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On the occurrence of the Pennant Coralfish *Heniochus acuminatus* (Linnaeus, 1758) and the Red Sea Bannerfish *Heniochus intermedius* Steindachner, 1893 in the Mediterranean Sea: New records and a regional review

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Abstract

Non-indigenous butterflyfishes (Chaetodontidae) are increasingly detected in the Mediterranean Sea, often through opportunistic observations supported by photographs or video. Here we report the first confirmed Mediterranean record of the Pennant coralfish *Heniochus acuminatus* (Linnaeus, 1758), based on a specimen speared off Larnaka (Cyprus) in August 2018 and photographed immediately after capture. We also provide six new Mediterranean occurrences of the Red Sea bannerfish *Heniochus intermedius* Steindachner, 1893, recorded between February 2021 and November 2025: three captures from Lebanon (two preserved as vouchers), and three additional individuals documented exclusively by underwater video from Italy, Cyprus and Greece, which are conservatively reported as *Heniochus* cf. *intermedius*. Finally, we compile and critically update published Mediterranean *Heniochus* records (n = 21), highlighting the growing contribution of citizen science and social media to the detection of conspicuous tropical fishes, while emphasizing the need for evidence-based reporting when identifications rely solely on visual material. The spatial clustering of *H. intermedius* in the Levant is compatible with the presence of an established population, although the broader spatio-temporal pattern indicates multiple introduction events of *Heniochus* spp. into the basin.

Keywords: Non-indigenous species; Mediterranean; shipping; first record; aquarium release.

Introduction

Butterflyfishes (family Chaetodontidae) comprise 12 recognized genera and 137 valid species (Fricke *et al.*, 2025), including seven new species described between 2016 and 2025 (Fricke *et al.*, 2025). They are primarily distributed across the tropical Indo-West Pacific (Nelson *et al.*, 2016), including the Red Sea, where 17 species have been documented to date (Golani & Fricke, 2018). Butterflyfishes are easily identifiable by their deep, compact bodies, small pointed snouts, protruding mouths, and vivid coloration patterns (Nelson *et al.*, 2016). Most are coral-reef species, able to feed on coral polyps and on various small benthic and planktonic invertebrates and algae. They occur along coastal areas to depths of at least 320 m, except for a pelagic larval stage and juveniles that are also found in lagoons and tidepools (Heemstra & Heemstra, 2022).

Until now, the Mediterranean had been known to host only four non-indigenous butterflyfishes, as recently reviewed by Golani *et al.*, 2021 and Azzurro *et al.*, 2023: *Chaetodon auriga* Forsskål, 1775 (first recorded in 2015); *Chaetodon austriacus* Rüppell, 1836 (first recorded in 2001); *Chaetodon larvatus* Cuvier, 1831 (first recorded in 2011); and *Heniochus intermedius* Steindachner, 1893 (first recorded in 2002). Other butterflyfishes, such as *Chaetodon hoefleri* Steindachner, 1881, have been reported in the past, but due to doubtful or insufficient information, these species are not currently considered in the lists of NIS (Golani *et al.*, 2021; Azzurro *et al.*, 2023; Galanidi *et al.*, 2023). Nevertheless, the recent observations reported by Ayari-Kliti (2025) should be carefully reconsidered, as they may warrant a reassessment.

With their elongated dorsal fin foremargin, bannerfish of the genus *Heniochus* are unmistakable among butterflyfish, comprising eight currently recognized species

(Heemstra & Heemstra, 2022; Fricke *et al.*, 2025). Of those, three species have a typical brown coloration (*H. chrysostomus*, *H. pleurotaenia*, *H. varius*), and two species have an unusual, hooked forehead (*H. monoceros*, *H. singularius*), making them relatively easy to identify. The remaining three species superficially resemble the Moorish idol, *Zanclus cornutus*, by having alternate clear and dark bands on the body (*H. acuminatus*, *H. diphreutes*, and *H. intermedius*), but the former can be easily distinguished due to the tubular shape of its snout and the color and shape of the tail (Heemstra & Heemstra, 2022). In this study, we present new records of two morphologically similar species, the Pennant coralfish (*H. acuminatus*) and the Red Sea bannerfish (*H. intermedius*). *Heniochus acuminatus* has a broad distribution, extending from the western Pacific to the Indian Ocean, where it is replaced, in the Gulf of Aden and the Red Sea by *H. intermedius* (Lieske & Myers, 2004; Froese & Pauly, 2025). Since its first record in the Mediterranean Sea in 2002 (Gökoğlu *et al.*, 2003), *H. intermedius* has been reported multiple times across the basin, particularly in its easternmost sectors, Golani *et al.*, 2021). Here we (*i*) document the first Mediterranean record of *H. acuminatus* from Cyprus; (*ii*) report six new records of *H. intermedius*, including voucher specimens from Lebanon and video-based observations from Italy, Cyprus and Crete treated as *H.* cf. *acuminatus*, and (*iii*) compile and critically reassess all published Mediterranean records of the genus *Heniochus*, with attention to the evidentiary basis of each identification.

Materials and Methods

Observations reported in this study were obtained through personal contacts between the authors and recreational fishers, as well as contributions from the citizen science Facebook group *Oddfish*. Direct communication with these observers allowed for thorough verification of each record and the gathering of detailed contextual information (e.g., original media, date, location, fishing technique).

The *Heniochus* specimen from Cyprus, identified here as *Heniochus acuminatus*, was photographed immediately after capture and initially preserved frozen at the Marine & Environmental Research (MER) Lab in Limassol, Cyprus. Due to unforeseen damage to the refrigeration unit, the specimen thawed and became unsuitable for morphological analyses or additional photographs. External morphometric characters - such as eye diameter and snout length relative to head length (HL) and standard length (SL) - were therefore estimated from the original photograph (Fig. 1a).

Two *H. intermedius* specimens from Lebanon were photographed immediately after capture, preserved frozen for taxonomical identification, and subsequently preserved in alcohol and deposited in the marine collection of the American University of Beirut (AUBM OS4031 and AUBM OS4045).

An additional specimen was recorded on video during a spearfishing excursion in Italy, using an Action Cam Midland with an underwater housing. Video frames were shared on February 4, 2025 in the Oddfish Facebook group. The video is openly accessible through the link https://youtu.be/LR7rSOSnyaQ

Taxonomic identification was primarily based on the dichotomous key in Heemstra & Heemstra, (2022) and Randall (1983), supplemented by diagnostic characters described by Debelius (1998), Pyle (2001), Allen *et al.*, (1998), and Khalaf & Disi (1997). Morphological distinctions between *Heniochus acuminatus* and the closely related *H. diphreutes* followed Rajan (2010), Kuiter (2002), and Taquet & Diringer (2012). Occurrence records for *Heniochus intermedius* were retrieved from the www.ormef.eu geo-platform, and an additional bibliographic search was conducted to verify and update the most recent records.

The revision of *Heniochus* spp. occurrences integrates and updates the information provided by Golani *et al.* (2021) and Azzurro *et al.* (2023) with a comprehensive and critical assessment of newly published scientific literature.

Results

On August 13, 2018, a single specimen of *Heniochus acuminatus* (Fig 1a) was caught by a spearfisher at a depth of six meters off the eastern coast of Larnaka, Cyprus (34.81120° N, 33.59701° E). Based on elements visible in the photograph, standard length was estimated at ~20 cm. The individual displayed the following morphological features: Laterally compressed, deep-bodied shape with an elongated dorsal fin forming a distinctive pennant-like extension. Head relatively short and pointed, with a slightly convex profile. Mouth opening small. Body white in color; two vertical and sharply defined black bars: the first extending to the hind margin of the operculum, embedding the base of the pectoral fin, and continuing to the base of the spinous anal and pelvic fins. The posterior black bar terminated just behind, but in close proximity to, the tip of the anal fin. The upper part of the snout and interorbital space were black, with a black blotch extending below the eye, without reaching the interopercle. Notably, the black pigmentation did not extend above the interorbital area and the posterior margin of the orbit remained whitish. Dorsal, pectoral and caudal fins were yellow. The caudal fin was damaged. Eye diameter was 3.06 in head length (HL) and 9.12 in standard length (SL); snout length was 2.89 in HL and 8.61 in SL.

Three individuals of *Heniochus intermedius* were captured off the coast of Lebanon: the first specimen (Fig 1b) was spearfished on February 10, 2021, off the coast of Tyre, at a depth of 14 meters on a rocky bottom (33.27822° N, 35.17902° E). The second individual (Fig 1c) was captured with the same method, on September 2, 2024, off the coast of Beirut at a depth of 24 meters on a muddy bottom near marine debris (33.91343° N, 35.52504° E). Finally on September 9, 2025, a third individual (Fig. 1d)

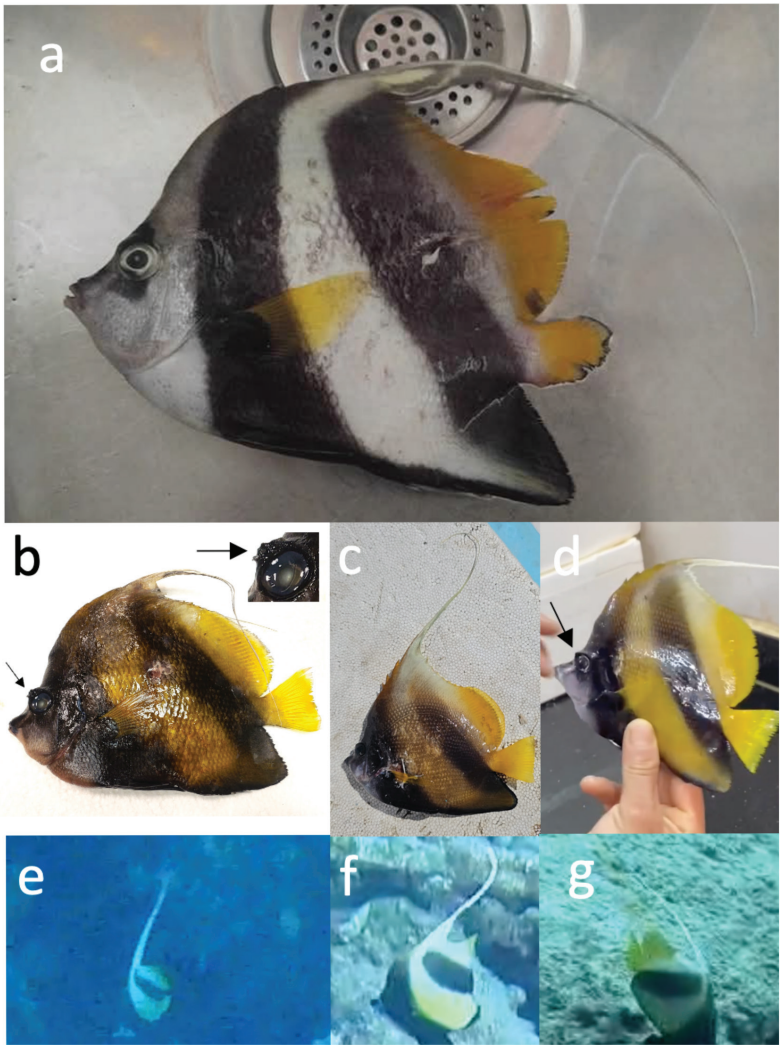

Fig. 1: Pictures of *Heniochus* spp. reported in the present study. (a) *H. acuminatus* photographed after capture off Larnaka, Cyprus (August 2018). *H. intermedius* captured off Lebanon: (b) Tyre (February 2021; arrow and inset highlight bony orbital tubercles), (c) Beirut (September 2024), and (d) Abbassiya, Tyre area (September 2025: arrow highlights bony orbital tubercles). Video frames of *H.* cf. *intermedius* recorded underwater: (e) Palmi, Italy (November 2022), (f) Agia Napa, Cyprus (November 2025), and (g) Elounta (Lasithi) wreck, Crete, Greece (November 2025). Photo credit: M. Rizzica, M. Ali Ibrahim, G. Gewrgiou, P. Giannaki, K. Sidiropoulos.

was captured by a small-scale fisher off Abbassiya, north of Tyre, Lebanon (approx. coordinates: 33.31443°N; 35.22735°E). The first two specimens measured 14.9 cm and 9.48 cm in standard length (SL); 18.1 and 11.4 cm in total length (TL), respectively, whilst the approximate length of the third specimen (estimated from elements occurring in the video) was 19 cm. All three specimens were described as follows: Laterally compressed, deep-bodied shape with an elongated dorsal fin forming a distinctive pennant-like extension. Head relatively short and pointed, with a slightly convex profile. Yellowish background color ventrally and whitish dorsally, with the two typical black bands that characterize the species. The first band from dorsal fin origin running through eye to pelvic fin. Second band from spine portion of dorsal fin to rear part of anal fin. Both bands were diffuse dorsally and more defined ventrally. Snout was dark on the upper portion and in the interorbital region, white on the underside and in the gular area. The dorsal, pectoral, and caudal fins were also yellow. In the pictures and videos related to the Tyre individuals, (Fig. 1b,d), bony tubercles ("horns") are clearly visible in the upper edge of the eyes.

Three additional occurrences were documented only through underwater videos (Fig. 1e,f,g and Suppl. File 1) and are conservatively reported as *Heniochus* cf. *intermedius*. A single individual (~15 cm TL; Fig. 1e) was filmed on 11 November 2022 near Palmi, Reggio Calabria, Italy (38.37650° N, 15.85091° E) at ~5 m on rocky bottom. On 3 November 2025, one individual was filmed in front of Agia Napa Harbour, Cyprus (34.98013° N, 34.00512° E) at ~20 m on rocky bottom (Fig. 1f). On 12 November 2025, one individual was filmed near the Elounta (Lasithi) wreck, Crete, Greece (35.25153° N, 25.732750° E) at ~10 m (Fig. 1g).

These six new records, along with 21 additional published Mediterranean *Heniochus* occurrences, are presented in Table 1 and in Figure 2.

Discussion

In the absence of a preserved fish specimen, the ob-

Table 1. Documented occurrences of *Heniochus acuminatus* (upper table) and *H. intermedius* (lower table) in the Mediterranean Sea, including the new records reported here. Georeferenced data were updated from ORMEF (Azzurro, 2023) and checked against original sources when available. Records supported only by underwater photographs/videos or unvouchered sightings are marked with an asterisk (*) and are conservatively treated as *H.* cf. *acuminatus* or *H.* cf. *intermedius.* Each record refers to a single individual observed or collected.

	Authors	Year of record	Month	Location	Country	Decimal_LAT reported in ORMEF	Decimal_LONG reported in ORMEF	Sampling method	Depth (m)	Habitat
	Heniochus acuminatus									
	This study	2018	8	Larnaka	Cyprus	34.81120° N	33.59701° W	Spearfishing	6	Rocky bottom
*	Bariche *et al.*, 2020	2018	5	Amphora Wall	Cyprus	35.17558° N	34.01762° W	Underwater pict/video	28	Rocky bottom
*	Fitori and Rizgalla, 2025	2025	10	Benghazi	Libya	32.10636° N	20.05170° W	Spearfishing	3	Artificial reef
	Heniochus intermedius									
	Gökoğlu *et al.*, 2003	2002	na	Antalya Bay	Turkey	36.74700° N	30.74500° W	na	na	na
*	Bariche, 2012	2005	8	North of Beirut	Lebanon	33.92100° N	35.48600° W	Underwater obs.	40	Rocky bottom
	Bariche, 2012	2011	7	Palm Island Reserve	Lebanon	34.46200° N	35.79700° W	Traps	18	Rocky bottom
*	Bariche, 2012	2011	8	Souffleur wrek, Beirut,	Lebanon	33.85600° N	35.45800° W	Underwater pict/video	35	Rocky bottom
*	Ergüden *et al.*, 2016	2011	11	Ulucinar, Iskenderun Bay	Turkey	36.59582° N	36.12316° W	Scoop net	19	Rocky bottom
	Evans *et al.*, 2015	2014	11	Grand Harbour, Valletta	Malta	35.89700° N	14.52400° W	Recreational fishing	3	na
*	Tsadok *et al.*, 2015	2014	5	Sdot Yam	Israel	32.49114° N	34.88567° W	Underwater obs.	6	na
*	Tsadok *et al.*, 2015	2014	7	Achziv	Israel	33.05578° N	35.10210° W	Underwater obs.	7	na
*	Tsadok *et al.*, 2015	2014	7	Ma'agan Michael	Israel	32.53856° N	34.90205° W	Underwater obs.	5	na
*	Tsadok *et al.*, 2015	2014	7	Nachsholim	Israel	32.60762° N	34.91461° W	Underwater obs.	5	na
*	Tsadok *et al.*, 2015	2014	7	Michmoret	Israel	32.40182° N	34.86480° W	Underwater obs.	5	na
	Tsadok *et al.*, 2015	2014	7	Sdot Yam,	Israel	32.49293° N	34.88733° W	Spearfishing	6	na
	Al Mabruk *et al.*, 2021	2017	11	Marsa Matruh, El Dabaa	Egypt	31.06944° N	28.47214° W	na	13	Mixed bottom
	Al Mabruk *et al.*, 2021	2017	11	El Dabaa – Marsa Matruh	Egypt	31.07155° N	28.47508° W	na	13	Mixed bottom
	Ragkousis *et al.*, 2020	2018	7	Tripoli, fish market	Lebanon	34.45000° N	35.82000° W	Fish market	na	na
	Ragkousis *et al.*, 2020	2018	7	Beirut	Lebanon	33.94000° N	35.58000° W	Angling	5	Muddy bottom
	This study	2021	2	Tyre	Lebanon	33.27822° N	35.17903° W	Spearfishing	14	Rocky bottom
	Saad *et al.,* 2022	2022	5	Banias city	Syria	35.12139° N	35.90409° W	Traps	14	Mixed bottom
*	***This study***	2022	11	Palmi	Italy	38.37649° N	15.85091° W	Underwater pict/video	5	Rocky bottom
	Abd Rabou *et al.*, 2024	2023	2	Gaza	Palestine	31.54500° N	34.45200° W	Setnets	10	Mixed bottom
*	Dragičević *et al.*, 2025	2024	9	Ploče	Croatia	43.06429° N	17.37891° W	Underwater pict/video	1.5	Rocky bottom
	This study	2024	9	Beirut	Lebanon	33.91343° N	35.52503° W	Spearfishing	24	Muddy bottom
	This study	2025	9	Abbassiya (Tyre)	Lebanon	33.31443° N	35.22735° W	na	na	na
*	***This study***	2025	11	Agia Napa	Cyprus	34.98013° N	34.00512° W	Underwater pict/video	20	Rocky bottom
*	***This study***	2025	11	Elounta Lasithiou	Greece	35.25153° N	25.73275° W	Underwater pict/video	10	Wreck

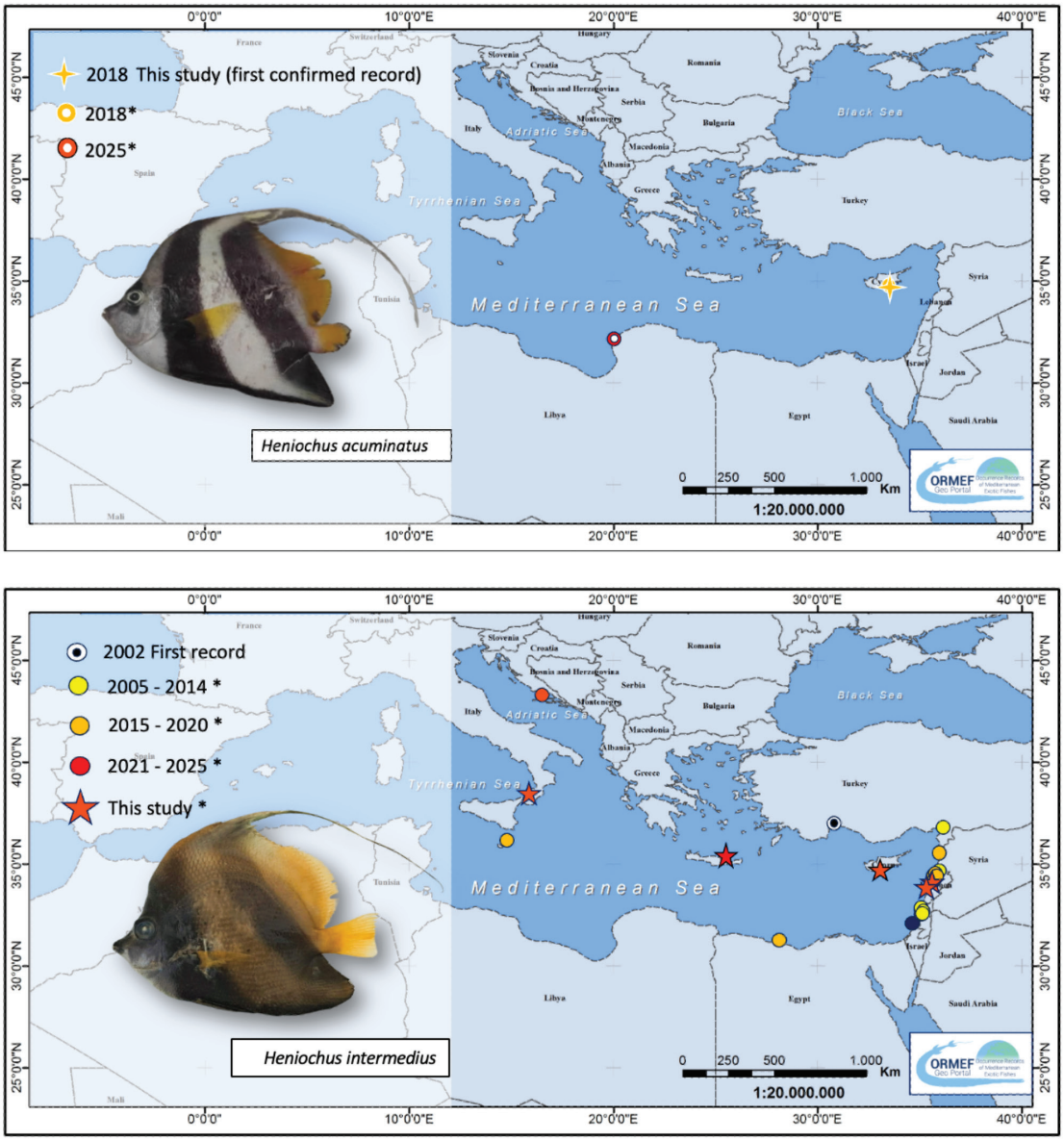

Fig. 2: Documented occurrences of *Heniochus acuminatus* (a) and *H. intermedius* (b) in the Mediterranean Sea, including the new records reported here. Georeferenced data were updated from ORMEF (Azzurro, 2023) and checked against original sources when available. Years containing records supported only by underwater photographs/videos or unvouchered sightings are marked with an asterisk (*) and are conservatively treated as *H.* cf. *acuminatus* or *H.* cf. *intermedius.*

servation of *Heniochus acuminatus* based solely on a photograph poses certain challenges for taxonomic analysis. However, a careful examination of the morphological features visible in the image provided valuable information, including key taxonomic characters supporting a proper identification. The description of the individual clearly ruled out confusion with the Red Sea bannerfish (*H. intermedius*) and the false Moorish idol (*H. diphreutes*), two morphologically similar butterflyfish species. Nevertheless, a more detailed examination was necessary to confidently distinguish *H. acuminatus* from the closely resembling *H. diphreutes*. One prominent diagnostic characteristic of *H. acuminatus*, clearly visible in the photograph from the present study, is that the black bar above the eye does not extend beyond the interorbital area and is in fact restricted to it, an important feature for separating *H. acuminatus* from *H. diphreutes* (Heemstra & Heemstra, 2022). Furthermore, according to the dichotomous keys provided by Heemstra and Heemstra, (2022, p. 464) and Randall (1983, p. 40), *H. acuminatus* is characterized by a snout length of 2.7-3.3 in head length (HL), whereas in *H. diphreutes* the snout is shorter, measuring 3.3-3.7 in HL. The snout length of the Larnaka individual, estimated from the photograph at 2.89 in HL aligns with the description of *H. acuminatus* and differs from that of *H. diphreutes*. Notably, the longer snout of *H. acuminatus* compared to *H. diphreutes* was considered a consistent and effective diagnostic character by several other authors, including Taquet & Diringer (2012, pp. 386–387), Kuiter (2002, pp. 88–89), and Allen (1998). Another key character is the smaller eye diameter of *H. acuminatus* relative to *H. diphreutes*, as also noted by Taquet & Diringer (2012, pp. 386–387), and this was verified in the Larnaka individual. According to Smith & Heemstra (1986), *H. acuminatus* is

distinguished by having a snout not shorter than the eye diameter, while in *H. diphreutes* the snout is shorter than the eye. Our measurements of the relative lengths of the snout and eye diameter correspond to the diagnostic features of *H. acuminatus*. All these characters, which are easily verifiable from the photograph, are complemented by additional diagnostic features highlighted by other authors, such as the shape of the anal fin (Kuiter, 2002) and the overall body shape, though it is generally considered less reliable for confidently separating these two species. To the best of our knowledge, *H. acuminatus* has not been previously recorded in the Mediterranean, and our observations represent the first confirmed occurrence of this species in the region. Nevertheless, we noted that Huseyinoglu & Ates (Bariche *et al.*, 2020), based on an underwater photograph, reported an individual identified as *Heniochus* spp. at Amphora Wall, Cyprus, on 19 May 2018. Based on the combination of diagnostic characters outlined above, a closer morphological examination of the features visible in the published photograph would supports its identification as *H.* cf. *acuminatus*. Interestingly, this sighting occurred 86 days prior to the capture of *H. acuminatus* presented in this study, with the two records separated by approximately 80 kilometers and we cannot exclude the possibility that they refer to the same individual.

In addition to the aforementioned record, this study reports six new observations of *Heniochus* spp. in the Mediterranean. Of these, three individuals were confirmed as *H. intermedius*, while the remaining three were identified as *H.* cf. *intermedius*, based on photographic and video evidence, as the specimens were not available for direct examination. Two specimens captured off Lebanon were retained as voucher specimens.

According to Pyle (2001), *H. intermedius* can be readily distinguished from the morphologically similar *H. acuminatus* and *H. diphreutes*. In *H. intermedius*, both dark bands are diffuse dorsally and more defined ventrally, a significant taxonomic character for this species, as noted by several authors (Debelius, 1998; Lieske & Myers, 2004; Bariche, 2012; Saad *et al.*, 2022). Moreover, in the Red Sea bannerfish, the two black bands on the body are separated by a yellow area towards the posterior part (Debelius, 1998; Lieske & Myers, 2004). All these diagnostic features, which were clearly visible in the photographs of the three *H. intermedius* individuals captured in Lebanon, were also noted in other *H. intermedius* specimens reported from Mediterranean waters (e.g., Bariche *et al.*, 2012; Tsadok *et al.*, 2015; Saad *et al.*, 2022), and are consistent with the species descriptions provided by various authors (Pyle, 2001; Randall, 1983; Allen *et al.*, 1998). Tsadok *et al.* (2015) also reported that adult *H. intermedius* possess bony tubercles ("horns") on the upper margin of the eyes, a diagnostic character that was clearly observed in the Tyre specimens.

Caution is required when the quality of photographic material is low, when individuals are observed underwater and only photographs or videos are available, or, in the most problematic cases, when observations lack any photographic documentation. Even when the observer is a scientist and the identification of *H. intermedius* appears plausible, a degree of uncertainty may persist. This is exemplified by the record presented by Fitori & Rizgalla (2025), for which a closer examination of diagnostic characters would more appropriately assign the specimen to *H.* cf. *acuminatus* rather than *H. intermedius*. Interestingly, on 26 October 2025, the *Libyan Observer* (https://libyaobserver.ly/news/rare-red-sea-fish-spotted-first-time-libyan-coast) published a photograph of a second *Heniochus* specimen identified as *H. intermedius*, but a closer examination of the image suggests that it is more likely attributable to *H.* cf. *acuminatus*. Ergüden *et al.* (2016) documented a putative record of *H. intermedius* in İskenderun Bay, Türkiye. While the report is noteworthy, the taxonomic details are limited and do not include the diagnostic characters required to confidently separate this species from other *Heniochus* spp. In addition, the absence of photographic evidence and a voucher specimen prevents independent confirmation. Tsadok *et al.* (2015) confirmed the presence of *H. intermedius* through molecular analysis of a single specimen and attributed five additional underwater observations to the same species based solely on visual evidence. Based on the analysis of a voucher specimen, Bariche (2012) reported *H. intermedius* from Lebanon and, in the discussion, described two additional sightings, one supported only by an underwater photograph and the other based solely on visual observation. Considering the evidence presented by these colleagues, records lacking sufficient taxonomic detail are here treated cautiously as *H.* cf. *intermedius*. Finally, Dragičević *et al.* (2025) documented a single individual identified as *Heniochus* sp. from Croatian waters, but closer examination indicates that this record can likewise be assigned to *H.* cf. *intermedius*. The complete list of revised *Heniochus* records is presented in Table 1.

The repeated observations of *Heniochus intermedius* in Mediterranean waters (Gökoglu *et al.*, 2003; Bariche, 2012; Evans *et al.*, 2015; Ergüden *et al.*, 2016; Tsadok *et al.*, 2015; Al Mabruk *et al.*, 2021; Ragkousis *et al.*, 2020) have led some authors (Tsadok *et al.*, 2015; Golani *et al.*, 2021) to suggest that a small population of this species may have become established in the eastern basin. Our additional records in Lebanon and Cyprus would further support this hypothesis, although they also warrant careful discussion. According to Golani *et al.* (2021), the Red Sea bannerfish may have entered the Mediterranean Sea via the Suez Canal, whereas the initial record of *H. intermedius* was originally attributed to shipping or aquarium release (Gökoglu *et al.*, 2003). The proximity of the commercial harbour of some of the location in which the species has been recorded, such the Grand Harbour of Malta (Evans *et al.*, 2025) and Gioia Tauro - Italy (present study), suggests a possible role of ships in the introduction of this species into Italian coastal waters. Although shipping is generally considered to contribute relatively little as a pathway for fish introductions (Zenetos *et al.*, 2012), ship-borne introductions are increasingly documented or suspected, particularly for species recorded near commercial hubs (Golani *et al.*, 2021; Slišković *et al.*, 2021). Transport by ships or mobile oil platforms has been proposed as the most plausible explanation for a

number of non-indigenous fishes, including *Holacanthus ciliaris* and *Paranthias furcifer* (Dulčić & Dragičević, 2013a,b), *Siganus fuscescens* (Azzurro & Tiralongo, 2020) and *Acanthurus coeruleus* (Evans *et al.*, 2015), all recorded near or within large commercial harbours. The mechanism of transport remains, however, poorly understood, with ballast water considered a possible but minor vector for fish dispersal (Saglam & Duzgunes, 2018). In other cases, the role of ships' sea chests has been proposed for the transport of both fish (Zenetos *et al.*, 2016) and crustaceans (e.g., Grati *et al.*, 2023; Froglia *et al.*, 2024). Another possible vector for the introduction of *H. intermedius* is aquarium release, a pathway recognized as a significant contributor to marine bioinvasions in the Mediterranean (Zenetos *et al.*, 2016; Giovos *et al.*, 2020). The Red Sea bannerfish is highly popular among aquarium hobbyists in Europe and the Middle East and is sold at relatively high prices (author's personal observations). Aquarium release has previously been proposed as the mode of introduction for *H. intermedius* and other species (Gökoğlu *et al.*, 2003; Deidun *et al.*, 2018). Additionally, the increasing number of mega-yachts equipped with onboard seawater aquariums could represent another potential introduction pathway. This vector has been suggested for other Acanthuriformes, including *Paracanthurus hepatus* in France (Boudouresque *et al.*, 2025), *Zebrasoma xanthurum* in Sardinia (Guidetti *et al.*, 2016), and *Heniochus* sp. in Lebanon (Bariche *et al.*, 2020). Similar hypotheses were advanced for the introduction of *Heniochus* spp. in other parts of the world (e.g., Luiz *et al.*, 2014; Jayanthi *et al.*, 2017; Adelir-Alves *et al.*, 2018; Lee *et al.*, 2021). As already highlighted by other authors (e.g., Evans *et al.*, 2015), current knowledge does not allow us to determine whether the separate sightings reflect unrelated multiple introduction events or are related to the geographical expansion of an established population. Likely, only a coordinated effort to perform genetic analyses on collected specimens could help clarify this issue, as demonstrated in similar cases (Hunter & Nico, 2015).

Finally, we acknowledge the significant amplification of detection capacity made possible by the widespread use of underwater cameras and social media. This trend is particularly evident for conspicuous tropical species, which are frequently documented and shared online, especially in Facebook groups, where they are often perceived as exceptional sightings (Azzurro & Tiralongo, 2020; Tiralongo *et al.*, 2020; Al Mabruk *et al.*, 2021). Nevertheless, many citizen-provided observations lack preserved specimens or material suitable for genetic analysis. To better determine whether multiple introductions of *Heniochus* spp. and other non-indigenous fish species are occurring in the Mediterranean, continued monitoring efforts are essential, ideally incorporating the collection of individuals for both proper morphological studies and molecular analysis. However, this remains a challenging task due to the sporadic nature of these observations and the frequent absence of physical samples.

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Supplementary Data

The following supplementary information is available online for the article:
Suppl. file: Red Sea bannerfish: first record in Italian waters (video).