

1 First record of *Cassiopea andromeda* 2 3 (Scyphozoa: Rhizostomeae: Cassiopeidae) 4 5 from the central Mediterranean Sea 6 7 8

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13 *The occurrence of the scyphozoan Cassiopea andromeda is reported from the Maltese Islands, where a sizable aggregation was*
14 *found in Marsamxett harbour. This is the first record of this circumtropical species from the central Mediterranean Sea,*
15 *hitherto known from the Levantine and Aegean basins. It is suggested that the most likely vector responsible for transporting*
16 *this species to the Maltese Islands is shipping.*
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19 **Keywords:** Cnidaria, scyphomedusa, Malta, alien species, lessepsian invasion, range extension
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21 Submitted 6 June 2009; accepted 26 June 2009
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23 INTRODUCTION

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26 The so called ‘upside-down jellyfish’, *Cassiopea andromeda*
27 (Forsskål, 1775), is not native to the Mediterranean, but was
28 one of the first wave of lessepsian immigrants that entered
29 the eastern Mediterranean through the Suez Canal. Galil
30 *et al.* (1990) traced the history of its invasion of the
31 Mediterranean to its presence in the Suez Canal in 1886,
32 and the first record, off Cyprus (Maas, 1903). *Cassiopea*
33 *andromeda* is well established in the Levantine and Aegean
34 Seas, but was hitherto unknown west of the south–central
35 Aegean (Galil *et al.*, 1990; Çevik *et al.*, 2006; Özgür &
36 Öztürk, 2008; Bayram Öztürk, personal communication,
37 2009).
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43 RESULTS AND DISCUSSION

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45 An aggregation of scyphomedusae of *Cassiopea andromeda*
46 (Figure 1) was observed by one of us (P.J.V.) on 20 March
47 2009 close to the mouth of Marsamxett Harbour
48 (35°53′54.61″N 14°30′21.13″E), on the north-east coast of
49 Malta, at depths of 3.5 – 6 m, on a muddy-sand bottom. The
50 aggregation, consisting of about 50 individuals 3–11 cm in
51 diameter, was observed again in the same location a month
52 later, and a few individuals were still present at the end of
53 May. The precise number of individuals could not be ascertained
54 due to the very poor visibility. Although underwater photo-
55 graphs of the aggregation were taken, the results were not very
56 satisfactory due to the amount of suspended particles in the
57 water. Specimens were identified using the key in Galil *et al.*
58 (1990). *Cassiopea andromeda* seems to prefer warm, well-lit,
59 shallow and sheltered waters with muddy or fine sand
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bottoms, to permit exposure of the photosymbionts disposed
in its oral arms (Verde & McCloskey, 1998). The area in
Marsamxett Harbour where the aggregation occurred conforms
to this habitat type. It is worth noting that practically the only
localities with shallow, sheltered, muddy habitats in the
Maltese Islands are the main harbours, so there are few places
where species such as *Cassiopea* can establish. No similar
jellyfish, either in coloration or in behaviour, occur in the
Maltese Islands. Local divers and fishermen, alert to the presence
of jellyfish due to recurring ‘blooms’ (mostly of *Pelagia*
noctiluca), have not reported aggregations of unusual species
to local news media.

The genus *Cassiopea* has a wide circumtropical distribution
in the western Atlantic and Indo-Pacific, including the Red
Sea. Noting the taxonomic confusion in the genus, Holland
et al. (2004) examined the global phylogeography and molecu-
lar systematics of the three currently recognized species:
Cassiopea andromeda, *C. frondosa*, and *C. xamachana*.
Their molecular phylogenetic results support identification
of the Red Sea populations as *C. andromeda*. Although no
specimens from the Mediterranean were studied by Holland
et al. (2004), given the history of the introduction and
spread of *Cassiopea* in the Mediterranean, it is reasonable to
assume that the Mediterranean populations, including
those reported here from the Maltese Islands, belong
to *C. andromeda sensu* Holland *et al.* (2004). However, only
molecular analysis of Mediterranean specimens will ascertain
this, since Holland *et al.* (2004) found that in Hawaii there
have been two independent introductions of different yet
morphologically similar cryptic species from separate source
populations.

At present one can only speculate as to how *Cassiopea* has
arrived in the Maltese Islands. Although *Cassiopea* possesses
pelagic larvae, surface currents in the region of Malta travel
west to east. Potentially, larvae may reach the Maltese
Islands from Sicily under certain conditions, but this species
is not known from Italian waters (Anna Occhipinti
Ambrogio, personal communication, 2009). Under the

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Fig. 1. Aboral view of a specimen of *Cassiopea andromeda* collected from Marsamxett Harbour, Malta on 20 March 2009, from a depth of 5 m. (Image by P.J. Vella.)

circumstances, shipping seems to be the most likely vector either through the transport of larvae in ballast water, or of scyphistomae on hulls.

ACKNOWLEDGEMENTS

We are grateful to Professor Bayram Öztürk (University of Istanbul, Turkey) and Professor Anna Occhipinti Ambrogi (University of Pavia, Italy) for information on the distribution of *Cassiopea*, and to Professor Bella Galil (National Institute of Oceanography, Israel) and Ms Marija Sciberras (University of

Bangor, Wales) for making literature available to us. An earlier draft of this report was greatly improved by the comments of two anonymous referees.

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