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SHORT COMMUNICATION

OCCURRENCE Of *Glaucus atlanticus* AND *Glaucus marginata* (Blue Ocean Slug) FROM Nagapattinam COASTAL WATERS, SOUTHEAST COAST Of INDIA

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ABSTRACT

Glaucidae is a taxonomic family of colorful sea slugs (blue ocean slugs). This is the first report presenting the occurrence of *G. atlanticus* and *G. marginata* in Nagapattinam coastal area, Bay of Bengal coastal shore (South East coast of India). All these animals float on the surface of the ocean being carried by the currents and the winds. Both species of *G. atlanticus* and *G. matginata* are closely associated with other open ocean invertebrates such as the Portuguese-man-of-war (*Physalia physalis*), the wind-sailor (*Velella velella*) and *Porpita porpita.* The nematocysts of Physalia pass unharmed through the digestive system and are used as defense system in the papillae. Male animals having its reproductive part (penis) with large looped and hook structure.

Glaucidae is a taxonomic family of colorful sea slugs (blue ocean slugs), which consists of two species viz. *Glaucus atlanticus* (Forster, 1777) and *Glaucilla marginata* (Bergh, 1868). They are spending its life in the open sea and these animals were approximately named after the greek god of the sea, Glaucus, who was forced to dwell in the sea forever (Sterrer, 1992). *G. atlanticus* was first thought to be a marine insect and finally this shell-less mollusc (slug) were classified as a marine gastropod.

Occurrence of blue ocean slug

The specimens were collected accidently from the shore of Nagapattinam coastal waters, Tamil Nadu, South east coast of India (Lat. 10^{o} 46.15, long. 79^{o} 51.69) and kept in a tank for a weak before being photographed. All these animals float on the surface of the ocean being carried by the currents and the winds. Blue ocean slugs have been found in the open ocean of temperate and tropical waters and the specimen images were reported in Sea Slug Forum, Australian Museum, Sydney. This is the first report of the occurrence of *G. atlanticus* and *G. marginata* in the Bay of Bengal coastal waters (South East coast of India).

Habitat

Both species of *G. atlanticus* and *G. marginata* are closely associated with other open ocean invertebrates such as the Portuguese-man-of-war (*Physalia physalis*), the wind-sailor (*Velella velella*) and *Porpita porpita.* They spend their life by floating upside down in the water and partially buoyed by a gas bubble in their stomachs and also able to stay afloat at the surface.

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Due to the location of the gas sac the animals actually floats upside down. The dorsal surface, actually the foot and underside, has either a blue or blue-white coloration. The true dorsal surface is completely silver-grey. This coloration is an example of counter-shading, which helps protect the *G. atlanticus* from predators.

Ecology

G. atlanticus is carnivorous and lives in the pleuston where it feeds on Velella, Porpita and Physalia. The nematocysts of Physalia pass unharmed through the digestive system and are used as defense system in the papillae; this is an example of Oplophagia (Thompson, and Bennett, 1969). *G. atlanticus* will consume the entire organism and appears to select and store the most venomous nematocysts for their own use. The venom is collected in specialized sacs (Cnidosacs), on the tip of their cerata, the thin feather-like "fingers" on its body. Because Glaucus stores the venom, it can produce a more powerful and deadly sting than the Man of War upon which it feeds.

Taxonomic Description

This is a bluish-purple nudibranch with a white underside. It resembles most nudibranchs and it is elongated, flattened body is up to 3 cm long. The papillae (up to 84 in number) are placed in four or three pairs of clusters (*Glaucus atlanticus*).

The head is small and blunt and pair of small oral tentacles near the mouth and a pair of extremely small rhinophores on the dorsal side. There are four or three pairs of clusters of papillae (cerata) placed on peduncles of the lateral side of the body. The papillae are placed in a single row (uniseriate) and an approximate of 84 in total.

The genital pore is on the ventral side at the right; the renal pore is on the right dorsal side between the first and second cluster of papillae; the anus is dorso-laterally at the right between the second and third pair of papillae. The penis is armed with a chitinous spine. The foot is flat and slender, at the ventral side; the metapodium is long.

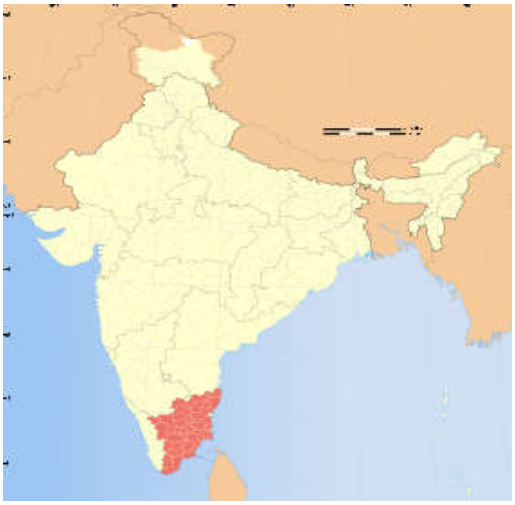

Figure 1. Recorded locations of *Glaucus atlanticus* along the Nagapattinam coast during January 2010

Figure 2. *Glaucus atlanticus*: Cerata (arrows) are arranged in a single row

Figure 3. *Glaucus marginata*: Cerata (arrows) are arranged in a multiple row

The body is deep bluish-purple ventrally (= upperside in living animals) and the dorsal side is silvery white. The radula formula is 0-1-0 (*Glaucus atlanticus* radula) and the body length up to 43 mm.

Reproduction

Glaucus is hermaphrodite, unlike most nudibranchs, which mate with their right sides facing, sea swallows mate with ventral sides facing (Debelius, 2007). After

Figure 4. *Glaucus atlanticus*: Large looped penis with hooked tips (arrow)

Figure 5. *Glaucus atlanticus*: The tip of the cerata having cnidosacs (arrows) with nematocysts toxins. Light microscope- 40X.

mating, both animals will produce egg strings. The eggs are 60-75 µm wide and 75-97 µm long. Eggs are laid in straight strings up to 17.5 mm long.

For the past several years, our research teams are monitoring the coastal ocean pollution, plankton biomass, chlorophyll distribution and total dissolved solids in the South East coast of India. For the first time, the research team have recorded blue ocean slug (*Glaucus* sp) with the Anthomedusae (*Porpita porpita)* in Nagapattinam coastal waters. Based on the cerata, two species were distinguished as single row (Fig.1. *G. atlanticus*) and multiple rows (Fig. 2. *G. marginata*). The glaucid nudibranchs, such as *Glaucus atlanticus* Forster, 1777 and *Glaucilla marginata* Bergh, 1868, are the predators of the chondrophores *Velella* and *Porpita* and the siphonophore, *Physalia* (Thompson & Bennett, 1970). As with the benthic nudibranchs they are able to utilize the prey nematocysts, particularly from *Physalia* and concentrate them in cnidosacs (Fig. 4) for defense (Thompson & Bennett, 1969; Bebbington, 1986). Moreover, *G.atlanticus* possesses its male reproductive part, the penis with large looped and small hooked organ. Probably to get around the dangerous cerata which could present difficulty in mating when animals are forced to be closewith one another (Rudman, 2002). The nudibranch *Fiona pinnata* (Eschscholtz, 1831) also feeds on *Velella* and concentrates its blue pigment (Kropp, 1931; Bayer, 1963).

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