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RECENT OSTRACODA (MICROCRUSTACEA) FROM A BANDA- TO- TIMOR SEA DEPTH TRAVERSE: IMPLICATIONS FOR PALEOBATHYMETRIC STUDIES

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Abstract

Surface sediments from water depths between 100 and 3070m along a transect off Timor Island between the Banda and Timor Seas contain more than one hundred species of marine ostracods. Generally, the number of species in each samples ranges from 2 to 112 and reflects a high diversity. The numbers of specimen is between 2 and 4942 individuals per 100 cc of sediment sample. The distribution of ostracod species clearly correlates with water depth. The abundance and diversity of the ostracod fauna tend to decrease with increasing water depth, except for one anomaly in station that was collected in the deepest part (3070m) of the study area. The highest numbers of individuals (>1000) occur in stations with water depth less than 100 m, i.e. in shelf zone and dominated by *Paracytheridea, Polycope, Foveoleberis,* and various species of Bairdiidae. The bathyal zone is characterized by *Cytheropteron*, *Saida*, *Bradleya*, *Pelecocythere*, *Henryhowella*, *Krithe* and *Parakrithe*. The unusually high number of ostracode in the Lower Abyssal zone (deeper than 3000m) is mainly caused by the high occurrence of shallow water ostracods. The abundance of ostracods in deep-water are strongly influenced by bathymetry and water mass characteristic that cause downslope transport of shallow water ostracods into deeper environments.

The results of this study clearly show that ostracods are an important component of marine sediments regarding the identification of paleoenvironments, and particularly paleobathymetry. They provide a new and promising tool for future studies of paleobathymetry based on ostracod distribution at continental margins. The results of this study and additional study on two other transects from continental margin could be applied as a model to reconstruct the paleoenvironments in Indonesia.

Abstrak

Sedimen dasar laut (23 lokasi) dari kadalaman antara 100 dan 3070m sepanjang transek di laut lepas Pulau Timor antara Laut Banda dan Laut Timor mengandung lebih dari 100 spesies ostracoda. Secara umum, jumlah spesies bervariasi (2-112 spesies) dan jumlah spesimen antara 2 dan 4942 per 100cc contoh sedimen. Kelimpahan dan keanekargaman ostracoda cenderung berkurang dengan bertambahnya kedalaman, kecuali pada contoh sedimen ini diambil pada bagian terdalam (3070m) dari daerah penelitian dan memperlihatkan kelimpahan yang agak tinggi. Jumlah individu tertinggi (>1000) ditemukan pada lokasi yang mempunyai kedalaman 100m dan didominasi oleh *Paracytheridea, Polycope, Foveoleberis,* dan beberapa spesies dari Bairdiidae. Zona batial dicirikan oleh *Cytheropteron*, *Saida*, *Bradleya*; *Pelecocythere, Henryhowella, Krithe* dan *Parakrithe*. Jumlah yang tidak seperti biasanya di zona Abisal Bawah (>3000m) disebabkan oleh keterdapatan ostracoda yang berasal dari laut dangkal. Melimpahnya ostracoda ini sangat dipengaruhi oleh kedlaman dan karakter masa air yang menyebabkan berpindahnya ostracoda laut dangkal menuju lingkungan yang lebih dalam.

Hasil dari studi ini menunjukkan bahwa ostracoda juga merupakan komponen penting dari sedimen yang berkaitan dengan identifikasi lingkungan pengendapan, khususnya paleobatimetri. Berdasarkan sebaran ostracoda di paparan tepi ini dapat memberikan data baru untuk studi paleobatimetri di waktu mendatang. Hasil studi ini ditambah dengan hasil studi dari dua transek berikutnya dari paparan tepi dapat diaplikasikan sebagai model untuk merekonstruksi lingkungan purba di Indonesia.

Introduction

Historically, according to Hanai *et al* (1980) recent ostracods from the western part of Indonesia were first described from the north coast of Java in the late ninetieth century. Subsequently, over the next almost 100 years, many other studies followed. Mueller (1906 in Hanai, 1980), for example, described 27 species of ostracods collected off Mentawai Island at water depths of 52 to 2400m. Whatley and Zhao (1987, 1988) studied ostracods from the Malacca Strait. Mostafawi (1992) worked on a series of samples between southwest Kalimantan and the Malay Peninsula. In the Java Sea proper, Whatley and Watson (1988), Dewi (1997, 2000a, 2000b) have also recognized more than 100 species in environments around Seribu, Bawean and Kangean Islands.

In contrast to the western part of Indonesia, very few ostracod studies in the eastern part of Indonesia have been conducted and results are still sparse. In 1899-1900, ostracods were collected during the Siboga Expedition between 1899 and 1900 (Hanai, 1980) from randomly collected 38 samples around the Banda Sea. This study mostly identified living deep-sea myodocopid ostracods, planktonic ostracods, which cannot be preserved as fossils. While this study did not contribute to the interpretation of the fossil record, it did help improve knowledge of ostracode taxonomy. In contrast to planktonic ostracods, however, the knowledge of benthic ostracods in eastern Indonesia is still very limited and previous studies have not been sufficient to overcome the gaps in our knowledge on recent benthic ostracods. But this knowledge is important because the reconstruction of paleoenvironments depends on the former. Clearly, a study of benthic ostracods that are preserved as fossils is needed in order to understand the linkage between ostracode communities and their living environments. Overall, the information on recent microbenthic organisms, particularly foraminifera and ostracods, had provided numerous distinct criteria of many depositional environments that can be applied to fossil assemblages from sedimentary rocks (Brasier, 1980). But no such study identifying past depositional environments based on fossil assemblages of ostracods have been done so far for eastern Indonesia. In this paper, we make the first attempt to understand the linkage between ostracod communities and their enviroments in the fossil record in this region.

A large number of various ecological factors influence the vital activity of ostracods and their distribution. Although these factors are not independent of one another, there are four main factors, temperature, salinity, water depth and the nature of the substrate, that have been more extensively studied than other factors. While some workers believe that the water depth is the most significant factor, others have argued that it is difficult to assess the ecological effect of water depth, mainly because it cannot be viewed as a factor separate from additional influence such as from nutrient supply or water masses. Nevertheless, various morphological and distributional attributes of the ostracods indicate that there is a depth effect. It has been shown, for example, that species diversity, taxonomic composition and absolute abundance of ostracods change systematically with water depth in the Gulf of Alaska (Brouwers, 1988). Furthermore, ostracods from shallow waters are generally more abundant and diverse than those from deep-water environments (Whatley, 1983). In deep-water environments, Benson (1984) stated that blind ostracods (loose their eyes/blind) could indicate water depths between 500 and 600m. Puri (1971) even suggested that each bathymetric zonation of the marine environment is characterized by distinctive ostracods assemblages, as well as other groups of microfossils such as foraminifera. Van Marle (1988), in his study in the eastern part of Indonesia, shows that there is four groups of benthic foraminifera that can be distinguished based on water depth. But this bathymetric zonation based on microfossils for eastern Indonesia is clearly not sound enough to allow for its general application as a paleobathymetric tool, because it is entirely based on the study of benthic foraminifera. Nothing is known on the abundance and diversity of ostracods in relation to water depth in the region. However, establishing a paleobathymetric zonation for the region depends on the availability of information on ostracodes. Consequently, the present study provides an important piece towards establishing a bathymetric zonation for recent ostracods of eastern Indonesia.

Study area

The study area includes the Banda and the Timor Seas. (Is this sentence important: It includes the Banda Basin in the South, includes the Leti Strait between the Timor and the Leti Islands in the east, and in the southwest from the Sahul Shelf to south of Banda Basin via the Leti Strait between Timor and Leti islands). Based on a shallow water ostracod study, it has been shown that the study area is part of the Australian Province that is separated from the East Indian Province by latitude and a deep oceanic barrier (Titterton and Whatley, 1988). The study area includes the Banda and the Timor Seas. (Is this sentence important: It includes the Banda Basin in the South, includes the Leti Strait between the Timor and the Leti Islands in the east, and in the southwest from the Sahul Shelf to south of Banda Basin via the Leti Strait between Timor and Leti islands). Based on a shallow water ostracod study, it has been shown that the study area is part of the Australian Province that is separated from the East Indian Province by latitude and a deep oceanic barrier (Titterton and Whatley, 1988). The boundaries of the Banda Sea are defined/surrounded by a composite island and the outer Banda arc reaching from Buru to Timor (Bowin et al., 1980). The Banda Sea fills the Banda Basin that is comprised of 11 basins. The three main basins are the North Banda basin, the South Banda Basin with a maximum water depth of 5,400m, and the Weber Deep with a maximum depth of 7,440m.

The Timor Sea includes the Sahul Shelf and the Timor Trough, extending north from Australia to Timor and its adjacent islands. Its eastern boundary is the Arafura Sea. The Sahul Shelf is a broad shelf with a total size of 1.5 million km^2. It consists of the Arafura, the Sahul and the Rowley Shelves. The Sahul Shelf is a stable continental platform and is bordered to the south by the Australian continent and to the north by the tectonically unstable Timor Trough. Numerous small steep-sided and flat-topped banks rise from a depth of 200-400m at the outher side of the shelf edge. Oceanographically, the study area is characterized by three layers of water masses

(Van Marle 1988): Firstly, the Indonesian Surface Waters can be found between 0 and 400 m water depth, charactertized by high temperatures, high oxygen-contents, and a salinity fluctuating between 34.00 and 34.70; Secondly, the Indonesian Intermediate Waters can be found between 400-1400 m water depth. In this layer, the temperature decreases with increasing depth, and oxygen content is relatively low. And lastly, the Indonesian Deep Waters can be found below 1400 m in the Timor Trough. In these waters, temperatures are lower, and oxygen content and salinity are higher than in the other two water masses, which is due to the direct influence of the Indian Ocean water.

Methods

The samples from the traverse between the Banda and Timor Seas on the Australian-Irian Jaya continental margin were sampled in Eastern Indonesia were collected during the Indonesian-Dutch Snellius-II Expedition in 1985. The ostracods were studied based on samples from 26 locations. For 12 locations, the ostracodes came from the same location as the foraminifera studies by van Marle (1988). Three samples (G5-6-141, -147 and –157) could not be plotted on the map due to lack of information on geographical position. But they have information on water depth, hence ostracod data from these samples were also used to have additional information. The ostracod samples were carried out in depth range between 100 and 3070 m by using a box-corer as seen in Figure 1. The top surface sediments (0-1 cm) have been sampled for micropaleontological group. The ostracods were picked and identified from sample volumes ranging from 40cc to 100cc, and the number of individuals found in each samples was then normalized to sample volumes of 100cc. The picked ostracod specimens were then identified, counted the number of adult valves, calculating both simple species and species diversity index using the Bakus's program (1990) based on formula from the Shannon-Weaver.

Results

All samples studied contain ostracods, with the exception of one sample (G5-6- 147B) that has been taken from an oxidized sediment layer at a water depth of 2539m. A total of 189 species belonging to 72 genera, including 13 undetermined taxa, have been identified from 5534 individuals. Selected ostracod genera can be seen in Plate 1. The total number of individuals in each sample ranged from 2 to 4942 per 100 cc sample volume. The highest number of individuals occurs at a water depth of 100m, and the lowest number occurs at a depth of 2187-2592m from oxidized muddy layer and biogenic sediments of sand size. The number of species is between 2 and 112. The Shannon Wever index is between 1.1 and 4.71. Species richness, which is greatest between depths of 100 and 311m, decreases considerably below 400m, with most species found rarely below 914m. There are two genera, *Cytheropteron* and *Xestoleberis*, which have more than 10 species and the number of species are decreasing with increasing water depth. The highest number of individuals belongs to the subfamily Bairdiinae represented by genera *Bairdopillata, Neonesidea* and *Paranesidea*. Other genera, *Foveoleberis* and *Polycope*, were also found dominantly in water depths less than 210 m. The cluster analyses and principal component analyses of the total numbers of ostracods show that there are two main groups of ostracods (Figure 2). But the above two groups are not in agreement/cannot be related with the regional bathymetric zonation inferred from the foraminiferal study of van Marle (1988). This suggests thatthe ostracod assemblages or depth biofacies recognized are defined by taxonomic composition and by trends in abundance of selected species with water depth. Some species are restricted to one assemblage, whereas others range through several depth biofacies. In general, the ostracod abundance and diversity can be grouped into shelf environments, continental slope environments (bathyal) and deep-sea environment (abyssal).

The shelf environment

Four of the samples studied (G5-6-161, -160, and -159) were collected from the continental Sahul Shelf from water depths between 100 and 210 m. These samples contained all of the 146 species found in the study area and were dominated by the families of Polycopidae, Bairdiidae, Cytheruridae, Xestoleberididae. All these families are common components of shelf faunas and most of the specimen identified belong to the species of *Polycope brevirostrata, Paracytheridea tschoppi, Neonesidea australis, Neonesidea globulus, Cytheropteron wrighti, Xestoleberis communis and Xestoleberis* sp. Among these four samples, sample G5-6-161B has the highest number of individuals with 4541 individuals in 100cc, but the species diversity of 99 species in this sample is lower compared to that of sample G5-6-158B, which had 111 species. The first sample from 100m water depth is dominated by species such as *Foveoleberis brevirostris, Polycope brevirostrate*, and *Neonesidea australis,* which each of these species reach more than 200 individuals.

The continental slope environment

The continental slope is divided into three zones: upper bathyal, middle bathyal and lower bathyal. For each zone, distinctive patterns of ostracode distribution could be found. In this study, the upper bathyal environment is represented by two samples. One sample taken from the lowest water depth included in this area, was taken from the range of 331 to 416m depth in the shelf break or the upper bathyal zone. A total of 120 species was found in this sample. Dominating species are *Argilloecia affinis, Argilloecia elliptica, Cytherella* cf. *lata,* and *Venerycythere papuensis* however. These species are all typical of the water depths of the upper bathyal zone. However, *Krithe* and *Parakrithe*, even though they are typical deep-sea ostracods (which usually are found at water depths below 400 m) also appear at this site with more than 5 different species. In the middle bathyal environment, at water depths between 547m and 914m, is found 95 species that contaminated by shallow marine ostracods. These environments characterized by *Argilloecia, Krithe, Parakrithe, Bradleya, Cytheropteron,* and *Loxoconcha juditahe* Their number is decreasing with increasing water depth compared to upper bathyal assemblage.

From the lower bathyal environment, ten samples studied from water depths between 1088m and 1951m. These samples contained 61 ostracod species, with the number of individuals ranging from 6 to 196 and the Shannon-Wiever index ranging from 1.38 to 3.46. The highest number of species and diversity occurs at water depths between 1509m and 1673m. The lower bathyal environment is characterized by *Acantocythereis, Agrenocythereis,* and several species of *Krithe-Parakrithe.*

The abyssal environment

The abyssal environment is represented by seven samples from water depths between 2187m and 3070m in the southwestern part of the Banda Basin. They contain a total of 38 species. However, some of these species found are typical shallow water ostracods such as *Neonesidea, Bairdopillata, Loxocorniculum* and *Cytherelloidea* etc. This suggests contamination of the in-situ sediments, particularly in sample G5-6-132B, which is the sample taken from the deepest site. These seven samples are characterized by *Argilloecia, Krithe, Saida, Cytheropteron, Pseudocythere, Pelecocythere* in low number of individuals.

Discussion

In general, the abundance and species diversity of recent ostracods from the study area change systematically with water depth. Based on the distribution/variation of selected ostracods with depth (Figure 3), three major assemblages and three subassemblages, each of which representing particular water depths, can be identified.

Assemblage I occurs in shelf environments below 210m water depths. It is characterized by shelf species, the occurrence of which is strictly controlled by water depth. These species include *Polycope brevirostrata*, *Foveoleberis brevirostris*, *Hemiparacytheridea* sp., *Neonesidea australiensis*, *Mutilus* sp., and *Xestoleberis communis*. This ostracod assemblage would best agree with the foraminiferal assemblage that is thought by van Marle (1988) to be related to the photic zone of the Indonesian Surface Waters. However, the ostracods indicate a different water depth for a biofacies boundary than the foraminifera. While the boundary of the outer shelf biofacies for the foraminifera is at 150m, it is at 200m water depths for the ostracods.

Assemblage II consists of three sub-assemblages that can be found on the continental slope. The first sub-assemblage II-A (lower than 200m of water depth) is characterized by species richness. It includes species that represent a range of environments, from the shallow-shelf to the upper slope environment. Examples of these species are *Krithe, Parakrithe, Bradleya* and *Cytheropteron.* According to Cronin (1988), it is generally difficult to judge for this depth range whether the specimens are *in situ* or allochthonous specimen. This depth range includes two mayor oceanographic boundaries, firstly, the thermocline, and secondly the upper part of the oxygen minimum zone. Ostracod assemblage has similar boundary of biofacies to foraminifera that correspond to aphotic, deeper Indonesian Intermediate Waters. In the shelf environments, Brouwer (1988) recognized five ostracod assemblages in the Gulf of Alaska area in water depth range from 20m to 311m. Therefore, the shelf environment in the study area can also be divided into more than two sub-assemblages if we have more detailed samples.

The sub-assemblages II-B occurs in the continental slope environments, extending from 416m to 911m. According to Benson (1988) that at depths about 400 m is characterized by rapid any faunal changes caused by the dissapearance of shelf taxa and an increase in deep-sea taxa. The rapid changes are related to not only with dept but also with water masses of the deep-sea. The downslope transport of shallow water species is found in many samples, particularly in the continental slope environments. In the study area, the ostracod assemblage is dominated by several species of *Krithe, Parakrithe, Cytheropteron* and *Argilloecia* mixed with shallow marine ostracod inhabitants such as *Bairdopillata* and *Neonesidea*. Cronin (1988) found very high ostracod species diversity for a bathyal zone in the Florida-Hatteras slope at water depths from 220 to 1070m and the samples are also contain 1-15% transported or reworked specimens. In comparison to foraminiferal biofacies, ostracod assemblage lies in the Indonesian Intermediate Waters with minimum oxygen-content although they have different boundaries. *Aversolvalva* is the only genus that found strictly at the depth range between 547 and 711m.

Sub-assemblage II-C: it consists of deep-sea ostracods that refer to lower bathyal depths as those between 1000m and 2000m (Whatley, 1996) and lower bathyal based on general bathymetric zonation by van Hinte (1978, in van Marle, 1988).

Agrenocythere is found in a limited depth range at water depths between 1509m and 1832m. According to Benson, this genus is considered typical of depths of about 1500m (Benson, 1972, in Cronin, 1988). *Krithe* and *Parakrithe* are included in this assemblage although their occurrences decreasing with increasing of water depths.

Assemblages III contains very low diversity of the abyssal ostracod and contaminated by shallow water ostracods that caused quite high species diversity in a sample that lies at deepest part of the study area. The deep-sea ostracods of *Bradleya* and *Parakrithe* are not found at water depths below 2000m, but *Krithe* still appears together with *Cytheropteron* and *Xestoleberis.* The low number of species and diversity of ostracods has also reported by Whatley (1983) in the South West Pacific. Cronin *et al* (1994) has also stated that the abundant ostracod faunas encountered between 1000m and 4500m are strongly influenced by both bathymetry and water mass characteristic in the Arctic Ocean. Whatley and Zhao (1993) found that ostracods are drop at depth below 3000m in South China Sea that is related to rather shallow lysocline (3000m) and CCD level that occurs at 3500 water-depth.

Conclusions

The results of this study clearly show that ostracods are an important component of marine sediments regarding the identification of paleoenvironments, and particularly paleobathymetry. From the study area, it can be identified three zonations based on composition and assemblages of recent ostracods that have their own characteristic species assemblages:

- Shelf environments (<200m): *Polycope brevirostrata, Paracytheridea tschoppi, Neonesidea australis, Neonesidea globulus, Cytheropteron wrighti*, and *Xestoleberis communis.*
- Continental slope environments (200-2000m):
  - Upper bathyal biofacies: *Argilloecia affinis, Argilloecia elliptica, Cytherella* cf. *lata, Venerycythere papuensis*
  - Middle bathyal biofacies: *Krithe, Parakrithe, Cytheropteron* and *Argilloecia*
  - Lower bathyal characterized by *Agrenocythere*
- Abyssal environments. *Argilloecia, Krithe,* Xestoleberis, and *Cytheropteron.*

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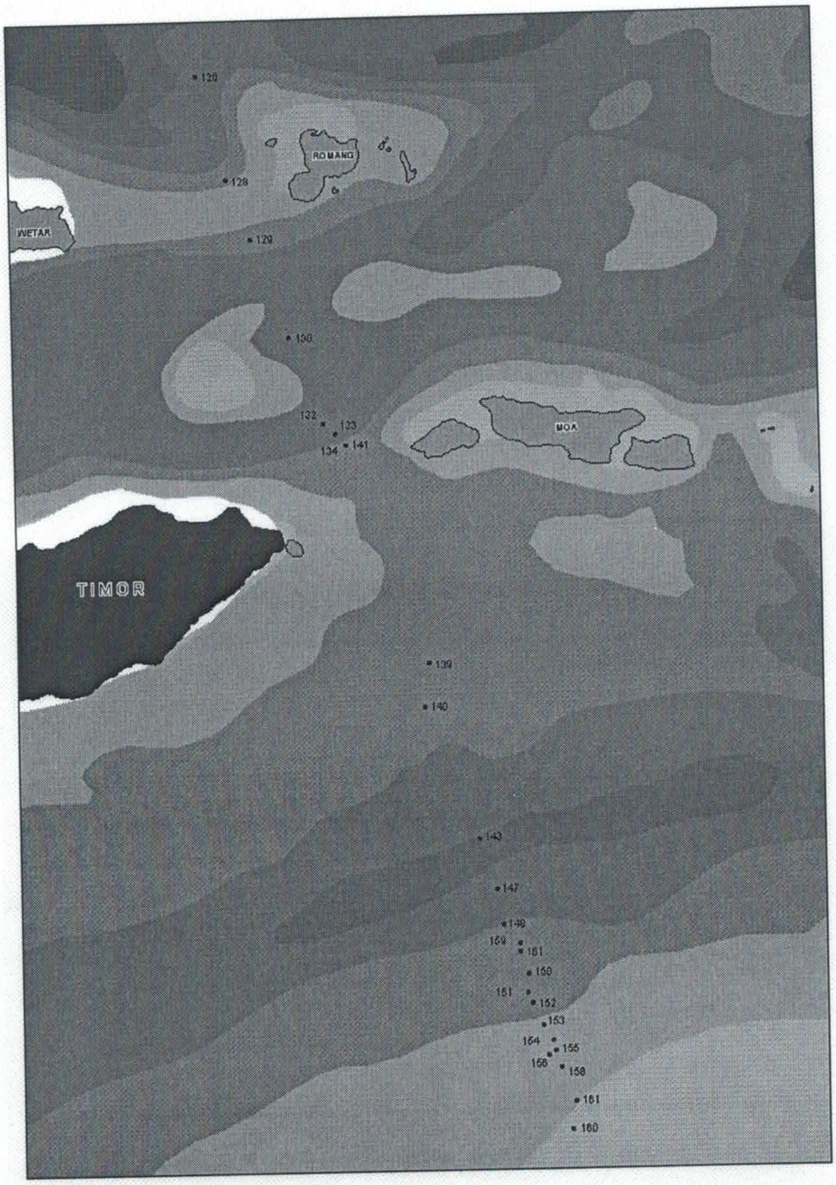

Fig. 1. Map of the South Banda and Timor Seas indicating location of the 23 samples

Table 1.List of ostracod genera and number of species (in bracket)

No.	Sample numbers sorted by depth	G5-6-161B	G5-6-160B	G5-6-159B	G5-6-158B	G5-6-157B	G5-6-156B	G5-6-155B	G5-6-154B	G5-6-153B	G5-6-152B	G5-6-128B	G5-6-151B	G5-6-139B	G5-6-149B	G5-6-129B	G5-6-150B	G5-6-140B	G5-6-148B	G5-6-134B	G5-6-141B	G5-6.147B	G5-6-133B	G5-6-130B	G5-6-143B	G5-6-126B	G5-6-132B
	Water depth (m)	100	150	210	331	416	547	711	914	1088	1258	1414	1509	1570	1673	1807	1832	1936	1951	2187	2294	2539	2592	2772	2870	2893	3070
	Genus (number of species)	Sample volumes (cc)																									
		50	50	50	50	50	50	50	100	100	100	100	100	40	50	100	100	100	100	100	100	100	100	100	100	100	100
1	*Actinocythereis* (4)		4	23	13			1					4														
2	*Acantocythereis* (1)							1	3	3	1		2	1	3						2						
3	*Agrenocythereis* (1)								4				1	1	5		1										
4	*Ambocythere* (1)						7	11	10	1	2			2			7		1	1							
5	*Argilloecia* (5)	54	5	22	87	121	88	40	24	6			1		2		5		1				2		4		5
6	*Aversolvalva* (1)						8	3																			
7	*Bisulcocythere* (1)							1	2																		
8	*Bairdopillata* (2)	12	20		4	6		3	8		2		2			1	3									2	9
9	*Bradleya* (7)	89		68	132		21	12					3		5		1										
10	*Bythoceratina* (5)		2	16	26											1											
11	*Callistocythere (1)*	15	10	1	15																						
12	*Candona (2)*	18			3				15	7			1		14	1	4										1
13	*Caudites* (3)	26		2	1			3																			
14	*Cardobairdia* (1)						2																				
15	*Cobanocythrere* (2)	25			1																						2
16	*Coquimba* (1)	4	3		1																						
17	*Cytheralison* (1)						1	1																			
18	*Cytherella* (8)	2	21	24	65	9	5	8							1		2										
19	*Cytherelloidea (1)*		3																								2
20	*Cytheromorpha?* (1)		2	2																							
21	Cytherois (1)	4												1													
22	*Cytheropteron* (16)	111	4	34	77	45	15	8	9	6	1	1	6	7	7		1		2	1							3
23	*Eucythere* (2)		1	5	4		3	3																			
24	*Falsocythere* (1)	11		7	1																						
25	*Firmanchinella* (1)																										
26	*Foveoleberis* (2)	442	6	12																							
27	*Gambiella* (1)		3	6	5		1																				
28	*Hanaiceratina* (1)		3	22	8				1																		
29	*Hemiparacytheridea* (1)	89		1	2																						
30	*Hemicytherura* (1)																										2
31	*Henryhowella* (1)	43			1						2			4	4									1			
32	*Javanella* (1)				2																						
33	*Keijia* (2)		7	11	11			1	2																		
34	*Kotorocythere* (1)				4																						
35	*Krithe* (5)	5		5		71	12	3	51	16	2			25	19									2			1

36	*Labutisella* (1)			8	7			2																			
37	*Loxoconcha* (3)	4		6	5	2	23	5		2																	1
38	*Loxoconchella* (1)	2																									
39	*Loxocorniculum* (2)	12		1	7		2							1													1
40	*Leptocythere* (1)																										1
41	*Macrocypris* (2)	7	1	7	3																						2
42	*Munsyella* (3)		4		10		12	2	1	1			1				2										
43	*Mutilus* (4)	90	13	10																							1
44	*Microcytherura* (1)			1																							
45	*Myocyprideis* (2)	5																									
46	*Neocaudites* (1)			2																							
47	*Neocytheretta* (2)		2	6	5																						
48	*Neonesidea* (7)	621	39	101	111	17	2	5																			6
49	*Oculocytheroteron* (1)			7			3																				
50	*Orlovibairdia* (1)	1																									
51	*Paijenborchella* (3)	1		1	2		6	1	2	2								1									
52	*Paracytheridea* (1)	72		2				1	1	1									1								
53	*Paracypris* (1)			1		1	8	1																			
54	*Paradoxostoma* (4)	11		1	5	3	2	3	2		1																1
55	*Parakrithe* (9)			3	41	39	35	50	32	18	27	4	16	9	28			3	10								
56	*Paranesidea* (2)	23	2					2		3					9												
57	*Pelecocythere* (2)	10						3		1				1			2										1
58	*Phlyctocythere* (1)						1																				
59	*Pistocythereis* (1)				1																						
60	*Polycope* (5)	284	6	9	6			1																			
61	*Pontocypris* (4)			4	17		1																				
62	*Praemunita* (2)			1	12																						
63	*Psammocythere* (1)	3		3			2																				
64	*Pseudocythere* (1)		1				1																				2
65	*Pterygocythereis* (1)		1	5	2		1																				
66	*Quadracythere* (1)				3																						
67	*Saida* (2)			5	6									2	1		1	1									2
68	*Semicytherura* (2)	5	3			3	6																				
69	*Stigmatocythere* (1)	1																									
70	*Trachyleberis* (1)	23		5	9																						
71	*Venericythere* (1)		2		38									3					1								
72	*Xestoleberis* (11)	334	16	50	54	19	20	10	7	8									2								16
73	Unidentified sp (13)	12		10	57	2	7	18	22	6	2	1		3	1	3	7	1		1				1		1	6
Total number		2471	184	510	864	338	295	203	199	81	40	6	37	59	98	6	36	6	18	2	2	-	2	4	4	3	65
Total number in 100 cc vol		4942	368	1020	1728	676	590	406	199	81	40	6	33	148	196	6	36	6	18	2	2	-	2	4	4	3	65
Number of species		92	50	95	112	32	67	57	46	29	18	4	21	26	32	5	17	5	13	3	1	-	1	3	3	3	33
Index diversity		4.52	3.9	4.55	4.71	3.5	4.2	4	3.8	3.4	2.9	1.4	3	3.3	3.5	1.6	2.8	1.6	2.6	1.1	-	-	-	1.1	1.1	1.1	3.5

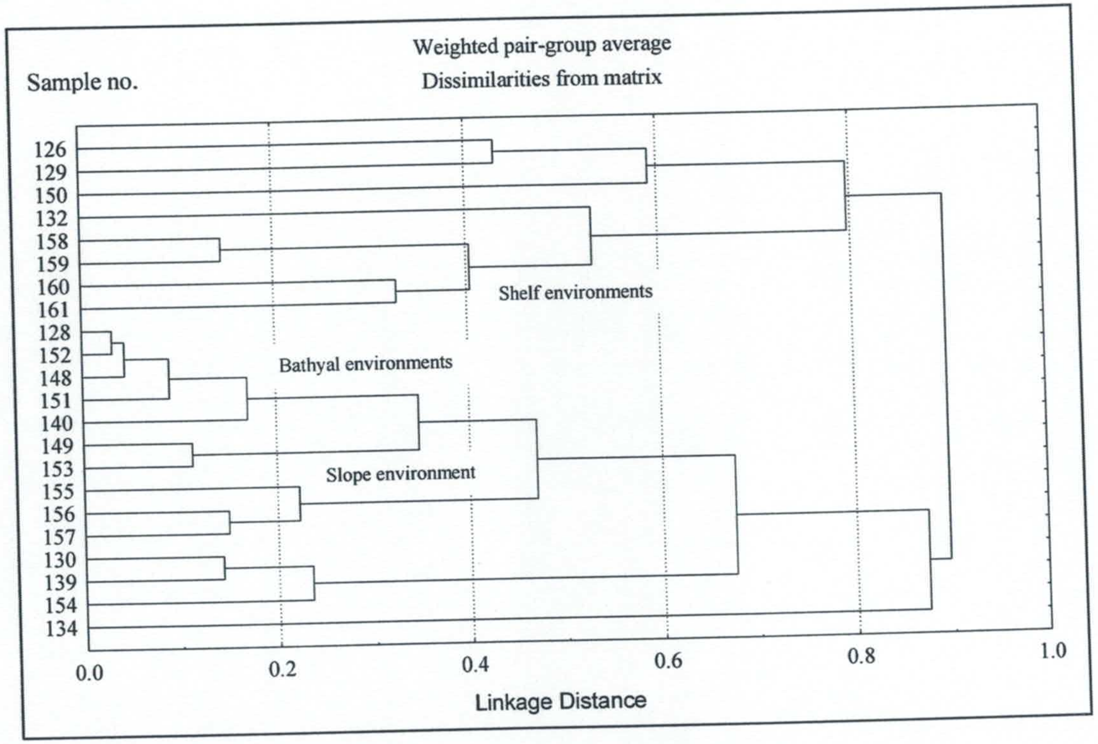

Figure 2. Dendrogram of cluster analysis of selected ostracods

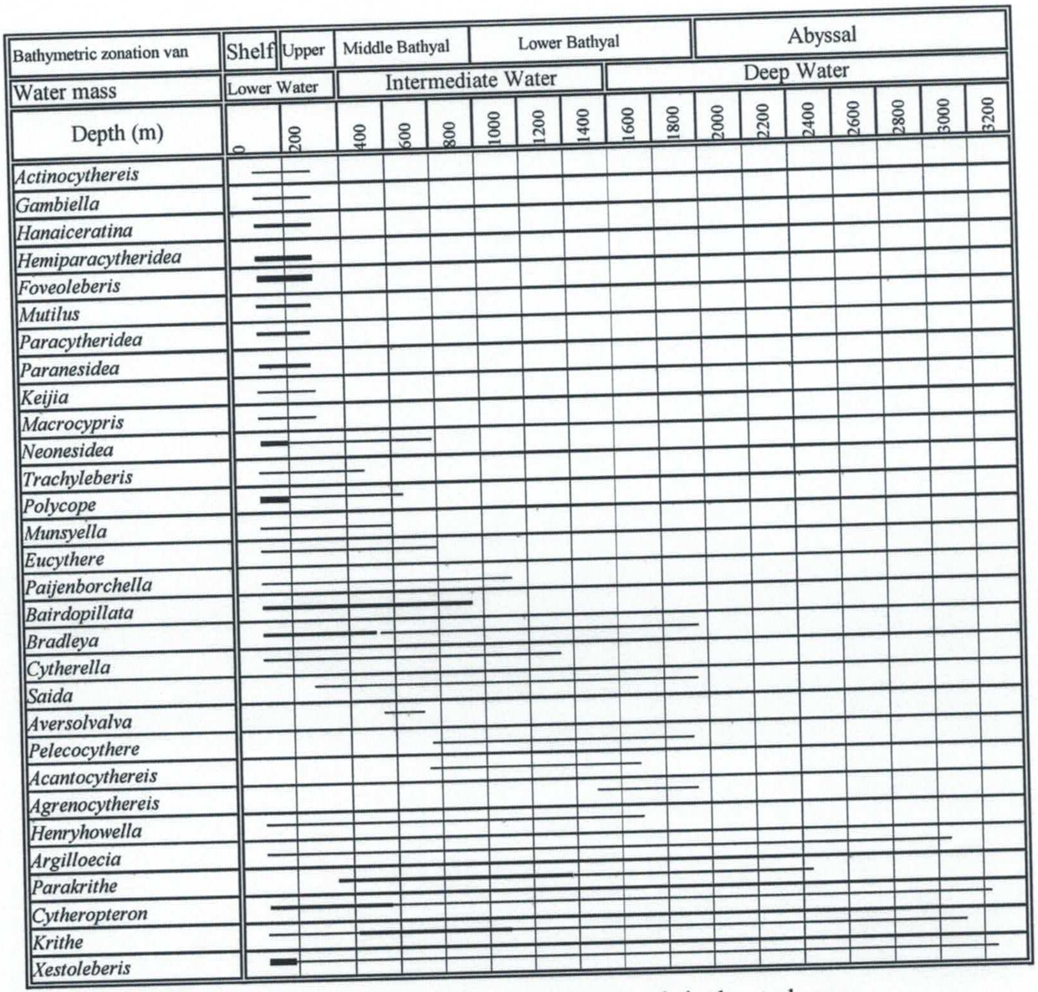

Figure 3. Depth distribution of ostracods in the study area

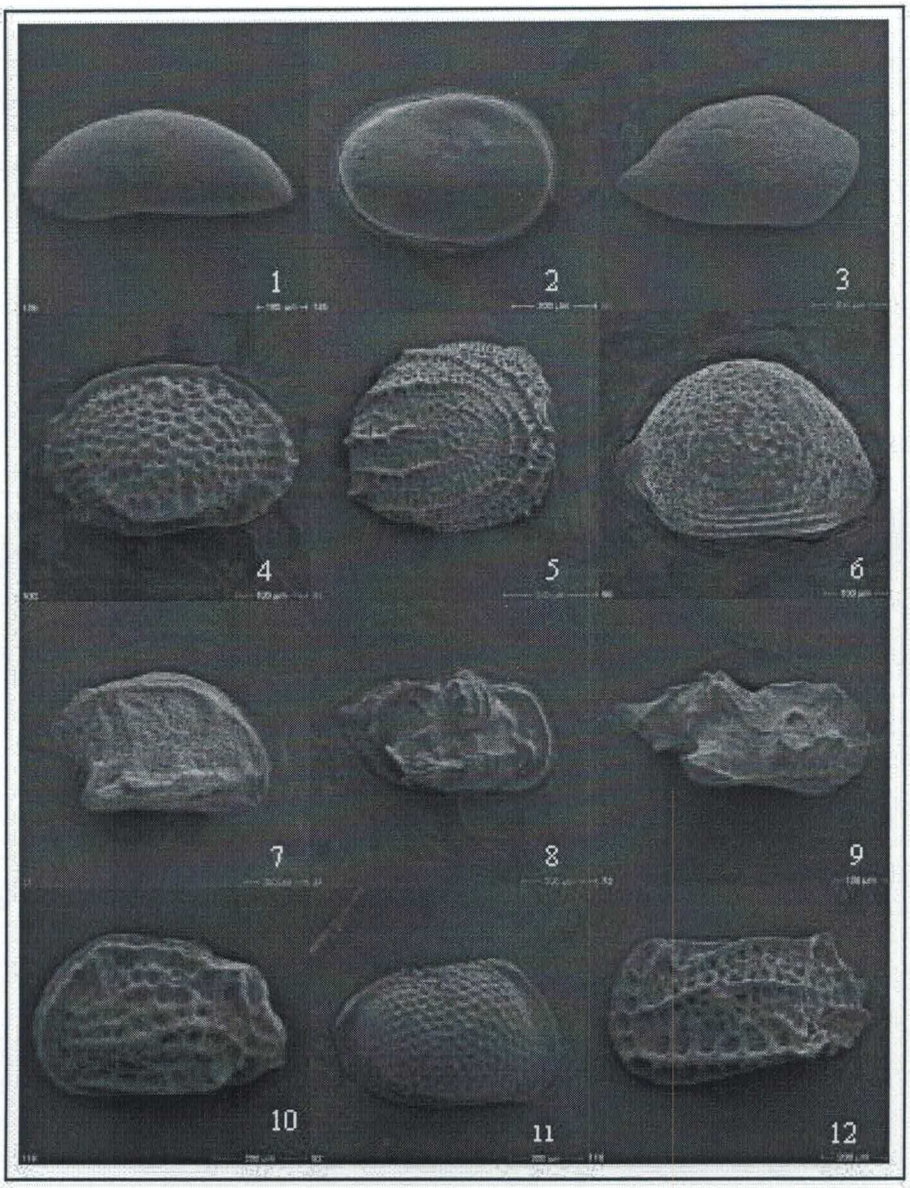

Plate 1. Selected ostracods from the South Banda and Timor Seas
1. *Argilloecia*; 2. *Cytherella*; 3. *Neonesidea*; 4. *Saida*; 5. *Polycope*; 6. *Foveoleberis*; 7. *Mutilus*; 8. *Hemiparacytheridea*; 9. *Paracytheridea*; 10. *Cytheropteron*; 11. *Hanaiceratina*; 12. *Bradleya*