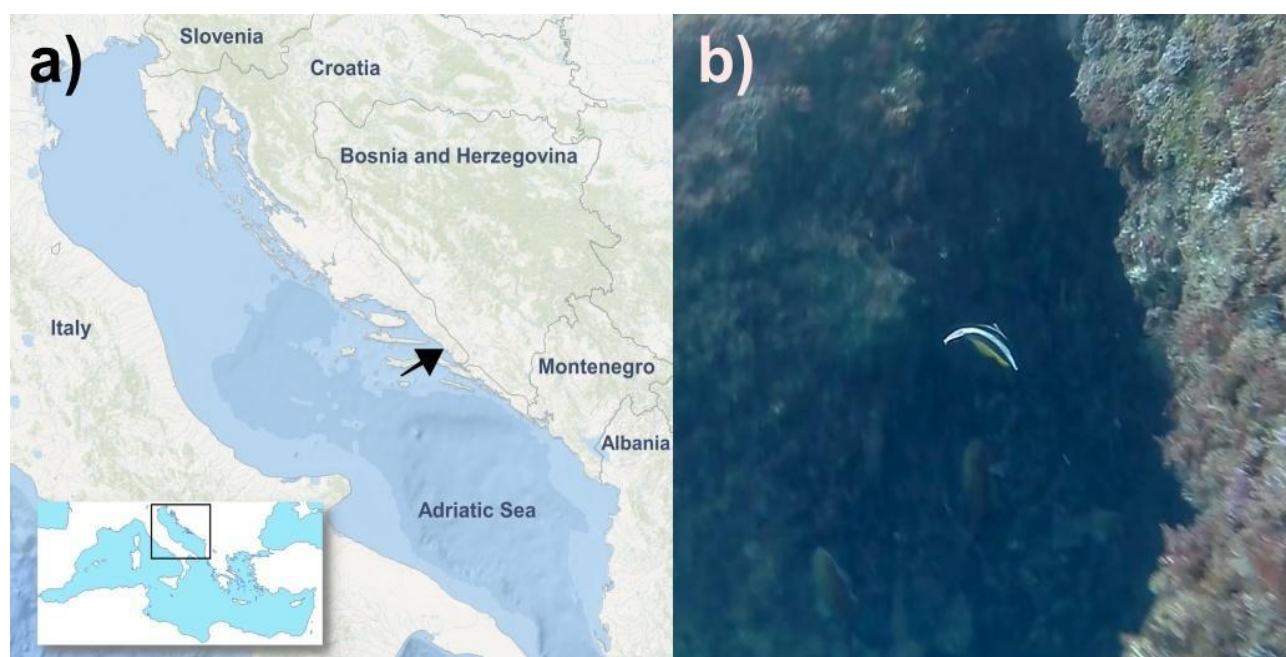


Figure 1. Location of the occurrence of *Heniochus* sp. in the eastern Adriatic Sea (a) and the still-frame from the underwater video featuring the fish in the middle of the image (b). Notice that the fish is observed from the rear and its position in the water column is under angle (about 45°).

These distinctive features align with the description of species within the *Heniochus* genus, with the elongated fourth dorsal spine serving as a key characteristic that differentiates this genus from other chaetodontids (Tsadok *et al.*, 2015; Froese & Pauly, 2024). While it was not possible to directly observe dorsal spine from the footage, the elongated dorsal fin is still a distinctive character of the genus. However, given the available information, it would be particularly risky to definitively identify the observed individual without support in morphological characters which were, unfortunately, unavailable in the present case. Therefore, it is possible that the observed individual belonged to one of several morphologically similar species of the *Heniochus* genus.

The only species of this Indo-Pacific genus recorded in the Mediterranean Sea is *Heniochus intermedius* Steindachner, 1893, a Red Sea species documented in Levantine waters, where a presumably established small population exists, as well as in Turkish, Cypriot and Maltese waters, suggesting multiple potential pathways for its introduction, including Lessepsian migration, aquarium release and shipping (Gökoğlu *et al.*, 2003; Tsadok *et al.*, 2015; Evans *et al.*, 2015; Bariche *et al.*, 2020; Saad *et al.*, 2022). The lack of documented records along the route from the Levant to the Adriatic Sea, gives additional support to the hypothesis of an anthropogenically induced introduction event, rather than a natural range expansion of the species. Additional support for this hypothesis comes from the sighting location, which was 2.6 NM from the Port of Ploče, Croatia's second-largest cargo port. With numerous ships arriving in the port from across the Globe, introduction events connected with shipping are not unexpected in the area. Indeed, several non-indigenous species whose presence has been attributed to shipping have

already been recorded in this area. For example, non-indigenous invasive bivalve *Arcuatula senhousia*, polychaete *Ficopomatus enigmaticus* and sponge *Paraleucilla magna* were all recorded in the close vicinity of the Port of Ploče (Despalatović *et al.*, 2013; Cvitković *et al.*, 2013). Moreover, the possibility of aquarium release, although less likely, should also be considered, as these species are popular in the aquarium trade. In any event, given its relevance to alien species introductions, the Port of Ploče and its surrounding area should be considered a key location for systematic monitoring efforts.

This record of *Heniochus* sp. adds to the growing list of non-native species whose presence in the Adriatic Sea can be attributed to shipping activities, many of which have been documented near cargo ports or shipyards. Some examples of non-indigenous fish species recorded along the eastern Adriatic coast and whose presence can be attributed to the mentioned pathway include *Oplegnathus fasciatus* recorded near Urinj in 2015, *Elates ransonnettii* recorded near Split in 2010 and *Paranthias furcifer* and *Holacanthus ciliaris* both recorded near Trogir shipyard in 2011 (Dulčić & Dragičević, 2023). Finally, greater effort should be directed toward enforcing measures aimed at preventing future introductions by managing potential vectors, such as maritime shipping.

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O prvom nalazu roda *Heniochus* (Pisces: Chaetodontidae) u Jadranskom moru

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SAŽETAK

U radu se izvještava o prvom nalazu vrste roda *Heniochus* u Jadranskom moru. Ova strana vrsta ribe uočena je 11. septembra 2024. u malom zalivu pored grada Ploče uz hrvatsku obalu. Riba je uočena od strane jednog od autora tokom aktivnosti podvodnog ribolova. Jedinka je dokumentovana podvodnom kamerom, ali fotografija sama po sebi nije bila dovoljna za preciznu identifikaciju na nivou vrste. Međutim, ključne vidljive karakteristike bile su dovoljne za potvrdu identifikacije na nivou roda. Autori pretpostavljaju da je riba unešena brodskim transportom, budući da se velika teretna luka nalazi u blizini područja gdje je uočena.

Ključne riječi: alohtone vrste, unijete vrste, Chaetodontidae, Sredozemno more, ribe leptiri