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# Recent benthic ostracoda of Pahang River Delta, Pahang Darul Makmur

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# Recent Benthic Ostracoda of Pahang River Delta, Pahang Darul Makmur

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**Abstract.** A study on the distribution of recent benthic Ostracoda in marine sediment was carried out around Pahang River Delta, Pahang Darul Makmur. A total of 24 surface sediments were taken from the sampling stations between latitude 3°20' and 3°39'N and longitude 103°26' and 103°35'E. From this study, 71 species of ostracods belonging to 17 families and 42 genera were identified. The abundant and dominant species is *Pontocypris virdis* with 326 specimens obtained. The dominant family is Trachyleberididae (16 species, 585 specimens). The distribution of ostracoda is from 13 to 637 specimens. The species diversity is from 6 to 29 species. The diversity index, H(s) is in the range of 1.71 to 3.08. There are five common species (*Hemicytheridea cancellata, Parakrithella australis*, *Propontocypris rostrata*, *Loxoconcha paiki* and *Lankacythere coralloides*) in the study area. A comparison showed that a total of 53 species identified had been previously recorded in Malacca Straits, South China Sea and Java Sea. Five species are newly recorded in Malaysians waters. The species are *Papillatabairdia elongata. Mimicocythere pseudomelobesoides, Kotoracythere doratus, Xestoleberis maculanitida* and *Bosasella profunda*.

**Keywords**: ostracoda, distribution, abundance, diversity, Pahang River Delta
**PACS:** 1st General



## INTRODUCTION

Ostracoda (class Crustacea, phylum Arthropoda) is one of the most diverse groups of living crustaceans and has calcified bivalve carapace that totally encloses the body and appendages. They are typically 0.5-2.0 mm long in the adult stage. Ostracods are known from Cambrian strata to modern sediments. They have been studied for two centuries. Ostracods are found in almost every aquatic environment (hot spring, cave, fresh, brackish and marine waters). The majority of ostacods are free living (benthonic or pelagic) but some are commensal on other crustaceans, echinoderms and even on sharks. The class of Ostracoda is subdivided into two subclasses, the Myodocopa and Podocopa. The vast majority of ostracods encountered in Quaternary sediments are likely to be podocopids [3].The distribution of ostracods is controlled by hydrological, biological and sedimentological features. Ostracods have a long and well documented fossil records; primarily due to their possession of a calcified bivalve carapace. They are useful for the biozonation of marine strata on a local or regional scale, as well as to determine water depth, salinity, sedimentation, temperature and other paleoecological factors. Ostracods are adequate bioindicators of environmental changes, with the disappearance, replacement or the appearance of certain species [1].

Important works on the recent Ostracoda of Malacca Straits has been contributed by Whatley and Zhao [11,12]. They have identified 129 species from 18 bottom samples from depths range from 20 to 100 m. [14] have described ostracods from shallow waters (<20m) from the Sedili River and Jason Bay regions, southeastern Peninsular Malaysia. A total of 101 species were recorded. In this study, one new genus (*Malaycythereis*), 12 new species (*Malaycythereis trachodes, Caudites asiaticus,, Cytherella incohatus, Hemicytheridea wangi, Keijella gonia, Loxoconcha malayensis, Loxocorniculum triconicula, Neocytheretta murilineata, Paracytheroma vantrosinuosa, Semicytherura contraria, Leptocythere pulchra* and *Xestoleberis malaysiana*) and one new subspecies (*Caudites scopulicolus jasonensis*) are described: Recent Ostracoda in Pulau Tinggi waters have been studied and 51 species were identified [7]. [8] also recorded 47 species in offshore sediment around Pulau Besar, Johor. The purpose of this study will determine the distribution, abundance and diversity of ostracoda within the study area in comparison with those recorded from adjacent areas.

## MATERIAL AND METHODS

Twenty four sediment samples were collected from the sampling stations around Pahang River Delta during June, 2012 (FIGURE 1). A grab sampler of Petite Ponar type was used to collect surface sediments. In the

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laboratory, the samples were washed over three different size sieves: 0.50 mm, 0.15 mm and 0.063 mm and dried at 60°C in the oven. Only the first two size fractions were picked totally for ostracods, while the last one was too fine and frequently barren. The specimens were picked, identified and counted from dried sediment. The data obtained were used to compute the species diversity (number of species in each sample) and abundance (specimen number in each sample). The Shannon-Wiener's diversity index, H(s) was calculated using PAST (Palaeontological Statistics). The species were identified using Tabletop Microscopy (TM-1000) and Light Microscopy (LM). For the identification, a comparison on morphological features between collected specimen with ostracods species that had been recorded by earlier researchers [2, 5-6, 9-14].

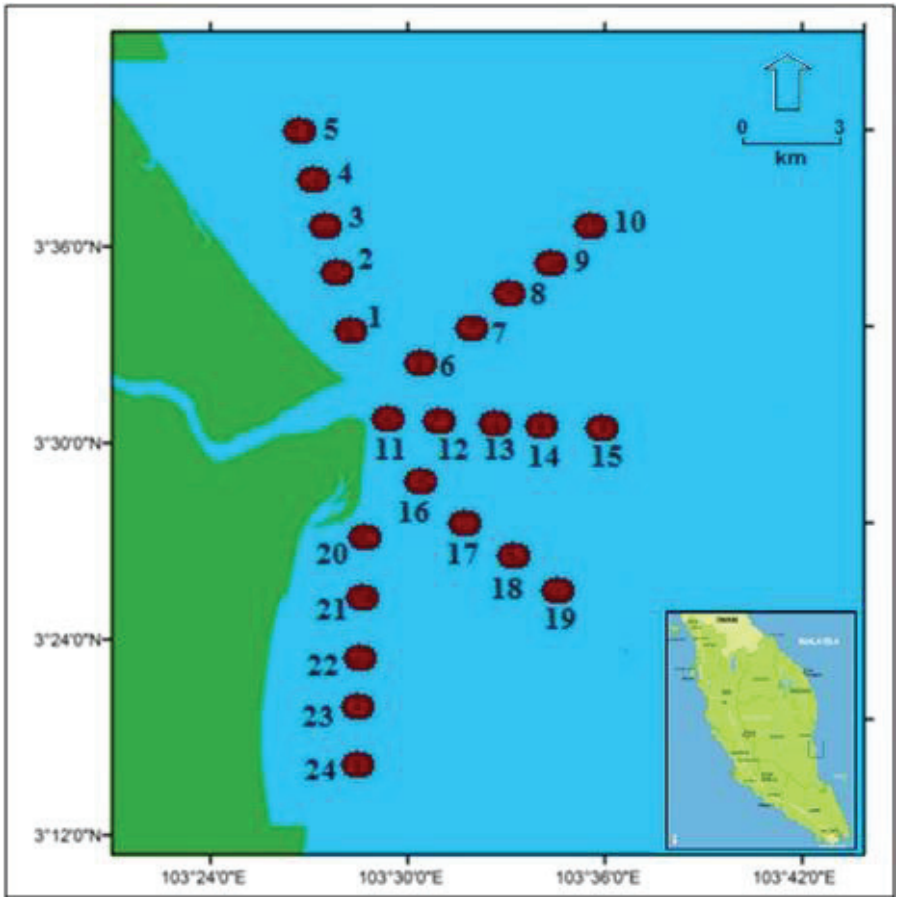


**FIGURE 1.** Location of sampling stations.

## RESULT AND DISCUSSIONS

### Dominance, Abundance and Diversity

A total of 71 species and 42 genera were identified from about 3,218 specimens picked from 24 sediment samples. Of these, 71.6% of species belong to the Cytheracea, 18.8% to the Cypridacea, 2.5% to the Bairdiacea and 7.1% to the Cytherellidae. Among the 17 families represented in the area, family Trachyleberididae has the highest diversity with 16 species recorded and the most dominant family with highest percentage, comprising 18.41% of all specimens. They are from genus *Arculacythereis, Mimicocythere, Keijella, Stigmatocythere, Pistocythereis, Lankacythere* and *Trachyleberis*. This is followed by family Hemicytheridae with 420 specimens i.e. 13.22% of the total specimens (FIGURE 2). The simple species diversity is from 6 to 29 species. The H(s) value ranges from 1.71 to 3.08, the highest at the station 10 (TABLE (1)). These illustrate the ostracod diversity in the study area. The highest distribution of ostracoda is recorded at station 1 (637 specimens) and followed by station 15 (569 specimens). While station 18 (13 specimens) has the lowest distribution of ostracoda. The dominant species is *Pontocypris virdis* (326 specimens) and followed by *Parakrithella australis* (220 specimens).

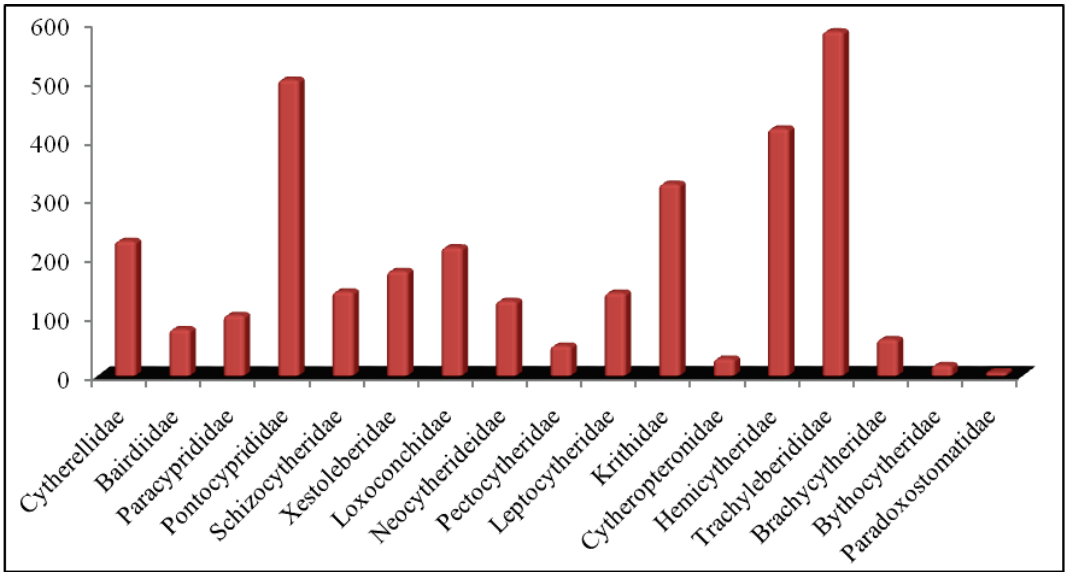


**FIGURE 2.** The abundance of ostracods according to their family.

*Pontocypris virdis* was previously recorded from recent reef flat deposits in Bali, Indonesia by [6]. This species is characterized by a large, elongate and subtriangular carapace with obtusely angled dorsal margin and have a greatest height from anterior margin. The anterior cardinal angle is distinct, the anterior margin is broadly rounded and the posterior margin is pointed. The surface is ornamented by striae that running parallel to the margins and being visible only at great magnification. This species was introduced by Brady in 1890 from Samoa and Fiji, and noted that this species is one of the most common and characteristic littoral taxon of the area.

**TABLE (1).** Diversity, abundance and value of H(s) for each sampling station.

| Station | Latitude (N) | Longitude (E) | Diversity | Abundance | H(s) | Dominant species |
|---|---|---|---|---|---|---|
| 1 | 03°33.008' | 103°27.870' | 21 | 637 | 2.65 | *Pontocypris virdis* |
| 2 | 03°34.762' | 103°27.530' | 8 | 24 | 1.95 | *Lankacythere coralloides* |
| 3 | 03°36.184' | 103°27.178' | 11 | 30 | 2.18 | *Hemicytheridea cancellata* |
| 4 | 03°37.720' | 103°26.889' | 9 | 15 | 2.02 | *Lankacythere coralloides* |
| 5 | 03°39.471' | 103°26.388' | 11 | 24 | 2.29 | *Xestoleberis hanaii* |
| 6 | 03°32.320' | 103°30.286' | 16 | 42 | 2.46 | *Parakrithella australis* |
| 7 | 03°33.543' | 103°31.546' | 18 | 54 | 2.66 | *Lankacythere coralloides* |
| 8 | 03°34.385' | 103°32.803' | 16 | 27 | 2.61 | *Xestoleberis hanaii* |
| 9 | 03°35.417' | 103°34.059' | 17 | 44 | 2.51 | *Xestoleberis hanaii* |
| 10 | 03°36.455' | 103°35.563' | 29 | 132 | 3.08 | *Xestoleberis hanaii* |
| 11 | 03°30.547' | 103°35.490' | 19 | 68 | 2.68 | *Xestoleberis hanaii* |
| 12 | 03°30.546' | 103°33.865' | 21 | 86 | 2.84 | *Lankacythere coralloides* |
| 13 | 03°30.544' | 103°32.239' | 16 | 35 | 2.54 | *Xestoleberis hanaii* |
| 14 | 03°30.543' | 103°30.600' | 16 | 57 | 2.52 | *Loxoconcha paiki* |
| 15 | 03°30.542' | 103°29.028' | 27 | 569 | 2.65 | *Parakrithella australis* |
| 16 | 03°28.534' | 103°30.329' | 15 | 439 | 2.02 | *Propontocypris rostrata* |
| 17 | 03°27.563' | 103°31.630' | 17 | 77 | 2.52 | *Loxoconcha paiki* |
| 18 | 03°26.594' | 103°32.929' | 6 | 13 | 1.71 | *Loxoconcha paiki* |
| 19 | 03°25.619' | 103°34.236' | 9 | 22 | 2.07 | *Xestoleberis hanaii* |

| | | | | | | |
|---|---|---|---|---|---|---|
| 20 | 03°20.228' | 103°28.466' | 16 | 57 | 2.62 | *Lankacythere coralloides* |
| 21 | 03°21.872' | 103°28.518' | 9 | 42 | 1.96 | *Loxoconcha paiki* |
| 22 | 03°23.536' | 103°28.534' | 16 | 61 | 2.49 | *Loxoconcha paiki* |
| 23 | 03°25.189' | 103°28.494' | 13 | 215 | 2.26 | *Parakrithella australis* |
| 24 | 03°26.931' | 103°28.447' | 15 | 428 | 2.36 | *Pontocypris virdis* |

## Assemblages

In this paper, the following terms are used, namely 'abundant', 'common' and 'rare' to describe the incidence of one species in particular sample. The term 'abundant' indicates that one species has a percentage of more than 10% of the total specimens of the sample; 'common' between 5 to 10% and 'rare' less than 5%. Most of the species obtained in the study area are classified as rare. The abundant species is *Pontocypris virdis* with 10.13% (FIGURE 3). This dominant species is found only at station with sediment of silt size. The surface sculptures of ostracod carapaces have a direct relationship with the sediment type. Smooth forms are dominant in finer-grained muds, whereas more ornamented forms, are found in coarser or more calcareous sediment [4]. Five species are common in the study area. They are *Hemicytheridea cancellata, Parakrithella australis*, *Propontocypris rostrata*, *Loxoconcha paiki* and *Lankacythere coralloides* (Figure 3). These common species are widespread throughout the entire study area and all of them have been previously recorded in Malacca Straits, South China Sea and Java Sea. The rest of 65 species are indicated as rare. This abundant and common species are shown in FIGURE 4.

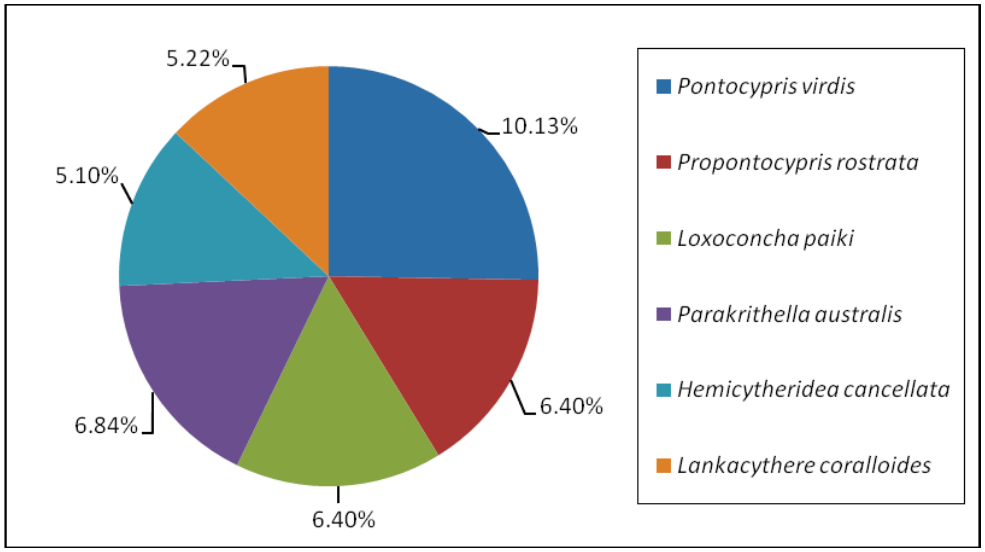


**FIGURE 3.** The abundance of common species in the study area.

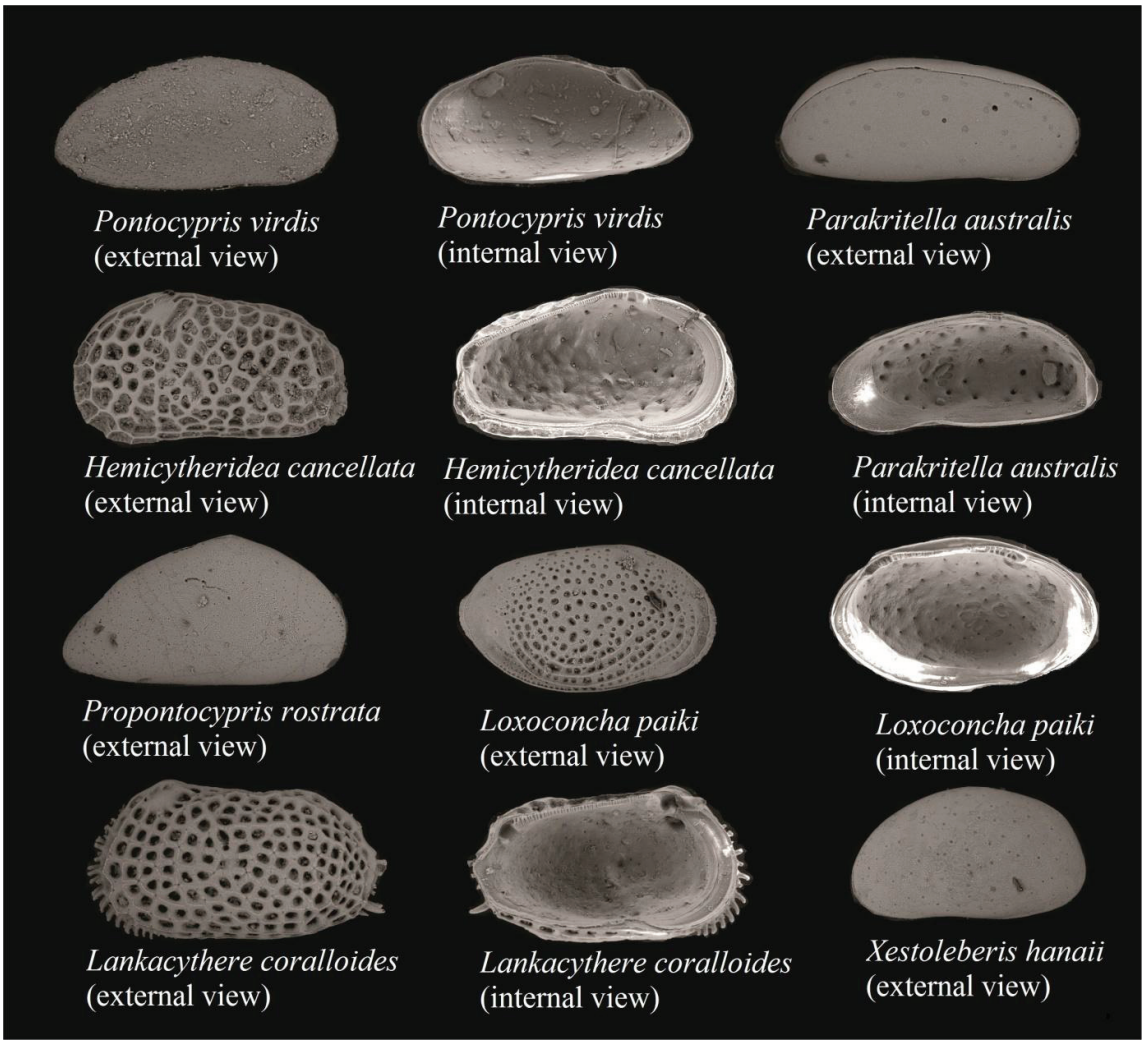


**FIGURE 4.** TM-1000 photograph for abundant and common species in the study area.

## Comparison

Out of 71 species obtained in this study, 53 species were previously recorded. An analysis of these species and a comparison made with adjacent areas show a high degree of faunal mixing in the Pahang River delta, which reveals the close relationship between the fauna and that of the Jason Bay, south eastern Peninsular Malaysia, Malacca Straits and Java Sea. There are 36 species (50.70%) common to Jason Bay, south eastern Peninsular Malaysia [14]. Of these, the most abundant species are *Loxoconcha paiki*, *Tanella gracilis, Pontocythere subjaponica, Xestoleberis hanaii* and *Lankacythere coralloides*. The large number of common species between study area and Jason Bay, is probably because they both share similar depth of water i.e. shallow water.

24 species were previously recorded in Malacca Straits including among others *Pistocythereis bradyi, Hemicytheridae cancellata, Keijella reticulata, Cytherella semitalis* and *Neomonoceratina iniqua* [11,12]. There are 30 species common to Java Sea such as *Bosasella elongata, Cytherella hemipuncta, Auradilus asutraliensis, Neobuntonia guttata* and *Javanella kendengensis* [2].

From this study, we noted that five species are newly recorded in Malaysians waters. The species are *Papillatabairdia elongata. Mimicocythere pseudomelobesoides, Kotoracythere doratus, Xestoleberis maculanitida* and *Bosasella profunda*. *Papillatabairdia elongata* and *Bosasella profunda* were previously recorded in southeast Australia [13] while *Kotoracythere doratus, Mimicocythere pseudomelobesoides* and *Xestoleberis maculanitida* were previously recorded in Solomon Islands [9, 10].

## CONCLUSIONS

The recognised ostracod fauna constituted by a total of 71 species belonging to 42 genera and 17 families were identified from the study area. There are one abundant species (*Pontocypris virdis*) and five common species (*Hemicytheridea cancellata, Parakrithella australis*, *Propontocypris rostrata*, *Loxoconcha paiki* and *Lankacythere coralloides*) in the study area. Almost of the ostracoda found in the study area were common to the Malacca Straits, South China Sea and Java Sea which reveals close zoogeographical relationship. Five species (*Papillatabairdia elongata. Mimicocythere pseudomelobesoides, Kotoracythere doratus, Xestoleberis maculanitida* and *Bosasella profunda*) are newly recorded in Malaysians waters.

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