



Short Communication

Occurrence of a Scyphozoan jellyfish, *Pelagia noctiluca* (Forskål, 1775) bloom in the Gulf of Mannar Marine National Park, Southern India

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A massive Scyphozoan jellyfish bloom has been encountered in branching coral, *Acropora* dominated reef area in the southern part of Hare Island of Gulf of Mannar region, Tamil Nadu. The live specimens were identified as *Pelagia noctiluca* (Forskål, 1775), adding a new occurrence record to the Gulf of Mannar biodiversity. A sudden outburst of *P. noctiluca* bloom represented thousands of live specimens (> 100/m² approximately) in the south side of Hare Island.

[**Keywords:** Gulf of Mannar, Jellyfish bloom, New record, *Pelagia noctiluca*]

Introduction

Scyphozoan jellyfishes are important denizens of the marine environment that have evolutionary importance and biomedical applications as anticancer and antioxidant activities¹. These jellyfishes have a brief generation time span of 2 to 17 months from the sessile polyp to free-living medusa². The jellyfish blooms are usually seen during summer and before monsoon due to favourable conditions such as eutrophication, global warming, salinity changes, counterparts – phytoplankton blooms^{2,3}, or due to non-indigenous invasive jellyfish like *Phyllorhiza punctata*⁴, or overfishing from an ecosystem⁵. In general, jellyfish blooms are considered as an indication of monsoon, declined fish density, and as earthquake indicator⁶.

Despite their ecological roles, massive aggregations of jellyfish has troubled fishing activities by clogging nets, interfering with aquaculture operations, and clogging in power station cooling system^{3,7,8}. The rapid change in the marine environment resulting from phenomena like blooms of toxic animals is directly or indirectly linked to anthropogenic activities³. Also, jellyfish blooms can influence the carbon, nitrogen,

phosphorus cycling, and plankton production⁹. Toxic stings of *Chiropsalmus* sp. had caused the death of fishermen during fishing in the Gulf of Mannar¹⁰. Additionally, the occurrence of freshwater jellyfishes *Limnognathia indica* from Kodaikanal Lake and *Craspedacusta sowerbii* from Kunnanpara, Thiruvananthapuram was also reported¹¹ along with a fossil medusoid jellyfish in Nimbaheralimestone¹². Therefore, studies on jellyfish diversity and distribution are important aspects that can be directly or indirectly linked to environmental health, global marine health conditions, and evolutionary histories.

Around the globe, several instances of jellyfish blooms and jellyfish sighting locations are documented in public observation networks (<http://jellywatch.org/>, <http://www.mcsuk.org/sightings/jellyfish.php>) and are increasing in several parts of the world¹³. In the Indian scenario, jellyfish blooms were recorded scarcely, and so far, thirty different scyphozoan jellyfishes have been reported from India¹⁴. Few reports further documented the blooms that occurred along the coast of Mumbai¹⁵, Chennai¹⁶ and Odisha¹⁷. For instance, the dreaded blue bottle jellyfish or “*Portuguese man of war*” which is frequently reported from Goa, Mumbai, and Andaman beaches. However, information on several other jellyfish species remains scarce.

The Gulf of Mannar Biosphere Reserve (GoMMBR), southeast coast of Tamil Nadu, India, is one of the coral reef rich biodiversity hotspot in the southeast Asia. It comprises of 21 islands under offshore waters of Mandapam, Keelakarai, Vembar and Tuticorin regions. Reefs in these regions are degrading due to environmental and anthropogenic influences^{18,19}. Although the area is mainly studied for reef monitoring, an interesting observation of *Pelagia noctiluca* bloom is reported here, which is a first report from this region.

Material and Methods

During a field trip conducted on 16th October 2018 to the southern part of Hare Island (09°11.779' N, 079°04.420' E) and Manoli Island (09°13.15' N, 079°07.33' E) for coral reef monitoring in the Gulf of Mannar, an enormous number of jellyfish bloom was observed. Specimens were photographed using an underwater Nikon W300 Waterproof 30 m & 16.05

Megapixel Digital Camera. The identification of this species was confirmed according to taxonomic database standards¹⁹ and based on the body characteristics of the species^{5,20}. Photographs were further verified through the jellyfish website (see. www.jellywatch.org) and were also reconfirmed through an expert Dr. Steven Haddock (pers. comm. 2019).

Results and Discussion

Swarming of jellyfish *P. noctiluca* bloom was observed only in the southern part of the Hare Island but was absent on the Northern side (Fig. 1). The body of *P. noctiluca* is transparent, with pinkish or violet tentacles and arms, purplish gonads, pinkish tentacles bearing stings (Fig. 2) have resulted in localized very painful and itchy sensation on skin and lips lasting up to 24 to 48 hours. Observations also indicated that the bloom of *P. noctiluca* gradually disappeared within two days. Sudden change in the weather conditions such as high temperature previously before the bloom has influenced *P. noctiluca* aggregation. While a possible dip in seawater salinity due to rain might have triggered the decline of bloom in the observed region. No records of reef fishes preying upon these jellyfishes were

noted. In general, the main predators for *P. noctiluca* are Olive Ridley⁵, Leatherback turtles²¹, and fishes^{22,23}. Ephyrae larvae of *P. noctiluca* preying on Atlantic Bluefin Tuna (*Thunnus thynnus*) eggs were recently investigated²⁴. While several other fishes are reportedly known to feed on different jellyfishes^{25,26}.

While, there is no answer for –why the blooms of this species have not occurred in the north part of Hare Island with only a few individuals (1 to 4), a probability might be due to heavy wind, rough waves, and currents. In the Mediterranean shores^{27,28}, hydrodynamic conditions like water currents is responsible for the inshore presence of this species²⁹. A recent report indicated this species occurrence in the Bay of Bengal from November 2012 to February 2013^(ref. 5). However, in the present observations, no such incident was observed but recorded the gradual disappearance of this bloom. *P. noctiluca* specimens have appeared in surface waters and spread up to a depth of 5 meters. Chain forming purplish to blood-red blooms (straight line clusters) are the striking sign of *P. noctiluca* in this study (Fig. 3).

So far, nine species of scyphozoan jellyfishes *Aurelia aurita*, *Cassiopea* cf. *andromeda*, *Chrysaora*

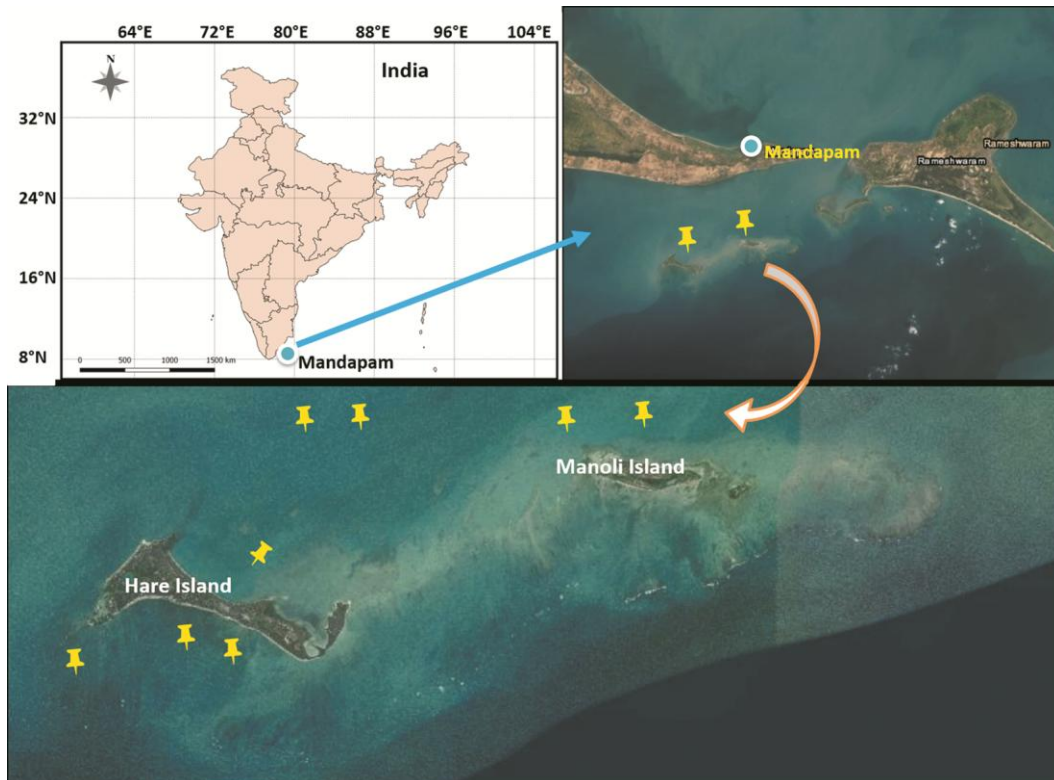


Fig. 1 — Study areas Hare Island and Manoli Island in the Gulf of Mannar Marine Biosphere Reserve

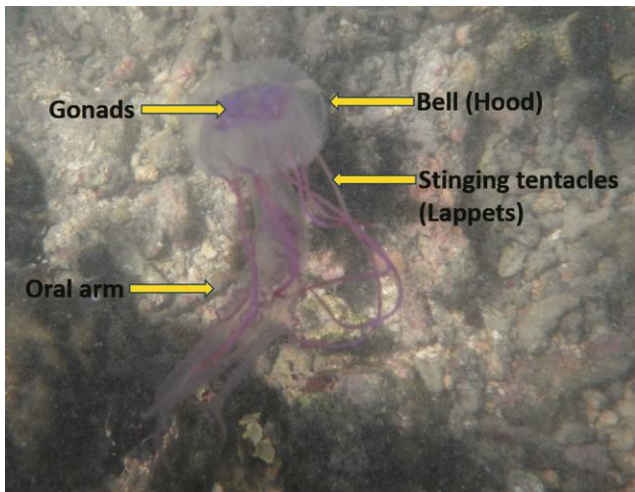


Fig. 2 — Underwater photograph of *P. noctiluca* from southern Hare Island



Fig. 3 — Blood-red bloom of *P. noctiluca* formed as a straight chain

caliparea, *Crambionella stuhlmanni*, *Cyanea* cf. *nozaki*, *Mastigias* cf. *papua*, *Netrostoma coerulescens*, *Phyllorhiza punctata* and *Rhopilema* cf. *hispidum* were recorded from Gulf of Mannar⁴. In addition to these, the present study adds another new record viz. *P. noctiluca* to Gulf of Mannar biodiversity representing the tenth addition of scyphozoan jellyfish species in this region. Interestingly, this scyphozoan jellyfish is also known to display bioluminescence during the night or in dark conditions⁵. This species was recently reported from the estuarine waters of Rushikulya river, western Bay of Bengal⁵. However, studies on this species in the Gulf of Mannar region was lacking until now about its negative impact on marine organisms. Although no mortality of any other marine organisms was observed during this event, investigations on toxicity levels of *P. noctiluca* on marine fauna and humans are yet to be demonstrated for better management of this species

and a future study might compliment this gap. Concerning the treatment, there are several scientifically evidenced treatment approaches for immediate pain relief from stinging jellyfishes, such as seawater rinsing, pouring hot water, placing ice packs, and use of various chemical solutions (e.g., vinegar)³⁰⁻³². Distribution of *P. noctiluca* has been well documented in the Mediterranean shores^{27,28}, and the species usually occurs offshore than in the inshore waters. A study from the Mediterranean Sea suggested that the presence of *P. noctiluca* in the inshore areas is possibly due to specific hydrodynamic conditions such as currents²⁹.

There is a need for continuous monitoring and immediate data acquisition of jellyfish bloom by the local community and by regional research organizations through repeated field observations and data collecting from local fisherfolk community. Earlier reports also noticed that jellyfish blooms are hindering the fishing activities, and these caught jellyfish are discarded on shore or in the sea itself without any use. Therefore, these specimens may be collected and subjected to toxicological and biomedical studies for developing anti-venom and novel drugs. Several edible jellyfish species like *Catostylus mosaicus*, *Cephea cephea*, *Crambionella* sp., *Rhopilema esculentum*, *Stomolophus meleagris*, etc. are being harvested, processed, and exported for human consumption in Southeast Asia^{2,32}. So, studying jellyfish socio-economics is an important aspect to assess their impact on fisheries, tourism, and on the sustainable management of these resources. The food value importance upon removal of the stings from jellyfishes is also to be validated. The prey and predator system between jellyfish blooms and other organisms will represent the aquatic environment's food web.

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Conflict of Interest

Authors do not have any conflict of interest to declare.

Author Contributions

CHR, SK, and TS did field surveys and underwater diving's and wrote manuscript. TS & MVRM guided the project, edited and approved the manuscript.

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