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First record of the striate piddock *Martesia striata* (Linnaeus, 1758) (Mollusca: Bivalvia: Pholadidae) in the Mediterranean Sea

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Abstract

This study presents the first record of *Martesia striata* (Linnaeus, 1758*)* in the Mediterranean Sea. It was detected during a routine monitoring study in the Iskenderun Bay, Turkey. The potential for *M. striata* to establish permanent population in the Mediterranean Sea and possible risks that might arise from such a situation were briefly discussed.

Key words: wood boring, alien molluscs, Iskenderun Bay, Levantine Sea

Introduction

The striate piddock *Martesia striata* (Linnaeus, 1758) is a wood-boring mollusk that has a global distribution: the Atlantic, Pacific and Indian Oceans, and connected seas of these oceans comprise its natural range. *M. striata* was recorded at Pearl Harbor, Hawaii, and the southern shores of England, and Ireland as an alien species, and in the Greater Tampa Bay (United States, Florida) as an invasive species (Coles et al. 1999; Baker et al. 2004). While *M. striata* is occurs naturally in the Red Sea (Oliver 1992), there has been no record of it in the Mediterranean Sea.

In addition burrows in wooden structures, *M. striata* is found in the argillaceous limestones, madrepores, brickwork, calcereous seashells, rocks of various levels of hardness in the area between the intertidal zone and shallow subtidal zone (Santhakumaran 1976). It was also reported on driftwood (Purchon 1955; Turner 1955; Turner 1971; Turner and Santhakumaran 1989; Carpenter and Niem 1998), a means of passive dispersal.

The Levantine coasts of Turkey are one of the regions heavily affected by colonization of alien species. Among the 400 alien species reported on the Turkish shores (98 of them Molluscs), 330 were reported in the Turkish Levantine coasts (Çinar et al. 2011). Iskenderun Bay, at the northeastern end of the Levantine Sea, is the area with the highest number of alien species after the Israeli coasts due to its proximity to the Suez Canal and the high volume of maritime traffic passing through the canal. For this reason, regular monitoring is performed in the Iskenderun Bay. So far, many alien species, the majority of which have the vector of Suez Canal, have been reported in the Iskenderun Bay (Çinar et al. 2011).

This article presents the first report of *M. striata*, which likely drifted through the Suez Canal on driftwood, in the Mediterranean Sea.

Material and methods

Martesia striata specimens were found during the monitoring studies performed in the Bay of Iskenderun when a large piece of driftwood, with holes and boring organisms within, was encountered in the Port of Iskenderun (36º35′33.1″N; 36º10′ 37.9″ E) on 15 May 2014. The collected material

Figure 1. Lateral view of *Martesia striata*. Photo: Cem Çevik.

Figure 2. Dorsal and ventral view of *Martesia striata.* Photo: Cem Çevik.

was carefully broken apart for examination and 28 boring organisms similar to the boring bivalve *Pholas* sp. were extracted. They were all alive. The specimens were taken to the Çukurova University Faculty of Fisheries Marine Biology Department and examined there.

As a result of the examination in the laboratory, the species was determined to be *M. striata* (based on Tryon 1862; Abbott 1955; Olsson 1961; Turner and Santhakumaran 1989; Oliver 1992). The shell length (SL) and shell width (SW) of individuals were measured (to the nearest 0.1 mm) and the shell width to shell length ratio calculated. After morphometric measurements, voucher specimens were fixed in 70% ethanol and preserved at the Faculty of Fisheries of the Çukurova University, Turkey (CSFM-BIV/15–09) (in collection of Dr. C. Çevik); these specimens are available for examination.

Results and discussion

The smallest *Martesia striata* collected was 13.7 mm SL and the largest 24 mm SL and the shell width to shell length ratio calculated (mean± SD) as 1.89±0.026 (n=28). The mean (± SD) SL and SW were 19.55±0.6 mm and 10.32±0.2 mm, respectively. The shell structure and colour were quite similar to those of the natural habitat (Figure 1; Figure 2).

Wood boring members of the Mollusca are grouped under the Teredinidae, Xylophaginidae (commonly known as shipworms) and Pholadidae (commonly known as piddock) families of Bivalvia. So far, in the Turkish seas, 7 species from the first two families have been reported (Sen et al. 2010; Öztürk et al. 2014; Borges et al. 2014). While endolytic species of the Pholadidae family such as *Barnea candida* and *Pholas dactylus* that live in hard substrates like rock and coral have been reported in the Mediterranean and Turkish waters, wood boring species have not been detected until this study.

M. striata is one of the most destructive warm-water wood boring organisms (Ansell and Nair 1969). The difference of *M. striata* from other wood boring species is that it does not use a chemical method of dissolution for the penetration process. Instead, boring is carried out mechanically. In addition, for feeding, it filters plankton rather than using the substrate as food. In contrast, Teredinidae and Xylophaginidae species feed on the wood they bore into (Turner 1955; Morton 1971; Scott 1991).

Due to these characteristics, *M. striata* is not affected by many wood preservation chemicals that are toxic to other boring organisms; therefore, it can attack and damage any structure and materials present in the marine environment. For example, wooden posts that are treated with turpentine, creosote, or tar for preservation can be easily destroyed by *M. striata* (Boyle and Turner 1976). Also, they attack acrylonitrile butadiene styrene (ABS) pipes, known to be resistant to boring organism attacks and for that reason used by many power plants, steel mills and nuclear power plants that take water from the sea for cooling; and even lead can be attacked and damaged by *M. striata* (Jenner et al. 2003).

As a tropical and subtropical species, *M. striata* has a broad environmental tolerance, i.e., itcan survive and breed even in low salinity habitats such as mangrove ecosystems (Yennawar et al. 1999). Thus, the likelihood of *M. striata* settling and establishing permanent populations in the

Iskenderun Bay and surrounding lagoon environments and estuaries can be considered to be quite high. If *M. striata* becomes established in the Iskenderun Bay area, it is obvious that the region will be affected very negatively from this.

There is a significant risk of *M. striata* spreading from Iskenderun Bay to the other regions of Turkey, and to the rest of the Mediterranean shores. Larvae of *M. striata* swim for more than a month, and they drift on and can be transported by ocean currents or ships. Adult *M. striata* may also be dispersed passively, despite the fact that they are stationary within bored wood objects. They disperse by movement of floating wood or wooden ship hulls into which they have bored (Nair 1984). Undoubtedly, if *M. striata* spreads from Iskenderun Bay to other regions of Turkey and the rest of the Mediterranean, similar risks and dangers would be present for these regions as well.

The Iskenderun Bay area, due to its proximity to the Suez Canal and its hydrographic characteristics and the high level of maritime traffic volume bringing alien species, clearly is suitable for the establishment of subtropical and tropical species (Zenetos et al. 2010; Çinar et al. 2011; Nunes et al. 2014; this study). So, it is under constant threat of invasion, especially by species of Red Sea origin. As a result of the widening of the Suez Canal, which started a few years ago and is expected to be finished in a couple of months, increasing maritime traffic, and increasing temperatures globally, this invasion can be expected to continue and intensify over the following years.

As a result, periodic monitoring of the Iskenderun Bay is critical for the detection of new alien species. These studies would also provide valuable information for the timely containment or elimination of alien species that might have harmful effects.

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