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Aquatic Invasions Records

On the population of *Chromodoris annulata* Eliot, 1904 (Mollusca: Opistobranchia: Chromodorididae) off the Mediterranean coast of Israel

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Abstract

The Indian Ocean opisthobranch *Chromodoris annulata* was first noted off the Mediterranean coast of Israel in October 2009. Early occasional sightings of single specimens were followed by increasingly frequent reports of clusters of specimens. Our findings point to the presence of an established population along the Mediterranean coast of Israel.

Key words: *Chromodoris annulata*, Mollusca, invasive species, Mediterranean, Israel

Introduction

Chromodoris annulata Eliot, 1904 is indigenous to the Indian Ocean, and is common along the east African coast and the Red Sea (Rudman 1987; Yonow 1989, 2008). The first occurrence in the Mediterranean was noted in August 2004, when a single specimen was collected in a rock pool in Salamina Island, Gulf of Saronikos, Greece (Daskos and Zenetos 2007). In 2008, a single specimen was found in Beldibi, Antalya, on the Mediterranean coast of Turkey (Gökoglu and Özgur 2008), and soon after three specimens were collected in Çevlik Harbor, on the southeastern coast of Turkey (Yokeş et al. 2009). During surveys conducted in the Gulf of Iskenderun and its vicinity between June 2008 and December 2009, eleven specimens were collected (Çevik and Ergüden 2008; Özcan et al. 2010). In 2009 it was reported from Dhekelia, Larnaca, Cyprus (Tsiakkiros 2010).

In the present paper we report the presence of an established population from the Mediterranean coast of Israel.

Results and discussion

A photograph of *C. annulata* taken near Caesarea (32°31'34"N, 34°53'58"E) on October 1st 2009, constitutes the first record of the species off the Mediterranean coast of Israel (Lavi 2009). On May 14th 2011, two specimens were collected off Sedot Yam (32°29'29"N, 34°53'16"E), at 1–3 m depth, and deposited in the National Collections at Tel Aviv University (TAU MO 73092). Five additional specimens were observed at the same site, at 1–5 m depth, on May 18–19th. On May 17th, 3 specimens were observed on the shallow reef near Mikhmoret (32°24'12"N, 34°51'56"E), and on the same date one specimen was found near Ma'agan Mikha'el (32°33'25"N, 34°54'23"E). In close succession, specimens of this conspicuously patterned opisthobranch were recorded and photographed on June 8th at the head of the Akhziv submarine canyon (33°03'38"N, 35°05'31"E), on a shallow rocky ledge sparsely covered with algae. On June 12th a single specimen was collected off Yafo (32°01'49"N, 34°44'23"E), 2 m depth (TAU MO

Figure 1. *Chromodoris annulata* Eliot, 1904. Coupling pair. Photographed in situ, Sedot Yam, Israel, May 2011 (Photograph by Gal Eyal).

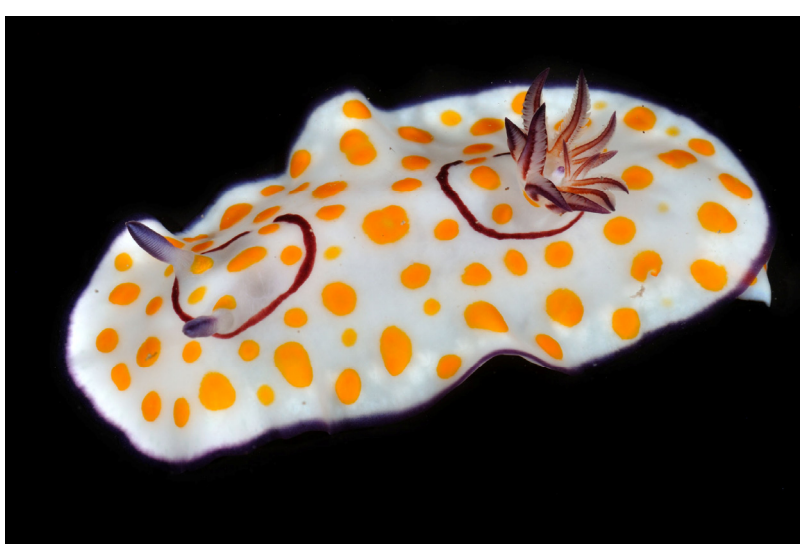

Figure 2. *Chromodoris annulata* Eliot, 1904. Photographed in Laboratory, specimen collected off Sedot Yam (TAU MO 73092) (Photograph by Oz Rittner).

73226). During July 2011 the nudibranch was sighted off HaBonim (32°38'32"N, 34°55'15"E), on the Carmel plain, south of Haifa Bay, and off Bat Yam (32°01'47"N, 34°44'25"E), on a rocky outcrop surrounded by sandy bottom. Four specimens (40 mm length) were collected at the latter site (TAU MO 73649).

Caesarea, Akhziv and HaBonim are among the most popular diving sites along the Mediterranean coast of Israel and it is doubtful that a brilliantly colored, slow moving opisthobranch would have eluded attention had it been present earlier. It is therefore assumed that *C. annulata* is a recent addition to the fast expanding list of Erythrean alien biota off the Israeli coast (Galil 2007), and that its population has increased significantly both in size and spread in the past year.

All the specimens sighted off the Israeli coast display the characteristic color pattern common to the Red Sea and Levantine specimens: a white mantle covered with orange-yellow spots and bordered in purple, purple rings encircling gills and rhinophores, purple rhinophore lamellae and gill edges (Figure 1).

The occurrence of *C. annulata* in the Gulf of Saronikos, next to the port of Piraeus, was attributed to shipping due to its perceived "… absence from the Levantine Sea, combined with the finding of the Arabian colour form near a port area" (Daskos and Zenetos 2007). However, it is clear that the species is established along the Levantine coastline, and that all Levantine specimens conform to the common Red Sea coloration. Since the color pattern of the Saronikos' specimen is found, albeit rarely, in the Red Sea (Yonow 1989, 2008), Yokeş et al. (2009) suggest that the specimen with the "rare extreme color pattern" may too has entered the Mediterranean through the Suez Canal. We agree that the most probable pathway for *C. annulata* into the Mediterranean, like previously recorded Erythrean alien opisthobranchs, is through the Suez Canal (Yokeş and Rudman 2004). Nonetheless, the possibility of shipping as a vector does exist, as attested to by the specimen of *C. annulata* recorded from the Gulf of California (Bertsch and Kerstitch 1984).

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