J. Terr. Mar. Res. Vol. 1(1) 2017: 1-3.
Journal of Terrestrial and Marine Research

Waveland Scientific Publications
wavelandscientificpublications.com/journal-of-terrestrial-and-marine-research-jtmr/

ISSN:2456-7639

Short Communication

Occurrence of cross breeding in benthic forminifera *Peneroplis* sp in Port Blair, South Andaman, India

P. MOTHILAL YUVARAJA AND N. RAMANUJAM.

Department of Disaster Management Pondicherry University (A Central University)
Brookshabad Campus, Post Box No 26, Junglighat. Port Blair –744103

ABSTRACT

In the present study, 23 species belonging to 8 Families and 3 orders of benthic foraminifera have been identified. Among them, intra and intergeneric fusion of *Peneroplis planatus*, *Peneroplis pertusus* and *Coscinospira hemprichii* have been observed by Light microscopic, SEM and EDAX studies. Abnormal Shell growth of Peneroplidae revealed that shell abnormalities are common in foraminiferal species due to changes in environmental conditions.

Keywords: Cross breeding, *Coscinospira hemprichii*, *Peneroplis* sp, SEM studies

INTRODUCTION

Foraminiferans are unicellular, shelled microorganisms, they are ubiquitous and are found as both planktonic and benthic forms in the marine ecosystem. Their ecological parameters, such as salinity variations, temperature, solubility of calcium carbonate, dissolved oxygen, illumination, anthropogenic heavy metal pollution or heavy metals carried by groundwater are suggested to cause the abnormal test development in foraminifers (Boltovskoy et al. 1991; Yanko et al. 1998; Stouff et al., 1999a, 1999b; Geslin et al. 2002; Elberling et al. 2003). In some foraminiferal assemblage studies conducted along the peneroplid specimens have been observed to be locally common (Mothilal and Ramanujam 2012). The abnormal peneroplids described herein may have formed by fusion of gametes from intergeneric individuals. The gametes of *Peneroplis pertusus* and *Peneroplis planatus* could have been combined with those *Coscinospira hemprichii* (Meric et al. 2008). In the present study abnormal growth of foraminifera collected from South Andaman has been studied by using SEM and EDAX.

MATERIALS AND METHODS

Samples were collected closely adjacent to reefs in the North Bay (5m depth), Sisostris Bay (7m depth), Carbyn's Cove (15m depth), Chidiyatapu (5m depth) and Wandoor (7m depth) in South Andaman Island, India (Fig: 1).

To study the common stress response of reef dwelling foraminiferal assemblages to the natural and human induced disturbances such as temperature, sedimentation, inorganic nutrients and solar radiation, samples were collected from the reefs in the North Bay (5m depth) Sisostris Bay (7m depth) Carbyn's Cove (15m depth), Chidyatapu beach (5m depth) in Andaman Sea, and Wandoor beach. (7m depth) in Bay of Bengal, South Andaman, India.

Samples were collected through Van veen grab sampler subsequently treated with Rose Bengal dye to distinguish living and deceased species. Specimens were collected by hand in aseptic conditions after sieving and drying of the sediment samples, and preserved in paleontological slides.

Manuscript Information

Received: 22 November 2016 / **Revised:** 11 December 2016 / **Accepted:** 12 December 2016 / **Published:** 14 December 2016 / **Corresponding Author:** marineyuva@gmail.com

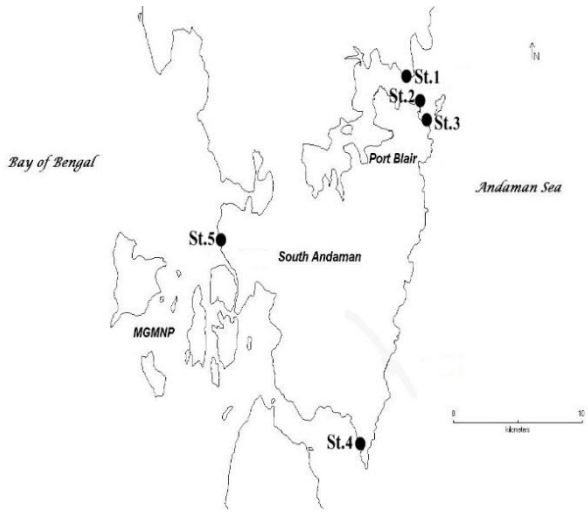

Fig 1: Sampling sites of South Andaman

Using Stereoscopic Binocular Microscope (Nikon-SMZ1500), species were identified and photographed. FEI Quanta 200 Environmental Scanning Electron Microscope (ESEM) with Energy-Dispersive X-ray Spectroscopy (EDAX EDS) system was used to study the variety of anomalous ultra-features and chemical characteristics of foraminiferal species. In this system, the EDAX is attached with SEM that enables the analysis of elemental composition and also the ultra-structure of foraminiferal samples. For that, specimens were rinsed with deionised water and air dried on paleontological slides. Then the specimens were mounted on aluminium SEM stubs using double-sided adhesive tabs. In this study the characteristic of an element with atomic structure is identified uniquely from one another in the form of EDX spectrum along with ultra-structures of the same species.

RESULT

Totally, 23 species belonging to 8 Families and 3 orders of benthic foraminifera have been identified from 5 sampling sites of South Andaman Island. Order: *Textularia conica* (d'Orbigny), Siphot*extularia* (nov), *Textularia agglutinans* (d'Orbigny);*Quinqueloculina intricate* (Terquem), *Quinqueloculina granulocostata*, *Quinqueloculina boueana*, *Quinqueloculina Lamarckiana* (d'Orbigny), *Quinqueloculina parkeri* (Brady), *Quinqueloculina vulgaris*, *Nodobaculariella convexiuscula* (Brady), *Spiroloculina foveolata*, *Spiroloculina antillarum* (d'Orbigny), *Spiroloculina communis* (Cushman), *Spiroloculina depressa* (d'Orbigny), *Spiroloculina henbesti* (Petri), *Spiroloculina angulata* (Cushman), *Peneroplis planatus* (Fichteland Moll), *Peneroplis pertusus* (Forskal), *Monalysidium politum* (Chapman), *Calcarina calcar* (d'Orbigny), *Calcarina spengleri* (Gmelin), *Calcarina hispidus* (Brady) *Coscinospira hemprichii* (Ehrenberg) have been collected from the study areas of North Bay, Sisostris Bay, Carbyns' Cove and Chidiyatapu from the Andaman Sea and Wandoor from the Bay of Bengal. Abnormal growth of *Peneroplis pertusus*, *Peneroplis planatus* and *Coscinospira hemprichii* have been observed under ESEM and EDAX (**Fig 2 & 3)**.

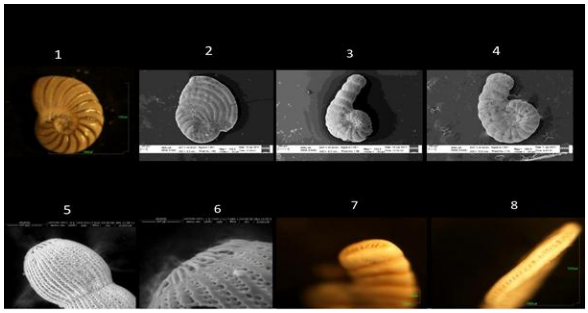

Fig 2: 1.*Peneroplis pertusus*, 2- *Peneroplis planatus*, 3-*Coscinospira hemprichii*, *4- Coscinospira hemprichii* 5-Aperture of *Coscinospira hemprichii* 100µm, 6-Aperture of *Coscinospira hemprichii* 40µm, 7-Aperture of *Peneroplis planatus* 1000µm, 8- Aperture of *Coscinospira hemprichii* 100µm

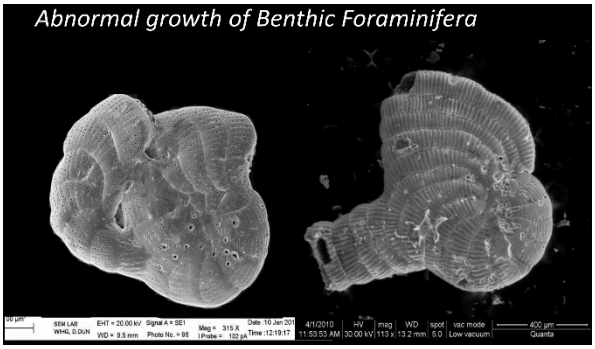

Fig 3: 1. *Peneroplis pertusus* and *Coscinospira hemprichii*, 2- *Peneroplis planatus* and *Coscinospira hemprichii*

DISCUSSION

Abnormal foraminiferal shells are measured to be markers of stressed environment, and some species are used as biomarkers to assess the anthropogenic pollution. The changes in the salinity of seawater could result in morphological anomalies in benthic foraminifer tests (Mothilal and Ramanujam 2013a, 2013b).The ratios of abnormal to normal foraminiferal shells can also be experimental in environments confined from human interaction. In this study, a rich foraminiferal assemblage represented by 31 species were observed. Morphologically abnormal individuals

were also abundantly observed, mainly in Peneroplids. Examples of abnormal togetherness in Peneroplidae between *Coscinospira hemprichii- Peneroplis pertusus*, *Coscinospira hemprichii- Peneroplis planatus* and *Vertebralina striata-Coscinospira hemprichii* have been previously reported (Meriç et al. 2008; Meriç et al. 2009). However, the specimen from North Bay exhibited togetherness between *Peneroplis pertusus-Peneroplis planatus.* Juvenile of *Peneroplis planatus* might have been fused with *Peneroplis pertusus* juvenile. This interaction is called as intrageneric as two different species of same genus are interacted or intergeneric interaction of *Peneroplis planatus* juvenile attached with the *Coscinospira hemprichii.*

ACKNOWLEDGEMENTS

Authors are thankful to the Head of the Department, Disaster Management, Pondicherry University, Port Blair for providing facilities and permission accorded by Vice-chancellor, Director, Dean and Registrar of Pondicherry University for constant encouragement and support. Authors also thankful to Prof. T. Pradeep, Department of Chemistry, IIT Madras, Chennai. Authors also thankful to Dr. Kapesa Scientist WADIA Institute of Himalayan Geology, Dehradun, India.

REFERENCES

1. Boltovskoy, E., Scott, DB, and Medioli, FS. (1991). Morphological variations of benthic foraminiferal tests in response to changes in ecological parameters: a review. J. Paleontology. 65(2): 175-185.
2. Elberling, B., Knudsen, KL., Kristensen, PH, and Asmund, G. (2003). Applying foraminiferal stratigraphy as a biomarker for heavy metal contamination and mining impact in a fiord in west Greenland. Marine Environ. Res. 55:235-256.
3. Geslin, E., Debenay, JP., Duleba, W, and Bonetti C. (2002). Morphological abnormalities of foraminiferal tests in Brizalian environments; comparison between polluted and non-polluted areas. Marine Micropaleontomlogy 45: 151-168.
4. Meric, E., Yokes, MB., Nielsen, JK., Gormus, M., Avsar, N, and Dincer, F. (2008).Abnormal formations in peneroplids: eneroplis-Coscinospiratogetherness. Anal. de Biol. 30:1-7
5. Meric, E., Yokes, MB., Avsar, N, and Bircan, C. (2009). A new observation of abnormal development in benthic foraminifers: Vertebralina-*Coscinospira* togetherness. Mar. Bio. Rec. 2 (167) 1-6
6. Mothilal Yuvaraja P, and Ramanajam, N. (2013a). Abnormal growth of benthic foraminifera of intergeneric individuals and microboring indication of increasing environmental stress in Port Blair, India. Int. J. Curr.Res. 5(2): 293-297.
7. Mothilal Yuvaraja P. and Ramanajam N. (2013b). Study of abnormal benthic foraminifers and its impacts in Andaman Sea Port Blair India. Int. J. Curr. Res. 5(2):332-335.
8. Nigam, R., Saraswat, R, and Kurtarkar, SR. (2006). Laboratory experiments to study the effects of salinity variations on benthic foraminiferal species-*Pararotalia nipponica* (Asano). J. Geo. Soc. India. 67: 41–46
9. Samir, AM, and El-Din, AB. (2001). Benthic foraminiferal assemblages and morphological abnormalities as pollution proxies in two Egyptian Bays. Marine Micropaleontology.41: 193-227.
10. Sharifi, AR., Croudace, IW, and Austin, RL. (1991).Benthic foraminifers as pollution indicators in South Hampton water, South England, United Kingdom: J. Micropaleontology. 10:109-113.
11. Stouff, V., Geslin E., Debenay JP, and Lesourd M. (1999a). Origin of morphological abnormalities in Ammonia (foraminifera): studies in laboratory and natural environments. J. Foram. Ress. 29: 152-170
12. Stouff, V., Lesourd, M, and Debenay, JP. (1999b). Laboratory observations on asexual reproduction (schizogony) and ontogeny of Ammonia tepida with comments on the life cycle. J. Foram. Res. 29: 75-84.
13. Yanko, V., Kronfeld, J, and Flexer, A. (1994). Response of benthic foraminifera to various pollution sources: implications for pollution monitoring. J. Foram. Res. 24: 73-97.
14. Yanko, V., Ahmed, M, and Kaminski, M. (1998). Morphological deformities of benthic foraminiferal shells in response to pollution by heavy metals: implications for pollution monitoring. J. Foram. Res.28:177-200.