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8. Preliminary Report on Foraminifera from the Southern Part of Tañon Strait, between Cebu and Negros Islands, the Philippines

by

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The field study on the habitat of *Nautilus* in the environs of Cebu and Negros Islands was carried out during the period from 6th to 19th September, 1981 and the details of study were described in the previous report (HAYASAKA *et al.*, 1982). During the field work, bottom samples for the ecological study on benthonic foraminifera were collected from nine stations within Tañon Strait and at one station outside the strait (St. N-1). Because the identification of benthonic foraminifera has not been finished, merely the general features of the foraminiferal assemblages are presented in this paper to assist in future ecological studies.

Description of the Area Studied

HAYASAKA *et al.* (1982) described in detail the results of the field studies on the environmental background of the habitat of *Nautilus*. Here the writer briefly outlines the results of the field studies.

Tañon Strait is rather narrow (27-15 km) and long (220 km from north to south) in outline and has the deepest basin of about 500 meters in depth (Fig. 1). This strait is separated from the sea outside by shallow areas. Therefore, it can be presumed that the strait is characterized by a more or less closed environmental condition from the oceanographic point of view.

Eleven bottom samples used for grain size analysis were collected with a small dredge. In the laboratory, the EMERY settling-tube method and pipette technique were utilized in determining the relative proportions of gravel, sand, silt and clay. Median diameter (Md), sorting coefficient (So) and skewness (Sk), developed by TRASK (1932), were obtained graphically from the cumulative curve (Table 1).

Rapid change in water temperature (thermocline) is clearly recognized to occur constantly at the depth between 100 and 150 m of each station in this area. Sea water temperature gradually lowers from the surface (about 30°C) to 100 m depth (about 25°C), and immediately below the thermocline it is about 20°C. The temperature of waters deeper than 200 m seems to be rather constant and bottom water is thought to be about 17°C.

The same may be said of the changes of dissolved oxygen (DO) with depth. DO values of waters shallower than 100 m range from 3.40 to 7.65, and in contrast to these

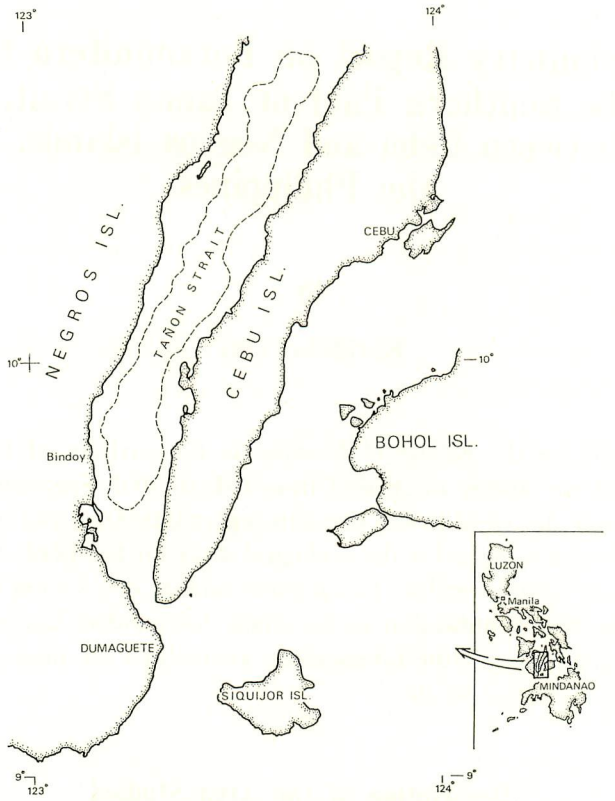

Fig. 1. Index map showing the studied area and the outline of the deepest basin (about 500 m in depth) in Tañon Strait.

Table 1. Grain size measurements of bottom sediments from the southern part of Tañon Strait.

Station No.	Depth (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Mud Content (%)	Silt / Clay	Md	So	Sk
OB-1	25	0.03	20.14	76.26	3.57	79.83	21.36	0.031	1.562	1.138
OB-2	50	0.14	23.74	71.71	4.41	76.12	16.26	0.030	1.588	1.587
OB-3	98	1.96	49.75	44.79	3.50	48.30	12.80	0.068	3.612	1.501
OB-4	215	1.03	21.63	51.71	25.63	77.34	2.02	0.023	3.770	0.405
A-1	498	0.01	6.57	85.60	7.82	93.41	10.95	0.013	1.258	1.349
F-2	495	2.96	13.62	56.59	26.83	83.42	2.11	0.011	3.162	1.071
F-3	430	0.02	7.21	80.46	12.30	92.77	6.54	0.006	1.365	1.110
K-1	463	1.72	16.91	39.82	41.54	81.36	0.96	0.012	–	–
L-1	307	0.35	43.08	25.94	30.62	56.56	0.85	0.019	>8.45	< 0.87
M-1	120	99.99	0.01	–	–	0	–	–	–	–
N-1	450	1.05	12.15	16.19	70.61	86.80	0.23	–	–	–

values they range from 1.20 to 2.35 at the depths deeper than 200 m.

pH value of sea water gradually decreases with depth from 8.59 to 7.55 in Tañon Strait.

Materials and Method

The bottom samples used for this study were collected with a small dredge from ten stations in the southern part of Tañon Strait (Fig. 2). All samples were preserved in buffered formaline (5%) and a part of each sample was stained with Rose Bengal for the study of living foraminifera.

In the laboratory, each bottom sample was washed through a 200-mesh (0.074-mm openings) sieve and oven-dried. Dry samples were split with a microsplitter to yield an aliquot containing 200 and 400 specimens, and all specimens were picked from the aliquot. Aliquots containing less than 200 individuals of benthonic foraminifera were supplemented by additional splits.

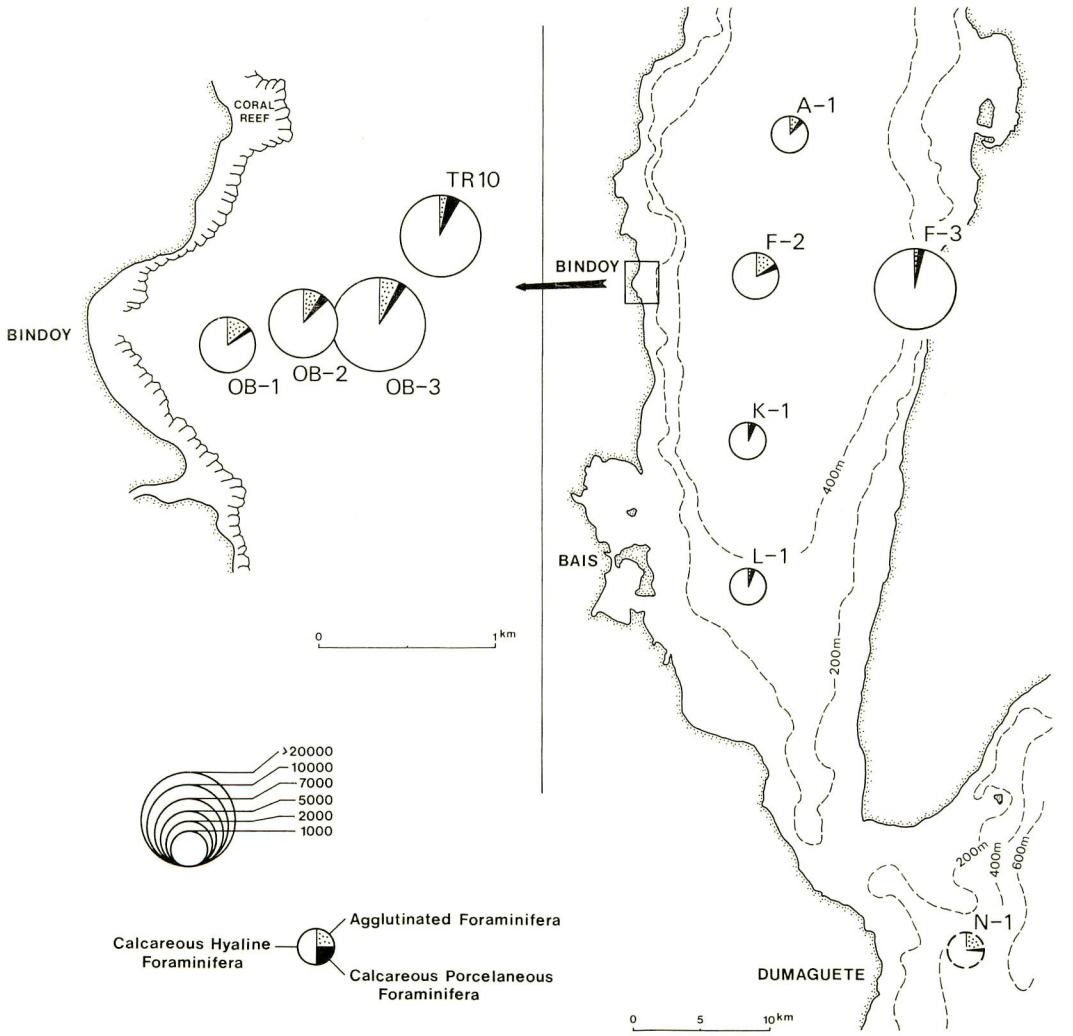

Fig. 2. Map showing the composition of benthonic foraminifera and the total number of benthonic foraminifera in 10 cc of wet sediment.

Table 2. Composition of foraminifera in the bottom sediments obtained from the ten stations within (OB-1~L-1) and outside (N-1) Tañon Strait, the Philippines.

Station Number		OB-1	OB-2	OB-3	TR-10	A-1	F-2	F-3	K-1	L-1	N-1
Depth (m)		25	50	98	170	498	495	430	463	307	450
Volume of Sediment Sample (cc)		12.3	11.4	11.4	8.8	13.2	9.7	4.4	3.5	4.4	(1.8)
Benthonic Population	in 10 cc of sediment	5093	7040	23316	10178	803	1947	16854	1260	935	(252)
	actually counted	393	250	207	279	264	234	231	221	205	126
Ratio of Agglutinated Foraminifera (%)		13.7	8.8	7.2	3.2	9.8	15.4	1.7	2.3	2.4	24.6
Ratio of Calcareous Porcelaneous Foraminifera (%)		2.0	4.0	2.4	5.0	3.0	3.8	2.6	4.5	3.9	1.6
Ratio of Calcareous Hyaline Foraminifera (%)		84.2	87.2	90.3	91.8	87.1	80.8	95.7	93.2	93.7	73.8
Planktonic Population	in 10 cc of sediment	1153	3661	20050	14628	6019	15941	70042	8254	3903	(1344)
	actually counted	89	130	178	401	495	479	480	362	214	336
	$\frac{\text{Pl.}}{\text{Pl.+Ben.}}$ (%)	18.5	34.2	46.2	59.0	88.2	89.1	80.6	86.8	80.7	84.2
	$\frac{\text{Pl.}}{\text{Pl.+Rads.}}$ (%)	73.0	70.3	89.0	85.5	88.7	91.2	69.3	86.4	85.3	58.7

Pl. : Planktonic Foraminifera ; Ben. : Benthonic Foraminifera ; Rads. : Radiolaria

Remarks on Foraminifera

The total number of benthonic and planktonic foraminifera in each sample, and respective ratio of agglutinated, porcelaneous and hyaline benthonic foraminifera to the total benthonic foraminifera, planktonic to the total foraminifera and of planktonic foraminifera to the total number of planktonic foraminifera plus radiolaria are given in Table 2. Through the analysis mentioned above, the following several points were made clear.

1) The total number of benthonic foraminifera amount to more than 5000 individuals in the nearshore region (St. F-3 and the four stations off Bindoy) and ranges from 803 to 1947 at the Stations A-1, F-2, K-1 and N-1 in the central part of Tañon Strait (Fig. 2). The same may be said of the total number of planktonic foraminifera and radiolaria per 10 cc (Table 2). The total number of planktonic foraminifera and radiolaria at the stations OB-3 and F-3, where the number of benthonic foraminifera is rather large, is apparently larger than that of the four stations (Stations A-1, F-2, K-1 and L-1) in the central part of the strait. It is particularly noticeable that the number of individuals of planktonic foraminifera exceeds 70000 and of radiolaria exceeds 30000 at the station F-3. From the facts mentioned above, it may be reasonably said that the rates of sedimentation in the central part of the strait are faster than those at the stations on the steep slope and its foot close to the coast.

2) As seen in the composition of benthonic foraminifera (Fig. 2), the ratio of the calcareous hyaline foraminifera to the total number of foraminifera is always more than 80% at every station within the strait. At every station, frequency of calcareous porcelaneous foraminifera is seen between 2.0 and 5.0%, and of agglutinated foraminifera is always less than 10% except for the two stations (OB-1 and F-2). On the contrary, at the station N-1 (outside the strait), the frequency of agglutinated foraminifera attains to 24.6%. This means that the composition of benthonic foraminifera at this station is slightly different from those at the stations within the strait.

3) The ratio of planktonic foraminifera to the total foraminifera in Tañon Strait increases with depth (Fig. 3). From the figure showing the correlation between the frequency of planktonic foraminifera and the depth of water, it is recognized that each point plotted against the two parameters mentioned above is on or near a parabola (Fig. 4).

4) The ratios of number of individuals between planktonic foraminifera and radiolaria contained in the bottom sediments of Tañon Strait never represent the correlation with the depth of water (Table 2). The ratio of the number of individuals of planktonic foraminifera to the total number of planktonic foraminifera and radiolaria is about 70% at the near-shore stations (OB-1, OB-2 and F-3), while at the four stations (A-1, F-2, K-1 and L-1) in the central part of the strait it comes up to 85-95% (Fig. 5). This seems to suggest a good correlation of the above-mentioned ratio to the distance from the shore. At the station N-1 outside the strait, this ratio is rather small (58.7%), that is, the relative frequency of radiolaria is higher than those within the strait.

The writer wishes to make a progress in the detailed taxonomy of benthonic fora-

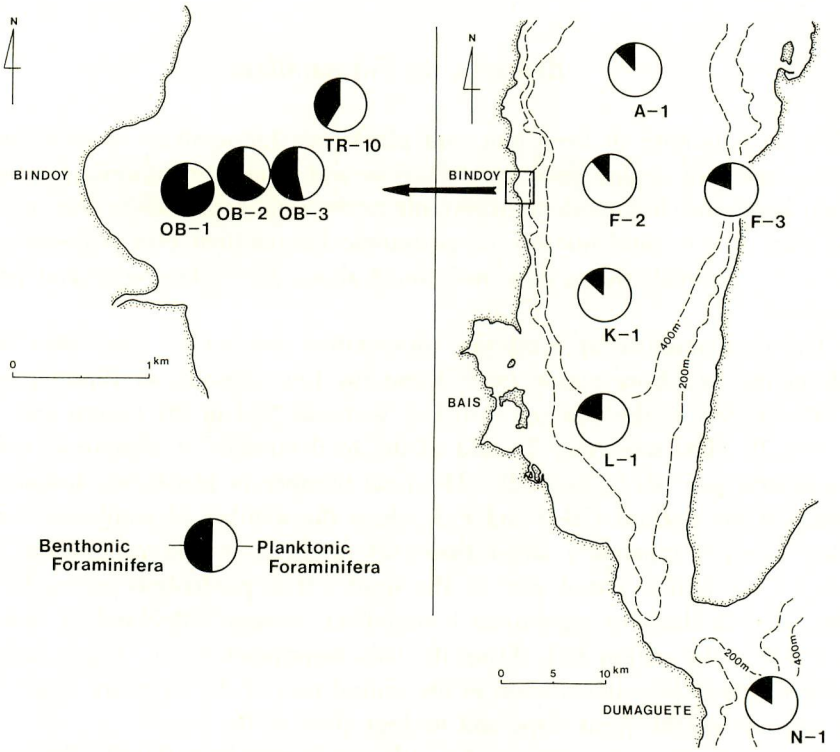

Fig. 3. Map showing the frequency of planktonic foraminifera and benthonic foraminifera in the bottom sediments collected from each station in Tañon Strait.

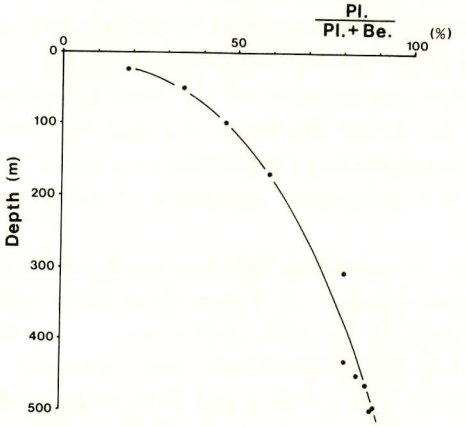

Fig. 4. The correlation between the frequency of planktonic foraminifera and the depth of water in Tañon Strait.

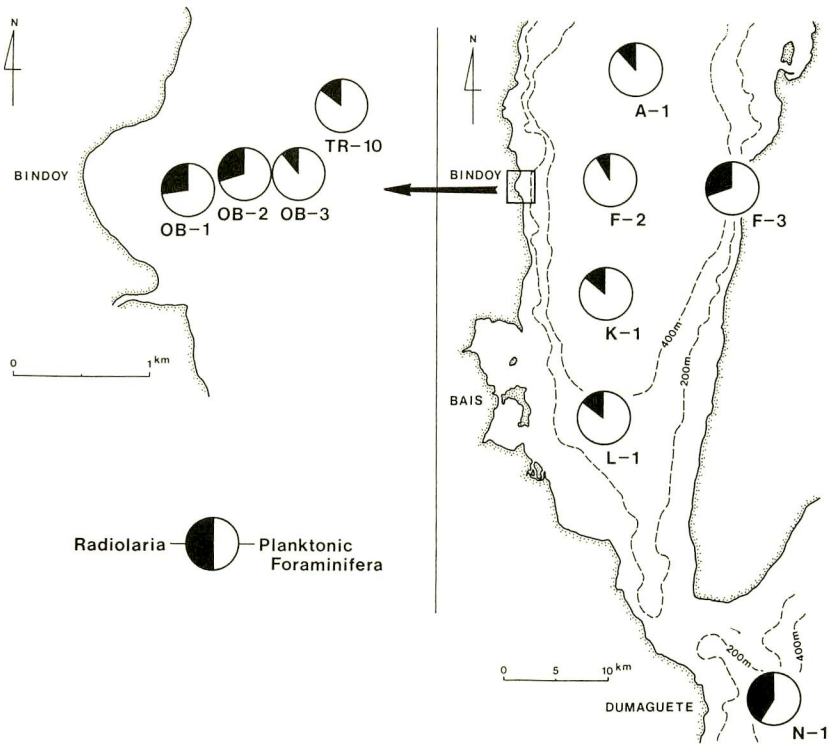

Fig. 5. Map showing the frequency of planktonic foraminifera and radiolaria in the bottom sediments collected from each station in Tañon Strait.

minifera and the comparison of them with those from the other waters taking geological, biological and oceanographical data into consideration.

Acknowledgement

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Explanation of Plate 6

Figs. 1-4. Foraminiferal tests in the bottom sediments collected from the St. OB-1 (fig. 1), St. OB-2 (fig. 2), St. OB-3 (fig. 3) and St. TR-10 (fig. 4) in Tañon Strait.

Figs. 5-9. Foraminiferal tests in the bottom sediments collected from the St. A-1 (fig. 5), St. F-2 (fig. 6), St. F-3 (fig. 7), St. K-1 (fig. 8) and St. L-1 (fig. 9) in Tañon Strait.

Fig. 10. Foraminiferal tests in the bottom sediments collected from the St. N-1 in Bohol Strait.

(Foraminiferal tests concentrated by flotation using carbon tetrachloride; the bar scales on plate represents a length of 1 mm).


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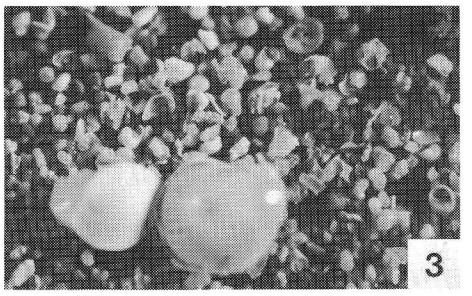
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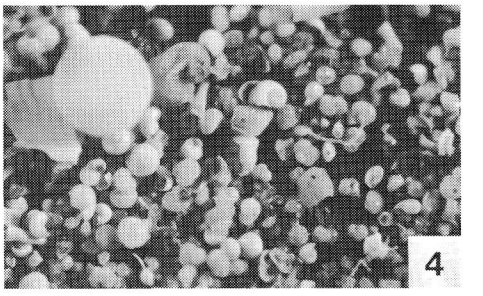
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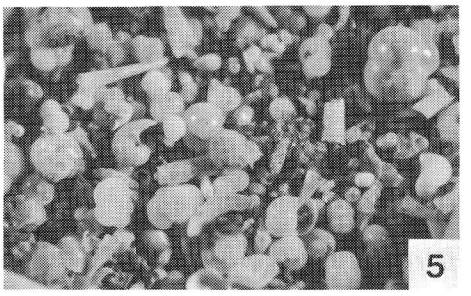
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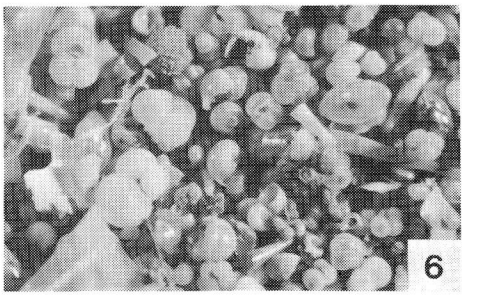
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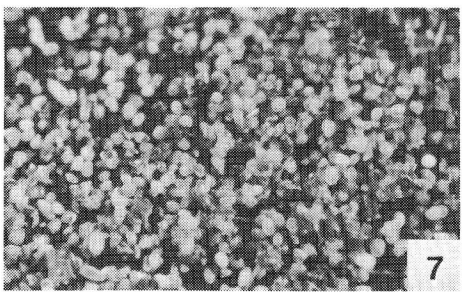
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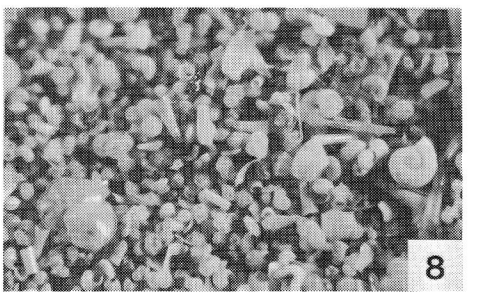
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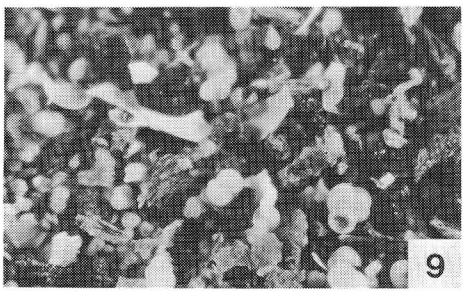
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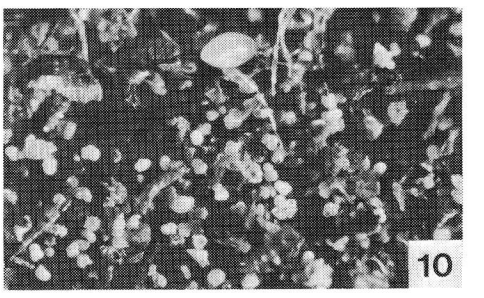
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