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7. Study on the Plankton Community in the Environs of Cebu and Negros Islands, the Philippines

By

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The sampling of plankton was carried out at nine stations within Tañon Strait and at one additional station outside the strait off Dumaguete City from 7th to 15th September, 1981 (Fig. 1 and Table 1). The plankton net used is the Marukawa's closing type net (30 cm in diameter with XX13 bolting silk müller gause ; 0.097 mm mesh). Sampling was made from the three layers, that is, 50-0 m, 100-50 m, and 200-100 m in depth.

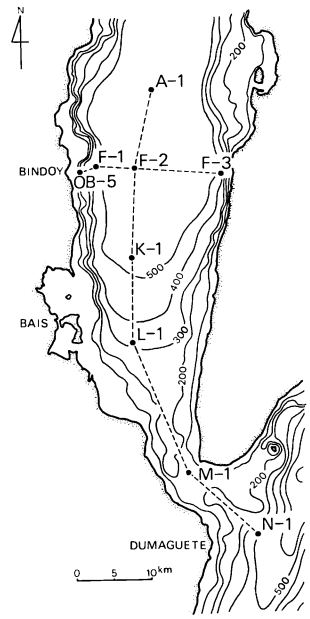

Fig. 1. Map of the southern part of Tañon Strait, showing the submarine topography and stations for oceanographic survey.

An average settling volume of plankton in Tañon Strait was 3.2 ml at the range of 5.6 ml and 1.8 ml. Planktons are abundant at the stations in the southern part of Tañon Strait (Stations L-1 to M-1) and in Bohol Strait (St. N-1) and rather scarce in the central part of Tañon Strait (Stations F-1, F-2, F-3 and A-1).

The main groups occurring in the zooplankton assemblages were Copepoda (*Oithona, Paracalanus, Oncaea, Acartia* and nauplius of copepods), Chaetognatha (*Sagitta enflata*), Appendicularia, Pteropoda, Amphipoda and Dinoflagellata. The first three groups are especially important in Tañon Strait because the abundance of them control the plankton volume at each station. *Oithona nana*, *O. plumifera* and *O. setigera* were widely distributed and predominantly found from Bohol Strait (St. N-1). They steadily decrease in number of individual towards the central part of Tañon Strait.

Oithona plumifera and *O. setigera* have generally been known to occur numerously in open sea waters. These two species decrease in number of individual in Tañon Strait and disappear in the innermost region of Tañon Strait. In the inner, more stable area, they occurred only sparsely and were not found in St. OB-1 and St. F-1. These

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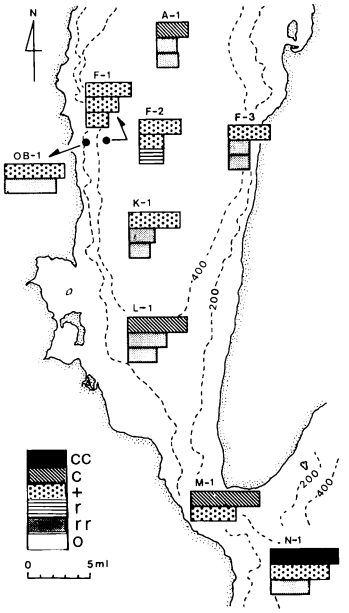

Fig. 2. Distribution of the *Oithona* group in the investigated area.

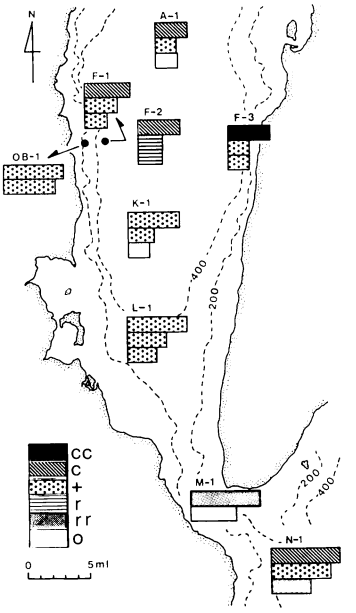

Fig. 3. Distribution of the *Paracalanus* group in the investigated area.

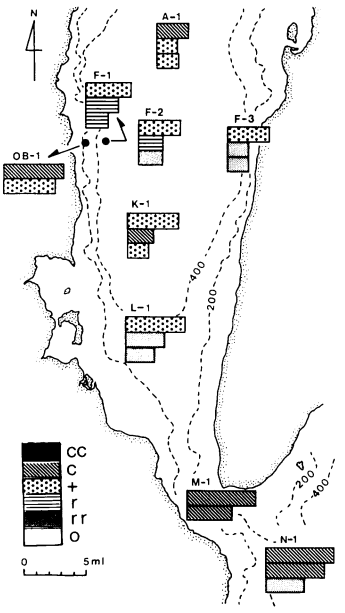

Fig. 4. Distribution of the Chaetognatha group in the investigated area.

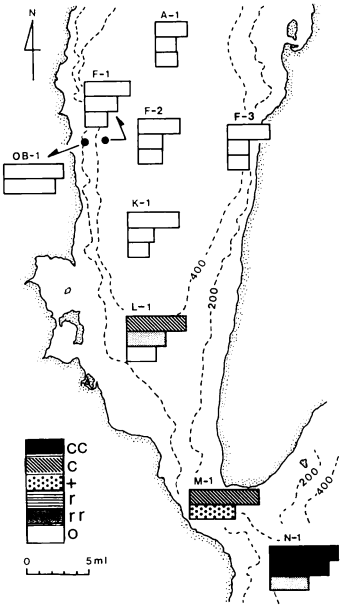

Fig. 5. Distribution of the *Trichodesmium thiebautii* in the investigated area.

Table. 1. The record of sampling and distribution of plankton in Tanon Strait and Bohol Strait.

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Station Number	St. F-1	St. F-1	St. F-1	Ft. F-2	St. F-2	St. F-2	St. F-3	St. F-3	St. F-3	St. A-1	St. A-1	St. A-1	St. K-1	St. K-1	St. K-1	St. L-1	St. L-1	St. L-1	St. M-1	St. M-1	St. N-1	St. N-1	St. N-1	St. OB-5	St. OB-5
Hauling depth (m)	50m-0m	100m-50m	200m-100m	50m-0m	100m-50m	200m-100m	50m-0m	100m-50m	200m-100m	50m-0m	100m-50m	200m-100m	50m-0m	100m-50m	200m-100m	50m-0m	100m-50m	200m-100m	50m-0m	100m-50m	50m-0m	100m-50m	200m-100m	50m-0m	100m-50m
Date in 1981	Sept. 7	Sept.7	Sept.7	Sept. 8	Sept. 8	Sept. 8	Sept. 9	Sept. 9	Sept. 9	Sept. 9	Sept. 9	Sept. 9	Sept. 10	Sept. 10	Sept. 10	Sept. 11	Sept. 11	Sept. 11	Sept. 11	Sept. 11	Sept. 12	Sept. 12	Sept. 12	Sept. 15	Sept. 15
Time	14:50	15:00	15:20	14:20	14:30	15:00	12:30	12:40	12:50	17:40	17:50	18:00	13:00	13:20	14:40	12:00	12:15	12:40	17:00	17:10	12:00	12:10	12:25	08:10	08:25
Settling volume (ml)	3.7	2.7	1.9	3.4	2.0	2.0	3.4	1.8	1.8	2.6	1.7	1.8	4.2	2.2	1.8	4.8	3.2	2.4	5.6	3.7	5.6	4.8	3.2	4.8	4.2
Globigerina	rr			rr	rr	rr	rr	rr	rr				rr	rr		rr	rr		+	+	+	r	rr	rr	rr
Acanthometron	rr	rr											rr						+		+	r	rr		
Noctiluca	rr			rr			rr			rr			rr			rr							r	
Pseudonoctiluca					rr		rr														rr	rr	rr		
Siphonophora					+	r										r					+	+	+		
Chaetognatha	+	r	r	+	r	rr	+	rr	rr	c	+	+	+	c	+	+	rr	rr	c	c	c	c	rr	c	+
Polychaeta pelagic larvae		rr		rr	rr																rr	rr			
Cladocera				rr		+							+									·			
Ostracoda		rr	rr			rr																			
Copepoda, *Oithona*	+	+	+	+	+	r	+	rr	rr	c	rr	rr	+	rr	rr	c	rr	rr	c	+	cc	+	rr	+	rr
Copepoda, *Acartia*		+				r	+	rr	rr	+	+		+			+	rr	rr	+	+	+	+	rr	+	+
Copepoda, *Oncaea*	++		+	+	+	r	+	rr	rr	+	+		+	rr	rr	+	rr	rr	+	+	+	+	rr	+	+
Copepoda, *Paracalanus*	c	+	+	c	r	r	cc	+	+	c	+	rr	+	+		+	+	+	rr		c	+	rr	+	+
Other Copepoda																								+	+
Cirripedia	rr			rr			rr						rr	rr		rr	+	rr							
Amphipoda					+	rr					rr								rr	rr	+	rr	rr		
Mysidacea		+	rr		+	r	rr			rr		rr				+	r	+							
Pteropoda							rr						rr						+	rr	+				
Cephalopoda larvae																									
Mollusca misc.	rr		rr	rr	rr										rr	rr			+		rr				
Echinodermata larvae	r	r		r	rr	rr	rr			rr			rr				rr								
Appendicularia	+	+					+	rr	rr		rr				rr				rr	rr	rr	rr	rr	+	+
Thaliacea, Hemimyaria	r	rr	+							+		rr													
Thaliacea, Cyclomyaria						rr								rr					rr		+	rr			
Fish eggs	rr																								
Fish larvae																					rr	rr			
Other larval forms																							rr		
Ceratium massiliense	rr	rr		rr			rr			+			rr	rr		rr			rr					+	+
Ceratium sumatranum	rr			rr	rr		rr			+		rr	+			rr	rr		+					+	+
Ceratium trichoceros	rr			rr			rr			r			rr	rr		rr	rr	rr	rr					rr	
Amphisolenia bidentata	rr	rr		rr	rr		rr			r			rr	rr		rr			+	rr	+	rr		rr	
Rhizosolenia styliformis	r	rr								+						rr			+					rr	rr
Rhizosolenia sp.										r														rr	
Chaetoceros coarctatus	+			+			+			+			+			+			+	+	+			rr	
Biddulphia sp.	rr			rr			+						r			rr			rr					+	
Nitzschia seriata	rr			rr			rr						rr			r			r					rr	
Trichodesmium thiebautii																c	rr		c	+	cc	cc	rr		

cc : very abundant c : abundant + : common r : rare rr : very rare

species are euryhaline and eurythermal forms and are judged to have been brought by the inflow of open sea water into this area where they sparsely thrive.

Paracalanus parvus occurred numerously in the inner area except in the restricted embayment, and were found to be widely distributed throughout the area. This species is cosmopolitan in warm region and has been recorded from the tropical and the temperate parts where *Oithona nana* and *Acartia* are predominant.

Sagitta enflata, S. regularis and *S. pacifica* are dominant species of Chaetognatha in Tañon Strait and Bohol Strait. These species penetrates into inshore waters and embayments from the open sea area. It has been found by many persons that *S. enflata* is a useful indicator of Kuroshio and the adjacent waters. In addition, both *S. regularis* and *S. pacifica* have also been known to occur rather abundantly in the Kuroshio region.

Dinoflagellates comprising some important species such as *Ceratium massiliense, C. sumatranum, C. trichoceros, C. tripos* and *Amphisolenia bidentata. Noctiluca scintillans* also exist in the inner part of Tañon Strait (St. F-1, F-2, OB-5). Phytoplankton is composed of Diatomaceae and Cyanophyceae. Main species were *Rhizosolenia styliformis, Rh. calca avis, Biddulphia sinensis, Chaetoceros coarctatus, Coscinodiscus granii, Nitzschia seriata* and *Trichodesmium thiebautii.* Other than *Trichodesmium* no important species that control the plankton volume were recognized. The distribution of pelagic blue green algae, especially of *Trichodesmium thiebautii* was investigated and the following points were made clear. This species predominates in Bohol Strait (St. N-1) and some were found to occur at the entrance but very few at the central part of Tañon Strait. Through the study on the plankton samples collected from the inner part of Tañon Strait, *Trichodesmium* was known to occur very scarcely, being absent in most stations and less than 10^3/L in filament number even at the stations showing their highest population (Stations L-1 and M-1). Two water masses were clearly characterized by the mode of occurrence of *Trichodesmium.* The distribution pattern of this species well corresponds to the distribution of coastal waters and open sea waters around this area. The distribution of *Trichodesmium* is considered to depend not only upon the environmental factors limiting the multiplication, such as temperature, salinity and nutrients, but also upon the water movement giving rise to the transportation by a small scale surface currents or waves. According to the C. S. K. studies, Desmoplankton mainly composed of *Trichodesmium* is distributed and covers all the Kuroshio area south of Japan in summer. *Trichodesmium* is a useful indicator organism of the Kuroshio and its adjacent waters, when it encounters the coastal water. In the present study, the specimens of *Trichodesmium* were collected not only from the surface layer but also from the layer of 100-50 m and 200-100 m. This alga is found in various depths from the surface skin layer down to about 200 m, though mostly in the layer shallower than 50 m.

Based on the table (Table 1), a distinct difference in plankton population between the southern part (St. N-1) and the northern part (Stations F-1 and F-2) is recognized. From the distribution of water temperature in the longitudinal section of Tañon Strait and Bohol Strait, it can be concluded that there is a striking contrast between Tañon Strait and Bohol Strait as to the temperature of water. The upper water crosses over the topographic rise at the outlet of the strait, but outside the strait the water mass deeper than 200 m represents a temperature distribution different from that of the

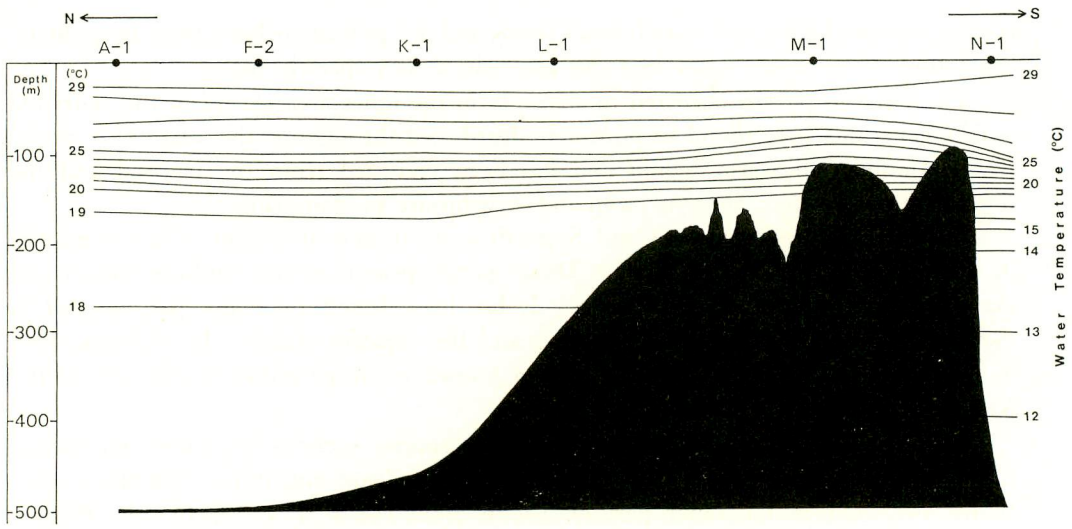

Fig. 6. Distribution of water temperature in the longitudinal section of the southern part of Tañon Strait.

inside of the strait (see Fig. 6). The variation in planktological properties corresponds to the oceanographical conditions. The population of zooplankton were small in Tañon Strait while it was rather large in Bohol Strait.

Plankton is by definition at the mercy of movements of the water masses, horizontal and vertical, and it can be of value as an indicator of water movements. In the area surveyed, *Paracalanus parvus* is used as an indicator of the inshore water mass. On the other hand, the distribution of allogenetic open sea forms such as *Oithona nana, O. plumifera, Sagitta enflata* and *Trichodesmium thiebautii* indicate an inflow of the outside water. In this area the outside waters characterized by the dominance of open sea forms, extend from the south to the central part of Tañon Strait where they become associated with the inshore forms. Thus, the direction of water movements, as indicated by the plankton communities, is in agreement with the general features indicated by the characteristics of the sea water.

Reference

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