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Aliens in Egyptian waters. A checklist of ascidians of the Suez Canal and the adjacent Mediterranean waters

Y. Halim ^a, M. Abdel Messeih ^{b,*}

^a Oceanography Department, Faculty of Science, Alexandria, Egypt

^b National Institute of Oceanography and Fisheries, Alexandria, Egypt

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Abstract Checklists of the alien ascidian fauna of Egyptian waters are provided covering the Suez Canal, the adjacent Mediterranean waters and the Gulf of Suez. Enrichment in ascidian species of the Suez Canal seems to have been on the increase since 1927. The distinctly uneven distribution pattern in the Canal appears to be directly related to the ship traffic system.

Earlier reports on alien ascidian species in the Mediterranean are compared and discussed. Of 65 species recorded from the Mediterranean waters of Egypt in all, four are Erythrean migrants and four potentially so. *Polyclinum constellatum* Savigny, 1816 is a new record for the Mediterranean Sea.

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Introduction

Ascidians are receiving more and more attention because of the invasive ability of some species and the severe damage caused to aquaculture (reviewed in a special issue of *Aquatic Invasions*, January 2009: <http://aquaticinvasions.net/2009/index1.html>). For example, two species, *Styela clava* Herdman, 1881 and *Ciona intestinalis* Linnaeus, 1767, have had an adverse effect on mussel culture along Canada's east coast (Lutz-Collins et al., 2009). In the last few years five International Conferences on Invasive Sea Squirts were held between

2005 and 2014 to deal with this issue and with other related problems.

Based on an analysis of the literature and on the on-line World Register of Marine Species (www.marinespecies.org/), Shenkar and Swalla (2011) assembled 2815 described ascidian species. The authors recognize that their inventory is certainly incomplete as the ascidian fauna in many parts of the world is relatively poorly known and many new species continue to be described each year. Species richness appears to be highest in tropical waters where colonial forms predominate, while solitary ascidians gradually increase in higher latitudes.

We owe the first inventory of the Mediterranean ascidian fauna to Peres (1958a) who compiled 136 taxa. The Peres inventory, however, leaves many problems open regarding the synonymy and the validity of some of the species or the biogeography of others (Koukouras et al., 1995). Numerous

* Corresponding author.

E-mail address: mabdelmesseih@gmail.com (M. Abdel Messeih).

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publications followed adding new records, either for non-indigenous species or from newly described ones.

According to Coll et al. (2010) the ascidian species now known from the Mediterranean number 229, so that about 8% of the global population are represented in this sea. They are, however, unequally distributed in its basin. Knowledge about the occurrence and distribution of ascidians in the Mediterranean and elsewhere is necessarily based on the availability of expertise and on the sampling effort. The Western basin has been studied in greater detail than the Eastern one and documented in numerous early and more recent publications. The species found to date in the Western basin number 165 (Koukouras et al., 1995), corresponding to 75% of the Mediterranean total.

A checklist was compiled by Koukouras et al. (1995) for the East Mediterranean basin (Aegean and Levantine Seas) and the Black Sea. Previously, forty-three species had been known from the Aegean Sea (including the Sea of Marmara) but with the additional records of Koukouras et al. (1995) their number increased to 67, about 28% of the Mediterranean records. The ascidian fauna of the Levantine basin (not including the Aegean Sea) has received much less attention than that of the West and Central basins and remains comparatively poorly known. Koukouras et al. (1995) report only ten publications, obviously overlooking the Egyptian waters as will be seen below.

It is to be noted that the earliest records of ascidian species from Egyptian waters do not concern the Mediterranean but only the Gulf of Suez with the work of Savigny (1816) describing several new ascidians from this Gulf. Savigny was followed one century later by Hartmeyer (1915) and Michaelsen (1918, 1919). With the additional contributions of Abdel Messeih (1994) we are now in possession of a list of 32 ascidian species from the Gulf of Suez and Port Tawfik harbour.

Ascidians from the fishing grounds of Alexandria collected by Steuer (1939) were examined and reported on by Harant (1939) in the "Notes et Mémoires" of the Institute of Hydrobiology and Fisheries of Alexandria. Other biological investigations were carried out on some Eastern Harbour ascidians

by Sedra and Khalil (1971). Later, a survey of both Eastern and Western harbours and of the Alexandria coast yielded more ascidian species (Abdel Messeih, 1982 and published in Ghobashy and Abdel-Messeih, 1991). The latter was followed by a comprehensive investigation in 1987–88 (Abdel Messeih, 1994) encompassing the Egyptian waters, including the Gulf of Suez, the Suez Canal and the Mediterranean coast, which remained unpublished. Further published and unpublished records were made in the following years.

The Suez Canal ascidian fauna has been subjected to a detailed investigation twice at a time interval of about seventy years, first by Harant (1927) in the material collected by the Cambridge Expedition to the Suez Canal (Fox, 1926), and then by Abdel Messeih (1994). The results of the latter were briefly reported on by Halim et al. (1995). A small collection from the middle segment of the Canal was examined by Monniot and Monniot (1972).

Therefore, the objective of the present article is to update a checklist of the alien ascidian fauna of Egyptian waters covering the Suez Canal and the adjacent Mediterranean waters.

Material and methods

Samples for the present study were collected seasonally in 1987–88 along the Egyptian Mediterranean waters and harbours (Fig. 1) and fourteen Suez Canal pilotage stations (Fig. 2), as well as several sites in the northernmost ten kilometres of the Suez Gulf.

Following Cambridge Expedition to the Suez Canal (Fox, 1926), samples were obtained from rocks, submerged concrete blocks, metal structures and navigational buoys in the Suez Canal from depths of 2–4 m using a six-metre long dredge sampler. Moreover, metal chains attached to buoys provided samples from greater depths. By contrast, in Mediterranean stations, Ascidian specimens were sorted out from the catch of trawler nets from depths 60 to 70 m at stations west of Alexandria and 50–60 m east of the city. Checklists are given for the Suez Canal and for the Mediterranean waters (Table 1).

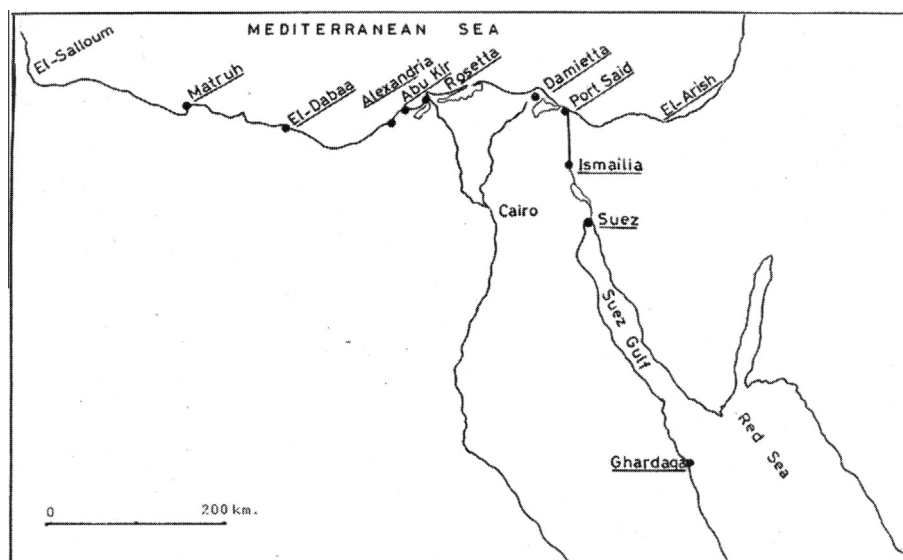


Figure 1 A map showing the sampling areas along the Mediterranean Sea.

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