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Distribution of bioluminescent polychaete larvae of *Odontosyllis* sp. in South Andaman

CH. Ramesh*, R. Mohanraju, P. Karthick & K. N. Murthy

Department of Ocean Studies and Marine Biology, Pondicherry Central University, Port Blair-744102, Andaman & Nicobar Islands, India.

*[Corresponding author E-mail address: chrameshpu@gmail.com]

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Larval distribution of a luminous *Odontosyllis* sp. on different marine niches such as the articulated coralline red algae *Amphirova anceps*, algal mats on boats, seawater and sediment is being reported here for the first time from Burmanallah Coast. The freshly collected luminous larvae of *Odontosyllis* sp. from these niches emitted an intense glow of luminescence upon the addition of freshwater and upon gentle disturbance. Flashes of internal luminescence was appeared in freshly collected larvae, whereas continuous glow lasted for few minutes when freshwater was added. Luminescent bacteria were not observed in these larvae, indicating that their luminescence emission is not due to bacterial production, but could be the self-internal emission mechanism.

[Keywords: *Odontosyllis* larvae, distribution, marine niches, bioluminescence]

Introduction

Marine bioluminescent polychaete worms inhabit shallow coastal waters and benthic regions[1, 2]. Some of the well-known bioluminescent polychaetes are *Cheatopterus*, *Eusyllis*, *Harmothoe*, *Odontosyllis*, *Pionosyllis*, *Polynoe*, *Tomopteris*[3], *Swima bombiviridis*[2], *Poeobius meseres* and *Flota vitjasi*[4]. These polychaetes are known to emit bioluminescence in the visible spectrum of 440 to 510 nm and this emission is useful for attracting mates or prey as well as for defensive and offensive functions[4]. Most of these polychaetes emit green coloured luminescence, except in *Tomopteris* sp. a planktonic polychaete that emits a golden yellow colour. Luminescence emission in these polychaetes is due to the oxidation reaction of luciferin and oxygen, catalysed by an enzyme luciferase or species specific photoprotein[1]. In the present study we examined the larval distribution of *Odontosyllis* sp. on different marine niches of South Andaman.

Materials and Methods

Samples such as coralline red algae *Amphirova anceps* (from Burmanallah- Lat $11^0$33’52.24’’ N, Long $92^0$44’01.51’’ E; Kodiyaghat- Lat $11^0$31’47.16’’N, Long $92^0$43’25.97’’E; Chidiyatapu- Lat $11^0$29’27.24’’N, Long $92^0$42’29.38’’E), unidentified algal mats on boats (from Junglighat- Lat$11^0$39’25.09’’N, Long $92^0$43’30.07’’E), seawater (from Burmanallah- Lat $11^0$33’52.24’’N, Long $92^0$44’01.51’’E; Junglighat- Lat $11^0$39’25.09’’N, Long $92^0$43’30.07’’E; Carbyns Cove -Lat $11^0$38’28.88’’N, Long $92^0$44’49.73’’E) and sediment (from Wandoor- Lat $11^0$35’37.52’’N, Long $92^0$36’33.09’’E; Burmanallah- Lat $11^0$33’52.24’’ N, Long $92^0$44’01.51’’ E) were monitored monthly for a year (2012-2013) (Map 1).

All the samples except seawater (collected with a one liter water collection bottle) were collected monthly during the receding tide by hand pick up method. These samples were brought to the laboratory and observed under dark conditions. To stimulate and check luminescence emission, samples were submerged slightly in fresh water and gentle disturbance was applied which resulted in continuous glow of polychaete larvae luminescence. These larvae were carefully removed from debris by using a needle with adjustable light and placed on a clean glass slide containing a drop of glycerol for microscopic examination. Taxonomic identification of these larvae was carried out by following the identification keys[5].

Map. 1— Showing sample collection stations in South Andaman.

Study was undertaken to understand their luminescence emission whether due to bacterial production or self-emission mechanism. Some larval specimens of *Odontosyllis* sp. were washed gently with sterile seawater for 3-4 times and grounded well with a sterile blunt end needle in 1 ml eppendorf centrifuge tube, with 5 drops of sterile seawater. 100 µl of this mixture was pour plated on both Luminescent and Marine agar to observe luminescent bacterial growth following standard methods[6]. These petri plates were incubated at 35^0C for 24 hours and subsequently these plates were observed in a dark room to check the presence of luminescent bacteria.

Results

Observations of the articulated coralline red algae *Amphirova anceps*, algal mats on boats, seawater and sediment under dark conditions in the laboratory showed the presence of luminous polychaete larvae on them. Microscopic examination of these larvae was found to have elongated body with numerous segments and absence of nuchal epaulettes, identified as *Odontosyllis* sp. The sizes of these larvae were found to range from 5 to 10 mm. These larvae were found in copious number and occurred throughout the year. Their luminescence emission was found to be a strong flash of yellow green colour. Bacterial colonies on both Luminescent and Marine agar did not show luminescence, indicating that these larval luminescence emissions is not due to luminescent bacteria but could be due to the self-internal luminescence pathway.

Discussion

Around the worldwide approximately 8,500 polychaete species belonging to 1,100 genera have been listed by Glasby *et al*. (2000). Recent studies show that more than 400 species have been found to occur in India[5] and bioluminescent polychaetes from this region have not been reported so far. In the present study luminous *Odontosyllis* sp. larvae distribution on red algae *Amphirova anceps*, algal mats on boats, seawater and sediment has been observed.

Earlier studies by Fischer and Fischer (1995) on syllid polychaete worm larvae belonging to the genus *Odontosyllis* showed that their larvae prefer

to settle in the places where rich organic matter is degraded by bacteria and beneath solid substrates. This is agreeable to this study, since discharge of domestic effluents is seen in these places and also both luminous and non-luminous bacteria have been isolated (Author personnel communication). It was asserted that *Odontosyllis* species bioluminescence display and spawning at fortnightly intervals depend on lunar periodicity[9], with peak reproduction periods, during summer for *O. luminosa* and *O. phosphorea*[10] and June to July for *O. enopla*[8]. However, interestingly these *Odontosyllis* sp. larvae were found to occur throughout the year on the marine niches of South Andaman, indicating a different biological rhythm by this species. Luminescence emission from the mucus of *O. phosphorea* has been reported by Deheyn and Latz (2009), whereas mucus secretion was not observed in this *Odontosyllis* sp.

Conclusion

Further studies are focused on the isolation of enzyme responsible for the light emission and as well genetical identification of these larvae.

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