

ORIGINAL RESEARCH

First report of *Nereis* (*Neanthes*) *virens* (Sars) an epitoky polychaete worm from Middle Strait, Baratang, Andaman Island, India

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ABSTRACT:

A sudden and mass outburst of the epitoky polychaete worm *Nereis* (*Neanthes*) *virens* (Sars)/ *Alitta virens* was observed of the surface waters of Middle Strait, Baratang, South Andaman Island during July 2014. This polychaeta worm was studied for its morphology and structural characteristics. We have taken nine consecutive seasonal samplings from July 2011 to January 2015, this was the first appearance of these worms in such a huge mass. These epitoky worms were observed in the month of July 2014 during monsoonal season in Andaman Nicobar Islands. Even though detailed studies were carried out on this worm in the world oceans, the present observation was the first report on the tropical island ecosystem of Andaman and Nicobar Islands.

Keywords:

Nereis (*Nthesean*) *virens* (Sars), epitoky, polychaete, Baratang, Andaman Sea, Andaman and Nicobar Islands, India.

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INTRODUCTION

The *Nereis virens* is commonly known as sand worm and king ragworm which is used as bait for fishes. This species belongs to a group of polychaete worm which has a distinct head with sensory organs and well developed parapodia (Westheide et al., 1999). The pair of chitinous jaws and many small denticles on the eversible proboscis of *Nereis virens* are used for grasping the prey (Gong 2003). The *Nereis virens* is of potential research significance; it can be cultured and maintained in the laboratory (Goerke 1971, 1984; Kristensen, 1984). In estuarine food web this species serves both as predator and prey and is thus an important component of this ecosystem (Heip and Herman 1979). Further, it is also a potential prey in the marine food webs and the shore birds Gull and Turns are often dependent on this worm (Spaans 1971; Shklyarevich 1979). This sand worms are also used in recreational fisheries for black fish, blue fish, bluke, poggy, weak fish, sea bass, striped bass, spot fish and flounder fish on Atlantic Gulf and Pacific coasts (Creaser et al., 1983) as a bait. Large amount of marine polychaete *Nereis virens* are imported to California from the U.S east coast as fishing bait (Cohen 2001). Moreover, *Nereis virens* and *Nereis caeca* polychaete annelids play an important role in the reworking of fluorescent particles, with in these *the Nereis virens* carry particles to their burrows (Piot et al., 2008). *Nereis virens* is an important species of estuarine sediments and also capable of surviving in high polycyclic aromatic hydrocarbon (PAH) environment

(Jorgensen, 2005). It is a semelparous polychaete and dies soon after reproduction (Bass and Brafield, 1972; Olive et al., 1998). During sexual maturation (epitoky), the species *Nereis virens* is characterized by behavioral, morphological and physiological changes which enforces the benthic worms for a brief pelagic life and then the mature male leaves their burrows to swarm and devoted for mating (Brafield and Chapman, 1967; Bass and Brafield, 1972; Snow and Marsden, 1974; Dean, 1978; Creaser and Cliffered, 1982; Wilson and Ruff, 1988). The enzymatic changes observed are likely related to the metabolic adjustment required to support higher level swimming abilities (Goerke, 1979; Hebert et al., 2008). As reported by Kristensen (1984) *Nereis virens* are known to exhibit spawning synchronous with new moon during the month of April with the water temperature of 10°C - 12°C. The low seawater temperature is favourable than the optimum temperature and strong selective pressure favours for reproduction of semelparous polychaete *Nereis virens* (Lewis et al., 2003). *Nereis virens* is an omnivorous animal (Fauchald and Jumars 1979) however, as reported by Goerke (1971) and Theede et al., (1973) it is herbivore that lives on Woods Hole.

Study Area

Baratang Island is located about 92 km North of Port Blair (Fig. 1). This Island is approximately 19 km long and 5 km wide with moderately high relief covered with thick forest (Rajshekhar, 1992) as well as known for its active mud volcano (Srinivasan, 1986). The middle strait separates Port Blair from Baratang Island. This strait is a major connectivity of the two major seas which are designated as Bay of Bengal in the western side and Andaman Sea on the eastern side of this Island. The role of tidal current is found to be an important factor in this strait; where during high tide the water current moves towards Andaman Sea where as during low tide the water is pushed towards the Bay of Bengal. The current speed is considered to be approximately 2-3 nautical

Table 1 Physico-chemical parameters of the seawater

Parameters	Surface	05 m	10 m	15 m
Temperature-°C	28.67	28.58	28.56	28.53
Dissolved Oxygen-ml/L	05.49	05.01	04.87	04.76
pH	08.76	08.79	08.74	08.72
Salinity-PSU	31.94	32.60	32.82	32.90
ORP-mv	-232	-234	-235	-237
Turbidity - NTU	01.60	01.00	01.70	19.70

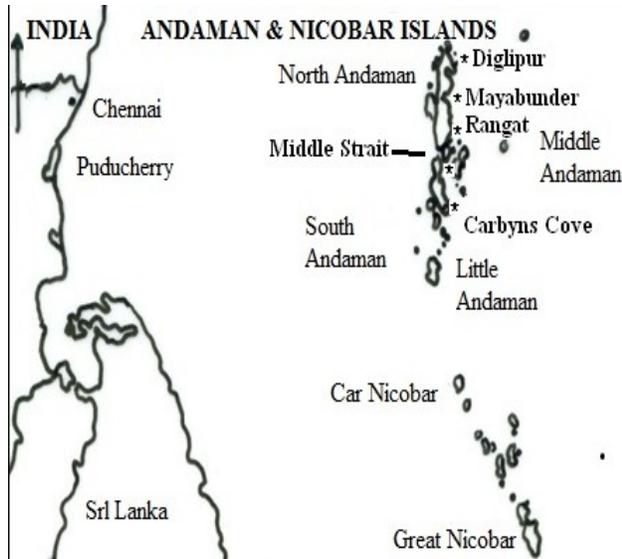


Fig. 1 Location of the Study Area

miles. The width of the strait is 200 to 250 m in an average. The mangroves are densely covered on both the sides along the strait. The sediment type is muddy and clayey with debris.

MATERIAL AND METHODS

The physico-chemical parameters such as temperature, salinity, pH, Eh, dissolved Oxygen (DO), turbidity and depth are measured at *in situ* by using Quanta Hydrolab equipment. The zooplankton samples were collected using the standard Indian Ocean Zooplankton net, hauling through the motorized dingy. The dingy were operated at two nautical mile speed for 10 minutes and the flow meter reading were noted at start and end of the collection. The observed worms in the zooplankton samples were separated out and preserved in 10% formaldehyde solution. The samples were brought to the laboratory and studies for structural and morphological characters were done using stereoscopic binocular microscope (Nikon SMZ 1500). Photographs were taken using Nikon Cool Pix p6000 Microscopic camera. The samples were preserved in a glass container and the specimens were kept for reference purpose.

Systematic position of the studied polychaete (****)

Kingdom: Animalia

Phylum: Annelida

Class: Polychaeta (Grube 1850)

Order: Phyllodocida (Williams 1815)

Family: Nereida (Blainville 1818)

Genus: *Nereis* (Linnaeus 1758)

Species: *Virens* (Sars 1835)

Diagnostic Features (Fig. 2, 3 and 4)

- Two pair of globular eyes are present on the head, eyes are located at the side vie
- Mouth is eversible
- Above the mouth a pair of antennae are present
- Two pair of tentacular cirri present on the prostomium at each side
- A pair of fleshy palps are present on the prostomium
- A pair of jaws are present which consists of denticles
- The paragnaths present as a rows on the eversible proboscis
- Total length of the specimen is 2.5 cm to 3.5 cm
- The width is 0.4 cm without parapodium and 0.6 cm including parapodium
- The total segments of the (3.5 cm length) specimen is more than 120
- The first two segments consist of two pair of tubular cirri
- From the third segment onwards five tubular cirri in each side with simple parapodia are present
- Below 19th segments there are complex parapodium with a pair of notopodial cirri
- A pair of anal cirri are also present

RESULTS AND DISCUSSION:

Even though continuous monitoring of this study area was done for last five years i.e. July 2011 to January 2015, this occurrence of *Nereis virens* was found only in the period of July 2014. The surface waters of the strait



Figure 2. *Nereis virens* Dorsal View



Figure 3. *Nereis virens* Ventral View

had countless number of individuals with very rapid swimming activities. The collected samples were examined in the laboratory and confirmed as the semelparous polychaete *Nereis virens* (Sars). According to the Presvions reports, this semelparous polychaete *Nereis virens* is mostly inhabited in the temperate regions. According to Kristensen (1984) this species required a temperature of 10°C to 20°C for spawning. However, during the day of collection in the present study the temperature of the surface water was 28.67°C, salinity was 31.94 PSU (Table 1) and also a new moon day. Creaser and Cliffered (1984) and Wilson and Ruff (1989) reported that the male species of *Nereis virens*

would swarm on the water column at new moon days. However, in the Indian Ocean, especially in Andaman Sea, of Andaman and Nicobar regions no such early reports on semelparous polychaete - *Nereis virens* were found. This information was further confirmed by the available reports of Soota and Rao (1977), Soota *et al.*, (1980) and Rajasekaran and Fernando (2012) who had reported one hundred and ninety one species of polychaete from the Andaman and Nicobar Islands. Aungtonya *et al.*, (2002) formulated a data base and check list of polychaetes from Puckhet Marine Biological Center, Thailand, and Idrish and Arshad (2013) also produced a check list of polychaetous



Figure 4. Microscopic photo of *Nereis virens* 10x7.8 X



Figure 5. Head with eversible Proboscis



Figure 6 Head with Denticular Jaws and Paraganthia

annelids in Malaysia, which also did not include this species in these waters.

Based on the above inferences, it is suspected that the cold deep waters may have been upwelled anywhere nearby the study area and the warming up of water may lead to the epitoky condition of *Nereis Virens*. This was further supported by the reports of Sachithanandam *et al.*, (2013) who stated that deep cold waters was noticed in the north of the study region. Cold ballistic waters from the international ships could also be a cause for this sudden appearance of epitoky of *Nereis virens*.

CONCLUSION

The present study could be concluded that the studied polychaete species *Nereis virens* is a first report on this part of the ocean waters. Further, it is also be considered as a invasive species to the Andaman water from the deep cold waters occurred from nearby waters or by ship's ballistic discharge.

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