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Short communication

The first record of the needle-spined urchin *Diadema setosum* (Leske, 1778) (Echinodermata: Echinoidea: Diadematidae) from the Mediterranean Sea

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Abstract

The needle-spined urchin, *Diadema setosum*, reported on 12 August 2006 from the southern coast of Turkey, is the first Erythrean alien echinoid to enter the Mediterranean Sea. Possible vectors include larval transport through the Suez Canal, shipping, and aquarium trade. The urchin's venomous spines may cause painful injuries to swimmers.

Key words: *Diadema setosum*, Echinoidea, Turkey, Mediterranean, vector, alien species

An adult specimen of *Diadema setosum* (Leske, 1778), test diameter 58 mm, was collected off Kaş peninsula (36º08.45'N, 29º39.30'E), Turkey on 12 August, 2006, at a depth of 18 m, while resting on an algae-covered rock. The specimen was deposited at the National Col-lections, Tel Aviv University (TAU EC 25437). Another specimen was seen nearby, at a depth of 15 m, on 19 July, 2006. The specimen has the five conspicuous white spots on the inter-ambulacrals just above the ambitus, and a bright orange ring around the periproctal cone characteristic of the species (Clark 1925) (Figure 1).

Diadema setosum is widely distributed in the Indo-West Pacific Ocean, where it occurs from the Red Sea (Gulf of Suez, Gulf of Aqaba, northern and southern Red Sea), and the east coast of Africa, to Japan and Australia (James and Pearse 1971, Lessios et al. 2001). The cryptic species is commonly observed around reefs and shallow rocky habitats (mostly 1-6 m depth), where it hides in crevices and under overhangs by day, and forages at night, at a distance of a few meters away from its daytime hideout. On occasion, it is found in large aggregations on the adjacent sand-flats (Fox 1926, B.Galil pers. obs.). It is an omnivorous scavenger and detrital feeder, ingesting loose substrate and scraping films off hard surfaces. In the Gulf of Suez gametogenesis begins in April-May, when the water temperature rises above 25ºC, and spawning takes place between June and September (Pearse 1970).

Five species of Erythrean echinoderms have been recorded in the Mediterranean Sea: the sea star *Asterina burtoni* (Gray, 1840), the brittle stars *Amphioplus laevis* (Lyman, 1874), *Ophiactis parva* Mortensen, 1926, and *O. savignyi*, (Müller

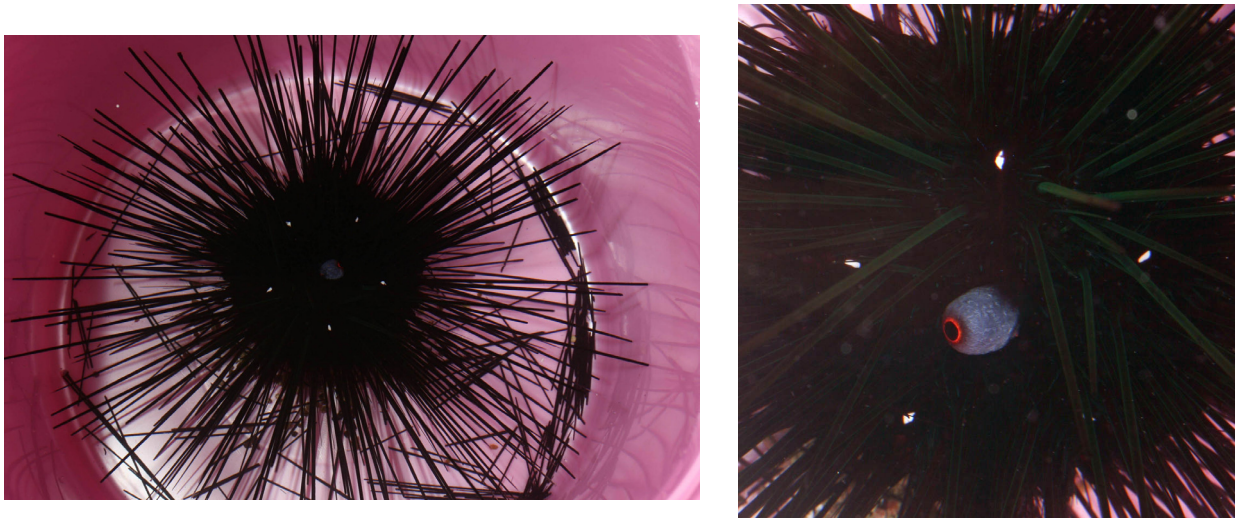

Figure 1. *Diadema setosum*, test diameter 58 mm, Kaş peninsula (photo by B.Yokes)

and Troschel, 1842), and the sea cucumber *Synaptula reciprocans* (Forsskål, 1775). Four of the five species were "found living" in the Suez Canal (Mortensen 1926: 127) in the autumn of 1924, and one of them, *O. savignyi*, was already established at that time in Port Said, at the Mediterranean terminal of the canal. The temporal succession of directional ("stepping stones") records from the Suez Canal and along the coasts of the Levant (Galil, in press) confirmed these species as naturally dispersing Erythrean aliens. However, "[T]he magnificent *Diadema*….. has not penetrated into the Canal " (Fox 1926: 129). James and Pearse (1971: 117) too were puzzled by the absence of *D. setosum* "…in the Suez Canal because they are very abundant in the northern part of the Gulf of Suez". They assumed that since it spawns in the summer months "….when current flow in the Canal is mainly from north to south; perhaps the larvae are unable to enter the Canal against the current". However, water velocity measurements taken in the 1930s (Baussan 1938) showed that only in September the current flowed through the canal from the Mediterranean into the Gulf of Suez. The enlargement of the Canal's depth and width since the late 1970s greatly increased the current velocity in its southern part (Soliman 1995), thus improving the chances for successful transport of Erythrean biota through the Canal, especially for species with long planktonic larval period. There have been several cases where a naturally dispersing Erythrean alien was first discovered off the Turkish coast, and only later in the southern Levant Sea (www.ciesm.org /atlas). However, the presence of *D. setosum* off Kaş may have resulted from anthropogenic intervention: adult specimens may have been transported in vessels' sea chests (Coutts et al. 2003), or, popular as "great additions to marine aquariums" (www.liveaquaria.com), *D. setosum* may have been released intentionally or not by an aquarist. Its future pattern of distribution may settle this question.

The presence of *D. setosum* is far from innocuous: its long, slender spines may inflict painful injuries on the unwary swimmers, divers and fishermen. The spines are brittle and hollow, with barbed tips that penetrate the skin and remain imbedded in the flesh, releasing venom from their tissue and lumen. The venom may cause redness, swelling, and acute pain, which subsides after a few hours; however, spine fragments are difficult to remove, and healing may take several weeks (Williamson et al. 1996, B.Yokes pers. obs.).

Marine aliens are impossible to remove once widespread; only if detected early enough, can eradication be successful. Since *D. setosum* is easily distinguished from all native Mediterranean echinoids, an immediate call to divers in the area to kill the urchin by smashing its test with a knife, may reduce its population below a sustainable threshold. The finding of *D. setosum* off one of the most popular beach resorts in

southern Turkey should be a clarion call for a Mediterranean-wide marine invasive species management program.

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