

First record of *Diadema setosum* (Leske, 1778) (Echinodermata, Echinoidea, Diadematidae) from Lebanon, Eastern Mediterranean

Manal R. Nader^{1*} and Shadi El Indary²

¹*Institute of the Environment, University of Balamand, Lebanon*

²*Marine Resources and Coastal Zone Management Program, Institute of the Environment, University of Balamand, Lebanon*

E-mail: manal.nader@balamand.edu.lb (MRN), shadi.elindary@balamand.edu.lb (SEI)

*Corresponding author

Received: 3 March 2011 / Accepted: 28 March 2011 / Published online: 25 April 2011

Abstract

The Eastern Mediterranean basin is facing a high invasion rate of mainly Indo-Pacific species entering through the Suez Canal. The needle-spined urchin, *Diadema setosum*, was first documented in the Mediterranean in 2006 off southern Turkey. The new record of *D. setosum* in September 2009 represents the first evidence of its presence in Lebanese coastal waters.

Key words: *Diadema setosum*, Echinoidea, Mediterranean, Lebanon, alien species

Introduction

Diadema setosum (Leske, 1778) is a widely spread Indo-Pacific sea urchin, found also in the Red Sea and the Gulf of Suez. It lives mainly close to reefs and rocks, and on occasion forms large aggregations. It is an unselective omnivore that forages at night (James and Pearse 1969; Coppard and Campbell 2006). The first record of *D. setosum* in the Mediterranean was reported in 2006 off Kaş Peninsula, southern coast of Turkey (Yokes and Galil 2006). In the present paper we report the first record of this species in Lebanese coastal waters.

Methods

A specimen of *Diadema setosum* was collected by divers of the Lebanese Army in September 2009, found on a rocky bottom in the coastal waters of the town of Monsef (34°10'59.24"N, 35°37'54.93"E; Figure 1) at a relatively shallow depth (10–20 m). It was kept by the divers for a period of 72 hours in inappropriate preservation conditions and lost many of its long and fragile spines when transported to the Marine Resources and Coastal Zone Management Program (MRCZM) at the Institute of the Environment of the University of Balamand, Lebanon for

identification. The specimen was identified using the description provided by Coppard and Campbell 2006: the five white spots, specific to *D. setosum* were easily discerned on the interambulacra (Figure 3), though the orange ring around the periproctal cone, an important character, was not apparent, possibly due to the improper preservation and late examination.

Results and discussion

The test of the examined specimen is black and hemispherical with a horizontal diameter of 84 mm and a vertical diameter of 46 mm indicating that it is an adult capable of spawning (Coppard and Campbell 2006). Surviving to adulthood gives *D. setosum* the potential of colonizing new habitats in the eastern Mediterranean.

The rate of the invasion of alien species in the eastern Mediterranean basin appears to be influenced by several parameters: water circulation patterns, global warming and anthropogenic activities. It is not possible at this stage to identify the arrival route of *D. setosum* to Lebanese waters. It may have entered through the Suez Canal and spread northward along the Levantine coast; spread southward from Turkey; transported by the ballast waters of ships docking in Lebanese ports; while another possibility is that individuals were released from

Figure 1. Map showing the collection site of the specimen.



Figure 2. Adult specimen of *Diadema setosum* (Ruler: 30 cm). Photograph by MRCZM.

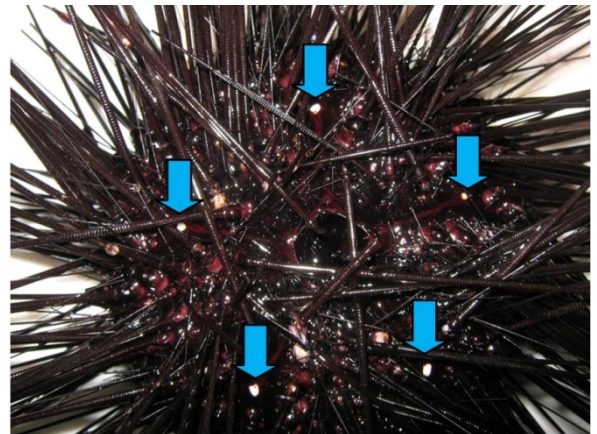


Figure 3. Five white spots above the ambitus. Photograph by MRCZM.

aquaria (Galil and Zenetos 2002; Coutts et al. 2003; Flagella and Abdulla 2005; Pancucci-Papadopoulou et al. 2005; Zenetos et al. 2005; Streftaris and Zenetos 2006; Yokes and Galil 2006; Galil 2007; Por 2009).

This species, once established in coastal waters frequented by swimmers, divers and fishermen might cause harm as its long slender spines contain mild venom (Yokes and Galil

2006). Furthermore, this species can aggregate in colonies in significant densities causing bioerosion to its surrounding habitat and competition with native species (Mokady et al. 1996). It is of great importance to assess the status of *D. setosum* Levantine populations and monitor their dispersal and colonization behavior along the Lebanese coastline in order to evaluate potential risk both to native species and humans.

Acknowledgements

Special appreciation goes to the Lebanese Army for providing the collected *Diadema setosum* specimen to the Marine Resources and Coastal Zone Management Program at the Institute of the Environment, University of Balamand.

References

- Coppard S, Campbell A (2006) Taxonomic significance of test morphology in the echinoid genera *Diadema* Gray, 1825 and *Echinothrix* Peters, 1853 (Echinodermata). *Zoosystema* 28 (1): 93–112
- Coutts A, Moore K, Hewitt C (2003) Ships' sea-chests: an overlooked transfer mechanism for non-indigenous marine species? *Marine Pollution Bulletin* 46: 1504–1515, [http://dx.doi.org/10.1016/S0025-326X\(03\)00292-3](http://dx.doi.org/10.1016/S0025-326X(03)00292-3)
- Flagella MM, Abdulla A (2005) Ship ballast water as a main vector of marine introductions in the Mediterranean Sea. *WMU Journal of Maritime Affairs* 4 (1): 95–104, <http://dx.doi.org/10.1007/BF03195066>
- Galil B, Zenetos A (2002) A sea change – Exotics in the Eastern Mediterranean. OceanDocs, E-Repository of Ocean Publications. <http://hdl.handle.net/1834/672> (Accessed 28 February 2011)
- Galil B (2007) Seeing Red: Alien species along the Mediterranean coast of Israel. *Aquatic Invasions* 2: 281–312, <http://dx.doi.org/10.3391/ai.2007.2.4.2>
- James D, Pearse J (1969) Echinoderms from the Gulf of Suez and the Northern Red Sea. *Journal for Marine Biology Assessment* 11: 78–125
- Mokady O, Lazar B, Loya Y (1996) Echinoid bioerosion as a major structuring force of Red Sea coral reefs. *Biological Bulletin* 190: 367–372, <http://dx.doi.org/10.2307/1543029>
- Pancucci-Papadopoulou M, Zenetos A, Corsini-Foka M, Politou CH (2005) Update of marine alien species in Hellenic waters. *Mediterranean Marine Science* 6 (2): 1–10
- Por DF (2009) Tethys returns to the Mediterranean: Success and limits of tropical re-colonization. *BioRisk* 3: 5–19, <http://dx.doi.org/10.3897/biorisk.3.30>
- Streftaris N, Zenetos A (2006) Alien marine species in the Mediterranean – the 100 'Worst Invasives' and their impact. *Mediterranean Marine Science* 7 (1): 87–778
- Yokes B, Galil B (2006) The first record of the needle-spined urchin *Diadema setosum* (Leske, 1778) (Echinodermata: Echinoidea: Diadematidae) from the Mediterranean Sea. *Aquatic Invasions* 1: 188–190, <http://dx.doi.org/10.3391/ai.2006.1.3.15>
- Zenetos A, Cinar ME, Pancucci-Papadopoulou MA, Harmelin JG, Furnari G, Andaloro F, Bellou N, Streftaris N, Zibrowius H (2005) Annotated list of marine alien species in the Mediterranean with records of the worst invasive species. *Mediterranean Marine Science* 6 (2): 63–118