

8. Notes on the Plankton Community in the Habitat of *Nautilus* off the Southeast Coast of Viti Levu, Fiji

by

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During the field operation late in August and September, 1983 for the ecological study on the habitat of *Nautilus* in Fiji, the writer was engaged in sampling of water for the study of plankton at the 15 stations in total off Suva (inside and outside of the fringing reef) and off Pacific Harbour (Mbengga Passage) in the south-eastern part of Viti Levu, Fiji (Fig. 1). The plankton net used is the MARUKAWA's type net (30 cm in diameter with XX 13 bolting silk MÜLLER's gauze: 0.097×0.097 mm mesh). Sampling was made from the water between -30 and 0 m by vertical towing at all the stations except for the nearshore stations shallower than 30 m, where the towing was done from the bottom to the surface. To determine the quantity of plankton, settling volume set in test tube after 24 hours was measured and the plankton volume of ml per cubic meter (ml/m^3) was calculated. Thus, the comparison of plankton volume was made between the stations (Table 1).

Results and Consideration

The plankton community in the studied area off Suva (outside the reef)

The plankton volumes collected from 11 stations off Suva varied from $1.2 \text{ ml}/\text{m}^3$ in minimum to $2.1 \text{ ml}/\text{m}^3$ in maximum and the average of them was $1.6 \text{ ml}/\text{m}^3$. Those were rather uniform showing little difference between stations (Fig. 2). The predominant elements of phytoplankton were *Trichodesmium hildebrandtii* and *Pelagothrix clevi* (Cyanophyceae); *Rhizosolenia alata* and *Thalassiothrix longissima* (Bacillariophyceae); *Ceratium macroceros*, *Ceratium inflatm*, *Ceratium pullchellum*, *Ceratium trichoceros* and *Ornithocercus serratus* (Dinophyceae). The predominant elements of zooplankton were *Sagitta* (Chaetognatha); *Paracalanus*, *Oithona*, *Acartia*, *Oncaea*, *Corycaeus* and *Oikopleura* (Appendicularia). All of them are very popular groups in the tropical sea area. However, the identification at the specific level was rather difficult to the writer, who is unfamiliar with the fauna of this district. It may be said that the plankton community around here are poor in volume but rather rich in variety.

The plankton community in Lauthala Bay (inside of the barrier reef off Suva)

Plankton sampling was carried out at two stations in Lauthala Bay, inside of the barrier reef off Suva, and at the two near shore stations outside the reef for comparison between inside and outside (Stations 101, 102, 103 and 104). The plankton volume collected at the station (Stn. 101) close to the harbour of IMR, was $15.0 \text{ ml}/\text{m}^3$ and at the Stn. 102 (at the center of the bay) it was $4.5 \text{ ml}/\text{m}^3$. It is noticeable that the former corresponds to six times and the latter three times of the amount of the plankton volume collected at the stations outside the reef Stn. 103: $1.8 \text{ ml}/\text{m}^3$, Stn. 104: $2.1 \text{ ml}/\text{m}^3$). The predominant plankton in Lauthala Bay were *Rhizosolenia alata* and

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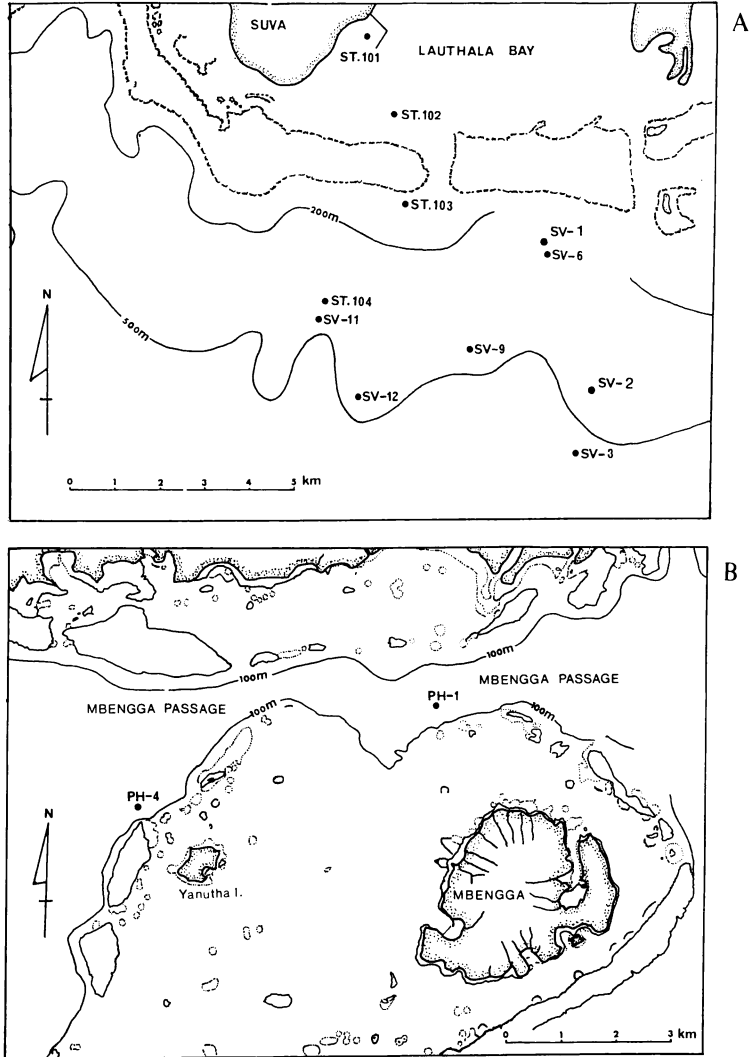


Fig. 1. Map showing the sampling points of plankton off the southeast coast of Viti Levu (A: off Suva, B: off Pacific Harbour), Fiji.

Navicula spp. of Bacillariophyceae, *Ceratium macroceros* and *C. pullchellum* of Dinophyceae, and *Acartia* sp. and *Oncaea* sp. of Copepoda. These were all neritic plankton and no oceanic plankton, such as *Trichodesmium* and *Pelagothrix* were collected.

The plankton community in the area off Pacific Harbour (stations close to Mbengga Island in Mbengga Passage)

Two plankton sampling were carried out in the area off Pacific Harbour (PH-1 and 4). Settling volumes of plankton at the two stations were 0.8 ml/m^3 (PH-1) and 0.9 ml/m^3 (PH-4) respectively, which were the minimum records during the investigation in Fiji. Appeared phyto-plankton were all oceanic type, such as, *Trichodesmium hildebrandtii* and *Pelagothrix clevei* (Cyanophyceae); *Thalssiothrix longissima* (Bacillariophyceae); *Ceratium macroceros*, *C. pull-*

Table 1. Record of sampling and distribution of plankton off the southeast coast of Viti Levu, Fiji. (CC: very abundant C: abundant+ : common r: rate rr: very rate)

Sample number	1	2	3	4	5	6	7	8	9	10	11	101	102	103	104	
Station number	SV-3	SV-1	SV-2	SV-11	SV-11	SV-9	SV-6	SV-3	SV-12	PH-4	PH-1	Harbour	Inner Reef	Outer Reef	SV-11	
Hauling depth(m)	30-0	30-0	30-0	30-0	30-0	30-0	30-0	30-0	30-0	30-0	30-0	30-0	30-0	30-0	30-0	
Date in 1983	Aug.29	Aug.31	Aug.31	Sept.2	Sept.13	Sept.13	Sept.14	Sept.16	Sept. 16	Sept.20	Sept.21	Sept.27	Sept.27	Sept.27	Sept. 16	
Time	14:30	11:00	15:00	11:40	12:30	14:20	11:30,	11:00	16:30	10:00	10:30	08:40	09:10	09:25	09:45	
Settling volume (ml/m ³)	2.1	1.9	1.8	2.0	1.3	1.6	2.1	1.6	1.2	0.9	0.8	15.0	4.5	1.8	2.1	
Phytoplankton																
<i>Trichodesmium thiebautii</i>	rr						rr	rr	rr							+
<i>Trichodesmium hildebrandtii</i>	r	+	+	+	+	+	+	+	+	+	+			+		+
<i>Pelagothrix clevei</i>	+	rr		rr	+		rr	+	+	+	+			+		+
<i>Thalassiothrix longissima</i>	rr	rr	rr	r	rr	rr	rr		rr	+	+	r		rr		rr
<i>Thalassionema nitzschioides</i>	rr				rr		rr		rr			+		rr		rr
<i>Coscinodiscus</i> sp. 1				rr			rr		rr							
<i>Coscinodiscus</i> sp. 2	rr		rr	rr		rr										
<i>Rhizosolenia alata</i>	+	+	c	c	+	c	+	+	+			+	+	+		+
<i>Navicula</i> sp.												+	+			
<i>Ceratium macroceros</i>	r	rr	+	rr	rr	+	+	+	+	+	+	rr	rr	rr		rr
<i>Ceratium inflatum</i>	r	rr	rr	rr	+	rr	rr	r	rr			rr	rr	c		+
<i>Ceratium pulchellum</i>	rr	rr			rr		rr	rr	rr	rr	rr	rr	rr	rr		rr
<i>Ceratium trichoceros</i>	rr	rr	rr	rr	rr	rr	rr	r				rr	rr	rr		rr
<i>Ceratium penectum</i>	rr	rr					rr	rr	rr			rr	rr			
<i>Ceratium</i> sp.	rr	rr			rr	rr	rr	rr	rr			rr	rr			rr
<i>Ornithocercus serratus</i>	rr	rr	rr	rr		rr	rr	rr	rr	rr	rr					rr
Zooplankton																
Radiolaria						rr			rr	rr	rr					rr
Foraminifera		rr		rr		rr	rr									
Siphonophora										+	+	rr	r			rr
Chaetognata	rr	rr	rr	rr	rr	rr	r	rr	rr	rr	r		+	r		+
Polychaeta larva							rr				rr	+	+	rr		rr
Copepoda, <i>Paracalanus</i>	r	r	rr	rr	+	rr	rr	r				rr	rr			
Copepoda, <i>Oithona</i>	r	rr	rr		rr	rr	+	c	c	c	c	rr	rr	rr		rr
Copepoda, <i>Acartia</i>	c	c	+	+	c	c	c	c	c			c	c			
Copepoda, <i>Oncaea</i>	c	+	+	c	+	c	+	+	+	c	c	c	c	r		+
Copepoda, <i>Corvaceus</i>	+	+	+	+	rr			+	rr						+	+
Other Copepoda	+	+	c	cc	+	+	+	+	+	cc	cc			+	r	+
Decapoda larva		rr		rr		rr			rr				rr	+		
Appendicularia	r	rr	rr	rr	rr	rr	r	r	r	+	+			rr		rr
Thaliacea, <i>Cyclomyaria</i>			rr							rr	rr					
Thaliacea, <i>Hemimyaria</i>		rr								rr						
Other larvae	rr		rr	rr	rr	rr		rr	rr	rr	rr	+				rr
Fish eggs	rr						rr	rr			rr		rr			

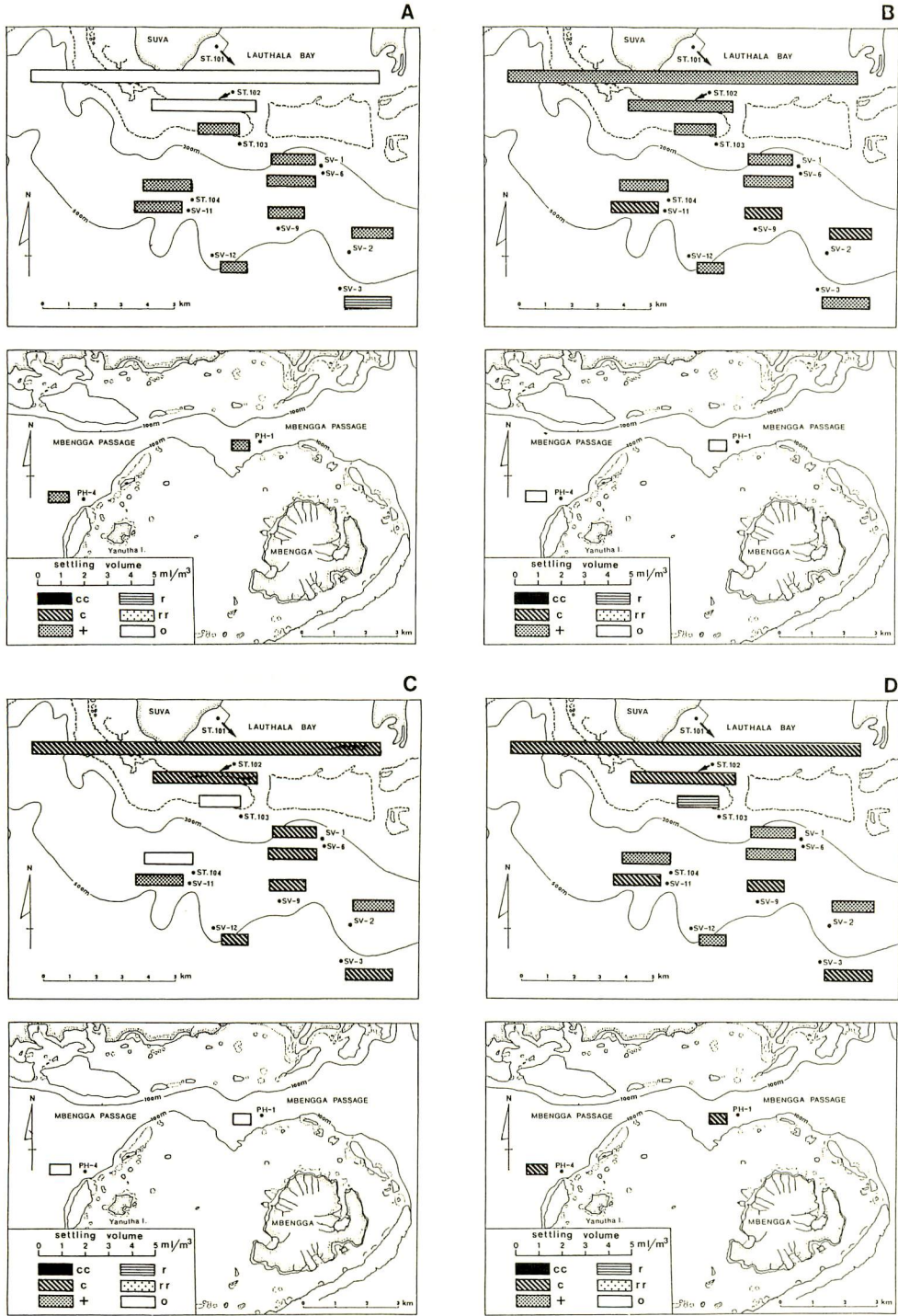


Fig. 2. Diagram showing the settling volume (bar length) and the frequency (pattern) of plankton at each station. (A) *Trichodesmium hildebrandtii* (B) *Rhizosolenia alata* (C) *Acartia* group. (D) *Oncaea* group.

chellum and *Ornithocercus serratus*. The predominant zooplankton were *Acanthometron* (Radiolaria); *Shiphonophora* (Coelenterata); *Sagitta pulchra* (Chaetognatha); *Oithona* spp. and *Oncaea* spp. (Copepoda); and *Oikopleura* spp. (Appendicularia). These were all oceanic and pelagic type plankton in the tropical sea.

Conclusion

Through the investigation of plankton in this area, three types of communities were discriminated. The first one was the stations outside of the reef off Suva, where plankton was poor in volume but rather rich in variety. The second type was the one from the shallow and calm innerbay where plankton is rich in volume and comprise the coastal species but is poor in variety. The third one was characterized by the poor volume and variety of plankton as seen at the stations off Pacific Harbour, with the exception of *Trichodesmium* and *Pelegothrix* (Cyanophyceae) which are the dominant pelagic species in the tropical ocean.

Acknowledgements

The writer wishes to express his gratitude to Professor Shozo HAYASAKA of Kagoshima University, leader of the present project, for his valuable suggestion and encouragement. The writer is also indebted to Professor Uday RAJ, Director of the Institute of Marine Resources, the University of the South Pacific. Particular thanks are due to the staff of the Institute for their help in many ways.

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