

THE DISTRIBUTION AND DIVERSITY OF CHROMODORID NUDIBRANCHS IN SIP ADAN ISLAND, BORNEO.

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ABSTRACT

The diversity and distribution of chromodorid nudibranchs were studied at 7 sites on Sipadan Island, Borneo. Seven species were reported, *Chromodoris annae* was the most common species, whereas *Chromodoris magnifica*, *Chromodoris coi* and *Chromodoris elizabethina* were rare. Most of the nudibranchs were found at depths ranging from 6-28 m. They were generally found on sponges, rubble and rock. The size range of each species of nudibranch was narrow. Most individuals measured from 1.6-2.0 cm in length.

INTRODUCTION

Nudibranchs are by far the largest group of opisthobranch. They occur in a variety of shapes at sizes ranging from a few mm up to 30 cm. They occupy a wide range of habitats from the intertidal region to oceanic depths, with the greatest diversity found in the tropics (Wells & Bryce, 1993).

Nudibranchs are molluscs without shells in adult life. A shell protects the veliger stage. Chromodoridae is a large nudibranch family comprising about 300 species. They are among the most brightly coloured of marine animals. They are usually seen feeding or moving on their prey such as sponges, hydroids, soft corals and sea anemones. Sponges seem to be favoured by chromodorids and they are often found on a single species of sponge (Wells & Bryce, 1993).

Sipadan Island has a fringing coral reef. It is situated at N 4° 7' 4.4" and E 118° 37' 37.3". There are a few other islands similar to Sipadan Island in terms of geomorphology. Sipadan Island has a very wide coral reef flat and a vertical wall, which is rich in soft corals, sponges and other living organisms. Sipadan Island but it is a well-known local-

ity for pleasure diving and for underwater photography. The nudibranchs of Sipadan Island have been much admired by divers and reported in some diving magazines. No scientific study has been done on the nudibranchs so far so this paper is the first attempt to summarise knowledge on the distribution and abundance of nudibranchs around the island.

MATERIALS AND METHODS

The study on abundance and distribution of chromodorids was conducted between 5 and 12 May 1999 at Sipadan Island, Borneo. The animals were searched on the coral reef using SCUBA diving. (Straight-line swim transects, 1 m wide). Habitat, external morphology and colour of nudibranchs were recorded by photography. Length of chromodorids was measured on live specimens from posterior to anterior ends.

Most of the study was done at the reef walls, which are well covered with wide diversity of soft coral and sponges. Unfortunately some of the reef flat and the slope had been destroyed by dynamite fishing a few years back and evidence of destruction by a big storm called Greg in November 1996 was still visible. In this survey 7 locations were studied: Barracuda Point, Drop-Off, Hanging Garden, Lobster Lair, South Point, Turtle Patch, and White Tip Avenue (Figure 1). Identification was done by comparison of *in situ* photos with the main references Debelius (1998) and Wells & Bryce (1993).

RESULTS

Table 1 shows the survey dates at 7 localities and the distance covered at each site.

A total of 7 species of chromodorid nudibranchs were found around Sipadan Island. Table 2 summarises the distribution

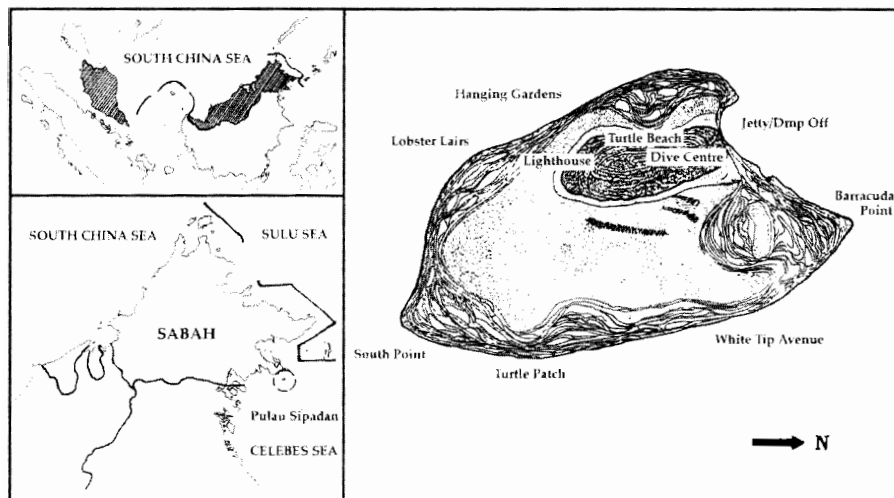


Figure 1. Location of Pulau Sipadan in East Malaysia and the 7 sites surveyed around the island.

and abundance of these species. *Chromodoris annae* was the most common species. The locality Drop-Off had the highest number of nudibranch per 100 m. More than 50 % of the chromodorids were found on sponges; the rest on coral rubble and rocks. Most of the nudibranchs were observed while moving, mating or feeding. Mating was commonly seen.

Table 1: Sampling dates and distances surveyed at study sites around Sipadan Island.

Date	Location	(m)
06 May 1999	White Tip Avenue	100
10 May 1999	White Tip Avenue	100
08 May 1999	Drop-Off	100
12 May 1999	Drop-Off	100
09 May 1999	Barracuda Point	120
11 May 1999	Barracuda Point	120
09 May 1999	Turtle Patch	120
09 May 1999	South Point	120
10 May 1999	Lobster Lairs	100
10 May 1999	Hanging Garden	100

RECORD OF SPECIES

Chromodoris annae

C. annae displays a combination of blue, yellow and orange colours. There is a yellow band around the edge of the mantle. There

is a black stripe between the orange rhinophores.

This was the most abundant species with the highest density at South Point and Turtle Patch (Table 2). The length ranged from 1-4 cm (Fig. 2) but more than 50 % of the individuals were in the range of 1.6-2.0 cm. The widest size range was found at Drop-Off and South Point (Fig. 2).

The species was most common at a depth of 13 m on sponges and coral rubble.

Chromodoris willani

C. willani has a dark blue body, a dark submarginal band, and a mid dorsal line. Both the rhinophores and gills are white. It occurred at a density of 6 individuals per 100 m at Drop-Off, Lobster Lair and Hanging Garden (Table 2). Specimens measured from 1-3 cm (Fig. 2) with one third in the size range 2.6-3.0 cm.

It was found at depths between 14 and 21 m. Most of the individuals were observed grazing on sponges.

Chromodoris lochi

C. lochi has a pale blue body with a dark line between the rhinophores. The line stretches to the posterior part of the gills. It has yellow gills and rhinophores.

This species was only found at Drop-Off at a density of 3 individuals per 100 m. The Drop-Off site has a very limited reef flat,

Table 2: Number of chromodorid species per 100 m surveyed during the study at Sipadan Island.

Location	individuals per 100 m								Total distance covered
	<i>C. annae</i>	<i>C. coi</i>	<i>C. elizabethina</i>	<i>C. magnifica</i>	<i>Chromodoris</i> sp.	<i>C. lochi</i>	<i>C. willani</i>	Total ind.	
Barracuda Point	4	1	0	0	0	0	0	5	240
Drop-Off	6	0	0	0	0	6	5	17	200
Hanging Garden	2	0	0	0	0	0	2	4	100
Lobster Lairs	1	0	0	0	0	0	2	3	100
South Point	5	0	0	0	0	0	0	5	120
Turtle Patch	5	0	0	1	0	0	0	6	120
White Tip Avenue	1	0	3	0	1	0	0	5	200
Total	24	1	3	1	1	6	9	45	1080

which stretches about 50 m from the land. Sponges and soft corals cover the vertical wall.

Specimens measured 1-2 cm (Fig. 2). Half of them were larger than 1.5 cm. It occurred at depths from 11 to 12 m. It fed on sponges in most cases.

Chromodoris elizabethina

C. elizabethina has very striking and contrasting colours. There is a thick orange band around the mantle edges. The mantle has a line, which runs between the rhinophores and the gills. There is also an orange band on its foot.

The size ranged from 2-3 cm (Fig. 2). It was rare in this survey except at White Tip Avenue. None were found on the reef flat but 3 individuals occurred at the vertical wall, which has approximately 70 % coverage of sponges. The 3 specimens were all found at a depth of 28 m; two of them were mating and one was feeding on a nearby sponge.

Chromodoris coi

C. coi has a purple margin around its mantle. It has pale brown rhinophores and gills. During crawling, it usually raises and lowers the margin of its mantle with a rippling motion.

Only 1 individual was found at 6 m depth on coral rubble on the reef slope at Barracuda Point, which has a large reef flat with

70 % cover of rubble. The length of the specimen was 2 cm (Fig. 2).

Chromodoris magnifica

C. magnifica has orange gills and rhinophores. The body is covered with dark lines and it has a dark line in between the rhinophores. There is a broad submarginal orange band around its body.

Only one 3 cm long individual of *C. magnifica* (Fig. 2) was found at Turtle Patch, which has a variety of soft corals and sponges along the vertical wall. It was moving on a rock at a depth of 18 m.

Chromodoris sp.

This nudibranch has a pale blue mantle and a black line on its mantle. The rhinophores are yellow; the gills are white with yellow tips.

The only individual (3.5 cm long) could not be identified to species. It was moving on a rock at White Tip Avenue at 24 m depth.

DISCUSSION

Chromodorids are usually restricted to coral reef areas covered with high diversity soft corals and sponges. The majority of the prey consists of sponges, bryozoans, cnidarians and ascidians (McDonald & Nybakken 1980). We observed about 50 % of the nudibranchs on sponges.

Most of our nudibranchs were found below a depth of 8 m, generally on the reef slope

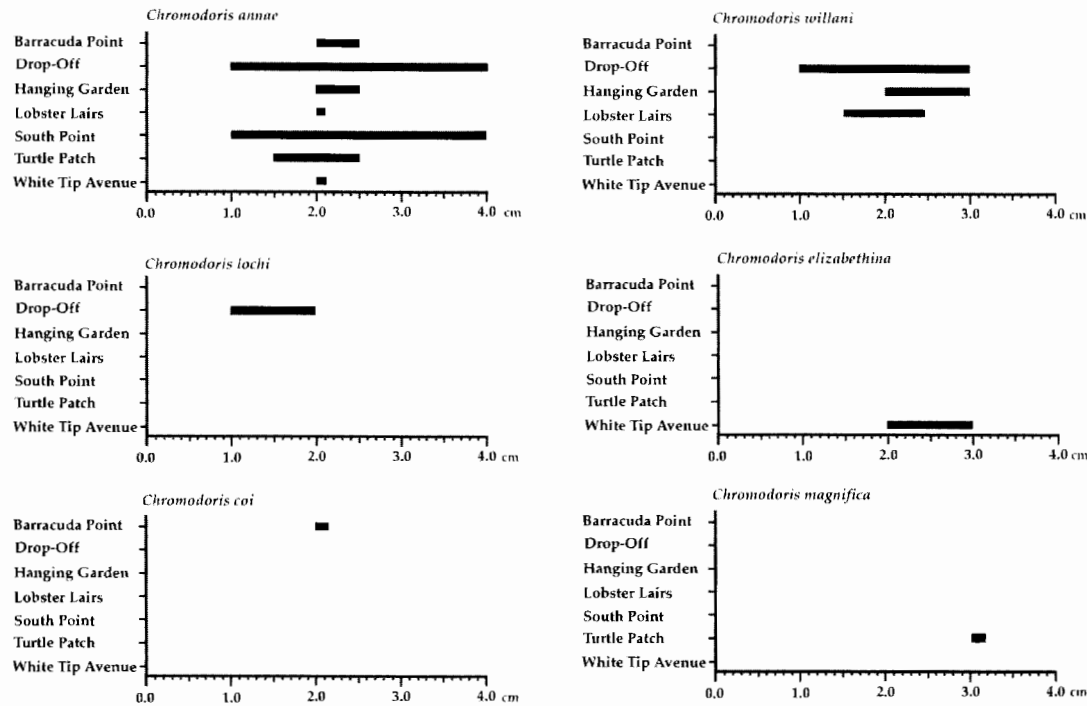


Figure 2.

Size range (length in cm) of 6 species of chromodorid nudibranchs recorded at 7 sites around Pulau Sipadan, Malaysia (see Fig. 1).

and vertical wall.

The site Drop-Off had the highest diversity of chromodorids correlated with a high diversity of soft coral and sponges, providing food for the nudibranchs. This area is also partially protected from winds due to its location.

Generally, the population densities of chromodorids are very low. It is speculated that this may be due to reef destruction by fish bombing, monsoons and strong wind.

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