

## On the presence of alien foraminifera *Amphistegina lobifera* Larsen on the coasts of the Maltese Islands

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### Abstract

More than 30 alien foraminifera species have been reported from the Levantine Basin. The most abundant of them is the Indo-Pacific originated *Amphistegina lobifera* Larsen, which is the dominant foraminifera species on the coasts of Israel and southwestern coasts of Turkey. It is widely distributed in the Eastern Mediterranean, Aegean Sea and even recorded in the Sea of Marmara. The westernmost limits of its distribution extend to Libya and Tunisia. This study constitutes the first record of *Amphistegina lobifera* Larsen from the Maltese Islands in June 2006.

Key words: alien species, Foraminifera, *Amphistegina lobifera*, Maltese Islands

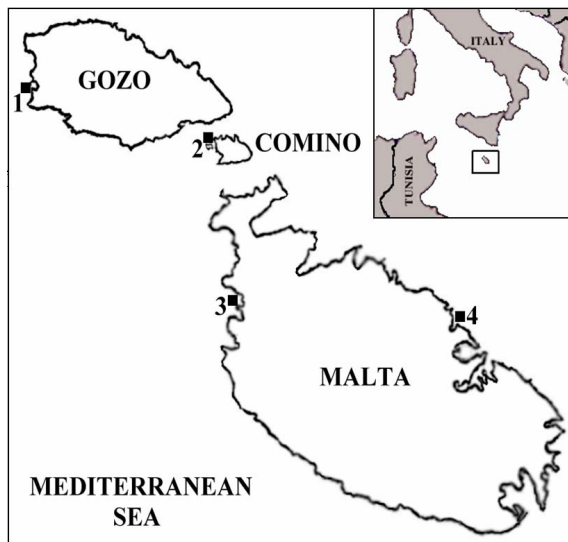
The Mediterranean Sea has been invaded by many alien species with Atlantic or Indo-Pacific origin ([www.ciesm.org/atlas](http://www.ciesm.org/atlas)). The macroscopic aliens, such as algae, fishes, crustaceans and molluscs have been well studied but, until recently, very little attention has been paid to the microscopic ones, such as foraminifera. In a recent study, 32 alien foraminifera species were reported from the Aegean and Mediterranean coasts of Turkey and 27 of these species were yet recorded only on the Turkish coastline (Meric et al. 2007). The most abundant of the alien foraminifera species in the Mediterranean Sea is *Amphistegina lobifera* Larsen. It shows a wide distribution range in the Indo-Pacific and Atlantic Oceans (Langer and Hottinger 2000),

and is also frequently recorded in the Eastern Mediterranean Basin, Israel (Langer and Hottinger 2000, Hyams et al. 2002, Gruber et al. 2007), Lebanon (Moncharmont Zei 1968), Greece (Cherif 1970) and Turkey (Avsar 1997, Meric et al. 2002, 2004). In Israel *Amphistegina lobifera* is the most abundant foraminifera species found in hard substrates, reaching densities of almost 180 specimens/g dry sediment and up to 700 specimens /g dry algae (Hyams et al. 2002, Gruber et al. 2007). It was recorded almost everywhere on the Aegean and Mediterranean coasts of Turkey, and even in the Sea of Marmara (Meric et al. 2005). It forms extensive, dense populations along the coasts of Antalya (SW Turkey) (Meric et al. 2002). The density of

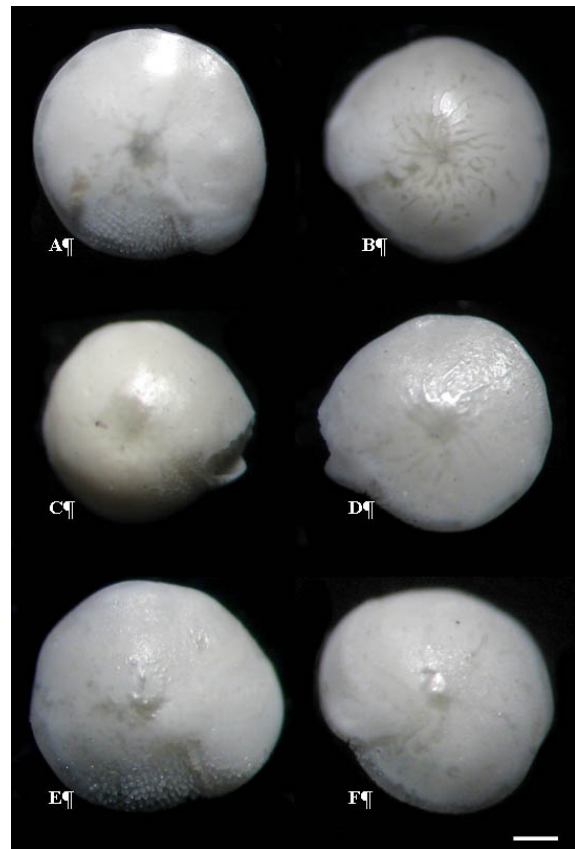
living individuals on the rocky substrate can reach 230000 - 310000 individuals/m<sup>2</sup>. The high ratio of tests in the sediment (>350 specimens/g; 0.75g tests/g) results in large amounts of sand formation, changing the habitat type and coastal structure (Yokes and Meric 2004).

The high sea water temperature observed in this region suggests that *Amphistegina lobifera* Larsen might like high water temperatures, which may limit its distribution in the Mediterranean. According to Langer and Hottinger (2000) the occurrence of living amphisteginids are delimited by the 14°C winter isotherm. Laboratory experiments showed that *Amphistegina lobifera* Larsen ceased all movements at temperatures below 12°C (Zmiri et al. 1974). However, its presence in the northern Aegean Sea and in the eastern Sea of Marmara shows that this species can adapt to much lower temperatures, thus may be dispersed into the western Mediterranean in time.

To date, *Amphistegina lobifera* Larsen has been reported only from Libya (Blanc-Vernet et al. 1979, Crapon-De Caprona and Benier 1985) and Tunisia (Glacon 1962) in the central Mediterranean. In June 2006 the coasts of Maltese Islands were investigated by skin diving between 0 – 3 m of depth (Figure 1, Annex).



**Figure 1.** Map showing the study area and the locations of the stations. 1: Fungus Rock, Gozo; 2: Blue Lagoon, Comino; 3: Golden Bay, Malta; 4: Sliema, Malta



**Figure 2.** *Amphistegina lobifera* Larsen individuals. A, ventral view of a specimen from Station 1; B, dorsal view; C, ventral view of a specimen from Station 2; D, dorsal view; E, ventral view of a specimen from Station 4; F, dorsal view. Scale bar: 200 µm

Live individuals of *Amphistegina lobifera* Larsen were observed on algae and on hard substrates. One sediment sample was collected at Station 2 (Blue Lagoon, Comino). In addition to the *Amphistegina lobifera* Larsen tests, 11 native foraminifera species were identified in the sediment sample; *Massilina secans* (d'Orbigny), *Quinqueloculina lamarckiana* d'Orbigny, *Quinqueloculina seminula* (Linné), *Peneroplis pertusus* (Forskål), *Marginulina* sp., *Uvigerina mediterranea* Hofker, *Rosalina bradyi* Cushman, *Tretompalus bulloides* (d'Orbigny), *Siphonina reticulata* (Czjzek), *Cibicidoides pachyderma* (Rzehak), *Cibicides advenum* (d'Orbigny), *Elphidium crispum* (Linné). This constitutes the first record of *Amphistegina lobifera* Larsen from the Maltese Islands, suggesting a wider distribution range for this species in the central Mediterranean Sea.

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## Annex

Locations and characteristics of the stations in Maltese Islands, where *Amphistegina lobifera* Larsen was collected in June 2006

Stations	Latitude N	Longitude E	Depth (m)	Description of the biotope	Number of specimens	Collector
1	36°02'43"	14°11'26"	0-1.0	rocky substrate	18 alive	M. Baki Yokes
2	36°00'55"	14°19'25"	3.0	sandy bottom	32 tests in sediment	M. Baki Yokes
3	35°55'45"	14°20'31"	0-1.5	rocky substrate	12 alive	M. Baki Yokes
4	35°54'42"	14°30'28"	0-1.5	rocky substrate	26 alive	M. Baki Yokes