



Guide to

OPISTHOBRANCHS

OF ANDAMAN AND NICOBAR ISLANDS

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ZOOLOGICAL SURVEY OF INDIA

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INTRODUCTION

The Andaman and Nicobar group of Islands consists of 572 islands, islets and rocky out crops and have an aggregate coastline of 1, 912 km, which is about a fourth of the coastline of India (ANDFISH, 2006). The continental shelf area is very limited with an estimated area of 16,000 km² and the sea is very deep within a few kilometers from the shore. The Exclusive Economic Zone (EEZ) around the Islands encompasses around 0.6 million km², which is again around 30% of the EEZ of India. This provides a great opportunity to explore the vast diversity of the seas around these Islands. The coral reef biodiversity data for Andaman and Nicobar Islands available at present are sporadic. Nevertheless, there are already 5, 440 marine species, 138 of which are endemic, so far reported under different groups (ZSI, 2009). The frequent large-scale climatic oscillations and local disturbances on the reefs worldwide recently add pressures on biodiversity sustenance. The concern is that we may loose many species without being aware of their existence in our coral reef area.

The faunal studies in these Islands had started centuries ago. During 1902 a reprint of the work by Dampier (1688) was published which is the earliest available report from this Archipelago. The reports during the 18th and 19th century are also provides sufficient information (Dalrymple 1784; Colebrooke 1795a, 1795b, 1799; Blyth 1846, 1863; Anon 1859; Smith 1878, 1894). The fishery research was also started during the same period (Blyth 1861; Day 1870, 1888) along with the studies on the Echinodermata (Bell 1887) during the late 19th century.

Nudibranchs are shell-less marine opisthobranch gastropod mollusks, which are noted for their often extraordinary colors and striking forms (Nudibranch means naked gills-mostly on the dorsal part of some species or along the side covered by a protective flap as these species tend to bury into sand or mud). Nudibranchia is the largest group in opisthobranchia with more than 3500 described species. The gills can be used for identification. Some species wave their gills as they move or feed. Nudibranchs live in marine environments from Antartica

to the tropics. Nudibranchs dwell at virtually all depths of sea, but reach their greatest size and variation in warm, shallow waters. Most spend their adult life on the bottom. *Glaucus marginata* and *G. altanticus* float around upside down on the ocean surface. *Glaucus* feed on *Physalia physalis* and *Velella velella*. The largest species grow to 40cm (*Hexabranchus sanguineus*), the smallest, microscopic and are easily able to move through grains of sand. Most of the opisthobranchs are smaller than 10 cm (Fig. 1).

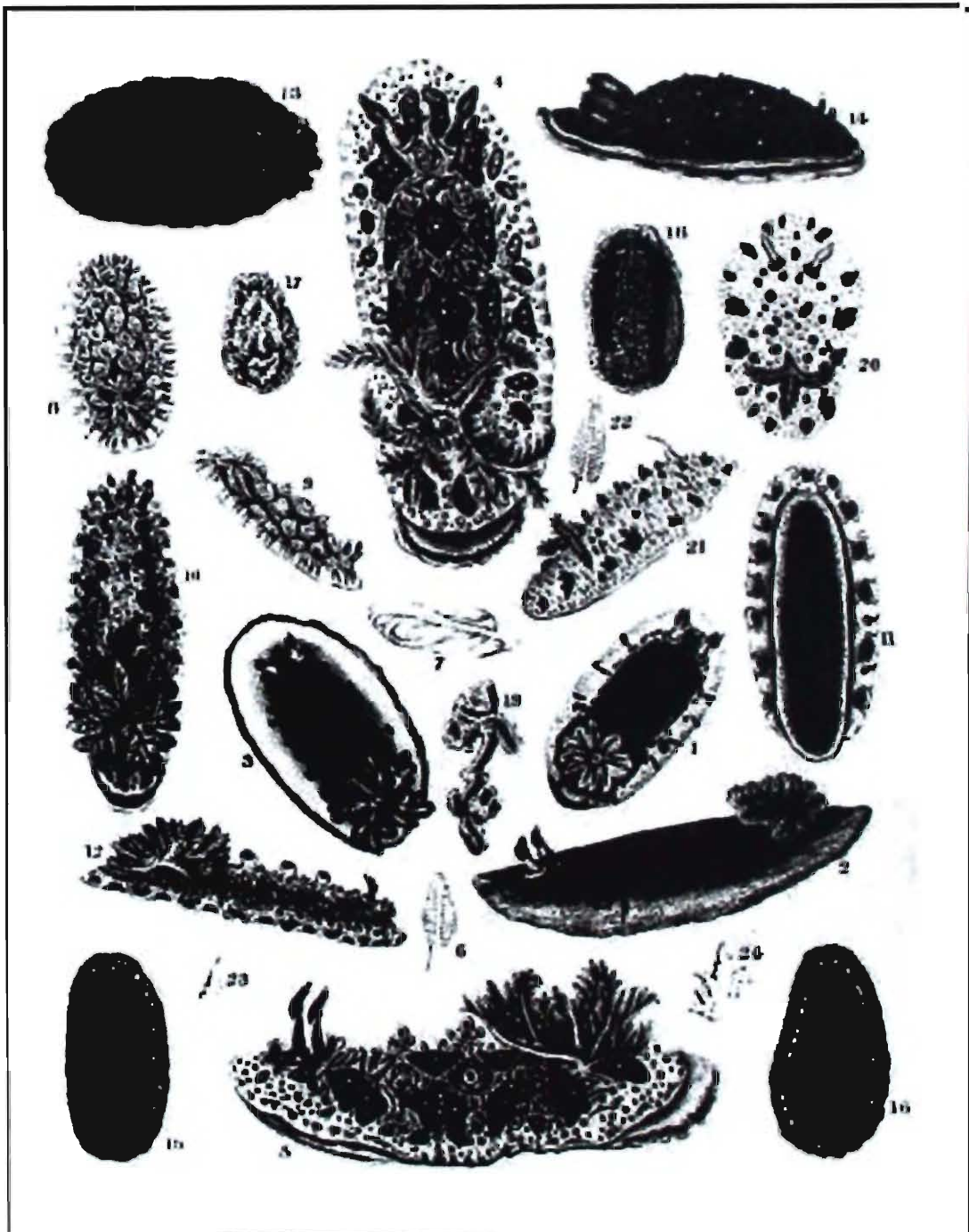


Fig. 1. Diagrammatic representation of nudibranchs (Alder and Hancock, 1864).

Nudibranchs are often casually called sea slugs. The name leads some people to assume that every sea slug must be a nudibranch. The term sea slug is also sometimes loosely applied to the only very distantly related, pelagic, caenogastropods within the superfamily Carinarioidea, and may also be casually used for the even more distantly related pulmonate sea slugs, the Onchidiidae. Nudibranchs are very numerous in terms of species, and are often very attractive and noticeable, but there are a wide variety of other kinds of sea slugs, and these belong to several taxonomic groups that are not very closely related to nudibranchs. A fair number of other sea slugs are colorful, and can be confused with nudibranchs.

The maximum lifespan of nudibranchs is of one and a half years, depending on food and suitable conditions. At times there will be population explosions and droughts. When food is plentiful the numbers increase, as the food source is consumed or decreases for natural reasons numbers decline. Water temperature and climatic conditions may also play a part in their survival chances. The life style of these organisms can be categorized as:

- * Organisms that feed upon hydroids, etc., (ephemeral prey) tend to appear several times each year
- * Those feeding upon sponges live longer, possibly beyond a year.

MORPHOLOGY

The body forms of nudibranchs vary enormously, but because they are opisthobranchs, unlike most other gastropods they are bilaterally symmetrical because they have undergone secondary detorsion. Most species have venomous appendages on their sides. These are used to deter predators. Many also have a simple gut and a mouth with a radula (Fig. 2-5).

CERATA - Finger-like processes arising in groups from the notum of aeolid and zephyrinid nudibranchs and containing

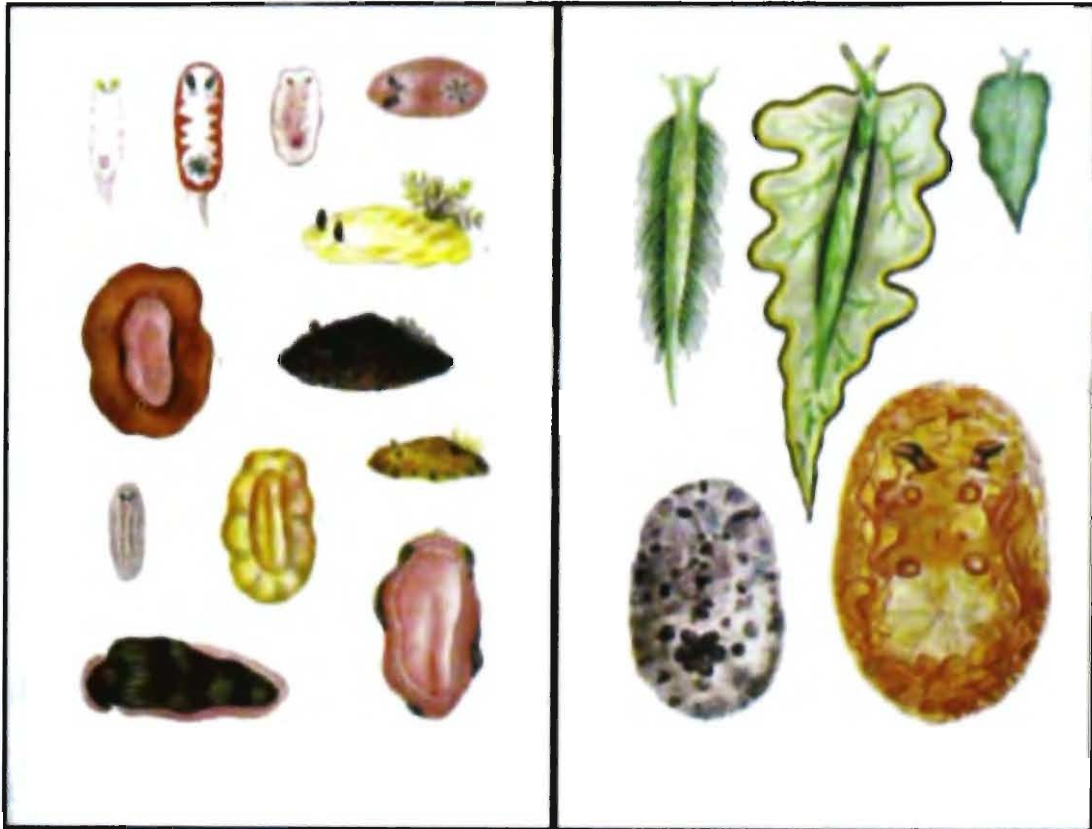


Fig. 2. Diagrammatic representation of morphology of nudibranchs (Eliot 1906a)

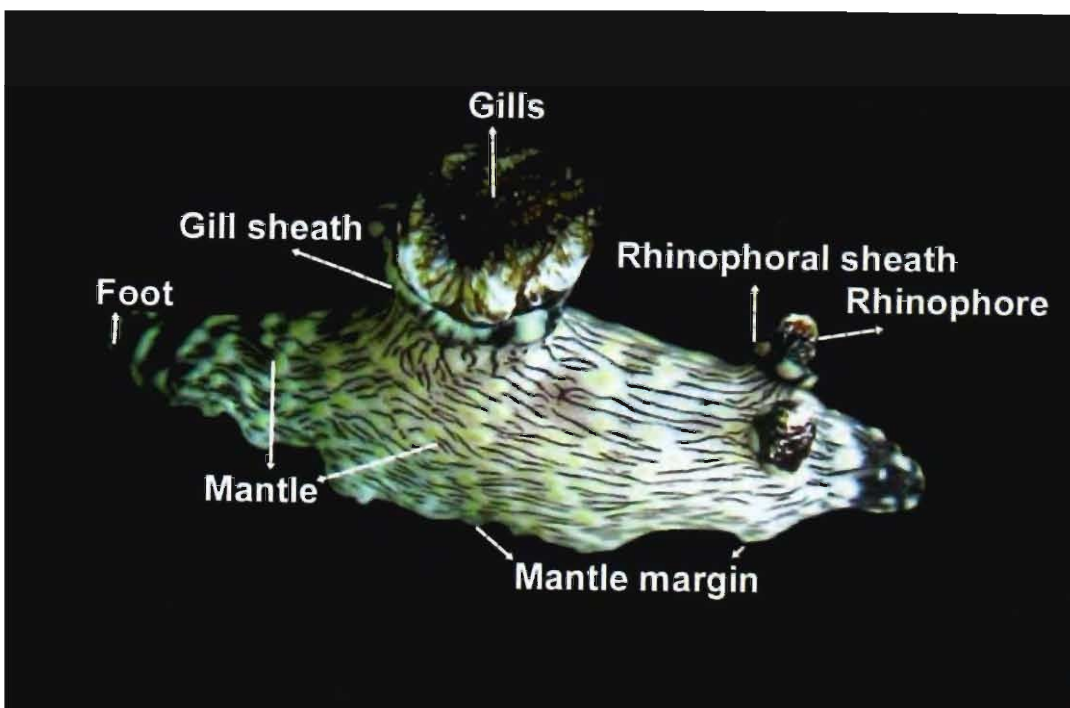


Fig. 3. A typical dorid showing the external body structure.

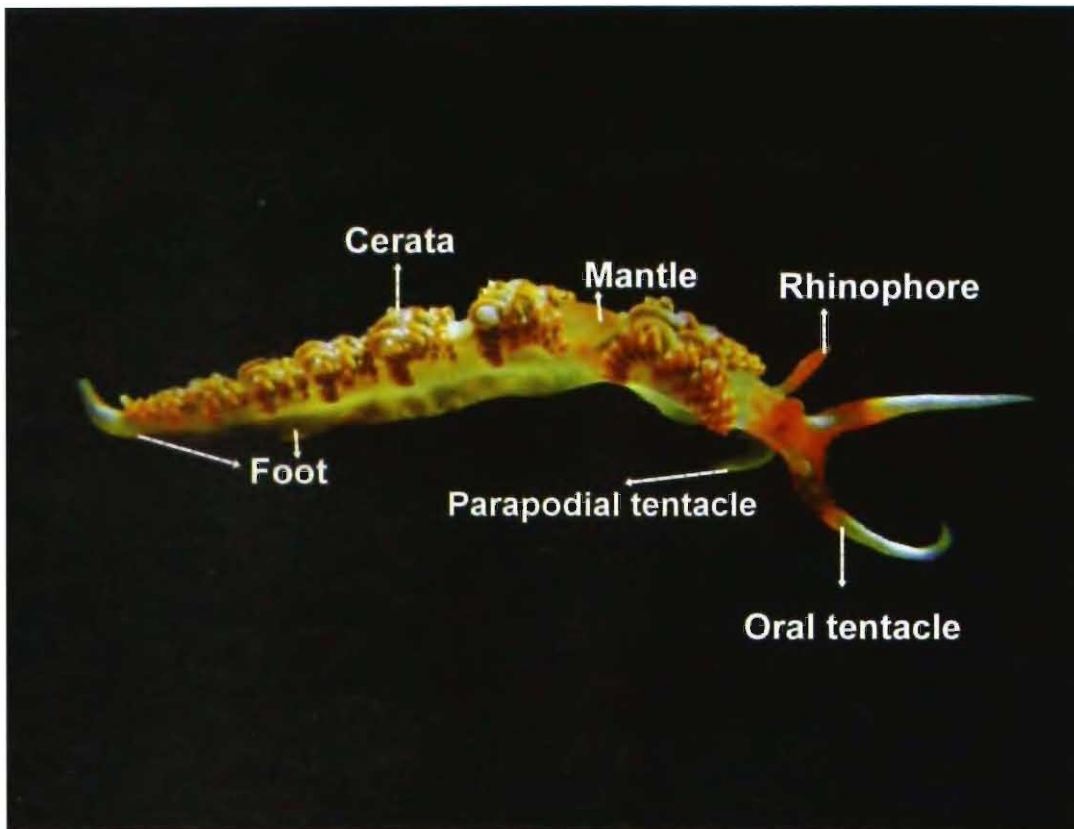


Fig. 4. A typical aeolid showing the external body structure.

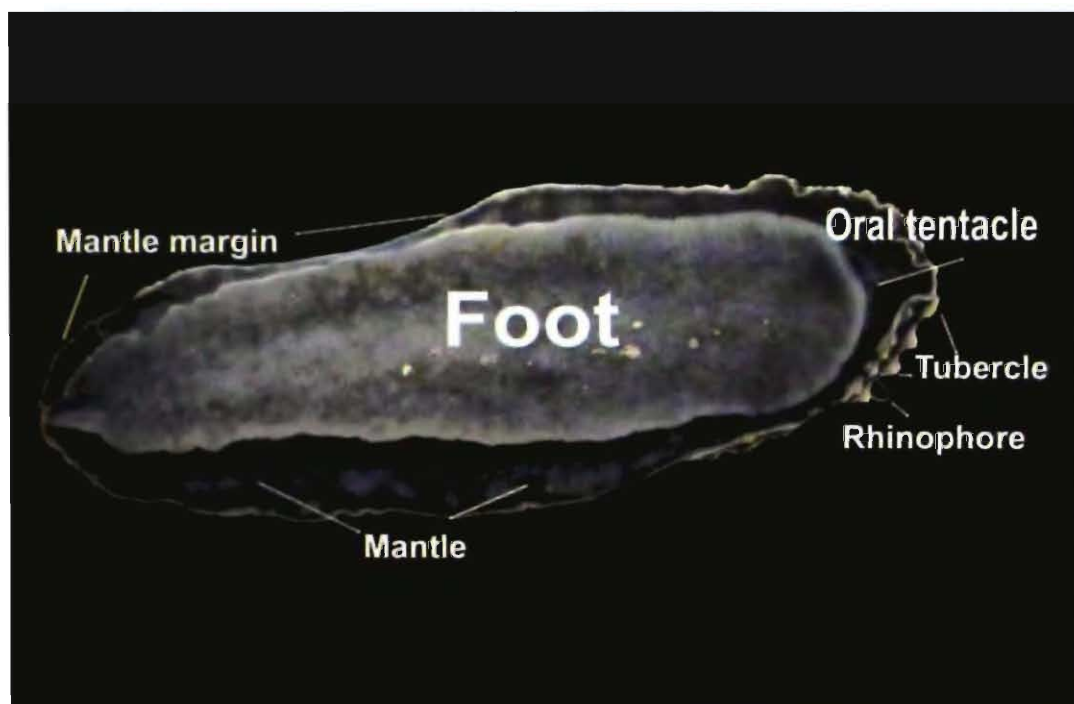


Fig. 5. The foot and ventral parts of a typical dorid.

diverticula of the digestive gland. Function in respiration, digestion and (in aeolids) in defense. They contain the extended digestive system, are used for respiration and in some species contain nematocysts, stinging cells extracted from prey and used for defence. These terms are used to describe the cerata: dumb-bell shape, bulbous, slender, tapering, finger like, petal shaped, branched, warty, club like, sail like, spindle like, coloured bands.

FOOT - The large muscle mass on which gastropods move. All species have a foot that extends the length of the body. Strong muscular action sends waves along the foot in the opposite direction to which they are travelling. The foot can be used for swimming when they need to escape or find food. Again strong muscular sideways (lateral) or up-down (dorso ventral) convulsions are employed to help the animal swim.

GILL - Nudibranchs use external gills or the cerata to breathe. The dorids have a branchial plume posteriorly on the mantle. The gills are a feathery structure surrounding the anus sometimes in the form of single leaflets (pinnate), or with smaller side branches (bipinnate or tripinnate). The structure of the gills is useful for identification. Cryptobranch dorids can retract their gills fully into a branchial pocket. Phanerobranch dorids can contract their gills but do not possess a branchial pocket. The Aeolids and the Dendronotaceans use their cerata the outer surface (ceratal epidermis) of the cerata for the exchange of gases. Depending on the species, Arminaceans use either cerata or gills (located under a ridge between the mantle and the foot).

MANTLE - In nudibranchs the shell is only present in the larval stage. As adults the mantle replaces the shell and the operculum. This is easily seen in the dorids. Their thick mantle extends over the foot and may be covered in small lumps (tubercles) varying in size, shape and number. Many nudibranchs have a colourful mantle making them easy to see, while others have cryptic mantles allowing them to blend in. Around the mantle margin are sometimes found small poison glands, used as a deterrent to inquisitive fish and other

predators. The arrangement of these glands can assist in identification. Some species have spicules in the mantle to deter would be predators. In others the mantle is reduced to a ridge down the side of the body with pallial tentacles protruding. This is the case with some of the dorids, the Goniodorids and the Polycerids. The tips contains toxins which have similar chemical compounds to those found in their bryozoans or ascidian prey. The mantle is covered in cerata, long finger like projections in the case of the aeolid, the extension of their digestive system. In aeolid nudibranchs the mantle is extended into long finger like projections called cerata (singular; ceras). The cerata contain branches of digestive gland and often this is visible through the ceratal epidermis.

ORAL TENTACLE - Tentacle (or flap) around the mouth; used for food location and recognition. A pair of sensory feelers (processes), on either side of the mouth, can be found on some species. These terms are used to describe the tentacles: smooth tapering, smooth blunt.

RHINOPHORE - Chemical sensors (Rhinophores) on their head are used to smell/taste chemicals in the water which leads them presumably to food or other members of their species. The rhinophores vary in shape. When observed closely these sensors look like antennae used to receive signals electromagnetic waves (radio and television). The dorids can retract their rhinophores into a basal sheath, possibly for protection. These terms are used to describe the rhinophores: sheathed, unsheathed, smooth tapering, smooth blunt, ribbed (lamellate), granular (Willan and Coleman 1989).

FOOD AND FEEDING

All nudibranchs are carnivores. They feed on other invertebrates; sponges, soft corals, anemones, sea pens, jelly fishes, bryozoans, ascidians and hydroids. Some are parasitic. Certain species are specific about their diet and feed only on a single or small selection of hosts, others are generalised browsers. Particular species eat the eggs of other nudibranchs.

These tend to be pale in colour so as to go unnoticed on the egg masses. One small group prey on other nudibranchs.

Some of the aeolids make use of microscopic green algae (zooanthellae) in their own bodies to supply them with food (Fig. 6), (solar powered nudibranchs), a practice used by many corals. The algae convert the sun's energy into sugar (photosynthesis) and supply the excess to the nudibranch. In return they are provided with green-house space to grow and reproduce safely (a symbiotic relationship).

DIGESTIVE SYSTEM

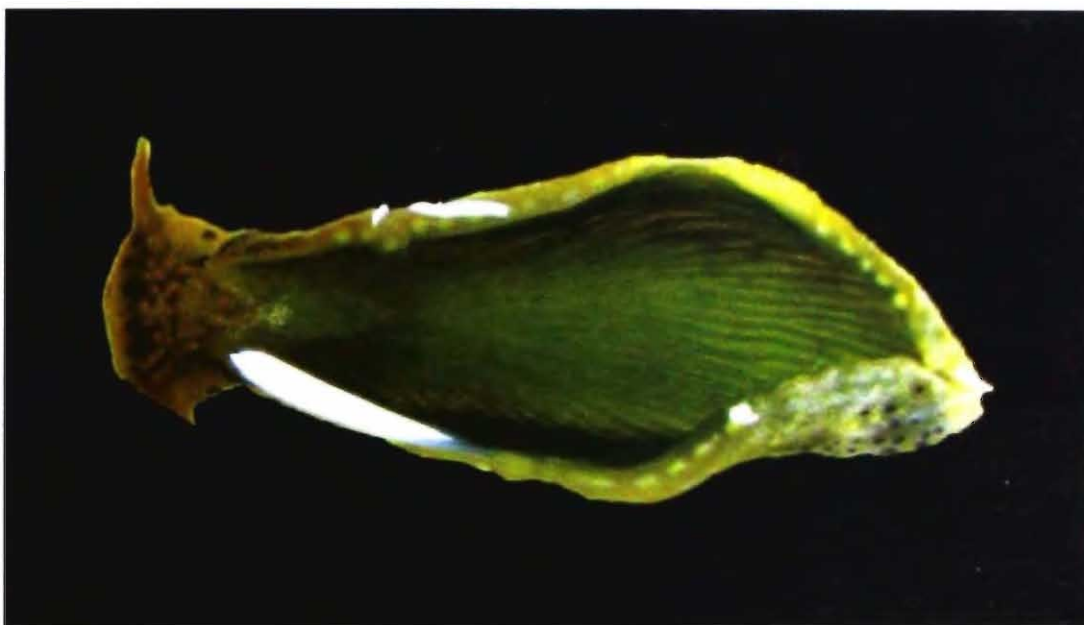


Fig. 6. *Plakobranthus ocellatus*, showing the green algae stored in their body

The digestive system of a nudibranch is divided into four functional areas. The most anterior one is formed by the mouth, buccal cavity and associated parts, and functions in reception of food. Conduction and storage take place in the next area of the digestive tract which includes the esophagus and an expanded portion, the crop. The latter is followed by the stomach, digestive gland and connecting ducts which form the area concerned with digestion and absorption. The cecum and intestine are principally concerned with formation of feces.

The mouth is anterior to the foot and is separated from it

by a transverse furrow. Surrounding the mouth are the oral tentacles. The opening of the esophagus is on the posterior dorsal surface of the buccal mass and immediately below this from the posterior ventral surface the radular sac protrudes. On either side of the esophagus and emptying into the dorsal lateral walls of the buccal mass are paired salivary glands. The opening connecting the buccal cavity with the esophagus is on

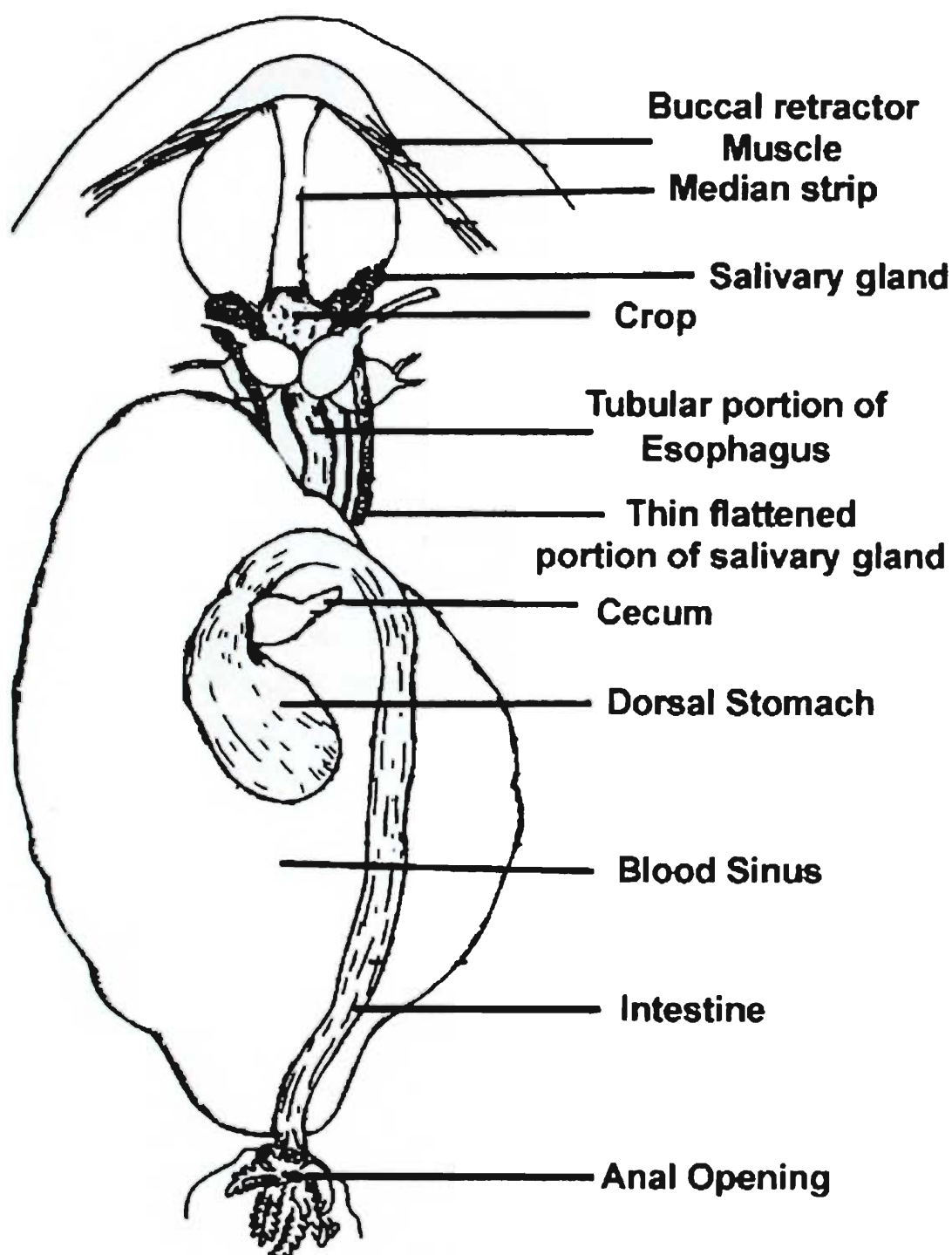


Fig. 7. The digestive system of a nudibranch (*Acanthodoris pilosa*).

the posterior dorsal surface of the buccal mass. The esophagus enlarges dorsally into a thin walled crop. The tubular esophagus enters the anterior face of the large heart shaped digestive gland and empties onto the floor of the stomach. This portion of the stomach is thin walled and receives the two major ducts from the digestive gland. An exposed muscular portion of the stomach lies in a depression on the mid-dorsal surface of the gland and has a highly folded mucosa enveloped by circular muscle. The intestine emerges from this exposed region. The region of formation of feces includes the tubular intestine and the cecum. The latter is an evagination of the dorsal stomach wall at the junction of the stomach and intestine. There is a reduced cecal evagination of the dorsal stomach which probably functions to form small fecal pellets (Patricia 1967).

REPRODUCTION

Nudibranchs are simultaneous hermaphrodites producing both sperm and eggs. To copulate two nudibranchs come together side by side and (usually both) pass sperm sacs through copulatory apparatus on the right behind the head. Copulation may take seconds or a whole day, depending on the species. Both then go their own way and lay 1-6 egg masses in an anti-clockwise spiral which may contain millions of eggs (Fig. 8-9). Hermaphroditism gives these animals a survival advantage in that mature animals can copulate and produce eggs.

Even though they are hermaphrodites, they cannot self fertilise. The reproductive system is complicated for several reasons such as to prevent self fertilization, autosperm, allosperm and ovoposition (Laying of eggs). The sperm is stored until the eggs develop, when fertilization occurs. Egg masses (spawn) can contain millions of mucus sheathed egg capsules attached to the substrate varying size, shape and colour. Chemical defence is used to protect the spawn against

predation. Nudibranchs take no part in the rearing of their young. Egg masses take three forms :

- * Ribbons attached to the substrate along one edge.
- * Cylindrical capsule filled cords, attached on one-side by a thin capsule free sheet. Some dendronotaceans produce tougher and basically similar cords.
- * Small kidney shaped jelly bags attached on one side.



Fig. 8. *Risbecia pulchella* mating (Photo: Mayabunder, North Andaman).



Fig. 9. Sea rose- Egg mass of *Hexabranhus sanguineus*. (Photo: Pongibalu, South Andaman).

Development takes place in two modes such as,

Direct Development : Eggs are laid on or near a food source and the young (*veliger*) hatch fully developed and commence feeding. The eggs are laid in a gelatinous mass, appear firm and are larger than in other types of development to provide sufficient food to nourish the embryo through to the juvenile stage.

Larval Development : Eggs are laid in a filomous mass on any suitable surface. When the young veligers hatch they are carried in the current. They eventually settle into a food source and continue developing into adults. A lot of the *veliger* doesn't make it adulthood; hence the high number of eggs lay. Two forms of larvae development occur;

1. *Planktotrophic* in which lots of small eggs are produced and the larvae veliger swim and feed on the plankton.
2. *Lecithotrophic* larvae (*veliger*) swim for a short period in the plankton and do not feed, although they may assimilate ions. Eggs need more yolk to give the larvae the energy for the brief period in plankton. Egg size is larger than that of *Planktotrophic* developers (Fig. 10-11).

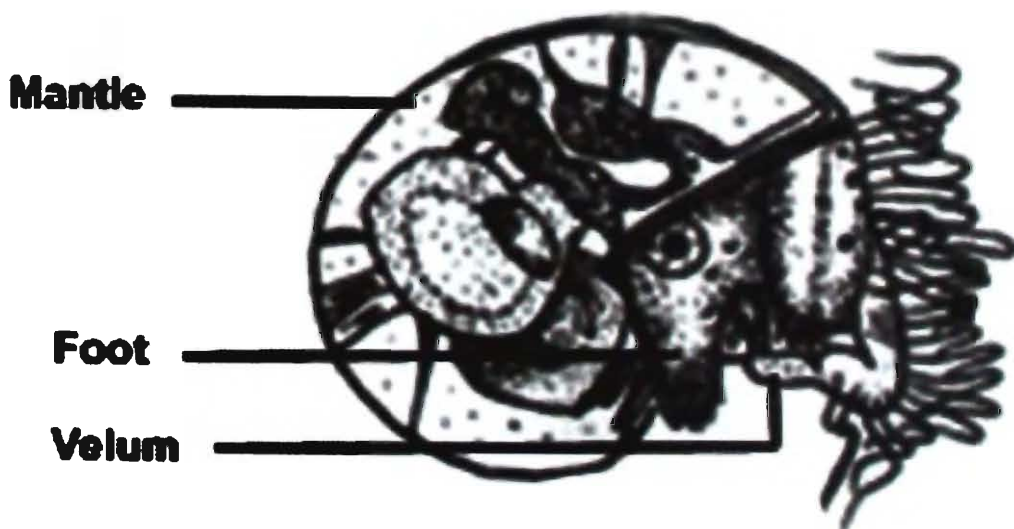


Fig. 10. Veliger larvae.

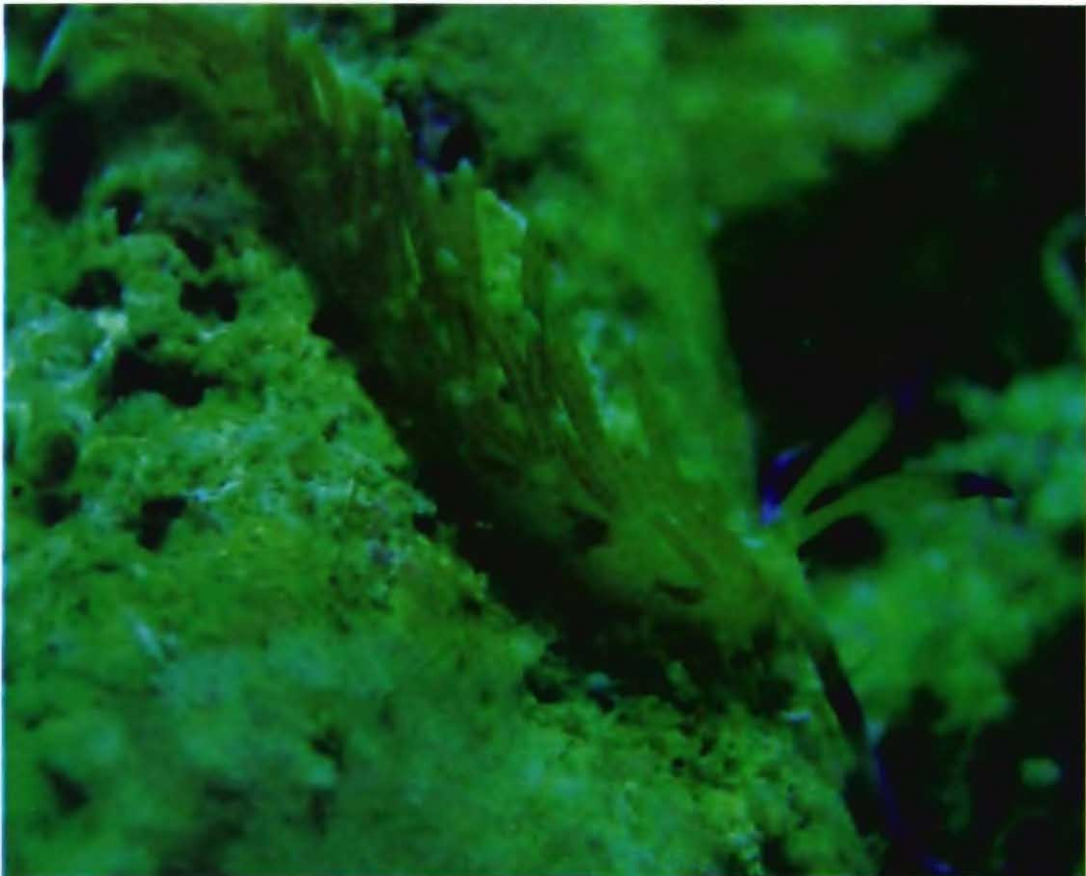


Fig. 11. Juvenile of *Pteraeolidia ianthina*. (Photo: Ritchie's Archipelago, South Andaman).

NUDIBRANCHIA V/S POLYCLADIDA

The most confused organisms underwater are the polyclads. The bright colour of them attracts the diver, and the shape also mimics the nudibranchs. They are a group of large, free-living marine flatworms which are mainly found in tropical coral reefs. Although not related to molluscs they are often mistaken for sea slugs because of their brilliant colour patterns.

Phylum PLATYHELMINTHES

Class TURBELLARIA

Order POLYCLADIDA

Separating the polyclad from opisthobranchs is much easier with a keen observation to their anterior portion. They are also having a rhinophore like projection, but on close observation we can see that the body is folded anteriorly to form a rhinophore like part (Fig. 12-13). These organisms are also commonly called to be sea slugs.

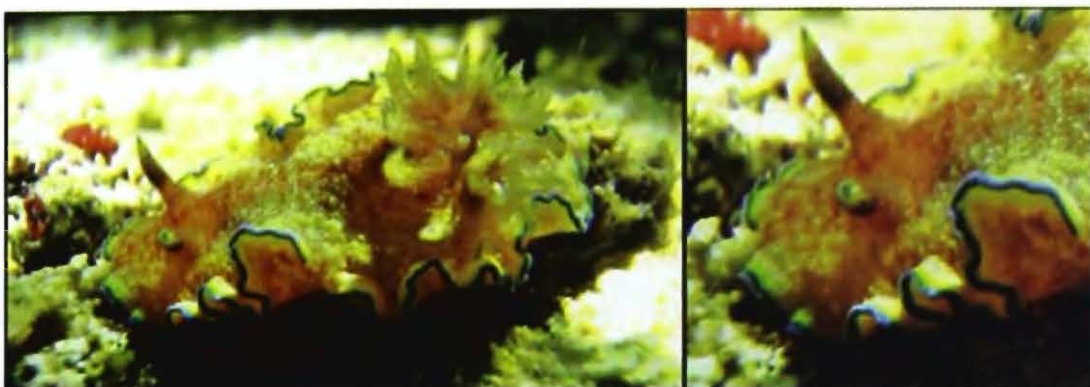
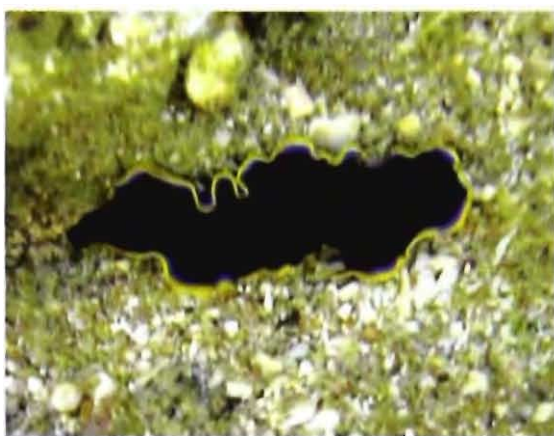


Fig. 12. A nudibranch (*Glossodoris cincta*) showing the whole body and the details of the rhinophore enlarged.



Fig. 13. A polyclad worm (*Acanthozoon sp.*) showing the whole body and the details of the "rhinophore like" part enlarged.



Pseudobiceros sp.



Pseudobiceros contrarius



Pseudobiceros hytranae



Pseudobiceros bedfordi

Fig. 14. Polyclad worms recorded from Andaman and Nicobar Islands.

SYSTEMATICS

CLASSIFICATION

Kingdom ANIMALIA

Phylum MOLLUSCA

Class GASTROPODA

Subclass OPISTHOBRANCHIA

Phylum Mollusca is divided into 6 classes such as Monoplacophora, Amphineura, Scaphopoda, Bivalvia, Cephalopoda and Gastropoda. The Class Gastropoda is again divided into three subclasses such as Prosobranchia (Marine snails with shells), Opisthobranchia (Marine slugs), and Pulmonata (Land snails and slugs).

The systematics followed in this work is based on the latest updated systematic position given by Dr Bill Rudman in the Australian Museum webpage <http://www.seaslugforum.net>. The recent changes in taxonomical positions are also dealt in this site from time to time.

The opisthobranchs differ from the more typical marine snails in exhibiting reduction, internalisation and the complete loss of the shell. Most prosobranch snails undergo torsion, where the viscera and the gill cavity rotate 180 degrees from their original position, directing the gills and the anus to the anterior of the animal. In the opisthobranchs detorsion occurs, the gills and anus are directed to the posterior or the right side. Within the Opisthobranchs there are eight orders each exhibiting a varying degree of reduction or loss of a shell. The most primitive group have well developed shells, in others a shell is present in the larval stage.

Sub Class Opisthobranchia is divided into the following eight Orders :

1. **CEPHALASPIDEA** : This is one of the largest and most primitive groups of opisthobranchs. The name is derived from the flattened head shields (cephala = head) which extends back up over the animals body. This wedge shaped head shield is a

practical adaptation for burrowing under sand. Some have shell large enough to contain the animal, while at the other end of the scale some have a small, vestigial shell.

2. **ACOCHLIDEA** : Members of this order dwell in gravel, sand and mud and little is known about their life cycles. Mostly marine and are less than 10 mm, some of the larger members (35 mm) live in freshwater

3. **SACOGLOSSA** : Members of this order have small or no shell and are small cryptic herbivores. They feed by piercing the algal wall with knife-like teeth on the radula and sucking out the contents. Some store chloroplasts in their own body providing a source of nutrients and their green colour

4. **ANASPIDEA** : These large bulky opisthobranchs, reaching 60 cm have two pairs of tentacles on their heads resemble a hare. They may weigh up to 2 kg. Some have a small internal shell; others have no shell at all. Most have a green mottled colour and can blend in well with their surroundings. Sea hares are herbivores.

5. **NOTASPIDEA** : These animals are distinguished by the elongated, plumed gill on the right side of the body. Primarily sponge feeders, they are known to also feed on hard corals or ascidians.

6. **THECOSOMATA** : This order lives a planktonic existence. The shell is small and the foot is adapted for swimming. Thecosomes are filter feeders applying mucus traps to catch their prey.

7 **GYMNOSOMATA** (Pteropods) : Another order living a planktonic life. Members of this order have no shell as adults and are specialised carnivores, preying on a single genus or species of thecosomes.

8. **NUDIBRANCHIA** : The most diverse group of opisthobranchia. Since they remain the most studied and explored group of opisthobranchia, the word nudibranch usually used for all opisthobranchs. Nudibranchia means animals with naked gills; it refers to their very identification

mark. They are marine and live in almost all depths of sea. All members of this order are carnivorous.

REVIEW OF LITERATURE

Indian subcontinent with its coastline extending over 8,000 km and subtropical climate condition has very few coral reef areas when compared to other regions of the world. In India, the reefs are distributed along the east and west coasts at restricted places. However, all the three major reef types occur in India (Venkataraman *et al.*, 2003). Within these habitats are some of the most diverse, extensive and least disturbed reefs in the Indian Ocean. To this day, many of these reefs are largely unstudied. Among the reefs of India, Andaman and Nicobar Islands have fringing reefs around many Islands, and a long Barrier reef (329 km) on the west coast. Little is known about these reefs, which may be the most diverse and pristine reefs in India. One of the most striking features of a coral reef is the immense concentration of different creatures that live on, around and within its complex three dimensional frames. Immediately noticeable are the fishes and, the corals themselves. Only on close inspection are the secret lives of tiny crabs, worms and sea slugs revealed.

The number of species of molluscs recorded from various parts of the world varies from 80,000 to 1,50,000. In India 5070 species of mollusca have been recorded from freshwater (183 species); land (1487 species) as well as from marine habitats (3370 species). Andaman and Nicobar Islands have a rich molluscan diversity, which include more than 1000 species from the marine region. Gulf of Mannar and Lakshadweep have 428 and 424 species respectively. 3,370 species of marine molluscs have been reported from India that includes those occurring in coral reef ecosystem as well as other areas (Venkataraman *et al.*, 2003). Prismatic, conspicuous invertebrates that live in coral reefs are the nudibranchs. Seemingly defenseless, these gaudy creatures are one of the excellent candidates for biomedical research. The

Opisthobranchiate fauna, even though endowed with numerous promising beneficial substances, unfortunately falls under the least studied category of mollusc in the entire Indian waters. Most of the information available on the Indian opisthobranchs is pertaining to the peninsular coast.

The first available report of opisthobranchiate fauna from India was on the collection of nudibranchiate mollusca made by Walter Elliot (Alder and Hancock, 1864). This paper deals with 42 species belonging to 10 families of which 30 species and 4 genera are newly described. The opisthobranchian research of the Indian waters can be classified into two, *viz.* Phase 1-Before 1950, and Phase 2-After 1950. The phase 1 consists of the greater part of the taxonomy and ecology of these organisms (Balfour, 1873; Eliot, 1906a, 1906b, 1909, 1910, 1916; Gravely, 1910, 1942; Sewell and Annandale, 1922; O'donoghue, 1932; Rao, 1937 and Winckworth, 1946, 1946a). During the second phase many publications were came about opisthobranchs but most of them were reports of the earlier described species from India or elsewhere (Burn, 1970; Narayanan, 1967, 1967a, 1968, 1968a, 1970, 1970a, 1971; Rao, 1962a, 1963, 1967a, 1967b; Rao and Krishnakumari, 1974; Rao and Alagarwami, 1961; Rao *et al.*, 1974 and Subba Rao and Surya Rao, 1980). Few new species were also been described during the second phase of opisthobranch research in India (Rao, 1968, 1968a, 1968b; Rao, 1952, 1962, 1967, 1968, 1970, 1973; Rao and Alagarwami, 1960; Rao and Krishnakumari, 1973; 1973a Rao and Rao, 1963; Rudman, 1980 and Valdes *et al.*, 1999). The species *Moridilla brockii* was redescribed by Rao (1965). Apart from this few diversity reports including the opisthobranchs were also published (Hornell, 1951; Satyamurti, 1952; Starmuhlner, 1968; Subba Rao and Dey 2000; Menon *et al.*, 1961; Panigrahi, 2000; Rao, 1991; Raddiah, 1970 and Russel, 1971). Chromosomal studies, bio-active component extraction, metabolites, and so on applied works were also carried out during this phase (Danialdoss, 1996; Fontana *et al.*, 2001; Gulavita *et al.*, 1991; Natarajan, 1970; Patterson, 1969; Rao *et al.*, 1993 and Salviniplawen and Rao, 1973). Recently an elysoid nudibranch, *Elysia bangtawaensis* was reported from Goa coast

of Indian Peninsula (Jagtap *et al.*, 2009).

The molluscan diversity studies of Andaman and Nicobar Islands were started in the late 19th century. The literature available shows that the earliest molluscan (Shells) study was on a collection of marine shells made by Smith in 1878. During 1879 Day published an article about the molluscan diversity of Andaman Islands. On the later part of 19th century few studies were undertaken on molluscan diversity by Sowerby, 1893 and Melvill and Skyes, 1898. The first report on nudibranch from these Islands was published by Eliot (1910), which deals with a collection of nudibranchs made by Annandale. He has described five species of nudibranchs, of which four were collected from Andamans; including a new species – *Thordisa annulata*. The other species from Andamans are *Linguella quadrilateralis* Bergh; *Doris pustulata* Abraham and *Chromodoris albo-pustulata* Pease. On turn of 21st century 29 species of opisthobranchs were reported from Andaman and Nicobar Islands belonging to 11 families and 4 orders, including the occurrence of nudibranch, *Pseudovermis solcatus* from these Islands (Subba Rao and Dey, 2000). Subba Rao (2000) reported the occurrence of eight orders and as many as fifty families consisting of about 150 species which is considerably a poor representation of the richly diversified sea slugs in India compared to 3400 species estimated to occur in the Indo-West Pacific Province.

Opisthobranchiate taxonomy and ecology in these Islands recently gained an attention after 99 years of the publication by Eliot with the report of five species of nudibranchs (Raghunathan *et al.*, 2009) and 17 new distributional records of nudibranch by Sreeraj *et al.* (2009); including new records to the Indian Subcontinent. These preliminary studies showed the abundance of these organisms in this Island groups. The present work consists of 81 species of opisthobranchs under 5 orders and as many as 21 families. All the species reported earlier from these Islands by the authors are also included.

SURVEY

A total of 15 areas are surveyed which includes 27 Islands (Fig. 15) during April to November 2009. The intertidal areas were covered by visual observation and for the sub-tidal areas up to 5 meters were surveyed by snorkeling and skin diving. The reef beyond that was surveyed using SCUBA apparatus. Up to a maximum of 28 meters were surveyed in sub-tidal areas. Maximum care was taken not to disturb the corals and other fauna.

Three species namely *Glossodoris atromarginata*, *Chromodoris rubropapulosa* and *Hypselodoris bullockii* were observed only in Nicobar group of Islands. *H. bullockii* was found to have maximum diversity in the western side of Car Nicobar Island during the month of November. The maximum population of *Plakobranthus ocellatus* was observed in Carbins cove area during the month of July. *Phyllidiella zeylanica* which was reported to be a rare nudibranch in peninsular India (Rao, 1974) is the most common species in Andaman which was recorded from almost all part of Andaman Islands.

The survey areas are given in detail below :

North Andaman

Mayabunder (Carlo Island, Avis Island, Rail Island and Sound Island) (12°53.092' N, 92°56.834' E to 12°56.860' N, 92°54.620' E)

Diglipur (Ariel Bay, Smith Island and Ross Island) (13°18'08.93"N, 93°04'39.51"E to 13°13'23.47"N, 93°03'07.32"E)

Middle Andaman

Ritchie's Archipelago (Havelock Island, Henry Lawrence Island, John Lawrence Island, Outram Island, South Button Island and Peal Island) (12°13'48.9"N, 93°05'23.4"E to 12°03.128' N, 93°00.236' E)

South Andaman

Aberdeen Bay (11°40.195' N, 92°45.008' E),

Burmanallah (11°31'32.77" N, 92°43'27.90"),

Carbins cove (11 38.468 N, 92 45.151 E),

Chidiyatappu (11°29'23.21"N, 92°42'31.84"),

Mahatma Gandhi Marine National Park, Wandoor (Grub Island, Jolly Buoy Island and Tarmugli Island)

North Bay (11 42.084 N, 92 45.102 E),

Pongibalu (11 30.958 N, 92 39.200 E),

Rutland Island (11°29.288'N, 92°40.141'E),

Little Andaman and Sister Island (10°30'14.69"N, 92°29'59.41" to 10°56'09.44N, 92°37'18.35")

Nicobar Islands

Car Nicobar Island (09°14'06.45"N, 92°48'15.78" to 09°07'08.54"N, 92°45'43.40"),

Kamorta Island (08°02.151', N, 93°33.182'E)

Katchal Island (08°13.686'N, 93°10.913'E, to 08°17.418'N, 93°10.338'E)

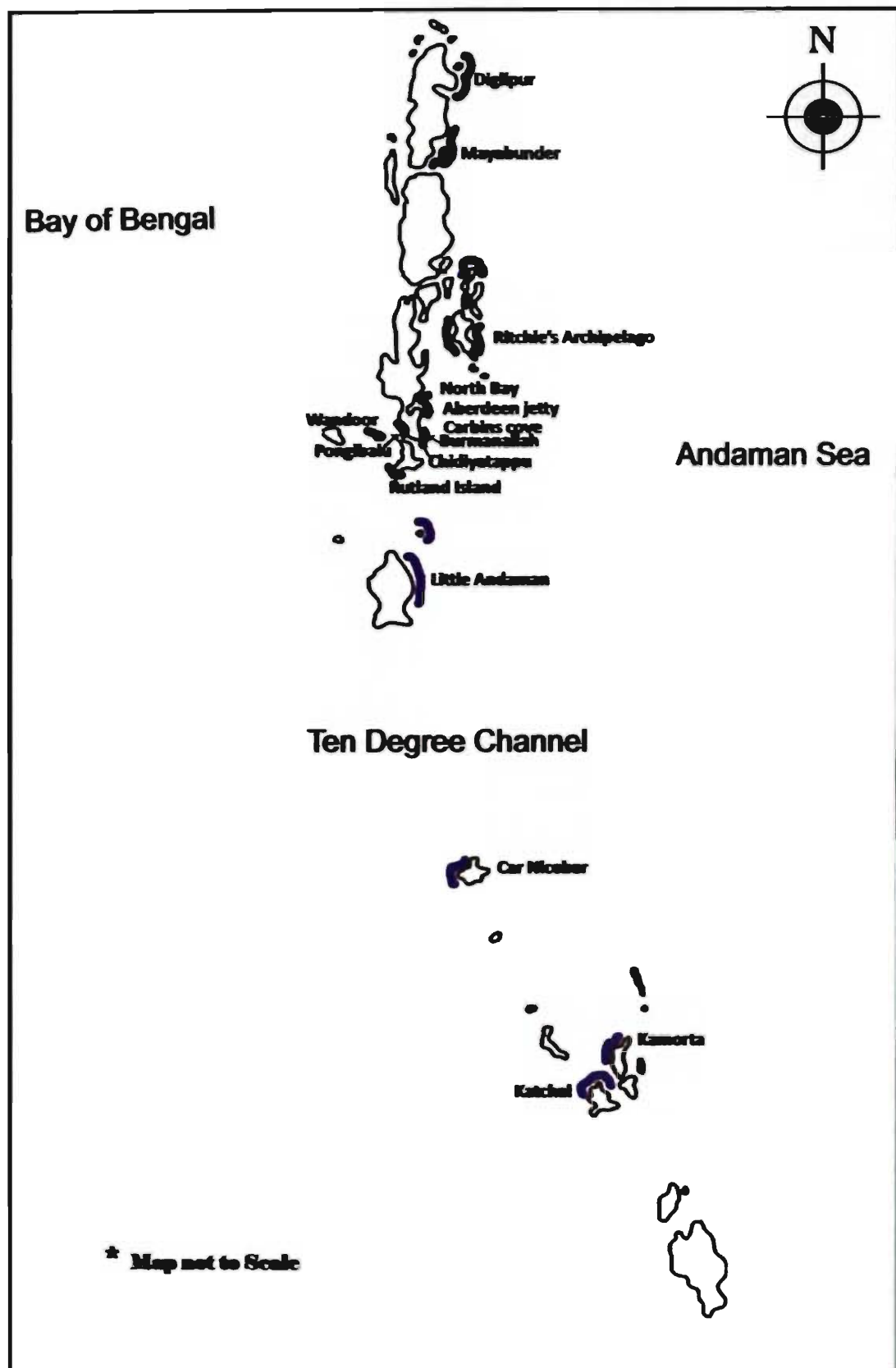


Fig. 15. Map showing the areas surveyed

DESCRIPTION OF OPISTHOBRANCHS

ORDER : NOTASPIDEA Fischer, 1883

These opisthobranchs are commonly referred to as the side-gilled slugs because the single, plume-like gill is located on the right side between the mantle and the foot. The shell is never external, and may or may not be present internally. The oral veil is trapezoidal in shape and bears rolled oral tentacles at the edges.

SUPERFAMILY : PLEUROBRANCHOIDEA Ferussac, 1822

FAMILY : PLEUROBRANCHIDAE Menke, 1828

The representatives of the family Pleurobranchidae are usually easily recognized by the plump body shape with a full and rounded dorsum. There is no external shell but an internal remnant may be present. The mantle may be smooth or evenly covered with rounded pustules. Glands in the skin secrete acidic fluid for defensive purposes. A broad oral veil lies above the mouth formed between the oral tentacles. Both the oral tentacles and rhinophores are enrolled by virtue of a longitudinal slit. Rhinophores may be carried close together on top of the head or spread to each side. The plume-like gill is located on the right side between the mantle and the foot. Locomotion is by cilia on the foot assisted by mucus from an anterior pedal groove. Their diet varies among species and ranges from sponges to corals and anemones to ascidians. They feed through a protrusible oral tube. Most often seen at night or found under rocks or coral plates during the day.

1. *Berthella martensi* (Pilsbry, 1896)

Fig. 16

TSUBOKAWA, R. and BOLLAND, R.F. (1991). *Berthella martensi* (Pilsbry, 1896), new to the Japanese Notaspidea Fauna. *Venus, Japanese Journal of Malacology*, 50(3) : 184-195.



DESCRIPTION : This species shows a wide variation in colour. The animal recorded in Andaman had yellow mantle with brown ring scattered over the mantle. This species is characterized by its ability to autotomise (break off) large sections of its mantle when disturbed. The brown ring visible in paler animals marks the breakage point when the animal breaks off its mantle skirt. Rhinophore dark brown in colour with yellow at the base. As with other species of *Berthella*, this species feeds on sponges.

DISTRIBUTION : Tropical Indo-West Pacific.
India : Ritchies Archipelago, South Andaman

REMARKS : New Record to Indian waters.

Fig. 16. *Berthella martensi* (Ritchie's Archipelago).



ORDER : ANASPIDEA Fischer, 1883

This order is dominated by the family Aplysiidae. Aplysiids are usually large, plump and have a distinct head with a pair of enrolled and erect rhinophores and large enrolled oral tentacles. If the shell is not lost it is reduced to a mostly internal plate over the gill and heart. Family Akeridae however, are considered primitive with an external shell not unlike the cephalaspideans and in fact their external appearance and lifestyle is suggestive of the "head shield slugs". The akerids possess an elongate body without rhinophores or oral tentacles and burrow through the substrate. The attributes that both of these families have in common include the possession of two glands that separately secrete a dark ink and an unpleasant smelling clear fluid for defensive purposes, and a somewhat similar digestive system anatomy. All are algae feeders.

FAMILY : APLYSIIDAE Rafinesque, 1815

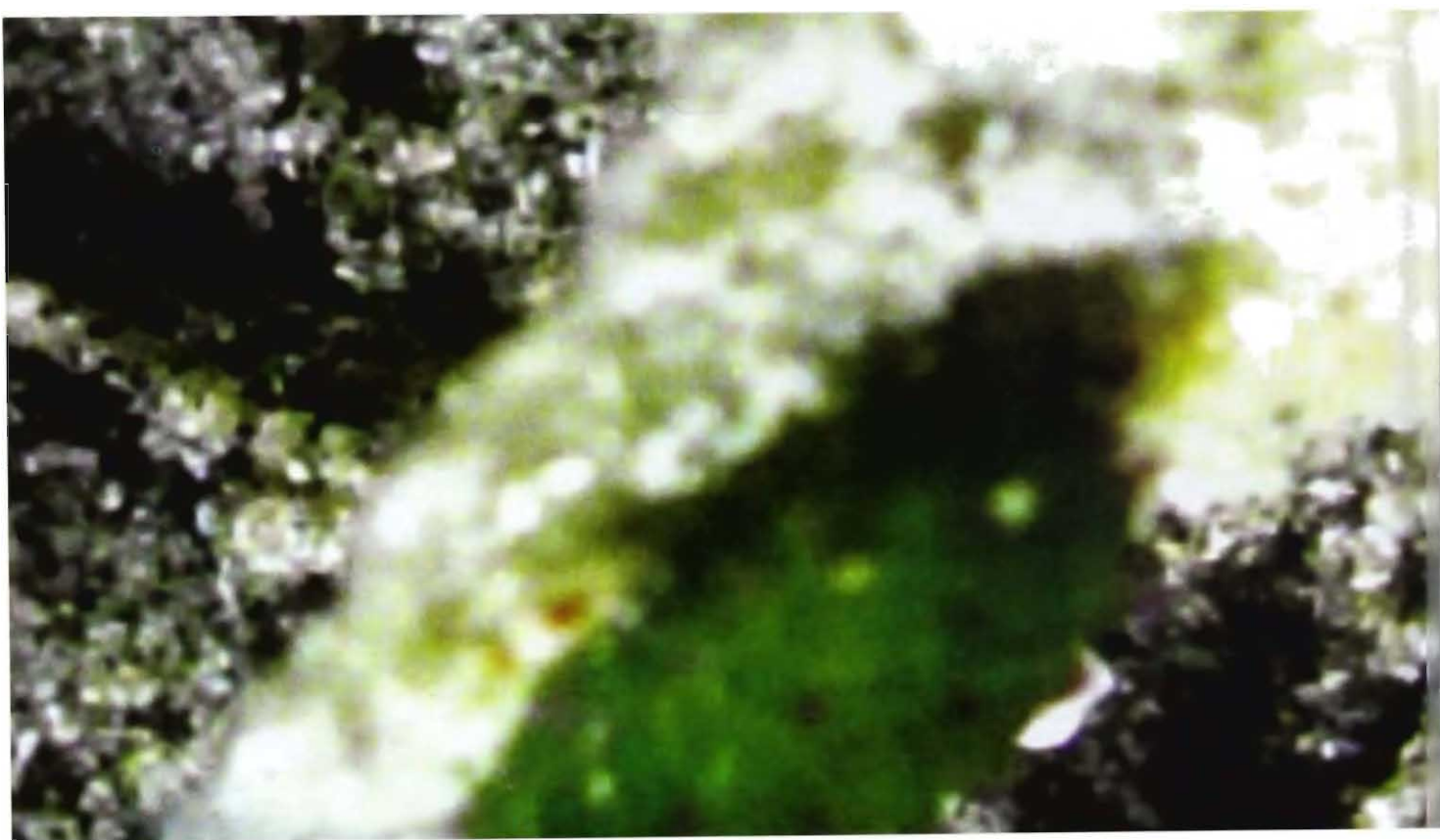
Commonly seen in the intertidal area where the growth of seaweeds is luxuriant. The aplysiids are commonly called "Sea Hares" due to their appearance. They are usually of bulky appearance with a great range in size, 10-750 mm, as adults when crawling. Their body form exhibits a distinct head with prominent oral tentacles and large, erect, grooved rhinophores. In those genera where the shell is not lost at metamorphosis its remnant is retained as a plate over the mantle cavity internally except for a couple of species of the genus *Aplysia* in which the mantle leaves part of it permanently exposed. Movement is achieved by a creeping action of the foot. Some aplysiids are able to swim by flapping their large parapodia. Most are well camouflaged among their seaweed food source upon which they are gross feeders and are often observed intertidally. When disturbed many aplysiids expel a thick cloud of ink and an unpleasant clear fluid, from separate glands, for defensive purposes.

2. *Stylocheilus longicauda* (Quoy and Gaimard, 1825), Fig. 17

QUOY, JEAN RENÉ CONSTANTIN and JOSEPH PAUL GAIMARD, 1825. In : Louis de Freycinet. Voyage autour de monde, entrepris par ordre du roy, sous le ministère et conformément aux instructions de S. Exc. M. de Vicomte du Bouchage, secrétaire d'état au département de la marine, exécuté sur les corvettes de S. M. l'Uranie et la Physicienne pendant les années 1817-1820. Paris. Zool., pt. 2, chapter 11, Description des Mollusques, pp. 410-516, pls. 66-72, 75, 87.

DESCRIPTION : The species shows a lot of colour variation. The observed was greenish in colour with blue coloured eye spots. This relatively small elongate Sea Hare usually has dark longitudinal lines and scattered eye spots, either with pink or blue centres. Although usually smaller, animals grew more than 6 cm in length. Like many Sea Hares they produce a purple ink when disturbed. Like *Bursatella leachii*, this species feeds on blue-green algae which form a mat or film over rocks or the surface of muddy shores. Found from the intertidal to about 30m, *Stylocheilus longicauda* can sometimes be found in large numbers.

Fig. 17. *Stylocheilus longicauda* (Ritchie's Archipelago).





SIMILAR SPECIES : *S. striatus*, *S. citrinus*

DISTRIBUTION : Circum-tropical (Indo-West Pacific & Atlantic). India : Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters.

ORDER : CEPHALASPIDEA Fischer, 1883

Cephalaspideans are the most primitive of opisthobranchs because of their external shell, basic gill structure, form of the radula and relatively simple reproductive system – though it is hermaphroditic like all opisthobranchs. As the name suggests, the Cephalaspidea contains the head shield slugs, descendants of the original burrowing opisthobranchs. Generally the head is shaped as a well-developed flattened shield and it is used for ploughing through the substrate. It is often wedge-shaped with posterior lobes. The foot is often enlarged laterally into flaps called parapodia. Most cephalaspideans possess a shell borne either externally or internally, but it can be reduced or lost altogether. The greater majority are carnivorous, eating foraminiferans, bristle worms or other molluscs. Many have a grinding gizzard for crushing the shells of their molluscan prey.

**Key to the families of order CEPHALASPIDEA recorded from
Andaman and Nicobar Islands**

- 1a. Shell internal and reduced AGLAJIDAE
- 1b. Shell external 2
- 2a. Shell quite small compared to the animal so it cannot completely withdraw into the shell APLUSTRIDAE
- 2b. Can withdraw into shell entirely. Foot less broader than the shell HAMINOEIDAE

SUPERFAMILY : PHILINOIDEA Gray, J.E., 1850

FAMILY : AGLAJIDAE Pilsbry, 1895 (1847)

The body is usually long and somewhat cylindrical in appearance and often strikingly coloured or marked. A large head shield most often of a triangular shape possesses sensory bristles on the broader anterior edge near the mouth with the lateral corners frequently lobed. The visceral hump extends posteriorly usually into long tapering caudal lobes often longer

one side than the other. The well developed parapodia arise from the sides of the foot to just cover the sides of the body or they may extend towards the midline and sometimes meet. The shell is reduced and internal. There are no external gills to observe.

Aglajids are all active predators on other opisthobranchs, polychaetes, nemerteans and flatworms depending on the species.

**Key to the genera of the family AGLAJIIDAE recorded from
Andaman and Nicobar Islands**

- 1a. The animal possess a tail 2
- 1b. No tail *Philinopsis*
- 2a. Tail forming chelae like structure since one of the tails is longer than the other *Chelidoneura*

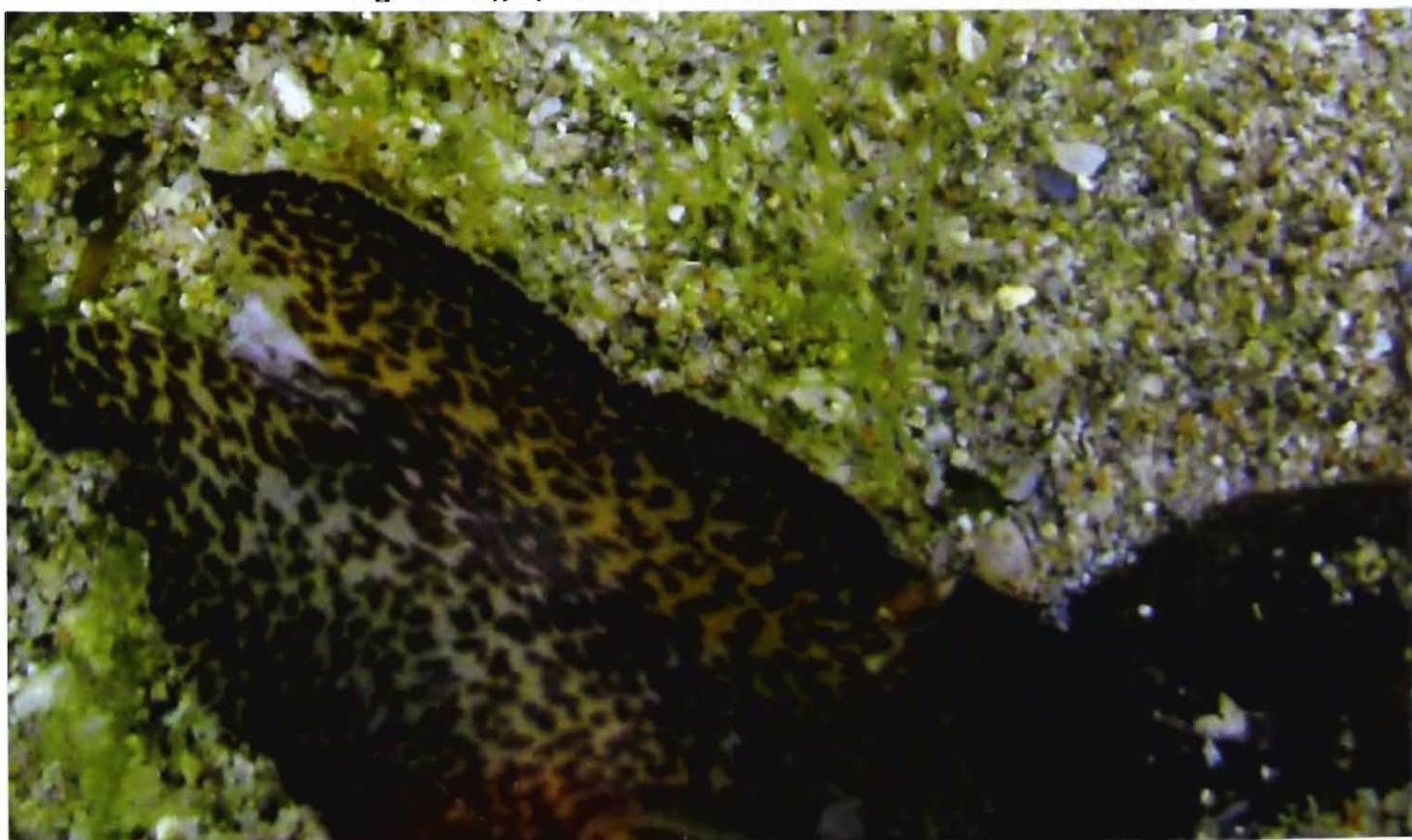
2b. Tail does not form chelae like structure *Aglaja*

3. *Aglaja tricolorata* Renier, 1807, Fig. 18

MARTINEZ, E., BALLESTEROS, M., AVILA, C., DANTART, L. and CIMINO, G.
(1993) The family Aglajidae (Opisthobranchia: Cephalaspidea) in
the Iberian Peninsula. *Iberus*, 11(1) : 15-29.

DESCRIPTION : The species observed from Burmanella had a length of 9.7 cm and width of 3.4 cm. The species has distinctive tentacular corners on the anterior parapodia and a thin posterior flagellum extending out from the ventral fold of the posterior shield. The animal is dark translucent brown with opalescent white spots scattered all over the dorsal surface and the sides. On the ventral surface the background colour is much more translucent and the white spots larger. Some reports say there are blue and orange lines along the parapodial edge. Like most other species *Aglaja tricolorata* also found associated with coral reef area of Andaman waters especially on the *Goniopora* and *Montipora* colonies.

Fig. 18 *Aglaja tricolorata* (Burmanallah. South Andaman)





SIMILAR SPECIES : *Philinopsis depicta*

DISTRIBUTION : Known from the Mediterranean and the west coast of Africa. India : Rutland Island, South Andaman

REMARKS : New Record to Indian waters

Key to the species of genus *Chelidoneura* recorded from Andaman and Nicobar Islands

- 1a. Large yellow orange spots on the mantle which is black in color *C. punctata*
- 1b. The mantle is white with yellow patches lined with black *C. sandrana*

4. *Chelidonura punctata* Eliot, 1903, Fig. 19

ELIOT, C.N.E. 1903. On some nudibranchs from east Africa and Zanzibar. Part III. Dorididae, Cryptobranchiatae, I. *Proceedings of the Zoological Society of London*, 2 : 354-385, pls. 22-24.

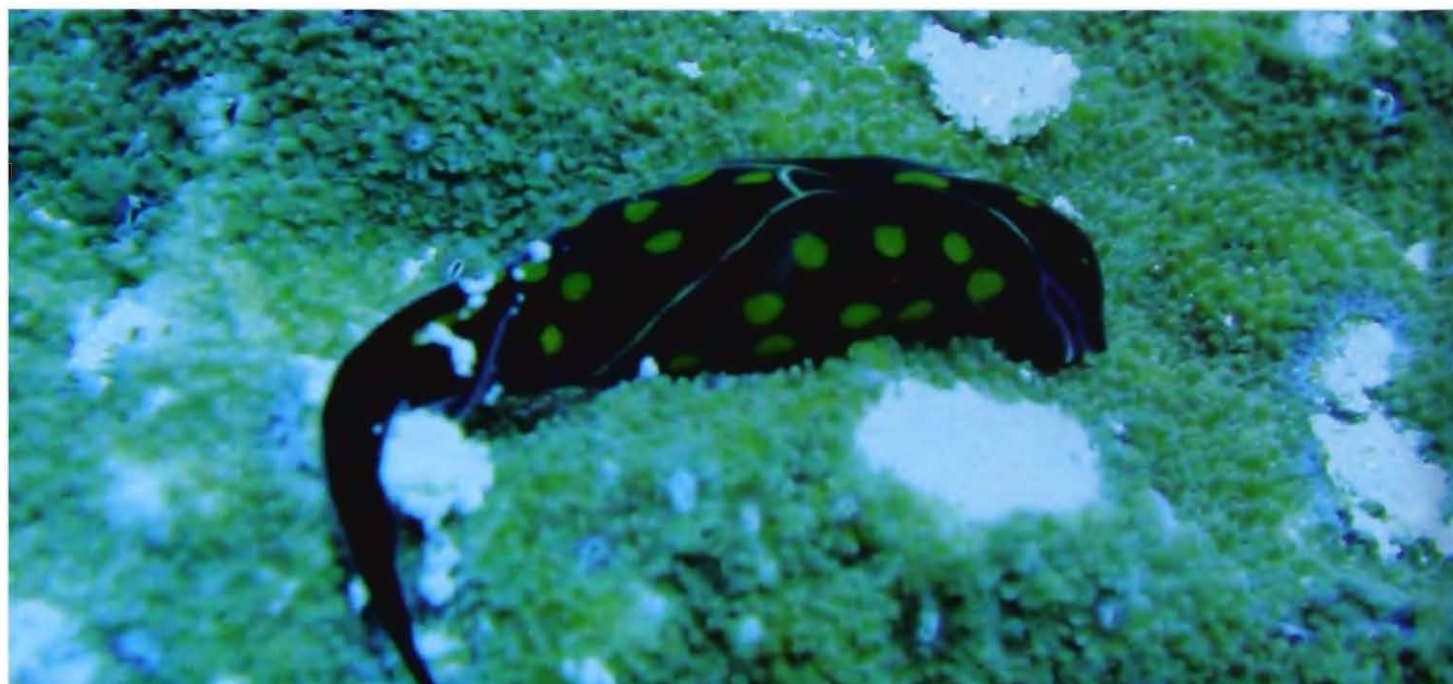
DESCRIPTION : This species is easily identified by its large yellow-orange spots. Spots are scattered in the mantle. Few near the mantle edge and few spots are on the anterior portion of the body. Mantle edge is coloured blue. The specimen in the photo was observed on top of hard coral *Montipora* sp. The specimen collected from Car Nicobar had very few but large orange spots on the mantle.

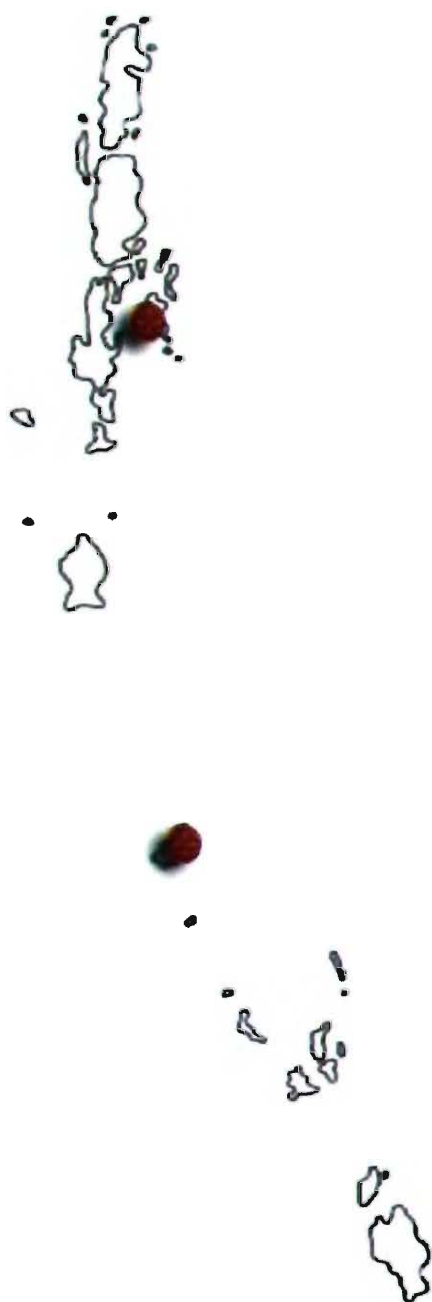
SIMILAR SPECIES : *C. tsurugensis*, *C. sandrana*

DISTRIBUTION : Tanzania, Madagascar in the western Indian Ocean, South Africa, Thailand and Burma. India : Ritchies Archipelago, South Andaman; Car Nicobar, Nicobar Islands.

REMARKS : New Record to Indian waters

Fig. 19. *Chelidonura punctata* (Ritchie's Archipelago).





5. *Chelidonura sandrana* Rudman, 1973, Fig. 20

RUDMAN, W.B. (1973) On some species of *Chelidonura* (Opisthobranchia : Aglajidae) from Zanzibar and Fiji. *Zoological Journal of the Linnean Society*, 52 : 201-215.



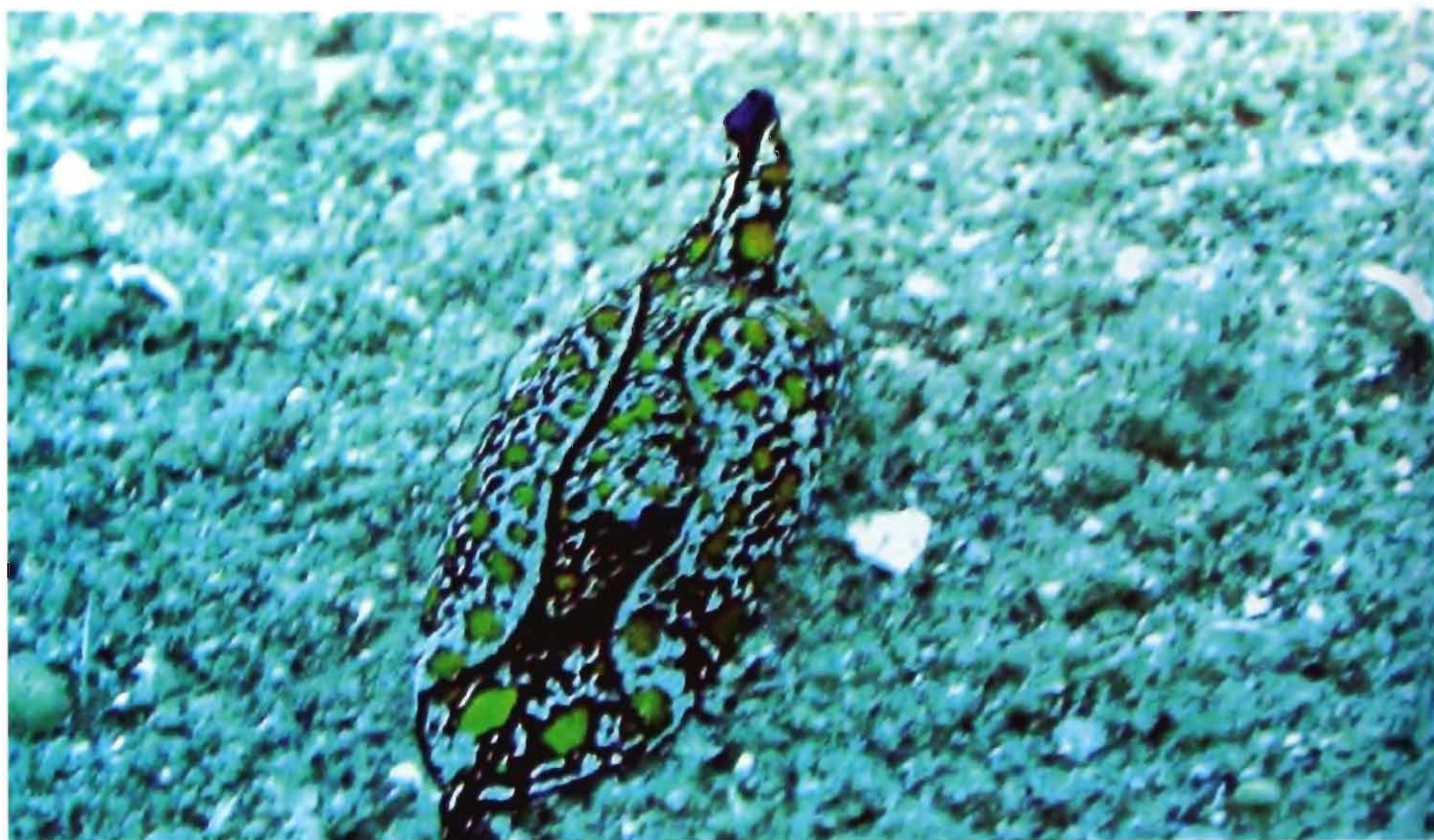
DESCRIPTION : Very similar to *C. tsurugensis*. One point of difference is that the two white patches on the front of the head in *C. tsurugensis* are absent in typical *C. sandrana*. White patches on the head are only present in specimens with only the yellow spots. This could suggest there are two species, *C. tsurugensis* with a wide distribution throughout the Indo-West Pacific, and *C. sandrana* restricted to the Indian Ocean. The mantle of the animal was white in colour with yellow patches lined with black. The mantle edge is black in colour

SIMILAR SPECIES : *C. tsurugensis*

DISTRIBUTION : Tanzania, Queensland.
India : Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters.

Fig. 20. *Chelidonura sandrana* (Ritchie's Archipelago)



Key to the species of genus *Philinopsis* recorded from
Andaman and Nicobar Islands

- 1a. Mantle edge blue in colour 2
- 1b. Mantle edge black in colour with pale yellow blotches
scattered on body *P. pilsbryi*
- 2a. Mantle edge with continuous blue stripe *P. cyanea*
- 2b. Mantle edge with blue and black alternate markings
..... *P. speciosa*

6. *Philinopsis cyanea* (Martens, 1879), Fig. 21

MARTENS, EDUARD VON, 1879. Übersicht der von ihm (W. Peters) von
1843 bis 1847 in Mossambique gesammelten Mollusca.
Monatsbericht der Konigl. Akademie der Wissenschaften zu Berlin, pp.
727-749.

DESCRIPTION : *Philinopsis cyanea*, is quite a variable species
found throughout the tropical Indo-West Pacific. It varies in
colour from plain black to black with blue, white, yellow or
brownish-yellow markings. Juvenile animals are often more
colourful than adults. The posterior edge of the headshield has
a tapering crest, which stands erect, and the body is cylindrical

Fig. 21. *Philinopsis cyanea* (Ritchie's Archipelago)





in shape. Species of *Philinopsis* are usually found burrowing through sand or mud. Two colour form observed in Andaman; brown and orange. In both the animals the mantle edge was lined with blue colour. The orange colour variant was similar colour pattern as that of *Chelidonura sandrana*.

SIMILAR SPECIES : *P. speciosa*

DISTRIBUTION : Widespread throughout the tropical Indo-West Pacific. India : Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters

Fig. 21. *Philinopsis cyanea* (Ritchie's Archipelago)



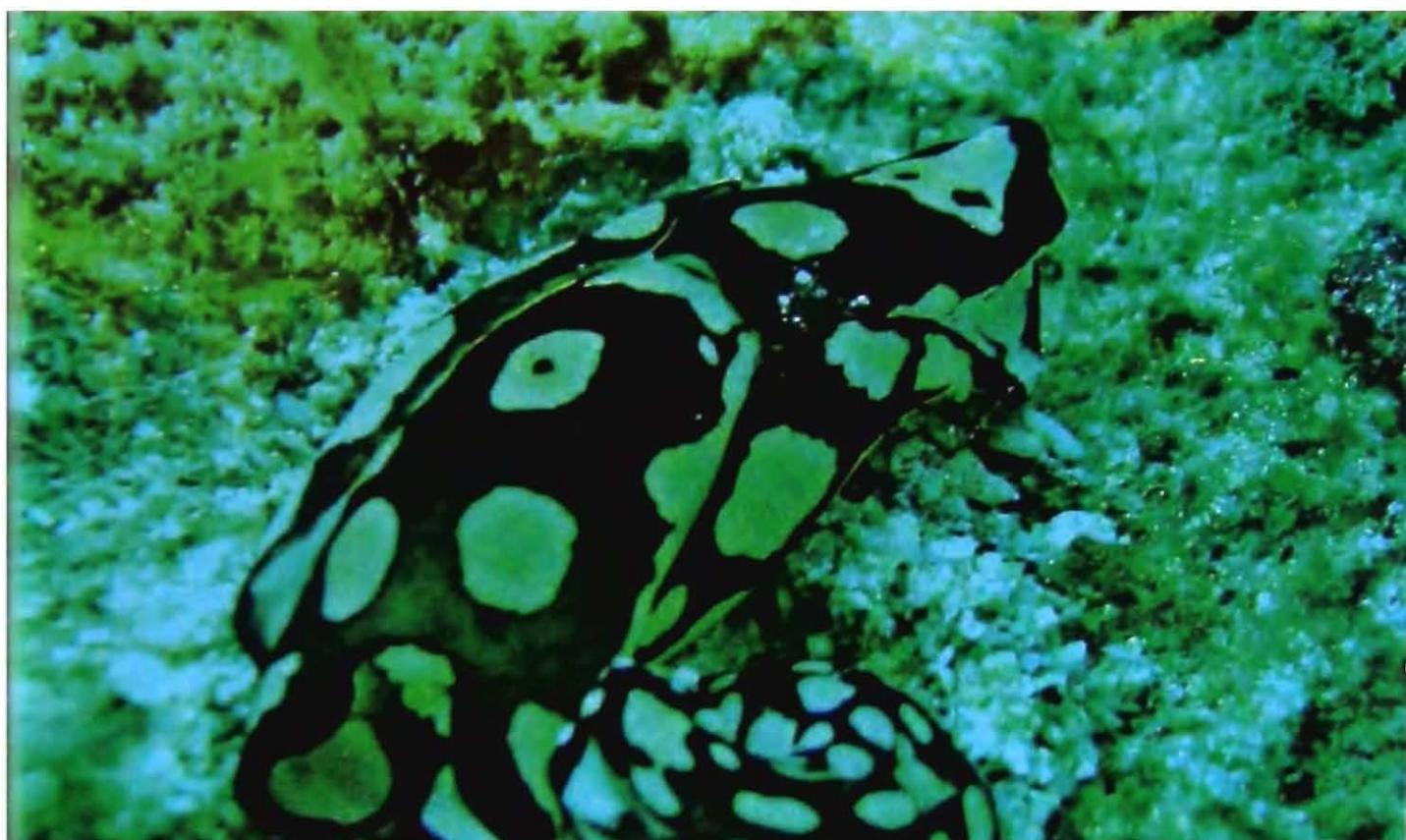
7. *Philinopsis pilsbryi* (Eliot, 1900), Fig. 22

ELIOT, CHARLES NORTON EDGEcombe, 1900. Notes on tectibranchs and naked mollusks from Samoa. *Proceedings of the Academy of Natural Science*, Philadelphia, pp. 512-523, pl. 19.

DESCRIPTION : The animal is translucent white with a pattern of black reticulate lines. In some specimens the lines are relatively thin and the head shield pattern is essentially a black figure of eight with some smaller rings and reticulations anteriorly, and similar figure of eight, often broken, is found on the posterior shield. The upper, outer edge of the parapodia has a black reticulation and the ventral part of the parapodia and the foot is colourless. The colour pattern though is very variable and turns through to animals which could best be described as being black dorsally with white spots. In these black variations there are usually two large white spots on the headshield and the posterior shield.

SIMILAR SPECIES : *P. reticulata*

Fig. 22. *Philinopsis pilsbryi* (Ritchie's Archipelago)





DISTRIBUTION : Tropical Indo-West Pacific (Solomon Islands, Vanautu, Queensland, Papua New Guinea, Indonesia, Malasia, Philippines, Hawaii, Marshal Islands). India : Ritchies Archipelago, South Andaman.

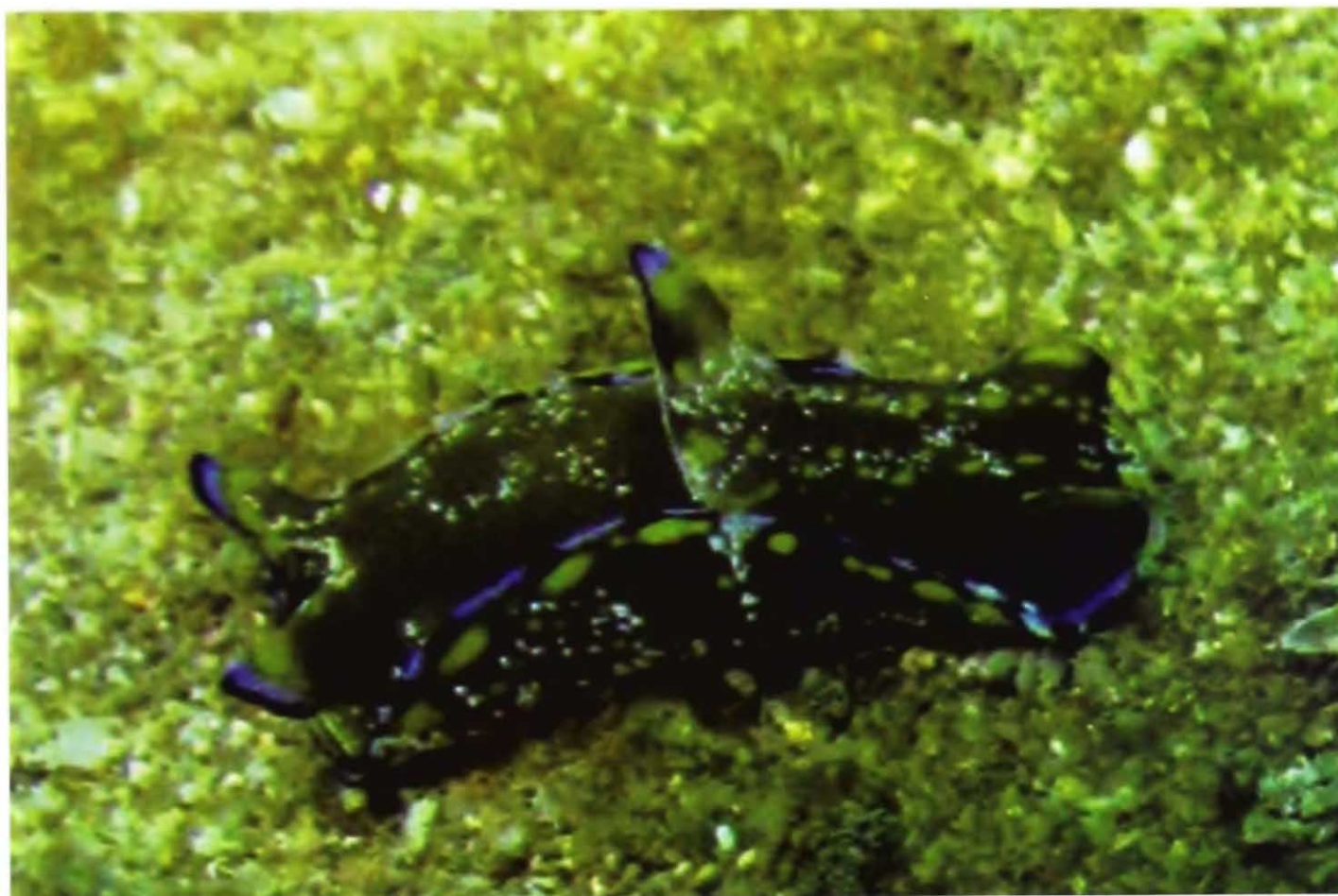
REMARKS : New Record to Indian waters.

8. *Philinopsis speciosa* Pease, 1860, Fig. 23

PEASE, W.H. (1860) Descriptions of new species of Mollusca from the Sandwich Islands. *Proceedings of the Zoological Society of London* 28, 18-36.

DESCRIPTION : The ground colour of the animal ranges from light translucent brown to an opaque dark brown or even black. There are a pair of yellow to orange-brown parallel lines on the head shield on either side of the midline, and sometimes traces of a second line on each side, further out, similar to those sometimes present in *P. cyanea*. The white spots range from quite small to very large, the large white markings being somewhat broken by brown speckling. The margin of the parapodia is colored with black, blue and orange-yellow markings, which can sometimes form lines. The foot appears to be of similar colour to the dorsal surface. The colour is extremely variable, and parts of the pattern can be absent in any specimen. Two colour forms of this species recorded from Andamans. Animal with brown mantle and

Fig. 23. *Philinopsis speciosa* (Ritchie's Archipelago).





animal with bright yellow mantle. Both have discontinuous blue colour on the mantle edge.

SIMILAR SPECIES : *P. cyanea*

DISTRIBUTION : Hawaii, Indonesia. India : Mayabunder, Ritchies Archipelago, Andaman Islands.

REMARKS : New Record to Indian waters.

Fig. 23. *Philinopsis speciosa* (Ritchie's Archipelago).



SUPERFAMILY : ACTEONOIDEA Orbigny, 1835

FAMILY : APLUSTRIDAE (Pilsbry, 1893)

The Aplustridae, popularly called Rose-petal Bubble Snails, was known by the name of Hydatinidae until recently. They are large and very conspicuous cephalaspideans due to their bright colours, flamboyant and enlarged foot and spirally banded shells. The thin, external shell is ovoid or globose with a large aperture but even so the animal cannot withdraw completely inside its shell. It has a large head shield producing a pair of broad and long posterior lobes framing the close set eyes anteriorly. With anterior lobes folded laterally the whole effect of the head is like that of a mask. The posterior end of the mantle produces a large infrapallial lobe folding up and over the apex of the shell. The foot is broad and delicate, and the sides are enlarged into what could be described as unfurled parapodia.

At times the large pliate gill may be visible protruding from the mantle cavity on the right side. All aplustrids feed on polychaete worms belonging to the family Amphinomidae-fire worms.

9. *Micromelo guamensis* (Quoy and Gaimard, 1825), Fig. 24

QUOY, JEAN RENÉ CONSTANTIN and JOSEPH PAUL GAIMARD, 1825. In: Louis de Freycinet. Voyage autour de monde, entrepris par ordre du roy, sous le ministère et conformément aux instructions de S. Exc. M. de Vicomte du Bouchage, secrétaire d'état au département de la marine, exécuté sur les corvettes de S. M. l'Uranie et la Physicienne pendant les années 1817-1820. Paris. Zool., pt. 2, chapter 11, Description des Mollusques, pp. 410-516, pls. 66-72, 75, 87.



DESCRIPTION : The only species recorded during this study which has a shell on its back. This organism retains its shell. Animal translucent white in colour with white patches on the mantle. Bright white lining borders the mantle. The second lining is thicker and is of bright blue in colour. The shell opaque with black lining.

SIMILAR SPECIES : *M. undata*

DISTRIBUTION : Indo-West Pacific (South wales). India : Ritchies Archipelago, South Andaman

REMARKS : New Record to Indian waters

Fig. 24. *Micromelo guamensis* (Ritchie's Archipelago)



SUPERFAMILY : HAMINOEOIDEA (Pilsbry, 1895)

FAMILY : HAMINOEIDAE Pilsbry, 1895

Typically the animal is small. Haminoeids usually possesses a thin, fragile, smooth and translucent shell occasionally with darker bands. The shell shape is broadly ovate to cylindrical, and always widest at the midpoint and with a sunken spire. The body can generally withdraw completely into the shell. The head shield is broad with the posterior edge usually developed into a pair of lobes and with discernable eyes located dorsally close to the surface. There is a broad foot, though it is shorter than the shell, whose sides are developed into parapodia that fold up to cover the neck and shell aperture often meeting or overlapping mid-dorsum. They may cup the shell to a varying degree. A tail is often visible behind the shell formed by a posterior extension of the mantle (a metapodium). There are no external gills to observe. They graze upon green algae turf.

10. *Haminoea ovalis* Pease, 1868, Fig. 25

PEASE, W. H., 1868. Descriptions of marine Gasteropoda, inhabiting Polynesia. *American Journal of Conchology*, 4(2):71-80, pls. 7-10.



DESCRIPTION : Note from Clay Carlson & Patty Jo Hoff - "*H. ovalis* is the only *Haminoea* proper that we are aware of that has all lateral teeth denticulate. Host is the blue-green algae, *Lyngbya majuscula*"

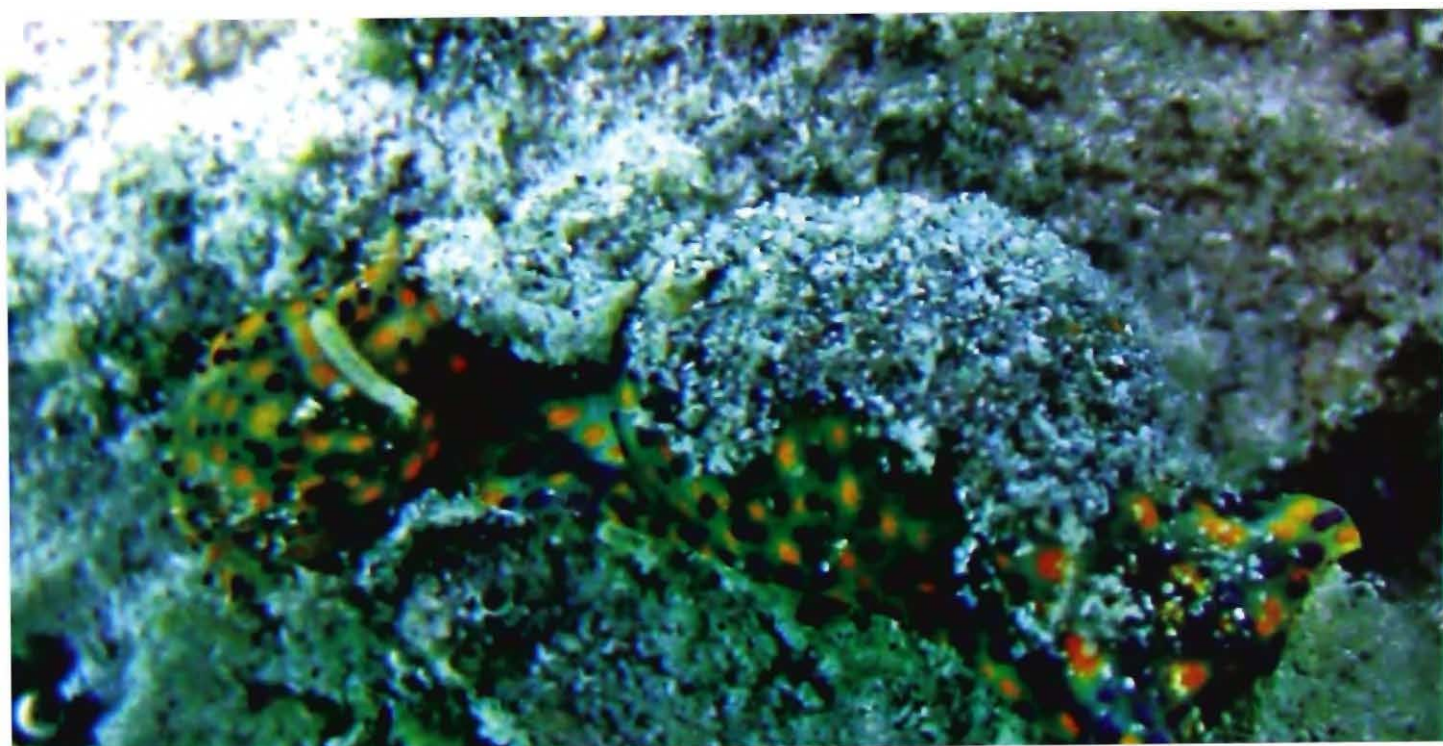
Seen half buried in the sand. The bright coloured spots on the body in noticeable. Body light green in colour with bright orange and blue spots scattered through out. The broad foot is developed into parapodium which is folded over to cover the shell.

SIMILAR SPECIES : *H. cymbalum*

DISTRIBUTION : Tropical western Pacific (Heron Island, Samoa). India : Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters

Fig. 25. *Haminoea ovalis* (Ritchie's Archipelago).



ORDER : SACOGLOSSA (von Ihering, 1876)

Sacoglossans are almost all herbivores that live in association with green algae of the order Siphonales, particularly those of the genus *Caulerpa*. All sacoglossans have radula teeth that are dagger-like and which are used to pierce the plant cells so that the cell fluid can be sucked out and swallowed. The chloroplasts from the algae may be sequestered and farmed within the cells of the sacoglossans digestive gland. This ability has caused them to also be termed solar powered slugs. A small number of sacoglossan species which lack a functional radula feed upon the spawn of other opisthobranchs. The name of the order, Sacoglossa, is derived from another common feature that sacoglossans possess, a uniseriate radula, from which the older, worn and discarded teeth are stored in a special sac. The more primitive members have an external shell into which the animal can completely withdraw. In the order Sacoglossa, the shell is never wholly internalised but as the shell becomes progressively reduced the body form becomes more elaborate. A variety of body forms are represented across the order - from limaciform, to aeolidiform, or even leaf-like.

SUPER-FAMILY : ELYSIOIDEA Forbes and Hanley, 1851

FAMILY : ELYSIIDAE Forbes and Hanley, 1851

Generally the body shape is long and narrow especially when crawling, and is high in profile in relation to its width. The sole of the foot is divided transversely into a short anterior section and a longer visceral section. They have large, flap-like parapodia along each side of the body that extend from behind the head along most of the body length. These are folded over the dorsum often meeting in the dorsal midline but sometimes there are gaps where the margins are kept slightly apart. The parapodia are not used for swimming but can contain branches of the digestive system and function in respiration. These parapodia are sometimes enlarged by additional folding of the margins, or by possession of lobes or papillae along the margins.

Tentacles are quite small or absent. The rhinophores are usually prominent and auriculate.

There are no external gills to observe. They feed primarily upon green algae.

**Key to the genera of family ELYSIIDAE recorded from
Andaman and Nicobar Islands**

- 1a. The rhinophores are set quite far apart or the sides of the head 2
- 1b. The rhinophores are set very close to each other *Thuridilla*
- 2a. Parapodial flaps folded on the mantle and flat on the body *Syphonota*
- 2b. Parapodial flaps lying perpendicular to the body, even in cases where they are folded totally they meet and point upwards *Elysia*

**Key to the species of genus *Elysia* recorded from
Andaman and Nicobar Islands**

- 1a. Rhinophore blue *E. abei*
- 1b. Rhinophore green *E. ornata*

11. *Elysia abei* Baba, 1955, Fig. 26

BABA, K. (1955). *Opisthobranchia of Sagami Bay, Supplement*. Tokyo: Iwanami Shoten.



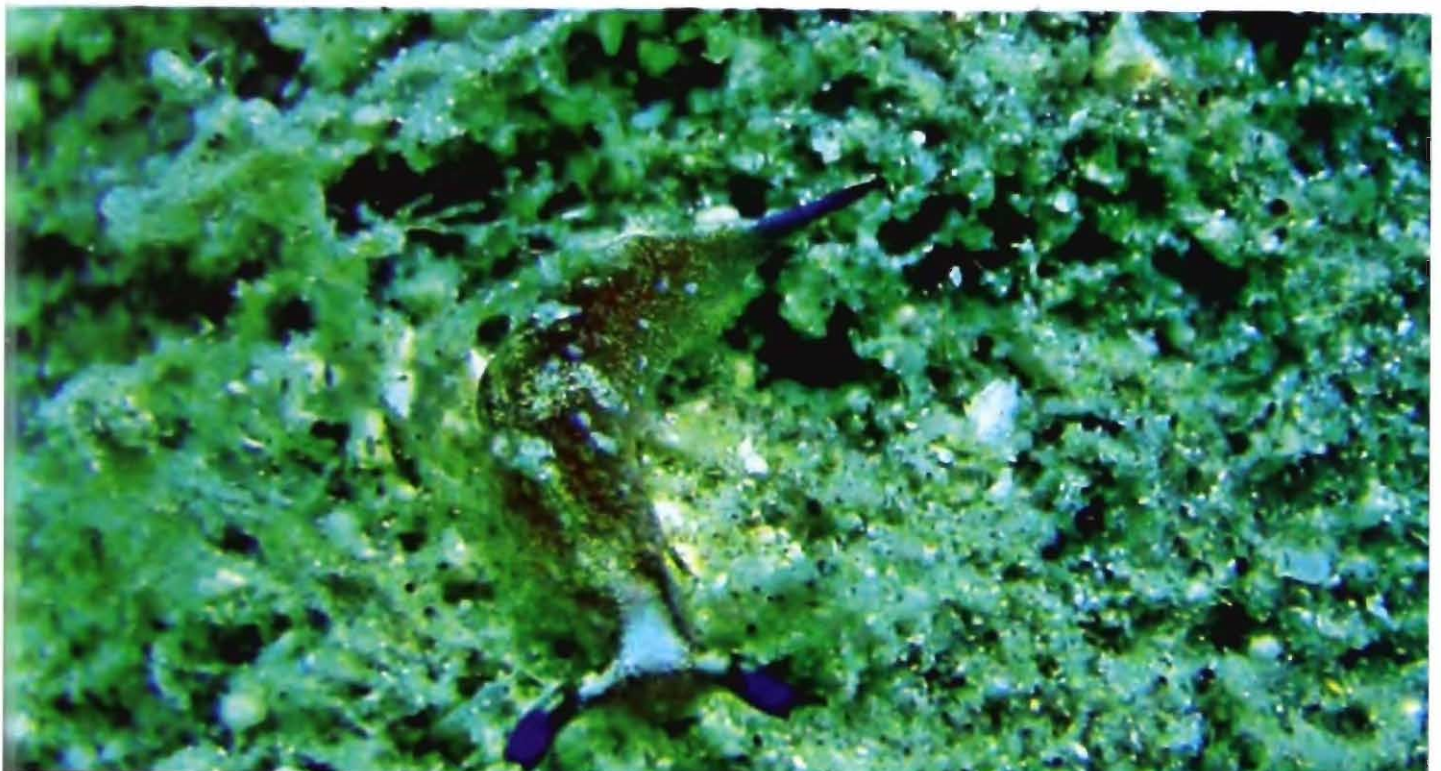
DESCRIPTION : Body brownish in colour. The white spots on the body are clearly visible. The cephalic portion white in colour. The tail portion bright blue in colour and tapered. Rhinophores blue in colour with white coloured base. The large spots on the mantle are slightly bluish in colour. Animal observed was very small in size (>3cm).

SIMILAR SPECIES : *E. amakusana*

DISTRIBUTION : Pacific Coast of Japan. India : Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters.

Fig. 26. *Elysia abei* (Ritchie's Archipelago).



12. *Elysia ornata* (Swainson, 1840), Fig. 27

JENSEN, K.R. (1992) Anatomy of some Indo-Pacific Elysiidae (Opisthobranchia : Sacoglossa (=Ascoglossa), with a discussion of the generic division and phylogeny. *Journal of Molluscan Studies*, 58(3): 257-296.

DESCRIPTION : The animal is usually a translucent green colour with a black parapodial margin and a submarginal yellow or orange band. Sometimes there is a white line between the orange and yellow bands. The tip of the rhinophores often has the same colour bands. There are also numerous black and white dots all over the body. A very similarly coloured species, from the Indo-West Pacific, *Elysia grandifolia*, has much larger, very thin parapodia. Jensen (1992) reports that *E. ornata* feeds on *Bryopsis* in both the Caribbean and the Indo West Pacific. The species observed was feeding on algae.

SIMILAR SPECIES : *E. grandifolia*



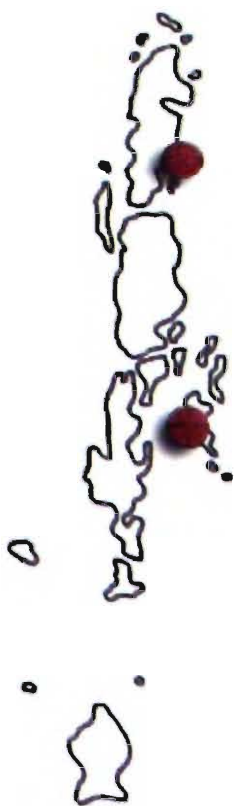


DISTRIBUTION : Circum-tropical; wide-spread in Caribbean and Indo-West Pacific. India : Gulf of Mannar, Mayabunder, Ritchies Archipelago; Andaman Islands

REMARKS : New Record to Andaman and Nicobar Islands

13. *Syphonota geographica* (Adams and Reeve, 1850), Fig. 28

ADAMS, A. and REEVE, L. (1850). Mollusca, Part 3. In: Adams, A.(Ed.), *The zoology of the voyage of the H.M.S. Samarang; under the command of Captain Sir Edward Belcher, C.B., F.R.A.S., F.G.S., during the years 1843-1846.* pp. 45-87, Pls 17-24. Reeve, Benham & Reeve: London.



DESCRIPTION : Animal is green in colour. This circumtropical species can be distinguished from species of *Aplysia* by the position of the rhinophores, close together and set back between the parapodial lobes. They swim by flapping the parapodia. Animal almost blend with the background flora.

SIMILAR SPECIES : *Elysia grandifolia*

DISTRIBUTION : Indo-West Pacific & Atlantic. India : Ritchies Archipelago, Mayabunder, Andaman Islands.

REMARKS : New Record to Indian waters.

Fig. 28. *Syphonota geographica* (Kizhakkarai, Gulf of Mannar).



**Key to the species of genus *Thuridilla* recorded from
Andaman and Nicobar Islands**

- 1a. Body with creamy colouration striations on black
background *T. bayeri*
- 1b. Body covered by green marks on a dull cream background
..... *T. carlsoni*

14. *Thuridilla bayeri* (Marcus, 1965), Fig. 29



MARCUS, Er., 1965. Some Opisthobranchia from
Micronesia. *Malacologia* 3(2):263-286.

DESCRIPTION : Body black in colour. Yellowish
lines starting from rhinophores and extends up
to the tail. Rhinophore large comparing to the
body length. Rhinophoral tips bright yellow in
colour and rest of the part white. The basal
portion of the rhinophore black from where the
yellowish lines start. Yellowish tint at the tail
tip. Animal very small and seen feeding on the
algae.

SIMILAR SPECIES : *T. livida*

DISTRIBUTION : Indo-West Pacific. India
Ritchies Archipelago, North Wandoor; South
Andaman.

REMARKS : New Record to Indian waters

Fig. 29. *Thuridilla bayeri* (Ritchie's Archipelago).



15. *Thuridilla carlsoni* Gosliner, 1995, Fig. 30

GOSLINER, T.M. (1995) The genus *Thuridilla* (Opisthobranchia: Elysiidae) from the tropical Indo-Pacific, with a revision of their phylogeny and systematics of the Elysiidae. *Proceedings of the California Academy of Sciences*, 49(1) : 1-54.



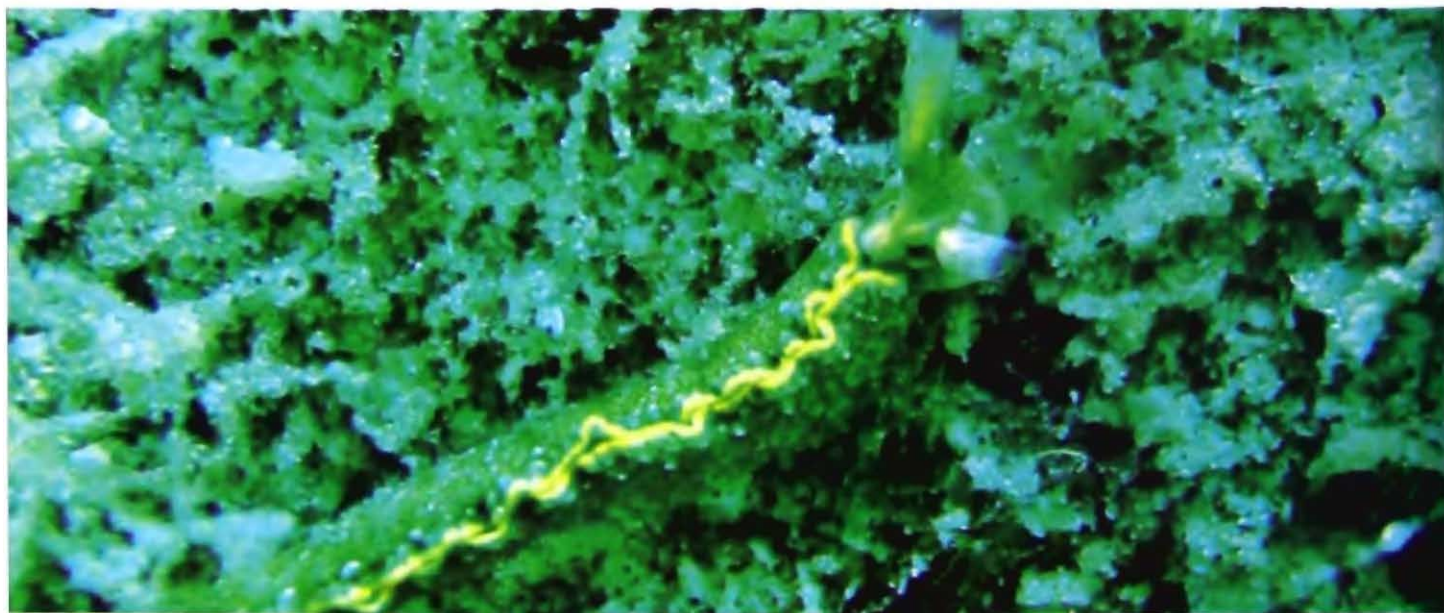
DESCRIPTION : It is characterised by the clusters of deep green marks on a dull cream background. The very characteristically coloured elysioid is known from both the east and west coasts of Australia (Wells & Bryce, 1993). Rudman recorded this in New Caledonia, and Gosliner has recorded it from other parts of the western Pacific. The rhinophores are cream except for green patterning at the base and a bluish tip. The parapodial margins are creamy in colour. The animal was seen feeding on algae.

SIMILAR SPECIES : *T. livida*

DISTRIBUTION : Hawaiian Islands, Marshall Islands, Guam, New Caledonia, Papua New Guinea (PNG), tropical Australia, Indonesia, Sulawesi. India : Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters.

Fig. 30. *Thuridilla carlsoni* (Ritchie's Archipelago).



FAMILY : PLAKOBRANCHIDAE Gray, 1840

16. *Plakobranthus ocellatus* Van Hasselt, 1824, Fig. 31

HASSELLT, J. C. V. (1824) In: Andre Férussac. Extrait d'une lettre du Dr. J. C. van Hasselt au Prof. van Swinderen, sur mollusques de Java (traduit de l'Algem. konst en letterbode, 1824, nos. 2, 3, 4.) Tjuringe (île Java), le 25 mai 1823 (l). Bulletin des Sciences Naturelle et de Géologie 3:237-245.

DESCRIPTION : *Plakobranthus ocellatus* is a common inhabitant of shallow waters of Andaman Islands. This species was reported from India four decades ago (Virabhadra Rao, 1961). Although a number of names exist for various color forms, the general consensus is that there is only one species. It is mostly seen half buried in the sandy area or coral reef of intertidal area. Like species of *Elysia*, it has parapodia which fold over the backside of the animal. The green patch in the mantle is from the green ridges, packed full of microscopic chloroplasts, which line inside of the parapodia. The rhinophore is creamy white in colour

DISTRIBUTION : Widespread throughout the tropical Indo-West Pacific. India : Gulf of Kutch, Widespread in Andaman Islands.

REMARKS : New record to Andaman and Nicobar Islands

Fig. 31. *Plakobranthus ocellatus* (North Bay, South Andaman)

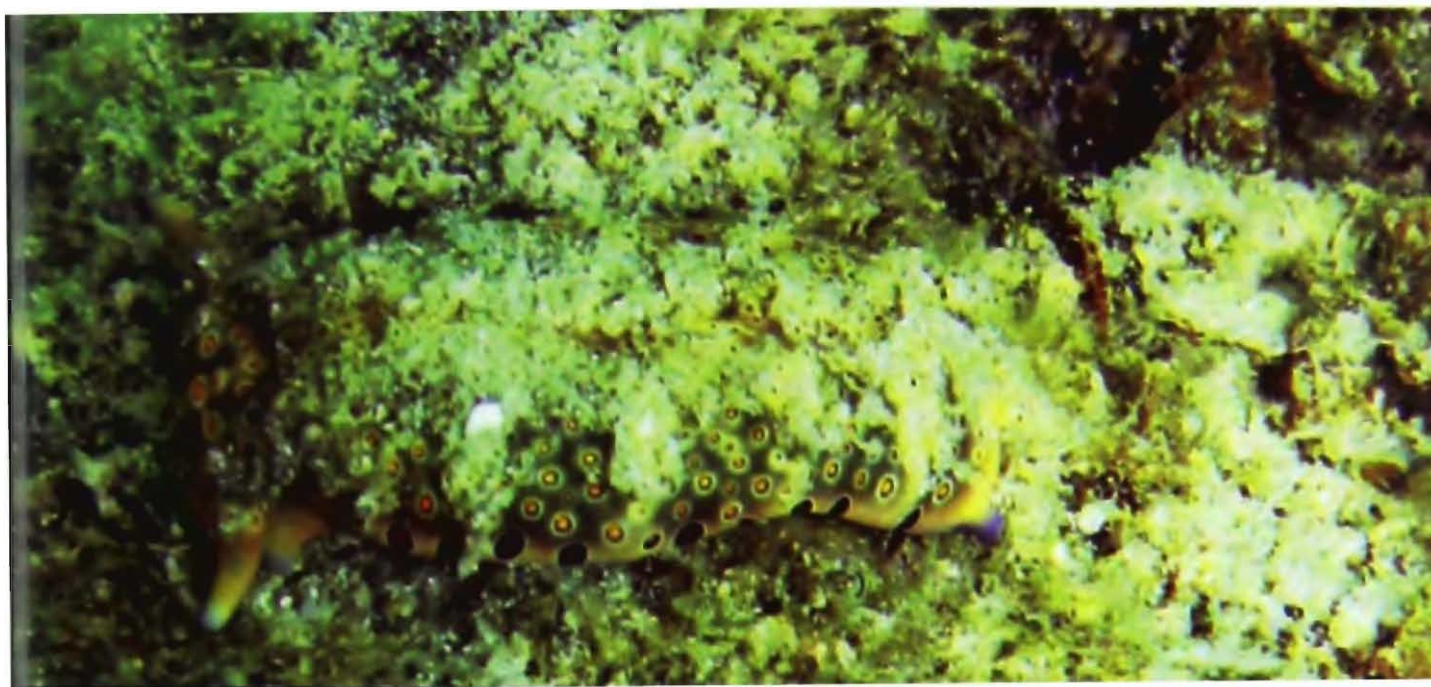
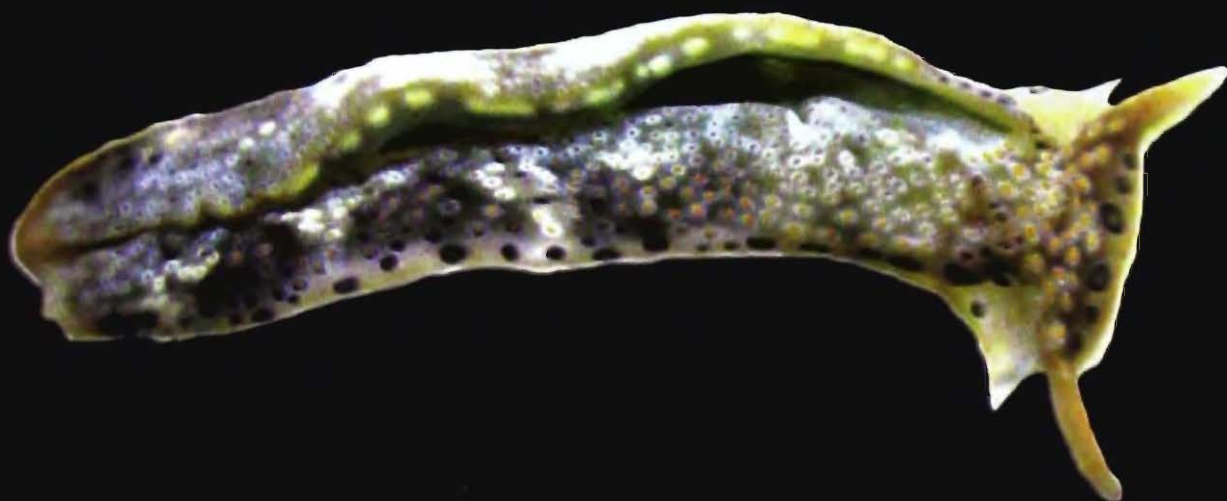




Fig. 31. *Plakobranchus ocellatus* (North Bay, South Andaman)



ORDER : NUDIBRANCHIA Blainville, 1814

The nudibranchs are the largest and most diverse order of opisthobranchs. No nudibranch ever possesses a shell as an adult, though most possess a tiny, cup-like shell at the larval stage. With exceptions, the gills are normally arranged on the dorsal surface usually as a circle (in dorids) or secondary structures such as the thin-walled cerata (in aeolids) may be utilized for the purpose. The notable exceptions are the Phyllidiidae and Arminidae, where instead the gills are secondary structures located down the sides under the mantle between it and the foot. Nudibranchs often possess defensive glands in the mantle that produce toxic or repellent substances derived from their food. Within the nudibranchs is a group - referred to as the aeolids - that use nematocysts obtained from their prey for their own defensive purposes.

Nudibranchs are to be found worldwide, but exhibit the greatest diversity in the tropics.

Key to the families of the order NUDIBRANCHIA recorded from Andaman and Nicobar Islands

- 1a. Gills readily visible on top of the mantle 6
- 1b. Gills not present on top of the mantle 2
- 1c. Cerata present on the body 3
- 2a. Body elongate soft and flattened ARMINIDAE
- 2b. Body elongate-ovate shaped and evenly convex in profile
body is stiff and tough since it contains spicules
..... PHYLLIDIIDAE
- 3a. The cerata are numerous and crowded all over the body
..... AEOLIDIDAE
- 3b. The cerata arranged in rows or clusters down each side of
the body 4
- 4a. Possess very large, extensible oral hood with fringing
tentacles TETHYDIDAE

- 4b. Possess several pairs of cerata like papillae, each protecting one or two small bushy gills that are attached near the base medially BORNELLIDAE
- 4c. Does not fall in 4a or 4b 5
- 5a. The cerata are in rows or cluster down each side of the body and are directly inserted onto the body wall FLABELLINIDAE
- 5b. The cerata are in clusters down each side of the body and attached to lobes of varying size GLAUCIDAE
- 6a. Possess more than 2 oral tentacles POLYCERIDAE
- 6b. Possess a pair oral tentacle 7
- 7a. Gills retractile 10
- 7b. Gills non-retractile 8
- 8a. Rhinophores retractile HEXABRANCHIDAE
- 8b. Rhinophores non-retractile 9
- 9a. Tail long and tapering GONIODORIDIDAE
- 9b. Tail may be long or short with blunt end GYMNODORIDIDAE
- 10a. Mantle is thick because it is reinforced with a network of spicules DORIDIDAE
- 10b. Mantle soft and smooth 11
- 11a. The leading edge of the foot is split transversely with the upper portion forming a cavity into which the mouth opens DENDRODORIDIDAE
- 11b. No such modification of the foot CHROMODORIDIDAE

SUBORDER : ARMININA Odhner, 1934

FAMILY : ARMINIDAE Iredale and O'Donoghue, 1923

Most arminids have an elongate body that is soft and flattened. The mantle is usually large, broad, and thick often with strong longitudinal ridges on the upper surface although

these may be replaced by irregular pustules or papillae, or even be absent. There are no cerata on the dorsum. The mantle and foot are approximately the same width, being widest anteriorly and tapering gradually to a rounded or pointed tail. In the genus *Armina* the mantle is attached posteriorly to the foot. Numerous glands or cnidosacs can be present along the mantle margin. Arminids have an oral veil that is distinct in appearance with short tentacular lobes laterally. Just in front of the rhinophores some species possess a transverse ridge or flap called a caruncle. The rhinophores are distinctive - possessing a club with compact vertical lamellae and are located quite anteriorly and close together. They are retractile.

Gills are present in the genus *Armina* but not in the genus *Dermatobranchus*. In *Armina* they are located anteriorly down the sides under the mantle brim and are leaf-like in structure whilst medially and posteriorly is a system of intricate lamellate outgrowths performing the same function. Arminids feed upon soft corals or sea pens.

**Key to the species of genus *Armina* recorded from
Andaman and Nicobar Islands**

- 1a. Rhinophore black in colour *A. cygnea*
- 1b. Rhinophore black in colour with yellow tip. Many evenly spaced white lines on body *A. semperi*

17 *Armina cygnea* (Bergh, 1876), Fig. 32

BERGH, L.S.R. (1876). Neue Beiträge zur Kenntniss der Pleurophyllidien. *Malakoz. Blätt.* 23: 1-14, pl. 1

DESCRIPTION : Animal is black in colour. Many white lines run longitudinally on the body. The thicker white lines and thinner lines are seen alternatively. The rhinophore is black in colour. The foot margin is also white in colour. This species is mostly observed in sandy area.

SIMILAR SPECIES : *A. cf japonica*.

DISTRIBUTION : Known from all of Australia except Victoria and Tasmania. India : Ritchies Archipelago, South Andaman

REMARKS : New Record to Indian waters.



Fig. 32. *Armina cygnea* (Ritchie's Archipelago).



18. *Armina semperi* (Bergh, 1861), Fig. 33

BERGH, L. S. R. 1861. [For 1860]. Om Forekomsten af Neldfiim hos Mollusker. *Videnskabelige Meddelelser fra den Naturhistoriske Forening, Kjobenhavn* : 309-331, pl. 8.

DESCRIPTION : This species is characterized by a blue foot with a yellow-orange border. Thin grooves running longitudinally on the mantle. White lines separate each groove. Foot blue in colour with a bright yellow border which makes the animal noticeable. Rhinophore is black in colour with yellow tip. This animal is also found in sandy area.

SIMILAR SPECIES : *A. cygnea*

DISTRIBUTION : Thailand, Singapore, Philippines. India : Ritchies Archipelago, South Andaman

REMARKS : New Record to Indian waters.

Fig. 33. *Armina semperi* (Ritchie's Archipelago).



SUBORDER : DORIDINA Odhner, 1934

FAMILY : DORIDIDAE Rafinesque, 1815

Usually ovate in shape, some tending to elongate with a broad mantle skirt. The mantle is thick and reinforced with a network of spicules. It is frequently covered with pustules or tubercles. The rhinophores are lamellate, sometimes with raised sheaths, and they can retract into pockets whose margins are either smooth or (rarely) carry pustules or papillae.

The usually tripinnate gills can retract beneath the mantle into a pocket that also contains the anal papilla. In some species the gills can be compressed posteriorly like a fan and topped by a notal flap. Doridids are often well camouflaged upon their sponge prey.

**Key to the genera of family DORIDIDAE recorded from
Andaman and Nicobar Islands**

- 1a. Tubercles are present 2
- 1b. Tubercles are absent *Jorunna*
- 2a. Tubercles are always joined together by ridges
..... *Halgerda*
- 2b. Tubercles are not connected by the ridges /Tubercles have
a rounded terminal knob *Hoplodoris*

**Key to the species of genus *Halgerda* recorded from
Andaman and Nicobar Islands**

- 1a. Orange colour tubercles that are connected by orange
coloured ridges 2
- 1b. Orange coloured tubercles scattered on top of the mantle
with no ridges joining them *H. stricklandi*
- 2a. Gills fully white to creamy in colour *H. bacalusia*
- 2b. Gills white in colour with black line in the dorsal side
..... *H. tessellata*

19. *Halgerda bacalusia* Fahey and Gosliner 1999, Fig. 34

FAHEY, S.J. and GOSLINER, T.M. (1999) Preliminary phylogeny of *Halgerda* (Nudibranchia: Halgerdidae) from the Tropical Indo-Pacific with descriptions of three new species. *Proceedings of the California Academy of Sciences*, 51(11) : 425-448.

DESCRIPTION : *Halgerda. bacalusia* has pronounced orange ridges linking the large orange-capped tubercles. The mantle edge and margin of the foot are bright yellow-orange. The rhinophoral club is reported to have a straw colour with black band down each side, but in the animal recorded here have white coloured rhinophoral club without any black markings. *H. bacalusia* has similarities to a number of other species of *Halgerda* with orange ridges and spots. *H. carlsoni* differs in having a mantle border of orange spots rather than a yellowish band. *H. aurantiomaculata* differs in lacking the many small orange spots scattered over the margin and in having a deep orange mantle margin. *H. diaphana* also has similarities but has a few orange streaks between the ridges rather than many small orange spots.

SIMILAR SPECIES : *H. carsoni*, *H. aurantiomaculata*, *H. diaphana*.

Fig. 34. *Halgerda bacalusia* (Ritchie's Archipelago)





DISTRIBUTION : Known only from Thailand and Philippines. India : Ritchies Archipelago, South Andaman

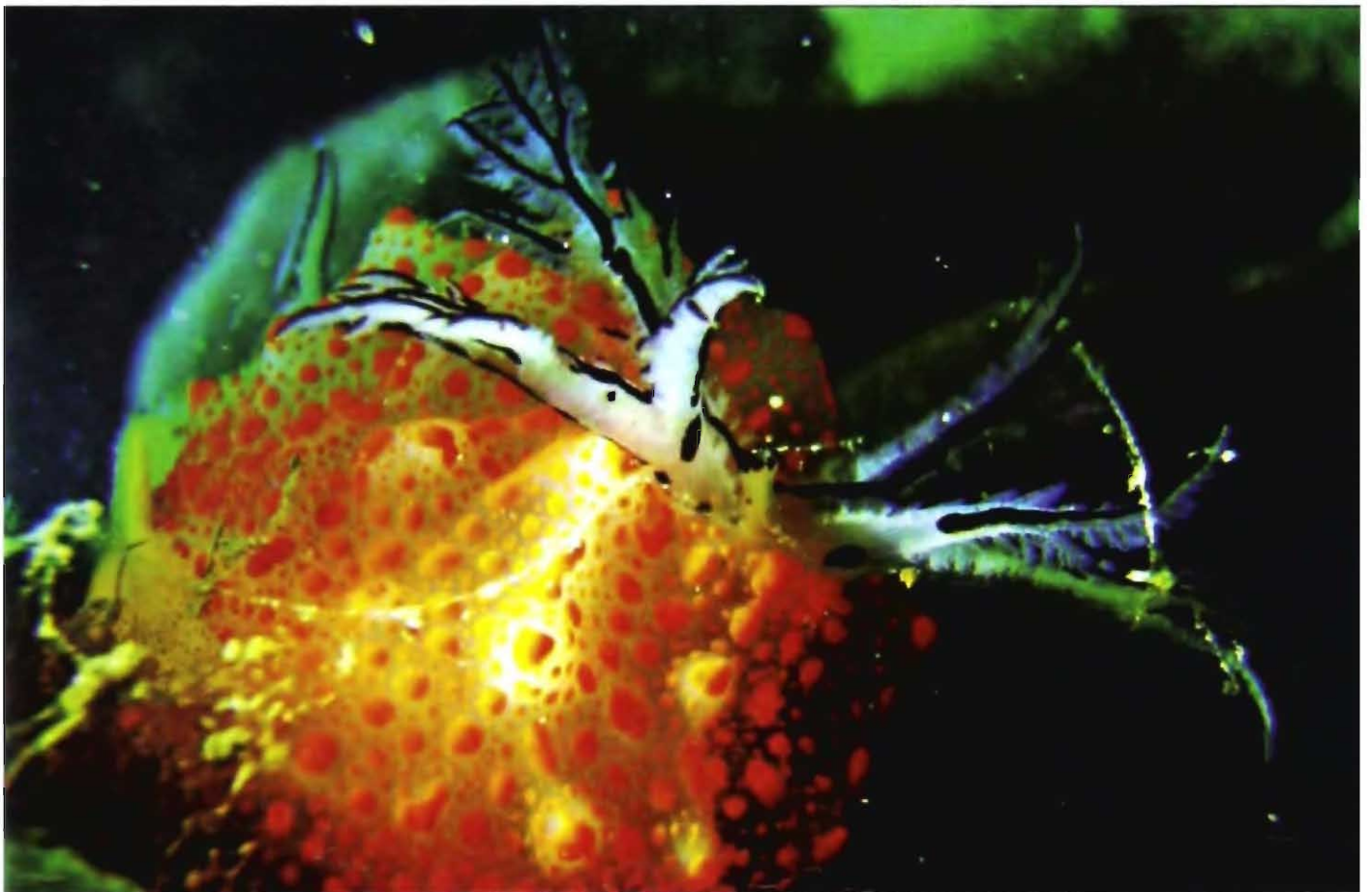
REMARKS : New Record to Indian waters

20. *Halgerda stricklandi* Fahey and Gosliner, 1999, Fig. 35

FAHEY, S.J. and GOSLINER, T.M. (1999) Preliminary Phylogeny of *Halgerda* (Nudibranchia: Halgerdidae) from the tropical Indo-Pacific, with descriptions of three new species. *Proceedings of the California Academy of Sciences*, 51(11) : 424-448.

DESCRIPTION : Species is with large, bright orange-tipped, conical tubercles scattered over the dorsum, but which are not interconnected by ridges. Below each orange tip the tubercles have a band of opaque white. There are many smaller orange tubercles scattered amongst the larger tubercles. The rhinophore club is translucent yellow and there is a black line extending down the whole length of both the rhinophore club and stalk on the posterior midline. In the animal observed in Andaman the rhinophore club was white in colour but the anterior side of the club had black pigmentation as recorded in other parts of the world. The gill has black spots on the anterior sides of the four branchial leaves. The foot has an orange margin.

Fig. 35. *Halgerda stricklandi* (Ritchie's Archipelago)





SIMILAR SPECIES : *Halgerda carlsoni*, *Halgerda malesso*

DISTRIBUTION : Known only from Thailand, Andaman Sea.
India : Ritchies Archipelago, South Andaman

REMARKS : New Record to Indian waters.

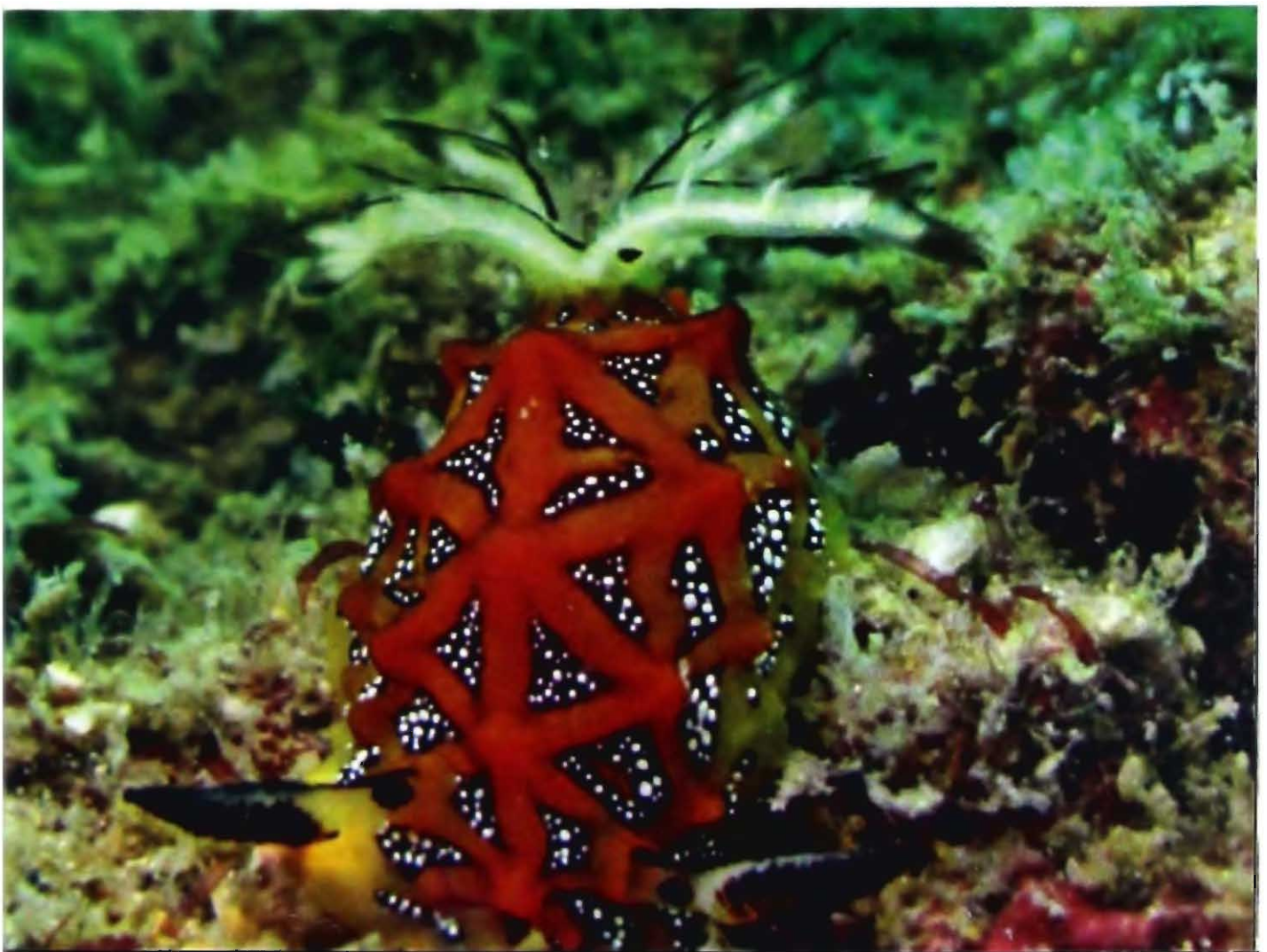
21. *Halgerda tessellata* (Bergh, 1880), Fig. 36

BERGH, L.S.R. (1880). Malacologische Untersuchungen. In : C.G. Semper, *Reisen im Archipel der Philippinen, Wissenschaftliche Resultate. Band 2, Suppl., 1* : 1-78, Pls. A-F.

DESCRIPTION : The animal is brilliantly coloured. The orange coloured tubercles are separated by black coloured grooves. The grooves have many bright white colored spots. The ridges joining the tubercles are also orange in colour. Rhinophore is white in colour with black edged rhinophoral lamellae. Gills white in colour with black line in the dorsal side. There is a black spot near the base of rhinophore.

SIMILAR SPECIES : *H. stricklandi*

Fig. 36. *Halgerda tessellata* (Ritchie's Archipelago)





DISTRIBUTION : Palau, Queensland, Mozambique, Malaysia, Thailand, Maldives, Southern Africa. India : Gulf of Kutch, Ritchies Archipelago, South Andaman

REMARKS : New record to Andaman and Nicobar Islands

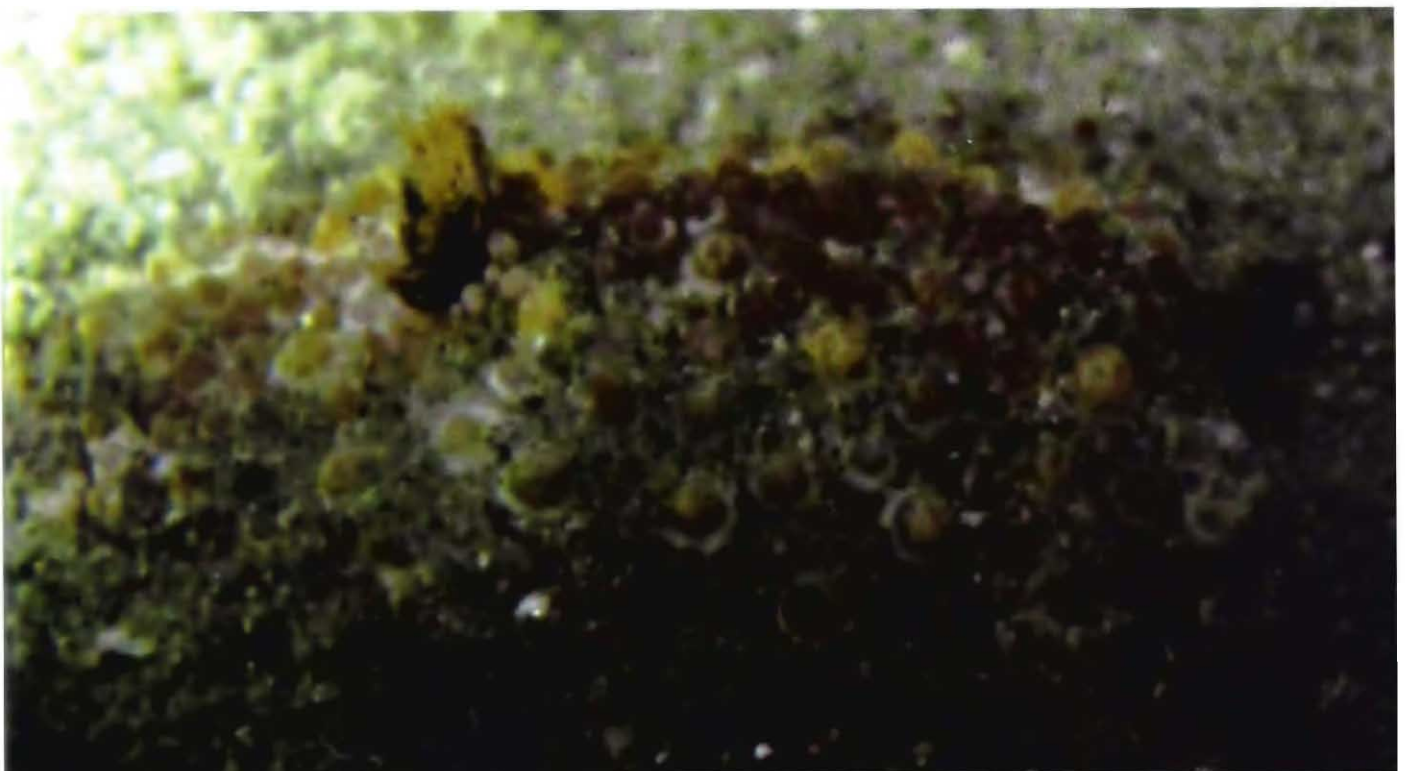
22. *Hoplodoris armata* (Baba, 1993), Fig. 37

BABA, K. (1993). Two new species of *Carminodoris* (Nudibranchia : Dorididae) from Japan. *Venus, The Japanese Journal of Malacology*, 52(3) : 223-234. (Figs 1-10, Pl.1.)

DESCRIPTION : Large ovate dorid with broad mantle skirt. The mantle is covered with rounded tubercles of varying sizes. The tubercles have a rounded terminal knob, a narrower waist and a basal stalk. The background colour of the mantle is a translucent watery brown with scattered dark brown patches. In some animals the patches coalesce so that much of the background is a dark reddish brown. The tubercles usually have a dark purplish knob, while the basal stalk is a translucent watery brown, often with an opaque white ring around the base. *H. armata* lacks the denticulate radular teeth but its name *armata* refers to its penis which is armed with many hooks.

SIMILAR SPECIES : *Carminodoris bifurcate*

Fig. 37. *Hoplodoris armata* (Ritchie's Archipelago)





DISTRIBUTION : Japan, South Korea, South Africa, Australia. India : Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters.

Key to the species of genus *Jorunna* recorded from Andaman and Nicobar Islands

- 1a. Pinkish coloured mantle with brown lines scattered over body *J. rubescens*
- 1b. White to creamy colour mantle with jet black spotted circles *J. funebris*

23. *Jorunna funebris* (Kelaart, 1858), Fig. 38

KELAART, E.F. (1858). Description of new and little known species of Ceylon nudibranchiate molluscs and zoophytes. *Journal of the Ceylon Branch of the Royal Asiatic Society, Colombo*, 3(1) : 84-139.

DESCRIPTION : Body oblong, convex, of a waxy-white colour, and spotted with black. Mantle coriaceous, granular, of an ivory white colour and ornamented with jet black spotted circles and half rings or imperfect annular spotted figures. Dorsal tentacles large, clavate; apex black, laminated, with out sheaths. Oral tentacles linear, white, tip black. Branchial plumes six, large and drooping, tripinnate, white and shaded lavender grey; midribs of a dark brown colour. Foot waxy white, spotted irregularly on the margin of the edges with small and large linear spots.

SIMILAR SPECIES : *J. ramicola*, *J. pardus*

Fig. 38. *Jorunna funebris* (Diglipur, North Andaman).





DISTRIBUTION : Widespread in Tropical Indo-West Pacific.
India : Gujarat, Diglipur, Mayabunder, Ritchies Archipelago, Rutland, Little Andaman, Andaman Islands.

REMARKS : New record to Andaman and Nicobar Islands.

24. *Jorunna rubescens* Bergh, 1876, Fig. 39

BERGH, L.S.R. (1876) Malacologische Untersuchungen. In: Reisen im Archipel der Philippinen von Dr. Carl Gottfried Semper. Zweiter Theil. Wissenschaftliche Resultate. Band 2, Theil 2, Heft 10, pp. 377-427, pls. 49-53.

DESCRIPTION : One of the largest nudibranchs recorded from Andaman and Nicobar Islands. Pinkish colour mantle with brown lines. Its mantle is covered in small spiculate papillae (caryophyllidia) which are characteristic of that genus. Presence of the caryophyllidia is one of the reasons that this nembrothid-like dorid is placed in the genus *Jorunna*. Observed to be feeding on algae. Gills are complex in structure and gill sockets are well developed. Rhinopore sockets are also well developed and raised from the mantle. The foot also has the brown coloured markings or the caryophyllidia.

Fig. 39. *Jorunna rubescens* (North Bay, South Andaman).





DISTRIBUTION : Widespread in Indo-West Pacific. India : North Bay, South Andaman.

REMARKS : New Record to Indian waters

FAMILY : CHROMODORIDIDAE Bergh, 1891

The Chromodorididae is a very large family of dorid nudibranchs. In Andaman and Nicobar Islands also this is the largest family recorded. They range in size from very small to very large (< 5 mm to > 150 mm). The body is usually smooth with a thin skin, elongate-ovate in shape with the mantle overlapping the foot except for the rear of the foot. Having said that, there is a graduation through several genera where the mantle skirt becomes progressively reduced and the body wall correspondingly thickens up considerably in lieu. The mantle contains special glands around the margin which store, as a defensive mechanism, toxic anti-feedant chemicals obtained from the sponge prey. The rhinophores and gills can retract into pockets. The rhinophores possess lamellate clubs. The gills are usually simple (unbranched) or occasionally complex. The chromodoridids are often elaborately patterned and coloured on the mantle and these colours can be repeated on the upper surface of the foot.

Key to the genera of family CHROMODORIDIDAE recorded from Andaman and Nicobar Islands

- 1a. Tubercles present on the mantle 2
- 1b. Tubercles absent, mantle smooth and soft 3
- 2a. Purple tipped tubercles on white mantle
..... *Mexichromis multituberculata*
- 2b. Red to pinkish tipped tubercle on a yellow coloured
mantle *Cadlinella ornatissima*
- 3a. Mantle edge frilled in a very conspicuous manner
..... *Glossodoris*
- 3b. Mantle has a long recurved dorsal horn
..... *Ceratosoma trilobata*
- 3c. Mantle edge is not frilled
..... *Chromodoris/Hypselodoris/Risbecia*

25. *Cadlinella ornatissima* (Risbec, 1928), Fig. 40

RISBEC, J. 1928. Contribution a l'étude des nudibranches Néo-Calédoniens. Thèse présentée à la faculté des sciences de l'Université de Paris pour obtenir le grade de docteur ès-sciences naturelles. *Faune des Colonies Française*, 2(1):1-328, pls. 1-12.



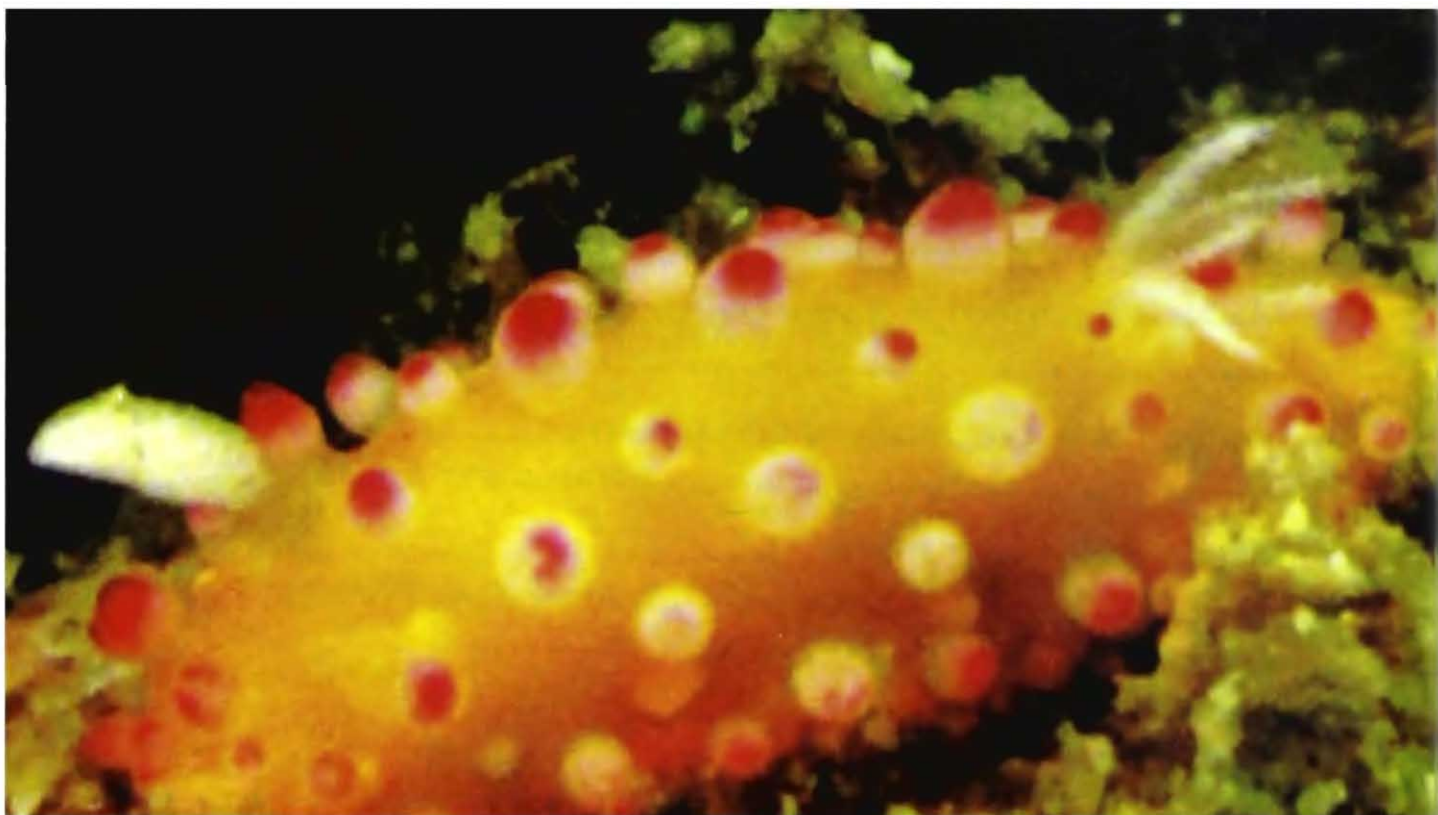
DESCRIPTION : This species of chromodorid is easily recognised by the pink-tipped tubercles on its dorsum. It has a characteristic pattern of single-celled, flask-shaped and compound mantle glands. The large compound glands around the mantle edge can be seen around the mantle edge. Rhinophore creamy white in colour and the gills are also of the same colour. Mantle yellow coloured with white tail portion.

SIMILAR SPECIES : *Mexichromis multituberculata*

DISTRIBUTION : Widespread in tropical Indo-West Pacific including Thailand, Andaman Sea. India : Ritchies Archipelago, South Andaman

REMARKS : New Record to Indian waters

Fig. 40. *Cadlinella ornatissima* (Ritchie's Archipelago).



26. *Ceratosoma trilobatum* (J.E. Gray, 1827), Fig. 41

RUDMAN, W.B. (1988) The Chromodorididae (Opisthobranchia : Mollusca) of the Indo-West Pacific : the genus *Ceratosoma* J.E. Gray. *Zoological Journal of the Linnean Society*, 93(2) : 133-185.

DESCRIPTION : This species is characterised by having only one large lateral lobe on each side of the body, just anterior to the gills. There is usually a ridge joining each lateral lobe to the anterior head lobe. The background colour can vary from pale green to orange-red or brown. There are usually small yellow or orange spots and the edge of the mantle, and sometimes the foot, is bordered with a broken or continuous purple line. Most species of *Ceratosoma* have a long recurved dorsal 'horn' which acts as a defensive lure attracting potential predators to the part of the animal which contains most of the distasteful chemicals stored from their food.

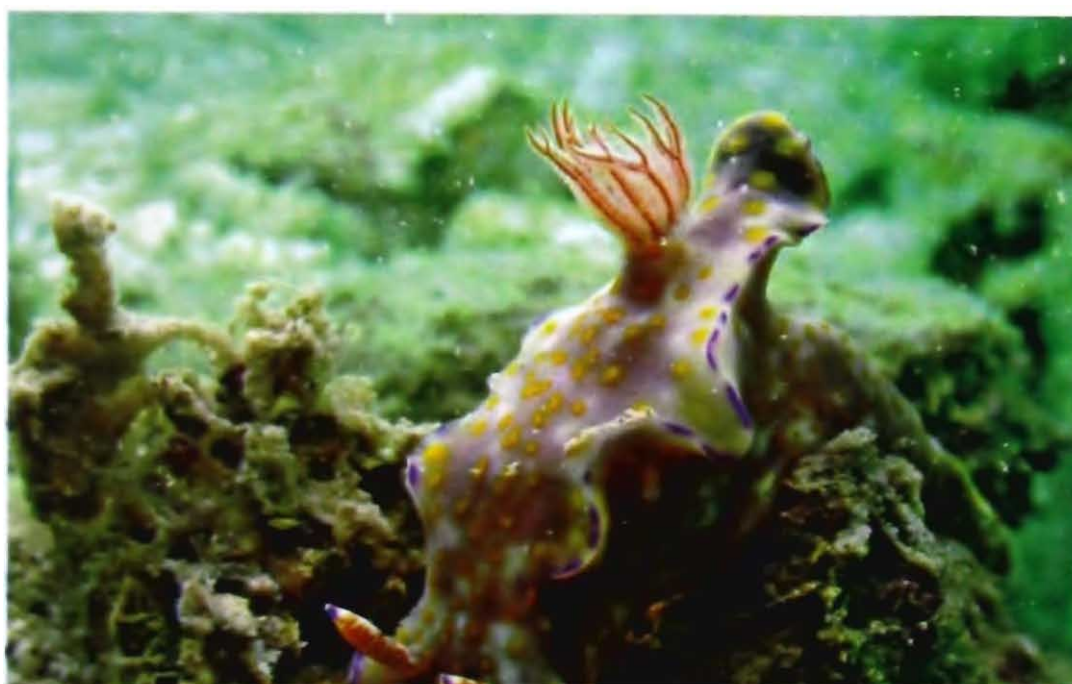


SIMILAR SPECIES : *Ceratosoma tenue*, *C. gracillimum*

DISTRIBUTION : Widespread in tropical Indo-West Pacific including Thailand, Andaman Sea. India : Ritchies Archipelago, South Andaman

REMARKS : New Record to Indian waters

Fig. 41. *Ceratosoma trilobatum* (Ritchie's Archipelago).



Key to the species of genus *Chromodoris* recorded
from Andaman and Nicobar Islands

- 1a. Mantle edge yellow in colour *C. elisabethina*
- 1b. Mantle edge orange in colour 2
- 1c. Mantle edge white in colour *C. gleniei*
- 1d. Mantle edge purple in colour 3
- 2a. The mantle is creamy white with a broad wavy orange line
around the mantle edge *C. fidelis*
- 2b. The mantle is lined with black lines on a creamy white
background *C. striatella*
- 3a. Mantle covered with large purple or purple brown spots
or marks, ringed with white *C. geminus*
- 3b. A red reticulate pattern which is covering most of the
mantle *C. tinctoria*

27. *Chromodoris elisabethina* Bergh, 1877, Fig. 42

BERGH, L. S. R., 1877. Kritische Untersuchung der Ehrenberg'schen Doriden. *Deutsche Malakozoologische Gesellschaft Jahrbücher*, 4 : 45-76.



DESCRIPTION : *Chromodoris elisabethina* is one of a group of chromodorids with a blue or bluish-white background colour and black or dark blue longitudinal lines. Often they have orange or yellow gills and rhinophores and a similarly coloured mantle border. The dark longitudinal line in the middle of the mantle ends in the gill base and forms a circle around it. The tail portion also have white colour other than the margins.

SIMILAR SPECIES : *Chromodoris annae*, *C. africana*, *C. hamiltoni*

DISTRIBUTION : Tropical western Pacific. India : Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters.

Fig. 42. *Chromodoris elisabethina* (Ritchie's Archipelago)



28. *Chromodoris fidelis* (Kelaart, 1858), Fig. 43

KELAART, E.F., 1858. Descriptions of new and little known species of Ceylon nudibranchiate molluscs and zoophytes. *Journal of the Royal Asiatic Society Ceylon Branch*, Colombo, 3(1) : 84-139, 2 pls.



DESCRIPTION : The mantle is creamy white with a broad orange band around the mantle edge and a thin wine red line between the white and the orange. On the inner edge of the orange band there are usually a series of tongue-like patches running into the white region. In some cases they are almost all wine red while in others there is only a slight thickening of the red band. Equally characteristic are the black rhinophores and gills and the white foot.

SIMILAR SPECIES : *C. rubrocornuta*

DISTRIBUTION : Common in tropical Indo-West Pacific. India : Visakhapatnam and/or Madras (Eliot 1906), Ritchies Archipelago, Carbines cove, North Wandoor; South Andaman.

REMARKS : New record to Andaman and Nicobar Islands.

Fig. 43. *Chromodoris fidelis* (Carbines cove, South Andaman)



29. *Chromodoris geminus* Rudman, 1987, Fig. 44

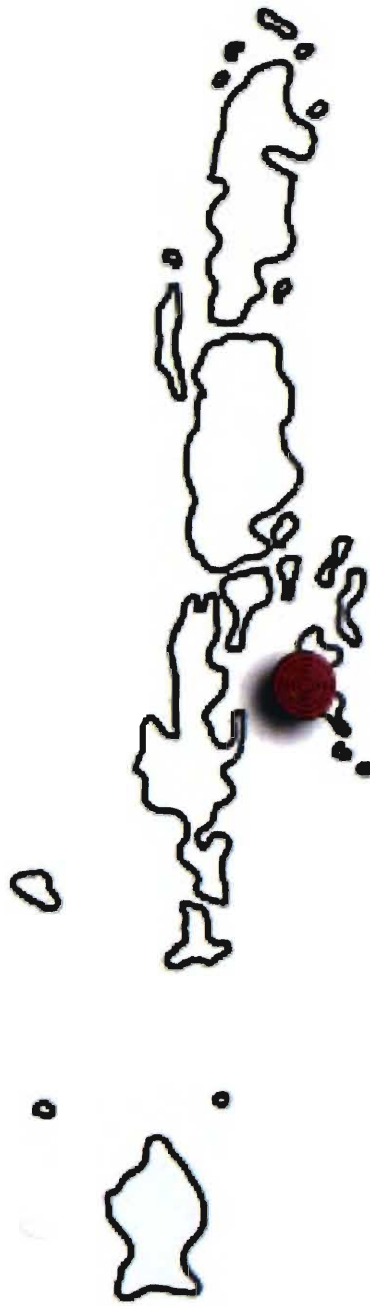
RUDMAN, W.B. (1987) The Chromodorididae (Opisthobranchia: Mollusca) of the Indo-West Pacific: *Chromodoris epicuria*, *C. aureopurpurea*, *C. annulata*, *C. coi* and *Risbecia tryoni* colour groups. *Zoological Journal of the Linnean Society*, 90 : 305-407.

DESCRIPTION : This is one of the species included in the *Risbecia tryoni* colour group as called by Rudman. Other species include are *Risbecia tryoni*, *C. kuniei* and *C. leopardus*. They all have large purple or purple-brown spots or marks, usually ringed with white, an often reticulate brownish background, and a purple border. *C. geminus* differs in having four colour bands around the mantle edge, an outermost white, then translucent greyish purple, then white, then yellow. Others have a distinct purple line at the border, narrow in *C. leopardus* and *R. tryoni*, but broad in *C. kuniei*.

SIMILAR SPECIES: *Risbecia tryoni*, *Chromodoris kuniei*, *Chromodoris leopardus*, *Chromodoris geminus*.

Fig. 44. *Chromodoris geminus* (Ritchie's Archipelago).





DISTRIBUTION : Tropical Indian Ocean (Indonesia, Thailand, Red Sea, Maldives, South Africa). India : Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters.

30. *Chromodoris gleniei* (Kelaart, 1858), Fig. 45

KELAART, E.F., 1858. Descriptions of new and little known species of Ceylon nudibranchiate molluscs and zoophytes. *Journal of the Royal Asiatic Society Ceylon Branch*, Colombo, 3(1) : 84-139, 2 pls.

DESCRIPTION : A brightly coloured chromodorid. Mantle oval in shape and becomes more prominent while crawling. From its colour pattern it seems to be a sibling species of the western Pacific species *Chromodoris coi*. In *C. gleniei*, the central part of the mantle is an orange-brown colour with deep purple or black markings. In *C. coi* the central region is a dull brown colour with a darker mottling of the same color. In both species there is a very similarly shaped wavy edge to the central region of the mantle and in both species the mantle margin consists of an inner dull purple band and outer white band. Rhinopore is orange brown in colour. Gills are simple and also orange brown in colour.

SIMILAR SPECIES : *Chromodoris coi*

Fig. 45. *Chromodoris gleniei*
(Aberdeen bay, South Andaman).





DISTRIBUTION : Indian Ocean. (Sri Lanka, Tanzania, Maldives). India : Visakhapatnam and/or Madras (Eliot 1906), Aberdeen Bay, Ritchies Archipelago, South Andaman.

REMARKS : New record to Andaman and Nicobar Islands.

31. *Chromodoris striatella* Bergh, 1876, Fig. 46

BERGH, L.S.R. (1876) Malacologische Untersuchungen. In: Reisen im Archipel der Philippinen von Dr. Carl Gottfried Semper. Zweiter Theil. Wissenschaftliche Resultate. Band 2, Theil 2, Heft 10, pp. 377-427, pls. 49-53.



DESCRIPTION : Mantle is yellowish with thin black lines as distinct from *C. lineolata* which is black with white lines. The difference is particularly clear in paler specimens in which the background colour is clearly a translucent white or straw colour. Unlike *C. lineolata*, this species has a white line along the inner edge of the orange border, rather than black. The mantle edge is bordered by an orange band. Rhinopore is black in colour with white spots. The colour pattern of the gills is also similar to the rhinopore.

SIMILAR SPECIES : *Chromodoris lineolata*

DISTRIBUTION : Common in tropical Indo-West Pacific. India : Pongibalu, Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters.

Fig. 46. *Chromodoris striatella* (Pongibalu, South Andaman)

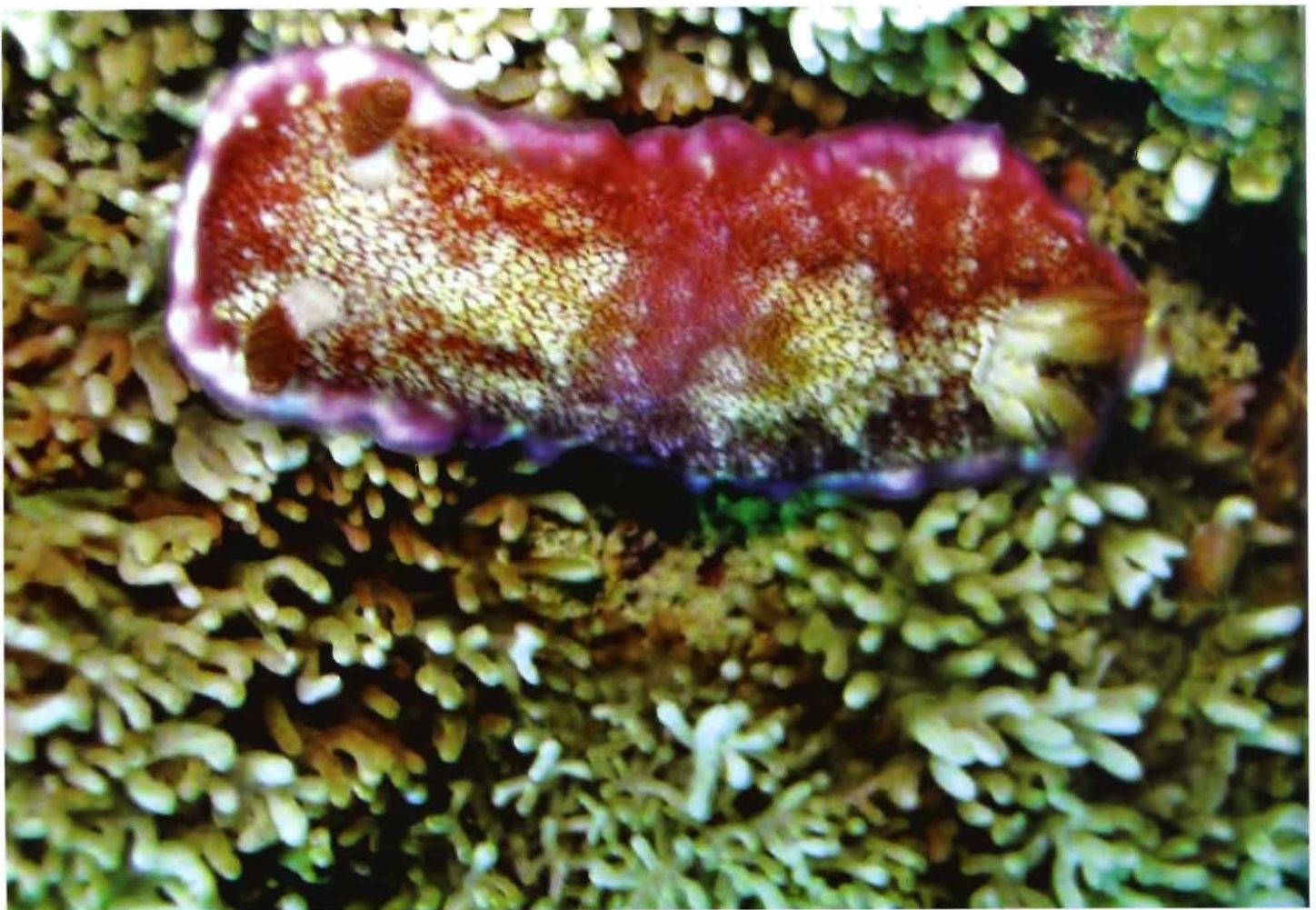


32. *Chromodoris tinctoria* (Ruppell and Leuckart, 1828), Fig. 47

RÜPPELL, WILHELM PETER EDUARD SIMON, & F. S. LEUCKART, 1831. [for 1828]. Mollusca. In: Atlas zu der Reise im nördlichen Afrika von Eduard Ruppell Erste Abtheilung Zoologie Neue wirbellose Thiere des Rothen Meers, pp. 15-47, pls. 1-12. [Nudibranchia pp. 15-18, 27-37, pls. 4-5, 8-11].

DESCRIPTION : The main colour differences are found at the border of the mantle. Usually there is an irregular white region between the yellow border and the red reticulate pattern which covers most of the mantle. In some animals this white region is absent or can occur just around the anterior end. In others the white region is a very regular white submarginal band, and in others small rounded patches of the reticulate pattern form red spots in the white region. Sometimes these spots are uniform red, but usually they have a red reticulate pattern. Have many synonyms such as *Chromodoris reticulata*, *Goniobranchus reticulatus* and *Doris reticulata*. Publication by Rudman (1973) had a confusion that there were differences

Fig. 47. *Chromodoris tinctoria* (Ritchie's Archipelago).





between *Doris tinctoria*, *Doris reticulata*, *Goniobranchus reticulatus*, *Chromodoris alderi* and *Chromodoris inopinata* extensive collections from throughout the Indo-West Pacific indicate that the species differences suggested by different colour patterns is not supported by internal anatomy. The earliest name for this species then is *C. tinctoria*.

SIMILAR SPECIES : *Glossodoris cincta*, *G. hikuerensis*.

DISTRIBUTION : Throughout the tropical Indo-West Pacific.
India : Ritchies Archipelago, South Andaman.

REMARKS : New record to Andaman and Nicobar Islands.

**Key to the species of genus *Glossodoris* recorded
from Andaman and Nicobar Islands**

- 1a. Mantle with black edge and also a similar coloured
rhinophore *G. atromarginata*
- 1b. Mantle with blue edge and a blue edged rhinophore
..... *G. cincta*
- 1c. Mantle with brownish red edge, rhinophoral lamellae also
brownish red *G. hikuerensis*

33. *Glossodoris atromarginata* (Cuvier, 1804), Fig. 48

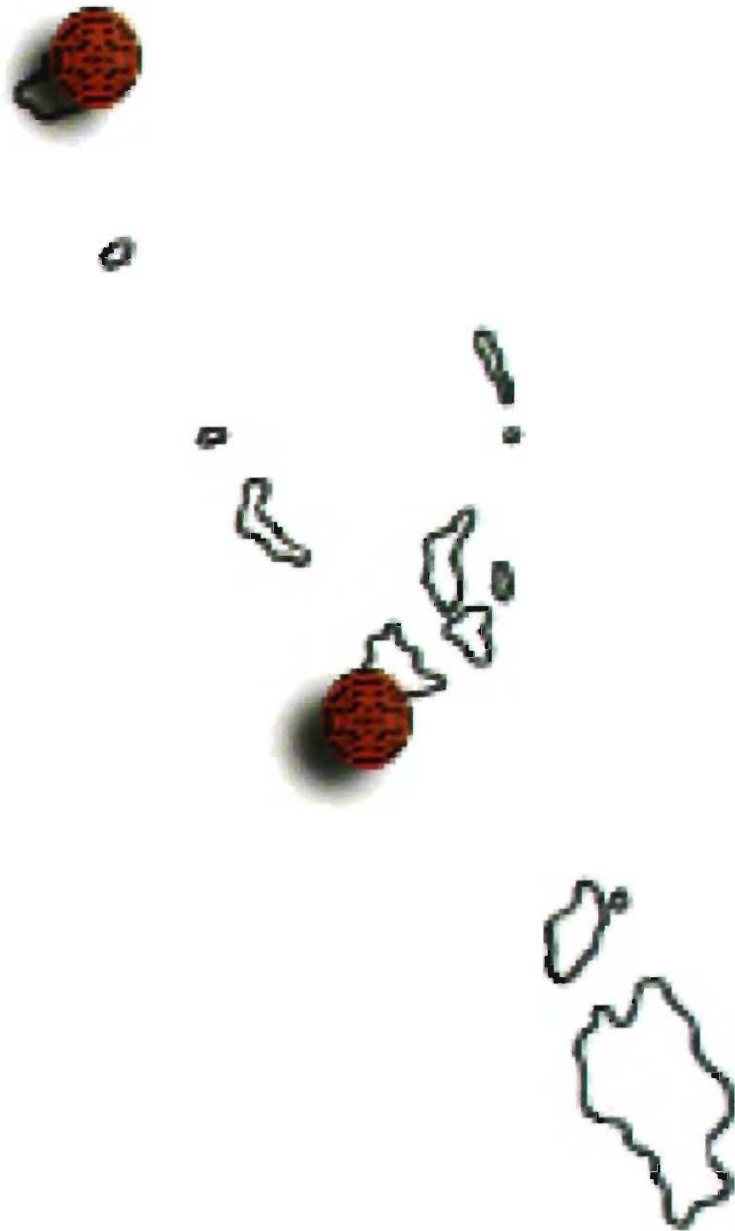
CUVIER, G.L.C.F.D. (1804) Suite de l'extrait des memoires sur les mollusques, par M. Cuvier, contenant la partie anatomique. *Bulletin des Sciences par la Société Philomathique*, Paris, 3(94) : 261-263.

DESCRIPTION : This species ranges in colour from creamy-white to a pale brown. It is characterized by the black line bordering the very sinuous mantle edge, the black edge to the rhinophore pockets, the black rhinophore clubs and the black edging to the simple gills. Although this is the most common species of the group it has been shown recently (Rudman 1986) that there are a number of almost identically coloured species difficult to separate from *G. atromarginata*. Foot is without any bordering or any colouration.

SIMILAR SPECIES : *G. angasi*, *G. sibogae*.

Fig. 48. *Glossodoris atromarginata* (Katchaal, Nicobar Islands).





DISTRIBUTION : Found throughout the tropical and subtropical Pacific and Indian Oceans. India : Nancowry, Car Nicobar, Nicobar Islands.

REMARKS : New Record to Indian waters.

34. *Glossodoris cincta* (Bergh, 1888), Fig. 49

BERGH, L.S.R., 1888. Die Pleuroleutiden, eine Familie der nudibranchiaten Gaströopoden. Zoologische Jahrbücher, Abtheilung für Systematik, *Geographie und Biologie der Thiere*, 3(3):348-364, pls. 10- 11.



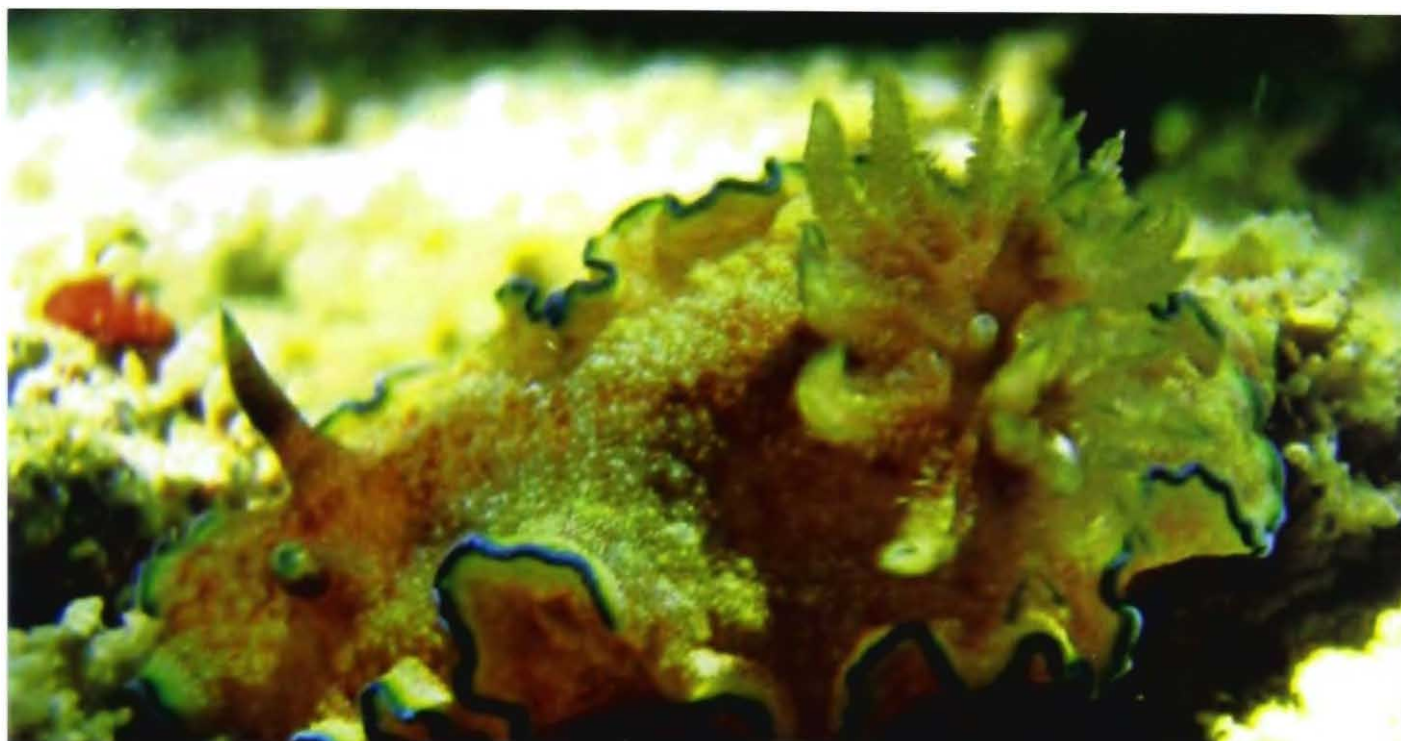
DESCRIPTION : This widespread Indo-West Pacific species seems to have three regional colour forms. The species observed in this area has a bluish outer band on the mantle edge but the inner black and yellow lines tend to merge into a dull khaki band. The dull khaki colour of the mantle extends to the rhinophores and the gills. The rhinophoral tip is also similar to the mantle edge colour combination.

SIMILAR SPECIES : *G. hikuerensis*, *G. pullata*

DISTRIBUTION : Throughout Indo-West Pacific. India : Gulf of Kutch, Ritchies Archipelago, South Andaman.

REMARKS : New record to Andaman and Nicobar Islands.

Fig. 49. *Glossodoris cincta* (Ritchie's Archipelago).



35. *Glossodoris hikuerensis* (Pruvot-fot, 1954), Fig. 50

PRUVOT-FOL, A., 1954. Mollusques Opisthobranches. *Faune de France*, Paris, 58 : 1-460, pl. 1.



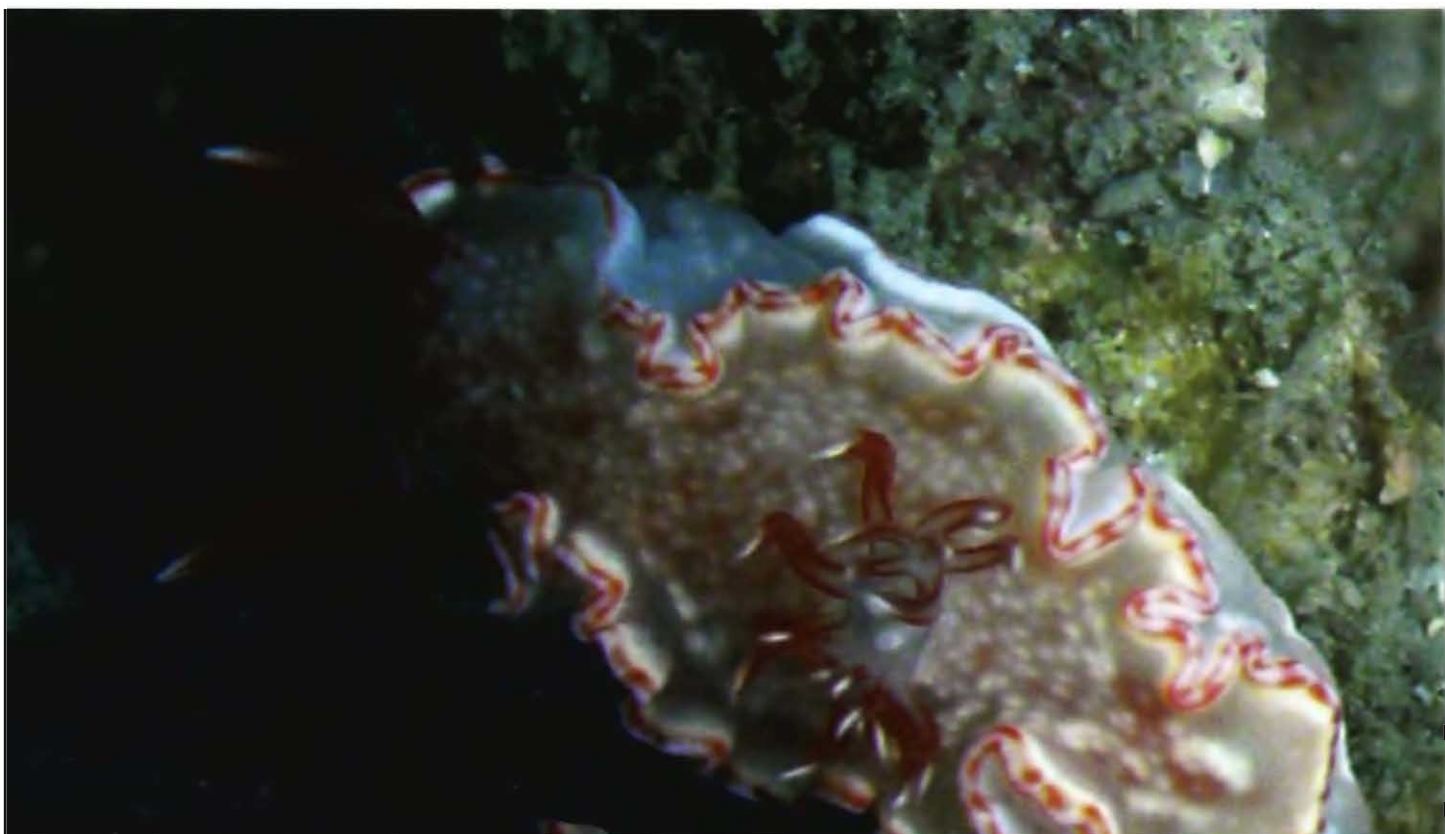
DESCRIPTION : This species is similar in colour and shape to *G. cincta*, but the three bands at the mantle border are wider and different colours. In *G. hikuerensis* there is an outer pale brown band, then a whitish band and an inner dark almost black band. The mantle is pale brown. The rhinophoral lamellae are more brownish as that of the gills. Originally described from the Tuamotu Archipelago, Central Pacific, it has a wide distribution from East Africa to Fiji and Queensland.

SIMILAR SPECIES : *Glossodoris cincta*, *G. pullata*

DISTRIBUTION : Indo-West Pacific. India : Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters.

Fig. 50. *Glossodoris hikuerensis* (Ritchie's Archipelago)



**Key to the species of genus *Hypselodoris* recorded
from Andaman and Nicobar Islands**

- 1a. Blue to purple in colour with yellow to orange tipped
rhinophores and gills *H. bullockii*
- 1b. Yellow in colour with reddish orange rhinophores and
gills. Mantle has brownish lines *H. emma*
- 1c. Brown colour mantle with brown and white coloured
rhinophores and gills *H. krakatoa*
- 1d. Translucent white rhinophore and gills with a broad orange
band at the base *H. maculosa*
- 1e. Rhinophores and the gills orange red in colour
..... *H. nigrostriata*
- 1f. Rhinophores and the gills are red in colour with white
base *H. sagamiensis*
- 1g. Rhinophores and gills are blue with red tip *H. zebrina*

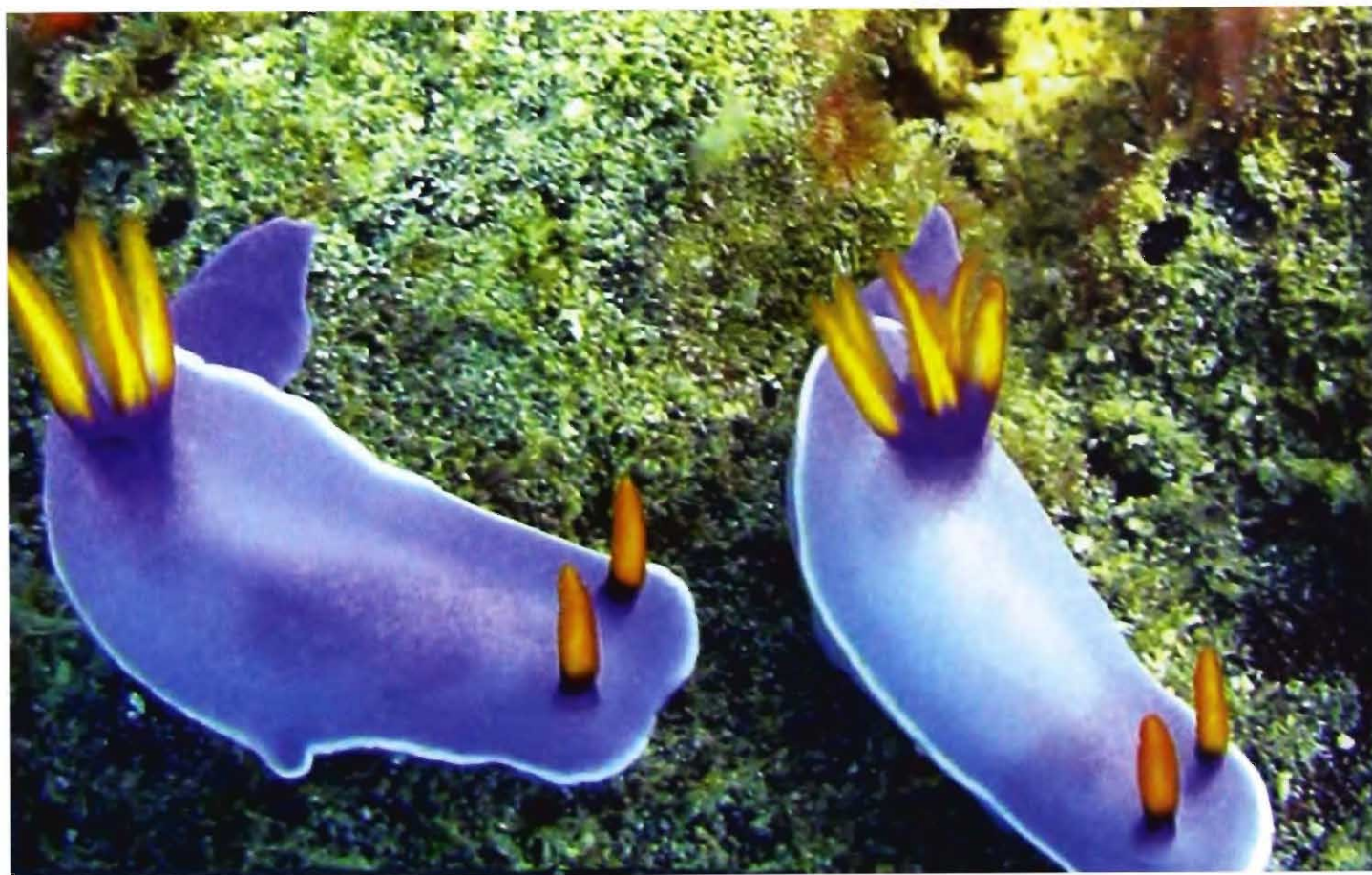
36. *Hypselodoris bullocki* (Collingwood, 1881), Fig. 51

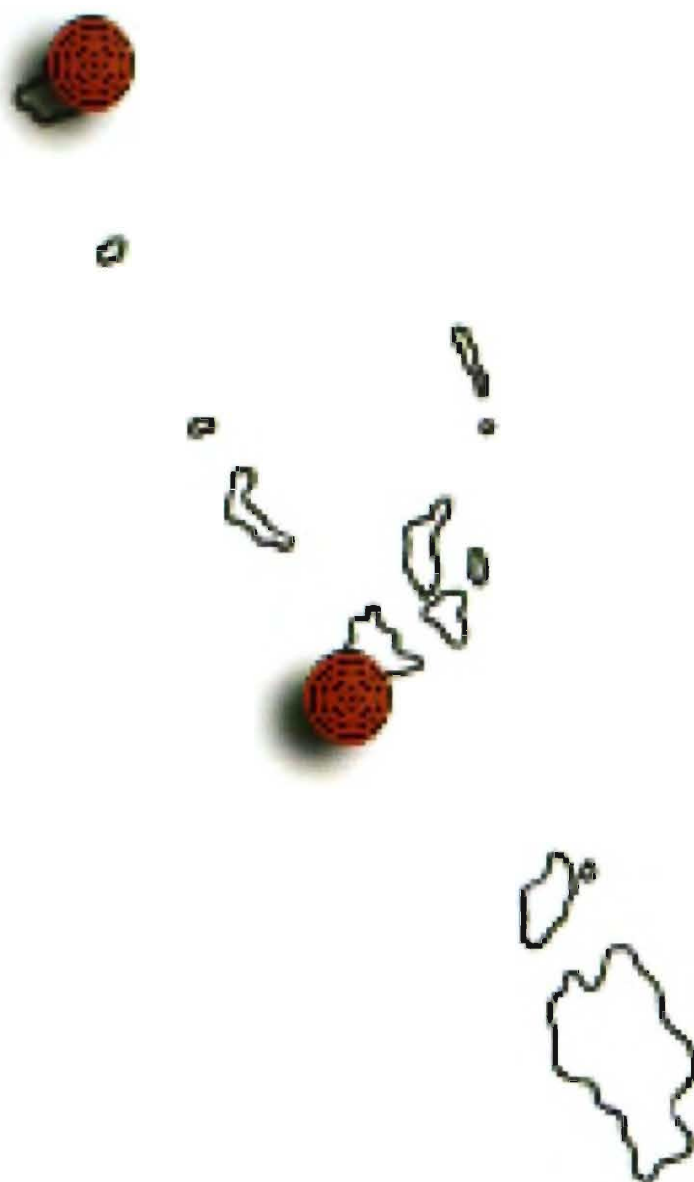
COLLINGWOOD, C. (1881) On some new species of nudibranchiate Mollusca from the eastern seas. *Transactions of the Linnean Society of London, Zoology*, series, 2, 2(2) : 123-140, pls. 9-10.

DESCRIPTION : It ranges in colour from a pale straw, or even white background to a deep purplish pink. The species observed was bluish in color. There is a thin opaque white line at the mantle border. Typically the gills and rhinophores are yellow or orange with a basal pink or purplish band. The mantle is smooth and without any colour or other ornamentations. Rhinopore is yellow to orange with a dark blue to purple base. Observed to be feeding on sponges. The sand covered sponges mostly look like algae, which may mislead about their food habit.

SIMILAR SPECIES : *H. apolegma*

Fig. 51. *Hypselodoris bullocki* (Katchaal, Nicobar Islands).





DISTRIBUTION : Tropical western Pacific and eastern Indian Ocean. India : Katchal, Car Nicobar, Nicobar Islands.

REMARKS : New Record to Indian waters

37 *Hypselodoris emma* Rudman, 1977, Fig. 52

RUDMAN, W.B. (1977) Chromodorid opisthobranch Mollusca from East Africa and the tropical West Pacific. *Zoological Journal of the Linnaean Society*, 61 : 351-367



DESCRIPTION : The body is a pale cream or yellow with a purple or bluish border to both the foot and the mantle. There are three purple longitudinal lines on the mantle and four brownish lines which vary in intensity in different individuals. The gills and rhinophores are a brilliant reddish orange and in Pacific specimens there is a white tip to the rhinophores. The middle longitudinal line is discontinuous. All the longitudinal lines bordered with white colour

SIMILAR SPECIES : *H. colemani*, *H. maridadilus*, *H. whitei*

DISTRIBUTION : Throughout the tropical Indo-West Pacific. India : Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters.

Fig. 52. *Hypselodoris emma* (Ritchie's Archipelago).



38. *Hypselodoris krakatoa* Gosliner and Johnson, 1999, Fig. 53

GOSLINER, T.M. and JOHNSON, R.F. (1999) Phylogeny of *Hypselodoris* (Nudibranchia: Chromodorididae) with a review of the monophyletic clade of Indo-Pacific species, including descriptions of twelve new species. *Zoological Journal of the Linnean Society*, 125 : 1-114.

DESCRIPTION : The colour pattern is complex but consists basically of a pale brown background colour. On the mantle there is a broad dark brown band around the mantle edge and transverse band of the same colour across the midway between the gills and the rhinophores, forming a figure of eight pattern. There is a longitudinal row of bright white spots down the dorsal midline and a submarginal row of spots which runs around the mantle edge. The rhinophore clubs are brown with a white tip and the gills are brownish with white spots up the outer edge of the rachis. The body is relatively high in profile, and the name *krakatoa*, from an Indonesian island which exploded in a massive volcanic eruption, refers to the high volcano-like gill pocket.

Fig. 53. *Hypselodoris krakatoa* (Ritchie's Archipelago)





SIMILAR SPECIES : *Glossodoris cincta*

DISTRIBUTION : Taiwan, Japan, Philippines, Indonesia, PNG, Thailand, Malaysia. India : Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters.

39. *Hypselodoris maculosa* (Pease, 1871), Fig. 54

PEASE, W. H. (1871) Descriptions of new species of nudibranchiate Mollusca inhabiting Polynesia. No.2. *American Journal of Conchology* 7(1) : 11-19, pls. 3-9.

DESCRIPTION : The mantle colour varies from place to place. The background colour of the mantle is a pale milky orange-brown. Around the anterior of the mantle is a broad translucent pinkish-purple margin with scattered white and darker pinkish-purple spots. At the posterior end the margin is similarly coloured but the band is not as broad. From the level of the rhinophores back to the gill pocket, there is a broad orange band at the edge. Running down the central part of the mantle is a purple line which is not continuous. The rhinophore stalks are translucent white and the clubs are white with a broad orange band at the base and another just below the tip. On the sides of the body there are white lines and streaks running parallel to the edge of the foot and some pinkish-purple spots.

SIMILAR SPECIES : *Thorunna australis*

Fig. 54. *Hypselodoris maculosa* (Ritchie's Archipelago).





DISTRIBUTION : Found throughout the tropical western Pacific and Indian Oceans. India : Aberdeen Bay, Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters.

40. *Hypselodoris nigrostriata* (Eliot, 1904), Fig. 55

ELIOT, C. N. E. 1904. On some nudibranchs from east Africa and Zanzibar. Part IV. *Proceedings of the Zoological Society of London*, 1 : 380-406, pls. 23-24.



DESCRIPTION : In colour this species is characterised by the dark blackish lines, usually diagonal, and the yellowish patches between. The background colour of the body has a bluish, the rhinophores are orange red and the gills, triangular in cross-section are edged with the same colour. There is a typical 'W' shaped black line on the cephalic region.

SIMILAR SPECIES : *H. nigrolineata*, *H. maritima*, *H. kanga*, *H. zephyra*.

DISTRIBUTION : Throughout Indian Ocean. India : Visakhapatnam or Madras (Eliot 1906), Ritchies Archipelago, South Andaman.

REMARKS : New record to Andaman and Nicobar Islands.

Fig. 55. *Hypselodoris nigrostriata* (Ritchie's Archipelago).



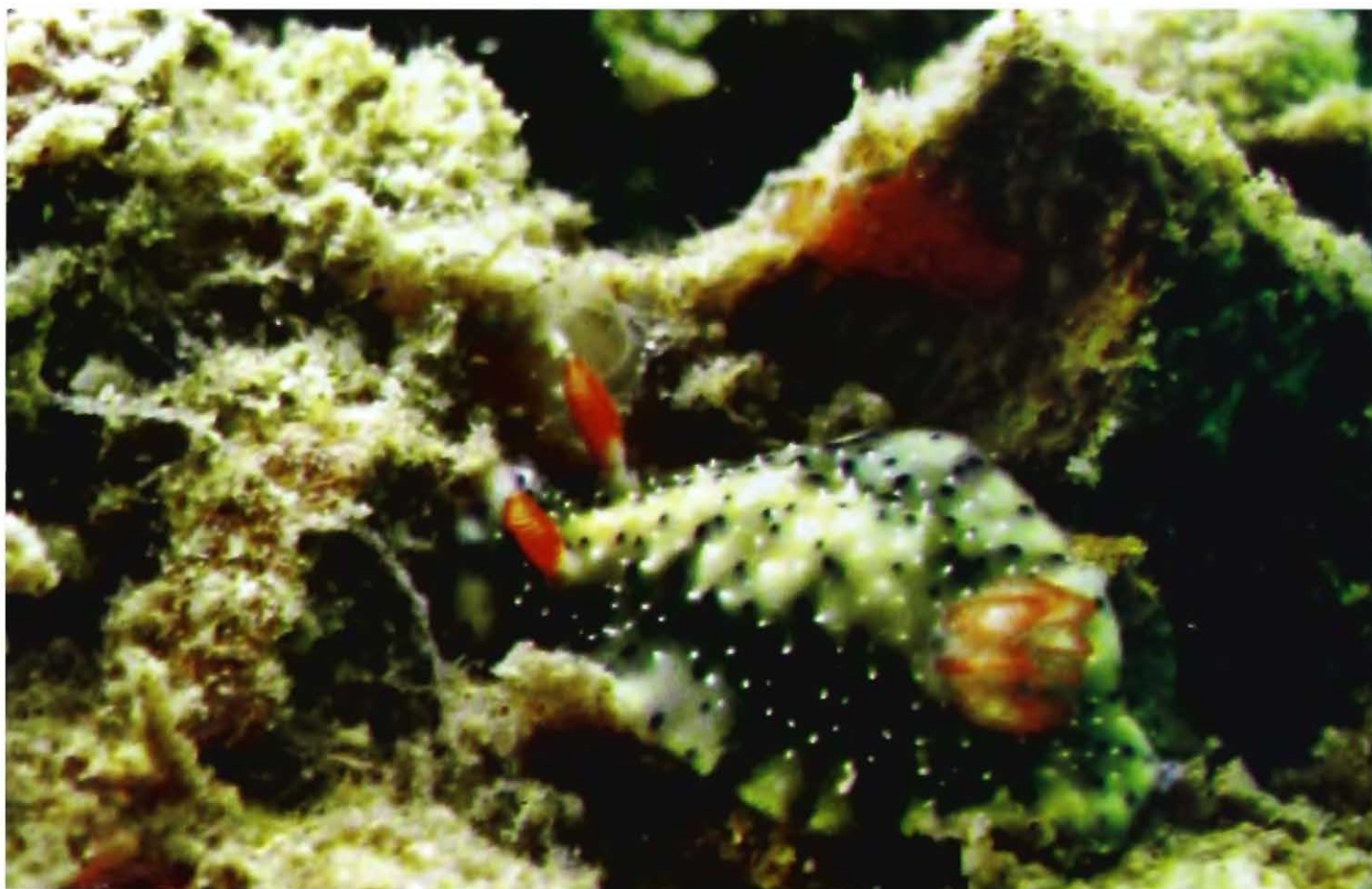
41. *Hypselodoris sagamiensis* (Baba, 1949), Fig. 56

BABA, K. (1949) *Opisthobranchia of Sagami Bay collected by His Majesty the Emperor of Japan*. Iwanami Shoten, Tokyo. 194 pp., 50 Pls.

DESCRIPTION : Mantle translucent, sometimes with much of the mantle covered with opaque white. There are smaller black spots scattered over the mantle and some larger diffuse black patches forming a band around the mantle just at the outer edge of the visceral mass. At the edge of the mantle is a band of purple, usually entire around the anterior end but breaking into a series of patches along the sides. Inside the purple margin is a broken band of orange-yellow. The rhinophore stalk is white and the club red. The simple gills are translucent white with red edging. The low pustules covering the mantle are a characteristic feature of the species. This species is one of only two species of *Hypselodoris* which are reported to lack mantle glands.

SIMILAR SPECIES : *H. rudmani*, *H. infucata*

Fig. 56. *Hypselodoris sagamiensis* (Ritchie's Archipelago)





DISTRIBUTION : Japan, Indonesia, Queensland. India :
Ritchies Archipelago, South Andaman.

REMARKS : First time report in Indian Ocean

42. *Hypselodoris zebrina* (Alder and Hancock, 1864), Fig. 57

ALDER, J. and HANCOCK, A. (1864) Notice of a collection of nudibranchiate mollusca made in India by Walter Elliot Esq., with descriptions of several new genera and species. *Transactions of the Zoological Society of London*, 5 : 113-147.

DESCRIPTION : Extract from the original description describing the colour pattern: "*white with waved crimson stripe down the centre of the back and transverse stripes of the same colour (of unequal lengths) at the sides and around the ends; there are largish yellow spots down each side of the central stripe and between the transverse ones near the margin; a crimson stripe also runs from the cloak along a ridge to the tail.*"

The yellow spots, radial purple lines, and purple dorso-median line down the posterior foot are all very characteristic features found in no other species of chromodorid. The species was originally placed in the genus *Chromodoris*. Although no anatomical information is available the general body shape and colour pattern would suggest that it is most likely to be a species of *Hypselodoris*. Rudman suggests this species may be a colour form of *H. kanga* (Sreeraj, C.R., 2009).

Fig. 57. *Hypselodoris zebrina* (Ritchie's Archipelago)





SIMILAR SPECIES : *Hypselodoris kanga*, *Hypselodoris nigrostrata*, *Hypselodoris zephyra*

DISTRIBUTION : Thailand. India : Madras region, Ritchies Archipelago, South Andaman.

REMARKS : New record to Andaman and Nicobar Islands; First time reporting in India after 145 years, when it was described from Madras region.

43. *Mexichromis multituberculata* (Baba, 1953), Fig. 58

BABA, K. (1953). Three new species and two new records of the genus *Glossodoris* from Japan. *Publications of the Seto Marine Biological Laboratory*, 3 : 205-211.



DESCRIPTION : *M. multituberculata* was considered to differ from the other western Pacific species of *Mexichromis* in having purple spots around the edge of the mantle rather than yellow or orange. The mantle has scattered purple-tipped tubercles. However many reports were published the animals with reddish, purple, blue or orange spots around the mantle edge. The mantle waxy white in colour, with blue tipped tubercles.

SIMILAR SPECIES : *Mexichromis festiva*, *Mexichromis macropus*, *Mexichromis mariei*

DISTRIBUTION : Seto, Kii, Japan and Hainan Island, Hong Kong, Sulawesi, Thailand, PNG. India : Ritchies Archipelago, South Andaman.

REMARKS : First time report in Indian Ocean region.

Fig. 58. *Mexichromis multituberculata* (Ritchie's Archipelago)



**Key to the species of genus *Risbecia* recorded from
Andaman and Nicobar Islands**

- 1a. Mantle is white in colour with yellow spots and purple coloured edge *R. ghardaqana*
- 1b. Mantle creamy white with purple tinged marking. Orange spots scattered all over the mantle *R. pulchella*

44. *Risbecia ghardaqana* (Gohar and Aboul-Ela, 1957), Fig. 59

GOHAR, H.A.F., and I. A. ABOUL-ELA. 1957. The development of three chromodorids (with the description of a new species). *Publications of the Marine Biological Station, Al-Ghardaqa, Egypt*, 9 : 203-228, pls. 1-5.

DESCRIPTION : *Risbecia ghardaqana* occurs sympatrically in the Red Sea, and probably elsewhere in the Indian Ocean, with *Chromodoris annulata* and *Risbecia pulchella*. Gohar & Aboul-Ela (1957) reported on the anatomy and developmental biology of the similar yellow-spotted chromodorids from Al Ghardaqa, on the Egyptian Red Sea coast, and it was in this publication that *Risbecia ghardaqana* was recognised a distinct species, which although very similar to the common *Risbecia pulchella*, differs in a few colour, anatomical and developmental differences. Rudman (1987) placed the species in the genus *Risbecia*. Compared with *R. pulchella* which grows

Fig. 59. *Risbecia ghardaqana* (Ritchie's Archipelago).





to approx 11cm, *R. ghardaqana* only grows to approx 5.5cm long. The ground colour of the body is white and there are no violet tinged patches. The spots on the mantle and sides of body are yellow not orange and much fewer in number than in *R. pulchella*. The anterior end of the mantle is not produced into a prominent veil like *R. pulchella* and the mantle border is bright blue not violet. The gills are simple and although a few may bifurcate they are never as branched as in *R. pulchella*.

SIMILAR SPECIES : *Risbecia imperialis*, *Risbecia pulchella*, *Chromodoris annulata*.

DISTRIBUTION : Red Sea, Indian Ocean (Oman, Thailand). India : Ritchies Archipelago, South Andaman

REMARKS : New Record to Indian waters.

45. *Risbecia pulchella* (Ruppell and Leuckart, 1828), Fig. 60

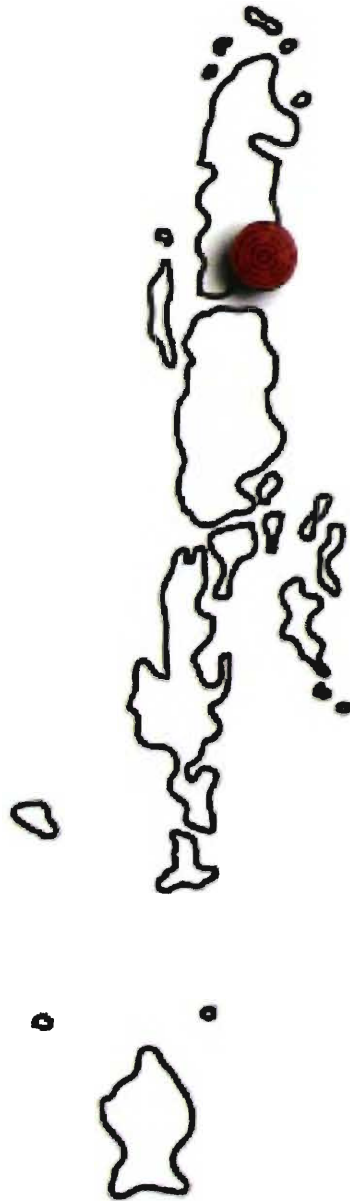
RÜPPELL, WILHELM PETER EDUARD SIMON, and F. S. LEUCKART, 1831. [for 1828]. Mollusca. In: Atlas zu der Reise im nördlichen Afrika von Eduard Ruppell Erste Abtheilung Zoologie Neue wirbellose Thiere des Rothen Meers, pp. 15-47, pls. 1-12.

DESCRIPTION : Opaque creamy white mantle, marked by a bluish purple tinge in irregular areas on the mantle and sides of the foot. All the dorsal surface of the mantle and the foot is covered with yellowish orange spots of irregular shape and different sizes. The mantle margin is fringed with a thin border of bright bluish violet. The rhinophores are blue in colour. The gills are simple and creamy yellow in colour with an orange coloured line. The gills are often branched and wave rhythmically from side to side. The front part of mantle has an inward curving typical to this species.

SIMILAR SPECIES : *Risbecia imperialis*, *Risbecia ghardaqana*, *Chromodoris annulata*.

Fig. 60. *Risbecia pulchella* (Mayabunder, North Andaman)





DISTRIBUTION : Indian Ocean. Relatively common in the Red Sea and East Africa. India : Mayabunder, North Andaman.

REMARKS : New Record to Indian waters.

FAMILY : DENDRODORIDIDAE O'Donoghue, 1924

The dendrodorids are large and moderately to extremely elongate, soft-bodied dorids. The mantle has a broad skirt and is usually smooth but its surface can be pustulose or tuberculate. The leading edge of the foot is split transversely with the upper portion forming a cavity into which the mouth opens. The lamellate rhinophores end in a distinct club, and they can be contracted into separate pockets. The complex (usually tripinnate) gills form a circle around the anus towards the posterior end of the dorsum (sometimes extremely so) and they can retract completely into a pocket beneath the mantle. A major characteristic of this family is the loss of radula and jaws and possession of a long, extensible suctorial tube in lieu of the buccal mass. Their prey of siliceous sponges is digested externally and the resulting fluids are sucked into the stomach. Most dendrodorids feed upon non-spiculate sponges.

**Key to the species of genus *Dendrodoris* recorded from
Andaman and Nicobar Islands**

- 1a. Straw coloured mantle with blue spots *D. denisoni*
- 1b. Black coloured mantle with white spots *D. nigra*

46. *Dendrodoris denisoni* (Angas, 1864), Fig. 61

ANGAS, G.F. (1864). Description d'espèces nouvelles appartenant à plusieurs genres de Mollusques Nudibranches des environs de Port-Jackson (Nouvelles-Galles du Sud), accompagnée de dessins faits d'après nature. *Journal de Conchyliologie*, 12 : 43-70.

DESCRIPTION : *Dendrodoris denisoni* is a widespread common species throughout the Indo-West Pacific. Not surprisingly it has been given a number of different names including *Dendrodoris gemmacea* (Alder & Hancock, 1864), which is commonly used for this species in New Zealand. Alder & Hancock's name was published a matter of months after Angas's *D. denisoni* so the latter has priority. Other names which are probably synonyms include *Doridopsis clavulata* Alder & Hancock, 1864, *Doridopsis mammosa* Abraham, 1877 and *Dendrodoris arenosa* Risbec. Another name, *Dendrodoris gunnamatta* Allan, 1932 probably applies to a darker colour form found in coastal New South Wales in which the blue spots are very small or absent. The tubercles are large and pink tipped. The blue spots are easily noticeable than the black

Fig. 61. *Dendrodoris denisoni* (Ritchie's Archipelago).





spots which are much more in number. The mantle is straw coloured, and the same with rhinophore also.

SIMILAR SPECIES : *D. coronata*

DISTRIBUTION : Tropical and warm temperate Indo-West Pacific. India : Ritchies Archipelago, South Andaman.

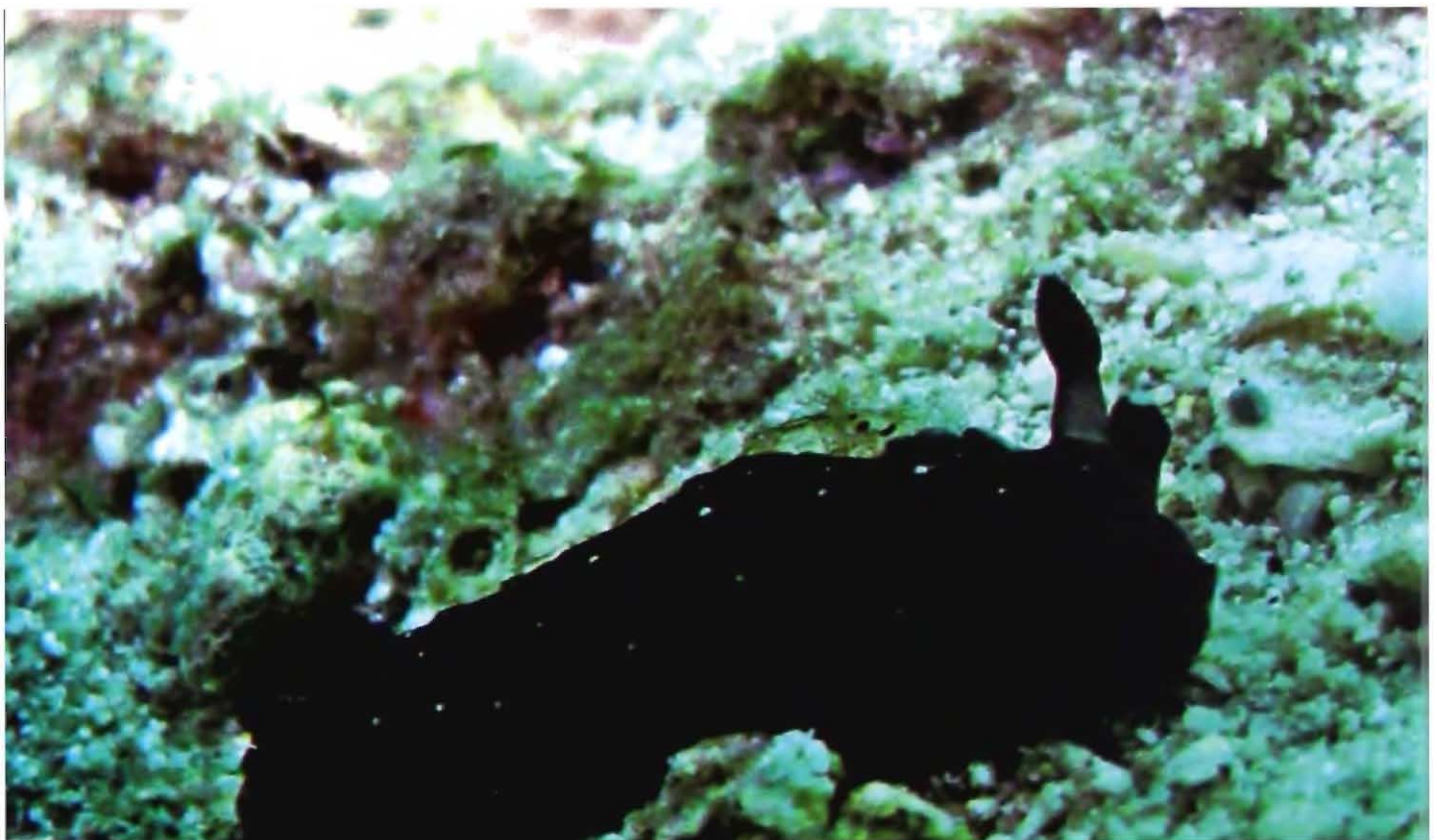
REMARKS : New Record to Indian waters.

47. *Dendrodoris nigra* (Stimpson, 1855), Fig. 62

STIMPSON, W. (1855). Descriptions of some of the new marine Invertebrata from the Japanese and Chinese Seas. *Proceedings of the Academy of Natural Sciences of Philadelphia*, 7(10) : 375-384.

DESCRIPTION : As the name implies the animal is black in colour. Have clusters of white spots on the mantle. Pease (1871) also gave different names (*D. debilis*, *D. sordida*, *D. rubrilineata*), to colour forms of this species from Tahiti, and Bergh's species, *D. affinis*, again from Tahiti, is also a synonym. Most external differences between *D. nigra* and *D. fumata* are comparative, for example, *D. nigra* is more elongate when crawling than *D. fumata*. The position and nature of the gills would appear to be characteristic. In *D. nigra* the gills are relatively numerous and form a compact circle around the anus at the extreme posterior end of the dorsum. The rhinophoral tip is white in colour. The white spots on the mantle are prominent on the centre and number decreases or nil in the edges.

Fig. 62. *Dendrodoris nigra* (Ritchie's Archipelago).





SIMILAR SPECIES : *Dendrodoris fumata*, *Dendrodoris communis*

DISTRIBUTION : Tropical to warm temperate Indo-west Pacific. India : Madras, Gulf of Mannar, Ritchies Archipelago, South Andaman.

REMARKS : New record to Andaman and Nicobar Islands.

FAMILY : GONIODORIDIDAE H. and A. Adams, 1854

Usually the body is only quite small (*i.e.* less than 30 mm crawling length). The rhinophores are long, tapered, and lamellate, sometimes sparsely so, and although contractile possess no pocket or sheath. Their simple gills are contractile, but do not possess a pocket for retraction under the surface of the mantle. They form a circle around the anal papilla posteriorly on the midline of the dorsum. There can be as few as three small and simple gills. The oral veil forms either flattened lateral lobes or a pair of long tentacles. Species of the genus *Trapania* also have a pair of long extra-rhinphoral papillae. The mantle skirt can be reduced to a lateral ridge which may have a few processes or may have a distinct brim that is sometimes enlarged into a flange at the level of the gills. The dorsum can have a midline ridge with papillae that can range from short to very long processes either side of the gills. The foot tapers posteriorly to either a rounded point, or it can be sharper and deeper like a keel. They prey on bryozoans or ascidians.

48. *Goniodoridella savignyi* Pruvot-Fol, 1933, Fig. 63



PRUVOT-FOL, A. (1933). Mission Robert Ph. Dollfus en Egypte. Opisthobranchiata. *Memoires de l'Institute d'Egypte*, 21 : 89-159.

DESCRIPTION : The animal observed was very small in size (>1.5 cm). The rhinophore is large; more than half the body size. The mantle is milky white in colour with yellow longitudinal line in the middle of the mantle. The mantle edge is also yellow in colour. Gills are white in colour. The tail is long and tapering.

DISTRIBUTION : Throughout the tropical and subtropical Indo-west Pacific. India Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters.

Fig. 63. *Goniodoridella savignyi* (Ritchie's Archipelago).



FAMILY : HEXABRANCHIDAE Bergh, 1891

Spanish dancers, as members of this family are called, are large and soft bodied with a broad and sinuous mantle skirt that is normally furled over the dorsal surface of the body. They have peculiar, large, plate-shaped oral tentacles possessing papillae along the outer edge. The lamellate rhinophores are clubbed at the distal end and are able to contract into separate pockets. There are six, separate, compound gills on the posterior end of the dorsum forming a circle around the anus. These are contractible but are not able to be retracted into pockets below the mantle surface. They are able to swim with dorso-ventral flexions of the body combined with undulations of the unrolled mantle skirt presenting a flamboyant display.

They have a wide tropical to sub-tropical distribution. Hexabbranchids are believed to feed upon a variety of siliceous sponges.

49. *Hexabranhus sanguineus* (Ruppell and Leuckart, 1828)

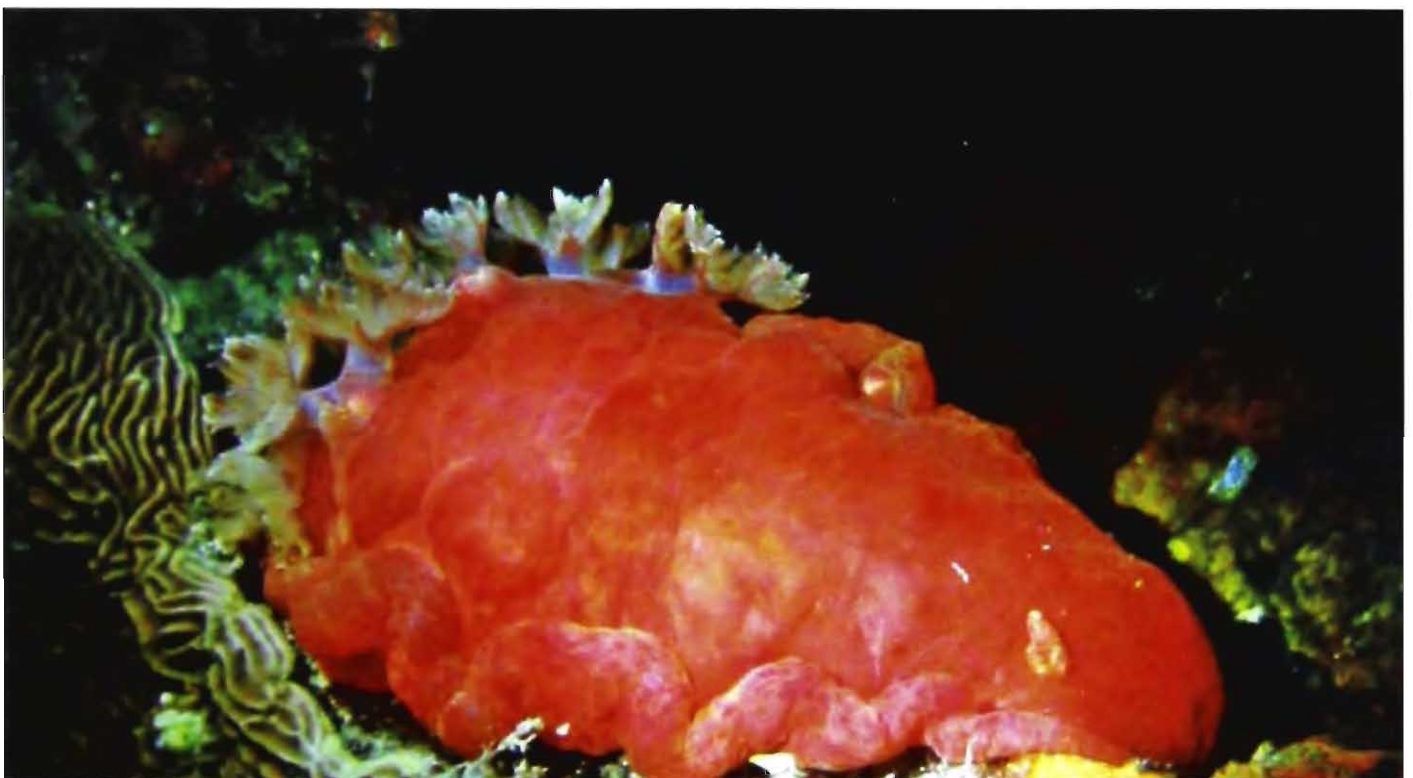
Fig. 64

RÜPPELL, WILHELM PETER EDUARD SIMON, and F. S. LEUCKART, 1831. [for 1828]. Mollusca. In: Atlas zu der Reise im nördlichen Afrika von Eduard Ruppell Erste Abtheilung Zoologie Neue wirbellose Thiere des Rothen Meers, pp. 15-47, pls. 1-12. [Nudibranchia pp. 15-18, 27-37, pls. 4-5, 8-11].

DESCRIPTION : Widely distributed in Andamans but rarely come in front of the diver. The egg mass, called the sea rose is a common seen in all the reefs in Andaman Islands. Dark red mantle with straw coloured gills and rhinophores. The mottled form is the most common colour form, although yellow animals have been reported from Hawaii and from Tanzania. Apart from being able to swim, *Hexabranhus* is an unusual member of the Superfamily Eudoridoidea in that its gills do not have a gill pouch into which the gills can retract. Also each gill is inserted separately into the body wall. *Hexabranhus sanguineus* is one of the largest of all nudibranchs with animals being recorded at over 40cm in length.

SIMILAR SPECIES : *H. marsomus*

Fig. 64. *Hexabranhus sanguineus* (Ritchie's Archipelago).





DISTRIBUTION : Tropical Indo-West Pacific. India : Commonly seen in South Andaman (Wandoor, Rutland, Pongibalu, Chidiyatappu, Ritchies Archipelago, Carbines cove, North Bay).

REMARKS : New Record to Indian waters.

FAMILY : POLYCERIDAE Alder & Hancock, 1845

SUBFAMILY : NEMBROTHINAE Burn, 1967

Polycerids have an elongate and high body shape. The only remnant of mantle skirt is the rounded frontal veil with the margin often possessing tentacular processes and also sometimes a few papillae connected by a ridge down the sides of the body tapering to the tail. In some species the oral tentacles are well-developed into wide lappets. The rhinophores are lamellate, retractile into a pocket, and sometimes have a sheath. The gills are non-retractile and in some are simply bipinnate or tripinnate and limited in number and arranged on the dorsum as a circle, an arch, or a row. In others (genus *Nembrotha*, *Roboastra*, and *Tambja*) the gills are carried as a high, prominent cluster midway down the dorsum. Some polycerids, such as the genus *Polycera*, bear a few, large papillae near the gills. In the genus *Thecacera* these extrabranchial processes can be quite considerable in size. Most polycerids feed upon bryozoans and their lifecycle is governed by the short life span of those bryozoans. Members of the genus *Nembrotha* feed on ascidians.

**Key to the species of genus *Nembrotha* recorded from
Andaman and Nicobar Islands**

- 1a. White mantle with orange striations *N. lineolata*
- 1b. White mantle with irregular brown patches
..... *N. purpureolineata*

50. *Nembrotha lineolata* (Bergh, 1905), Fig. 65

BERGH, L.S.R. 1905. Malacologische Untersuchungen. In: Reisen im Archipel der Philippinen von Dr. Carl Gottfried Semper. Zweiter Theil. Wissenschaftliche Resultate. Band 9, Theil 6, Lief. 2, pp. 57-118, pls. 5-8.

DESCRIPTION : One of the brilliantly coloured nudibranchs. Mantle creamy in colour with many bright red lines on the body. Mantle edge bluish in colour, with many dark blue spots. The lines on the mantle are discontinuous. The gills are red with white edging. The rhinophoral lamellae also bright red in colour.

SIMILAR SPECIES : *N. livingstonei*

DISTRIBUTION : Tropical Pacific Ocean and western Indian Ocean (Malaysia). India : Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters.



Fig. 65. *Nembrotha lineolata* (Ritchie's Archipelago).

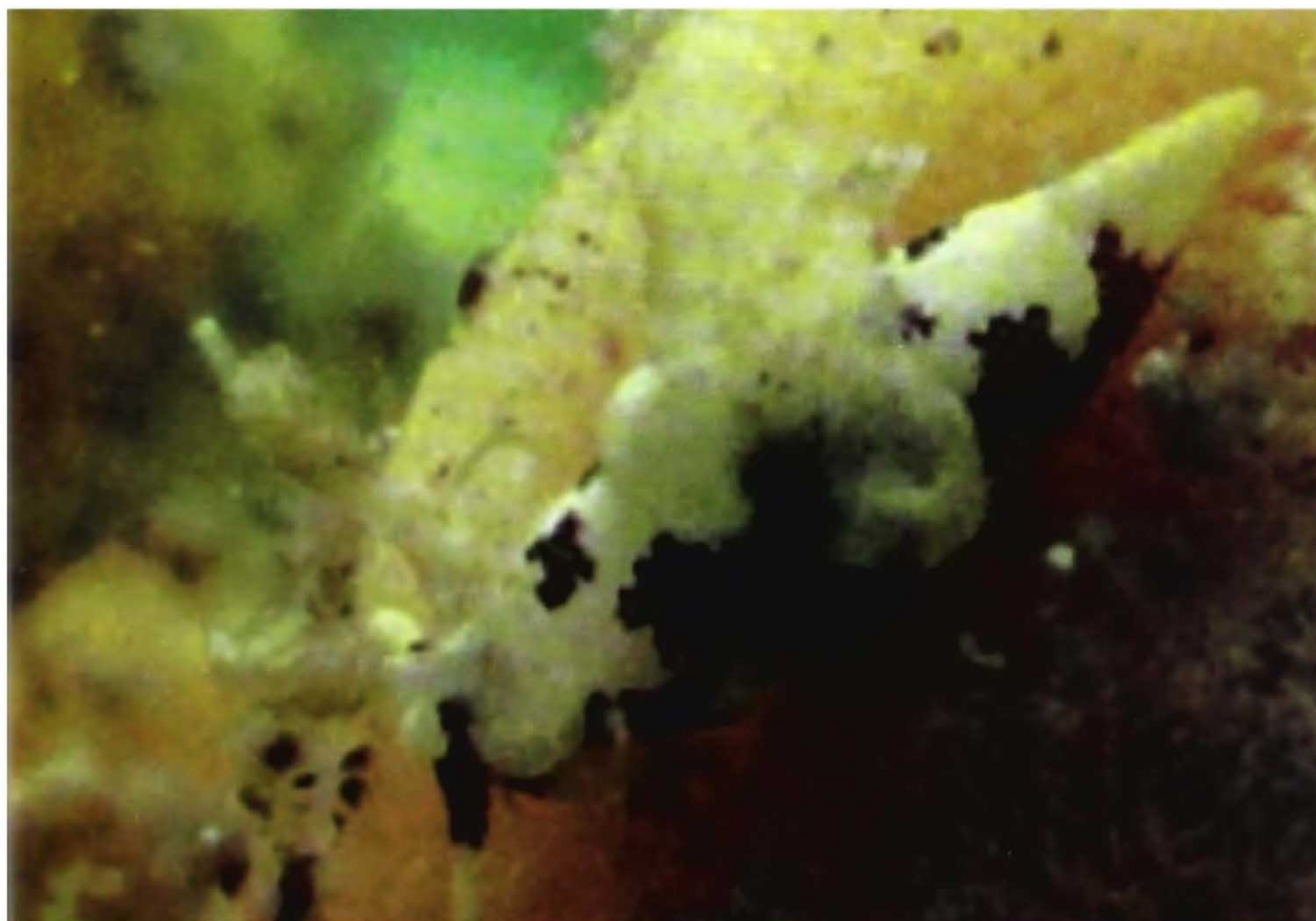


51. *Nembrotha purpureolineata* O'Donoghue, 1924, Fig. 66

O'DONOGHUE, C. H. (1924) Report on Opisthobranchiata from the Abrolhos Islands, Western Australia, with description of a new parasitic copepod. *Journal of the Linnean Society, London*, 35 : 521-579, Pls. 27-30.

DESCRIPTION : The background colour is creamy white, but much of this is obscured by a large brown, characteristically shaped patch which covers most of the dorsum. There is a brown band running around the head and anterior end of the mantle. Brown patch is broken into a few broad irregular longitudinal patches. The rhinophore sheaths are white in colour. The rhinophore clubs are red or orange-red and the stalk is usually pink or purple. The gills are orange or reddish orange and the gill stalks are white with some pink or purple colouration. The foot is edged with purple or at least faint traces of purple.

Fig. 66. *Nembrotha purpureolineata* (Ritchie's Archipelago).





SIMILAR SPECIES : *N. rutilans*, *N. aurea*

DISTRIBUTION : Tropical Indo-West Pacific. India : Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters.

SUPERFAMILY : ANADORIDOIDEA Odhner, 1968

FAMILY : GYMNODORIDIDAE Odhner, 1968

The size of adults ranges from small to large. The body is soft and elongate, and it tapers posteriorly to a tail. The body may be covered with low pustules. Some gymnodorids have translucent bodies with the viscera clearly visible and the viscera become even more noticeable when they are engorged. The mantle is much reduced with the skirt represented by a small ridge around the anterior end. The rhinophores are non-retractile and lamellate. The gills are non-retractile, small, simply pinnate and arranged around the anus as a circle (in *Gymnodoris*) or in a transverse line (in *Analogium*). Gymnodoridids are most often observed crawling very quickly across the substrate on the hunt for prey, which are other opisthobranchs.

**Key to the species of genus *Gymnodoris* recorded
from Andaman and Nicobar Islands**

- 1a. Translucent white body with reddish to orange markings 2
- 1b. Translucent white body with yellow markings 3
- 2a. Body scattered with small orange spots *G. ceylonica*
- 2b. Body densely covered with reddish orange spots which are more or less circles *G. rubropapulosa*
- 2c. Body covered with orange dashes *G. striata*
- 3a. Yellow dots arranged in rows along the body *G. citrina*
- 3b. Yellow lines on the body *G. subflava*

52. *Gymnodoris ceylonica* (Kelaart, 1858), Fig. 67

KELAART, E.F. (1858). Description of a new Ceylonese nudibranch. *Annals & Magazine of Natural History, (Ser. 3), 1(4)* : 257-258, Pl. 10B.

DESCRIPTION : First reported by Kelaart (*Trevelyana ceylonica*) from Sri Lanka. This widespread Indo-West Pacific species was next reported from the Society Islands in the western Pacific by Pease (as *Trevelyana picta*). It is characterised by the translucent white body with small bright orange-red spots and large orange-lined white gills. The rhinophores yellow in colour. The white gills lined with orange colour.

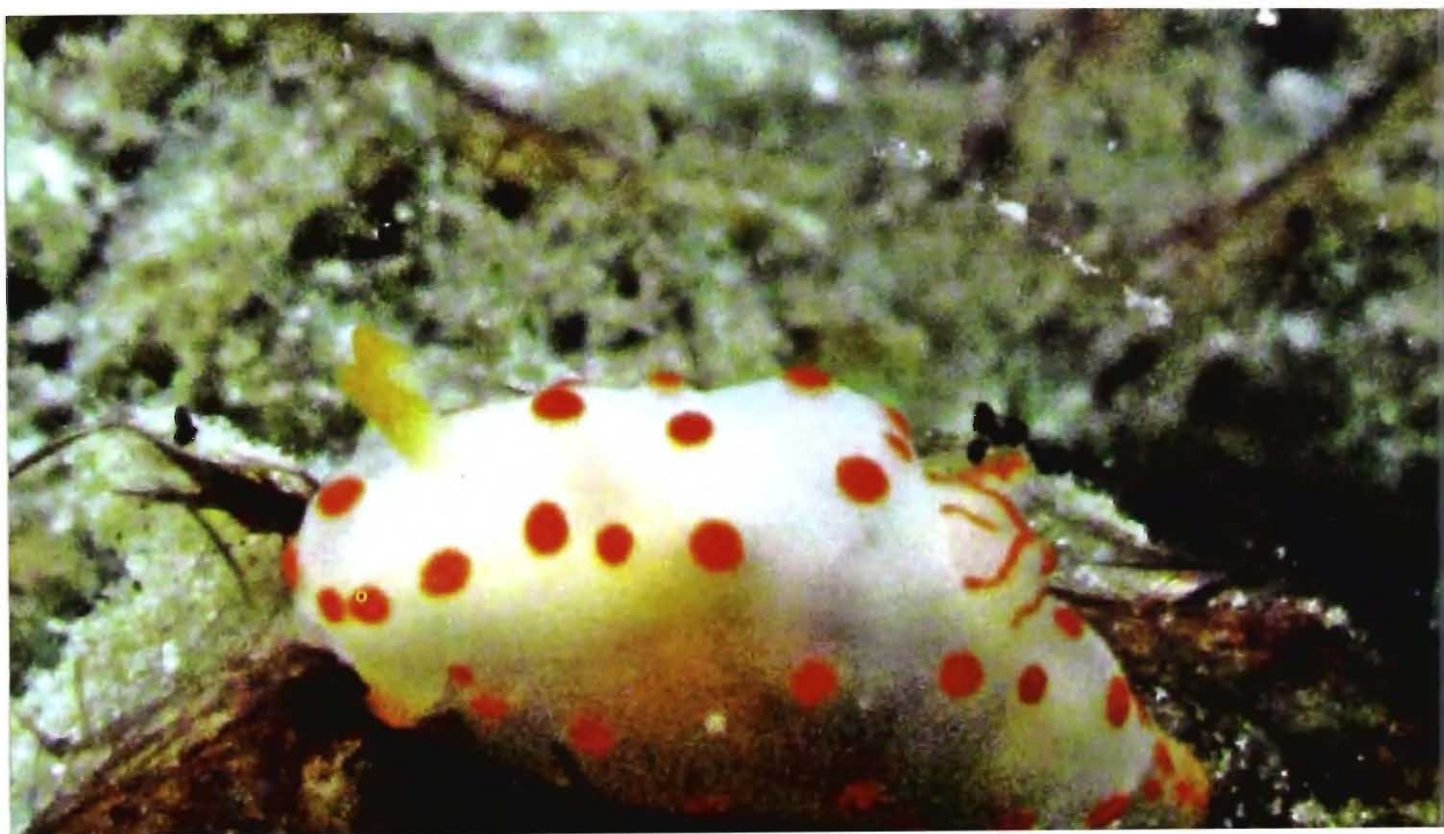
SIMILAR SPECIES : *G. citrina*

DISTRIBUTION : Widespread in Indo-West Pacific. India : Gulf of Kutch, Ritchies Archipelago, South Andaman.

REMARKS : New record to Andaman and Nicobar Islands.



Fig. 67. *Gymnodoris ceylonica* (Ritchie's Archipelago).



53. *Gymnodoris citrina* (Bergh, 1875), Fig. 68

BERGH, L.S.R. (1875). Malacologische Untersuchungen. In : C.G. Semper, *Reisen im Archipel der Philippinen, Wissenschaftliche Resultate. Band 2, Heft, 8* : 315-344, Pls. 40-45.



DESCRIPTION : The translucent white body has many orange-yellow spots. Gills are white in colour. The white rhinophores are tipped with yellow colour. The rhinophoral lamellae are white in colour.

SIMILAR SPECIES : *G. ceylonica*

DISTRIBUTION : Widespread in Indo-West Pacific. India : Laccadives, Ritchies Archipelago, South Andaman.

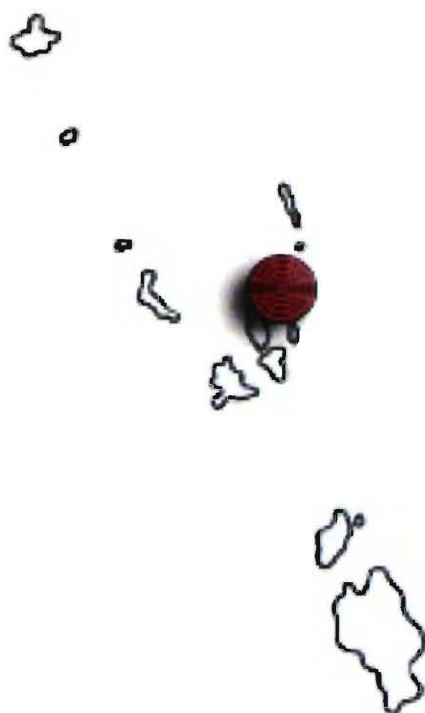
REMARKS : New record to Andaman and Nicobar Islands.

Fig. 68. *Gymnodoris citrina* (Ritchie's Archipelago).



54. *Gymnodoris rubropapulosa* (Bergh, 1905), Fig. 69

BERGH, L. S. R. (1905) Malacologische Untersuchungen. In : Reisen im Archipel der Philippinen von Dr. Carl Gottfried Semper. Zweiter Theil. Wissenschaftliche Resultate. Band 9, Theil 6, Lief. 2, pp. 57-118, pls. 5-8.



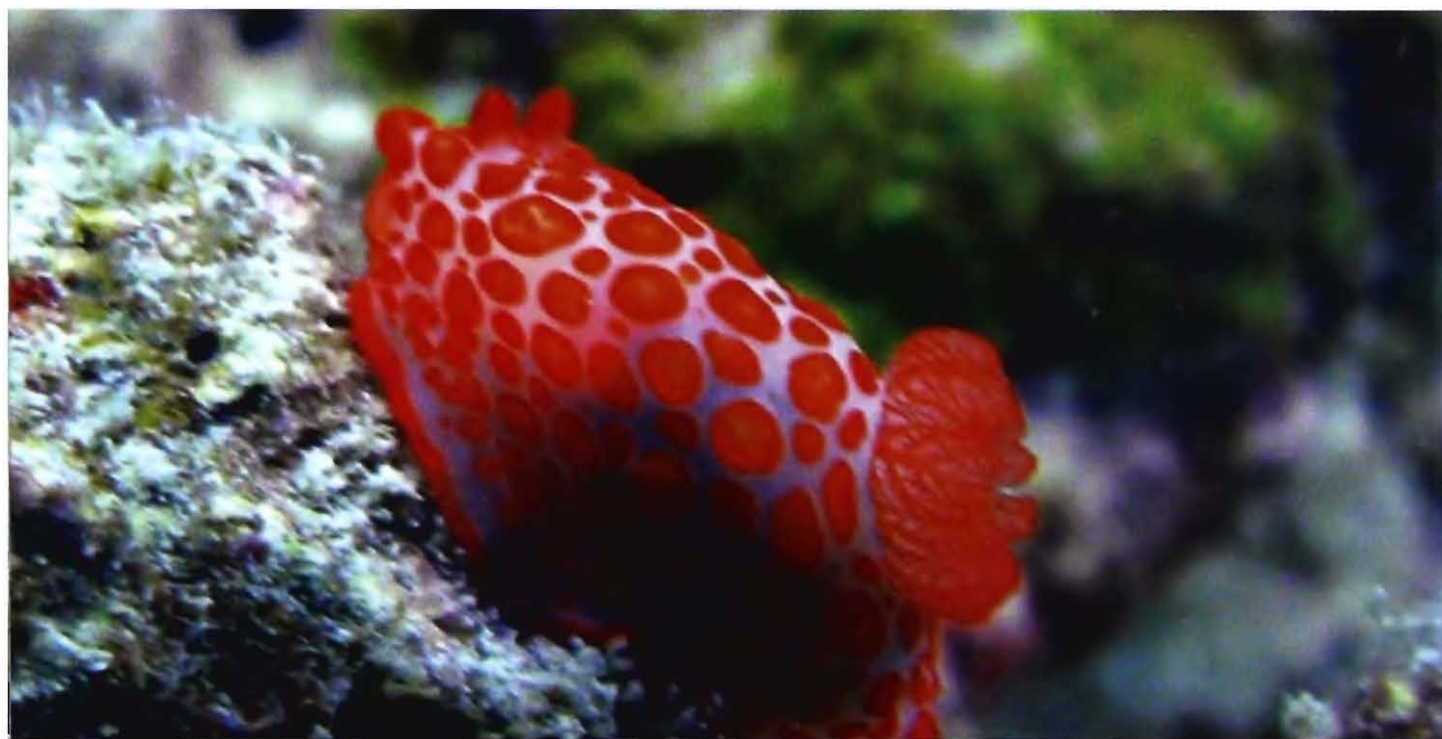
DESCRIPTION : This species has a wide Indo-West Pacific distribution. The mantle is white in colour with orange spots. It has similarities in colour pattern to *G. ceylonica* but the orange spots are much larger and more densely arranged, the body is more elongate and the gills relatively small. The rhinopore is orange in colour with a white base. The gills are also orange in colour. The gills are branched. It was observed that this species feeds on algae.

SIMILAR SPECIES : *Chromodoris westraliensis*

DISTRIBUTION : Widespread in Indo-West Pacific. India : Kamorta, Nicobar Islands

REMARKS : New Record to Indian waters.

Fig. 69. *Gymnodoris rubropapulosa* (Kamorta, Nicobar Islands).



55. *Gymnodoris striata* (Eliot, 1908), Fig. 70

ELIOT, C. N. E., 1908. Reports on the marine biology of the Sudanese Red Sea. XI. Notes on a collection of nudibranchs from the Red Sea. *Journal Linnean Society London, Zoology*, 31(204) : 86-122.

DESCRIPTION : It is characterised by the longitudinal orange lines on the dorsum and the transverse arrangement of the gills. There is considerable variability in the orange ridges on the body. The mantle is yellow in colour with orange border. Gills also yellow with yellow edging. Animals lacking most of the orange ridging were considered a separate species, *Gymnodoris amakusana* by Baba recently. Risbec (1928) considered the arrangement of the gills to be sufficient grounds for erecting a new genus *Analogium* for this species, but this is not followed by most authors, although it is used by Hamatani (1995) and Baba (1996).

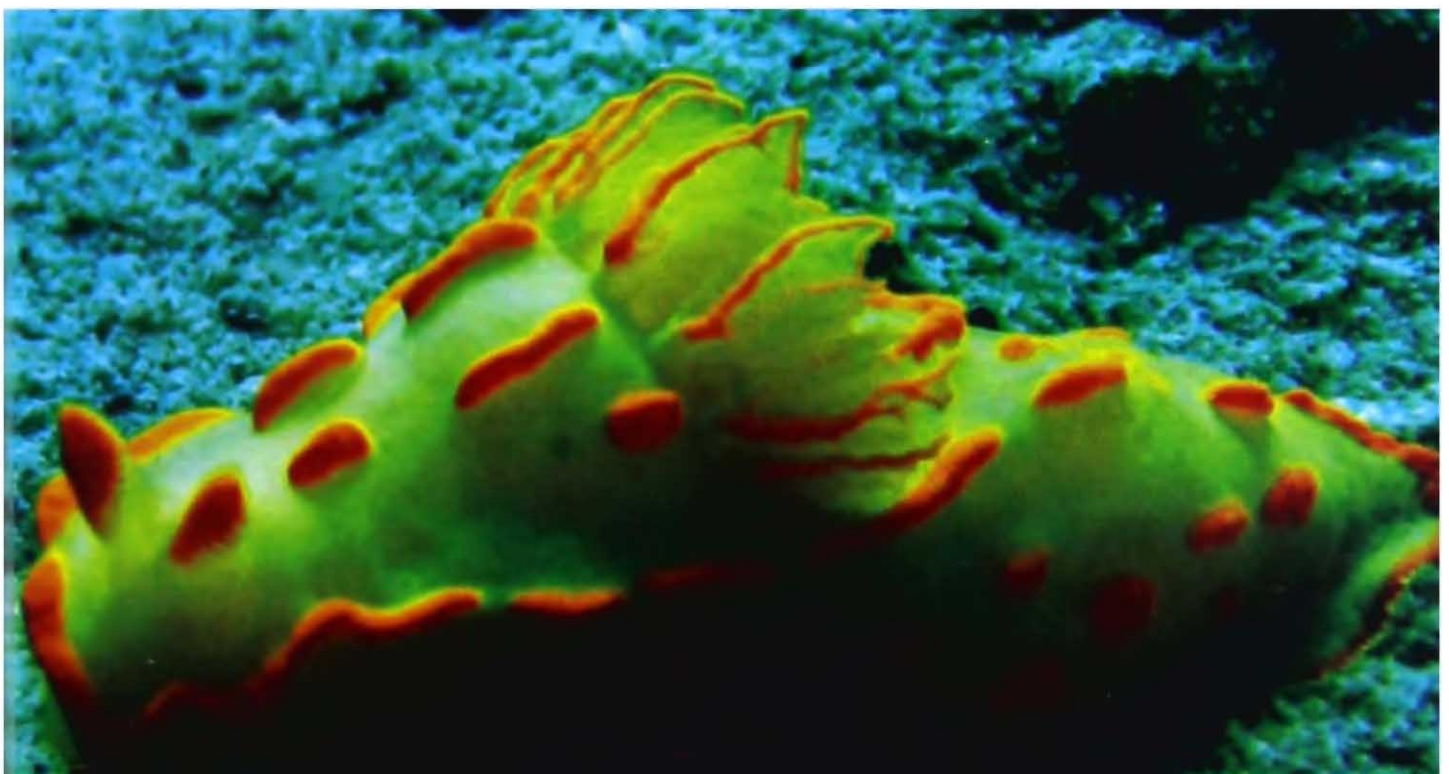
SIMILAR SPECIES : *G. amakusana*

DISTRIBUTION : Indo-West Pacific, from Red Sea to Japan. India : Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters.



Fig. 70. *Gymnodoris striata* (Ritchie's Archipelago).



56. *Gymnodoris subflava* (Baba, 1949), Fig. 71

BABA, K. (1949) *Opisthobranchia of Sagami Bay*. Iwanami Shoten, Tokyo. 211pp + pls.



DESCRIPTION : Translucent yellow animal with dark yellow longitudinal lines. The posterior part is more or less transparent so that shade of the internal organs can be seen. Gills and rhinophores are also yellow in colour. The only species seen in this area with a single colour without any spots or markings.

DISTRIBUTION : Japan, Philippines. India : Ritchies Archipelago, South Andaman.

REMARKS : First time report in Indian Ocean area.

Fig. 71 : *Gymnodoris subflava* (Ritchie's Archipelago)



FAMILY : PHYLLIDIIDAE Rafinesque, 1815

The phyllidiids are a very distinctive looking family of nudibranchs. They have an elongate-ovate shape that is evenly convex in profile. The mantle skirt is the same width as the foot, but still covers it and the reduced head completely. The mantle is stiff and tough since it contains spicules (as does the foot and body wall) and the mantle bears stiff tubercles that may be variously coloured. The colour, shape and arrangement of these tubercles are significant features in the identification of species. Glands that release acrid and toxic chemicals for defensive purposes are located in the mantle. The oral tentacles may be fused or unfused.

Phyllidiids have a small mouth, with jaw plates and radula absent making them suctorial feeders. The rhinophores are lamellate and can retract into pockets. The gills are not borne upon the dorsum, but instead they are simple leaflets located underneath, down each side in the cavity between the mantle and foot (the hyponotum). The anus is located on the midline of the dorsum posteriorly except for some species of the genus *Phyllidia* (those that were previously named *Fryeria*) where instead it opens in the posterior midline below the mantle.

All phyllidiids feed upon sponges and are slow movers.

**Key to the species of family recorded from Andaman and
Nicobar Islands**

- 1a. Animal yellow with white ridges which are separated by yellow grooves and a black spot at the centre
..... *R. suzannae*
- 1b. White coloured animal with various markings in black... 2
- 1c. Black coloured mantle with variously coloured and shaped tubercles 4
- 1d. Blue-blue grey coloured phylliid 9
- 2a. Black rhinopore 3
- 2b. Pale white rhinopore *Phyllidiopsis phippiensis*

- 2b. Salmon pink rhinopores *Phyllidiopsis shireenae*
- 3a. Compound tubercle with a granulated structure
..... *P. granulata*
- 3b. Tubercles do not have white tips and does not look
granulated *P. striata*
- 4a. Tubercles are arranged in rows 5
- 4b. Tubercles are single or compound tubercles but scattered
on top of the mantle 6
- 5a. The centre row of tubercles is continuous *P. rosans*
- 5b. The centre row of tubercles are discontinuous with ridges
separating the grey tubercles in black *P. zeylanica*
- 6a. Rhinophores are black in colour 8
- 6b. Rhinophores not black in colour 7
- 7a. Tubercles bright yellow and simple *P. ocellata*
- 7b. Some tubercles are compound and usually white in colour
..... *P. madangensis*
- 8a. Tubercles are simple *P. pustulosa*
- 8b. Tubercles are compound *P. cooraburrama*
- 9a. Ventral foot stripe present 10
- 9b. Ventral foot stripe absent 11
- 10a. All tubercles are yellow tipped *P. varicosa*
- 10b. Tubercles in the central ridge alone are yellow tipped ..
..... *P. alyta*
- 11a. 3 large tubercles on the central ridge very conspicuous
..... *P. coelestis*
- 11b. The central ridge has smaller tubercles than the ridges
located to the sides *F. marindica*

57 *Fryeria marindica* (Yonow and Hayward, 1991), Fig. 72

BRUNCKHORST, D.J. (1993) The systematics and phylogeny of Phyllidiid Nudibranchs (Doridoidea). *Records of the Australian Museum, Supplement*, 16 : 1-107.

DESCRIPTION : *F. marindica* is predominately blue-grey in colour with two longitudinal black bands running the length of the mantle, one on each side of a single median blue ridge. The median ridge has a single row of yellow capped tubercles. There are also many black rays or lines, on either side of the mantle, running at right angles to the mantle edge. The ventral surface of mantle and the foot are grey

Fryeria marindica appears to be closest to *F. menindie* which is found in the western Pacific Ocean. This species has often been confused with *Fryeria rueppelii* Bergh, which is considered by Brunckhorst to be confined to the Red Sea. It is also likely to be mistaken for the widespread *Phyllidia varicosa* but in that species there are always three or five longitudinal ridges on

Fig. 72. *Fryeria marindica* (Ritchie's Archipelago)





the dorsum, and of course the anus opens in the dorsal midline.

SIMILAR SPECIES : *Fryeria menindie*, *F. rueppelii*, *Phyllidia varicosa*.

DISTRIBUTION : Indian Ocean from North Western Australia to Eastern Africa. India : Diglipur, Ritchies Archipelago, North Bay, Andaman Islands.

REMARKS : New record to Andaman and Nicobar Islands.

58. *Phyllidia alyta* Yonow, 1996, Fig. 73

YONOW, N. (1996) Systematic Revision of the Family Phyllidiidae in the Indian Ocean Province: Part 1 (Opisthobranchia: Nudibranchia: Doridoidea). *Journal of Conchology*, 35 : 483-516.

DESCRIPTION : This species is characterized by four longitudinal black bands which rarely meet. The inner pair runs from behind the rhinophores to just in front of the anal papilla. Between them is the median row of tubercles which are usually tipped with yellow. There is then a second row of tubercles on each side which are rarely tipped in yellow. Outside this row is the second black line on each side which runs from the anterior edge of the mantle back to behind the anal papilla. There is also usually a black tranverse band between the rhinophores. Outside the longitudinal black lines are another row of tubercles and outside that row small irregularly scattered tubercles at the mantle edge. There is a solid black median line on the sole of the foot which is broken anteriorly into one or two patches. The rhinophores are yellow.

Fig. 73. *Phyllidia alyta* (Ritchie's Archipelago).





SIMILAR SPECIES : *Fryeria marindica*, *Phillidia varicosa*, *p. coelestis*

DISTRIBUTION : Western Indian Ocean (Maldives, Mauritius, Myanmar). India : Wandoor, Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters.

59. *Phyllidia coelestis* Bergh, 1905, Fig. 74

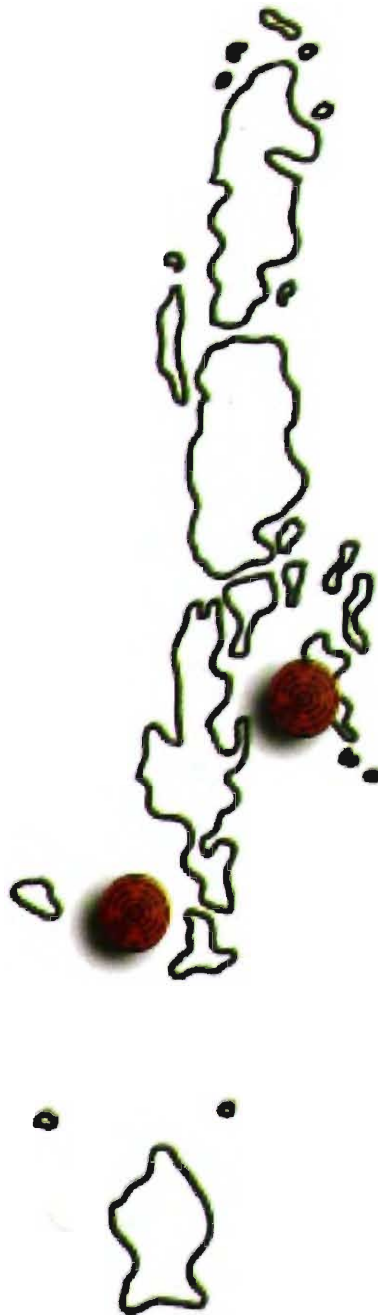
BERGH, L.S.R. (1905) Malacologische Untersuchungen. In: Reisen im Archipel der Philippinen von Dr. Carl Gottfried Semper. Zweiter Theil. Wissenschaftliche Resultate. Band 9, Theil 6, Lief. 2, pp. 57-118, pls. 5-8.

DESCRIPTION : Body white with two black lines on both sides of the mantle. A median black line with three large tubercles of yellow colour. *P. coelestis* is a smaller species which has neither a foot stripe nor a median ridge. *P. coelestis* can be distinguished from other similar-looking phyllidiids by colour and pattern: in particular the “Y” shape of the blue-grey dorsal ridges; the yellow-capped mid-dorsal tubercles (which never form a median ridge as in *P. varicosa*); the evenly tuberculate, broad, blue-grey mantle margin; and the uniformly grey foot without a dark stripe.

SIMILAR SPECIES : *P. alyta*, *P. varicosa*

Fig. 74. *Phyllidia coelestis* (Ritchie's Archipelago).





DISTRIBUTION : Western Pacific Ocean, South China Sea, Timor Sea and across the Indian Ocean to South Africa. India : Wandoor, Ritchies Archipelago, South Andaman

REMARKS : New Record to Indian waters.

60. *Phyllidia madangensis* Brunckhorst, 1993, Fig. 75

BRUNCKHORST, D.J. (1993). The systematics and phylogeny of Phyllidiid Nudibranchs (Doridoidea). *Records of the Australian Museum, Supplement*, 16 : 1-107.

DESCRIPTION : *P. madangensis* is characterized by having few, sparsely scattered notal tubercles on a black mantle, the black colour runs up to the edge of the mantle. Another character that can be noticed by keen observation is the presence of an alternating smaller tubercle between the larger notal tubercle. Presence of rhinotubercles is a common occurrence in all *Phyllidia* species, but a small tubercle is present immediately in front of each rhinophoral pocket which is characteristic to *P. madangensis*. *P. madangensis* is very similar to *P. carlsonhoffi*, *P. varicosa* and *P. tula*, but the absence of black line on the foot sole distinguishes it from the rest.

Fig. 75. *Phyllidia madangensis* (Mayabunder, North Andaman).





Phyllidia madangensis was first described by Brunckhorst in 1993. Subsequently few reports on the occurrence of the species are reported in the Australian museum web page (www.seaslugforum.net), all from various parts of the South Western part of Pacific Ocean (Sulawesi, Vanuatu, Papua New Guinea). It has been observed that in the Pacific Ocean the same species has a yellow tipped tubercle but in the specimen observed here, the tubercles were whitish in colour.

SIMILAR SPECIES : *P. carlsonhoffi*, *P. tula*, *P. varicosa*, *P. ocellata*.

DISTRIBUTION : Tropical western Pacific Ocean (Guam, Vanuatu, Solomon Islands and PNG). India : Mayabunder, North Andaman

REMARKS : New Record to Indian Ocean area.

61. *Phyllidia ocellata* Cuvier, 1804, Fig. 76

BRUNCKHORST, D.J. (1993) The systematics and phylogeny of Phyllidiid Nudibranchs (Doridoidea). *Records of the Australian Museum, Supplement*, 16 : 1-107.

DESCRIPTION : The most typical dorsal pattern consists of four to ten black rings bordered in white, each with a central gold coloured. There is little ontogenetic variation in external pattern (*i.e.*, juveniles resemble adults), however considerable individual variation in dorsal pattern occurs in this species. From the basic pattern described, there appear to be numerous related and irregular patterns where the black areas expand and or meander across the dorsum.

SIMILAR SPECIES : *P. madangensis*, *P. tula*.

DISTRIBUTION : Common throughout the tropical Indo-West Pacific Ocean, including the Red Sea. India : Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters.

Fig. 76. *Phyllidia ocellata* (Ritchie's Archipelago).



62. *Phyllidia varicosa* Lamarck, 1801, Fig. 77

LAMARCK, J.B. (1801) *Système des animaux sans vertèbres*. Paris.

BRUNCKHORST, D.J. (1993) The systematics and phylogeny of Phyllidiid Nudibranchs (Doridoidea). *Records of the Australian Museum, Supplement*, 16 : 1-107.

DESCRIPTION : One of the commonest nudibranchs distributed in Andaman Islands. Length of the collected specimens ranged from 3.5 – 9.7 cm and the width varied from 1.3 – 3.3 cm. The body is firm, 3-6 longitudinal tuberculate notal ridges on the dorsum. The ridge and bases of the tubercles are blue-grey in colour and the tubercles are capped in yellow. The foot sole possesses a black longitudinal foot stripe. The rhinophoral clavus possesses 27-30 lamellae. This species also have close resemblances with *P. coelestis* which has a brown black band down the midline while in *P. varicosa* there is a bluish grey ridge down the middle line. This species is also confused with *P. alyta* which possesses a solid black median

Fig. 77. *Phyllidia varicosa* (Ritchie's Archipelago)





line in the sole of the foot. However, *P. varicosa* has many yellow capped notal tubercles on all the rows while only few notal tubercles in the inner three rows found in *P. alyta*.

SIMILAR SPECIES : *Bohadschia graffei* juvenile.

DISTRIBUTION : Throughout the Indo-West Pacific Oceans including the central Pacific and the Red Sea. India : Gulf of Kutch, Gulf of Mannar, Widespread in Andaman and Nicobar Islands.

REMARKS : New record to Andaman and Nicobar Islands.

63. *Phyllidiella cooraburrama* Brunckhorst, 1993, Fig. 78

BRUNCKHORST, D.J. (1993). The systematics and phylogeny of Phyllidiid Nudibranchs (Doridoidea). *Records of the Australian Museum, Supplement*, 16 : 1-107.

DESCRIPTION : *P. cooraburrama* is particularly striking nudibranch. It is characterized by its extremely large, isolated, notal tubercles which have a very broad pink base, are steep sided, tall and multicomound with flattish apices. The rhinopores are black in colour. *P. cooraburrama* is easily separated from other phyllidiids with pink tubercles by the form of its large tubercles. *Phyllidiella pustulosa* has grouped clusters of low tubercles. *Phyllidiella annulata* has rings of pink with low angular tubercles. *Phyllidiella nigra* has single rounded red-pink tubercles. *Phyllidiella rosans* has low, rounded, smooth, straight ridges. *Phyllidiella zeylanica* has highly tuberculate ridges which join together anteriorly and posteriorly. *Phyllidiella granulata* is superficially similar to *P.*

Fig. 78. *Phyllidiella cooraburrama* (Ritchie's Archipelago).





cooraburrama, but differs in having smaller conical or acute white tubercles on a granular grey background.

SIMILAR SPECIES : *P. rosans*, *P. nigra*, *P. pustulosa*.

DISTRIBUTION : Ponape, Fiji, and Great Barrier Reef, Australia.

India : Wandoor, Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters.

64. *Phyllidiella granulata* Brunckhorst, 1993, Fig. 79

BRUNCKHORST, D.J. (1993). The systematics and phylogeny of Phyllidiid Nudibranchs (Doridoidea). *Records of the Australian Museum, Supplement*, 16 : 1-107.

DESCRIPTION : The distinguishing external features of *P. granulata* are the grey background with conical and acute compound white tubercles, and the circular black bands medially. The granular white pattern on the grey foot sole of live specimens is also characteristic. *Phyllidiella granulata* possesses fewer lamellae on the rhinophoral clavus than most other species of *Phyllidiella*, except *Phyllidiella rosans*.

Phyllidiella pustulosa has three clusters of tubercles which vary ontogenetically in their state of amalgamation, the background colour is black and the tubercles are pink (white tubercles in *P. granulata*). *Phyllidiella pustulosa* is further separated by its grey ventral coloration. *Phyllidiella cooraburrama* differs from the present species primarily in having very large, isolated, smooth, rounded tubercles which

Fig. 79. *Phyllidiella granulata* (Ritchie's Archipelago).





are pink. *Phyllidiella rudmani* also has rounded, white capped tubercles but its background coloration is bright pink and it has two longitudinal black stripes.

SIMILAR SPECIES : *P. cooraburrama*, *P. pustulosa*, *P. rudmani*.

DISTRIBUTION : Tropical Western Pacific Ocean (Micronesia to the Great Barrier Reef, Australia). India : Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters.

65. *Phyllidiella pustulosa* (Cuvier, 1804), Fig. 80

BRUNCKHORST, D.J. (1993) The systematics and phylogeny of Phyllidiid Nudibranchs (Doridoidea). *Records of the Australian Museum, Supplement*, 16 : 1-107.

DESCRIPTION : *P. pustulosa* has three median clusters of pink tubercles. The tubercles are in a cluster which is separated in adult specimen; however it is amalgamated on juvenile stage. The intensity of pink colouration is possibly related to diet and time since feeding. The mantle has pale pink edge, the broad and oral tentacles are triangular, black tipped and the rhinophoral clavus possessing 22-26 lamellae. The length of the specimens collected from Andaman water ranges from 3.5- 6.0 cm with the width 1.5-2.8 cm.



SIMILAR SPECIES : *P. annulata*, *P. granulata*, *P. cooraburrama*.

DISTRIBUTION : Throughout the tropical Indo-West Pacific. India : Rutland, Mayabunder, Ritchies Archipelago, Andaman Islands.

REMARKS : New Record to Indian waters.

Fig. 80. *Phyllidiella pustulosa* (Ritchie's Archipelago)



66. *Phyllidiella rosans* (Bergh, 1873), Fig. 81

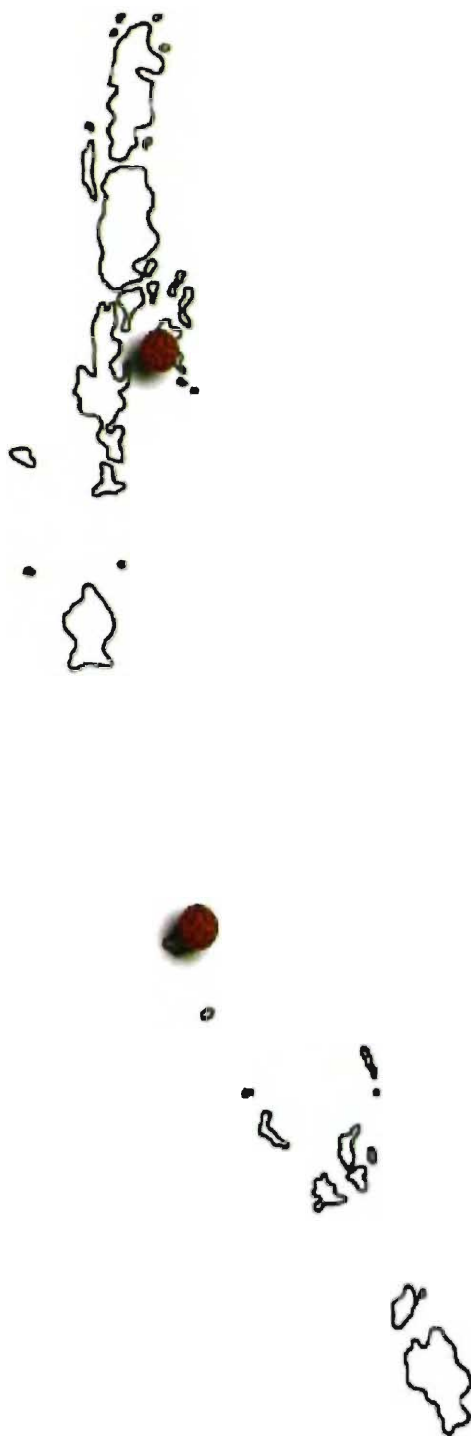
BRUNCKHORST, D.J. (1993) The systematics and phylogeny of Phyllidiid Nudibranchs (Doridoidea). *Records of the Australian Museum, Supplement*, 16 : 1-107.

DESCRIPTION : *Phyllidiella rosans* is distinguished by its numerous, longitudinal, rounded pink ridges, pink margin and black rhinophores which have a pink stalk. Ventrally, *P. rosans* is pale grey. The longitudinal notal ridges of the present species distinguish it from the similar species of *Phyllidiella*. The only other species of *Phyllidiella* which possesses longitudinal ridges and a pale foot is *Phyllidiella zeylanica*. However, that species differs from *P. rosans* in the very uneven, irregular nature of the notal ridges which are formed from the coalesced bases of compound tubercles. Furthermore, the foot of *P. zeylanica* is whitish and its gills and oral tentacles are dark grey (pale in *P. rosans*).

SIMILAR SPECIES : *P. zeylanica*

Fig. 81. *Phyllidiella rosans* (Ritchie's Archipelago).





DISTRIBUTION : Western Pacific Ocean and the Indian Ocean (Maldives, East Africa). India : Ritchies Archipelago; South Andaman, Car Nicobar; Nicobar Islands.

REMARKS : New Record to Indian waters.

67 *Phyllidiella zeylanica* (Kelaart, 1859), Fig. 82

KELAART, E.F. (1859). Descriptions of new and little known species of Ceylonese nudibranchiate mollusks. *Ann. Mag. Nat. Hist.*, 3(3) : 291-304 : 3(3) : 488-496.

BRUNCKHORST, D.J. (1993) The systematics and phylogeny of Phyllidiid Nudibranchs (Doridoidea). *Records of the Australian Museum, Supplement*, 16 : 1-107.

DESCRIPTION : The species is characterized by the presence of three black concentric bands running round the notum and an interrupted median dark band. The median band and the first concentric dark band close to the former are prominent. The concentric band is incomplete posteriorly leaving a small gap. The other two more marginally situated bands are very narrow and inconspicuous. In between the dark concentric bands are prominently elevated greenish yellow longitudinal ridges bearing tubercles of varying sizes. These ridges run across in front of the rhinopore and behind the anal region. Mantle tubercular, salmon-coloured; three continuous black lines run round the whole length; the internal one broader, taking within its circuit the dorsal tentacles and anal orifice;

Fig. 82. *Phyllidiella zeylanica*
(Pongibalu, South Andaman)





two other lines run parallel to this all round the mantle, the outer one narrowest. Dorsal tentacles large, conical, pointed, circularly laminated at the upper half, which is of a black colour.

SIMILAR SPECIES : *P. rosans*

DISTRIBUTION : Tropical Indian Ocean (Eastern Africa to Java). India : Gulf of Kutch, Kavaratti lagoon, Lakshadweep Islands, Widespread in Andaman and Nicobar Islands

REMARKS : Extremely rare and little known species which has been recorded only for the third time in the past 113 years after its first description by Kelaart in 1859 (Rao, 1974); New record to Andaman and Nicobar Islands and is one of the most common species in Andaman Islands.

68. *Phyllidiopsis phiphiensis* Brunckhorst, 1993, Fig. 83

BRUNCKHORST, D.J. (1993). The systematics and phylogeny of Phyllidiid Nudibranchs (Doridoidea). *Records of the Australian Museum Supplement*, 16 : 1-107.

DESCRIPTION : *Phyllidiopsis phiphiensis* is characteristically noticed by two low white ridges which are separated by three furrows lined with black. The central furrow is anteriorly longer than the two adjacent furrows almost reaching up to the mantle margin. Whereas posteriorly the adjacent furrows are longer and generally join together to form a 'U' shaped furrow. The mantle margin is white with black spots. Rhinophores were pale white in colour. The ventral side is white in colour with black spots on the margin of the hyponotum and on the side of the foot. *P. phiphiensis* shares close resemblances with three species of the same genera which can be confused one for the other as they are all longitudinally striped phyllidiids. In *P. striata* the central black furrow is separated into two from the

Fig. 83 *Phyllidiopsis phiphiensis* (Mayabunder, North Andaman)





posterior side to the anterior side by a centrally running white ridge. Thus *P. striata* has four black striations whereas *P. phiphiensis* has only three. In *P. sphingis* and *P. annae* the rhinopores are yellow and black coloured respectively whereas in *P. phiphiensis* it is white to very pale brown. *P. sphingis* and *P. annae* have a bluish colour more towards the periphery on their body which is absent in *P. phiphiensis*.

SIMILAR SPECIES : *P. striata*, *P. annae*, *P. sphingis*.

DISTRIBUTION : Southern Thailand (Andaman Sea). India : Mayabunder, North Andaman.

REMARKS : New Record to Indian waters.

69. *Phyllidiopsis shireenae* Brunckhorst, 1993, Fig. 84

BRUNCKHORST, D.J. (1993). The systematics and phylogeny of Phyllidiid Nudibranchs (Doridoidea). *Records of the Australian Museum Supplement*, 16 : 1-107.

DESCRIPTION : *Phyllidiopsis shireenae* is characteristically noticed by its mid-dorsal crest (*i.e.*, the body is not dorsoventrally flattened as in other phyllidiids). The crest is lined with a black furrow which is extended towards the mantle edge into thinner line anteriorly and posteriorly. In most specimens the line diverges mid dorsally from the central furrow towards both the sides. The mantle is white in colour with salmon pink rhinophores. Each rhinophoral clavus has 18 lamellae. Other phyllidiids do not possess a large dorsal crest and salmon pink rhinophores like *P. shireenae*. *Phyllidiopsis gemmata* has black rhinophores. *Phyllidiopsis krempfi* has multicomound pink tubercles, black and pink rhinophores, and possesses 26-28 lamellae on each rhinophoral clavus whereas in *P. shireenae* it is 17-20. *Phyllidiopsis pipeki*,

Fig. 84. *Phyllidiopsis shireenae* (Ritchie's Archipelago).





Phyllidiopsis burni and *Phyllidiopsis fissuratus* differ from *P. shireenae* in having large compound tubercles, black and pink rhinophores and pink to grey ventral coloration.

SIMILAR SPECIES : *P. krempfi*, *P. pipeki*, *P. burni*, *P. fissuratus*, *P. gemmata*.

DISTRIBUTION : Tropical Indo-West Pacific. India : Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters.

70. *Phyllidiopsis striata* Bergh, 1888, Fig. 85

BRUNCKHORST, D.J. (1993). The systematics and phylogeny of Phyllidiid Nudibranchs (Doridoidea). *Records of the Australian Museum, Supplement*, 16 : 1-107.

DESCRIPTION : *Phyllidiopsis striata* is easily distinguished in the field by its three low, white longitudinal dorsal ridges, white mantle skirt, four black longitudinal bands and translucent straw-coloured rhinophores. *Phyllidiopsis phippiensis* has two white ridges and three black bands (three white ridges and four black bands in *P. striata*), black spots on the mantle margin, white rhinophores and is white ventrally (grey and black in *P. striata*). *Phyllidiopsis annae* has three blue ridges, and black rhinophores. *Phyllidiopsis sphingis* has three irregular white ridges which are usually separated (straight ridges join at the anus in *P. striata*), iridescent blue coloration to the mantle skirt, cream rhinophore and a cream to white foot sole (grey in *P. striata*). The specimen observed from

Fig. 85. *Phyllidiopsis striata* (Ritchie's Archipelago)





Andaman has a black rhinophore but other characters similar to *P. striata* and so considered to be this species.

SIMILAR SPECIES : *P. phippiensis*, *P. sphingis*, *P. annae*

DISTRIBUTION : Central and western Pacific Ocean and Indian Ocean. India : Ritchies Archipelago, South Andaman

REMARKS : New Record to Indian waters.

71. *Reticulidia suzanneae* Valdes and Behrens, 2002, Fig. 86

VALDES, A. and BEHRENS, D.W., 2002. Phylogenetic systematics of *Reticulidia* Brunckhorst, 1990 (Mollusca, Nudibranchia), with the description of a new species from the tropical Indo-Pacific. *Nat. Hist. Mus. Los Angeles Co., Contrib. in Sci.*, 492 : 1-10.



DESCRIPTION : A recently described genus by Brunckhorst (1990). Only three species reported till date as per the data available. Animal yellow with white ridges. The ridges are separated by yellow coloured grooves and a black spot at the central. Rhinphore yellow in colour The type specimens were collected from Andaman Sea, Thailand. The gill is between notch and foot, very characteristic to this genera.

SIMILAR SPECIES : *R. halgerda*, *R. fungia*

DISTRIBUTION : Indian Ocean (East Africa, Thailand). India : Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters.

Fig. 86. *Reticulidia suzanneae* (Ritchie's Archipelago).



SUBORDER : AEOLIDINA Odhner, 1934**FAMILY : AEOLIDIIDAE Gray, 1827**

The size of aeolidiids range from small to quite large. The elongate body may be narrow or broad, and the back is often crowded with cerata. The foot is usually wider than the body and the anterior corners are enlarged, and either angular or tentacular. The oral tentacles are usually long. The rhinophoral structure can be smooth or annulate or with clubs that are lamellate or papillate. The cerata are often, but not always numerous. Their shape can vary from flattened to cylindrical and tapering. When distressed, aeolidiids tend to readily cast off their cerata. In most aeolidiids, the cerata are arranged in regular, oblique rows. The majority prey upon sea anemones. Species of the genus *Cerberilla* plough beneath the sand and are dorso-ventrally flattened, clearly an adaptation to that habitat. Many species of this family have also developed a symbiosis with zooxanthellae obtained when digesting their prey and subsequently “farm” them within special branches of the digestive gland in the body wall. These branches containing the zooxanthellae appear as fine brown reticulations just under the skin.

**Key to the species of genus *Cerberilla* recorded from
Andaman and Nicobar Islands**

- 1a. Dorsal side of the foot is plain white in colour.....
..... *C. annulata*
- 1b. Dorsal side of the foot is lined with black stripe extending
to the foot edge..... *C. ambonensis*

72. *Cerberilla ambonensis* Bergh, 1905, Fig. 87

BERGH, L.S.R. (1905). *Die Opisthobranchiata der Siboga-Expedition. Monographie*, 50 : 1-248, pls. 1-20.



DESCRIPTION : The most characteristic external feature of this species would appear to be the transverse dark lines across the foot. The basal half of the longest cerata is greyish brown then black. The black band between the yellow and the white terminal region can be thin, broad or absent. The oral tentacles are white at the base and have a broad blue band filling the middle half of the tentacle, a short black band, and white tip. In *Cerberilla annulata* which also has yellow and black ceratal bands, the yellow and black are in reverse order

SIMILAR SPECIES : *C. annulata*

DISTRIBUTION : Western Pacific and Indonesian Archipelago. India : Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters.

Fig. 87. *Cerberilla amboinensis* (Ritchie's Archipelago).



73. *Cerberilla annulata* (Quoy and Gaimard, 1832), Fig. 88

QUOY, J.R. and GAIMARD, J.P. (1832). Voyages de découvertes de l'Astrolabe pendant les années 1826-1829 sous le commandement de M.J. Dumont d'Urville. *Zoologie*, 2 : 1-686.

DESCRIPTION : Mantle and cerata are white in colour. This sand dwelling aeolid has a wide tropical Indo-West Pacific distribution. It is characterised by the relatively long cerata, white body and cerata, and yellow (upper) and black (lower) band near the ceratal tip. The yellow and black bands are divided with a small white band. The cerata are numerous in number and are arranged irregularly.

SIMILAR SPECIES : *C. ambonensis*

DISTRIBUTION : Wide Indo-West Pacific distribution. India : Mayabunder, North Andaman

REMARKS : New Record to Indian waters

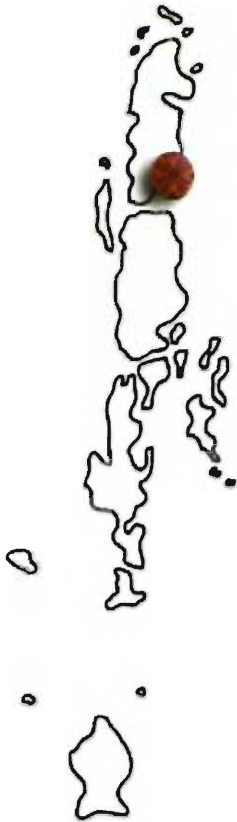


Fig. 88. *Cerberilla annulata* (Mayabunder, North Andaman)



FAMILY : FLABELLINIDAE Bergh in Carus, 1889

Flabellinids are aeolids that have a long, narrow and tapering body, usually with a pointed tail. The body is generally high in profile and the underlying foot is wide. The anterior corners of the foot are rounded or developed into short blunt tentacles. The oral tentacles are very long and tapering. The rhinophores can be either smooth, or have clubs that are papillate or lamellate. There are no basal sheaths. The eyes are positioned at the base of each rhinophore. There is usually a mantle brim or ridge running down the dorsal midline which is a mantle remnant. The cerata, which are usually long and thin, arise in rows or clusters down each side of the body and are either directly inserted onto the body wall or are attached to lobes of varying size. Each ceras carries a digestive gland branch that continues to the tip ending in a cnidosac containing nematocysts. There are no separate gill structures with respiration taking place through the thin walls of the body and cerata. All flabellinids feed on athecate hydroids.

74. *Flabellina exoptata* (Gosliner and Willan, 1991), Fig. 89

GOSLINER, T.M. and WILLAN, R.C. (1991) Review of the Flabellinidae (Nudibranchia: Aeolidacea) from the tropical Indo-Pacific, with the descriptions of five new species. *The Veliger*, 34(2) : 97-133.

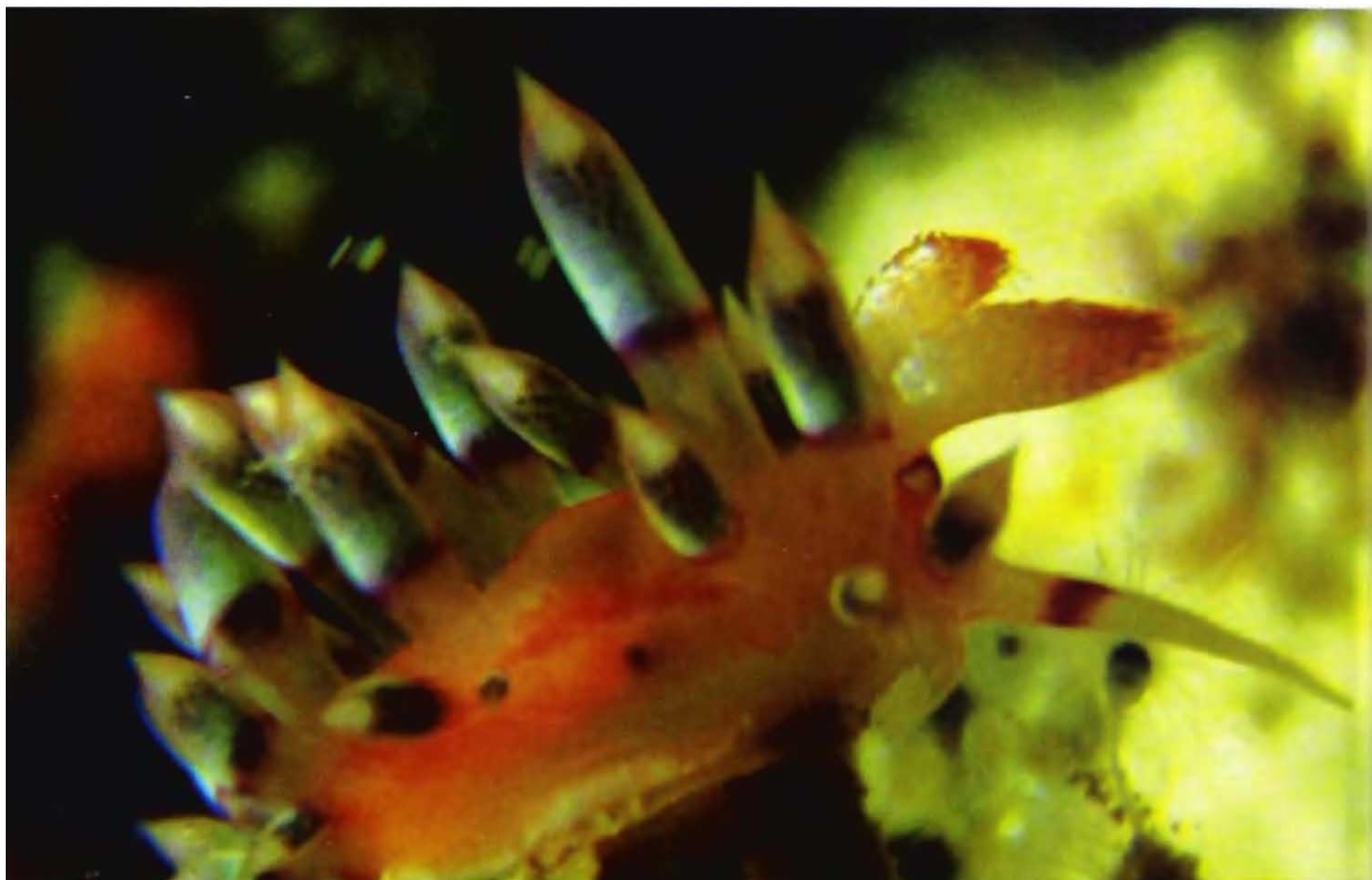
DESCRIPTION : *Flabellina exoptata* is characterised by the brilliant colour pattern and the bright orange papillate rhinophores. The oral tentacle have a purple band in the middle region. The cerata are metallic in colour with a purple band in the mid region. The animal observed was only up to 5 cm in length.

SIMILAR SPECIES : *F. delicate*, *F. macassarana*, *F. rubrolineata*

DISTRIBUTION : Indian Ocean (South Africa, Malaysia, Indonesia), Western Pacific. India : Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters.

Fig. 89. *Flabellina exoptata* (Ritchie's Archipelago).



FAMILY : GLAUCIDAE Oken, 1815

The body is long and slender, with two cephalic tentacles or feelers on their head, and rhinophores on top and at the front. These animals have finger like cerata of their digestive system extending down the back of the animal. They lack gills and it is believed they absorb oxygen through diffusion. They feed on sea anemones, corals, soft corals and gorgonians, jelly fish and mollusk eggs. These animals can pass the stinging cells through their digestive system without triggering them and use them in their own defence. Some species extract algae from their prey and farm them.

Key to the genera and species of family Glaucidae recorded from Andaman and Nicobar Islands

- 1a. Blue annuli present on the oral tentacles
..... *Pteraeolidia ianthina*
- 1b. Milky orange oral tentacles *Sakuraeolis kirembosa*
- 1c. Oral tentacle with orange base and white tips
..... *Moridilla brockii*
- 1d. An orange stripe on each tentacle meeting at the base. The tip of the oral tentacle pale yellow *Phidiana militaris*

75. *Moridilla brockii* Bergh, 1888, Fig. 90

BERGH, R. (1888) Beitrage zur Kenntnis der aeolidiaden, 9. *Verh. K. Zool. Bot. Ges. Wein.*, 673-706.

RAO, K.P. (1965) *Moridilla brockii* Bergh 1888, redescribed with notes on anatomy and early development. *Journal of the Marine Biological Association, India*, 7(1) : 61-68.

DESCRIPTION : "The specimens are light orange in colour along the dorsal and lateral surfaces. The region between the rhinophores and the oral tentacles, the surface of the oral tentacles, the club of the rhinophores, the surface of the cerata and the integument of the pericardial prominence are deep orange in colour. The middle one third of the oral tentacles and the cnidosacs of the cerata are coated with silvery shining granules. The foot is colourless. The hermaphrodite gland which is visible through the foot is light orange in colour (Rao, 1965). The specimens were mostly found under the loose stones and in the algal turf, below the part of sublittoral zone." This species was redescribed with specimens collected from Gulf of Mannar

The bright red tips to the cerata of this aeolid apparently warn potential predators of the presence of the cnidosac which contains the stinging nematocysts removed from the cnidarian food of *Moridilla brockii*. When disturbed, *Moridilla* puts on a spectacular 'startle' display, uncoiling the large rolled cerata and pointing them at the source of the disturbance. There are few anatomical reasons to retain *Moridilla* as a genus distinct from *Phidiana*.

Fig. 90. *Moridilla brockii* (Ritchie's Archipelago).





SIMILAR SPECIES : *Phidiana militaris*

DISTRIBUTION : Tropical Indo-West Pacific. India : Gulf of Mannar, Ritchies Archipelago, South Andaman.

REMARKS : New record to Andaman and Nicobar Islands.

76. *Phidiana militaris* (Alder and Hancock, 1864), Fig. 91

ALDER, J. and HANCOCK, A. (1864). Notice of a collection of Nudibranchiate Mollusca made in India by Walter Elliot, Esq., with descriptions of several new genera and species. *Transactions of the Zoological Society of London*, 5 : 113-147.

DESCRIPTION : Body rather stout, tapering to a fine point behind, of a pale flesh colour or nearly white. Dorsal tentacles rather long, smooth, swelling a little in the centre, and tapering to a point above, with a broad belt of scarlet near the centre, gradually fading into flesh colour below. Bright yellow on the upper half, excepting the extreme tips, which are white. Oral tentacles large, stout, and tapering, color as the dorsal, excepting that the scarlet central belt is extended down each tentacle in narrow line, the two uniting on a bulb on the central of the head, and continued thence backwards to the commencement of the branchial papillae. Branchial papillae numerous, moderately stout, of a reddish brown colour, with bright yellow tips, forming six clusters on each side, and nearly meeting on the back.

Originally described from India, it has been reported two or three times from India.

Fig. 91. *Phidiana militaris* (Ritchie's Archipelago).





SIMILAR SPECIES : *Moridilla brockii*

DISTRIBUTION : Gulf of Oman, Thailand, Hong Kong, Philippines. India : Originally described from India from Visakhapatnam, Gulf of Kutch, Ritchies Archipelago, Andaman Islands.

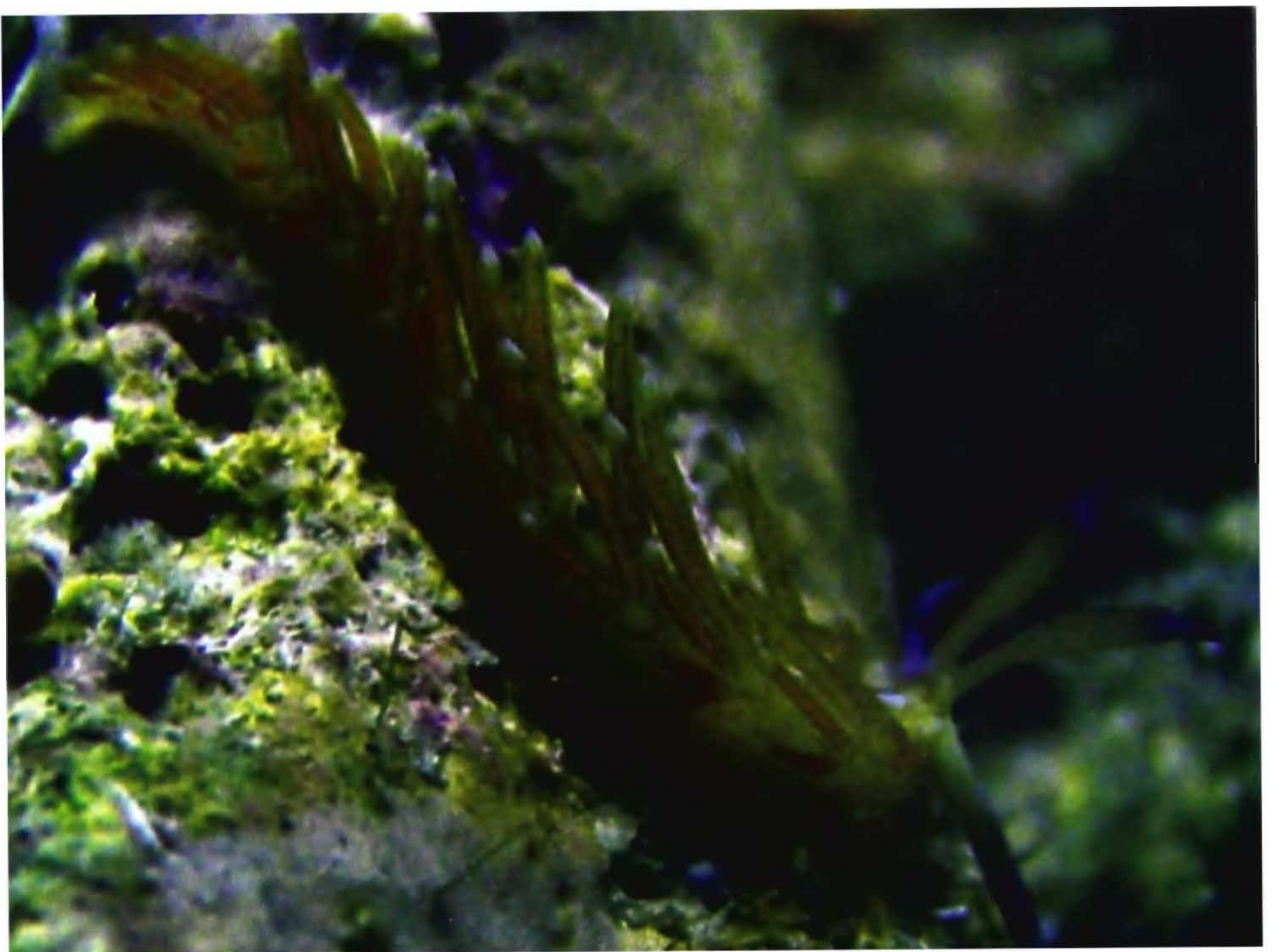
REMARKS : New record to Andaman and Nicobar Islands.

77. *Pteraeolidia ianthina* (Angas, 1864), Fig. 92

ANGAS, G.F. (1864). Description d'espèces nouvelles appartenant à plusieurs genres de Mollusques Nudibranches des environs de Port-Jackson (Nouvelles-Galles du Sud), accompagnée de dessins faits d'après nature. *Journal de Conchyliologie*, 12 : 43-70.

DESCRIPTION : The mantle greyish in colour; the colour varies from place to place. Distinguished by the length and branched ceratal group at particular interval. A greenish white stripe from the anterior of the mantle to the end. *Pteraeolidia* has stores zooxanthellae in its body, which helps them to stay without taking food for few days. The white animal is a juvenile which as not yet developed its crop of zooxanthellae. White juveniles are usually found in lush growths of short turfing hydroids. The large solitary hydroid is the preferred adult food. The animal was collected from a massive *porites* coral from the reef flat area.

Fig. 92. *Ptaeraeolidia ianthina* (Ritchie's Archipelago).





DISTRIBUTION : Throughout the tropical and subtropical Indo-West Pacific. India : Diglipur, Ritchies Archipelago, North Bay, Andaman Islands.

REMARKS : New Record to Indian waters.

78. *Sakuraeolis kirembosa* Rudman, 1980, Fig. 93

RUDMAN, W.B. (1980). Aeolid opisthobranch molluscs (Glaucidae) from the Indian Ocean and the south-west Pacific. *Zoological Journal of the Linnean Society*, 68 : 139-172.

DESCRIPTION : Head and body a milky translucent orange colour, with body darkening behind the second ceratal arch to a deeper orange where the gonads show through. The oral tentacles are long and tapering and about one and a half time the length of the rhinophores. The basal half of each oral tentacle is transparent with the distal half being milky orange. The basal third of the rhinophores is transparent, while the upper two thirds is a milky orange. The rhinophores have scattered, rounded bumps all over them. The foot is translucent with a faint orange tinge, the anterior end producing long, tapering foot corners. A median band of orange runs to the tip of the tail from between the most posterior cerata. The cerata are arranged into six pairs of multi-rowed arches each raised on a pad, and there is also a group of irregularly arranged cerata at the posterior end of the body. The lower three quarters of each ceras is translucent, with dense white speckling, which obscures the digestive gland duct. The upper quarter of each cerata is quite colourful, with a milky orange tip, and then below that a bright purple region, and below that a dull greenish brown section. As in other

Fig. 93. *Sakuraeolis kirembosa* (Ritchie's Archipelago).





species of the genus, the cerata are long and slender, and are held out from the body in large clumps

SIMILAR SPECIES : *Godiva quadricolor*, *S. gujaratica*

DISTRIBUTION : Tanzania and Gulf of Oman. India : Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters.

SUBORDER : DENDRONOTINA Odhner, 1934**FAMILY : TETHYDIDAE Rafinesque, 1815**

Tethydids range in size from small to very large, and all have an elongate body. Their most distinctive feature is a very large, extensible oral hood with fringing tentacles which is used to trap prey. The rhinophores have very small, lamellate clubs. The rhinophoral sheaths, however, are quite large and cylindrical or flattened to be similar to the cerata. Each side of the body bears quite large cerata down its length. These are broad and flat except at the base which is more cylindrical. They are often fluid-filled but do not usually have branches of the digestive gland within. In some of the smaller species, the cerata may be tuberculate. The cerata can be shed when the animal is disturbed but they can regenerate. In most species, the bushy gills are scattered over the inside and outside surface of the cerata or over the whole dorsum. In others, pairs of gills may be attached to the base of the larger cerata. Some of the larger species can swim with lateral flexions of the body assisted by the large surface area of the erect cerata. This appears to be only an escape response. They feed upon small crustaceans captured in the oral hood.

**Key to the species of the genus *Melibe* recorded from
Andaman and Nicobar Islands**

- 1a. Papillae present on the cerata *M. megaceras*
- 1b. Cerata simple with no papillae *M. ocellata*

79. *Melibe megaceras* Gosliner, 1987, Fig. 94

GOSLINER, T.M. (1987). Review of the nudibranch genus *Melibe* (Opisthobranchia: Dendronotacea) with descriptions of two new species. *The Veliger*, 29(4) : 400-414.

DESCRIPTION : The whole animal appears translucent brown, the colour shown by microscopic algae living in the body, and which can be seen through the transparent body wall. Some animals can have opaque whitish spots on the ceratal wall and along the edge of the foot. Like all species of *Melibe* there is a large oral hood which is used in the capture of its food - small crustacea. There are also large cerata down each side of the body.

This species is found on shallow water sandflats in Hawaii and suggests that it may be seasonally abundant. He describes how it holds the cerata out horizontally when it is crawling along, so that it is 'exceedingly flat' It translucent brown colour, and its flat aspect, make it almost invisible on a white sandy bottom. Kempf (1984) studied the symbiotic relationship

Fig. 94. *Melibe megaceras* (Ritchie's Archipelago).





between *Melibe megaceras* and its symbiotic zooxanthellae *Symbiodinium microadriaticum*. Kempf suggests that it must obtain zooxanthellae either during the veliger stage, when it is an phytoplankton feeder, or just after metamorphosis, when it may feed on something which has zooxanthellae.

SIMILAR SPECIES : *M. cf ocellata*

DISTRIBUTION : Hawaii, Malaysia, Great Barrier Reef. India : Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters.

80. *Melibe cf ocellata* Bergh, 1888, Fig. 95



BERGH, R. (1888). Beitrage zur Kenntnis der aeolidiaden, 9. *Verh. K. Zool. Bot. Ges. Wein.*, 673-706.

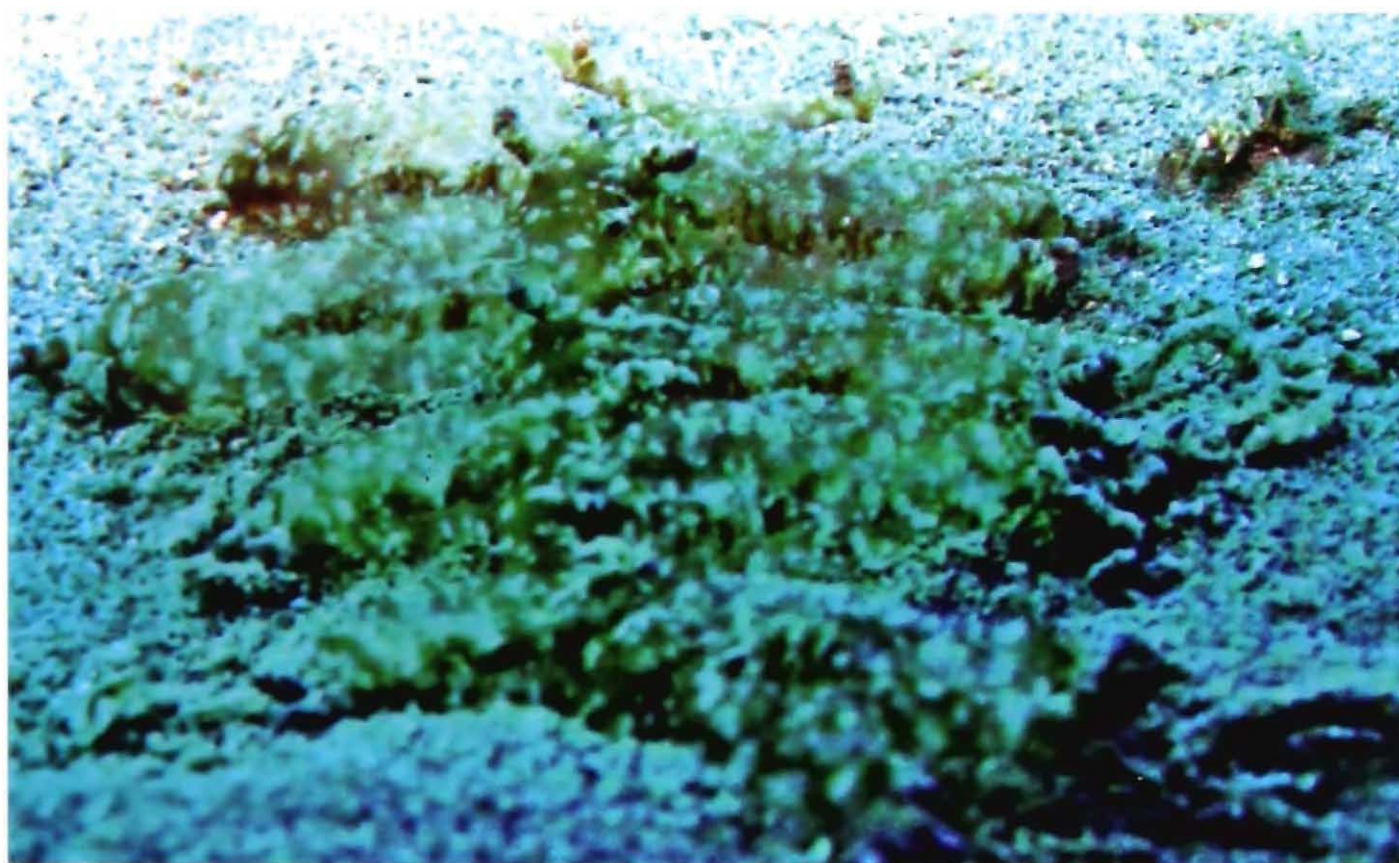
DESCRIPTION : This is the only tropical species of *Melibe* with tall pointed cerata without any pustules or papillae on them. The oral hood is relatively small. The large cerata have white spots on them which enables them to blend with the background of sand. The body darker than the cerata.

SIMILAR SPECIES : *M. megaceras*

DISTRIBUTION : Malaysia. India : Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters.

Fig. 95. *Melibe cf ocellata* (Ritchie's Archipelago).



SUBORDER : DENDRONOTINA Odhner, 1934

FAMILY : BORNELLIDAE Fischer, 1883

The body is soft, narrow, and elongate (almost sinuous) and the mantle skirt is absent. Along each side of the dorsum are several pairs of cerata-like papillae, sometimes branched, each protecting one or two small bushy gills that are attached near the base medially. Each side of the mouth an oral tentacle presents as a palm-like paddle bearing five to ten pointed papillae.

The rhinophores have a lamellate club and a tall sheath that is usually branched and resembles the papillae on the body. Some species are able to swim by lateral flexions of the body so they resemble an eel. They feed upon small hydroids.

81. *Bornella dotoides* Pola, Rudman and Gosliner, 2009, Fig. 96

POLA, M., RUDMAN, W.B. and GOSLINER, T.M. (2009). Systematics and preliminary phylogeny of Bornellidae (Mollusca: Nudibranchia: Dendronotina) based on morphological characters with description of four new species. *Zootaxa*, 1975, 1-57.

DESCRIPTION : The general body shape is long and tapering, typical for species of *Bornella*, and the surface is scattered with low pointed tubercles. The body is a translucent whitish brown colour with subepidermal white granules scattered all over. The head is rounded, and bears a lobe-like oral tentacle on each side of the mouth, with seven finger-like papillae of unequal length arranged in two rows. The rhinophore sheath is tall with the whitish rhinophore protruding at the tip. There are three elongate papillae on the front and sides of the upper edge of the rhinophore sheath, and a taller, flat and branched sail-like structure attached posteriorly. The posterior sail carries three or four small papillae of different lengths. Behind the rhinophores are four pairs of dorsolateral processes, followed by two single processes in the dorsal midline. The first two dorso-lateral processes on each side have four papillae, the third dorso-lateral process has only three papillae, and the fourth is simple, lacking any papillae.

Behrens suggested this may be a species of *Phyllodesmium* (Personel communication).

SIMILAR SPECIES : *Phyllodesmium*.

Fig. 96. *Bornella dotoides* (Ritchie's Archipelago).





DISTRIBUTION : North coast of Papua New Guinea. India
: Ritchies Archipelago, South Andaman.

REMARKS : New Record to Indian waters.

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GLOSSARY

AEOLID - A nudibranch having cerata rather than a plume-like gill on it's back and no rhinophoral sheath, belonging to the major group (suborder) Aeolidina.

ANNULATE – Referring to a type of rhinophore having a series of rings or bands along its stalk.

ANTERIOR - Toward the front of the body.

ANUS - Exit of intestine.

APERTURE - The single large terminal orifice of a shell through which the head-foot is extruded.

APEX - Narrow first formed part of shell, typically bearing a protoconch (the tip of the spire).

AUTOTOMY - A defensive behaviour in which an animal deliberately casts off part of its body (usually the mantle or cerata).

AXIAL - Describes direction of shell sculpture that is more or less parallel to the coiling axis.

BENTHIC - Refers to an organism living on or in the substrate.

BIFURCATE - Branching or forking evenly into two lobes.

BIPINNATE - With small side branches arising on two sides of the main stem or axis (refers to the gill).

BIVALVES - An exclusively aquatic class of molluscs that has two shells that are typically symmetrical along the hinge line and feed by siphoning and filtering particles from the water

BRANCHIAL PLUME - Respiratory structure, or gill, usually situated posteriorly on the dorsum.

BRANCHIAL POCKET - A cavity in the posterior midline of a dorid's body into which the gills can be retracted.

BUCCAL Referring to the mouth or mouth cavity.

BUCCAL MASS - The strongly muscular portion of the digestive system posterior to the oral tube and anterior to the esophagus.

CARNIVOROUS - Literally a meat-eater; but in this context relates to a nudibranch feeding on a diet of animal material (e.g. sponges, bryozoans, bristle worms, cnidarians, or sea squirts).

CARUNCLE - Elevated ridge or lobe with presumed sensory function.

CARYOPHYLLIDIA - Specialised spiculose tubercles on the mantle surface of some cryptobranch dorids.

CEPHALIC TENTACLES - the most anterior paired tentacles; head tentacles, oral tentacles.

CHLOROPLASTS - The plastid within a plant cell that contains chlorophyll and is the site of photosynthesis.

CILIA - Fine hair-like organelles that beat with a lash-like stroke.

CLAVATE - Gradually thickening near distal end.

CLAVUS - The distal portion of the rhinophore above the stalk. It is often expanded and ornamented with lamellae or papillae.

CNIDOSAC - A small cavity at the apex of each cerata of aeolids in which unexploded nematocysts acquired from the cnidarian food are stored.

COLUMELLA - The pillar forming the central axis of the shell around which the whorls spiral of a shell.

CRYPTIC - Body camouflaged to resemble part of the microhabitat; or possessing secretive behaviour

CRYPTOBRANCH - Referring to the group of dorid nudibranchs which are capable of retracting their gills in a cavity.

DENTICULATE Having little teeth or raised points; with notches much finer than those referred to as serrate.

DIGESTIVE DIVERTICULUM - A branch of the digestive gland within a ceras.

DIGITIFORM - Finger-like.

DISTAL - That section of an organ or appendage which is most remote from the point of attachment to the body.

DORID - Nudibranchs with a circle of gills surrounding the anus in the midline towards the rear of the body, belonging to the major group (suborder) Doridina.

DORIDIFORM - Shaped like a dorid nudibranch.

DORSAL - The top surface of the animal.

ENDEMIC - A species that is restricted to one or few localities in its distribution.

EPHEMERAL - Seasonal organisms that usually die back in winter

GIZZARD - A modified region of the gut used for masticating food.

HERBIVOROUS - Feeding on plant material (e.g. seaweed, encrusting microalgae).

HERMAPHRODITE - Bisexual; an individual possessing functional male and female reproductive organs and capable of producing both sperm and eggs.

HYPONOTUM - The under surface of the mantle.

IN SITU - Refers to the natural environment of an animal.

INFRAPALLIAL LOBE - Posterior fold of body enclosing shell of cephalaspideans.

INVOLUTE - Refers to the spire of the shell of the family Bullidae, which is sunk below the level of the apex.

JAW - Chitinous structure used to grasp prey while feeding.

LAMELLATE - (= perfoliate) Rhinophores bearing plates on the posterior face of the stalk or clavus.

LATERAL TEETH The teeth located to each side of the rachidian or central tooth on the radula.

LECITHOTROPHIC - Relates to the type of development in which larvae utilise only the reserves of yolk in the egg to nourish themselves

MANTLE CAVITY - Cavity housing gills and other organs in typical prosobranch mollusks and primitive opisthobranchs.

MANTLE GLANDS - In anaspideans, a group of simple glands on the right ventral edge of the mantle shelf. They exude a purple or whitish fluid and or musky odor Also called purple gland.

MANTLE RIM - The edge of the mantle; in many nudibranchs this is reduced to a ridge along the sides of the body, from which processes or cerata arise.

MARGINAL TEETH - Radular teeth, usually along the margin of the radula. They differ in shape significantly from adjacent lateral teeth.

METAMORPHOSIS - A biological process whereby an animal develops by undergoing a physical and abrupt change in form often accompanied by a change in habitat and behaviour

METAPODIUM – Posterior extension of the mantle.

NEKTON - Permanently floating at the surface of the ocean.

NEMATOCYST - The stinging organ of the Cnidaria (a microscopic capsule with a coiled thread that rapidly unwinds on discharge). Present in hydroids, sea anemones, corals, etc. Aeolid nudibranchs separate the nematocysts from the remainder of the hydroid tissues and pass them, unexpoded, through the digestive diverticulum in the cerata to the cnidosac at the tip where they are used for the aeolid's own defense.

NOCTURNAL - Active at night.

NOTAL RIDGE - A more or less projecting, lateral ridge on the side of some nudibranchs' bodies" represents the original mantle edge.

NOTUM - (= dorsum) The exposed back or top surface of a nudibranch mantle.

OPERCULUM - A plate serving to close the aperture when the animal retreats into its shell. Present in a few primitive opisthobranchs. Lost in adult nudibranchs.

ORAL VEIL - A membranous extension of the head about the mouth.

OUTER LIP - Outer edge of aperture of a shell.

PAPILLA - A finger-like extension with a basal diameter much smaller than its length and not containing digestive gland diverticulae.

PARAPODIA - Flap-like extensions from the sides of the foot in cephalaspidean, sacoglossan and thecosomatous opisthobranchs. They enclose the body and can be used for swimming.

PERICARDIUM - Sac-like structure enclosing the heart.

PERIOSTRACUM - The external, chitinous covering of the shell of certain molluscs.

PHANEROBRANCH GILL - Gills of dorid nudibranchs that cannot be withdrawn into a branchial pocket beneath the notum. They can only be contracted into a tight group above the notum.

PINNATE - Bearing side branches; branched as to resemble a feather

PLANKTOTROPHIC - Relates to the type of development in which larvae actively feed on micro-organisms to nourish themselves while they are in the plankton.

PROPODIAL - Located at the anterior part of the foot.

PROSOBRANCH - The subclass of marine gastropods in which the mantle cavity is located anteriorly.

PUSTULE (= tubercle) A low, conical, rounded or uneven swelling on the notum.

RACHIS - The axis of the branchial plume.

RADULA - Nudibranchs have a file like organ (radula) which is only found in molluscs and is used to scrap off their food, sponge, soft coral etc. This organ is covered on top with rows of chitinous teeth which are produced by the radula sac as they are worn down. Many species are identified by their radula. The Phanerobranch dorids have a narrower radula with a pair of large teeth in most cases used to cut open bryozoans or ascidians. The Cryptobranch dorids have a broad radula with many teeth in each row. The Aeolids have a horse shoe shaped tooth with a strong central denticle usually flanked by smaller cusps. The Phyllidiid and Dedrodorids don't have a radula. They use digestive enzymes to break down tissue before sucking small pieces from the food source (suctorial predators). The Melibe species use a net-like hood to capture their prey, which they swallow whole.

RETICULATE - A pattern of straight lines or ridges joining at angles.

RHINOPHORAL POCKET - The cavity into which the rhinophore of a dorid nudibranch can be withdrawn.

RHINOPHORAL SHEATH - Upstanding flange from the antero-lateral part of the mantle (of dendronotoid nudibranchs) into which the rhinophore can be contracted.

SHELL - The molluscan shell is a calcareous exoskeleton which encloses, supports and protects the soft parts of the animal. It is formed, repaired and maintained by the mantle. In opisthobranchs it may be reduced, internal or completely lost in the adult. **SIPHON** - A tube-like extension of the mantle for the passage of water currents.

SPICULE - A minute rod or star-shaped thickening in the mantle; spicules can be interwoven in a sponge-like fashion to give a protective texture to the mantle.

SPIRAL - Whorled or twisted in helical fashion.

STALK - The basal attachment of the rhinophore.

STRIATE - Marked with fine grooves.

SYMBIOSIS - Describes a close and often long term interaction between different species usually where both organisms benefit.

SYNONYM - A newer name given inadvertently to a species already described.

TENTACLE – A projecting sensory appendage associated with the head or mouth.

These terms are used to describe the gills: unipinnate, bipinnate, tripinnate, retractable.

TRIPINNATE - With small branching arising from the sides of the main stem or axis

TUBERCLE - A small, rounded elevation on the body surface with a basal diameter equal to or greater than its height.

UNISERIATE - In relation to the arrangement of teeth in the radula where there is a single tooth in each row.

VEIL - A membranous extension of the head.

VELIGER - The larval stage of a mollusk which is furnished with a velum or ciliated swimming membrane. When hatched, veligers are usually free-swimming but they may also be seen rotating within the egg capsule just prior to hatching.

VELUM - A ciliated pair of lobes, used for swimming and feeding by larval molluscs.

VERRUCOSE - Covered with warty elevations, referring to a type of rhinophore; wrinkled.

VISCERA - The soft interior organs of the body.

WHORL - One complete spiral turn of a univalve shell.

ZOOXANTHELLAE - Symbiotic dinoflagellates in many cnidarians (Mostly of *Symbiodinium* sp.)

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