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### NOTE

**REAPPEARANCE OF THE RARE SHINGLE URCHIN *COLOBOCENTROTUS (PODOPHORA) ATRATUS* (CAMARODONTA: ECHINOMETRIDAE) AFTER EIGHT DECADES FROM THE ROCKY SHORE OF KODIYAGHAT (PORT BLAIR), SOUTH ANDAMAN ISLANDS, INDIA**

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## REAPPEARANCE OF THE RARE SHINGLE URCHIN *COLOBOCENTROTUS (PODOPHORA) ATRATUS* (CAMARODONTA: ECHINOMETRIDAE) AFTER EIGHT DECADES FROM THE ROCKY SHORE OF KODIYAGHAT (PORT BLAIR), SOUTH ANDAMAN ISLANDS, INDIA

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Andaman & Nicobar Islands are situated between 6°45'–13°45'N & 92°12'–93°57'E in the south-eastern Bay of Bengal. The The Andaman group of Islands is broadly separated into three regions, viz., North Andaman, Middle Andaman and South Andaman that contributes to 30% of Indian exclusive economic zone (EEZ) and a 1,962km long coastal line. Marine faunal diversity of these Islands have not been completely explored despite the fact that the coastal zones and fringing reefs of Andaman and Nicobar Islands harbours a rich variety of echinoderms, which is approximately half the echinoderm fauna of the Indian subcontinent (Sastry 2007).

Echinoderms have always drawn the attention of scientists since early times due to their beautiful symmetrical shape and accessibility on intertidal zone (James 1983). These are exclusively marine benthic invertebrates and contains about 6,500 known species and constitutes the only major group of deuterostome invertebrates, with relatively large and pentamerous radial symmetrical body. The echinoderms that encompass

a substantial group of marine organisms including sea cucumbers, sea stars, brittle stars, sea urchins, and feather stars reach highest diversity in reef environments, but are also widespread on shallow shores. Due to their wide trophic preferences as, detritivores, filter-feeders, grazers, scavengers and active predators, they play an important role in structuring benthic communities in shallow coastal reaches (Himmelman & Dutil 1991).

Investigation on echinoderms of Indian waters was initiated as early as 1743 by Plancus and Gualtire (James 1983) when they reported *Acanthaster planci* off Goa coast. Bell (1887) reported echinoderms from the Andaman Islands for the first time. However works on echinoderms attained momentum after the works done by James (1987). Later Julka & Das (1978) did an extensive study on shallow water starfishes of these Islands. Sastry (1998, 1999, 2001, 2002) documented many echinoderms of Andaman & Nicobar Islands, which added several new species of echinoderms to the established list from these islands.

Sea urchins fall under the class Echinoidea, are echinoderms with alimentary, reproductive, nervous and water-vascular systems enclosed within a 'test' or shell usually rigid (rarely flexible) made up of plates, which bear movable spines. They are one of the most common and very important component of near-shore marine benthic communities worldwide that plays a major role in regulating the abundance, distribution and species composition of marine plants through selective feeding in a variety of habitats (Hernandez et al. 2008). As prey to a variety of predators (Pearse 2006) they act as a connecting



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link between primary producers and carnivores. Regular sea urchins are mostly herbivores and feed on algae (Barbera et al. 2011), whereas burrowing sea urchins are detritivore deposit feeders (Lawrence 2006). These forms play an important role in bio-turbation, especially spatangoids are important in this process due to their size, abundance and mobility (Chiold 1989; Barbera et al. 2011). By feeding on algae, urchins maintain the balance between coral erosion and algal growth. They are also considered very sensitive bio-indicators (Zizka 2012) to various nutrients and heavy metal pollution.

*Colobocentrotus atratus* (Linnaeus, 1758), commonly known as shingle urchin or helmet urchin, under the family Echinometridae was previously named as *Echinus atratus* Linnaeus, 1758. *Colobocentrotus (Podophora) atratus* is the currently accepted name (Clark & Rowe 1971). Genus *Colobocentrotus* has very peculiar morphology amongst the regular echinoids. The aboral spines are reduced and similar in length, which gives an overall compact mosaic structure on the aboral side of the urchin. Whereas, oral part of the urchin is surrounded by marginal flattened spines projecting from the ambitus (Clark & Rowe 1971). The tips of marginal spines are rounded and swollen, which makes the overall external shape of the urchin smooth and resembles a limpet or helmet.

Shingle Urchin *C. atratus* is an occupant of extreme wave swept areas of intertidal zone throughout the Indo-west Pacific (Santos & Flammang 2008), and possess significant medicinal properties. Albeit their high abundance in coastal waters of Hawaii, they were conferred the title of nationally endangered species by the Government of Hawaii (McCormack 2007). This species was never reported from the mainland coast of India. Even from the Andaman Islands where this species was reported for the first time (Sastry 2005), no reports are available after its occurrence (only one specimen) in the year 1935. But one specimen (Sastry 1999) of *C. atratus* was reported from Katchal, Great Nicobar Islands, which are separated from Andaman Islands by 10 degree Channel. The present report of five live specimens of *C. atratus* from the south Andaman Islands proves its rarity in occurrence.

**Materials and Methods:** The present study was conducted along the east coast of South Andaman. A total of six rocky shore locations were chosen for the study of Macrobenthos. Seasonal survey at every three months interval was carried out to assess the macrofaunal distribution during December 2011 to December 2014. For the collection of macrobenthic samples a quadrat of 1m<sup>2</sup> was used (English et al. 1997). From each location 12 random quadrat samples were studied covering upper, mid and lower intertidal zones. All the macrobenthic

epifaunal groups within the quadrat were enumerated at species-level in the field to estimate species diversity and abundance. Simultaneously, digital photographs were taken for further taxonomic study. For the present study site (Kodiyaghat) no specific permits were required as the location is not privately owned or protected in any way, and the present study of Shingle Urchin is not a protected species of India.

Five individuals of *C. atratus* were found at Kodiyaghat (11°31'532"N & 92°43'457"E), on an uneven rocky terrain with a number of tide pools and big rocks. This location is directly connected to open sea and subjected to extreme wave action. For the first time in the three years of study period, only during the August 2014 sampling, five individuals of Shingle Urchins were noticed towards the lower shore where the wave action was very high. At this location a thorough survey was made to find more individuals in the north-south direction (~1km, parallel to the coast), but no individuals were noticed during the survey other than the recorded five.

The individuals of *C. atratus* were examined for their morphological characters (viz., number of ambulacral plates, marginal flattened spines, colour of the test and spines, the size of the test, and structure of tube feet). After a thorough examination, digital photographs were obtained for later reference. Considering the sparse population of the species, no individuals were removed from this area.

#### Taxonomy and Discussion:

Phylum: Echinodermata  
 Class: Echinoidea Leske, 1778  
 Order: Camarodonta Jackson, 1912  
 Family: Echinometridae Grey, 1855  
 Genus: *Colobocentrotus* Brandt, 1835  
 Sub genus: *Podophora* Agassiz, 1840  
 Species: *atratus* (Linnaeus, 1758)

This species was recorded for the first time from the Andaman Islands by Bell (1887) and later by Clarke (1925). Sastry (2005) reported this species from Carbyn's cove of South Andaman based on a single specimen collected in 1935. In the present study, during a continuous three-year monitoring of macrobenthic epifauna along the South Andaman coast, we recorded five live specimens of *C. atratus* within 0.5m<sup>2</sup> area off Kodiyaghat (11°31'532"N & 92°43'457"E; Fig. 1). This urchin is dark purple in colour at aboral and light magenta at oral side and shaped like a domed limpet. The size of largest individual among the five individuals was 7.5cm whereas smallest one recorded 4.5cm in diameter. The aboral surface is composed of modified spines to form a smooth, flattened shingle-like mosaic of modified polygonal plates with a flange of

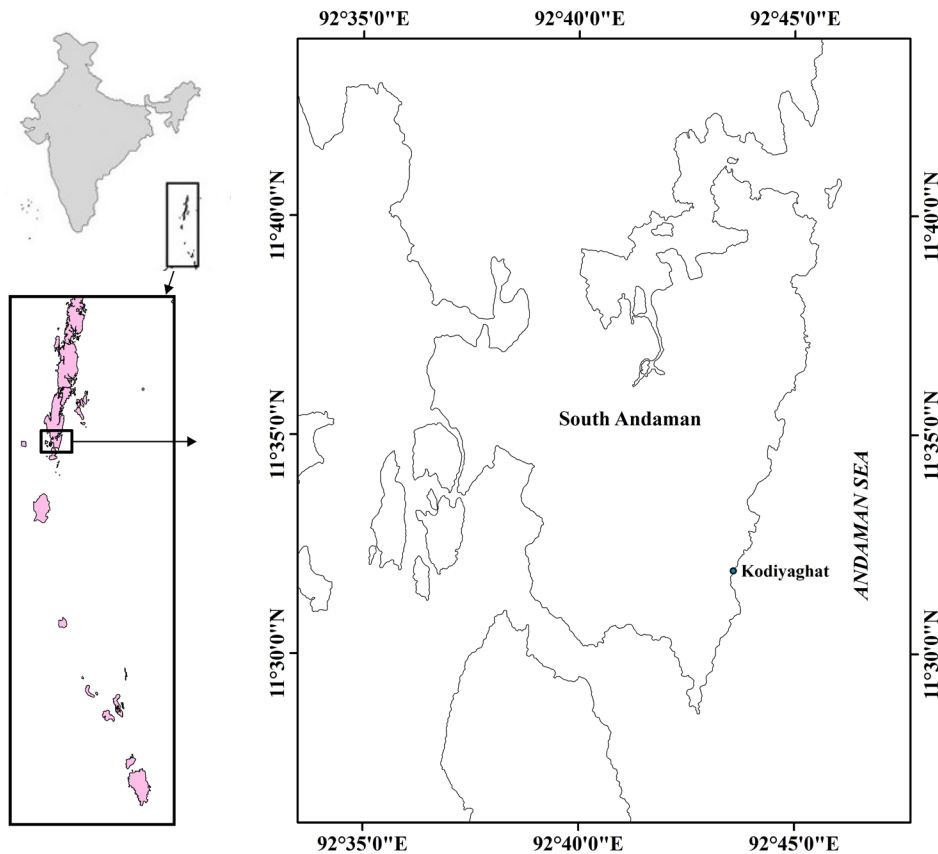


Figure 1. Reappearance site of the rare Shingle Urchin off South Andaman Island

flattened spines forming a close fringe around the edge. Each ambulacra contains 11 plates and 25 marginal flattened spines (Image 1). Flattened plates are an adaptation for surviving in the heavy wave-swept environment. On the oral side there is another ring of smaller flattened spines and a number of sucker tipped tube feet offering a great degree of adhesion in a heavy wave-swept environment. The species has a hard body and it is very firmly attached to the rocks and all individuals were found in a narrow flat crevice at the low water line where the regular influx of tidal water was noticed. The rounded shape and marginal flattened spines are adaptations for resisting the force of the incoming waves to which the streamlined body of the urchin offers little resistance. In addition, numerous sucker tipped tube feet on the oral side of the organism helps in firm attachment to the substratum and gives advantage over other sympatric species (Santos & Flammang 2008). The Shingle Urchin is herbivorous and mainly grazes on red coralline algae.

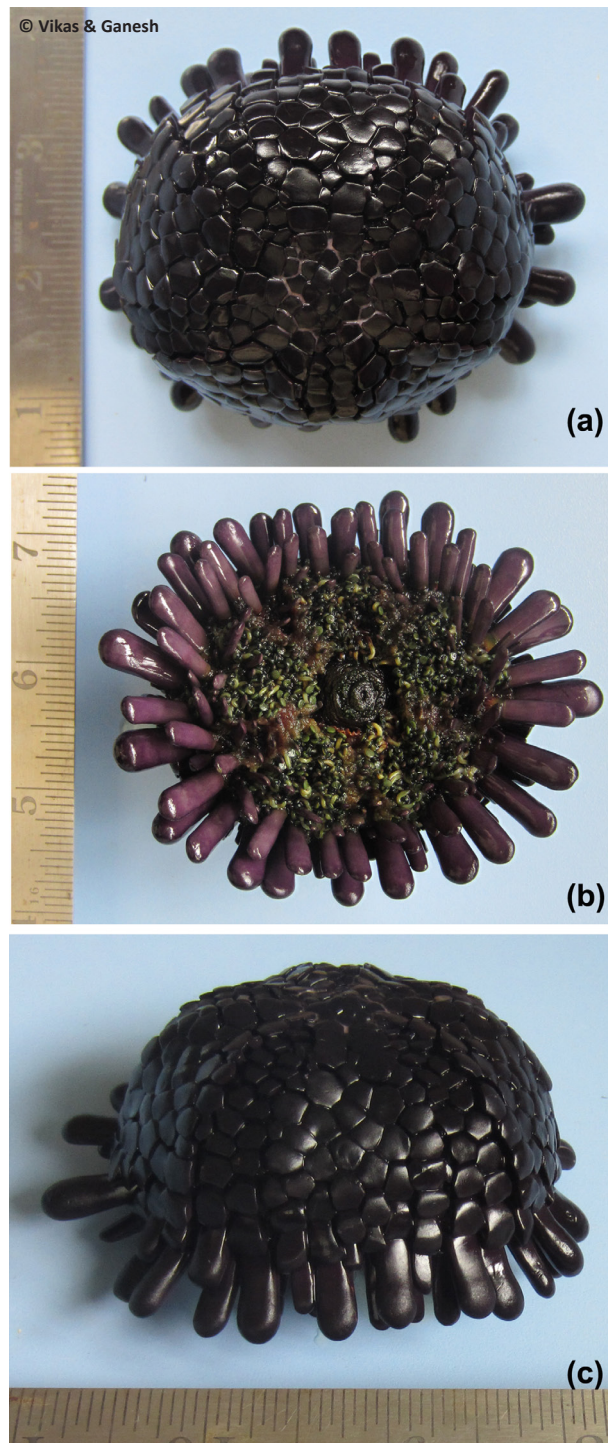
Flattened spines reduces the chances of its breakage and thereby energy expense of repair. Mortenson (1943) speculated that the reduced spine was an adaptation to withstand extreme hydrodynamic forces, which was later

confirmed by Gallien (1986), who measured the drag enacted on exposed *C. atratus* and *Echinometra mathaei* (a co-occurring echinoid) tests. The result showed that *C. atratus* was at a much reduced risk of dislodgment by wave-induced hydrodynamic forces and provide an explicit example of structural adaptation. Danny & Gaylord (1995) re-examined the conclusion and showed that the morphological changes in *C. atratus* is predominantly to make it possible for this urchin to survive in extreme surf zone. In addition, the morphology of this urchin is ideal for holding extra water, which can be indispensable to withstand high temperature and desiccation stress at low tide.

The significant re-appearance of *C. atratus* after an interval of 79 years in the south Andaman Islands, with a sparse population, and no reports of the occurrence of this species from mainland coast of India, suggests that it is a species that can be considered for long-term monitoring programme.

## References

- Barbera, C., D. Fernández-Jover, J.L. Jimenez, D.G. Silvera, H. Hinz & J. Moranta (2011). Trophic ecology of the sea urchin *Spatangus purpureus*



**Image 1.** Shingle Urchin, *Colobocentrotus (Podophora) atratus* (a) aboral view (b) oral view and (c) lateral view.

elucidated from gonad fatty acids composition analysis. *Marine Environmental Research* 71(4): 235–246; <http://dx.doi.org/10.1016/j.marenvres.2011.01.008>

**Bell, F.J. (1887).** Report on a collection of Echinodermata from Andaman Islands. *Proceedings of Zoological Society of London* 1887: 139–145; <http://dx.doi.org/10.1111/j.1096-3642.1887.tb02953.x>

**Chold, J. (1989).** Species distributions of irregular echinoids. *Biological*

*Oceanography* 6: 79–162.

**Clark, A.M. & F.W.E. Rowe (1971).** *Monograph of Shallow-water Indo-West Pacific Echinoderms*. London, Trustees of the British Museum (Natural History), i-vii, 1-238pp, pls. 1–31.

**Clark, H.L. (1925).** *A Catalogue of The Recent Sea Urchins (Echinoidea) in the Collection of The British Museum (Natural History)*. The British Museum, London, 250pp.

**Denny, M. & B. Gaylord (1996).** Why the urchin lost its spines: hydrodynamic forces and survivorship in three echinoids. *The Journal of experimental biology* 199(3): 717–729.

**English, S., C.R. Wilkinson & V.J. Baker (1997).** *Survey Manual for Tropical Marine Resources*. Australian Institute of Marine Science, Townsville, Australia.

**Gallien, W.B. (1986).** A comparison of hydrodynamic forces on two sympatric sea urchins: implications of morphology and habitat. MSc Thesis, University of Hawaii, Honolulu, HI, USA.

**Hernández, J.C., S. Clemente, C. Sangil, & A. Brito (2008).** The key role of the sea urchin *Diadema aff. antillarum* in controlling macroalgae assemblages throughout the Canary Islands (eastern subtropical Atlantic): an spatio-temporal approach. *Marine Environmental Research* 66(2): 259–270; <http://dx.doi.org/10.1016/j.marenvres.2008.03.002>

**Himmelman, J.H. & C. Dutil (1991).** Distribution, population structure and feeding of subtidal seastars in the northern Gulf of St. Lawrence. *Marine Ecology Progress Series* 76: 61–72; <http://dx.doi.org/10.3354/meps076061>

**James, D.B. (1983).** Research on Indian echinoderms—a review. *Journal of the Marine Biological Association of India* 25(1&2): 91–108.

**James, D.B. (1987).** Ecology of intertidal echinoderms of the Indian seas. *Journal of the Marine Biological Association of India* 24(1&2): 124–129.

**Julka, J.M. & S. Das (1978).** Studies on the Shallow-Water Starfishes of the Andaman and Nicobar Islands. *Mitteilungen aus dem Museum für Naturkunde in Berlin. Zoologisches Museum und Institut für Spezielle Zoologie (Berlin)* 54(2): 345–351.

**Lawrence, J.M. (2006).** *Edible Sea Urchins: Biology and Ecology. Developments in Aquaculture and Fisheries Sciences*. Elsevier, Oxford UK, 380pp.

**McCormack, G. (2007).** Cook Islands Biodiversity Database. Version 2007.2. Cook Islands Natural Heritage Trust. Rarotonga. Available from: <http://cookislands.bishopmuseum.org>. Downloaded on 26 August 2014.

**Mortensen, T. (1943).** *A Monograph of Echinoidea. Vol. III, 3. Camarodonta. II. Echinoidea, Strongylocentrotidae, Parasaleniiidae, Echinometridae*. C. A. Reitzel, Copenhagen, 446pp.

**Pearse, J.S. (2006).** Ecological role of purple sea urchins. *Science* 314(5801): 940–941; <http://dx.doi.org/10.1126/science.1131888>

**Santos, R. & P. Flammang (2008).** Estimation of the attachment strength of the shingle sea urchin *Colobocentrotus atratus*, and comparison with three sympatric echinoids. *Marine Biology* 154: 37–49; <http://dx.doi.org/10.1007/s00227-007-0895-6>

**Sastry, D.R.K. (1998).** Some Echinoderms new to Mahatma Gandhi Marine National Park with two Records from India. *Proceedings of Symposium on Island Ecosystem and Sustainable Development: Andaman Science Association, Port Blair*, 245pp.

**Sastry, D.R.K. (1999).** New records of Echinodermata from Andaman Island, Bay of Bengal. *Journal of Andaman Science Association* 15: 17–20.

**Sastry, D.R.K. (2001).** Echinodermata (other than Holothuroidea) from Ritchie's Archipelago, Andaman Islands. *Records of the Zoological Survey of India* 99: 157–170.

**Sastry, D.R.K. (2002).** Echinodermata associated with coral reefs of Andaman and Nicobar Islands. *Records of the Zoological Survey of India* 100: 21–60.

**Sastry, D.R.K. (2005).** Echinodermata of Andaman and Nicobar Islands, Bay of Bengal: An annotated list. *Records of the Zoological Survey of India* 233: 1–207.

**Sastry, D.R.K. (2007).** Echinodermata of India: An annotated list. *Records of the Zoological Survey of India* 271: 1–387.

**Zizka, M.D. (2012).** Sea Urchins on the move: distribution change of Echinometra in Mo'orea French Polynesia. *Berkeley Scientific Journal* 15(1): 1–9.





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