

Recent evidence on the presence of *Heniochus intermedius* (Teleostei: Chaetodontidae) and *Platycephalus indicus* (Teleostei: Platycephalidae) in the Mediterranean Sea

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Abstract

A second specimen of the Red Sea bannerfish *Heniochus intermedius* Steindachner, 1893 and a specimen of the Bartail flathead *Platycephalus indicus* (Linnaeus, 1758) have been recently collected from Lebanon (eastern Mediterranean). The two alien species constitute very rare occurrences in the Mediterranean; the first record of *H. intermedius* dates back to 2002 and only a few *P. indicus* individuals were collected between the 1950s and 1970s. Their presence in the Mediterranean is discussed as well as possible future trends in light of recent environmental changes.

Key words: *Heniochus intermedius*, *Platycephalus indicus*, alien species, Lessepsian migration, Lebanon, eastern Mediterranean

Introduction

Butterflyfishes (Chaetodontidae) are marine fishes that can be easily recognized by a deep compressed body, small terminal and protractile mouth and bright coloration patterns (Randall 1983; Nelson 2006). The family is constituted of about 122 species occurring mainly in the Indo-West Pacific (Nelson 2006). *Heniochus intermedius* Steindachner, 1893 is considered endemic to the Red Sea and the Gulf of Aden (Randall 1983). It is characterized by having the fourth spine of the dorsal fin very elongate and two broad characteristic blackish bands. The first band extends from the front of the dorsal fin to the abdomen and pelvic fins and the other from the middle of the spinous portion of the dorsal fin to the rear of the anal fin (Randall 1983). The species is diurnal and is usually observed in pairs or as solitary individuals and can be found down to 50 m depth (Randall 1983; Debelius 1998; Taquet and Diringier 2007). It can reach 20 cm in length and is a benthic feeder living closely

associated to coral reefs (Randall 1983; CIESM 2009).

Flatheads (Platycephalidae) are large bottom dwelling fishes found mostly in the Indo-Pacific area. They are characterized by an elongate body, a depressed head and a large mouth, with the lower jaw longer than the upper (Knapp 1986; Nelson 2006). Around sixty five species have been described (Nelson 2006). *Platycephalus indicus* (Linnaeus, 1758) is a widespread species that occurs from the Red Sea and West Africa to Japan and northern Australia (Hureau 1986; Knapp 1986; Carpenter et al. 1997; CIESM 2009). The species is recognisable by the presence of a single transversal patch of vomerine teeth, 67–84 pored scales on the lateral line, and a distinctive caudal fin with 2–3 horizontal black stripes (Knapp 1986; Carpenter et al. 1997; CIESM 2009). It occurs over soft substrate in shallow marine waters (<40 m) and can enter estuaries. It feeds mainly on crustaceans and fishes and can reach 100 cm in length (Knapp 1986; Carpenter et al. 1997; CIESM 2009).

Methods

Measurements and counts followed Kottelat and Freyhof (2007). Most diagnostic features were observed under a dissecting microscope and all measurements were made with digital calipers.

Results

On 16 July 2011, a butterflyfish was captured in a wire trap, west of Al Bellan Islet (34° 29.175'N, 35°46.472'E), in the vicinity of the Palm Islands Park and Nature Reserve in the northern part of Lebanon. The trap was set at 18 m depth on a hard bottom, scattered with boulders. The fish was displayed in an aquarium and died 20 days later. It was frozen immediately afterwards. Descriptive characters, measurements, counts and coloration (Figure 1) followed those given for *Heniochus intermedius* (Randall 1983; Khalaf and Disi 1997; CIESM 2009). The specimen was 120.3 mm in standard length (SL) and weighed 99.8 g. It was deposited in the marine collection of the American University of Beirut (AUBM OS 3779).

Description of the specimen from Lebanon (Figure 1):

Deeply compressed body (1.32 in SL). Head length (HL) was measured to 3.04 in SL, and concave in its dorsal profile in front of eyes. Snout produced (2.68 in HL), with a small protractile and slightly oblique mouth. Brush-like teeth present in the jaws but not on the roof of mouth. Eye diameter was 3.40 in HL; interorbital width 3.19 in HL. Bony tubercle was present in front of the upper edge of the eye. Dorsal fin XI, 26, the fourth spine elongate (1.70 in SL); anal fin III, 17; pectoral fin 16; pelvic fin I, 15, with a scaly axillary process at its upper base; caudal fin truncate. Lateral line with 58 ctenoid scales covering the body, head and median fins.

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).

On 12 December 2011, a flathead fish was captured by a trammel net, north of Beirut (33°54.321'N, 35°33.881'E). The net was set on a

muddy bottom at about 40 m depth. The fish was frozen immediately after capture. Morphometric and meristic characters, as well as caudal color pattern corresponded to *Platycephalus indicus* following Hureau (1986), Knapp (1986) and CIESM (2009). Its meristic formula was as follow: D, I/VII/I+13; A, 13; P, 18; V, I + 5; LL, 83; GR 2+7. The specimen (267.5 mm SL; 263 g) received the catalogue number AUBM OS 3780 (Figure 3).

Discussion

A small number of *Heniochus intermedius* and *Platycephalus indicus* specimens have been captured from the Mediterranean over a long period of time. *Heniochus intermedius* is recorded here by a voucher specimen for the second time. The first individual was observed underwater in the Gulf of Antalya in June 2002 at depths ranging between 5 and 10 m and was captured three months later (Gökoğlu et al. 2003). However, there have been at least three other separate underwater visual sightings of the species in the Mediterranean. Gökoğlu et al. (2003) clearly mentioned the presence of another *H. intermedius* in the same region in 2002. A single individual was sighted on 13 and 21 August 2005, respectively, from North of Beirut, Lebanon (33°58.128'N, 35°34.512'E) at 35–40 m depth and over hard bottom (pers. obs.). The fish was not captured and probably moved to another location afterwards. More recently, a third individual was photographed by a scuba diver on 28 August 2011 south of Beirut (Figure 2). According to the diver, this fish has been sighted many times and is still alive. The site is a WWII submarine wreck, named Souffleur (33° 47.899'N, 35°26.683'E) and is lying on a soft bottom at 35–38 m depth. The capture of a *Platycephalus indicus* from Lebanon is interesting because of the rarity in previous records and their dates of capture. In fact, very few specimens have been collected from the eastern Mediterranean coast and always as single individuals (Ben-Tuvia 1953; Krefft 1963; Mounieimné 1977). During the same period (end of the 1970s), a juvenile *P. indicus* was found stranded on a beach in Sicily, at the strait of Messina level (Castriota et al. 2009). No other specimens have been recorded since the 1970s in the Mediterranean Sea (CIESM 2009).

Ballast water transport has been invoked to explain the sudden appearance of *H. intermedius*



Figure 1. *Heniochus intermedius* (AUBM OS 3779) captured off Al Bellan Islet (34°29.175'N, 35°46.472'E) in the northern part of Lebanon. Photograph by M. Bariche.



Figure 2. Underwater photo of a living individual of *Heniochus intermedius* on a wreck (33°47.899'N, 35°26.683'E), south of Beirut, Lebanon. Photograph by W. Nochie.



Figure 3. *Platycephalus indicus* (AUBM OS 3780) captured North of Beirut (Lebanon). Photographs by M. Bariche.

in Turkish waters and the presence of *P. indicus* in Sicily (Gökoğlu et al. 2003; Castriota et al. 2009). Lessepsian migration was proposed as the mode of entry to the Mediterranean for *H. intermedius* (CIESM 2009; Golani 2010). The various records of the same species from

Lebanon are proofs that other individuals existed at different time and locations. The presence of *P. indicus* in the Levant in the 1950s and 1970s is also most likely due to an entry through the Suez Canal (CIESM 2009). Based on this, Lessepsian migration seems to be the most

probable mode of introduction for both species to the Mediterranean, but the aquarium release hypothesis or ballast water transport cannot be completely ruled out.

Regardless of the means of introduction, it is clear that neither of the two species was able to successfully establish in the Mediterranean since their first sighting. One plausible explanation could be that their sporadic presence is a result of unrelated multiple entries to the Mediterranean and the two specimens in this paper could well be newcomers. Another possibility could be that both *P. indicus* and *H. intermedius* have a small population already established in the eastern Mediterranean but for some biological or environmental reasons they remain very rare. In that case, the capture of the two specimens in this study could be due to chance. However, it seems unlikely that the two species were overlooked in the past as their general body shapes and body patterns make them easily recognizable as non-indigenous fishes to the Mediterranean.

A significant acceleration in the number of newly recorded species has been noticed in the last few years (Bariche 2010a, b, 2011; Golani and Appelbaum-Golani 2010; Golani et al. 2010; Goren et al. 2010a, b; Edelist et al. 2011; Salameh et al. 2011; Bariche and Heemstra 2012). This has been attributed to the warming of the Mediterranean waters (Francour et al. 1994; Galil 2009; Ben Rais Lasram and Mouillot 2009; Ben Rais Lasram et al. 2010; Coll et al. 2010). Such environmental changes could favor new types of species, notably typical coral reef fishes (Salameh et al., 2011). It is difficult to conclude what the trend will be in the upcoming future, but new conditions in the Mediterranean might facilitate the establishment of alien fish species which occur in small restricted populations or which have been scarcely recorded (CIESM 2009). The future will reveal whether species recorded years ago and previously labeled as “rare” in the Mediterranean Sea are able to establish larger populations or expand their ranges. If this hypothesis is supported, other “rare” species such as *Crenidens crenidens* (Sparidae), *Cylichthys spilostylus* (Diodontidae), *Scarus ghobban* (Scaridae) or *Petroscirtes ancydon* (Blenniidae), might become more successful and establish larger populations in the future. This could be an important turning point in the history of Mediterranean bioinvasions.

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