

NUDIBRANCHS: SNAILS WITHOUT HOMES

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Many colourful and oddly shaped animals are seen on the reefs and sand when diving. As there are so few illustrated guides available that describe marine animals and plants, we are very often unable to identify what we have seen. A further difficulty is that those guides that are available are likely to cover areas other than the Indian Ocean. I had always found the group known commonly as sea slugs or nudibranchs fascinating, because of their striking colours and the variety of form. I, therefore, decided to observe, photograph and learn more about them during the west-coast diving season in the year 2000.

Nudibranchs are molluscs, a phylum that includes the shelled gastropod snails, the bivalved clams, oysters, mussels etc. and, believe it or not, squid and octopus (see the box for a simplified classification.) An obvious feature of the animals that we call 'snails' is the shell that they carry about with them and into which they retreat when danger threatens. Some even have a 'front door' (operculum) that can be shut to keep out marauders, for instance crabs. The bivalves have paired shells. Many of these animals live permanently attached to solid substrates while others move about and may even burrow into sand and mud; some even bore their way into wood and limestone. Nudibranchs are molluscs without shells, rivalling reef fishes in their beautiful and striking patterns and colours.

These animals are grouped into the subclass Opisthobranchia together with related forms that share a common anatomical arrangement of the gut and mantle cavity that differs from that possessed by the gastropods in the subclass Prosobranchia. The shell is often reduced: in the bubble shells it is thin and fragile with a large aperture, into which the animal is unable to retreat fully. The shells of *Bulla ampulla* (Fig. 1) can be found washed up on beaches. The shell of the Paper Bubble *Hydatina physis* (Fig. 2) is too fragile to withstand waves. The shell of the Little Bubble *Haminoea* sp. (Fig. 3) is covered in life by its beautiful light green mantle with pink markings. In the most advanced opisthobranchs, like *Philineopsis cyanea* (Fig. 4), the shell is lacking. It can easily be mistaken for a nudibranch. It is a voracious carnivore that preys on nudibranchs, swallowing them whole in a matter

of seconds. There are other animals that may be mistaken for nudibranchs, like the flatworms (Fig. 5). Flatworms are very flattened, like oval carpets, with two folds that stick up like tentacles at the head end. The animal in the photograph is bunched up over an irregularity on the rock.

Nudibranchs are placed in an order different from that of the animals described above. As their name suggests, internal gills are absent, but external (naked) respiratory structures are present in many. They are found on the seabed in rocky areas and sometimes on sand near rocks or amongst seaweeds. They feed on a variety of invertebrates including worms, bryozoans, sponges, coelenterates, crustaceans and molluscs. They are soft-bodied animals and, unlike their relatives the snails, have no obvious form of defence. However, like other animals that are sedentary (e.g. sponges and sea squirts) they produce a range of chemical substances to protect themselves from predators and, in addition to the chemicals they produce themselves, substances extracted from their prey are stored in their bodies and used for the nudibranchs' own defence. This form of "chemical warfare" practiced by nudibranchs has drawn the attention of chemists looking for new substances with which to fight cancer, infections, pain and a host of other diseases. Sri Lanka's nudibranchs are being investigated as well, in Sri Lanka. Tubercular nudibranchs go a step further: they hijack solid weapons, not just chemicals (see below).

Nudibranchs show bilateral symmetry externally, being elongated animals with a resemblance to garden slugs. The order nudibranchia is divided into four suborders on the basis of general appearance. The Harlequin nudibranchs (suborder Doridacea, figs. 6 - 26) are the most commonly encountered in our waters. The 'body' of the animal and its head is hidden to varying degrees by an expanded lobe on top called the mantle. The animal walks by means of an elongated foot like all snails, and the mouth is surrounded by one or more pairs of oral tentacles. But what makes them special is the tuft of feathery gills on the rear part of the back surrounding the anus and the pair of specialised tentacles called rhinophores in front. One group of doridaceans however, (the phyllidiids, figs. 17 - 26) does not possess gills on the

back, but instead they are present in two rows on either side of the body below the mantle, which is itself characteristically lumpy (tuberculated).

A simplified classification of the phylum MOLLUSCA		
Class:	GASTROPODA	Snails.
Subclass:	PROSOBRANCHIA	Three (or four) ORDERS containing all the familiar marine snails.
	OPISTHOBRANCHIA	There are nine orders. The more familiar ones are listed below.
Order:	CEPHALASPIDEA	A primitive order, with and without shells. Most are predators.
Family:		Hydatinidae Paper bubble shells
		Bullidae Bubble shells
		Atyidae Little bubble shells
		Aglajidae (lack shell)
	ANASPIDEA	Sea hares. Sea slugs with small internal shells. Herbivores. Some weigh more than 2kg and exceed 60 cm in length.
	NOTASPIDEA	Side-gilled sea slugs. Feed on sponges.
	SACCOGLOSSA	Highly specialised herbivores, with or without external or internal shells.
	NUDIBRANCHIA	Nudibranchs and sea slugs. Lack shells. Feed on various attached invertebrates. Four suborders.
Subclass:	PULMONATA	Air breathing forms. Mostly terrestrial. Coffee bean shells and False limpets are mangrove and seashore forms.
Class	BIVALVIA	Clams, mussels, oysters and other molluscs with paired shells.
	CEPHALOPODA	Squid, cuttlefish and octopuses.

Tubercular nudibranchs (suborder Aolidacea, fig. 27) feed mostly on coelenterates: animals that use stinging cells called nematocysts to capture prey. (Jellyfish, sea anemones and corals are all coelenterates.) They are able to ingest the nematocysts without firing them, transport them to the numerous finger-like appendages (cerata) that cover their bodies and use them for defence against predators. Tubercular nudibranchs usually have one pair of tentacles greatly enlarged.

Nudibranchs are colourful and hardy and are collected for the ornamental marine fish trade. Some nudibranchs belonging to the two suborders described above collected on the west-coast reefs, are illustrated in the accompanying photographs. The animals were either collected personally by the author or obtained from other divers. Wherever possible underwater colour, when it differs from that at the surface, is noted. Some of the animals were observed in an aquarium and it was seen that particular species had characteristic movements e.g. of the mantle and gills; these are described, but it must be

remembered that these observations are based on single specimens.

The photographs are all of live animals taken in an artificial environment. Identification was done by reference to published colour guides that are listed under references. Where an unequivocal match was not found, a genus is suggested based on resemblance to identified specimens. The common names provided are those taken from the literature (usually based on the Latin specific name), names used by divers in Sri Lanka or coined by the author based on some obvious physical feature. Names have been coined for all the unidentified animals to aid reference. Habitat, location and size information relates to the subjects photographed and/or examined.

Little is known about the distribution and abundance of Sri Lanka's marine invertebrates. Study in this field is hampered by a lack of literature with which to identify animals. It is hoped that this collection of photographs will be a step in filling a void and that it will

be of use to underwater naturalists as a field guide. It is also hoped that this collection of photographs and names will encourage those involved in the trade in these animals

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to keep detailed records of the species collected, exported etc. as an input towards sustainable exploitation management.

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Figure 1. *Bulla ampulla* 'Bubble shell': CEPHALASPIDEA, BULLIDAE; Pasikudah, Colombo. Sand bottoms.



Figure 2. *Hydatina physis* 'Paper bubble shell': CEPHALASPIDEA, HYDATINIDAE; Barbery reef, Beruwela. Tide pool.



Figure 3. *Haminoea cymbalum*. ‘Little bubble shell’: CEPHALASPIDEA, ATYIDAE; Pigeon Islands, Nilaveli. Tide pool. [Currently *Lamphrohaminoea cymbalum*]



Figure 4. *Philinopsis cyanea*: CEPHALASPIDEA, AGLAJIDAE; Moratuwa, Itipandama reef. Sand bottom, 10m.



Figure 5. Unidentified flatworm, phylum Platyhelminthes? *Pseudoceros* sp.: POLYCLADIDA, PSEUDOCEROTIDAE; Moratuwa, Itipandama reef. On rocks, 10m.



Fig. 6. *Chromodoris tennentana* ‘Tennent chromodoris’ CHROMODORIDIDAE; Wellawatte, Degal Meda reef; 22m, on rocks. 50mm. The colour underwater is cream with black spots and a dark mantle edge. Now *Goniobranchus tennentanus*

Nudibranchs of the family chromodorididae are very soft and jelly-like, collapsing out of water. All have a pair of rhinophores at the head end and a branching Christmas tree-like set of gills behind. The mouth and its oral tentacles are hidden by the mantle; the rearmost portion of the foot shows behind the mantle in some species.

Figure 7. (At right) *Chromodoris decora* ‘Decorated chromodoris’ CHROMODORIDIDAE; Ratmalana Deep reef (Bamba dahaya); 20m, on rocks. 20mm. Feeds on sponges. [Current name: *Goniobranchus decorus*]





Figure 8. *Chromodoris fidelis* 'Girdled nudibranch': CHROMODORIDIDAE; Moratuwa, Itipandama reef; 10m, on sandy, rock strewn bottom. 25mm.

[Current name: *Goniobranchus fidelis*]

Figure 9. *Chromodoris geminus* 'Three-lined chromodoris': CHROMODORIDIDAE; Lunawa, Bodhigala; 21m, on rock. 40mm.

This chromodoris (identified since the publication) has a yellow-blue-white mantle border clearly seen underwater, the spots showing up pale blue on a pale honey background. The underside of the mantle and the upper side of the foot are covered with small purple spots with white edges; the mantle edge underneath is lilac. The sole of the foot is an unmarked cream. When resting, the animal flattens itself and spreads the mantle out in a wide oval. When moving, the whole mantle is periodically flipped up and down.



[Current name: *Goniobranchus geminus*]



Figure 10. *Glossodoris atromarginata* 'Common nudibranch': CHROMODORIDIDAE; Colombo reefs. Collection data not available. 60mm.

This nudibranch is the one seen most often on Colombo's shallow in-shore reefs. The deeply ruffled narrow mantle with a dark edge is distinctive. Described in older books as *Casella atromarginata*. Feeds on sponges.

[Current name *Doriprismatica atromarginata*]

Figure 11. *Risbecia pulchella* 'Beautiful risbecia': CHROMODORIDIDAE; Colombo reefs. Collection data not available. 60mm.

This animal has a mantle that is narrow behind showing the yellow-spotted foot below, with a characteristic expanded head-lobe.



[Current name *Hypseldoris pulchella*]



Figures 12, 13.

? *Risbecia* sp. 1 'Red-lipped nudibranch': CHROMODORIDIDAE; Moratuwa, Itipandama reef; 10m, on sandy, rock strewn bottom. 20mm.

The underside of the mantle is the same orange-red as the rhinophores and gills. The mantle is expanded into a head-lobe that it periodically flips up and down flashing the red underside, as seen in Fig. 13. The gills are in constant rapid quivering movement; a characteristic displayed only by this nudibranch.



Figure 14. *Hypselodoris kanga* 'Chequered nudibranch': CHROMODORIDIDAE; Moratuwa, Itipandama reef; 10m, on sandy, rock strewn bottom. 30mm.

The gills are held stiffly erect in a tulip shape; the yellow spots on their outer faces are characteristic of this species.

The animals illustrated in figures 15 & 16 belong to two different families. They resemble the chromodorids in possessing rhinophores and branchiae (gills) around the anal opening.

Figure 15. *Jorunna funebris* 'Peppermint slug, Funeral jorunna': DORIDIDAE; Colombo reefs; 1m to 10m. 50mm.

These are thick and rather cylindrical animals with mantles that cover the foot completely. They are usually found in the vicinity of a blue encrusting sponge (*Xestospongia* sp.) common on the Colombo reefs that they feed on.



Figure 16. *Tambyja affinis* 'Bordered tambyja': POLYCERIDAE; Ratgama, Godagala; 15m, on rock. 55mm. This nudibranch was found on a rocky cliff exposed to strong currents from the open sea a few kilometres off the coast. It has a rounded body with a distinct hump in the middle and no mantle expansion. There is a pair of thick black oral tentacles that are very prominent. These nudibranchs feed on bryozoans (moss animals).



Figure 17. *Phyllidia varicosa* ‘Varicose phyllidia’: PHYLLIDIIDAE;

Colombo reefs; collection data not recorded. 70mm.

The animals seen most often on the Colombo reefs have white ridges with yellow spots on a black background. Those illustrated in the reference books under the name *varicosa* have blue ridges with yellow spots – like the animal in figure 18.

(Viewed from the right side.)



Figure 18. *Phyllidia varicosa* ‘Varicose phyllidia’: PHYLLIDIIDAE; Blue form: Moratuwa, Itipandama rocks; 10m, on sandy rocky bottom. 40mm.

The only blue coloured *varicosa* seen by the author. The colour is a deeper blue underwater. (Viewed from above; the head is to the left.)

[The white and the blue forms are the same species]

Nudibranchs of the family phyllidiidae have thick, warty mantles that are oval in shape, firm and rubbery to touch and which cover the foot all round. There is a pair of rhinophores at the anterior (head) end. The gills are hidden under the mantle on either side of the foot. When picked up and taken out of water they tend to curl up slightly, but otherwise hold their shape, unlike the soft and jelly-like chromodorids that collapse out of water.



Phyllidia cf. *nobilis* ‘Noble phyllidia’: Wellawatte, Kinross first reef; 2-3m, on rock. 40mm.

Figure 19. (At right, upper. Viewed from above, the head to the right;)

Figure 20. (At right, lower. Viewed from the left side;)

[*Phyllidiella pustulosa*. *Phyllidia nobilis* is a synonym.]



Black phyllidias with groups of white nodules (tubercles) arranged in various patterns, as seen underwater, are commonly found on reefs off Colombo. At the surface, the white tubercles are seen to be pink (like in this one), grey or white.

The reference books are full of phyllidias, many unidentified to species level, differing in details of tubercle arrangement and colour. This was the only specimen for which a reasonable match was found, but not convincing enough for definite identification. The tubercles appear fuzzy in the photo because the groups of pigmented lumps are covered by a layer of translucent tissue. A ‘keyhole’ shaped grouping of tubercles extends forwards from the rhinophores (to the right in Fig. 19) – an arrangement seen in many of the photos that follow.

[See page 10 for references available on line that enabled inclusion of current names. 13.9.2019]



Figure 21. *Phyllidia* sp. 1 'Fin-back phyllidia': PHYLLIDIIDAE; Ratmalana Deep reef (Bamba dahaya); 20m, on rock. 25mm.

The dorsal surface of this phyllid is covered in rows of tuberculated ridges that are thin and fin-like. White on black underwater. May be the same animal as Fig. 26.

[Animals in figures 21 & 26 are *Phyllidiella zeylanica* (Kelaart, 1859)].

Figure 22. ? *Phyllidia* sp. 2 'Sergeant phyllidia': PHYLLIDIIDAE; Ratmalana Deep reef (Bamba dahaya); 20m, on rock. 25mm.

The common name is derived from the three black stripes on the white background. This animal does not possess lumpy tubercles but only small papillae arranged in two rows down the back and scattered around the mantle periphery. It may not even be a *Phyllidia* but is named so as nothing resembling it has been located in the reference books. The rhinophores are white and can be seen on the left.



[*Phyllidiopsis phiphensis*]

Figure 23. *Phyllidia* sp. 3 'Gold-spotted phyllidia': PHYLLIDIIDAE; Moratuwa, Itipandama rocks; depth 10m, on sandy rock-strewn bottom. 45mm.

This striking animal was surprisingly not located in any of the reference books. At rest it flattens itself and spreads the mantle into the shape of a wide oval, as seen in the photo. It is more a lemon yellow underwater.

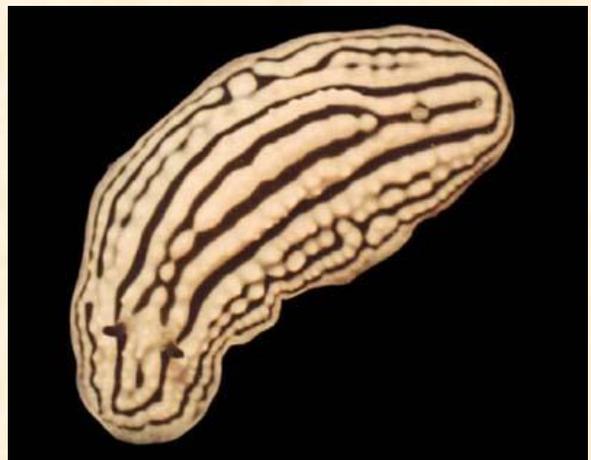


[*Phyllidia ocellata*]

Figure 24. *Phyllidia* sp. 4 'Concentric phyllidia': PHYLLIDIIDAE; Wellawatte, Degal Meda reef; 20m, on rocks. 30mm.

Very striking concentric white tuberculated ridges that are rather low and rounded.

[Characteristically has warty white ridges on black with a series of mid-line oval rings. In this specimen the oval rings are elongated and joined.]



[*Phyllidiella meandrina* (Pruvot-Fol, 1957)]



[cf. *Phyllidiella cooraburrama* Brunkhorst, 1993]

Figure 26. *Phyllidia* sp. 6 ‘Fin-back phyllidia’: PHYLLIDIIDAE; Moratuwa, Itipandama reef; depth 10m, on sandy, rock strewn bottom. 30mm.

Similar to *Phyllidia* sp. 1 (Fig. 21) but differs in the lower and wider ridges where only the midline one is discontinuous, the differently shaped ‘keyhole’ and the three-spot pattern posterior to the anus. The significance of these variations is not known and these animals may turn out to be the same species.



[*Phyllidiella zeylanica* (Kelaart, 1859)]



Figure 27. *Pteraeolidia ianthina* ‘Railroad nudibranch, Violet pteraeolidia’: GLAUCIDAE; Wellawatte, sand inshore of the Palagala reef; 13m. 80mm.

This is a tuberculate nudibranch of the sub-order Aolidacea. Situated along the back of the worm-like body are 17 pairs of fan-like structures, the cerata, which are characteristic of this sub-order. The cerata communicate with the digestive system of the animal and at their summits are special structures (cnidosacs) to store the nematocysts obtained from their hydroid prey. These are used for the animal’s defence. Never handle these animals with bare hands, as they are capable of causing irritating stings on account of these (borrowed) nematocysts.

The colour underwater was brown with a few spots of green-blue iridescence, as it was an overcast day. In bright sunlight, the animals glow with a brilliant mauve iridescence with bluish green highlights. The colour is said to vary from pale to dark purple with brown and green not being uncommon. All the animals seen in Sri Lanka have been brown.

END
11.9.2019

Text and photographs are those published, including names. Where mis-identifications have been corrected or names have been revised, the current name (December 2019) is shown within square brackets.