

## Preliminary Taxonomic Survey and Molecular Documentation of Jellyfish Species (Cnidaria: Scyphozoa and Cubozoa) in Malaysia

Mohammed Rizman-Idid<sup>1,\*</sup>, Abu Bakar Farrah-Azwa<sup>2</sup>, and Ving Ching Chong<sup>1,2</sup>

<sup>1</sup>Institute of Ocean and Earth Sciences, University of Malaya, 50603 Kuala Lumpur, Malaysia

<sup>2</sup>Institute of Biological Sciences, University of Malaya, 50603 Kuala Lumpur, Malaysia.

E-mail: farrahazwa@gmail.com, chong@um.edu.my

(Received 1 June 2015; Accepted 24 May 2016)

**Mohammed Rizman-Idid, Abu Bakar Farrah-Azwa, and Ving Ching Chong (2016)** Scientific enquiries into jellyfish blooms and associated problems are often deterred by the lack of taxonomical and ecological studies worldwide. Taxonomic difficulty is attributed to the high degree of morphological variations among and within species. To date, only two scyphozoan jellyfish species have been documented from field surveys in Malaysian waters, whereas another four Malaysian scyphozoan and two cubozoan jellyfish species have been mentioned in toxicological studies. None of these species have; however, been verified. This study thus aimed to document and resolves the uncertainty of earlier identified species in the region using morphology and molecular DNA sequencing. Jellyfish specimens were collected from Malaysian waters in the Straits of Malacca, South-China Sea and the Sulu-Sulawesi Sea over two years (June 2008 to October 2010), and their DNA sequences were compared with those from the Atlantic and Pacific regions. Ten scyphozoan and two cubozoan species were recorded in Malaysian waters (South China Sea and Straits of Malacca). These jellyfish included eight species from the order Rhizostomeae (Rhizostomatidae, Lobonematidae, Mastigiidae, Catostylidae and Cepheidae), two species from Semaestomeae (Pelagiidae and Cyaneidae) and two species from class Cubozoa; one from order Carybdeida (family Carukiidae) and another from order Chirodropida (family Chiropsalmidae). Molecular identification of species using phylogenetic approaches was based on DNA sequences of partial cytochrome oxidase I (COI), 16S and internal transcribed spacer (ITS1) regions. The COI phylogenetic tree of Cubozoa and Scyphozoa species from the Atlantic and Pacific regions showed distinct clustering of six Malaysian jellyfish species. However, most of the deeper divergences and relationships between the families were unresolved, which were also observed in the 16S and ITS1 phylogenetic trees. The Malaysian edible species *Lobonemoides robustus*, *Rhopilema hispidum* and *Rhopilema esculentum* were grouped within Rhizostomeae, whereas other scyphozoans showed phylogenetic affinities to Semaestomeae and Kolpophorae. *Chrysaora* and *Cyanea* appeared non-monophyletic; however their paraphyly was not confirmed. This study has provided the much needed baseline information on the taxonomy of Malaysian jellyfish species which have been substantiated by partial COI, 16S and ITS1 sequences. A total of 12 putative species of jellyfish were identified, which encompassed 12 genera.

**Key words:** Scyphozoa, Cubozoa, Jellyfish, Phylogenetics, DNA barcoding, Malaysia.

### BACKGROUND

Due to the increased awareness on jellyfish blooms in the past two decades, there has been a revival of taxonomical and ecological studies of jellyfish worldwide (Nishikawa et al. 2008; Hopf and Kingsford 2013; Bayha and Graham 2014;

D'Ambra et al. 2015). Jellyfish blooms are known to affect fishing industries, power stations and offshore mining operations by clogging fishing nets and cages, water intake points and vacuum pipes, respectively (Purcell and Arai 2001; Mills 2001; Mullan et al. 2005; Lucas 2001; Lynam et al. 2006). Beach tourism is also affected due to increased

---

\*Correspondence: E-mail: rizman@um.edu.my