

SOME TRACHYLEBERIDIDAE (OSTRACODA) FROM OFFSHORE SEDIMENT AROUND PULAU SIBU, JOHOR

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Abstract: Study was conducted on ostracods from offshore sediment around Pulau Sibul, Johor. A total of 10 sediment samples were taken from 10 sampling stations. The sampling was carried out in July 2006. The preparation of ostracoda samples was conducted by the method of wet-filtration washings. As a result, a total of 409 specimens were collected and identified as Trachyleberididae family. A total of 14 species and 9 genera belonging to Trachyleberididae family were identified. The genera were *Actinocythereis*, *Stigmatocythere*, *Pistocythereis*, *Borneocythere*, *Trachyleberis*, *Venericythere*, *Keijella*, *Lankacythere* and *Bradleya*. Station ST8 showed the highest abundance of ostracods with 136 specimens. The dominant species for this family was *Pistocythereis euplectella* with 95 specimens.

KEYWORDS: Ostracoda, Trachyleberididae family, abundance, dominant.

Introduction

Ostracods are one of the most diverse groups of living crustaceans (estimated at more than 20,000 living species, of which approximately 8,000 have been described) (Morkhoven 1962). They have an excellent fossil record, primarily due to their possession of a calcified bivalve carapace that totally encloses the body and appendages. Their bodies show reduced trunk segmentation and 5 to 8 pairs of limbs, which protruded from gaping valves for locomotion. They are typically 0.5-2.0 mm long in the adult stage; however, some interstitial forms are as small as 0.2 mm, some freshwater species attain 8.0 mm and the pelagic marine myodocopan genus *Gigantocypris* reaches 32 mm. They are all essentially aquatic, inhabiting both marine and non-marine environments, although some taxa are adapted to semi-terrestrial life. The vast majority are free-living (benthonic or pelagic) but some are commensal on other crustaceans, echinoderms and even on sharks (Horne et al. 2002). Fossil ostracoda are regarded by paleontologists as important stratigraphical and environmental indices, with important applications in oil and gas exploration (Moore 1961). The previous study of ostracoda from Malacca Straits showed a total of 129 species identified. 22 species and 2 genera (*Bythocytheropteron* and *Alataconcha*) were described as new (Whatley and Zhao 1987; 1988). A total of 101 species of live and dead assemblages were recorded in the study of the recent podocopid ostracoda of the Sedili River and Jason Bay, southeastern Peninsular Malaysia (Zhao and Whatley 1989). The purpose of this study is to describe the distribution and abundance of family Trachyleberididae in Pulau Sibul, Johor.

Materials and Methods

A total of 10 sediment samples were collected from 10 sampling stations at Pulau Sibul, Johor between 02°15'55.8"N to 02°17'38.9"N and 104°07'12.0"E to 104°05'34.1"E (Figure 1). The

sampling was carried out with Grab Sampler of Petite Ponar type. The preparation of ostracoda samples was conducted by the method of wet-filtration washings (Sohn et al. 1965). In the laboratory, samples were first soaked in tap water for 1 to 2 days after drying at 60°C in an oven and then were washed over a 0.50, 0,125 and 0.063 mm sieve. All the specimens were picked from the dried samples and the simple species diversity of each sample, abundance (specimen number in each sample), dominance (percentage of the most abundant species in each sample) were ascertained in order to elucidate the nature of the various ostracod communities. The species were identified with Scanning Electron Microscopy (SEM) and Light Microscopy (LM). The species from SEM micrograph are shown in Figure 2. Diversity indices were calculated using PAST statistical analysis program.

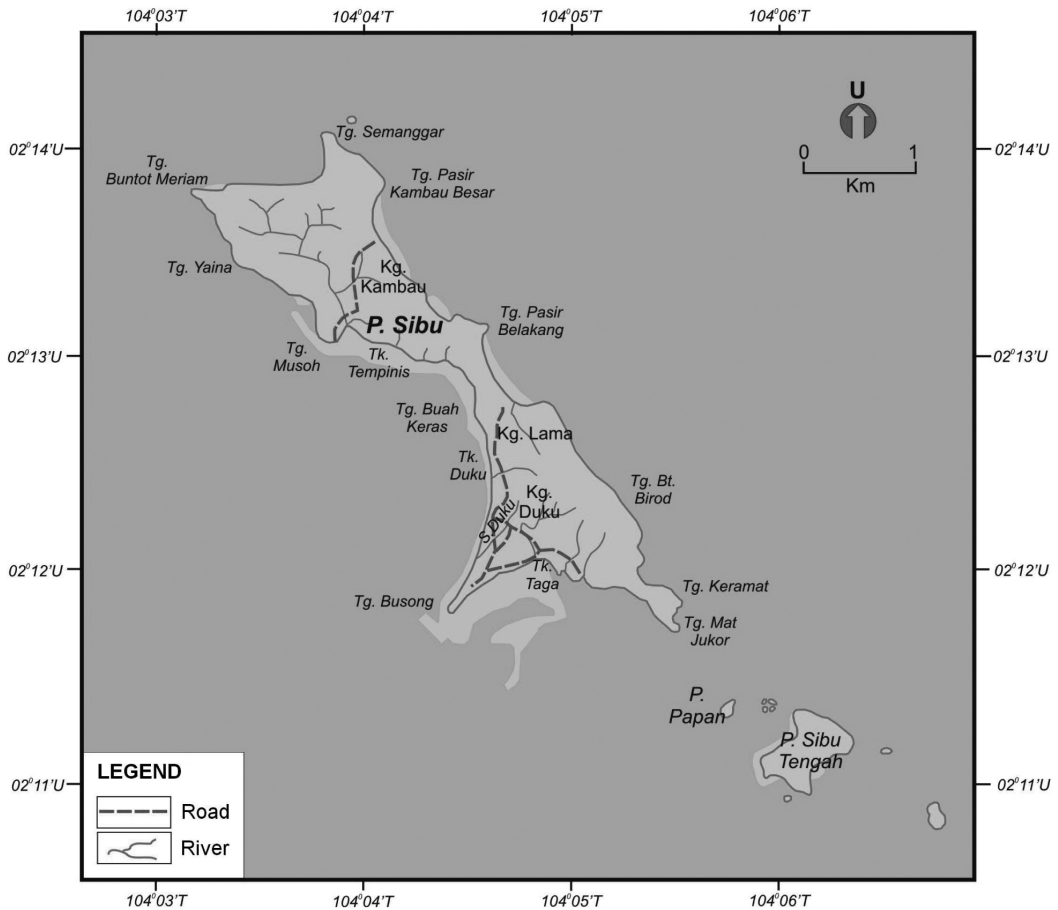


Figure 1. Location of sampling stations in Pulau Sibul, Johor

Results and Discussion

A total of 409 specimens, 9 genera and 14 species had been identified as Trachyleberididae family from 10 sediment samples at Pulau Sibul, Johor. The range of simple species diversity is between 2 to 8. For Shannon- Wiener Diversity Index, H(S), station ST7 showed the highest value with 1.8 while station ST3 showed the lowest value with only 0.4. Station ST8 showed the highest distribution of

ostracods with 136 specimens while the lowest distribution was at Station ST5 with only 6 specimens (Table 1). The dominant species is *Pistocythereis euplectella* with 95 specimens (average abundance 23.23%) followed by *Venericythere papuensis* with 78 specimens (19.07%) (Table 2).

Table 1: Simple species diversity, total of specimens and Shannon-Wiener Diversity Index, H(S) for every sampling station.

Station	ST1	ST2	ST3	ST4	ST5	ST6	ST7	ST8	ST9	ST10
Species	4	4	2	5	2	5	8	5	6	5
Specimens	19	15	20	12	6	25	44	136	84	48
H(S)	1.1	1.3	0.4	1.4	0.6	1.4	1.8	1.5	1.5	1.3

Table 2: The distribution of species for every sampling station.

Species	ST1	ST2	ST3	ST4	ST5	ST6	ST7	ST8	ST9	ST10	TOTAL
<i>Actinocythereis scutigera</i>								24			24
<i>Bradleya pitalia</i>						2	2	21			25
<i>Stigmatocythere bona</i>	3	2					2		2	1	10
<i>Stigmatocythere roesmani</i>	12	2		1		12	14		3		44
<i>Stigmatocythere rugosa</i>			3				2			1	6
<i>Borneocythere paucipunctata</i>	2	5									7
<i>Keijella</i> sp.				4		4	5	15	14		42
<i>Lankacythere coralloides</i>					4		1				5
<i>Lankacythere elaborata</i>		6									6
<i>Pistocythereis cribriformis</i>			17			5			12		34
<i>Pistocythereis euplectella</i>	2			5			7	32	34	15	95
<i>Trachyleberis</i> sp.				1							1
<i>Venericythere papuensis</i>				1				44	19	14	78
<i>Venericythere darwini</i>					2	2	11			17	32

Members of family Trachyleberididae are characterised by their oblong carapace and heavy calcification. The carapace is usually conspicuously ornamented, often with strong spines or ridges and has marginal denticulations which are very common, both anteriorly and posteriorly. The carapace of *Actinocythereis scutigera* is covered with numerous, strong and prominent spines and tubercles. *Bradleya pitalia* have three horizontal ridges in their carapace. *Venericythere darwini*, *Venericythere papuensis* and *Borneocythere paucipunctata* have a marginal denticulate in both anterior and posterior. A total of 10 species was previously recorded both in Malacca Straits (Whatley and Zhao 1988), Sedili River and Jason Bay, southeastern Peninsular Malaysia (Zhao and Whatley 1989). The species are *Actinocythereis scutigera*, *Stigmatocythere rugosa*, *Stigmatocythere roesmani*, *Stigmatocythere bona*, *Pistocythereis cribriformis*, *Pistocythereis euplectella*, *Venericythere darwini*, *Venericythere papuensis*, *Lankacythere elaborata* and *Lankacythere coralloides*. *Borneocythere paucipunctata* was only found in Malacca Straits, while *Bradleya pitalia* was only found in southeastern Peninsular Malaysia. *Trachyleberis* sp. and *Keijella* sp. are probably new species.

Systematic Classification

The following list includes species of Trachyleberididae mentioned in Table 2.

Famili TRACHYLEBERIDIDAE Sylvester-Bradley, 1948
Subfamili TRACHYLEBERIDINAE Sylvester-Bradley, 1948

Genus *Actinocythereis* Puri, 1953

Actinocythereis scutigera (Brady, 1868)

Pl. 1, fig. 4

- 1868 *Cythere scutigera* Brady; p. 70, pl. 8, figs. 15, 16
 1880 *Cythere scutigera* (Brady); Brady, p. 109, pl. 22, figs. 5a-b
 1948 *Cythereis scutigera* (Brady); Kingma, p. 83, pl. 9, figs. 6a-b
 1954 *Trachyleberis scutigera* (Brady); Keij, p. 356, pl. 3, fig. 2
 1987 *Actinocythereis scutigera* (Brady); Whatley and Zhao, p. 7, pl. 6, fig. 14
 1992 *Actinocythereis scutigera* (Brady); Mostafawi, p. 143, pl. 3, fig. 61
 1997 *Actinocythereis scutigera* (Brady); Dewi, p. 68, figs. 145, 146

Occurrence: Only found in ST8 (24)

Distribution: Pulau Besar and Pulau Tinggi, Johor (Noraswana 2008). Aceh, North Sumatra (Lower Pliocene), East Java (Pliocene-Pleistocene), Java Sea (Dewi 1997), west coast of India, rare in Malacca Strait (Whatley and Zhao 1988) and abundant throughout Singapore platform (Mostafawi 1992).

Genus *Bradleya* Hornibrook, 1952

Bradleya pitalia (Hu, 1981)

Pl. 1, fig. 1

- 1972 *Bradleya* (*Quasibradleya*) sp. Benson; p. 114, pl. 2, fig. 10
 1981 *Trachyleberis pitalia* Hu; p. 86 and 87, pl. 1, figs. 12, 14, 20-22
 1990 *Bradleya pitalia* (Hu); Gou, p. 28, pl. 2, fig. 24
 1993 *Quadracythere* sp. Tu et al.; pl. 13, fig. 9
 1995 *Bradleya pitalia* (Hu); Zhou, p. 75, pl. 3, fig. 15

Occurrence: Found in ST6, ST7 and ST8 (25).

Distribution: Pulau Besar, Pulau Tinggi and abundant in Pulau Tioman, Johor (Noraswana 2008). According to Zhao (1995), this species was found by Hu in 1981 in Hengchun Peninsular, South of Taiwan. Also found in recent sediment in Philippine, Ryukyu Island in Japan, Hainan Island in South China Sea and Pacific, south-west of Japan.

Genus *Stigmatocythere* Siddiqui, 1971

Stigmatocythere bona Chen, 1982

Pl. 1, fig. 3

- 1982 *Stigmatocythere bona* Chen; in Hou et al., p. 228, pl. 82, figs. 17-21
 1983 *Stigmatocythere bona* Chen; Gou et al., p. 88, pl. 17, figs. 9-18
 1988 *Stigmatocythere bona* Chen; Whatley and Zhao, p. 9, pl. 6, fig. 19
 1997 *Stigmatocythere bona* Chen; Dewi, p. 68, figs. 153, 154

Occurrence: Found in ST1, ST2, ST7, ST9 and ST10 (10).

Distribution: A small number found in Pulau Tinggi, Johor (Noraswana 2008). Recorded in

East China (Pliocene-Quaternary), rare in Malacca Strait (Whatley and Zhao 1988) and Java Sea (Dewi 1997).

Stigmatocythere roesmani (Kingma, 1948)

Pl. 1, fig. 6

- 1948 *Cythereis roesmani* Kingma; p. 82, pl. 9, figs. 1a, b
 1982 *Stigmatocythere dorsinoda* Chen; in Hou et al., p. 230, pl. 82, figs. 10-16
 1988 *Stigmatocythere roesmani* (Kingma); Whatley and Zhao, p. 23, pl. 6, fig. 23
 1989 *Stigmatocythere roesmani* (Kingma); Zhao and Whatley, p. 246, pl. III, figs. 16, 17, pl. IV, fig. 1
 1992 *Stigmatocythere roesmani* (Kingma); Mostafawi, p. 143, pl. 3, fig. 60
 1997 *Stigmatocythere roesmani* (Kingma); Dewi, p. 69, fig. 155

Occurrence: Found in ST1, ST2, ST4, ST6, ST7 and ST9 (44).

Distribution: Pulau Tinggi, Johor (Noraswana 2008). East Java (Upper Pliocene) and Java Sea (Dewi 1997). Malacca Strait (Whatley and Zhao 1988), Jason Bay, southern Peninsular Malaysia (Zhao and Whatley 1989) and Singapore platform (Mostafawi 1992).

Stigmatocythere rugosa (Kingma, 1948)

Pl. 1, fig. 9

- 1948 *Cythereis roesmani* var. *rugosa* Kingma; p. 83, pl. 10, figs. 3a, b
 1983 *Stigmatocythere dorsinoda* Gou et al.; p. 89, pl. 17, figs. 19-25
 1988 *Stigmatocythere rugosa* (Kingma); Whatley and Zhao, p. 29, pl. 6, fig. 22
 1989 *Stigmatocythere rugosa* (Kingma); Zhao and Whatley, p. 246, pl. III, fig. 18, pl. IV, fig. 2
 1997 *Stigmatocythere rugosa* (Kingma); Dewi, p. 69, figs. 158, 159

Occurrence: Small number found in ST3, ST7 and ST10 (6).

Distribution: Very few found in Pulau Tinggi, Johor (Noraswana 2008). Also found in Java Sea (Dewi 1997). Malacca Strait (Whatley and Zhao 1988) and Jason Bay, southern Peninsular Malaysia (Zhao and Whatley 1989).

Subfamili PTERYGOCYTHERINAE Puri, 1957

Genus *Borneocythere* Mostafawi, 1992

Borneocythere paucipunctata (Whatley and Zhao, 1988)

Pl. 1, fig. 10

- 1988 *Keijella paucipunctata* Whatley and Zhao; p. 33, pl. 8, figs. 5-9
 1992 *Borneocythere paucipunctata* (Whatley and Zhao); Mostafawi, p. 146, pl. 3, figs. 64-68
 1997 *Borneocythere paucipunctata* (Whatley and Zhao); Dewi, p. 71, figs. 172, 173

Occurrence: Only found in ST1 and ST2 (7).

Distribution: Pulau Besar and Pulau Tinggi, Johor (Noraswana 2008). Java Sea (Dewi 1997), first recorded in Malacca Strait marine sediment (Whatley dan Zhao 1988) and occurs nearly throughout the Singapore platform (Mostafawi 1992).

Genus *Keijella* Ruggeri, 1967*Keijella* sp.

Pl. 1, fig. 2

Occurrence: Found in five stations which were ST4, ST6, ST7, ST8 and ST9 (42).Genus *Lankacythere* Bhatia and Kumar, 1979*Lankacythere coralloides* (Brady, 1886)

Pl. 1, fig. 5

- 1886 *Cythere coralloides* Brady; p. 307, pl. 39, figs. 19-22
 1977 *Cythere? cf. cribriformis* Paik; pl. 1, figs. 9-11, pl. 8, fig. 147
 1979 *Lankacythere coralloides* (Brady); Bhatia and Kumar, p. 176, pl. 1, figs. 1-5
 1987 *Lankacythere coralloides* (Brady); Whatley and Zhao, p. 33, pl. 8, figs. 19-22
 1989 *Lankacythere coralloides* (Brady); Zhao and Whatley, p. 186

Occurrence: Only found in ST5 and ST7 (5).**Distribution:** Pulau Besar and Pulau Tinggi, Johor (Noraswana 2008). Recorded in Malacca Strait (Whatley dan Zhao 1988) and northern Indian Ocean beach ((Bhatia dan Kumar 1979).*Lankacythere elaborata* Whatley and Zhao, 1988

Pl. 1, fig. 7

- 1987 *Lankacythere elaborata* Whatley and Zhao; p. 33, pl. 8, figs. 23-28

Occurrence: Only six specimens found in ST2.**Distribution:** Found in Pulau Tinggi, Johor (Noraswana 2008).Genus *Pistocythereis* Gou, 1983*Pistocythereis cribriformis* (Brady, 1865)

Pl. 1, fig. 8

- 1865 *Cythere cribriformis* Brady; p. 379, pl. 61, figs. 6a-d
 1880 *Cythere cribriformis* Brady; Brady, p. 96, pl. 19, figs. 3a-d
 1948 *Cythere cribriformis* Brady; Kingma, p. 78, 79, pl. 9, figs. a, b
 1988 *Pistocythereis cribriformis* (Brady); Whatley and Zhao, p. 19, 20, pl. 9, figs. 6, 7
 1992 *Pistocythereis cribriformis* (Brady); Mostafawi, p. 146, pl. 4, fig. 73
 1997 *Pistocythereis cribriformis* (Brady); Dewi, p. 72, fig. 189

Occurrence: Found in ST3, ST6 and ST9 (34).**Distribution:** Found in Pulau Besar and Pulau Tinggi, Johor (Noraswana 2008). Mediterranean, South China Sea and Malacca Strait (Whatley dan Zhao 1988). Abundant in Singapore platform (Mostafawi), Gulf of Carpentaria and Java Sea (Dewi 1997).*Pistocythereis euplectella* (Brady, 1869)

Pl. 1, fig. 8

- 1869 *Cythere euplectella* Brady; p. 157, 158, pl. 16, figs. 5-7
 1981 *Bicornucythere euplectella* (Brady); Hanai et al., p. 173
 1985 *Bicornucythere euplectella* (Brady); Zhao et al., p. 199, pl. 19, fig. 18
 1988 *?Lankacythere euplectella* (Brady); Whatley and Zhao, p. 34, pl. 9, figs. 1, 2
 1992 *Lankacythere euplectella* (Brady); Mostafawi, p. 146, pl. 4, fig. 74

1997 *Pistocythereis euplectella* (Brady); Dewi, p. 72, figs. 190-193

Occurrence: Abundant in study area which was in ST1, ST4, ST7, ST8, ST9 and ST10 (95).

Distribution: Pulau Besar (Noraswana 2008). Found in nearly all surface sediments in Java Sea (Dewi 1997). Recorded in Malacca Strait (Whatley dan Zhao 1988), South and East China Sea (Zhao et al. 1985) and Singapore platform (Mostafawi 1992).

Genus *Trachyleberis* Brady, 1898

Trachyleberis sp. 1

Pl. 1, fig. 13

Occurrence: Only single specimen found in ST4.

Genus *Venericythere* Mostafawi, 1992

Venericythere darwini (Brady, 1868)

Pl. 1, fig. 11

1868 *Cythere darwini* (Brady); p. 71, pl. 8, figs. 17, 18

1977 *Ruggieria darwini* (Brady); Paik, pl. 5, figs. 85-88, pl. 9, fig. 164

1980 *Bicornucythere darwini* (Brady); Hanai et al., p. 173

1988 *Ruggieria darwini* (Brady); Whatley and Zhao, p. 33, pl. 8, figs. 10-13

1992 *Venericythere darwini* (Brady); Mostafawi, p. 146, pl. 4, figs. 69, 70

1997 *Venericythere darwini* (Brady); Dewi, p. 71, figs. 174, 175

Occurrence: Found in ST5, ST6, ST7 and ST10 (32).

Distribution: Pulau Besar (Noraswana 2008). Found in Java Sea (Dewi 1997). Persian Gulf, Andaman Sea, west coast of India, Malacca Strait (Whatley dan Zhao 1988) and Singapore platform (Mostafawi 1992).

Venericythere papuensis (Brady, 1880)

Pl. 1, fig. 12

1880 *Cythere papuensis* Brady; p. 95, figs. 15a-d

1948 *Cythereis papuensis* (Brady); Kingma, p. 81-82, pl. 10, figs. 2a-b

1976 *Cythere papuensis* (Brady); Puri and Huling, p. 283, pl. 16, figs. 7, 11-18

1988 *Keijella papuensis* (Brady); Whatley and Zhao, p. 13, pl. 18, figs. 1, 2

1992 *Venericythere papuensis* (Brady); Mostafawi, p. 146, pl. 4, figs. 71, 72

1997 *Venericythere papuensis* (Brady); Dewi, p. 70, figs. 170, 171

Occurrence: Found in ST4, ST8, ST9 and ST10 (78).

Distribution: Abundant in Pulau Tioman (Noraswana 2008). Recorded in Papua New Guinea, Persian Gulf, the west coast of India Sumatra (Pliocene), Malacca Strait (Whatley dan Zhao 1988) and Java Sea (Dewi 1997). However, is rare in Singapore platform (Mostafawi 1992).

Conclusion

Our present study shows 9 genera and 14 species identified as Trachyleberididae family from 10 sediment samples at Pulau Sibul, Johor. The range of simple species diversity is between 2 to 8, for

Shannon-Wiener Diversity Index, H(S); distribution of species range from 6 to 136 specimens with the dominant species being *Pistocythereis euplectella*.

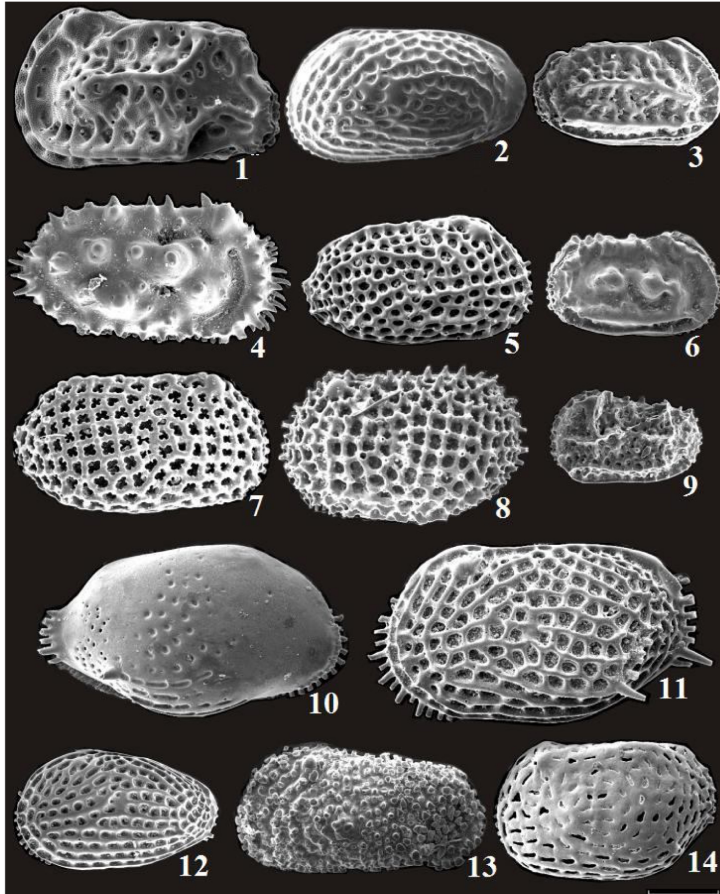
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FIGURE 2



1) *Bradleya pitalia* (Hu, 1981), external view, left valve, 112x; 2) *Keijella* sp. external view, left valve, 116x; 3) *Stigmatocythere bona* Chen, 1982, external view, right valve, 150x; 4) *Actinocythereis scutigera* (Brady, 1868), external view, right valve, 80x; 5) *Lankacythere coralloides* (Brady, 1886), external view, right valve, 136x; 6) *Stigmatocythere roesmani* (Kingma, 1948), external view, right valve, 176x; 7) *Lankacythere elaborata* Whatley and Zhao, 1988, external view, right valve, 106x; 8) *Pistocythereis cribriformis* (Brady, 1865), external view, left valve, 110x; 9) *Stigmatocythere rugosa* (Kingma, 1948), external view, left valve, 174x; 10) *Borneocythere paucipunctata* (Whatley and Zhao, 1988), external view, right valve, 95x; 11) *Venericythere darwini* (Brady, 1868) external view, left valve, 85x; 12) *Venericythere papuensis* (Brady, 1880), external view, left valve, 154x; 13) *Trachyleberis* sp., external view, left valve, 125x; 14) *Pistocythereis euplectella* (Brady, 1869), external view, left valve, 129x.