SOME OBSERVATIONS ON THE SWARM OF *PEGEA CONFOEDERATA*(TUNICATA: SALPIDAE) IN MIANIHOR, BALOCHISTAN, PAKISTAN

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خلاصہ

7فروری 2017کو میانی ہور کی ساحلی جھیل میں سالپڈپیگیہ کنفیوڈیریٹا کے ایک جم غفیر کا مشاہدہ ہوا۔ یہ جم غفیر جو کہ بنیادی طور پر پیراکی ٹیونیکیٹ پر مشتمل تھا، ساحلی جھیل میں وسیع پیمانے پر پھیلا ہوا تھا جبکہ یہ جم غفیر میانی ہور کے باہر نہیں دیکھا گیا ماسوائے داخلی راستے کے قریب۔ ٹیونیکیٹ کے علاوہ ہائیڈوزون جیلی فش ایکوریا ایپینیسیلس (نائیڈریہ: ہائڈروزوہ) کے نمونے بھی اس جم غفیر میں موجود تھے۔ اس جم غفیر جس نے ماہی گیری کے عوامل میں خلل ڈال دیا تھا 5 دن میں منتشر ہو گیا اور 4 مارچ 2017 تک یہ جم غفیر میانی ہور کی ساحلی جھیل سے مکمل طور پر غائب ہو گیا تھا۔ اس مقالے میں سمندری عوامل کی حرکیات میں لیسدار حیاتی پیراکیوں کے کردار پر بھی بحث کی گئی ہے۔

Abstract

A swarm of salpid *Pegea confoederata* was observed in the Miani Hor lagoon on 27 February 2017. The swarm which was consisted predominantly of pelagic tunicate was found to be widely distributed within the lagoon whereas the swarm was not observed outside the Miani Hor except near the entrance. In addition to tunicates, specimens of hydrozoan jellyfish *Aequorea pensilis* (Cnidaria: Hydrozoa) were also present in this swarm. The swarm, which had disrupted fishing operations, dissipated in five days and by March 4, 2017 it completely disappeared from the Miani Hor lagoon. The paper also discusses the role of gelatinous zooplankton in dynamics of the oceanic processes.

Keywords: Swarm, tunicate, salpid, *Pegea confoederata*, hydrozoan jellyfish *Aequorea pensilis*, Miani Hor, Balochistan

Introduction

Blooms of gelatinous material including jellyfish and salpidsis are increasing globally (Andersen, 1998; Bone, 1998; Purcell *et al.*, 2007). Among marine organisms, gelatinous zooplankton which include cnidarians, ctenophores, and pelagic tunicates are considered to be unique due to their energetic efficiency (Purcell *et al.* 2007). Their gelatinous body allows them to assimilate carbon from the sea. After death their body rapidly sinks and deposited on the seafloor. Through this process they play an important role in global carbon fluxes. Such blooms are also known from Arabian Sea along the coast of Pakistan (Anonymous, 2016; Gul and Gravili, 2013; Haq, *et al.*, 1973; Murty *et al*., 2009; Peter *et al*., 2018). There is no record available for salpid blooms occurring along the coastal areas of Pakistan. Salpid blooms are, however, reported from the Indian coast (Kannathasan *et al*., 2014; Lodhi, *et al*., 1998; Mohan, 1965). Sewell (1953) was first to report the occurrence of salpid *Pegea confoederata* from Pakistan coast (Northern Arabian Sea) forming dense patches. Gul and Jahangir (2018) reported strands of *P. confoederata* beached on sandy coast at Sandspit, Karachi. A swarm of salpid *P. confoederata* was observed in the Miani Hor, Balochistan, Pakistan on 27February 2017.Present paper describes some aspect of this swarm and the occurrence of swarms of gelatinous mass along Pakistan coast.

Material and Methods

Fishermen reported presence of a bloom of gelatinous material on 26 February 2017which was reported to have widely distributed in the major areas of the Miani Hor lagoon and disrupting the fishing operations. A visit was arranged to the Miani Hor area on 27 February2017to monitor the extent of the bloom and also the species involved in this event. During the survey cast net was used to collect the specimens of the gelatinous material which was preserved for later examination.

Results and Discussion

The bloom reported from Miani Hor lagoon on 27 February 2017 was caused primarily by salpid *Pegea confoederata*. The swarm was found to be widely distributed within the lagoon area whereas the swarm was not observed outside the Miani Hor except near the entrance. In addition to tunicates, specimens of hydrozoan jellyfish *Aequoreapensilis* (Cnidaria: Hydrozoa) were also found associated with swarm (Fig.1). Zooids have distinctly cylindrical bodies with soft tests and have length from 9 to 11 cm (Fig. 2).

Fig. 1. Swarm of salpid (*Pegea confoederata*) and hydrozoans jellyfish (*Aequorea pensilis*) on 27 February, 2017 in Miani Hor lagoon

The swarm of salpid (*Pegea confoederata*) and hydrozoans jellyfish (*Aequorea pensilis*) was distributed throughout the lagoon except that their density was much lower in the creeks within mangroves. Fishing activities which mainly involve small-meshed bottom set gillnet aimed mainly for shrimp and surface gillnet aimed for croakers and small pelagic had to be stopped because of clogging of the nets. According to the fisher men, the swarm of salpid (*Pegea confoederata*) and hydrozoans jellyfish (*Aequorea pensilis*) remained in the lagoon for next four days and were then drained off from the lagoon. Also a large number of salpids and hydrozoans jellyfish casted off on the sandy shores. The fishing activities was restored on 4th March 2017.

Sewell (1953) in the John Murray Expedition (1933-34) has reported *Pegea confoederata* from Northern part of Arabian Sea, off the coast of Pakistan. It was encountered on many occasions by divers from Scuba Adventure and also Diver Reef Karachi. They have found strands of *Pegea confoederata* around Churna island on many occasions (Fig. 3-4).

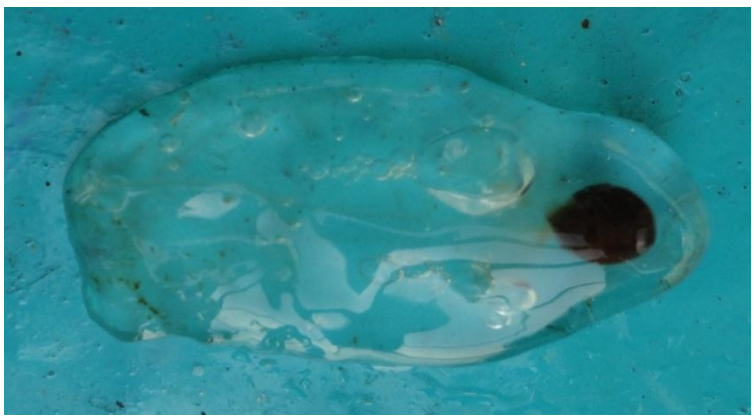

Fig. 2. Salpid, *Pegea confoederata* from 27 February, 2017 in Miani Hor lagoon

In the aggregate phase, salps in the genus *Pegea* could be distinguished from other species by the pattern of zooid linkage (Furuhashi and Tokioka, 1966; Godeaux, 1987; Madin and Harbison, 1978; van Soest, 1974). The axes of individual *Pegea confoederata* are at right angles to the axis of the chain (Fig. 3). Aggregates formed double-row chains in the form of a tight spiral coil were also noticed in case of *Pegea confoederata* (Fig. 4). Solitary zooids individuals are often unpigmented whereas the older ones with yellow or reddish-brown reticulate pattern over the entire body (Fig. 2) whereas the nucleusis reddish brown. The aggregate zooids: are transparent or with reticulate rust-colored pigmentation around oral and a trial openings and nucleusis reddish-brown.

The blooms of gelatinous mass (mainly because of jellyfish) have been previously reported from Pakistan (Anonymous, 2016; Daryana bard and Dawson, 2006. Gul, 2020; Gul and Gravili , 2013; Moazzam, 2020; Murty *et al*., 2009). Bloom of *Pelagia noctiluca* were reported from the continental shelf along the Sindh and Balochistan coasts as well as large aggregations of this stinging jellyfish which have mauve to magenta colour were reported in offshore waters of Karachi to Ghora Bari and Ormara along Sindh and Balochistan coast on 26 December, 2016, as well as a bloom of large jellyfish *Rhopilema hispidium* was reported from Indus Swatch area during the same period (Anonymous, 2016). Increase in gelatinous bloom is not only increasing in Pakistan but this phenomenon has been reported from other parts of the world including Arabian Sea (Lebrato, *et al.*, 2012; Pitt, *et al.*, 2014; Brodeur *et al*., 2002; Mills, 2001; Peter *et al.*, 2018; Purcell *et al.*, 2007).

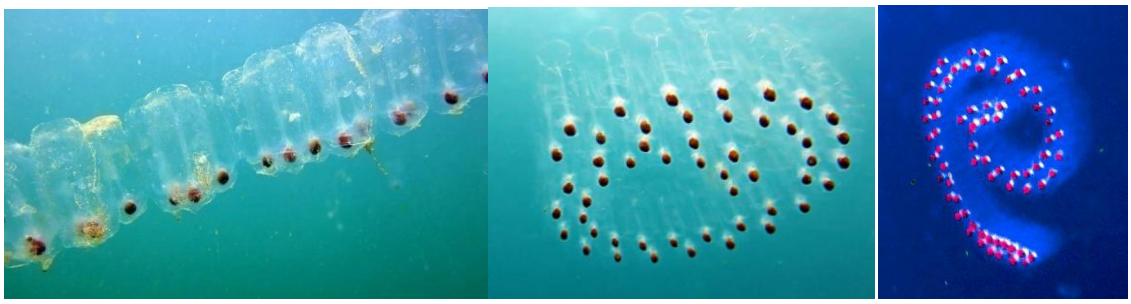

Fig. 3. *Pegea confoederata* strands photographed underwater at Churna Island by Scuba Adventure, Karachi in 2015

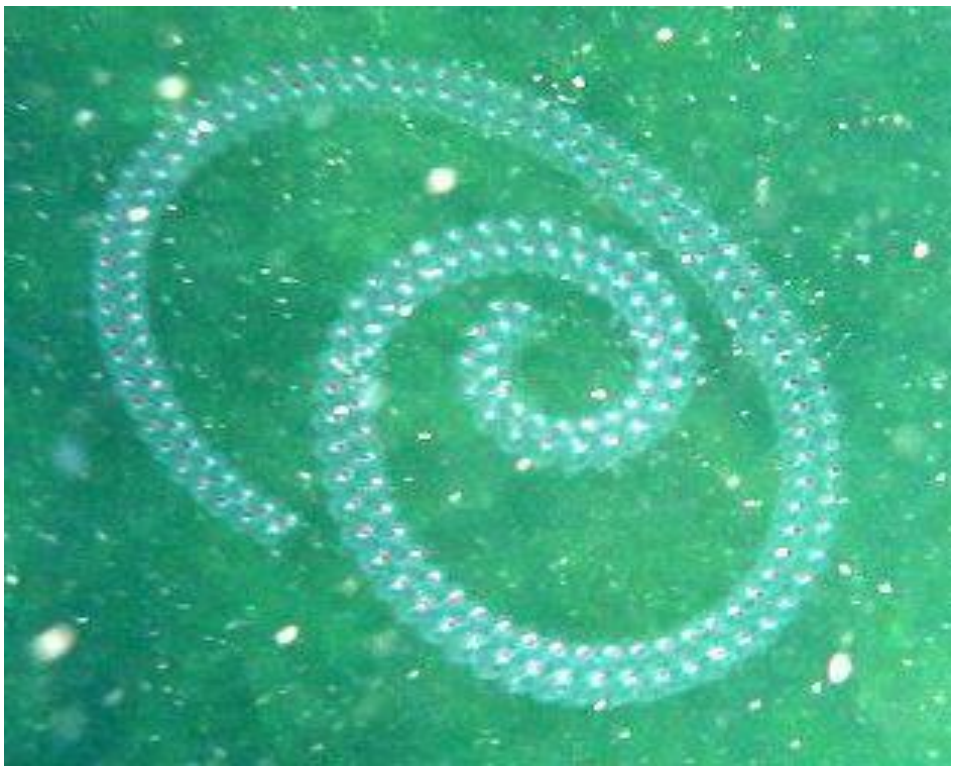

Fig. 4. Strand of salpid (*Pegea confoederata*) photographed underwater at Churna Island by Diver Reef, Karachi in 2016.

Daryanabard and Dawson (2006) reported a massive bloom of *Crambionella orsini* in 2002 and 2003 which was widely distributed in Gulf of Oman and Arabian sea including Pakistan. In December 2002, large numbers of dead *Crambionella orsini*, were observed on the seabed over a wide area of the Arabian Sea off the coast of Oman at depths between 300 m and 3,300 m (Billett, *et al*., 2006). Moribund jelly fish was seen tumbling down the continental slope and large aggregations of dead jellyfish were evident within can yon sand on the continental rise (Billett, *et al*., 2006). Since this bloom was equally distributed in Pakistan in 2002-2003 (Moazzam, 2020), therefore, it was expected that such mass deposition is expected in Pakistani deep sea basin and Indus Canyon. Another massive bloom of *Crambionella orsinii*, is again appeared in the Arabian Sea since October 2019 and still prevailing in May 2020 (Moazzam, 2020).

Gelatinous zooplankton including jellyfish and salpids play an important role in the transfer of organic matter to the seabed in faecal aggregate sand mucous sheets (Wiebe *et al.* 1979; Robison *et al*. 2005).These sink rapidly to the deep seafloor and provide a labile food source for benthic organisms (Pfannkuche and Lochte, 1991). However, the role played by the bodies of gelatinous zooplankton in the downward transport of carbon is not well understood (Moseley, 1880). The role played by gelatinous zooplanktons like *Pegea confoederata* in shallow coastal waters including lagoons is not well understood. Naqvi *et al*., (2002) observed important role of salpids in carbon cycling in the northern Arabian Sea duringthe northeast monsoon. A similar role of salpids and other gelatinous material is expected in shallow coastal waters such as lagoon, however, the dynamic of salpids is not adequately studied (Kremer, 2002).

Conclusion

Gelatinous zooplankton are playing important role in coastal and offshore production dynamic. The frequency of occurrence of gelatinous bloom is increasing globally as well as in Pakistan. A massive bloom of salpid *Pegea confoederata* which was associated with hydrozoan jellyfish *Aequoreapensilis* was observed to be widely spread in Miani Hor lagoon during 26 February to 4 March, 2017 resulting in closure of fishing operations. However, role of such gelatinous material in coastal waters including lagoon is not well understood.

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