

Short Communication

Cheilodipterus novemstriatus (Rüppell, 1838) along the Levantine coast of the Mediterranean Sea: a forthcoming invasion?

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Received: 16 November 2012 / Accepted: 14 December 2012 / Published online: 11 January 2013

Handling editor: Ernesto Azzurro

Abstract

New records of the rapid spread and establishment of the Erythraean alien apogonid *Cheilodipterus novemstriatus* along the Israeli coast are presented. In October 2012, a school numbering hundreds of adult specimens was photographed off Rosh HaNikra – a finding that confirms the presence of an established population of the species along the Levantine coast of the Mediterranean Sea.

Key words: twospot cardinalfish; Erythraean alien; Israel; rapid population increase; Mediterranean Sea

Introduction

The twospot cardinalfish, *Cheilodipterus novemstriatus* (Rüppell, 1838) was the fifth Erythraean apogonid species recorded in the Levantine Sea, Eastern Mediterranean, and the fourth described within five years. It was preceded by *Apogonichthyoides pharaonis* (Bellotti, 1874) collected: near the Mediterranean terminal of the Suez Canal at Port Said, Egypt, in 1924 (Fox 1927); off Jaffa, Israel, before 1947 (Haas and Steinitz 1947); off Cyprus in 1961 (Demetropoulos and Neocleous 1969); off Tripoli, Lebanon in 1962 (George et al. 1963); off Iskenderun, Turkey in 1984 (Mater and Kaya 1987); off Syria in 1992 (Sbaihi and Saad 1992); and finally had spread as far as Rhodes, Greece in 2002 (Corsini-Foka et al. 2004). That same year, it was collected off the Datca-Bozburun peninsula, Turkey (Öz et al. 2007). *Apogonichthyoides pharaonis* has proven to be a successful colonizer, steadily increasing in abundance, and is now a common by-catch of trammel nets and small mesh size gill-nets (Carpentieri et al. 2009). In 2004, *Apogon queketti* Gilchrist, 1903 was recorded in Iskenderun, Turkey (Eryilmaz

and Dalyan 2006), first recorded at depths of 58–63 m off the Israeli coast Ashdod in May 2007 (Goren et al. 2009a); and then off Jaffa, Israel, in November 2007 (Ben Eliahu and Golani 2008). In 2009 it was reported from the Gulf of Antalya, Turkey, at a depth of 140–150 m (Gökoğlu et al. 2011a) and in 2011 it was found in Ekincik Bay (SE Aegean Sea; Filiz et al. 2012). In 2007, *Apogon smithi* (Kotthaus 1970) was collected off Jaffa, Israel (Golani et al. 2008), and a year later, it was already common on sandy–mud bottoms along the Israeli coast and in Iskenderun Bay, Turkey (Goren et al. 2009a). A year later, its abundance increased almost hundred fold in Iskenderun Bay (Yokes et al. 2010) and it had spread to near Antalya (Gökoğlu et al. 2011b). Similarly, a year after being noted off the Israeli coast, *Ostorhinchus fasciatus* (White, 1790) (Goren et al. 2009b) was collected in Iskenderun Bay (Akamca et al. 2010; Turan et al. 2010), and in 2011, off Antalya (Gökoğlu et al. 2012). The rapid population build-up and range increase of these last species is nothing short of astounding. Here we report evidence of the rapid spread and establishment of *Cheilodipterus novemstriatus* along the Israeli coast.



Figure 1. A school of *Cheilodipterus novemstriatus* at Rosh HaNikra canyon, Israel, 20 October 2012 (Photo: B.S. Rothman).

Methods

While SCUBA diving in the coastal waters of Israel, photographs of a school of *Cheilodipterus novemstriatus* were taken using Canon S100 Digital Camera with Ikelite Underwater Housing. The species was identified from these high resolution photographs based on descriptions by Gon and Randall (2003) and Goren et al. (2010).

Results and discussion

In the fall of 2011, individuals of *Cheilodipterus novemstriatus* were spotted at the head of Rosh HaNikra canyon, Israel; however, they were not observed in subsequent SCUBA surveys until early autumn 2012. On 20 October 2012, a

school numbering hundreds of *C. novemstriatus* individuals was photographed at this site at 26–27 m depth (34°04.144N; 35°05.561E). The school, composed of large-sized individuals (50–60 mm TL), hovered over a small rocky outcrop surrounded by bare sandy bottom (Figure 1).

Cheilodipterus novemstriatus was first recorded in the Mediterranean off Tel Aviv in June 2010 (Goren et al. 2010), soon the population along the Israeli coast increased dramatically and spread along the coast to Haifa and Rosh HaNikra. Recently, Bariche and Azzurro (2012) reported specimens north of Beirut, Lebanon.

Most of the 55 (Golani and Bogorodsky 2010) species of the family Apogonidae known from the Red Sea (Goren, in press) are nocturnal

shallow-water and reef-associated species. While there are other Erythraean alien apogonids established in the Mediterranean (*A. pharaonis*, *A. queketti*, *A. smithi*, *O. fasciatus*) that occupy sea grass meadows and soft bottom habitats (sand and silt), *C. novemstriatus* is also found at shallow (1–10 m) depths in association with holes and under ledges of coral or rocky reefs. As well, it shelters among the spines of sea-urchins (*Diadema* sp.) in groups of up to about 30 individuals, depending on the size of the sea-urchin and of the fishes (Gon and Randall 2003). In the Mediterranean it was recorded from a shipwreck (30 m depth), where it shared the habitat with the native cardinal fish *Apogon imberbis* (Linnaeus, 1758) (Goren et al. 2010); on hard bottom covered with calcareous algae (35 m depth), near a rocky crevice (37 m depth), and near small crevices and overhangs (33 m depth) along with juveniles of the native wrass *Coris julis* (Linnaeus, 1758) (Bariche and Azzurro 2012). It would appear that *C. novemstriatus* is following its predecessors' pattern of rapid population build-up and range increase.

Of the three main vectors of spread of alien species to the Mediterranean Sea (shipping, mariculture, and the Suez Canal), the Suez Canal seems to be the main vector for the ongoing invasions from the Red Sea ("Lessepsian migrants" cf. Por 1978). The increased cross-sectional area of the Canal (<http://www.suezcanal.gov.eg>), and resulting increased volume of water exchange, has increased the number of alien species propagules carried into the Mediterranean. This increased propagule pressure is comprised of a suite of co-evolved invaders, which greatly increases the risk of establishment additional alien invasive species (Ricciardi et al. 2011).

Acknowledgements

We would like to thank Yair Yam and Oren Klein from Putsker Diving Club in Nahariya for their assistance, for helpful diving services, and for the use of their facilities. This research was partly supported by the European Community's Seventh Framework Programme (FP7/2007-2013) for the projects Vectors of Change in Oceans and Seas Marine Life, Impact on Economic Sectors (VECTORS) (BSG), Towards COast to COast NETworks of marine protected areas (from the shore to the high and deep sea), coupled with sea-based wind energy potential (COCONET) (BSG), and Options for Delivering Ecosystem-Based Marine Management (ODEMM) (MG&BSG). We also thank the reviewers for their useful and constructive comments.

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