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## ***Pelagia benovici* sp. nov. (Cnidaria, Scyphozoa): a new jellyfish in the Mediterranean Sea**

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### **Abstract**

A bloom of an unknown semaestome jellyfish species was recorded in the North Adriatic Sea from September 2013 to early 2014. Morphological analysis of several specimens showed distinct differences from other known semaestome species in the Mediterranean Sea and unquestionably identified them as belonging to a new pelagiid species within genus *Pelagia*. The new species is morphologically distinct from *P. noctiluca*, currently the only recognized valid species in the genus, and from other doubtful *Pelagia* species recorded from other areas of the world. Molecular analyses of mitochondrial cytochrome *c* oxidase subunit I (COI) and nuclear 28S ribosomal DNA genes corroborate its specific distinction from *P. noctiluca* and other pelagiid taxa, supporting the monophyly of Pelagiidae. Thus, we describe *Pelagia benovici* sp. nov. Piraino, Aglieri, Scorrano & Boero.

**Key words:** taxonomy, new species, scyphomedusae, invasive alien species, North Adriatic, jellyfish blooms

### **Introduction**

The impact of jellyfish blooms on fisheries and other human activities renewed scientific attention to the most conspicuous taxon of marine gelatinous organisms, the Scyphozoa (Boero 2013). In the Mediterranean Sea, the mauve stinger *Pelagia noctiluca* (Forskål 1775) occurred in mass throughout the western and central basins including the Adriatic Sea since the early 1980s, becoming the most important jellyfish because of its widespread distribution, high abundance, and ecological role (CIESM 2001; Brotz 2012; Canepa *et al.* 2014). However, the overall biodiversity of Scyphozoa remains poorly understood, with several unknown life cycles, multiple taxonomic synonymies, and assumptions of cosmopolitan species that either under-estimate or over-estimate diversity. Species new to science (Galil *et al.* 2010) and the description of new anatomical internal structures in well known taxa, such as the quadralinga in the Pelagiidae (Gershwin & Collins 2002), are common, suggesting much remains to be learned.

Here we report on a so far undescribed jellyfish species in the Mediterranean Sea, off the North Adriatic coasts, in the gulf of Venice. A prolonged bloom with densities of hundreds of mature medusae per trawl (2.5 nautical miles, 35 minutes, 35 x 5 m<sup>2</sup> net mouth) has been observed by fishermen and divers from mid September 2013 to at least March 2014; the bloom occurs near the Po River Delta to the Gulf of Trieste, at depths from the surface to 20–25 m. Morphologically the jellyfish can be referred to the scyphozoan order Semaestomeae, and the family Pelagiidae, genus *Pelagia*. However, the specimens differ morphologically from *P. noctiluca*, which currently is considered the only valid species in the genus (Cornelius 2013; Gul & Morandini 2013). Because there is a long history of species introductions to the Mediterranean, we also make comparisons with *P. flaveola* Eschscholtz 1829 and *P. panopyra* Péron & Lesueur 1809, two *nomen dubium* from the Indian and Pacific oceans, and consider DNA

hardly have escaped attention until the 21<sup>st</sup> century. Recently, the finding of *M. stellata* off the coast of Kerala, India (Galil *et al.* 2013) corroborated this hypothesis and established this species as the fourth Erythrean alien jellyfish species introduced in the Mediterranean Sea through the Suez Canal. Similarly, given the number of marine biological stations in the Adriatic Sea, the long history of investigations on gelatinous zooplankton in the area, and the increasing attention on jellyfish blooms in recent years, it is highly unlikely that *P. benovici* remained unnoticed until 2013, when a large population of mature jellyfish suddenly appeared and then persisted in a restricted area. The North Adriatic Sea, particularly the Gulf of Venice, is a major hotspot for introduction of alien species by shipping- and aquaculture-mediated in Europe (Occhipinti *et al.* 2011; Galil 2012) and an increase in shipping related invasions has been noted recently (Galil 2009). Re-discovery of rare jellyfish (e.g. *Rhizostoma luteum* in the Gibraltar Strait or the native *Drymonema dalmatinum* in the Adriatic Sea) after almost a century-long absence (Bayha & Dawson 2010 for a review; Prieto *et al.* 2013) suggests some scyphozoans might remain undetected for a very long time and re-appear suddenly, perhaps linked to the presence of an asexually reproducing polyp stage in the life cycle (Boero *et al.* 2008). However, this is unlikely to be the case for *P. benovici*. The genus *Pelagia* is thought to lack a polyp stage, although this needs to be confirmed for *P. benovici*. By its currently restricted distribution in the Gulf of Venice (Fig. 1), its conspicuous bloom, and each medusa's unignorable size, *P. benovici* seems most likely to be another alien species introduced by human activities into the Mediterranean Sea.

Most probably, *P. benovici* was transported as viable jellyfish in the ballast waters of ships coming from the native area of this species, where it remains still undetected. This is the third case of a new species discovered in the Mediterranean but native to different seas, after the Erythrean immigrants *Alpheus migrans* (Decapoda) Lewinson and Holthuis 1978, and the rhizostome jellyfish *Marivagia stellata*. The life cycle of *P. benovici* still remains unknown, but this new taxon looks like an invasive species with the potential to form large blooms. It may have potential to spread across the Adriatic and neighbouring seas, raising the need for research efforts on mechanisms driving bioinvasions and on the impact of outbreak-forming species, as Boero (2013) recently advocated.

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