Contributions to the knowledge of the young-Caenozoic Ostracoda from the Malayan region

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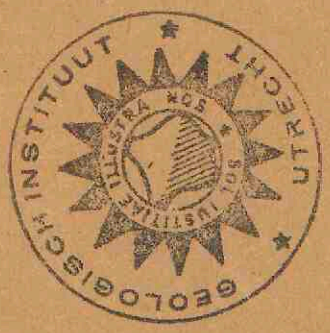

J. Th. KINGMA

CONTRIBUTIONS TO THE KNOWLEDGE OF THE YOUNG-CAENOZOIC OSTRACODA FROM THE MALAYAN REGION

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PROEFSCHRIFT

TER VERKRIJGING VAN DEN GRAAD VAN DOCTOR IN DE WIS- EN NATUURKUNDE AAN DE RIJKS-UNIVERSITEIT TE UTRECHT, OP GEZAG VAN DEN RECTOR MAGNIFICUS Dr H. WAGENVOORT, HOOGLEERAAR IN DE FACULTEIT DER LETTEREN EN WIJSBEGEERTE, VOLGENS BESLUIT VAN DEN SENAAT DER UNIVERSITEIT TEGEN DE BEDENKINGEN VAN DE FACULTEIT DER WIS- EN NATUURKUNDE TE VERDEDIGEN OP MAANDAG 18 OCTOBER, DES NAMIDDAGS TE 3 UUR.

DOOR

JACOBUS THEODORUS KINGMA

GEBOREN TE SOEKABOEMI, JAVA

1948

KEMINK EN ZOON N.V. — UTRECHT — DOMPLEIN 2

PROMOTOR:
Prof. Dr G. H. R. von Koenigswald

Toen ik, na mijn candidaats-examen in 1938, met vacantie naar Indië ging teneinde mijn Ouders op te zoeken, vermoedde ik niet, dat dit een studie-onderbreking van zeven jaren zou worden.

In Indië aangekomen werd ik nl. onmiddellijk opgeroepen voor den Militairen Dienst, terwijl de bezetting van Nederland het mij later onmogelijk maakte naar Utrecht terug te keeren. Goede en slechte ervaringen heb ik in deze zeven jaren opgedaan, waarbij ik vooral vol afgrijzen terugdenk aan de krijgsgevangenschap onder de Japanners, in welken tijd mij een eventueel afstudeeren schier onbereikbaar leek.

Met groote voldoening is het dan ook, dat ik thans bij het einde van mijn academische studie de gelegenheid heb U, Hoogleeraren aan de Rijks Universiteit te Utrecht, te danken voor hetgeen gij gedaan hebt voor mijn universitaire vorming.

In de eerste plaats gaan mijn gedachten uit naar mijn eersten leermeester, wijlen Prof. Dr L. M. R. RUTTEN. Immers hij was het, die mij de beginselen der Geologie bijbracht en wiens streven er altijd op gericht was van ons bruikbare menschen te maken. Helaas moest ik bij mijn terugkomst in Nederland vernemen, dat deze gedenkwaardige man juist eenige dagen tevoren was overleden.

Hooggeleerde VON KOENIGSWALD, Hooggeschatte Promotor, onze vriendschap dateert reeds van jaren her en het is, tot mijn groot genoegen, een merkwaardige samenloop van omstandigheden, dat juist gij mijn Promotor moest worden. Ik dank U voor Uw goede kameraadschap en voor de wijze waarop gij mij met raad en vooral met daden terzijde hebt gestaan in zaken, die van het allergrootste belang voor mij zijn geweest.

Hooggeleerde TROOSTER, hoewel ik slechts korten tijd van Uw ervaring heb kunnen profiteeren, acht ik het mij toch een voorrecht onder Uw leiding te zijn afgestudeerd. Het gevoel voor de „dingen" in de Geologie hebt gij in mij aanzienlijk versterkt.

Hooggeleerde NIEUWENKAMP, de wijze waarop gij mij inzicht hebt verschaft in vele theoretische kwesties, hoe hypothesen steeds door nieuwe vervangen kunnen worden, zijn voor mij van blijvende waarde.

Hooggeleerde VENING MEINESZ, ik dank U voor de wijze, waarop gij mijn kijk op de Geophysica hebt verhelderd.

Verder zou ik mijn dank willen betuigen aan den Dienst van den Mijnbouw in Nederlandsch-Indië, waarbij ik als assistent-geoloog werkzaam ben geweest. Deze tijd is ongetwijfeld leerzaam voor mij geweest en ik wil hén danken, al zijn het er niet velen, die zich het lot van een nog-niet-afgestudeerden geoloog hebben aangetrokken. Vooral denk ik daarbij aan den Mijnbouw Geoloog wijlen Ir J. DUYFJES, aan wien ik gedurende 1941 was toegevoegd. Helaas heeft hij de krijgsgevangenschap niet mogen overleven.

Hooggeleerde HELD, U dank ik voor de wijze, waarop gij, tijdens onze krijgsgevangenschap, ons lot verlicht hebt met Uw niets ontzienden humor en Uw vertellingen over de Ethnologie in het algemeen en die van Nieuw-Guinea in het bijzonder.

De „Bataafsche Petroleum Maatschappij" ben ik ten zeerste verplicht voor het beschikbaar stellen der voortreffelijke monsters uit Bodjonegoro, Oost-Java.

Zeergeleerde RAVEN, Uw merkwaardig origineele kijk op het leven is immer een toetssteen voor mij geweest.

Waarde VAN DIJK, met genoegen zal ik altijd terugdenken aan dezen tijd, waarin gij en uw staf mij in allerhande zaken terzijde stond. Als blijk van mijn achting en sympathie heb ik één van de ruigere Ostracoden uit deze collectie naar U genoemd.

Jaargenooten, oud-leden van het Utrechtsch Studenten Corps en gij tijdgenooten, goed is de tijd geweest, waarin wij tezamen aan deze Universiteit mochten studeeren; moge het U in de toekomst naar wensch gaan.

Met dankbaarheid denk ik aan mijn Ouders, die mij, niettegenstaande er een oorlog overheen is gegaan, in staat stelden mijn eens begonnen studie te voltooien. Het vervult mij echter met weemoed, dat mijn Vader dit niet heeft mogen beleven.

Contributions to the knowledge of the Young-Caenozoic Ostracoda from the Malayan region

by
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Geological Institute,
University of Utrecht,
HOLLAND

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PREFACE

During my stay in the Indies, my attention was drawn to Ostracods from the Neogene of Western Java; unfortunately the war interrupted my work and my collection was destroyed. Although Ostracods may prove to be at least as useful as any other group of fossils, the study of this subject has been practically neglected in the Malayan region.

Notwithstanding the fact that considerable geological and palaeontological work was carried out in the Netherlands East Indies by the Geologcial Survey, little attention has been paid to Ostracods and smaller Foraminifera until now. The Tertiary sedimentary complexes generally consist of very monotonous series and the stratigraphical columns are mainly based upon lithological characteristics while Molluscs, larger Foraminifera and in a few cases Vertebrates were used. The subdivision of these complexes and correlation of stratigraphical horizons has not been very successful in using these fossils. Ostracods and smaller Foraminifera may still prove to be very useful in this respect.

Ostracods, discussed in this paper, are from the following localities:

1. Atjeh (North Sumatra). The samples were collected by Professor S. G. TROOSTER at the time he was working as a field-geologist with the „Bataafsche Petroleum Maatschappij" and they were presented by him to our Institute several years ago.

2. Bodjonegoro (East Java). Several years before the war an exploratory drilling to a depth of more than 2000 metres was carried out by the „Bataafsche Petroleum Maatschappij". The management of this Company, was so kind as to put 151 core-samples from this bore hole at my disposal, for which I am very much indebted to them. The smaller Foraminifera of this column are being worked by my colleague Mr L. BOOMGAART.

3. Southern Kendeng area (East Java). Ostracods have been studied from three localities:

a. Sangiran. The Ostracods were collected by Professor Dr G. H. R. VON KOENIGSWALD in the year 1938 from the marine lower beds of the Sangirandome. These Ostracoda-bearing strata are of special interest, because they underlie the famous Pithecanthropus deposits.

b. and c. Pentoek and Kloemprit. Two localities in more or less the same horizon, but located farther to the East. These samples were kindly presented to our Institute by the Geological Survey of the Netherlands East Indies.

4. Java sea. The material collected by the Snellius-Expedition 1929—1930 is at present in the Geological Institute of Groningen, Holland. Bottom samples from three stations have been selected, giving an idea of the recent Ostracodafauna of this region.

This paper begins with a chapter on hinge-patterns of the principal Caenozoic genera, as in my opinion these patterns are the most important features in classifying Ostracoda. This point of view has already been mentioned by several other authors, but, until now, the data have not been compiled. This compilation is an attempt to serve as a key for beginners, supplementing Dr VAN DEN BOLD's useful paper. This author did not sufficiently emphasize the importance of hinge-patterns, which may be ascribed to the poor illumination used at that time at our Institute.

I want to express my gratitude to Professor Dr G. H. R. VON KOENIGSWALD for his invaluable advice in preparing this paper and for putting the Sangiran material at my disposal; to Professor S. G. TROOSTER, who kindly served as a "trait d'union" with the „Bataafsche Petroleum Maatschappij" in obtaining the Bodjonegoro core-samples; to Mr L. BOOMGAART, who revised the English text; to Mr J. H. M. VAN DIJK, who has drawn the accompanying maps.

Finally I wish to express my appreciation to my wife, for typewriting the manuscript; although she was not familiar with the subject, her understanding, patience and remarks were of great help to me.

The work preliminary to the compiling of this paper has been carried out by the author during the last fourteen months and the experience obtained on this subject at the Geological Survey of the Netherlands East Indies, while working under the supervision of Dr W. MOHLER of the „Bataafsche Petroleum Maatschappij" enabled me to tackle the problem in so short a period.

All the type specimens described in this paper from Atjeh, Bodjonegoro, Kendeng and Java-Sea will remain in the micropaleontological collection of the „Mineralogisch-Geologisch Instituut" of the State University of Utrecht, Holland. The D-numbers refer to the slides in this collection.

All the Ostracoda figures have been drawn by the author.

CONTENTS.

Illustrations.

A. CONTRIBUTION TO THE STUDY OF THE HINGE-PATTERNS.

I. Introduction.

This chapter has been written more particulary for those who are not acquainted with Ostracoda work.

There are five definite characteristics by which fossil Ostracods may be classified, viz.:

1. General outline.
2. Valve ornamentation.
3. Marginal-zone with the porecanals.
4. Muscle-scar-pattern.
5. Hingement.

In my opinion this last characteristic is of the utmost importance, a fact not sufficiently emphasized by VAN DEN BOLD in his key on tertiary and cretaceous Ostracoda. The occurrence of hinges in the Ostracoda valves produces an important determination characteristic and for this reason I have summarised the data. In comparing them it appeared that indeed all genera possess a different hingement, though some are a variation on the *Cythereis-theme*. The principal points in studying these hinges are: the length in comparison with the length of the valve, the width of the hinge, the terminal dentition areas, the groove or bar in between and the area above this groove or bar. Is the general line of the hinge parallel to the ventral margin or not? Dr J. H. GERMERAAD a.o. has drawn the same conclusions and I take this opportunity to thank him for some valuable suggestions.

II. The principal Caenozoic genera.

Ordo: OSTRACODA Latreille.

Subordo I. PLATYCOPA Sars.

Family: CYTHERELLIDAE Sars, 1865.

1. (*a*) [1]) Genus: *Cytherella* Jones, 1849.
2. (*a*) „ *Cytherelloidea* Alexander, 1929.
3. (*a*) „ *Ankumia* v. Veen, 1932.
4. (*a*) „ *Staringia* v. Veen, 1936.
5. (*a*) „ *Platella* Coryell and Fields, 1937.

Subordo II. PODOCOPA Sars.

Family CYPRIDAE Baird, 1846.

Subfamily 1. Pontocyprinae Sars, 1925.

6. (*a*) Genus: *Pontocypris* Sars, 1865.
7. (*a*) „ *Erythrocypris* Müller, 1894.
8. (*a*) „ *Argilloecia* Sars, 1865.

Subfamily 2. Macrocyprinae Müller, 1912.

9. (*a*) Genus: *Macrocypris* Brady, 1867.

Subfamily 3. Cyprinae Sars, 1925.

10. (*a*) Genus: *Paracypris* Sars, 1865.
11. (*a*) „ *Krausella* Ulrich, 1894.
12. (*a*) „ *Phanasymmetrica* Roth, 1929.

Family: BAIRDIIDAE Sars, 1887.

13. (*a*) Genus: *Bythocypris* Brady, 1880.
14. (*a*) „ *Bairdia* Mc. Coy, 1844.
15. (*t*) „ *Bairdoppilata* Coryell, Sample & Jennings, 1935.
16. (*t*) „ *Triebelina* v. d. Bold, 1946.
17. (*a*) „ *Antibythocypris* Jennings, 1936.

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1) (a) = adont.
(t) = taxodont.
(h) = heterodont.

Family: CYTHERIDAE Baird, 1850.

Subfamily 1. Cytherideinae Sars, 1925.

18. (*t*) Genus: *Cythere* O. F. Müller, 1785.
19. „ *Cytheridea* Bosquet, 1852.
This genus has been split into several other genera by Stephenson, Triebel a.o. (vide 20, 21, 22, 23, 24, 25, 26, 27).
20. (*t*) „ *Haplocytheridea* Stephenson, 1936.
21. (*t*) „ *Cytheridea* Stephenson, 1936.
22. (*t*) „ *Clithrocytheridea* Stephenson, 1936.
23. (*t*) „ *Leptocytheridea* Stephenson, 1937.
24. (*t*) „ *Anomocytheridea* Stephenson, 1938.
25. (*t*) „ *Dolocytheridea* Triebel, 1938.
26. (*t*) „ *Perissocytheridea* Stephenson, 1938.
27. (*t*) „ *Hemicytheridea*, N. Gen.
28. (*t*) „ *Paracyprideis* Klie, 1929.
29. (*a*) „ *Krithe* Brady, Grosskey & Robertson, 1874.
30. (*a*) „ *Eucythere* Brady, 1866.
31. (*a*) „ *Habrocythere* Triebel, 1941.
32. (*a*) „ *Cuneocythere* Lienenklaus, 1894.
33. (*h*) „ *Apatocythere* Triebel, 1941.
34. (*t*) „ *Ruttenella* v. d. Bold, 1946.
35. (*t*) „ *Microcythere* Müller, 1894.
36. (*t*) „ *Paracytheridea* Müller, 1894.
37. (*h*) „ *Leptocythere* Sars, 1925.

Subfamily 2. Cytherinae Dana, 1852.

38. (*a*) Genus: *Cytherideis* Jones, 1856.
39. (*t*) „ *Archycythereis* Howe & Law, 1936.
40. (*h*) „ *Cytheromorpha* Hirschmann, 1909.
41. (*h*) „ *Cytheretta* Müller, 1894.
42. (*h*) „ *Atjehella*, N. Gen.
43. (*h*) „ *Paracytheretta* Triebel, 1941.
44. (*h*) „ *Hemicythere* Sars, 1926.
45. (*h*) „ *Brachycythere* Alexander, 1933.
46. (*h*) „ *Alatacythere* Murray & Hussey, 1942.
47. (*h*) „ *Cythereis* Jones, 1849.
48. (*h*) Subgenus: *Pterigocythereis* Blake, 1933.
49. (*t*) Genus: *Protocythere* Triebel, 1938.
50. (*h*) „ *Platycythereis* Triebel, 1941.

51. (*h*) Genus: *Isocythereis* Triebel, 1941.
52. (*h*) „ *Anticythereis* v. d. Bold, 1946.
53. (*h*) „ *Pyricythereis* Howe, 1936.
54. (*h*) „ *Leguminothereis* Howe, 1936.
55. (*h*) „ *Basslerites* Howe, 1937.
56. (*h*) „ *Campylocythere* Edwards, 1944.
57. (*h*) „ *Acuticythereis* Edwards, 1944.
58. (*h*) „ *Caudites* Coryell & Fields, 1937.
59. (*h*) „ *Paijenborchella*, N. Gen.
60. (*h*) „ *Tanella*, N. Gen.
61. (*h*) „ *Cativella* Coryell & Fields, 1937.
62. (*h*) „ *Thalmannia* le Roy, 1939.
63. (*h*) „ *Javanella*, N. Gen.

Subfamily 3. Loxoconchinae Sars, 1927.

64. (*h*) Genus: *Loxoconcha* Sars, 1865.
65. „ *Cytheropteron* Sars, 1865.
66. (*t*) Subgenus: *Cytheropteron* Alexander, 1933.
67. (*t*) „ *Eocytheropteron* Alexander, 1933.
68. (*t*) Genus: *Kangarina* Coryell & Fields, 1937.
69. (*t*) „ *Orthonotacythere* Alexander, 1933.

Subfamily 4. Bythocytherinae Sars, 1926.

70. (*a*) Genus: *Bythocythere* Sars, 1865.
71. (*a*) „ *Jonesia* Brady, 1866.
72. (*a*) „ *Pseudocythere* Sars, 1865.
73. (*a*) „ *Monoceratina* Roth, 1928.
74. (*t*) „ *Luvula* Coryell & Fields, 1937.
75. (*h*) „ *Neomonoceratina*, N. Gen.

Subfamily 5. Cytherurinae Müller, 1894.

76. (*h*) Genus: *Cytherura* Sars, 1865.
77. (*h*) „ *Eucytherura* Müller, 1894.

Subfamily 6. Xestoleberinae Sars, 1926.

78. (*t*) Genus: *Xestoleberis* Sars, 1865.

Subfamily 7. Paradoxostominae Müller, 1894.

79. (*t*) Genus: *Pellucistoma* Coryell & Fields, 1937.
80. (*a*) „ *Paradoxostoma* Fischer, 1855.

III. The patterns.

Four kinds of hinge-systems can be distinguished:

1. **Adont** — without teeth, generally a groove in the outer margin of the larger valve; the outer margin of the smaller countervalve fits into this groove.
2. **The Archycythereis hingement** — the whole group of the Crustacea throws off their carapace several times in immature stages. Each stage is larger than the foregoing, so giving room for the growing Crustacean body. The carapace ornamentations of these immature stages show great differences in comparison with the adult stages. Moreover, the hingement, which is heterodont in the adult, is taxodont in the immature form. The Archycythereis stages of the Taxodont group are also Taxodont, but less pronounced. Howe & Law established the genus *Archycythereis* for these forms; this name has no real generic value. We are now, however, able to name the immature stages. In the past several genera were established, which afterwards appeared to belong to these Archycythereis-stages. For a detailed description of the hingement of this genus, vide nr. 39 of the Taxodont group.
3. **Taxodont** — crenulated areas at or near the cardinal angles in one valve, corresponding with sockets in the other valve. These terminal dentitions (sockets) are connected by a crenulate groove (bar).
4. **Heterodont** — heavy teeth, smooth or serrate, occur in one or both valves, often with a carved ridge or groove between them.

From the above mentioned list it appears, that the greater part (2/3) of the Ostracods are hinge-bearers. In examining Ostracods, the hinge pattern may already supply sufficient information for generic classification. In case of adontism, the general outline and the ornamentation, the scar and if present, the marginal area, are to be used as characteristics in classification. For this group reference is made to VAN DEN BOLD's paper. My observations on this subject, together with data from the wide-spread literature are compiled in the following pages.

THE TAXODONT GROUP.

15. **Genus: Bairdoppilata Coryell, Sample & Jennings, 1935.**
Pl. I, Fig. 1.
The left valve hingement of these small, bairdia-shaped Ostracoda consists of a groove in the dorsal margin; above this groove a ridge. This groove-ridge system disappears before the middle of the posterior and anterior slope is reached. Further downward, dorsally from the angulations at the ends of the valve and within the overlap margin, there are short series of transverse teeth and sockets supported by the internal marginal platform.

16. **Genus: Triebelina Van den Bold, 1946.**
Pl. I, Fig. 2.
Hingement of the right valve with two terminal smooth teeth truncated into a separating bar; the central portion of this bar depressed, separated from the dorsal margin by a furrow. Left valve hinge, obscured by the overlying dorsal margin, consisting of terminal sockets connected by a shallow depression below these sockets; below the depressed area there is a bar, most prominent in its central part.

18. **Genus: Cythere O. F. Müller, 1785.**
Pl. I, Fig. 3.
Right valve hingement consists of two terminal crenulate dental areas with a groove between them. These elements are not situated on a straight line, while the teeth are situated below this line. The groove is pitted and deepest in its central part. The terminal teeth are rather strong, giving them a heterodont appearance. Left valve hinge exactly the complement of the right.

19. **Genus: Cytheridea Bosquet, 1852.**
According to Van den Bold, 1946, the genera, established by Stephenson a.o., have been brought back to the rank of subgenus, as the hinges are slightly different. However, this difference cannot be overlooked and I will follow Stephensons suggestion, giving them their former generic place.

20. **Genus: Haplocytheridea Stephenson, 1936.**
Pl. I, Fig. 4.
The right valve hingement consists of two elongate dental

areas, each of which is divided into several cusps. Between these terminal dentitions, along the dorsal margin and separated from it by a faintly incised line, lies a ridge of equidimensional minute crenulations. The left valve hingement is the complement of the right.

21. **Genus: Cytheridea Stephenson, 1936.**
Pl. I, Fig. 5.
The hinge of the right valve consists of four elements i.e. an anterior cusped tooth, running from the outer to the inner edge and most prominent at the dorsal edge. The posterior tooth is likewise built and more prominent at the inner edge; between these two terminal teeth lies a serrate groove consisting of two parts, an anterior and a posterior part, separated from each other by a diamond-shaped notch. The overhanging dorsal margin often obscures the hinge system. The left valve hinge is exactly the complement of the right.

22. **Genus: Clithrocytheridea Stephenson, 1936.**
Pl. I, Fig. 6.
The hinge of the right valve contains two truncated, notched dental areas, separated from each other by a short crenulate groove. The intersocket ridge of the left valve is rather prominent.

23. **Genus: Leptocytheridea Stephenson, 1937.**
Pl. I, Fig. 7.
Hinge of the right valve with elongate terminal dentitions, notched, forming 8—10 small cusps. A slender wellintrenched crenulate groove connects these dental areas and is most prominent immediately behind the anterior tooth and less pronounced as it approaches the posterior dentition. The hinge structure is poorly developed. Left valve hinge pattern just the complement of the right.

24. **Genus: Anomocytheridea Stephenson, 1938.**
Pl. I, Fig. 8.
The right valve hinge starts with an anterior, finely-serrated tooth, a postjacent elongate socket, which may be faintly crenulate. Posteriorly from this socket a tooth is present, which is inconspicious in the beginning and more pronounced and serrate at the end, although there are less cusps than in the anterior tooth.

25. **Genus: Dolocytheridea Triebel, 1938.**
Pl. I, Fig. 9.
Hingement of the right valve consists of two terminal teeth with a smooth ridge between them. The posterior tooth may be serrate, or both teeth are smooth.

26. **Genus: Perissocytheridea Stephenson, 1938.**
Pl. I, Fig. 10.
The hinge structure difinitely shows affinities to that of the genus *Clithrocytheridea* (22). The bar connecting the terminal sockets in the left valve is more elongate and higher in the anterior part. This bar is separated from the dorsal margin by a faintly incised line, which fits the dorsal margin of the smaller right valve.

27. **Genus: Hemicytheridea, N. Gen.**
Pl. II, Fig. 1.
Hingement in the right valve with an anterior socket, merging into a serrate groove and a posterior tooth. The anterior socket is divided into 3—4 smaller compartments separated from each other by 2—3 vertical ridges. These ridges are drawn out ventrally into 2—3 tooth-like cusps, fitting into a shallow groove below the anterior tooth in the left valve. The groove is deepest in the anterior part. The posterior tooth is rather heavy, more or less triangular and serrate. The left valve hingement is exactly the complement.

28. **Genus: Paracyprideis Klie, 1929.**
Pl. II, Fig. 5.
Hingement in the right valve with terminal, smooth, narrow, long teeth with an intermediate groove. In the left valve terminal sockets and a smooth bar.

34. **Genus: Ruttenella v. d. Bold, 1946.**
Pl. II, Fig. 2.
Hinge in the left valve consists of an anterior crenulate socket, followed by a raised and denticulate part of the dorsal margin. At the posterior cardinal angle the margin curves upward to form the dorsal wall of a socket, fitting the posterior tooth of the right valve. In the right valve an elongate, crenulate dental area is present, containing a postjacent notched groove. A strong pointed tooth is found at the posterior end of the groove.

35. **Genus: Microcythere Müller, 1894.**
Pl. II, Fig. 4.
The hinge pattern in these small Ostracoda is difficult to observe. The valves are rather variable in size, sometimes the left overlapping the right or the reverse. The hinge teeth are always situated on the smallest valve. Two hinge systems were drawn by Müller (1894). To my opinion we may divide this genus into two subgenera:
1. with terminal, smooth, flat teeth in the right valve.
2. with terminal small teeth and an intermediate smooth to serrate bar in the left valve.
Dorsal margin arched in both groups. The teeth are not strong enough to place this genus among the heterodonts.

36. **Genus: Paracytheridea Müller, 1894.**
Pl. II, Fig. 3.
Hinge in the right valve with a faintly developed posterior tooth and crenulate edge, extending over the entire length of the hinge margin. The anterior part of this margin is taxodontly notched. In the left valve: posterior socket, crenulate edge and taxodontly notched anterior part. The teeth of this tooth system fit exactly between those of the opposite valve.

39. **Genus: Archycythereis Howe & Law, 1936.**
Pl. II, Fig. 7.
Hinge in the right valve with terminal crenulations and a crenulate groove between them. In the left valve terminal crenulate sockets open towards the interior of the valve with a finely notched bar connecting them. The whole hingement is weak in appearance. The following "moult genera" have been established a.o.:
Cytheridella Howe.
Navecythere Coryell & Fields.
Buntonia Howe.
Favella Coryell & Fields.
Paracythereis Jennings.

49. **Genus: Protocythere Triebel, 1938.**
Pl. II, Fig. 6.
Hingement in the right valve with terminal denticulate areas, separated by a strongly serrate groove. The left valve hingement is just the complement. This genus differs from

Cythere Müller 1785 and *Clithrocytheridea* Stephenson 1936 by the outline of the terminal teeth, being more robust and broader in *Protocythere* (other differences: marginal area and general outline).

66. **Subgenus: Cytheropteron Alexander, 1933.**
Pl. III, Fig. 1.
Hingement in the right valve with terminal ridge-like teeth, each of which shows several small, round cusps; between these denticulations a shallow, notched, furrow. The teeth are more or less equal in size and placed on the anterior and posterior slope of the valve; the groove is slightly arched. These cusps are not ridge-like as in *Cytheridea* and set at right angles to the long axis of the tooth, but small and round. The left valve is just the complement of the right valve, with terminal sockets and a crenulate bar between them. This bar and furrow complex is very poorly developed in some Cretaceous species, but becoming more pronounced towards the Upper-Tertiary.

67. **Subgenus: Eocytheropteron Alexander, 1933.**
Pl. III, Fig. 2.
These wingless Ostracoda have a rather primitive hinge pattern, with terminal ridge-like elevations; each ridge bearing a series of small round teeth in the right valve and corresponding notched sockets in the left valve. There is no bar connecting these sockets as in *Cytheropteron*, but the hinge margin is finely denticulate in both valves. The teeth of one valve fit the sockets between the teeth of the other valve. The median teeth are but slightly smaller than those of the two terminal series of the right valve.

68. **Genus: Kangarina Coryell & Fields, 1937.**
Pl. II, Fig. 8.
The hingement of the left valve consists of a median crenulated bar, heavier crenulated towards the ends, with terminal long, narrow, obliquely arranged, serrate teeth. Above and below the bar some room is spared to receive the heavy dorsal and ventral walls of the groove in the opposite valve, however, without forming distinct grooves. The right valve with terminal sockets and intermediate groove. The dorsal wall of the groove is formed into a heavy bar. The ventral wall is much narrower and bears

terminal crenulations, fitting the terminal crenulations of the bar in the left valve.

69. **Genus: Orthonotacythere Alexander, 1933.**
Pl. III, Fig. 4.
The hinge in the right valve shows terminal dentitions with a notched furrow between them. The terminal dentitions are stronger built than in *Cytheropteron* and are situated on a straight line with the groove. The left valve hingement is the complement of the right-valve-hinge.

74. **Genus: Luvula Coryell & Fields, 1937.**
Pl. III, Fig. 3.
Hingement in the left valve with terminal blade-like teeth connected by a narrow bar. Right valve hinge pattern with terminal sockets and a connecting, narrow groove. The sockets are formed by extensions of the inner surface shell below the cardinal angles. The teeth are not strong enough to place this genus in the Heterodont-group. The genus *Macrocytherina* has the same hingement; it is somewhat stronger developed. There is no reason to maintain this. There may be some synonymy with *Cytherura*.

78. **Genus: Xestoleberis Sars, 1865.**
Pl. II, Fig. 9.
Hinge in the right valve consists of a finely denticulate anterior ridge, occupying nearly half the length of the hinge margin, a posterior tooth with numerous small cusps; between these two terminal denticulations a narrow, shallow crenulate groove. The hingement of the larger left valve is exactly the complement of the right valve hinge pattern, somewhat obscured by the overhanging dorsal margin.

79. **Genus: Pellucistoma Coryell & Fields, 1937.**
Pl. II, Fig. 10.
Left valve hingement with an anterior long, blade-like somewhat triangular tooth. From this tooth a long, narrow serrate bar extends backward and terminates at the posterior cardinal angle; above this bar and parrallel to it a narrow line-shaped groove, fitting the narrow dorsal edge of the right valve. Right valve with an anterior socket and crenulated groove. The ventral wall of the socket is formed

by a toothlike structure projecting from the inner surface just below the anterior cardinal angle, leaving the cavity open at the anterior and posterior end; the posterior cardinal angle of the right valve is somewhat angular by the development of a sharp, small hook on the dorsal margin; this hook fits the posterior end of the bar of the left valve.

THE HETERODONT GROUP.

33. **Genus: Apatocythere Triebel, 1941.**
Pl. III, fig. 5.
Hinge in the right valve with terminal smooth teeth. The anterior tooth much larger than the posterior. Between these teeth a strong, smooth bar. The larger left valve has no teeth; only sockets and groove are present. Above this groove lies a furrow-like depression, fitting the dorsal edge of the right valve.

37. **Genus: Leptocythere Sars, 1925.**
Pl. III, Fig. 6.
Hinge in the right valve with terminal teeth and intermediate bar. Behind the anterior tooth a small socket merging into a serrate narrow furrow. Socket and groove are situated below the bar. Left valve hingement the complement of the right.

40. **Genus: Cytheromorpha Hirschmann, 1909.**
Pl. III, Fig. 7.
Hinge in the right valve with an anterior socket and postjacent tooth. Behind this tooth again a small socket. The sockets merge into each other above the tooth; from here a groove runs backward curving round the posterior denticulation, consisting of two teeth and an intermediate small socket (enveloping tooth). The left valve hingement is exactly the complement.

41. **Genus: Cytheretta Müller, 1894.**
Pl. III, Fig. 8.
Right valve hingement consists of a strong anterior tooth, which is highest at the anterior side. The postjacent socket is deeper anteriorly and becomes shallow posteriorly, merging into a long serrate groove. The posterior tooth is ovate, elongate, with the highest part at the posterior side. Left valve hinge-margin is the complement of the right, but the bar between the terminal sockets is strongly built, with tooth-shaped ends.

42. **Genus: Atjehella, N. Gen.**
Pl. III, Fig. 10.
Hingement in the right valve with terminal teeth and a groove between them. This groove, shallow in the anterior

part, becomes deeper and slightly serrate on the posterior side, merging into a small socket just in front of the strong, outwardly directed, smooth posterior tooth. The anterior tooth is elongate, carved and triangular in dorsal view. The left valve hinge is the complement of the right, sockets open towards the interior. Besides these hinge elements the left valve is provided with an "anti-slip" tooth just below the anterior socket.

43. **Genus: Paracytheretta Triebel, 1941.**
Pl. III, Fig. 9.
Hinge of the right valve with terminal teeth. The anterior tooth is smooth, except for a sharp ridge on its posterior part. On the posterior side there is a large socket, merging into a serrate groove. This groove becomes very narrow towards the posterior. The posterior tooth is large and rectangular. The left valve-hingement is exactly the opposite of the right valve hinge pattern. There is some similarity with *Cythereis,* although differences may be observed, as the S-shape of the anterior tooth and the sockets which are open towards the interior.

44. **Genus: Hemicythere Sars, 1926.**
Pl. IV, Fig. 1.
Hinge in the right valve with a knob-shaped anterior tooth. The broad, postjacent socket merges into a narrow groove, terminated by an ovate, outwardly directed posterior tooth. The general hinge line is curved and situated more in the posterior part of the carapace. Dorsal and ventral margins converge towards the posterior end though not as strong as in *Pyricythereis.* Left valve hingement is the complement of the right; sockets mostly open towards the interior.

45. **Genus: Brachycythere Alexander, 1933.**
Pl. IV, Fig. 2.
Hinge in the right valve consists of a strong knob-shaped anterior tooth and postjacent socket, a slight furrow extending over the entire length of the hinge margin and a compressed, finely serrate, posterior tooth, triangular in side view. In the left valve a deep anterior socket is found and immediately behind it a strong tooth. Posteriorly from this tooth there is a strong bar, free from the dorsal margin except at its posterior end; here it joins the dorsal

margin just in front of a long narrow socket. Above this bar a shallow groove is visible, fitting the dorsal edge of the lower right valve.

46. **Genus: Alatacythere Murray and Hussey, 1942.**
Hinge in the right valve consists of an anterior S-shaped tooth and a postjacent deep socket. From this socket a long straight, finely crenulate, groove extends backward, at the posterior side ending in an elongate, very strong, crenulate tooth. Left valve hinge-pattern with terminal sockets. The anterior one is S-shaped. Behind this anterior socket a tooth; a rather strong serrate bar extends backward.
Pl. IV, Fig. 3.

47 (48) **Genus: Cythereis Jones, 1849.**
Pl. IV, Fig. 4.
Hinge structure in the right valve consists of a knob-shaped anterior tooth, postjacent a deep socket merging into a groove, at the posterior side ending in a knob-shaped tooth, which is usually smaller than the anterior one. In the left valve an anterior socket, a postjacent strongly built tooth and a posterior socket. Between the tooth and the posterior socket the dorsal margin forms an elevated bar, which fits into the right valve groove. The posterior tooth in the right valve is sometimes more or less compressed and serrate. Sometimes the left valve bar is also serrate. In lower-cretaceous forms the anterior tooth of the right valve is slightly carved. However, this characteristic disappears in the upper-cretaceous and eocene types. The dorsal- and ventral margins are parallel.

48. **Subgenus: Pterigocythereis Blake, 1933.**
Pl. IV, Fig. 4.
An alae-bearing *Cythereis* with the same hinge-pattern.

50. **Genus: Platycythereis Triebel, 1941.**
Pl. IV, Fig. 5.
This genus differs from *Cythereis* in the outline of the terminal teeth in the right valve; these teeth cannot be distinguished from *Isocythereis* (51).

51. **Genus: Isocythereis Triebel, 1941.**
Pl. IV, Fig. 5.
As already mentioned in the genus *Cythereis* (47), the

lower-cretaceous forms have a more or less serrate anterior tooth. Some of these lower-cretaceous forms were called *Isocythereis* and *Platycythereis* by Triebel. Hingement in the right valve of *Isocythereis* consists of a strong anterior tooth, which is subdivided into a high posterior- and a low anterior part. The tooth at the posterior end of the hinge-line is compressed and serrate. Other differences with *Cythereis* are the broad marginal area and the more complicate scar pattern.

52. **Genus: Anticythereis Van den Bold, 1946.**
Pl. IV, Fig. 4.
Hingement as in *Cythereis*. The right valve, however, is larger than the left one.

53. **Genus: Pyricythereis Howe, 1936.**
Pl. IV, Fig. 6.
Hingement much alike *Cythereis*, but the groove, parallel to the dorsal margin in the right valve and also the hinge bar in the left valve, are distinctly crenulate. The dorsal- and ventral margins strongly converge towards the posterior end.

54. **Genus: Leguminocythereis Howe, 1936.**
Pl. IV, Fig. 7.
Hingement as in *Cythereis*, but the overlap of the left valve at the posterior angulation is well-developed, forming a distinct thickening at the junction of the dorsal and posterior margins.

55. **Genus: Basslerites Howe, 1937.**
Pl. IV, Fig. 8.
Hinge in the right valve consists of a high, strong, anterior tooth below a depression in the dorsal margin. A postjacent deep socket merges into a groove, with more or less pronounced ridges on the dorsal and ventral side. At the posterior end this groove forms a high, outwardly projecting tooth. Hinge of the left valve with a deep anterior socket. The anterior end of this socket is open towards the interior. The narrow high tooth and bar of this left valve-hingement are separated from the dorsal and ventral edge of the hinge margin by parallel grooves and terminated by a deep, ovate socket at the posterior end.

56. **Genus: Campylocythere Edwards, 1944.**
Pl. IV, Fig. 9.
Hingement of right valve with a narrow anterior tooth, triangular in side view and highest at the anterior side; postjacent an elongate socket, deepest at the posterior side. This socket is open towards the interior of the valve. At the posterior side the socket merges into a finely serrate groove on the edge of the infolded dorsal margin, terminated posteriorly by an ovate, outwardly projecting tooth, which is highest in the posterior part. Left valve hingement beginning with an anterior overlap; below this overlap a socket, deepest at the anterior side, open towards the interior. On the infolded dorsal margin there is a postjacent crenulate bar, whose anterior end is sligtly raised, forming a low narrow tooth. The posterior socket is partially open towards the interior.

57. **Genus: Acuticythereis Edwards, 1944.**
Pl. IV, Fig. 10.
The hinge-pattern shows much resemblance with *Campylocythere* (56). The anterior tooth in the right valve is more bluntly pointed and moreover, curves under the postjacent socket. The left valve hingement is the complement.

58. **Genus: Caudites Coryell & Fields, 1937.**
Pl. V, Fig. 1.
Hinge in the right valve with a high, rounded anterior tooth and a shallow, postjacent, elongate socket. This socket merges into a narrow, slightly curved, groove, ending at the posterior side in an elongate, low tooth. Socket and groove are finely serrate. The left valve hingement is the complement.

59. **Paijenborchella, N. Gen.**
Pl. V, Fig. 2.
Hingement in the right valve with terminal teeth, a very strong and knob-like anterior- and a small, rather narrow posterior one. Behind the anterior tooth there is a large socket, situated on and excavated into the dorsal end of the median sulcus. Between this socket and the posterior tooth there is a coarsely serrated groove. The left valve hinge is the complement of the right and is moreover provided with an "Ausweichfurche", which is broadly incised

in the overhanging dorsal edge. In comparison with the size of the valve, the hingement is rather large.

60. **Tanella, N. Gen.**
Pl. V, Fig. 3.
Hingement in the right valve consists of a very thin hinge-margin with two terminal teeth. The anterior tooth is elongate, rather low in dorsal view. The posterior tooth is blunt, rectangular and outwardly directed. Left valve hinge with a large posterior socket, merging into a line-shaped groove. This groove becomes broader and deeper anteriorly, to fit the anterior tooth of the right valve. As this socket is entirely open towards the interior of the valve, a more or less elongate, triangular tooth (anti-slip tooth) is formed below this socket on the interior side of the valve, preventing the anterior tooth from slipping out of its socket.

61. **Genus: Cativella Coryell & Fields, 1937.**
Pl. V, Fig. 6.
Hingement shows some similarity with *Cythereis*. The anterior tooth in the right valve, however, consists of two parts of equal height, separated from each other by a shallow depression. The posterior tooth is elongate and serrate. The left valve hingement is the complement. The genus *Navecythere* Coryell & Fields 1937, is a moult-form of this genus.

62. **Genus: Thalmannia Le Roy, 1939.**
Pl. V, Fig. 4.
Hinge in the right valve with terminal, straight to slightly curved, low, smooth to faintly cusped teeth, with an intermediate crenulated groove. The left valve hingement shows terminal, rather shallow sockets with an intermediate cusped bar. The anterior part of this bar is more pronounced than the posterior part.

63. **Javanella, N. Gen.**
Pl. X, Fig. 6.
Right valve hingement with a narrow, finely serrated groove along the entire dorsal margin, somewhat wider near the antero-cardinal angle. Below this area, built on the interior of the valve, there is a narrow, elongate tooth (anti-slip tooth). Left valve without teeth, the dorsal edge is finely notched, fitting the right valve groove.

64. **Genus: Loxoconcha Sars, 1865.**
Pl. V, Fig. 7.
Hingement in the right valve terminal horseshoe-shaped teeth. The anterior tooth is open at the dorsal side; the posterior part is larger than the anterior. The posterior tooth is open at the ventral side. The socket in the centre of the anterior tooth merges into a shallow groove, parallel to the dorsal margin; at the posterior end it merges with a curve around the anterior part of the posterior tooth into a socket, situated in the centre of the posterior horseshoe. The left valve hinge pattern is the complement. The groove and ridge are distinctly crenulate in recent and later-tertiary species, smooth in cretaceous forms. The terminal teeth are also much less developed in early-tertiary species. The strength of the hinge structure tends to increase during the Tertiary.

75. **Genus: Neomonoceratina, N. Gen.**
Pl. V, Fig. 5.
Hingement in the right valve consists of two rather strong terminal teeth. Immediately behind and somewhat below the anterior one there is a large socket open towards the interior of the valve. A serrate groove projects forward from the anterior side of the posterior tooth, merging into the anterior socket. Left valve hingement shows a large anterior socket, a postjacent strong tooth and a posterior socket. From the dorsal side of the tooth a finely crenulated bar runs backward into the dorsal wall of the posterior socket. Both sockets are open towards the interior of the valve.

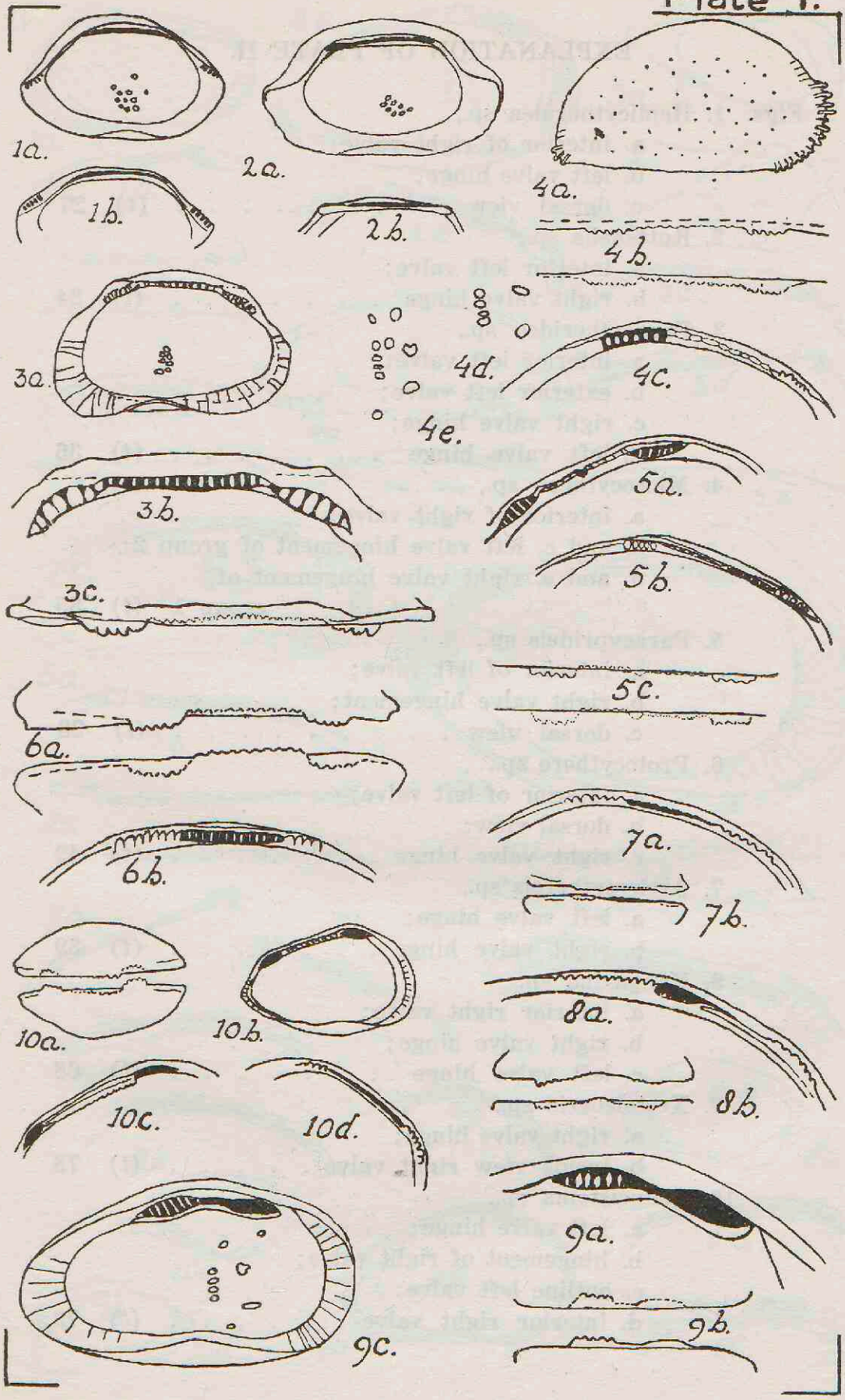
76. **Genus: Cytherura Sars, 1865.**
Pl. V, Fig. 8.
Hingement of these small Ostracoda with terminal teeth in the right valve; posteriorly to the anterior tooth and anteriorly to the posterior tooth there are sockets, connected by a groove. Left valve is the complement. The immature specimens are sometimes adont.

77. **Genus: Eucytherura Müller, 1894.**
Pl. V, Fig. 9.
Hinge in the right valve with terminal flat, elongated teeth and a connecting narrow groove, which may be finely crenulate. Left valve is the complement.

EXPLANATION OF PLATE I.

Figs. 1. Bairdoppilata sp.,
a. interior of left valve;
b. right valve hingement . . . . . (*t*) 15
2. Triebelina sp.,
a. interior of left valve;
b. right valve hingement . . . . . (*t*) 16
3. Cythere sp.,
a. interior of right valve;
b. right valve hingement;
c. dorsal view of right valve hinge . . (*t*) 18
4. Haplocytheridea sp.,
a. general outline of right valve;
b. dorsal view of the hinge;
c. right valve hingement;
d. and e. scars in the Cytheridea group (*t*) 20
5. Cytheridea sp.,
a. left valve hingement;
b. right valve hingement;
c. dorsal view of the hingement . . . (*t*) 21
6. Clithrocytheridea sp.,
a. dorsal view of the hingement;
b. right valve hinge . . . . . (*t*) 22
7. Leptocytheridea sp.,
a. right valve hingement;
b. dorsal view . . . . . (*t*) 23
8. Anomocytheridea sp.,
a. right valve hingement;
b. dorsal view . . . . . (*t*) 24
9. Dolocytheridea sp.,
a. right valve hinge;
b. dorsal view;
c. interior of right valve . . . . . (*t*) 25
10. Perissocytheridea sp.,
a. dorsal view;
b. interior of left valve;
c. left valve hingement;
d. right valve hingement . . . . . (*t*) 26

Plate I.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EXPLANATION OF PLATE II.

Figs. 1. Hemicytheridea sp.,
a. interior of right valve;
b. left valve hinge;
c. dorsal view . . . . . (*t*) 27

2. Ruttenella sp.,
a. interior left valve;
b. right valve hinge . . . . . (*t*) 34

3. Paracytheridea sp.,
a. interior left valve;
b. exterior left valve;
c. right valve hinge;
d. left valve hinge . . . . . (*t*) 36

4. Microcythere sp.,
a. interior of right valve;
b. and c. left valve hingement of group 2;
d. and e. right valve hingement of group 1 (*t*) 35

5. Paracyprideis sp.,
a. interior of left valve;
b. right valve hingement;
c. dorsal view . . . . . (*t*) 28

6. Protocythere sp.,
a. interior of left valve;
b. dorsal view;
c. right valve hinge . . . . . (*t*) 49

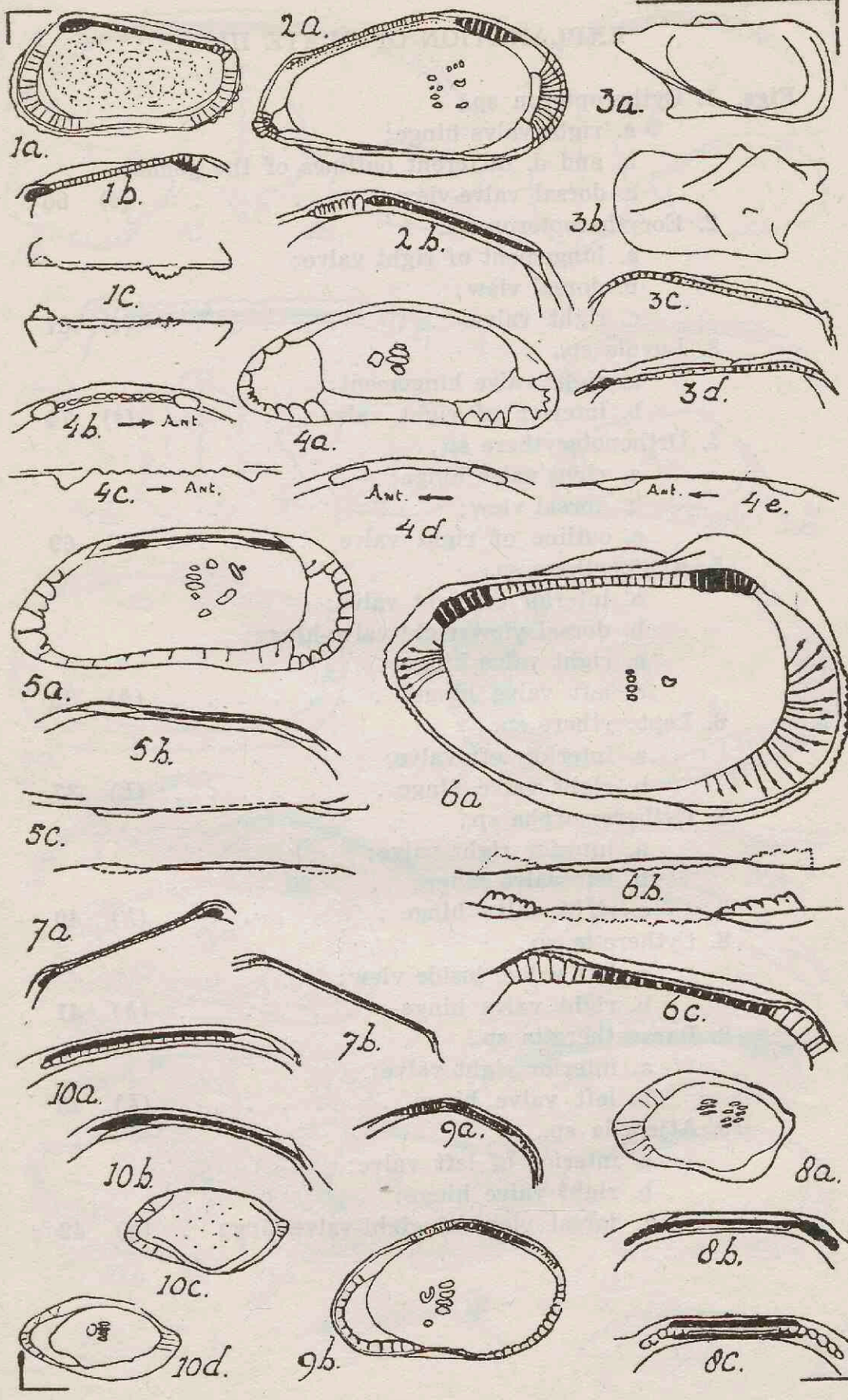
7. Archycythereis sp.,
a. left valve hinge;
b. right valve hinge . . . . . (*t*) 39

8. Kangarina sp.,
a. interior right valve;
b. right valve hinge;
c. left valve hinge . . . . . (*t*) 68

9. Xestoleberis sp.,
a. right valve hinge;
b. inside view right valve . . . . . (*t*) 78

10. Pellucistoma sp.,
a. left valve hinge;
b. hingement of right valve;
c. outline left valve;
d. interior right valve . . . . . (*t*) 79

Plate II.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EXPLANATION OF PLATE III.

Figs. 1. Cytheropteron sp.,
a. right valve hinge;
b. and d. different outlines of the genus;
c. dorsal valve-view . . . . . (*t*) 66

2. Eocytheropteron sp.,
a. hingement of right valve;
b. dorsal view;
c. right valve . . . . . (*t*) 67

3. Luvula sp.,
a. right valve hingement;
b. interior of right valve . . . . . (*t*) 74

4. Orthonotacythere sp.,
a. right valve hinge;
b. dorsal view;
c. outline of right valve . . . . . (*t*) 69

5. Apatocythere sp.,
a. interior of right valve;
b. dorsal view right-valve-hinge;
c. right valve hinge;
d. left valve hinge . . . . . (*h*) 33

6. Leptocythere sp.,
a. interior left valve;
b. right valve hinge . . . . . (*h*) 37

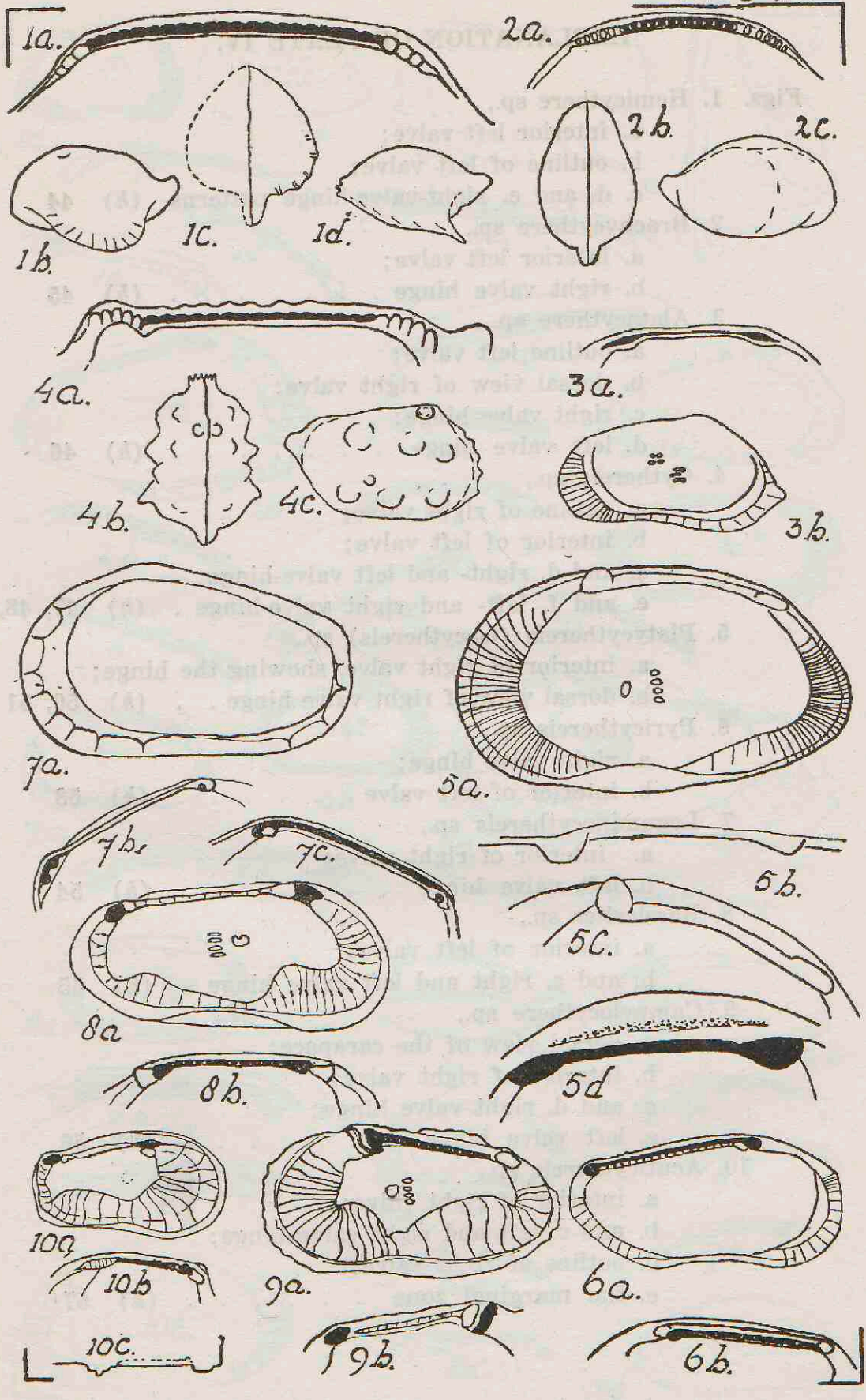
7. Cytheromorpha sp.,
a. interior right valve;
b. left valve hinge;
c. right valve hinge . . . . . (*h*) 40

8. Cytheretta sp.,
a. left valve, inside view;
b. right valve hinge . . . . . (*h*) 41

9. Paracytheretta sp.,
a. interior right valve;
b. left valve hinge . . . . . (*h*) 43

10. Atjehella sp.,
a. interior of left valve;
b. right valve hinge;
c. dorsal view of right-valve-hinge . (*h*) 42

Plate III.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EXPLANATION OF PLATE IV.

Figs. 1. Hemicythere sp.,
a. interior left valve;
b. outline of left valve;
c. d. and e. right-valve-hinge patterns (*h*) 44

2. Brachycythere sp.,
a. interior left valve;
b. right valve hinge . . . . . (*h*) 45

3. Alatacythere sp.,
a. outline left valve;
b. dorsal view of right valve;
c. right valve hinge;
d. left valve hinge . . . . . (*h*) 46

4. Cythereis sp.,
a. outline of right valve;
b. interior of left valve;
c. and d. right- and left valve-hinge;
e. and f. left- and right valve-hinge . (*h*) 47, 48, 52

5. Platycythereis (isocythereis) sp.,
a. interior of right valve, showing the hinge;
b. dorsal view of right valve hinge . . (*h*) 50, 51

6. Pyricythereis sp.,
a. right valve hinge;
b. interior of left valve . . . . . (*h*) 53

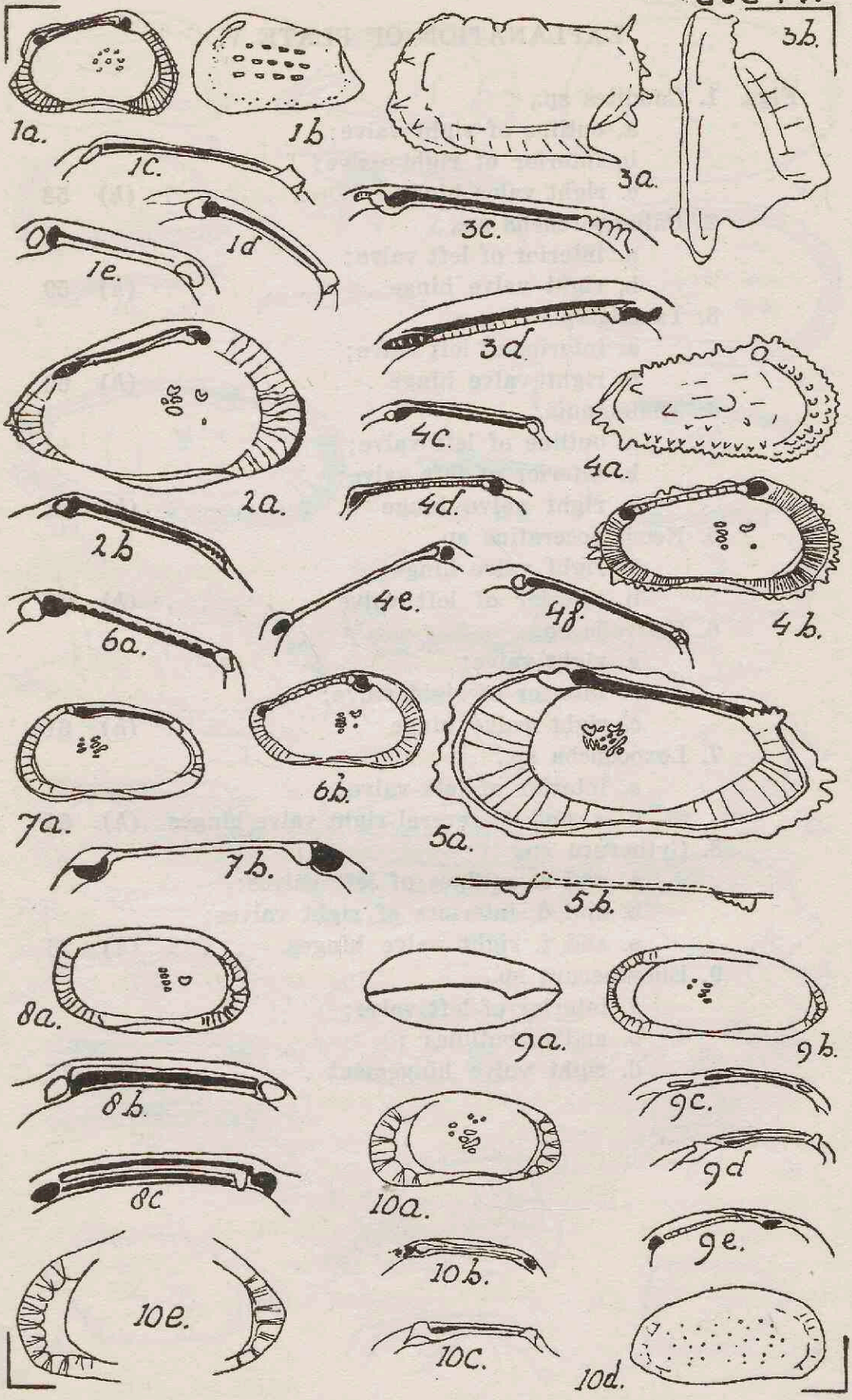
7. Leguminocythereis sp.,
a. interior of right valve;
b. left valve hinge . . . . . (*h*) 54

8. Basslerites sp.,
a. interior of left valve;
b. and c. right and left valve hinge . (*h*) 55

9. Campylocythere sp.,
a. dorsal view of the carapace;
b. interior of right valve;
c. and d. right valve hinge;
e. left valve hinge . . . . . (*h*) 56

10. Acuticythereis sp.,
a. interior of right valve;
b. and c. left and right valve hinge;
d. outline of right valve;
e. the marginal zone . . . . . (*h*) 57

Plate IV.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EXPLANATION OF PLATE V.

Figs. 1. Caudites sp.,
a. outline of right valve;
b. interior of right valve;
c. right valve hinge . . . . . (*h*) 58

2. Paijenborchella sp.,
a. interior of left valve;
b. right valve hinge . . . . . (*h*) 59

3. Tanella sp.,
a. interior of left valve;
b. right valve hinge . . . . . (*h*) 60

4. Thalmannia.,
a. outline of left valve;
b. interior of left valve;
c. right valve hinge . . . . . (*h*) 62

5. Neomonoceratina sp.,
a. right valve hinge;
b. interior of left valve . . . . . (*h*) 75

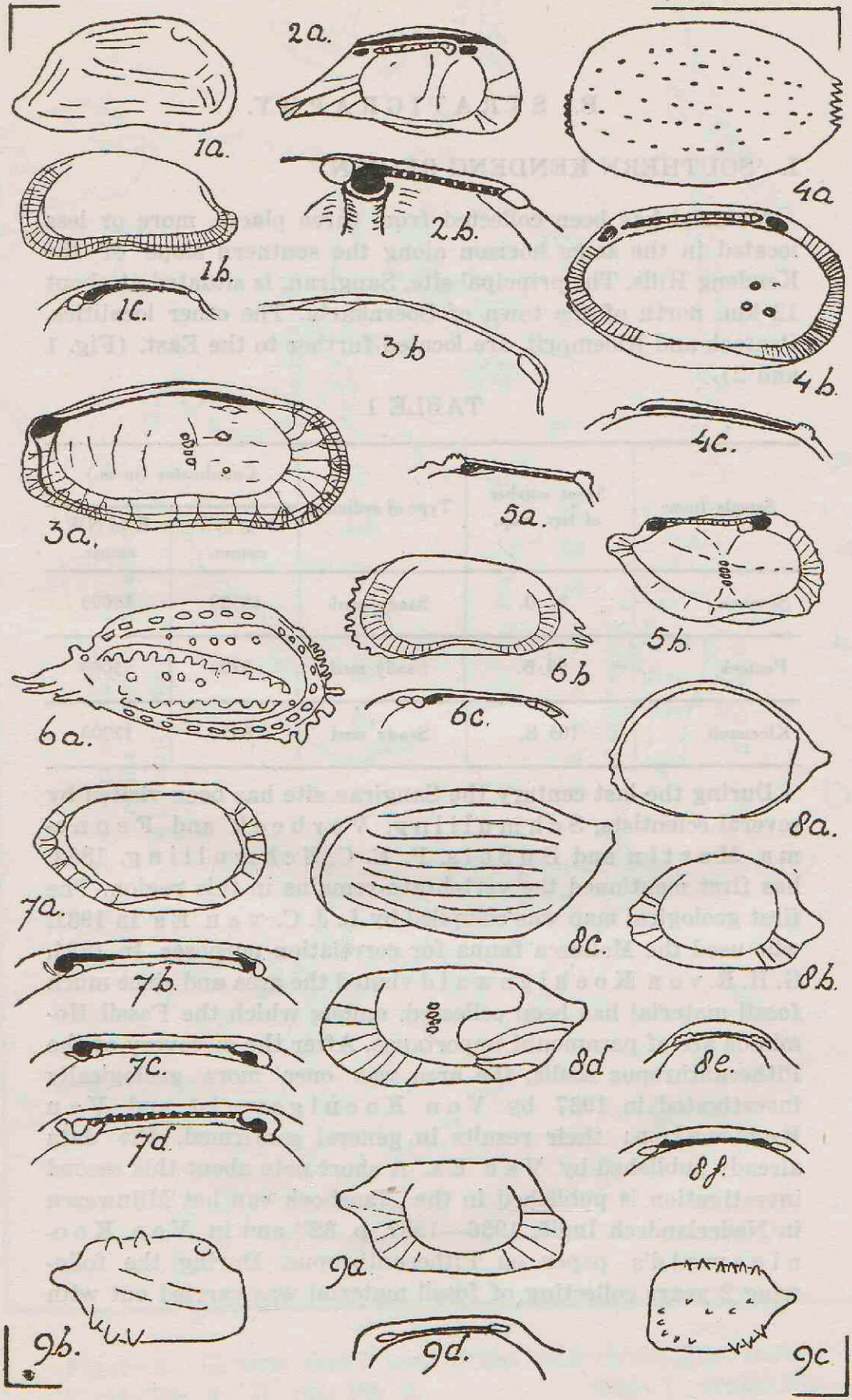
6. Cativella sp.,
a. right valve;
b. interior of right valve;
c. right valve hinge . . . . . (*h*) 61

7. Loxoconcha sp.,
a. interior of left valve;
b., c. and d., several right valve hinges (*h*) 64

8. Cytherura sp.,
a. and c. outlines of left valves;
b. and d. interiors of right valves;
e. and f. right valve hinges . . . (*h*) 76

9. Eucytherura sp.,
a. interior of left valve;
b. and c. outlines ;
d. right valve hingement . . . . . (*h*) 77

Plate V.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B. STRATIGRAPHY.

I. SOUTHERN KENDENG REGION.

Material has been collected from three places, more or less located in the same horizon along the southern slope of the Kendeng Hills. The principal site, Sangiran, is situated at about 12 km. north of the town of Soerakarta. The other localities, Pentoek and Kloemprit, are located further to the East. (Fig. 1 and 2).

TABLE 1

Sample from:	Sheet number of top. map.	Type of sediment	Coordinates (in m.)	
			S of NW corner.	E of NW corner.
Sangiran	81 B.	Sandy marl	16500	18000
Pentoek	93 B.	Sandy marl	3700	5000
Kloemprit	105 B.	Sandy marl	8550	17900

During the last century the Sangiran site has been visited by several scientists, Schmulling, Verbeek and Fennema, Martin and Dubois. P. E. C. Schmulling, 1864, has first mentioned the vertebrate remains in this region. The first geological map was compiled by L. J. C. van Es in 1931, who used the Mollusca fauna for correlation purposes. In 1934, G. H. R. von Koenigswald visited the area and since much fossil material has been collected, among which the Fossil Hominids are of paramount importance. After the discovery of the Pithecanthropus sculls, the area was once more geologically investigated in 1937 by Von Koenigswald and Van Bemmelen; their results in general confirmed, the data already published by Van Es. A short note about this second investigation is published in the „Jaarboek van het Mijnwezen in Nederlandsch Indië, 1936—1937, p. 32" and in Von Koenigswald's paper on Pithecanthropus. During the following 2 years collecting of fossil material was carried out with

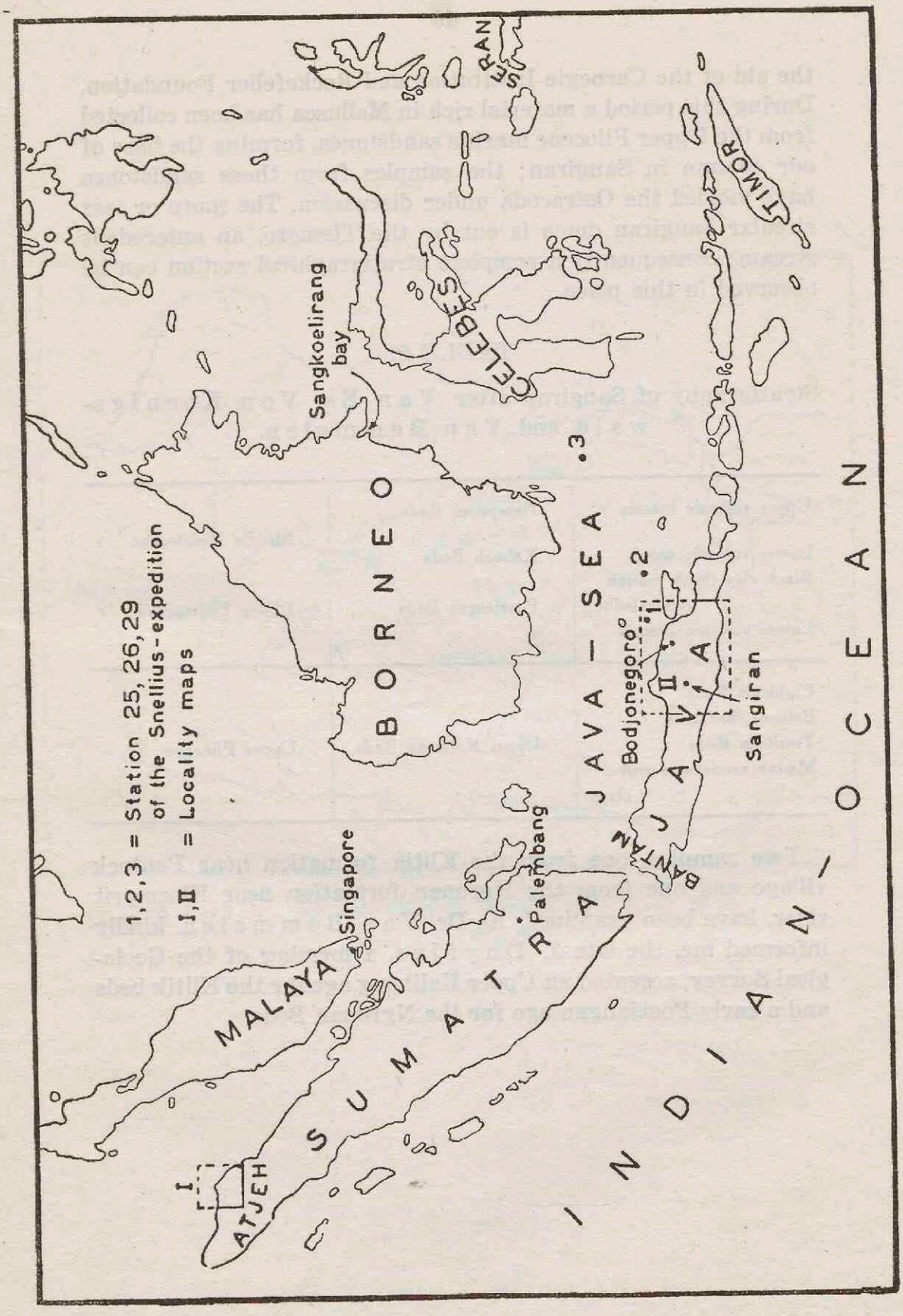

Figure 1. General sketch map of the Netherlands East Indies.
I. vide Fig. 3; II. vide Fig. 2. Scale 1 : 20.000.000

the aid of the Carnegie Institution and Rockefeller Foundation. During this period a material rich in Mollusca has been collected from the Upper Pliocene marine sandstones, forming the base of our column in Sangiran; the samples from these sandstones have yielded the Ostracoda under discussion. The more or less circular Sangiran dome is cut by the Tjemoro, an antecedent stream; consequently a complete stratigraphical section can be observed in this place.

TABLE 2.

Stratigraphy of Sangiran after Van Es, Von Koenigswald and Van Bemmelen.

Upper volcanic breccia	Notopoero Beds	Middle Pleistocene
Lower volcanic congl.	Kaboeh Beds	
Black clay (with marine intercalation)	Poetjangan Beds	Lower Pleistocene
Lower volcanic breccia		
Corbicula Beds	Upper Kalibeng Beds	Upper Pliocene
Balanus limestone		
Turritella Beds		
Marine sandstones and clays		

Two samples, one from the Klitik formation near Pentoek village and one from the Ngronan formation near Kloemprit river, have been examined. As Dr Van Bemmelen kindly informed me, the late J. Duyfjes, a member of the Geological Survey, accepted an Upper Kalibeng age for the Klitik beds and a early Poetjangan age for the Ngronan Beds.

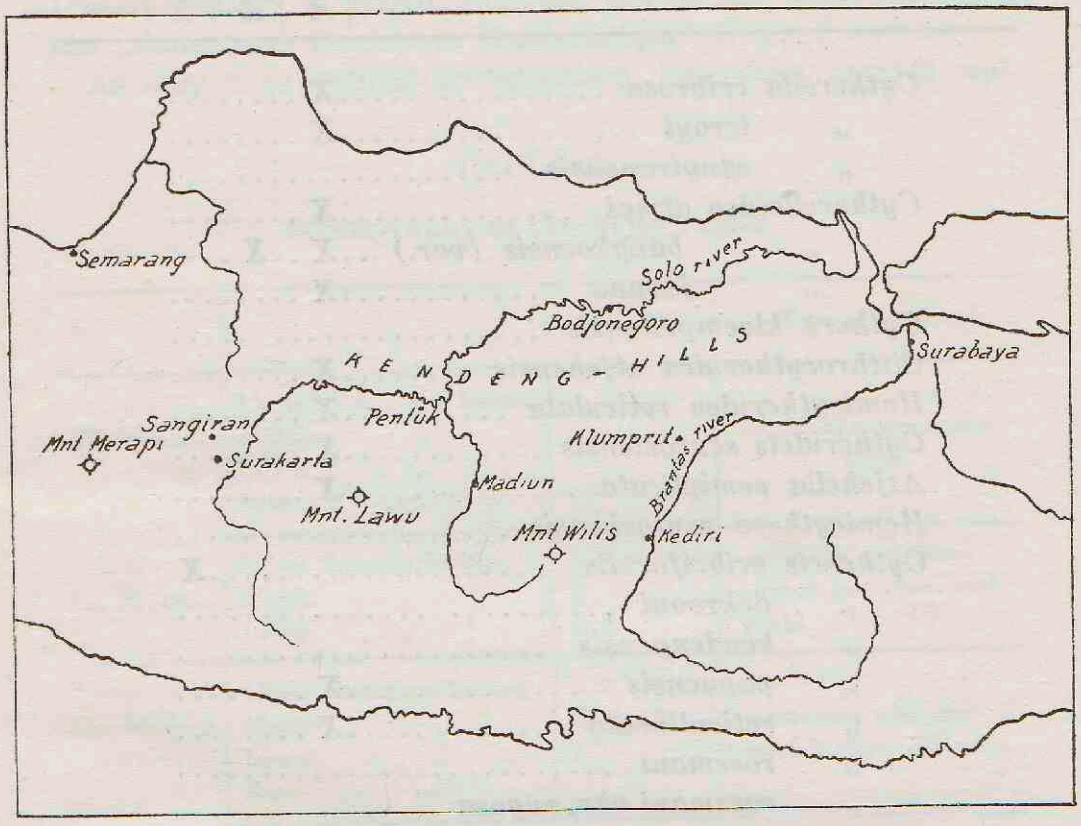

Figure 2. Sketch map of Middle- and East Java.
Scale 1 : 2.800.000.

TABLE 3.

List of Ostracods from the Kendeng region.

Kendeng	Atjeh	Bodjonegoro	Java Sea
Cytherella cribrosa	X		
„ *leroyi*	X		
„ *sangiranensis*			
Cytherelloidea atmai	X		
„ *bangkoensis (var.)*	X	X	
„ *javana*	X		
Cythere kloempritensis			
Clithrocytheridea atjehensis	X		
Hemicytheridea reticulata	X		
Cytherideis seuroelensis	X		
Atjehella semiplicata	X		
Hemicythere pentoekensis			
Cythereis cribriformis			X
„ *dekrooni*			
„ *kendengensis*			
„ *papuensis*	X		
„ *reticulineata*	X		
„ *roesmani*			
„ *roesmani var. rugosa*			
„ *scutigera*	X		X
„ *vandijki*	X		X
Caudites medialis var. javana	X		
Tanella gracilis	X		
Javanella kendengensis			
Loxoconcha pentoekensis			
„ *sinensis*			
Eocytheropteron sp. 1.			
Neomonoceratina microreticulata			
Cytherura sumatrensis	X		
Xestoleberis foveolata			X
„ *cf. variegata*			
Total species: 31	16	1	4

II. ATJEH, NORTH SUMATRA.

Through the courtesy of Professor S. G. Trooster the Geological Institute of Utrecht received material from the Upper Tertiary of Atjeh, sampled, during his fieldwork with the „Bataafsche Petroleum Maatschappij" (Figs. 1 and 3).

As only a superficial investigation has been carried out

TABLE 4.

Stratigraphy of the Atjeh region.

		Locality	Type of sediment
Up. Pliocene	Upper Djoclo Rajeu horizon Middle „ Lower „ Base „	13	greyish-blue arenaceous clays.
Lo. Pliocene	Upper Seurocla horizon Middle „ Lower „	1, 7 2 5, 6	soft clays with intercalated sandstones and marls.
Up. Miocene	Upper Keutapang horizon Middle „ Lower „ Base „	8, 9, 12 3	sandstones with intercalated clays and marls.
Md. Miocene	Upper Border clay Middle „ Lower „ Base „	4, 10 11	dark-green clays.
Lo. Miocene	Black clay with limestones in the Upper part.		*Lepidocyclinae and Cyclo-clypei* limestones.
Oligocene	Black clay with limestones in the Lower part. Mica quartz sandstones.		*Lepidocyclinae and Cyclo-clypei* limestones.
Eocene	Mica quartz breccia with intercalated Nummulitic-limestones.		
	Unconformity		
Pretertiary	Quartzites, limestones a.o.		

in this part of the Netherlands East Indies by the Geological Survey, samples from this region are hardly available. Nothing has been published until now on Ostracoda palaeontology of the Atjeh Tertiary. It is hoped that the following data stimulate a closer investigation in due time.

The Upper Tertiary of North Sumatra has been divided on lithological grounds into several horizons by J. Zwierzycki, C. W. A. P. 't Hoen and other members of the Geological Survey (1920).

For their stratigraphical column, reference is made to Table 4.

In later years this region has been sporadically visited by younger geologists of the Geological Survey of the Netherlands East Indies (Van Bemmelen a.o.), but the stratigraphical column has not essentially been altered. However, they assigned the entire Djoelo-Rajeu Horizon to the Lower Pleistocene, also on the strength of lithological data. Oostingh pointed in this direction, in connection with results obtained on Mollusca.

According to the work of Van Es, Von Koenigswald and Van Bemmelen in the Kendeng region, a Pleistocene age is accepted for the lacustrine-terrestrial deposits of the Upper-Sangiran layers and an Upper Pliocene age for the subjacent marine sandstones, which are equivalent in age with the Upper Kalibeng formation.

It appears, that the Seuroela Horizon and the investigated horizon of the Kendeng area (vide chapter B, I) have more than 50 % of the Ostracoda species in common. Consequently the Seuroela Horizon is proposed to be considered of Upper Pliocene age. However, it is evident, that more data are necessary to unravel the true stratigraphical position of the deeper parts of this column.

TABLE 5.

Ostracoda from the Atjeh region.

Border clay	Keutapang hor.	Seuroela hor.	ATJEH	Kendeng	Bodjonegoro	Java Sea
		X	*Cytherella cribrosa*	X		
		X	„ *leroyi*	X		
		X	„ *semitalis*			X
	X	X	*Cytherelloidea atmai*	X		
		X	„ *bangkoensis (var.)*	X	X	
		X	„ *javana*	X		
	X		„ *sp.*			
	X		*Macrocypris sp.*			
		X	*Paracypris zealandica*			X
	X		*Bythocypris sp.*			
	X		*Bairdia sp.*			
		X	*Triebelina cf. cubensis*			
		X	*Clithrocytheridea atjehensis*	X		
		X	*Hemicytheridea reticulata*	X		
	X		*Krithe bartonensis*	X	X	
		X	*Cytherideis ashermanni*			
		X	„ *seuroelensis*			
		X	*Atjehella semiplicata*	X		
		X	*Cythereis cruysi*			
	X	X	„ *dictyon*	X		
		X	„ *hamata*			
	X		„ *keutapangensis*			X
		X	„ *papuensis*	X		
		X	„ *reticulineata*	X		
		X	„ *scutigera*	X		X
		X	„ *vandijki*	X		X
		X	*Caudites medialis var. javana*	X		
	X		*Paijenborchella malaiensis*	X		
		X	*Tanella gracilis*	X		
		X	*Cytheropteron sp. F*			
		X	„ *sp. G.*			X
		X	„ *sp. H.*			
	X		„ *sp. I.*			
		X	*Neomonoceratina columbiformis*			X
		X	*Cytherura sumatrensis*	X		
		X	*Xestoleberis granulosa*			
		X	„ *sp.*			
7	4	29	*Total species: 37*	15	4	8

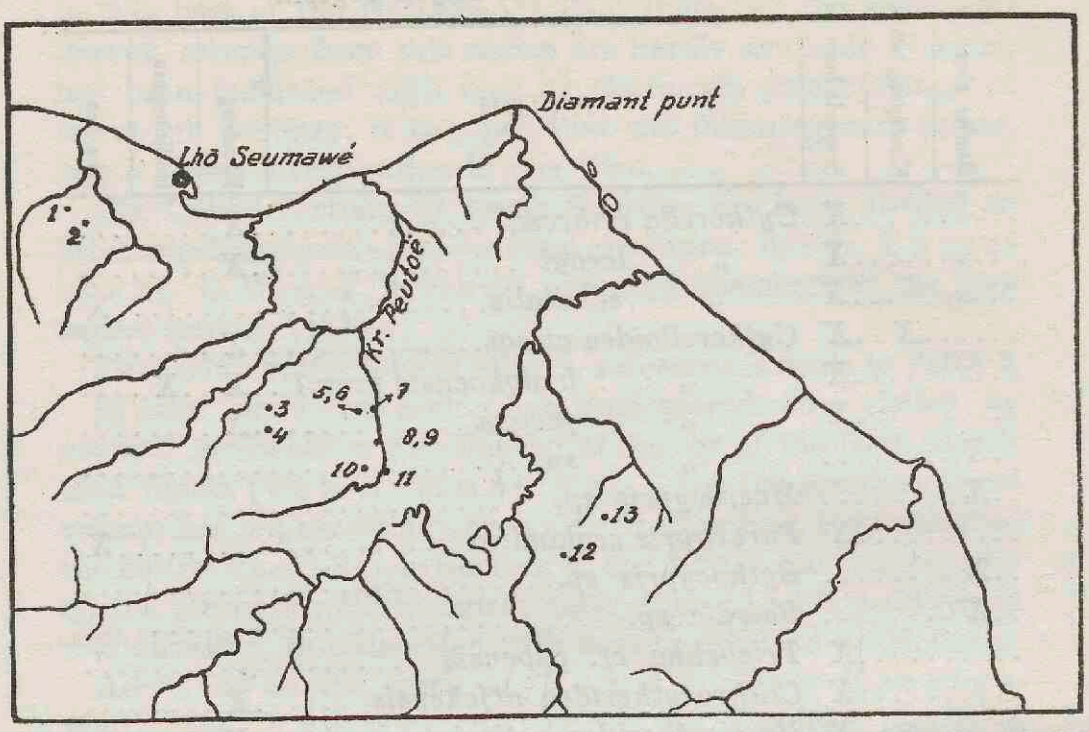

Figure 3. Sketch map of Atjeh, showing the localities.
Scale 1 : 1.000.000

LIST OF LOCALITIES IN THE ATJEH-REGION.

1. Blang Oeno river, Beureugang-anticline; Tjoenda district, Atjeh I.
   Upper Seuroela horizon, dark grey arenaceous marl.
   Sample nr. 399—1932 of the geological collection in the Geological Institute, State University of Utrecht.
2. Blang Koembang river, Beureugang anticline; Tjoenda district, Atjeh I.
   Middle Seuroela horizon, grey marl.
   Sample nr. 382—1932 of the geological collection.
3. Pale Teungkoe river, 2,4 km from the confluence with Pira river; Pira district, Atjeh II.
   Lower Keutapang horizon, dark grey clay.
   Sample nr. 442—1932 of the geological collection.

4. Pale Teungkoe river, 3,5 km from the confluence with Pira river; Pira district, Atjeh II.
   Middle Border clay, dark marly clay.
   Sample nr. 384—1932 of the geological collection.

5—6. Tjoetjoer river, 500 m from the confluence with Peutoë river; Peutoë district, Atjeh II.
   Lower Seuroela horizon, dark grey Mollusca marl.
   Sample nrs. 395—1932 and 390—1932 of the geological collection.

7. Tjoetjoer river, at the confluence with Peutoë river; Peutoë district, Atjeh II.
   Upper Seuroela horizon, dark grey arenaceous marl.
   Sample nr. 402—1932 of the geological collection.

8—9. Reudeuëp river, at the confluence with Peutoë river; Peutoë district, Atjeh II.
   Middle Keutapang horizon, dark grey marls.
   Sample nrs. 392—1932 and 428—1932 of the geological collection.

10. Reudeuëp river, 1,2 km from the confluence with Peutoë river; Peutoë district, Atjeh II.
   Middle Border clay, marly clay.
   Sample nr. 408—1932 of the geological collection.

11. Peutoë river, 1 km from the confluence with Beudari river; Peutoë district, Atjeh II.
   Lower Border clay, marly clays.
   Sample nr. 429—1932 of the geological collection.

12. Djoewa river, western part of the Peulaloe-Idi anticline; Simpang Olim district, Atjeh II.
   Middle Keutapang horizon, dark grey marl.
   Sample nr. 418—1932 of the geological collection.

13. Upper course of the Baleh river; Djoelo Rajeu-Simpang Olim district, Atjeh II.
   Lowermost part of the Djoelo Rajeu horizon (? Seuroela horizon), clay.
   Sample nr. 380—1932 of the geological collection.

III. BODJONEGORO, EASTERN JAVA.

Several years before the outbreak of the war in the Pacific an exploratory drilling was put down by the „Bataafsche Petroleum Maatschappij" in an area immediately North of Bodjonegoro (Fig. 2). The site is situated on Sheet 104 A of the geologocal map of Java — which is due West of Sheet 109 and 115 — with the coordinates S 12000 m and E 5700 m from the NW corner of the map.

TABLE 6.

Stratigraphical column of Sheet 109 and 115 (Soerabaya) according to J. Duyfjes (1938).

	Type of sediment	Age
ALLUVIUM	Modern river deposits	HOLOCENE
	UNCONFORMITY	
KABOEH BEDS	Sandstones (arkoses).	PLEISTOCENE
POETJANGAN BEDS	**The Upper Part** is mainly developed as volcanic facies with intercalations of marly sandstones. **The Lower Part** is developed in a clayey facies alternating with thin layers of grained quartz sandstones.	
UPPER KALIBENG BEDS	**The Upper Part** with prevailing marls, containing Globigerinidae and locally Diatoms. **The Lower Part** generally consists of limestones alternating with marls.	PLIOCENE
LOWER KALIBENG BEDS	Marls, containing an abundance of Globigerinidae.	
	UNCONFORMITY	
REMBANG BEDS	Quartz sandstones and clays (marly-). This series contains severals limestone horizons, rich in larger Foraminifera (*Lepidocyclina, Miogypsina, Miogypsinoides, Spiroclypeus*).	MIOCENE

As a geological map of this region has not yet been published, we only can compare our stratigraphical data with those from the closest known area. The region of Soerabaya has been mapped by J. Duyfjes (Sheet 109 and 115) up to 25 km East of Bodjonegoro. That the available data allow a comparison of the stratigraphy observed at Bodjonegoro with Duyfjes' stratigraphy of Sheet 109 and 115, is due to the fact, that the layers of the Sheets 109 and 115 can directly be followed into the surroundings of Bodjonegoro.

The drilling of Bodjonegoro was carried beyond the 2000 m level into the Rembang Formation (Miocene). 151 Samples from this drilled section were presented to the Geological Institute in Utrecht, by the „Bataafsche Petroleum Maatschappij", to be examined for Ostracods and smaller Foraminifera.

TABLE 7.

Complete list of samples received from the Bodjonegoro drilling. Samples containing Ostracoda have been marked with an asterisk (depths in metres).

x 217	x 316	522	698	927	1157	1491	
x 221	x 324	x 534	700	x 950	x 1161	1496	
x 244	x 328	x 540	714	x 956	x 1167	1509	
x 248	x 331	543	723	965	x 1269	1521	
x 256	x 335	x 547	x 729	x 973	1275	x 1531	
262	x 339	x 557	740	x 981	1284	1535	
x 264	x 343	x 577	747	x 985	1292	1547	
x 266	x 345	x 598	x 761	999	1322	x 1555	
x 268	x 355	x 606	780	x 1009	1330	1563	
270	x 368	x 620	788	1024	1338	1567	
272	x 372	626	798	1035	x 1355	1582	
273	x 386	x 630	816	x 1051	x 1361	x 1598	
x 274	x 390	638	x 822	1057	1380	1606	
275	x 412	648	828	1066	1390	1638	
x 276	x 414	652	x 858	x 1073	1399	1650	
278	x 416	658	x 867	1083	1405	x 1656	
x 285	x 419	662	872	x 1089	1428	1690	
286	x 427	668	x 885	1095	1436	1704	
x 292	451	x 675	x 898	1111	1467	x 1708	
x 293	473	x 690	x 903	1120	x 1476	1715	
x 296	x 505	694	x 909	1124	1480	x 1877	
	x 511		x 915		1484	2006 m.	

In order to simplify the distribution chart the results have been combined into ranges of approximately 20 metres (vide Table nr. 8).

The core samples generally consist of fine grained sediments of the clay-, marl- or sandstone group; it is conspicuous, that samples of limestone are absent in our collection. According to D u y f j e s, several limestone horizons occur on Sheet 109 and therefore could be expected in our material. It is not known to us, wether the lack of limestone in our profile is due to the artificial selection of the samples or really represents the natural conditions. The absence of these limestones made a determination of the various boundaries and a certain correlation with known stratigraphical horizons extremely difficult.

However, some striking data point to the supposition of boundaries at 427, 658 and 1300 metres.

According to the clayey nature of the samples in the upper part of the column and in connection with the fact that no samples are available from 0—217 m, we may suppose that representatives of the sandy Kaboeh Beds and the volcanic facies of the Upper Poetjangan Beds are absent in our material and that at 217 m the samples already belong to the lower part of the Poetjangan Beds.

The upper part of our column (217—300 m) is definitely clayey whereas from 300 m down to 427 m the core fragments are much harder and even had to be boiled for desintegration. However, the lower boundary of these beds is not conspicuous in the reaction of the rock fragments when treated with hydrochloric acid (10 %).

Moreover, the colour which is a greenish-grey from 217 to 300 m, then changes to white and light-grey, which continues to 427 m. From here to 658 m the reaction towards hydrochloric acid remains practically the same, but the colour again becomes a greenish-grey. At 658 m the reaction with hydrochloric acid becomes definitely less in comparison with the higher samples. The boundary line between Poetjangan and Upper Kalibeng is assumed at 427 m which is not in contradiction with results found by D u y f j e s in sheet 109. The transition from Upper Kalibeng to Lower Kalibeng is assumed at 658 m.

From 1292 m downward the core samples show a much stronger reaction with hydrochloric acid and the clayey character in

slibbing these samples practically disappears. It seems justified to put the transition from the Lower Kalibeng beds to the Rembang beds approximately at 1300 m. This coincides with a remarkable change in the foraminiferal content of the slibbed material between 1284 and 1338 m. A detailed distribution chart of the smaller foraminifera will be published in the near future by Mr L. Boomgaart.

The distribution of Ostracods within this column hardly confirms the assumptions made above. *Cytherelloidea sangkoelirangensis, Pyricythereis mohleri* and *Cythereis bodjonegoroensis* are the only species confined to the range of 217 to 427 m. As for the other boundaries, the distribution of Ostracoda does not give any indications.

In general the number of the Ostracods in the samples is small. Only in two cases I found a greater concentration viz. from 316 to 335 m and from 973 to 985 m containing 87 and 122 specimens respectively. In my opinion this is due to ecological circumstances only. While practically all genera can be observed over great distances in the section, the remarkable genus *Cytherura* is restricted to the lower part of the Lower Kalibeng Beds.

TABLE 8.

Abundance of Ostracoda genera and species in the Bodjonegoro column.

Ranges	Number of genera	Number of species	Number of specimens
217—221	4	4	6
244—264	5	8	29
266—285	5	7	25
292—296	6	7	22
316—335	9	14	87
339—355	5	6	19
368—386	6	7	17
390—412	5	6	20
414—427	7	8	31
505—511	3	3	7
534—547	7	9	17
557—577	5	6	8
598—606	4	4	5
620—630	6	9	13
675—690	2	2	6
729	2	2	2
761	1	1	1
822	3	3	10
858—867	3	5	21
885—903	4	4	5
909—915	6	9	26
950—956	8	12	31
973—985	13	23	122
1009	4	7	12
1051	2	2	2
1073—1089	3	3	6
1161—1167	2	2	2
1269	2	2	3
1355—1361	4	6	7
1476	1	1	1
1531	2	2	6
1555	4	4	5
1598	1	1	1
1656	3	4	7
1708	2	2	2
1877	1	1	1

TABLE 9.

Ostracoda species in the Bodjonegoro column.

Bodjonegoro	Atjeh	Kendeng	Java Sea
Cytherella posterotuberculata			
„ *punctata*			
„ *truncata*			
Cytherelloidea bangkoensis (var.)		X	X
„ *bodjonegoroensis*			
„ *rimbai*			
„ *sangkoelirangensis*			
Argilloecia hiwanneensis			
Bythocypris indica			
Bairdia cf. boeloenganensis			
„ *gracilis*			
„ *cf. orientalis*			
Krithe bartonensis		X	X
„ *javana*			
Paracytheridea tschoppi			
„ *sp.*			
Hemicythere sp.			
Cythereis bodjonegoroensis			
„ *dacyi*			
„ *dictyon*		X	
„ *keyi*			
Pyricythereis bodjonegoroensis			
„ *mohleri*			
Paijenborchella iocosa			
„ *malaiensis*		X	
Loxoconcha cf. avellana			
Cytheropteron punctatum			
„ *sp. A.*			
„ *sp. B.*			
„ *sp. C.*			
„ *sp. D.*			
„ *sp. E.*			
Kangarina sp.			
Orthonotacythere orientalis			
Neomonoceratina macropora			
Cytherura bodjonegoroensis			
„ *javana*			
„ *(?)kalibengensis*			
„ *cf. scutellata*			
Xestoleberis curta			
„ *kalibengensis*			
Species: 41	4	1	1

IV. RECENT OSTRACODA FROM THE JAVA SEA.

As is evident from the check-list, the Bodjonegorofauna is completely different from the intimately related Atjeh and Southern Kendeng faunae. It was therefore, that an examination of recent material from this region seemed very desirable. Samples from the Snellius-expedition (1929—1930), which are kept at the Geological Institute of the State-University of Groningen, Holland, were a welcome addition to the examined fossil material. I am very much indebted to Professor Dr P h. H. K u e n e n, Director of the abovementioned Institute, for putting this material at my disposal.

Several samples from Snellius-stations in the Eastern part of the Java Sea were examined, but only the samples from stations 25, 26, 29 (Fig. 1), contained Ostracoda.

TABLE 10.

	Station	Depth in m	Distance to coast in km	Type of sediment	Position	
					Lat. S.	Long. E.
Java Sea	25	61	60	terrigenous mud.	6-22.5	112-48.5
Java Sea	26	81	40	terrigenous mud.	6-28.0	113-57.0
Makassar Str.	29	683	160	Globigerina ooze.	4-55.0	117-18.0

The following Ostracoda have been found in the Java Sea samples of the Snellius-expedition:

TABLE 11.

Ostracoda-species from the Java Sea	Atjeh	Kendeng	Bodjonegoro
Cytherella semitalis	X		
Cytherelloidea cingulata			
Paracypris zealandica	X		
Krithe bartonensis	X		X
Krithe radiolata			
Archycythereis cf. militaris			
Paracytheretta snellii			
Cythereis cribriformis		X	
Cythereis keutapangensis	X		
Cythereis cf. prava			
Cythereis scutigera	X	X	
Cythereis vandijki	X	X	
Cythereis wyville-thomsoni			
Loxoconcha semistriata			
Cytheropteron sp. G.	X		
Cytheropteron sp. J.			
Eocytheropteron sp. 2			
Neomonoceratina columbiformis	X		
Xestoleberis foveolata		X	
Total species: 19	8	4	1

Cythereis dictyon, collected by Brady along the northern coast of Java and fragments of which were found at station 25, can be added to this list. In consulting the above mentioned species we arrive at the strange conclusion, that, except for the two cosmopolitan forms *Cythereis dictyon* and *Krithe bartonensis*, none of the Bodjonegoro Ostracoda are present in this recent material (vide Distribution-Chart at the end of the paper), while more than 50 % of these species is known from the Atjeh and Kendeng regions.

C. SYSTEMATIC DESCRIPTIONS.

Ordo: Ostracoda Latreille.
Subordo: Platycopa Sars.
Family: Cytherellidae Sars.

Genus: Cytherella Jones, 1849.

1. **Cytherella cribrosa Brady (Pl. VI, fig. 1).**
   Cytherella cribrosa Brady, 1880, p. 176, Pl.XXVI, fig. 5.
   „ „ Egger, 1901, p. 468, Pl. III, fig. 7.
   Dimensions: L. 0,50; H. 0,29; W. 0,21.
   Occurrence: Atjeh loc. 1, 2, 5; Kloemprit.
   D. 31891, 31892.

2. **Cytherella leroyi, N. Nom. (Pl. VI, fig. 2).**
   Cytherella truncata Le Roy, 1939 (non Brady, 1880).
   Dimensions: L. 0,56; H. 0,28; W. 0,25.
   Described by Le Roy from the Telisa formation (Miocene) of Sumatra. The species-name "truncata" has already been used by Brady in 1880.
   Occurence: Atjeh loc. 5 and 6; Sangiran; Kloemprit.
   D. 31893, —4, —5.

3. **Cytherella posterotuberculata, N. Sp. (Pl. VI, fig. 3).**
   Dimensions: L. 0,36; H. 0,27; W. 0,16.
   Carapace highest anterior to the middle. Anterior end broadly rounded, the posterior part is less rounded. Dorsal and ventral margins convex. In dorsal view wedge-shaped; posterior end rather truncate, widest in the postero-ventral region, giving the carapace a triangular appearance in end view. Carapace without ornamentation except at the posterior end which shows several irregularly placed low tubercles. Largest overlap of the right valve anteriorly of the middle. There is some similarity with. *C. confusa* Lienenklaus, 1900.
   Occurrence: Bodjonegoro 266—285; 292—296; 316—335; 339—355; 620—630; 950—956; 973—985 m.
   D. 31896.

4. **Cytherella punctata Brady, Var. (Pl. VI, fig. 4).**

Cytherella punctata Brady, 1866, p. 362, Pl. LVII, Fig. 2.
„ „ Brady, 1880, p. 174, Pl. XXXVI, fig. 6.

Dimensions: L. 0,70; H. 0,40; W. 0,30.

Our form is more truncate than the form described by Brady in 1866 and that one more than the form described in 1880. The outline and ornamentation of the Bodjonegoro species are exactly the same as those described by Brady.

Occurrence: Bodjonegoro 266—285; 316—335; 414—427; 534—547; 557—577; 950—956 m.

D. 31897.

5. **Cytherella sangiranensis, N. Sp. (Pl. VI, fig. 5).**

Dimensions: L. 0,45; H. 0,27; W. 0,16.

Carapace subovate, dorsal margin parallel to the ventral ventral one and sometimes slightly convex. Both ends evenly rounded. Greatest width posteroventrally, where a more or less pronounced ridge occurs, running towards the anterior end; here it is less strongly built, giving the carapace a subquadrate shape in dorsal view. The female specimens are shorter than the male specimens.

Occurrence: Sangiran.

D. 31898.

6. **Cytherella semitalis Brady (Pl. VI, fig. 6).**

Cytherella semitalis Brady, 1867, p. 72, Pl. VIII, fig. 23—24.

Cytherella semitalis Brady, 1880, p. 175, Pl. XLIV, fig. 2.

Dimensions: L. 0,57, H. 0,31, W. 0,20.

Occurrence: Atjeh loc. 7; Java Sea, station 26.

D. 31899, 31900.

7. **Cytherella truncata Brady (Pl. VI, fig. 7).**

Cytherella truncata Brady, 1867, p. 154, Pl. XIX, fig. 3—4.

Cytherella truncata Brady, 1880, p. 174, Pl. XXXVI, fig. 3.

Dimensions: L. 0,67; H. 0,40; W. 0,22.

Occurrence: Bodjonegoro 316—335; 414—427; 885—903; 1555; 1656 m.

D. 31901.

Genus: Cytherelloidea Alexander, 1929.

1. **Cytherelloidea atmai, N. Sp. (Pl. VI, fig. 8).**

Dimensions: L. 0,49; H. 0,28; W. 0,22.

Carapace elongate ovate in side view, with a well developed surface sculpture. Dorsal and ventral margins straight to slightly concave. Anterior and posterior ends broadly rounded; in the right valve the anterior end is broader than the posterior end. The ornamentation is the same in both valves, with around the margin a very strongly built marginal rim, which is most pronounced in the posterior part. The outer side of this rim is ornamented with a row of circular pits starting at the postero-ventral corner, running along the entire ventral side, along the anterior extremity, where they are very well developed, disappearing in the middle of the dorsal margin. Just below the postero-cardinal angle a heavy rim runs downward towards the centre of the valve and from there forward, parallel to the dorsal and ventral margins. This rim is connected with the dorsal one by three short ridges in the central pit area and with the ventral one by several inconspicuous ridges. In dorsal view more or less wedge-shaped, posterior end truncate. The male specimens are more elongate and less wide than the female specimens.

Etymology: Named after a Javanese collector of Professor Dr G. H. R. von Koenigswald.

Occurrence: Atjeh Loc. 1, 5 and 12; Sangiran; Pentoek.

D. 31902, —3, —4.

2. **Cytherelloidea bangkoensis Le Roy, Var. (Pl. VI, fig. 9).**

Cytherelloidea bangkoensis le Roy, 1941, p. 615, Pl. 83, fig. 9, 10.

Dimensions: L. 0,40; H. 0,24; W. 0,16.

There is a great similarity with *C. bangkoensis* le Roy, 1941.

The outline of our specimens, however, are more ovate and there are more ridges in the posterior part.

Occurrence: Atjeh loc. 7; Sangiran; Kloemprit; Bodjonegoro: 534—547; 950—956; 973—985; 1009 m.

D. 31905, —6, —7, —8.

3. **Cytherelloidea bodjonegoroensis, N. Sp. (Pl. VI, fig. 11).**

Dimensions: L. 0,35; H. 0,22; W. 0,19.

Carapace ovate in side view. Dorsal margin straight, ventral margin convex. Posterior- and anterior ends broadly rounded, the latter slightly more. A marginal rim runs around the entire periphery and is rather broad on the ventral side. A sub-central pit occurs, encircled by a well-developed rim, the posterior part of which is connected by a very short ridge with the posterior part of the margin. The dorsal side coincides with the dorsal part of the marginal edge. Between the ventral side of the central ring and the marginal elevation the space is divided into several compartments bij narrow, very inconspicuous ridges. In dorsal view sub-wedge-shaped, truncate in the posterior and rather blunt in the anterior part. The relief of the ventral part of the central ring is most pronounced. Female specimens somewhat shorter than the male specimens.

Occurence: Bodjonegoro 950—956; 973—985; 1009 m.

D. 31909.

4. **Cytherelloidea cingulata (Brady). (Pl. VI, fig. 10).**

Cytherella cingulata Brady, 1880, p. 171, Pl. XLIII, fig. 1—2.

Cytherella cingulata Brady, 1867, p. 159, Pl. XVII, fig. 24—25.

Dimensions: L. 0,62; H. 0,40; W. 0,29.

In the anterior end our specimen is broader than the one described by Brady in 1880.

Occurrence: Java Sea, station 25.

D. 31910.

5. **Cytherelloidea javana, Le Roy (Pl. VI, fig. 12).**

Cytherelloidea javana Le Roy, 1941, p. 614, Pl. 83, fig. 7—8.

Dimensions: L. 0,52; H. 0,31; W. 0,28.

Described by le Roy from the Miocene and Pliocene of W.-Java.

Occurrence: Atjeh Loc. 1 and 5; Sangiran.

D. 31911, —12.

6. **Cytherelloidea rimbai, N. Sp. (Pl. VI, fig. 13).**

Dimensions: L. 0,44; H. 0,28; W. 0,21.

Ovate in outline, anterior extremity broadly rounded, posterior end less rounded. The surface ornamentation is pronounced, with ridges in the posterior- and pits in the anterior part. Four more or less longitudinal rims can be distinguished, which are connected by secondary ridges, not distinct in the ventral region and well-developed in the dorsal part, especially where they curve around a subcentral pit, divided into two compartments by a very thin ridge. Blunt wedge-shaped in dorsal view.

Etymology: Named after one of the native surveyors of the Geological Survey of the N.E.I.

Occurrence: Bodjonegoro 339—355; 909—915; 973—985; 1009; 1051 m.

D. 31913.

7. **Cytherelloidea sangkoelirangensis Le Roy (Pl. VI, fig. 14).**

C. sangkoelirangensis le Roy, 1941, p. 616, Pl. 83, fig. 13—14.

Dimensions: L. 0,64; H. 0,37; W. 0,32.

Described by Le Roy from the younger Miocene of Sangkoelirang bay, E.-Borneo.

Occurrence: Bodjonegoro 316—335 and 368—386 m.

D. 31914.

8. **Cytherelloidea sp. (Pl. VI, fig. 15).**

Dimensions: L. 0,77; H. 0,49; W. 0,32.

Only one complete specimen is available; the carapace is elongate ovate, equal in height. Anterior and posterior extremities well rounded. The left valve is overlapped by the right one all along the margin. Surface sculpture consists of several poorly developed ridges in the posterior part. Anteriorly to these rims the surface is smooth with a narrow marginal rim which becomes less pronounced in the central part of the dorsal and ventral margins. Dorsally from the centre of the valve a shallow, rather large pit occurs, which is open towards the dorsal edge of the valve. This species differs from *C. umbonata* Edwards, 1944, in having a less broad marginal rim. *C. montgomeryensis* Howe, 1934, has a more pronounced ridge system

and a median pit which is closed dorsally. *C. hiwanneensis* Howe, 1934, has a somewhat other outline and is broader in the anterior. This may be a new species.

Occurence: Atjeh loc. 11.

D. 31915.

Subordo: Podocopa Sars.

Family: Cypridae Baird.

Subfamily: Pontocyprinae Sars.

Genus: Argilloecia Sars, 1865.

1. **Argilloecia hiwanneensis Howe & Lea (Pl. VI, fig. 16).**

A. hiwanneensis Howe & Law, 1936, p. 25, Pl. I, fig. 25—29.

A. hiwanneensis Van den Bold, 1946, p. 64, Pl. III, fig. 7.

Dimensions: L. 0,54; H. 0,24; W. 0,18.

Occurrence: This species has been observed at Bodjonegoro throughout the entire column.

D. 31916.

Subfamily: Macrocyprinae G. W. Müller.

Genus: Macrocypris Brady, 1868.

1. **Macrocypris sp. (Pl. VI, fig. 17).**

Dimensions: L. 0,51; H. 0,20; W. 0,18.

Only two indistinct, closed valves have been collected. Right valve larger than the left one. Muscle-scar-area not clearly visible but more or less circular and situated in the centre of the valve.

Occurrence: Atjeh loc. 11.

D. 31917.

Subfamily: Cyprinae Sars.

Genus: Paracypris Sars, 1865.

1. **Paracypris zealandia (Brady) (Pl. VI, fig. 18).**

Phlyctenophora zealandica Brady, 1880, p. 33, Pl. III, fig. 1.

Paracypris zealandica G. W. Müller, 1912, p. 126.
„ „ E. C. Fyan, 1916, p. 1 (1175), fig. 17.

Dimensions: L. 0,87; H. 0,42; W. 0,40.

This species has been described by Fyan from the Upper-Pliocene of Atamboea, Timor.

Occurrence: Atjeh loc. 2 and 5; Java Sea, station 25.

D. 31918, —19.

Family: Bairdiidae Sars.

Genus: Bythocypris Brady, 1880.

1. **Bythocypris indica, N. Sp. (Pl. VI, fig. 19).**

Dimensions: L. 0,38; H. 0,19; W. 0,14.

Carapace bean-shaped in side view, mroe or less equal in height, somewhat higher in the anterior. Both extremities well-rounded. Dorsal margin slightly convex and ventral margin slightly concave. Left valve larger than the right one, strongly overlapping on dorsal and ventral side; valve surface smooth. In dorsal view elliptical and widest behind the middle. The males are straighter and less rounded in the posterior part. There is some similarity with *B. obtusata* (Sars), but our specimen is much smaller. There may be some relationship with *Bythocypris sp.* as figured by V. d. Bold from the Miocene of Cuba.

Occurrence: Bodjonegoro 316—335, 620—630 and 973—985 m.

D. 31920.

2. **Bythocypris sp. (Pl. VI, fig. 20).**

Dimensions: L. 0,72; H. 0,43; W. 0,21.

Three closed valves have been collected, two of which are rather damaged.

Occurrence: Atjeh loc. 11.

D. 31921.

Genus: Bairdia McCoy, 1844.

1. **Bairdia cf. boeloenganensis (Doeglas) (Pl. VII, fig. 1).**

Nesidea boeloenganensis Doeglas, 1931, p. 36, Pl. IV, fig. 4.

Dimensions: L. 0,76; H. 0,54; W. 0,37.
Only two specimens are available, one of which may be a moult. They are more or less related to the form described by Doeglas, but more spindle-shaped in dorsal view.
Occurrence: Bodjonegoro 1656 m.
D. 31922.

2. **Bairdia gracilis Alexander (Pl. VII, fig. 2).**
Bairdia gracilis Alexander, 1929, p. 60, Pl. II, fig. 16, 17.
Dimensions: L. 0,79; H. 0,48; W. 0,32.
Occurrence: Bodjonegoro 534—547.
D. 31923.

3. **Bairdia cf. orientalis (Doeglas) (Pl. VII, fig. 3).**
Nesidea orientalis Doeglas, 1931, p. 37, Pl. IV, fig. 5.
Dimensions: L. 0,76; H. 0,48; W. 0,40.
Occurrence: Bodjonegoro 1476 and 1656 m. (in both samples one specimen).
D. 31925.

Genus: Triebelina Van den Bold, 1946.

1. **Triebelina cf. cubensis Van den Bold (Pl. VII, fig. 4).**
T. cubensis V. d. Bold, 1946, p. 74, Pl. V, fig. 4.
Dimensions: L. 0,57; H. 0,28; W. 0,27.
One well-preserved right valve has been found. There seems to be a close relationship with *T. cubensis,* as described by Van den Bold from Guatamala, which shows the same rugose ends. Our form, however, is more reticulate.
Occurrence: Atjeh loc. 1.
D. 31926.

Family: Cytheridae Baird.

Genus: Cythere O. F. Müller, 1785.

1. **Cythere kloempritensis, N. Sp. (Pl. VII, fig. 5).**
Dimensions: L. 0,57; H. 0,33; W. 0,30.
Carapace ovate in side- and in dorsal view; anterior end rounded, bearing minute denticles in the ventral part. Posterior end rounded with one long spine in the postero-

ventral region. Valve ornamentation with longitudinal ridges in the posterior part. The space between these ridges is reticulate. Anterior end with irregularly placed, large, round pits, which are absent in the very central part. There may be some relationship with *C. darwini* Brady, 1880, but in this species the entire valve surface is reticulate.

Occurrence: Sangiran; Kloemprit.

D. 31927.

Genus: Clithrocytheridea Stephenson, 1936.

1. **Clithrocytheridea atjehensis, N. Sp. (Pl. VII, fig. 6).**

Dimensions: L. 0,65; H. 0,31; W. 0,35.

Carapace subovate in side view, highest in the middle. Dorsal margin arched and more or less flattened along the hinge-line. Ventral margin slightly convex. Anterior and posterior ends rounded, broader in the anterior part, which, moreover, is ornamented with short, blunt, club-shaped spines; similar spines in the postero-ventral region. Surface rather smooth with many irregularly placed pits. In dorsal view ovate. Hingement and scar typical for this genus. The usual dimorphism has been observed.

Occurrence: Atjeh loc. 1, 2, 5 and 7; Pentoek.

D. 31928, —9.

Genus: Hemicytheridea, Nov. Gen.

Genotype: Hemicytheridea reticulata.

Medium sized Ostracoda, with a more heterodont than taxodont hingement. Except for the surface ornamentation the outline of the carapace is similar to *Cytheridea*. The sub-equal, thick-shelled valves are heavily ornamented. The marginal area is moderately narrow; line of concrescence and inner margin do not coincide in the anterior and posterior end. Hingement in the right valve with an anterior socket merging into a serrate groove and a posterior tooth. The anterior socket is divided into 3—4 smaller compartments, separated by 2—3 vertical ridges; these ridges are drawn out ventrally into 2—3 tooth-like cusps which fit into a shallow groove below the anterior tooth in the left valve; this groove is deeper in the anterior than in the

posterior part. The posterior tooth is rather heavy, more or less triangular and serrate. The left valve hingement is exactly the complement of the right valve hingement. Radial pore-canals are moderately present in the anterior and posterior part, they are straight and simple. The muscle-scar-area could not be examined, obscured as it is by the surface ornamentation. Sexual dimorphism is pronounced. The hingement shows a new possibility in hinge structures and definitely places this genus apart; the other shell features are not uncommon for the family.

1. **Hemicytheridea reticulata, N. Sp. (Pl. VII, fig. 7).**
   Dimensions: Males, L. 0,60; H. 0,28; W. 0,28.
   Females, L. 0,53; H. 0,32; W. 0,29.

   Taxodont to heterodont. The valves are nearly equal in size and rather thick. The right valve somewhat higher than the left one. Outline of the carapace just as in *Cytheridea* and related genera, anterior end weakly denticulate. Surface ornamentation heavily reticulate throughout; in the ventral part the meshes are arranged in rows, tending to become parallel to the ventral margin. In the dorsal part of the valve, where the meshes are much smaller, the rows tend to radiate from the center of the dorsal margin. The central reticulation is completely irregular. The entire outer margin lies in a more or less depressed area, so that in side view it is completely obscured by the overhanging reticulation. Hingement of the right valve with an anterior socket, a postjacent shallow groove and a posterior serrate tooth. The anterior socket is divided into four sub-sockets, separated by three vertical ridges. In the ventral part of the socket these ridges are drawn out into three tooth-like knobs, which fit into a shallow groove below the anterior tooth of the left valve. The anterior socket merges into a groove, having its deepest part anteriorly and becoming very shallow in the posterior part, where it is terminated by a finely serrate, triangular tooth. The left valve hingement is exactly the complement of the right valve hingement. Marginal area moderately narrow, line of concrescence and margin do not coincide in the anterior- and posterior ends. Muscle-scar-pattern could not be examined due to the

surface ornamentation. Sexual dimorphism is pronounced.

Occurrence: Atjeh loc. 1, 2 and 5; Sangiran; Kloemprit; Pentoek.

D. 31930, —1, —2, —3, —4, —5.

Genus: Krithe Brady, Grosskey and Robertson, 1874.

1. Krithe bartonensis (Jones) (Pl. VII, fig. 8).

Cytherideis bartonensis Jones, 1855, p. 50, Pl. V, fig. 2, 3.
Ilyobates pretexta Sars, 1865, p. 60.
„ *bartonensis* Brady, 1866, p. 432, Pl. XXXIV, fig. 11—14.

Krithe bartonensis Brady, Grosskey and Robertson, 1874, p. 184, Pl. II, fig. 22—26.

Krithe bartonensis Brady, 1880, p. 113, Pl. XXVII, fig. 2.

Krithe bartonensis Müller, 1912, p. 335.
„ „ Sars, 1925, p. 165, Pl. LXXVII.
„ „ *& Krithe pretexta* V. d. Bold, 1946, p. 76, Pl. IV, fig. 15, 16.

Dimensions: L. 0,70; H. 0,37; W. 0,30.

To my opinion there is no reason to follow V. d. Bold (1946) in separating these species. The female specimens are wider and more convex in side view.

Occurrence: Atjeh loc. 4 and 11; Bodjonegoro, throughout the drilled section; Java Sea, station 29.

D. 31936, —7, —8.

2. Krithe javana, N. Sp. (Pl. VII, fig. 9).

Dimensions: L. 0,54; H. 0,30; W. 0,24.

In side view the carapace is elongate ovate, highest posteriorly to the middle. Anterior- and posterior ends rounded, posterior end more or less pointed in the middle. Dorsal margin strongly convex, becoming shallower towards the anterior. The ventral margin, though less pronounced, shows the same shape. In dorsal view elongate elliptical, widest posteriorly to the middle. For details of the marginal area reference is made to the drawing. The male specimens are less wide and show a straighter outline in side view.

Occurrence: Bodjonegoro 244—264; 316—335; 339—355; 414—427; 505—511; 534—547; 557—577; 620—630; 973—985 m.

D. 31939.

3. **Krithe radiolata Egger (Pl. VII, fig. 10).**

Krithe radiolata Egger, 1901, p. 451, Pl. VII, fig. 32—33.
Dolocytheridea vermunti V. d. Bold?, 1946, p. 83, Pl. VII, fig. 12.

Dimensions: L. 0,54; H. 0,22; W. 0,16.

In Egger's figure the outline of the anterior part of the marginal zone is not clearly visible, as no loop has been drawn. Our specimen seems to be closely related to *Dolocytheridea vermunti* V. d. Bold, 1946. After a close examination of his type specimens, however, it appeared that the radial pore canals in *D. vermunti* are otherwise built than is indicated in the figures. Actually they are not curved and not thickened in the middle. Apparently there are two kinds of canals; one series, which reaches the outer edge and one series of shorter canals running from the line of concrescence directly towards the valve surface. In our specimen the hinge line is poorly developed and shows more relationship to *Krithe* than to *Dolocytheridea*.

Occurrence: Java Sea, station 29.

D. 31940.

Genus: Paracytheridea Müller, 1894.

1. **Paracytheridea sp. (Pl. VII, fig. 11).**

Dimensions: L. 0,30; H. 0,16; W. 0,32.

One right valve of a broadly-winged Paracytheridea has been collected. Dorsal margin straight, ventral margin convex. Posterior end sharply pointed above the middle; anterior end rounded. The surface is ornamented with a large, compressed tubercle in the center of the valve and a smaller outwardly directed tubercle in the postero-ventral region. Anterior end of the carapace reticulate. Small tubercles are irregularly distributed over the valve-surface. At the antero-cardinal angle a rounded tubercle, which should not be mistaken for an eye-spot.

Occurrence: Bodjonegoro 973—985 m.

D. 31941.

2. **Paracytheridea tschoppi Van den Bold (Pl. VII, fig. 12).**

Paracytheridea tschoppi V. d. Bold, 1946, p. 85, Pl. XVI, fig. 6, 7.

Dimensions: L. 0,44; H. 0,21; W. 0,32.

Only very few valves have been found. The Bodjonegoro specimens are more slender than those described by V. d. Bold from Cuba (1946).

Occurrence: Bodjonegoro 390—412; 414—427; 534—547 m.

D. 31942.

Genus: Cytherideis Jones, 1856.

1. **Cytherideis ashermani Ulrich & Bassler (Pl. VIII, fig. 2).**

Cytherideis ashermani Ulr. & Bass., 1904, p. 126, Pl. XXXVII, fig. 10—16.

Cytherideis longula Ulr. & Bass., 1904, p. 128, Pl. XXXVII, fig. 21—27.

Cytherideis semicircularis Ulr. & Bass., 1904, p. 127, Pl. XXXVII, fig. 18—20.

Cytherideis ashermani Howe & grad. stud., 1935, p. 14, Pl. III, fig. 8—10.

Cytherideis ashermani Edwards, 1944, p. 514, Pl. LXXXVI, fig. 1—4.

Cytherideis ashermani V. d. Bold, 1946, p. 87, Pl XII, fig. 8.

Dimensions: L. 0,60; H. 0,24; W. 0,20.

The female specimens are shorter, higher and dorsally more convex than the male specimens.

Occurrence: Atjeh loc. 1 and 7.

D. 31943.

2. **Cytherideis seuroelensis, N. Sp. (Pl. VIII, fig. 3).**

Dimensions: L. 0,46; H. 0,24; W. 0,20.

Carapace elongate triangular, the base angles well-rounded, the ventral outline slightly concave. Greatest height and greatest width both anterior to the middle. Valve surface finely punctate. The marginal area with a thin, raised line just within the outer edge. Marginal zone very narrow throughout, with simple radial pore-canals. Hingement typical for the genus.

Occurrence: Atjeh loc. 1; Sangiran.
D. 31944, —5.

Genus: Archycythereis Howe and Law, 1936.

1. **Archycythereis cf. militaris (Pl. VII, fig. 13).**
Cythereis militaris Brady, 1866, p. 385, Pl. LXI, fig. 9.
Dimensions: L. 0,46; H. 0,32; W. 0,37.

One Archycythereis stage has been found, which, as to ornamentation, is rather similar to *Cythereis militaris* Brady, 1866, although the spines are less developed. The carapace is translucent and has an *Archycythereis* hingement. Seen from the interior, the centre of the valve presents an elevation with an irregularly built scar; at the exterior side this place is represented by a central depression.

Occurrence: Java Sea, station 25.
D. 31946.

Genus: Atjehella, Nov. Gen.

Genotype: Atjehella semiplicata.

Medium-sized, heterodont Ostracoda. In side view oblong, subquadrate; the greatest height is in the middle or just in front of it. Dorsal and ventral margin convex. Anterior end broadly rounded, posterior end rectangular. In dorsal view wedge shaped, thickest in the posterior part. Marginal area extremely broad in the anterior part, becoming narrower ventrally and very narrow in the posterior end. Inner margin and line of concrescence coincide throughout. Radial pore canals long, straight, simple, moderately numerous and sometimes bifurcating. Hingement in the right valve with terminal teeth, separated by a groove; this groove, which is shallow in the anterior part, becomes deeper and slightly serrate towards the posterior part and merges into a small socket just in front of the stout outwardly directed posterior tooth. The anterior tooth is elongate, carved and triangular in dorsal view. The left valve hinge is the complement of the right one, with sockets open towards the interior. Apart from these hinge elements the

left valve, moreover, is provided with an "anti-slip tooth" just below the anterior socket.

Muscle-scar-pattern is hardly recognizable, but seems to consist of some irregularly placed spots in the centre of the valve. No sexual dimorphism has been observed. Some relationship with the *Cytheretta* group may be noticed; the outline of the valve, however, is entirely different.

1. **Atjehella semiplicata, N. Sp. (Pl. VIII, fig. 1).**

Dimensions: L. 0,46; H. 0,24; W. 0,14.

Heterodont, equal-sized Ostracoda. In side view carapace oblong-subquadrate, highest in front of the middle and translucent; dorsal and ventral margins convex in the anterior part, becoming straight in the posterior end where the carapace has a more or less rectangular outline. In dorsal view convex wedge-shaped, thickest at the posterior end. Valve ornamentations consist of ridges in the posterior and a pronounced marginal rim in the anterior end. These ridges are placed longitudinally and only the dorsal and ventral ones reach beyond the middle of the carapace. The marginal area is extremely broad in the anterior part and becomes narrower ventrally and very narrow in the posterior part. Line of concrescence and inner margin coincide throughout. The outline of the inner margin is not constant in this species but shows slight differences. The figure, however, shows the general outline. Radial pore canals extremely long, slightly curved, simple and sometimes bifurcating. Hingement of the right valve with terminal teeth, separated by a groove. The anterior tooth is elongate, crenulate and triangular in dorsal view. The groove is shallow in the anterior, becomes deeper towards the posterior and merges into a small socket just in front of the blunt rectangular, outwardly directed posterior tooth. Left valve hinge with terminal sockets, open towards the interior and provided with a small coniform anti-slip tooth below the anterior socket. The inter-socket ridge in this valve is low in the anterior, but becomes more pronounced in the posterior part, where it is crenulate; the last crenulation is tooth-like. A narrow line-shaped groove runs along the entire length of the ridge fitting the dorsal wall of the

right-valve groove. Muscle-scar-pattern could not be recognized with certainty, though there are a few irregularly placed spots in the centre of the valve. Slight sexual dimorphism if present at all; different dimensions have been observed but in specimens which are probably young moults.

Occurrence: Atjeh loc. 1, 2, 5; Sangiran; Pentoek.

D. 31948, —9, —50.

Genus: Paracytheretta Triebel, 1941.

1. **Paracytheretta snellii, N. Sp. (Pl. VII, fig. 14).**

Dimensions: L. 0,73; H. 0,38; W. 0,43.

Only one well-preserved specimen is available. In outline this species resembles *Cythereis vandijki;* the ornamentation, however, is completely different, with irregular tubercles in the posterior half and one tubercle in the middle of the anterior part. The surface, moreover, is ornamented with narrow irregular ridges. Hingement and marginal zone typical for the genus.

Occurrence: Java Sea, station 25.

D. 31947.

Genus: Hemicythere Sars, 1926.

1. **Hemicythere pentoekensis, N. Sp. (Pl. VIII, fig. 4).**

Dimensions: L. 0,60; H. 0,35; W. 0,27.

Carapace sub-triangular in side-view. Dorsal- and ventral margin slightly convex, converging towards the posterior. The anterior end broadly rounded, posterior end distinctly angled. The valve ornamentation is heavy, irregularly reticulate in the dorsal part and more regular in the ventral part. Between these two ornamentation systems there is a rather heavy, raised ridge, most prominent in dorsal view. Along the entire anterior edge there is a well developed rim, starting at the antero-cardinal angle with an eye spot. In the ventral part of the carapace there is a second rim, which starts in the antero-ventral region and sharply turns upward in the postero-ventral part. From here this rim runs towards the postero-cardinal angle, then

turns forward again to become vague in the centre of the valve. In dorsal view thin, except for the raised central rim.

Occurrence: Sangiran; Pentoek.

D. 31951.

2. **Hemicythere sp. (Pl. VIII, fig. 5).**

Dimensions: L. 0,49; H. 0,27; W. 0,32.

Two right valves have been found. Dorsal margin slightly convex; ventral margin straight; both margins converging towards the posterior end. Anterior end broadly rounded, posterior end pointed in the middle. Valve ornamentations consist of very regular reticulations, placed in rows from the postero-cardinal angle towards antero-ventral region. Wing-like elevations in the postero-ventral and postero-cardinal areas. In dorsal view roughly ovate, widest in the middle.

Occurrence: Bodjonegoro 419 m.

D. 31952.

Genus: Cythereis Jones, 1849.

1. **Cythereis bodjonegoroensis, N. Sp. (Pl. X, fig. 4).**

Dimensions: L. 0,67; H. 0,43; W. 0,43.

Dorsal margin straight, with several small denticles and an eye spot in the anterior part. Ventral margin slightly convex. Anterior end broadly rounded, posterior end rather truncate with denticles in the postero-ventral region. Valve ornamentation with inconspicuous reticulations and the separating ridges irregularly built and faintly denticulate. These ridges become more irregular and prominent in the anterior part. Along the ventral margin the reticulation disappears and is replaced by longitudinal ridges. In dorsal view irregularly ovate, widest in the posterior end.

Occurrence: Bodjonegoro 244—264; 266—285; 292—296; 316—335; 368—386 m.

D. 31953.

2. **Cythereis cribriformis (Brady) (Pl. IX, fig. 3).**

Cythere cribriformis Brady, 1866, p. 379, Pl. LXL, fig. 6.

Cythere cribriformis Brady, 1880, p. 98, Pl. XIX, fig. 3.

Dimensions: L. 0,71; H. 0,46; W. 0,48.

Occurrence: Kloemprit; Pentoek; Java Sea, stations 25 and 26.
D. 31954, —5.

3. **Cythereis cruysi, N. Sp. (Pl. IX, fig. 10).**
Dimensions: L. 0,36; H. 0,19; W. O,16.
A rather small representative of the *Cythereis group,* the carapace of which has a straight ventral margin; the dorsal margin is more or less convex except for the hinge line. Anterior and posterior ends rounded and finely denticulate anteriorly. Highest anterior to the middle. In dorsal view sub-quadrate. Valve ornamentation with irregular longitudinal, smooth ridges. Marginal zone typical for the genus. The hinge shows a variation of the usual system; the posterior end of the bar in the left valve hingement is more or less knob-like; the bar proper is finely serrate.
Etymology: Named in honour of my colleague Mr H. Cruys.
Occurrence: Atjeh loc. 1.
D. 31956.

4. **Cythereis dacyi Howe and Law (Pl. IX, fig. 4).**
Cythereis dacyi Howe and Law, 1936, p. 45, Pl. IV, fig. 6.
Dimensions: L. 0,67; H. 0,41; W. 0,35.
Our form differs from the one described by Howe & Law in having a greater posterior height and a few more spines.
Occurrence: Bodjonegoro 858—867; 909—915; 1009 m.
D. 31957.

5. **Cythereis dekrooni, N. Sp. (Pl. IX, fig. 15).**
Dimensions: L. 0,46; H. 0,24; W. 0,24.
A *Cythereis* with a rather unusual valve ornamentation, consisting of a broad, thick rim, irregular in height and very pronounced along the ventral and anterior margin; this rim is more or less tuberculous in the posterior part; near the eye spot the rim is less developed. Two large tubercles are located somewhat above the centre of the valve. Dorsal and ventral margin straight, but on the ventral side indistinct due to the marginal rim. Anterior end broadly rounded, posterior end truncate. Hinge and marginal zone typical for the genus.

Etymology: Named after Mr E. W. de Kroon of the Netherlands East Indian Geological Survey.
Occurrence: Sangiran; Kloemprit.
D. 31958.

6. **Cythereis dictyon (Brady) (Pl. IX, fig. 8).**

Cythere dictyon Brady, 1880, p. 99, Pl. XXIV, fig. 1.
„ „ Egger, 1901, p. 442, Pl. VI, fig. 41—43.
„ „ Chapman, 1910, p. 433.
„ „ Guppy, 1921, p. 128.
„ „ Chapman, 1926, p. 34, Pl. VII, fig. 12—13.
„ *telisaensis* Le Roy, 1939, p. 275, Pl. XI, fig. 9.
„ *dictyon* V. d. Bold, 1946, p. 90, Pl. X, fig. 13.

Dimensions: L. 0,97; H. 0,60; W. 0,60.

Our specimens do not show any difference with the holotypes of the Oligocene of Cuba and the Plio-pleistocene of Seran (V. d. Bold). Le Roy has described this form from the Tertiary of Central Sumatra as *C. telisaensis*.

Occurrence: Atjeh loc. 4, 5, 8, 9, 10, 12 and 13; Bodjonegoro, throughout the entire drilled section.
D. 31959, —60.

7. **Cythereis hamata G. W. Müller (Pl. IX, fig. 5).**

Cythereis hamata Müller, 1906, Pl. III, fig. 22—23.

Dimensions: L. 0,49; H. 0,28; W. 0,25.

Besides moult forms with the Archycythereis hingement, the usual dimorphism has been observed in this species.

Occurrence: Atjeh loc. 1, 2, 5 and 7.
D. 31961.

8. **Cythereis kendengensis, N. Sp. (Pl. IX, fig. 16).**

Dimensions: L. 0,51; H. 0,33; W. 0,27.

Dorsal margin straight, but not clearly visible due to the overhanging valve ornamentation; a very pronounced eye spot. Ventral margin strongly convex, meeting the dorsal margin in the middle of the posterior part, where the carapace is more or less pointed. Anterior end broadly rounded. Valve ornamentation very regularly reticulate, most regular along the anterior. Behind the eye spot a rather deep depression is visible without any reticulation.

Hinge and marginal zone typical for the genus. In dorsal view ovate, truncate in the posterior part; widest in the postero-ventral region.

Occurrence: Sangiran; Kloemprit.

D. 31962.

9. **Cythereis keutapangensis, N. Sp. (Pl. X, fig. 1).**

Dimensions: L. 0,65; H. 0,38; W. 0,36.

In side view the carapace shows a straight dorsal margin and a slightly convex ventral margin. Posterior end truncate, anterior end rounded. The entire margin, excepting the ventral side and also the valve surface, ornamented with large and small spines. Anterior to the middle of the valve the denticles are connected by irregular, tuberculous ridges. In dorsal view ovate, widest in the posterior part. Hinge and marginal zone typical for the genus.

Occurrence: Atjeh loc. 3 and 12; Java Sea, station 26.

D. 31963, —4.

10. **Cythereis keyi, N. Sp. (Pl. IX, fig. 9).**

Dimensions: L. 0,75; H. 0,46; W. 0,27.

Carapace angular-pyriform in side view; dorsal margin straight and ventral margin slightly convex. Anterior end broadly rounded, bearing a heavy marginal rim and ornamented with regularly distributed short denticles. Posterior end angular, pointed in the middle of the valve and ornamented with some irregularly placed small tubercles. Surface strongly and rather regularly reticulate with a central swelling; a second swelling is located behind the first one in the posterior third part of the valve. Above this last elevation and situated just below the dorsal margin there are three short and heavy spines. In dorsal view the carapace is rather thin, excepting the central swelling. Eye spot undeveloped. Hinge etc. typical for the genus.

Etymology: Named after my collegue Mr A. J. Key.

Occurrence: Bodjonegoro 390—412; 858—867; 909—915 m.

D. 31965.

11. **Cythereis papuensis (Brady) (Pl. X, fig. 2).**

Cythere papuensis Brady, 1880, p. 95, Pl. XXV, fig. 5.

Dimensions: L. 0,70; H. 0,42; W. 0,37.

Our species differs slightly from *Cythere papuensis* as figured by Brady; it is higher at the postero-cardinal angle and has a more regular ornamentation in the ventral part. The usual dimorphism and Archycythereis stages have been observed.

Occurrence: Atjeh loc. 1 and 7; Sangiran and Pentoek. D. 31966.

12. **Cythereis prava Baird? (Pl. IX, fig. 7).**

Cythereis prava Baird, 1850, p. 254, Pl. 18, fig. 13—15.

Dimensions: L. 0,96 (?); H. 0,54; W. 0,52.

One damaged specimen has been found, which may belong to *C. prava* as figured by Baird in 1850.

Occurrence: Java Sea, station 29.

D. 31967.

13. **Cythereis reticulineata, N. Sp. (Pl. IX, fig. 2).**

Dimensions: L. 0,56; H. 0,32; W. 0,42.

Carapace roughly ovate in side view; dorsal margin straight and ventral margin convex. Anterior and posterior ends rounded, ornamented with short, thick spines.

Valve ornamentation with irregular, longitudinal ridges, the space between these ridges irregularly reticulate. The uppermost dorsal ridge is rather high and tuberculous, projecting beyond the dorsal margin. A well developed eye spot is present. In dorsal view the carapace is roundly ovate, widest behind the middle of the valve. The usual dimorphism has been observed; the moults present a more regular surface pattern.

Occurrence: Atjeh loc. 1, 2, 5, 7; Pentoek.

D. 31968, —9.

14. **Cythereis roesmani, N. Sp. (Pl. IX, fig. 1).**

Dimensions: L. 0,44; H. 0,27; W. 0,27.

This rather small member of the *Cythereis group* has a straight dorsal margin and a convex ventral margin in side view. Dorsal and ventral margins slightly converging towards the posterior end. Anterior end broadly rounded, denticulate just as the posterior end, which, however, is less rounded. Valve ornamentation consisting of two heavy

irregular tubercles, placed in one longitudinal line in the middle of the valve. Along the hinge line there are three rather stout spines in the posterior part, with a few small, short spines between them. Moreover, the valve is ornamented with a broad, outwardly directed rim along the anterior end; antero-ventrally this rim joins a second one, while the first one continues along the ventral margin. This second rim is pitted and is situated just above the ventral margin, ending abruptly below the posterior central tubercle. In dorsal view the carapace is thin excepting the tubercles. Hingement and marginal zone typical for the genus.

Etymology: Named after one of the Javanese collectors of Professor Von Koenigswald.

Occurrence: Sangiran; Pentoek; Kloemprit.

D. 31970, —1, —2.

15. **Cythereis roesmani, Var. rugosa, N. Var. (Pl. X, fig. 3).**

Dimensions: L. 0,49; H. 0,28; W. 0,22.

A variation of *C. roesmani* has been found, differing from the type by a more robust carapace and less developed central tubercles, while the entire surface is covered with small tuberculous spines.

Occurrence: Pentoek; Kloemprit.

D. 31973.

16. **Cythereis scutigera (Brady) (Pl. IX, fig. 6).**

Cythere scutigera Brady, 1867, p. 70, Pl. VIII, fig. 15, 16.

„ „ Brady, 1880, p. 109, Pl. XXII, fig. 5.

Dimensions: Females, L 0,80; H. 0,47; W. 0,48.
Males, L. 0,88; H. 0,45; W. 0,35.

Occurrence: Atjeh loc. 1, 5, 7; Sangiran; Kloemprit; Java Sea, station 25 and 26.

D. 31974, —5, —6, —7.

17. **Cythereis vandijki, N. Sp. (Pl. IX, fig. 13).**

Dimensions: L. 0,78; H. 0,43; W. 0,42.

Carapace robust, with a strongly reticulate valve ornamentation. Dorsal margin straight, ornamented with several very low tubercles. Ventral margin convex. Anterior end broadly rounded and ornamented with short spines. Poste-

rior end drawn out into a sub-caudal process. Greatest width in the postero-ventral region. Marginal zone and hingement typical for the genus.

Etymology: Named in honour of Mr J. H. M. van Dijk of the Geological Institute, Utrecht, Holland.

Occurrence: Atjeh loc. 1 and 7; Kloemprit; Java Sea, station 25 and 26.

D. 31978, —9, —80.

18. **Cythereis wyville thomsoni (Brady) (Pl. IX, fig. 12).**

Cythere wyville thomsoni Brady, 1880, p. 82, Pl. XX, fig. 4.

Dimensions: L. 0,59; H. 0,35; W. 0,30.

The specimen figured by Brady is larger in size, but there is no difference in valve-ornamentation.

Occurrence: Java Sea, station 29.

D. 31981.

Genus: Pyricythereis Howe, 1936.

1. **Pyricythereis bodjonegoroensis, N. Sp. (Pl. IX, fig. 14).**

Dimensions: L. 0,59; H. 0,32; W. 0,27.

Carapace sub-pyriform in side view. Ventral margin straight; dorsal margin remains straight and parallel to the ventral margin for about two third of the valve length and then slopes strongly towards the ventral margin, which is hinge-line at the same time. Anterior end broadly rounded, posterior end pointed postero-ventrally. Anterior end ornamented with a heavy, well-developed, raised marginal rim. The valve ornamentation consists of a very regular reticulation, which does not reach the marginal zone. In dorsal view drop-shaped, widest in the posterior region.

Occurrence: Bodjonegoro 414—427; 858—867; 909—915; 1009 m.

D. 31982.

2. **Pyricythereis mohleri, N. Sp. (Pl. IX, fig. 11).**

Dimensions: L. 0,46; H. 0,32; W. 0,21.

Carapace pyriform in side view. In the postero-cardinal area a very heavy spineous ornamentation. Anterior end very broadly rounded, ornamented with some indistinct

denticles. Ventral margin slightly convex. Hinge line strongly converging towards the ventral margin. The valve surface smooth, except for a thin ridge in the ventral part. A sub-central depression may be observed and above this depression a rather heavy, irregularly shaped tubercle system in the postero-cardinal area. Hinge structure and marginal area typical for the genus. The usual dimorphism has been observed.

Etymology: Named in honour of Dr W. Mohler, micro-palaeontologist of the „Bataafsche Petroleum Maatschappij".

Occurrence: Bodjonegoro 244—264; 292—296; 316—335; 339—355; 368—386; 390—412; 598—606 m.

D. 31983.

Genus: Caudites Coryell and Fields, 1937.

1. **Caudites medialis Coryell and Fields, Var. javana, N. Var. (Pl. X, fig. 5).**

Caudites medialis Coryell and Fields, 1937, p. 11, fig. 12.

Dimensions: L. 0,40; H. 0,22; W. 0,20.

Differs from *C. medialis* Coryell and Fields, 1937, by the lack of a median ridge; instead our form shows a well-developed central swelling.

Occurrence: Atjeh loc. 1; Pentoek; Sangiran.

D. 31984.

Genus: Paijenborchella, Nov. Gen.

Genotype: Paijenborchella iocosa.

These Ostracoda are of medium size, longtailed, unequal-valved and have a rather rugose valve ornamentation. Left valve much higher than the right. Except for the caudal process the outline is roughly ovate in side view. Dorsal and ventral margins gently convex. Anterior end broadly rounded. Posterior extremity with a long caudal process in the ventral part of the valve. This process may be directed downward or straight backward. Valve ornamentation with irregular longitudinal ridges, situated on a subcentral swelling. These ridges are usually drawn out

posteriorly into long, sharp, backwardly directed spines. The dorsal part of the valve shows a well developed median sulcus. Apart from these ornamentation elements the rest of the valve surface may be smooth or finely rugose. Marginal zone broad, line of concrescence coinciding with the inner margin. A few straight, simple, radial pore-canals in the anterior end; very few in the caudal region where they are long and often appear to bifurcate at the end.

The hinge system is heterodont and a variation of the Cythereis theme; compared with the size of the valve the hinge is rather large. In the right valve we find terminal teeth; a very strong and knob-like anterior one and a small, rather narrow, posterior one. Behind the anterior tooth there is a large socket situated upon and excavated into the dorsal end of the median sulcus. A coarsely serrated groove is present between the socket and the posterior tooth. The left valve hingement is the complement of the right; moreover, it is provided with an „Ausweichfurche" which is broadly incised into the overhanging dorsal edge. In dorsal view the carapace is drop- or arrowhead shaped; widest in the middle of the valve.

Etymology: Named after "Paijenborch", the Geological Institute in Utrecht.

1. **Paijenborchella iocosa, N. Sp. (Pl. V, fig. 2; Pl. VIII, fig. 12).**

   Dimensions: L. 0,46; H. 0,22; W. 0,43.

   Carapace drop-shaped in side view, with the long, downwardly directed, caudal process situated in the ventral part. The left valve is much higher than the right one, overlapping along the dorsal edge over its entire length. Valve ornamention with a very pronounced swelling in the middle of the ventral part; above this elevation a deep median sulcus. Eye spots at the anterior and posterior cardinal angles. The central swelling is ornamented with two smooth, longitudinal ridges, separated by a deep pit; at the posterior side these ridges are drawn out into two backwardly directed spines, the outer much stronger than the inner one, which is often broken off. The rest of the valve surface is smooth except for a few small tubercles in the antero-ventral region. Marginal zone broad, radial

pore-canals few, simple and bifurcating in the posterior part. Hingement typical for the genus.

Occurrence: Bodjonegoro 244—264; 316—335; 534—547; 620—630; 909—915; 973—985; 1355—1361 m.

D. 31985.

2. **Paijenborchella malaiensis, N. Sp. (Pl. VIII, fig. 13).**

Dimensions: L. 0,54; H. 0,30; W. 0,27.

Carapace drop-shaped with the long caudal process directed straight backward and often slightly upward. Anterior end broadly rounded. Left valve higher than the right, overlapping over the length of the hinge margin. Valve ornamentation rugose, with three ridges situated on a swelling in the ventral part. These ridges are drawn out posteriorly into small spines and have a rather untidy appearance by smaller and larger pits in their sides. Between the two upper ridges there is a well developed depression. The third and lowermost ridge runs along the ventral margin. Above the swelling a deep median sulcus. Furthermore, the surface is ornamented with small and large pits and low tubercles, distributed irregularly over the surface. Hingement and marginal zone typical for the genus.

Occurrence: Atjeh loc. 10; Bodjonegoro, in the entire drilled section (see Distribution-Chart.)

D. 31986.

Genus: Tanella, Nov. Gen.

Genotype: Tanella gracilis.

Rather small, heterodont Ostracoda. In side view the carapace has its greatest height in the middle; dorsal and ventral margins convex, anterior and posterior ends rounded except at the postero-cardinal angle in the left valve, where the outer margin is interrupted by a more or less heavy tubercle. Outline ovate in dorsal view, rather strongly compressed in the anterior end. Marginal area broad, line of concrescence and inner margin coincide throughout. Numerous radial pore canals, very peculiarly built, starting as a simple, straight or curved canal from the inner margin and intensely ramificating at the outer margin.

Hingement in the right valve consists of a very thin hinge margin with two terminal teeth, the anterior one of which is elongate, rather low in dorsal view; the posterior one is directed outward, blunt and rectangular. Left valve hingement with a large posterior socket, merging into a groove which becomes broader and deeper in the anterior end, where it fits the anterior tooth of the right valve. This socket is entirely open towards the interior of the valve. Below this socket and built upon the interior side, there is a more or less elongate, triangular tooth (anti-slip tooth) which prevents the anterior tooth of the right valve from slipping out of its socket. Muscle-scar-pattern could not be recognized with certainty, but apparently consisting of 4 small scars in one vertical row and 2 scars in front of these four, which is the normal pattern in the *Cytheridae family*. Sexual dimorphism has not been observed.

Etymology: The name is in honour of the late Dr S. H. Tan, micro-palaeontologist of the Geological Survey of the Netherlands East Indies, murdered in Bandoeng by the Javanese, a few month after the capitulation of Japan.

1. **Tanella gracilis, N. Sp. (Pl. X, fig. 7).**

Dimensions: L. 0,45; H. 0,22; W. 0,17.

Carapace elongate ovate, translucent in side view. Highest in the middle, valves subequal, the left one slightly higher; dorsal and ventral margins convex, anterior and posterior ends rounded except at the postero-cardinal angle in the left valve, where the posterior socket of the hinge forms a more or less strong tubercle. In dorsal view the valve is convex, rather compressed anteriorly. Valve ornamentation with ridges, longitudinally placed in the anterior and at right angles to these in the posterior part; the space between these ridges is divided into series of meshes, each mesh with a central pit (normal pore-canal). Slight sexual dimorphism, if present at all. The specimens from Sangiran, Kloemprit and Pentoek show a broader anterior extremity, the surface ornamentation is stronger ridged and the posterior edge bears a few minute spines. These differences, however, are not considered of enough importance to form a new species or variation.

Occurrence: Atjeh loc. 1, 7; Sangiran; Kloemprit; Pentoek.

D. 31987, —8.

Genus: Javanella, Nov. Gen.

Genotype: Javanella kendengensis.

One left and one right valve have been found, which, according to their hinge pattern, could not be classified with one of the known genera. The carapace is of medium size and thin-shelled and is roughly ovate in side-view as well as in dorsal-view; a caudal process is present in the postero-ventral region. Valve surface with a few pits or without any ornamentation at all. Hinge pattern in the right valve with a narrow, finely serrate groove along the entire dorsal margin, which is somewhat wider near the anterior cardinal angle. Below this area and upon the interior side of the valve, there is a narrow, elongate tooth (anti-slip tooth). Left valve hingement without teeth; the dorsal edge is ornamented with small notches, fitting the right valve groove. The marginal area is moderately broad. Line of concrescence and inner margin coincide along the ventral margin only; in the anterior and posterior part they are distinctly separated. Radial pore-canals moderate in number, reaching the outer edge only in the very anterior and posterior parts. The scar-pattern could not be recognized. Only a few specimens have been found; the valve details, however, are extremely clear and the hinge pattern is completely different from known genera. For this reason these specimens have been assigned to a new genus.

1. **Javanella kendengensis, N. Sp. (Pl. X, fig. 6).**

Dimensions: L. 0,54; H. 0,24; W. 0,18.

Carapace roughly ovate in side- and dorsal view; dorsal margin gently curved, sloping rather steeply into a caudal process, which is situated somewhat below the middle of the posterior part. Ventral margin sinuate, convex in the posterior- and concave in the anterior end. Anterior extremity is rounded. Valve without ornamentation, but slightly pitted. For the hinge and marginal zone, reference is made to the generic description.

Occurrence: Pentoek.
D. 31989.

Subfamily: Loxoconchinae Sars, 1927.

Genus: Loxoconcha Sars, 1865.

2. **Loxoconcha cf. avellana Brady (Pl. XI, ifg. 3).**
L. avellana Brady, 1880, p. 117, Pl. XXVIII, fig. 1.
L. avellana Chapman, 1926, p. 103, Pl. XXII, fig. 5.
Dimensions: L. 0,35; H. 0,24; W. 0,19.
Only one specimen has been collected. The outline in dorsal- and in side-view is more or less similar to *L. avellana* Chapman, 1926.
Occurrence: Bodjonegoro, 1355—1361 m.
D. 31990.

2. **Loxoconcha pentoekensis, N. Sp. (Pl. XI, fig. 1).**
Dimensions: L. 0,54; H. 0,35; W. 0,27.
Carapace robust, rhomboidal in side view and ovate in dorsal view. Dorsal margin slightly convex, ventral margin concave. Anterior end rounded, with the strongest curve in the antero-ventral region; subdorsally pointed in the posterior end. Valve surface ornamented with fine pits and one large tubercle at the postero-cardinal angle.
Occurrence: Pentoek.
D. 31991.

3. **Loxoncha semistriata, N. Sp. (Pl. XI, fig. 4).**
Dimensions: L. 0,56; H. 0,33; W. 0,27.
Carapace approximately ovate in side view. Dorsal margin straight to slightly convex. Anterior end broadly rounded; posterior end slightly pointed above the middle. The valve is ornamented in the central part with ridges dorsally and ventrally. The space between these ridges is pitted as is the very central part of the valve. In dorsal view ovate with compressed ends. Hingement and marginal zone typical for the genus.
Occurrence: Java Sea, station 29.
D. 31992.

4. **Loxoconcha sinensis Brady (Pl. XI, fig. 2).**
   L. sinensis Brady, 1867, p. 158, Pl. XVI, fig. 17, 18.
   L. sinensis Brady, 1880, p. 120, Pl. XXIX, fig. 2.
   Dimensions: L. 0,38; H. 0,27; W. 0,22.
   Occurrence: Sangiran and Kloemprit.
   D. 31993.

Genus: Cytheropteron Sars, 1865.

Subgenus: Cytheropteron Alexander, 1933.

1. **Cytheropteron punctatum Brady (Pl. XI, fig. 14).**
   C. punctatum Brady, 1868, p. 449, Pl. XXXIV, fig. 45-48.
   Dimensions: L. 0,40; H. 0,24; W. 0,32.
   Occurrence: Bodjonegoro 598—606; 620—630; 973—985 m.
   D. 31994.

Only one valve of the following Cytheropterons and Eocytheropterons, belonging to twelve different species, was found. Specific determination proved to be impossible and they are mentioned as a matter of record only.

2. **Cytheropteron sp. A. (Pl. XI, fig. 5).**
   Dimensions: L. 0,62; H. 0,46; W. 0,46.
   Occurrence: Bodjonegoro 316—335 m.
   D. 31995.

3. **Cytheropteron sp. B. (Pl. XI, fig. 6).**
   Dimensions: L. 0,40; H. 0,24; W. 0,24.
   Occurrence: Bodjonegoro 620—630 m.
   D. 31996.

4. **Cytheropteron sp. C. (Pl. XI, fig. 7).**
   Dimensions: L. 0,45; H. 0,35; W. 0,35.
   Occurrence: Bodjonegoro 909—915 m.
   D. 31997.

5. **Cytheropteron sp. D. (Pl. XI, fig. 12).**
   Dimensions: L. 0,32; H. 0,18; W. 0,27.
   Occurrence: Bodjonegoro 973—985 m.
   D. 31998.

6. **Cytheropteron sp. E. (Pl. XI, fig. 11).**
   Dimensions: L. 0,30; H. 0,18; W. 0,30.
   Occurrence: Bodjonegoro 973—985 m.
   D. 31999.

7. **Cytheropteron sp. F. (Pl. XI, fig. 13).**
   Dimensions: L. 0,35; H. 0,22; W. 0,19.
   Occurrence: Atjeh, loc. 1.
   D. 32000.

8. **Cytheropteron sp. G. (Pl. XI, fig. 17).**
   Dimensions: L. 0,60; H. 0,35; W. 0,56.
   Occurrence: Atjeh loc. 1; Java Sea, station 29.
   D. 32001, -2.

9. **Cytheropteron sp. H. (Pl. XI, fig. 8).**
   Dimensions: L. 0,38; H. 0,24; W. 0,32.
   Occurrence: Atjeh loc. 1.
   D. 32003.

10. **Cytheropteron sp. I. (Pl. XI, fig. 9).**
    Dimensions: L. 0,49; H. 0,27; W. 0,42.
    Occurrence: Atjeh loc. 9.
    D. 32004.

11. **Cytheropteron sp. J. (Pl. XI, fig. 10).**
    Dimensions: L. 0,68; H. 0,40; W. 0,60.
    Occurrence: Java Sea, station 26.
    D. 32005.

Subgenus: Eocytheropteron Alexander, 1933.

1. **Eocytheropteron sp. 1. (Pl. X, fig. 12).**
   Dimensions: L. 0,46; H. 0,27; W. 0,26.
   Occurrence: Sangiran.
   D. 32006.

2. **Eocytheropteron sp. 2. (Pl. X, fig. 11).**
   Dimensions: L. 0,54; H. 0,35; W. 0,27.
   Occurrence: Java Sea, station 29.
   D. 32007.

Genus: Kangarina Coryell and Fields, 1937.

1. **Kangarina sp. (Pl. VIII, fig. 15).**
   Dimensions: L. 0,35; H. 0,22; W. 0,16.
   Carapace thick-shelled. Dorsal margin strongly convex in the anterior part and becoming straight towards the posterior end. Ventral margin sligthly convex with a

flattened ventral surface. Posterior end drawn out into a subdorsal caudal process. Anterior end truncated dorsally and narrowly rounded antero-ventrally. The principal valve ornamentation consists of a central swelling, from which a prominent ridge runs towards the postero-cardinal angle; vague rims are going from this swelling towards the anterior and posterior edges, without, however, reaching the margins. Along the ventral margin there is a well-developed ridge, much more pronounced in the posterior than in the anterior end. Apart from this rim-system, the valve is pitted and ornamented with small tubercles. Hingement typical for the genus. Marginal area only developed in the caudal and antero-ventral part, where the line of concrescence does not coincide with the inner margin; only a few radial pore-canals.

Occurrence: Bodjonegoro 368—386 m.

D. 32008.

Genus: Orthonotacythere Alexander, 1933.

1. **Orthonotacythere orientalis, N. Sp. (Pl. VIII, fig. 14).**

Dimensions: L. 0,30; H. 0,19; W. 0,21.

Although *Orthonotacythere* becomes extinct towards the middle of the Tertiary, several specimens have been found in the Javanese Pliocene and consequently once more the value of an index fossil has become questionable. The outline, hingement and ornamentation pattern are typical for the genus. Dorsal margin straight, obscured by tubercles; ventral margin convex, drawn out posteriorly into a short, subdorsal caudal process. Anterior end roundly truncated. Valve ornamentation with a base pattern of small reticulations. Rather large tubercles are scattered over the surface and are most prominent at the antero- and postero-cardinal angles, in the centre of the valve and in the postero-ventral region. Along the ventral margin, starting near the postero-ventral tubercle, there is a ridge which becomes indistinct at the antero-ventral side, rendering the ventral surface a flattened appearance. Marginal area and scar-pattern could not be recognized.

Occurrence: Bodjonegoro: 557—577; 950—956; 973—985.

D. 32009.

Subfamily: Bythocytherinae Sars, 1926.

Genus: Neomonoceratina, Nov. Gen.

Genotype: Neomonoceratina columbiformis.

Medium-sized, heterodont, sub-equal valved Ostracoda. The valve ornamentation may be smooth, ridged, pitted or reticulate. A single stout spine occurs in the postero-ventral region of both valves. Dorsal margin straight; ventral margin convex, drawn out posteriorly into a sub-dorsal caudal process; anterior end broadly rounded. Marginal area moderately broad, line of concrescence and inner margin coincide throughout. Radial pore-canals few and simple in the anterior end and in the caudal process. A few normal pore-canals scattered over the surface, causing a pitted appearance. Hingement in the right valve consisting of two terminal, rather strong teeth; immediately behind the anterior tooth a large socket, which is open towards the interior. A serrate groove runs forward from the dorsal side of the posterior tooth, merging into the dorsal wall of the anterior socket. Left valve hinge pattern the complement of the right, with terminal sockets, both of which are open towards the interior. Behind the anterior socket a strong tooth; between the dorsal side of this tooth and the dorsal wall of the posterior socket a finely crenulate bar. Muscle-scar-area with a vertical row of four scars, situated on the interior ridge of the sulcus; in the male specimens they are situated more towards the anterior than in the female specimens and they are often hardly visible. Sexual dimorphism pronounced, the males being more elongate and less swollen than the females. This Ostracoda-genus has several features in common with *Monoceratina* Roth, as the general outline, the median sulcus, the muscle-scar-pattern, etc. The peculiar hingement, however, places this genus definitely apart. Not long ago *Monoceratines* have been found in recent associations; post-oligocene fossils of this group are still unknown and it is of some importance to emphasize, that a monoceratine group survived and that also in this group the hingement tends to become more pronounced in approaching recent species.

1. **Neomonoceratina columbiformis, N. Sp. (Pl. X, fig. 8).**

Dimensions: L. 0,48; H. 0,27; W. 0,43.

Carapace sub-quadrate, translucent, highest in front of the middle. The valves are sub-equal, the right one slightly higher; dorsal margin straight; ventral margin strongly convex, posteriorly curving upward towards the caudal process near the postero-cardinal angle; anterior end broadly rounded, denticulate, grading into the ventral margin without break. Carapace strongly convex in dorsal and in end view, widest near the ventral margin. A deep median sulcus divides the valve into two lobes, the anterior one of which is smaller than the posterior. In the ventral part of the valve and immediately behind the sulcus there is a hornlike spine. Surface ornamentation with pits and ridges. A prominent ridge runs from the vicinity of the postero-cardinal angle to the antero-ventral region, without, however, reaching the outer edge. A second ridge, in the ventral part of the valve, runs forward and backward from the spine. The valve surface between the ridges and pits is smooth. A more or less strong keel is present. Hingement, marginal area and scar-pattern are typical for the genus. This scar-pattern, which is situated upon the interior ridge of the sulcus, consists of 4 elongate scars; the top-scar is smaller than the 3 lower, equal-sized scars. Sexual dimorphism is pronounced, the male specimens are more elongate than the female specimens.

Occurrence: Atjeh loc. 1 2,; Java Sea, station 25.

D. 32015, —6.

2. **Neomonoceratina macropora, N. Sp. (Pl. X, fig. 9).**

Dimensions: L. 0,46; H. 0,27; W. 0,43.

A few neomonoceratines have been found in the Lower-Kalibeng formation; in outline and in ornamentation they are quite different from those of Atjeh and Sangiran. In side view the outline is not so angular as in *N. Columbiformis* or as in *N. microreticulata,* but is more rounded. Apart from the normal base ridges, this ornamentation consists of large pits scattered over the valve surface and a short, broadly-rooted spine in the ventral area. The pit ornamentation is quite heavy near the ventral spine. The

carapace is arrow-head-shaped in dorsal view. Hingement and marginal zone typical for the genus.

Occurrence: Bodjonegoro 973—985 m.

D. 32017.

3. **Neomonoceratina microreticulate, N. Sp. (Pl. X, fig. 10).**

Dimensions: L. 0,49; H. 0,24; W. 0,27.

The outline of the carapace is exactly the same as in *N. columbiformis* from Atjeh. There are, however, some differences in ornamentation. In this species the valve ornamentation is finely reticulate and the ventral spine is less well-developed as in *N. columbiformis*. Hingement and marginal zone typical for the genus.

Occurrence: Sangiran; Kloemprit.

D. 32018, —9.

Genus: Cytherura Sars, 1865.

1. **Cytherura bodjonegoroensis, N. Sp. (Pl. XI, fig. 20).**

Dimensions: L. 0,30; H. 0,16; W. 0,16.

Carapace roughly ovate in side view. Dorsal margin straight, ventral margin convex. Anterior end rounded; posterior end drawn out into a sub-dorsal, caudal process. Valve ornamentation with coarse, completely irregular reticulations. In the postero-cardinal region, the ridges between these reticulations are pronounced and the meshes are very deep. Hingement and marginal zone typical for the genus.

Occurrence: Bodjonegoro 950—956; 973—985; 1355—1361 m.

D. 32010.

2. **Cytherura javana, N. Sp. (P.l XI, fig. 19).**

Dimensions: L. 0,30; H. 0,16, W. 0,16.

The carapace of this wing-bearing Ostracoda has a straight dorsal and ventral margin. Anterior end rounded; posterior extremity tapering into a subdorsal process. Valve surface irregularly and coarsely reticulate with a pronounced longitudinal rim in the middle of the valve. A second prominent rim is situated in the antero-ventral part of the valve, merging into a wing near the ventral margin, a

little behind the middle. All other features are typical for the genus.

Occurrence: Bodjenegoro 950—956; 973—985 m.
D. 32011.

3. **Cytherura? kalibengensis N. Sp. (Pl. XI, fig. 15).**

Dimensions: L. 0,35; H. 0,17; W. 0,12.

Several closed carapaces and one left and right valve are available. The hingement is not very well recognizable, but seems to be closely related to *Cytherura*. The marginal zone, however, is entirely different; it is rather narrow, except at the posterior and anterior ends, where the line of concrescence and the inner margin are definitely separated. Dorsal and ventral margin slightly convex. Anterior end rounded, posterior end truncate and drawn out into a caudal process in the postero-ventral part. The valve is without any ornamentation, smooth. Thinly ovate in dorsal- and in end-view.

Occurrence: Bodjonegoro 973—985 m.
D. 32012.

4. **Cytherura cf. scutellata Brady (Pl. XI, fig. 18).**

C. scutellata Brady, 1890, p. 509, Pl. III, fig. 30.

Dimensions: L. 0,27; H. 0,16; W. 0,19.

Differing from *C. scutellata* Brady, 1890, by the more irregular reticulation and from *C. cellulosa* Brady by the more pronounced caudal process.

Occurrence: Bodjonegoro 950—956; 973—985; 1355—1361 m.
D. 32013.

5. **Cytherura sumatrensis, N. Sp. (Pl. XI, fig. 16).**

Dimensions: L. 0,46; H. 0,24; W. 0,28.

Carapace sub-ovate in side view, highest in front of the middle. Dorsal margin arched, sloping steeper towards the anterior than towards the posterior end; ventral margin straight. Anterior end rounded; posterior extremity with a compressed, caudal process in the middle of the valve. Valve surface ornamented with pits; these pits are arranged in slightly curved, longitudinal furrows. These furrows are separated by low but sharp ridges. The region along the

outer edge is devoid of any ornamentation. In dorsal view ovate with compressed ends.

Occurrence: Atjeh, loc. 1; Sangiran.

D. 32014.

Subfamily: Xestoleberinae Sars, 1926.

Genus: Xestoleberis Sars, 1865.

1. **Xestoleberis curta Brady (Pl. VIII, fig. 7).**

Cytheridea(?) curta Brady, 1865, p. 370, Pl. LVIII, fig. 7.
Xestoleberis curta Brady, 1867, p. 79, Pl. X, fig. 16—18.
„ „ Brady, 1880, p. 126, Pl. XXXI, fig. 6.
„ „ Chapman, 1914, p. 43, Pl. VIII, fig. 31.
„ „ Chapman, 1926, p. 104, Pl. XXII, fig. 6.

Dimensions: L. 0,51; H. 0,30; W. 0,20.

Several valves are available, only one of wich is of the same size as Brady's specimens; the others are much smaller, but similar in outline. Our specimens are generally less wide than most figures.

Occurrence: Bodjonegoro, 316—335; 368—386; 822; 973—985; 1269 m.

D. 32020.

2. **Xestoleberis foveolata Brady (Pl. VIII, fig. 10).**

Xestoleberis foveolata Brady, 1880, p. 130, Pl. XXX, fig. 1.

Dimensions: L. 0,52; H. 0,40; W. 0,32.

Occurrence: Sangiran; Java Sea, station 25 and 26.

D. 32021, —2.

3. **Xestoleberis granulosa Brady (Pl. VIII, fig. 8).**

Xestoleberis granulosa Brady, 1880, p. 125, Pl. XXX, fig. 5.

Dimensions: L. 0,40; H. 0,20; W. 0,18.

Occurrence: Atjeh loc. 1. (2 specimens).

D. 32023.

4. **Xestoleberis kalibengensis, N. Sp. (Pl. VIII, fig. 6).**

Dimensions: L. 0,48; H. 0,30; W. 0,29.

Only closed valves are present. Dorsal margin strongly

convex, more or less pointed and with its greatest diameter just behind the middle. Posterior and anterior extremities wellrounded, very pronounced antero-ventrally, giving the ventral margin a deep concave outline. Valve surface sparsely punctate. In dorsal view egg-shaped. Strong overlap of the left valve in the posterior part. The usual dimorphism has been observed.

Occurrence: Bodjonegoro 973—985 m.

D. 32024.

5. **Xestoleberis sp. (Pl. VIII, fig. 11).**

Dimensions: L. 0,54; H. 0,24; W. 0,21.

A few indistinct *Xestoleberinae* have been observed in the material of the Seuroela Horizon and were figured as a matter of record only.

Occurrence: Atjeh loc. 2 and 5.

D. 32025.

6. **Xestoleberis cf. variegata Brady (Pl. VIII, fig. 9).**

Xestoleberis variegata Brady, 1880, p. 129, Pl. XXXI, fig. 8.

Dimensions: L. 0,48; H. 0,33; W. 0,32.

Only one right valve is available, which differs from *X. variegata* Brady in having a less heavy punctation and a straighter ventral margin.

Occurrence: Sangiran; Pentoek.

D. 32026.

D. SUMMARY AND CONCLUSIONS.

As only a very small number of fossil Ostracods have been described from the Netherlands East Indies (DOEGLAS, FYAN and LE ROY), the author was glad to have an opportunity to enlarge the micropalaeontological knowledge of this group for the Malayan Region. Ostracods have been examined from four places in the Netherlands East Indies, viz. from Atjeh (Northern Sumatra), from Bodjonegoro and the Southern Kendeng Region in East Java, and from the eastern part of the Java Sea.

The fossil Ostracods from Atjeh and S. Kendeng have been collected from surface samples, while the Bodjonegoro Ostracods are from a series of core-samples ranging from 217—2006 m. Some recent Ostracods from bottom samples in the eastern part of the Java Sea, collected by the Snellius Expedition (1929—'30) were added in order to obtain an idea of the recent fauna in this region.

Ninety-four species and four varieties are recorded and figured in this paper; forty of the species and two of the varieties are new. Six new genera have been described: *Hemicytheridea, Atjehella, Paijenborchella, Tanella, Javanella* and *Neomonoceratina.*

From the thirty-seven species, found in the Atjeh Tertiary, twenty-nine are restricted to the Seuroela Horizon, while the other eight were found in deeper layers.

Thirty-one species could be examined from approximately one and the same horizon in the Kendeng Region; it appeared, that sixteen of these species occur in the Seuroela Horizon. There seems to be a close relationship between the tertiary deposits of northern (and western?) Sumatra on the one hand and western and southern Java on the other hand. *Cytherelloidea javana* has been recorded by LE ROY from the Bantam Pliocene and is present in our material from Atjeh and S Kendeng. OOSTINGH's investigations on Molluscs shows a close relationship between the tertiary deposits of Atjeh and Bantam; moreover, Prof. VON KOENIGSWALD kindly informed me, that a pronounced similarity exists between the Molluscs of sangiran

and those found in the Pliocene of Bantam. Consequently the Seuroela Horizon in Atjeh and our material from the southern Upper-Kalibeng in the Kendeng region are apparently of the same age.

A comparison of the Atjeh and Kendeng Ostracods reveals the fact, that a remarkable number of identical species occurs in both regions, 2500 km apart.

The composition of the Bodjonegoro fauna is quite different; forty-one species were found, four of which are only present in the material of the Atjeh-Kendeng Region: *Cytherelloidea bankoensis var., Krithe bartonensis, Cythereis dictyon,* and *Paijenborchella malaiensis.* Bodjonegoro, Atjeh and Kendeng have only one species in common, i.e. *Cytherelloidea bangkoensis var.* which is also the only Bodjonegoro species in the Kendeng region. The cosmopolitan forms *Krithe bartonensis* and *Cythereis dictyon* are of little importance. *Paijenborchella malaiensis,* however, was found in the Border Clay and does not occur in younger deposits. There seems to be some relationship with the eastern Borneo Tertiary as is indicated by the presence of *Cytherelloidea sangkoelirangensis, Bairdia cf. boeloenganensis, Baidia cf. orientalis.*

No Ostracods of pre-Upper Kalibeng age have been met with in the S Kendeng region. Our material from there, which is of Upper Kalibeng age, contains Ostracods quite different from the Bodjonegoro fauna. Apparently the Kendeng Hills have not been submerged during the Pliocene and Pleistocene periods at least; this is in accordance with DUYFJES, who accepted an unconformity between the Rembang — and the Lower Kalibeng Beds.

The examined material from the Java Sea contained nineteen species. With the exception of *Krithe bartonensis,* this recent material and the Bodjonegoro samples have no species in common. whereas nine recent forms were also found in the Atjeh-Kendeng material.

Seven of the Bodjonegoro Ostracods have been found by Brady in the eastern part of the Archipelago (Moluccas and Papua region); it is remarkable, that these forms are absent in the recent Java Sea material. This may be explained by the assumption, that the Bodjonegoro Basin was separated from the surrounding seas, causing a degeneration of the fauna, the

remains of which afterwards became lost in the pleistocene Soenda fauna. This assumption is confirmed by the presence of Orthonotacythere, — which has until now been considered an index-fossil of the Lower Tertiary — in the Pliocene of Bodjonegoro, As BOOMGAART kindly informed me, this supposition may be strengthened by the result of the examination of smaller Foraminifera from Bodjonegoro. It is possible, that many of the recent Java Sea Ostracods migrated from the Indian Ocean into the Java Sea after the drowning of the Soenda Platform and after the forming of Soenda Strait, between Java and Sumatra.

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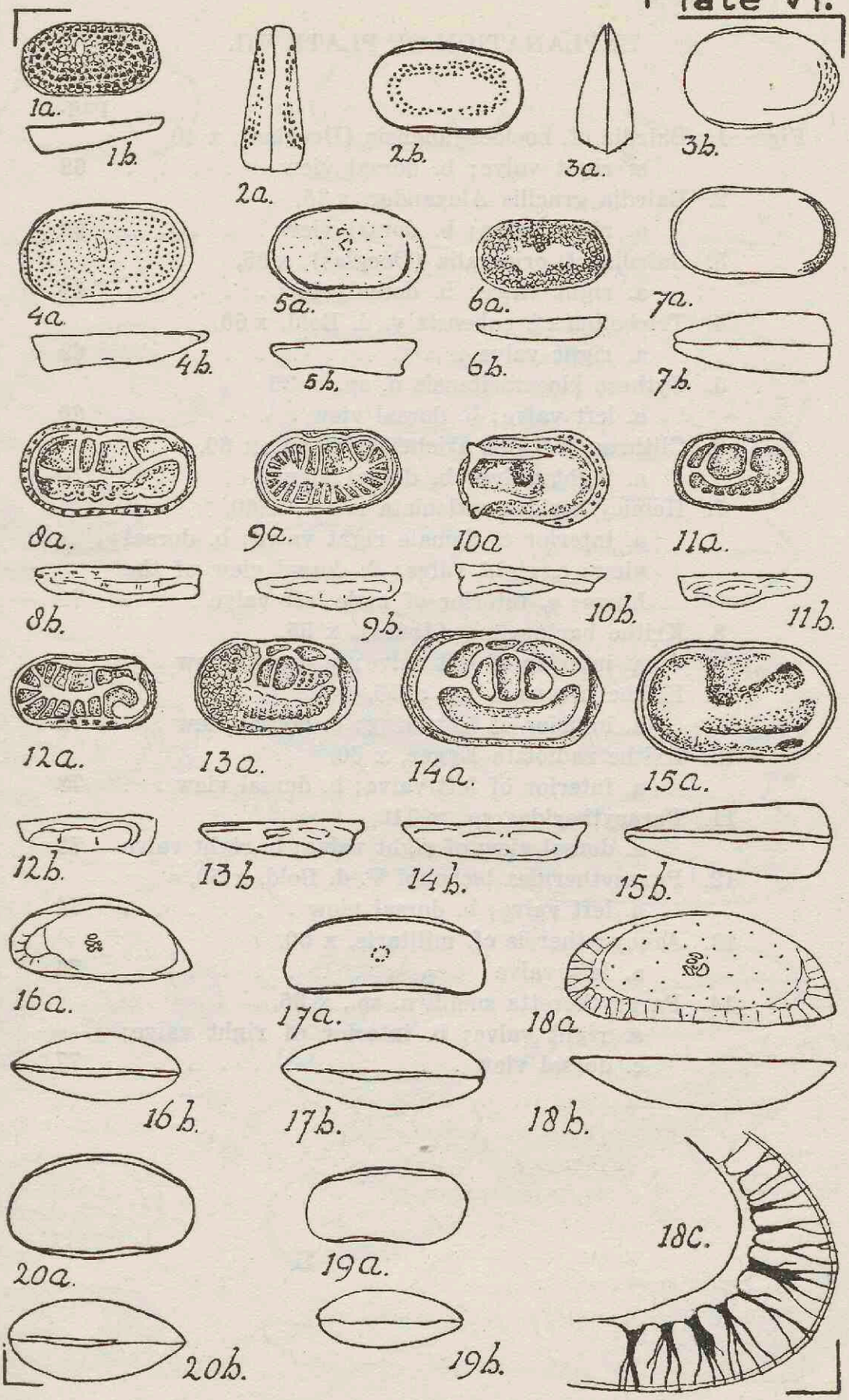
Plate VI.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14b.
15a.
15b.
16a.
16b.
17a.
17b.
18a
18b.
18c.
19a.
19b.
20a.
20b.

EXPLANATION OF PLATE VII.

pag.

Figs. 1. Bairdia cf. boeloenganensis (Doeglas), x 40,
a. right valve; b. dorsal view 68

2. Bairdia gracilis Alexander, x 35,
a. right valve; b. dorsal view 69

3. Bairdia cf. orientalis (Doeglas), x 35,
a. right valve; b. dorsal view 69

4. Triebelina cf. cubensis v. d. Bold, x 60,
a. right valve 69

5. Cythere kloempritensis n. sp., x 35,
a. left valve; b. dorsal view 69

6. Clithrocytheridea atjehensis n. sp., x 60,
a. right valve; b. dorsal view 70

7. Hemicytheridea reticulata n. sp., x 60,
a. interior of female right valve; b. dorsal view; c. right valve; d. dorsal view of the hinge; e. interior of male left valve . . . 71

8. Krithe bartonensis (Jones), x 55,
a. interior of left valve; b. dorsal view . . 72

9. Krithe javana n. sp., x 55,
a. interior of left valve; b. dorsal view . . 72

10. Krithe radiolata Egger, x 60,
a. interior of left valve; b. dorsal view . . 73

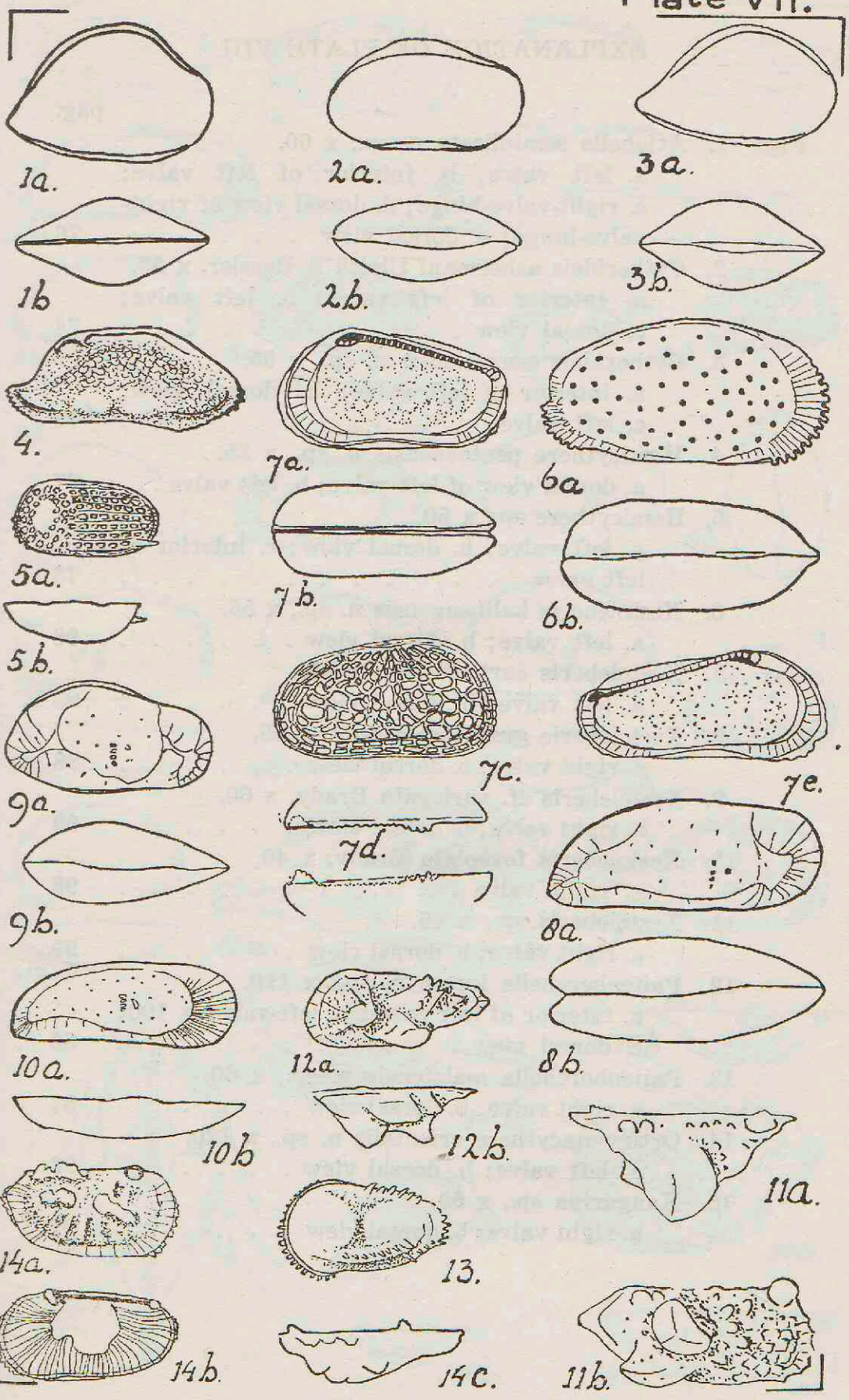
11. Paracytheridea sp., x 110,
a. dorsal view of right valve; b. right valve 73

12. Paracytheridea tschoppi V. d. Bold, x 50,
a. left valve; b. dorsal view 74

13. Archycythereis cf. militaris, x 50,
a. left valve 75

14. Paracytheretta snellii n. sp., x 35,
a. right valve; b. interior of right valve; c. dorsal view 77

Plate VII.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7e.
9a.
7d.
9b.
8a.
10a.
12a.
8b.
10b
12b.
11a.
14a.
13.
14b.
14c.
11b.

EXPLANATION OF PLATE VIII.

pag.

Figs. 1. Atjehella semiplicata n. sp., x 60,
a. left valve; b. interior of left valve; c. right-valve-hinge; d. dorsal view of right-valve-hinge; e. dorsal view 76

2. Cytherideis ashermani Ulrich & Bassler, x 55,
a. interior of left valve; b. left valve; c. dorsal view 74

3. Cytherideis seuroelensis n. sp., x 55,
a. interior of left valve; b. dorsal view; c. left valve 74

4. Hemicythere pentoekensis n. sp., x 35,
a. dorsal view of left valve; b. left valve . . 77

5. Hemicythere sp., x 50,
a. left valve; b. dorsal view; c. interior of left valve 78

6. Xestoleberis kalibengensis n. sp., x 55,
a. left valve; b. dorsal view 98

7. Xestoleberis curta Brady, x 55,
a. left valve; b. dorsal view 98

8. Xestoleberis granulosa Brady, x 60,
a. right valve; b. dorsal view 98

9. Xestoleberis cf. variegata Brady, x 60,
a. right valve; b. dorsal view 99

10. Xestoleberis foveolata Brady, x 40,
a. right valve 98

11. Xestoleberis sp., x 45,
a. right valve; b. dorsal view 99

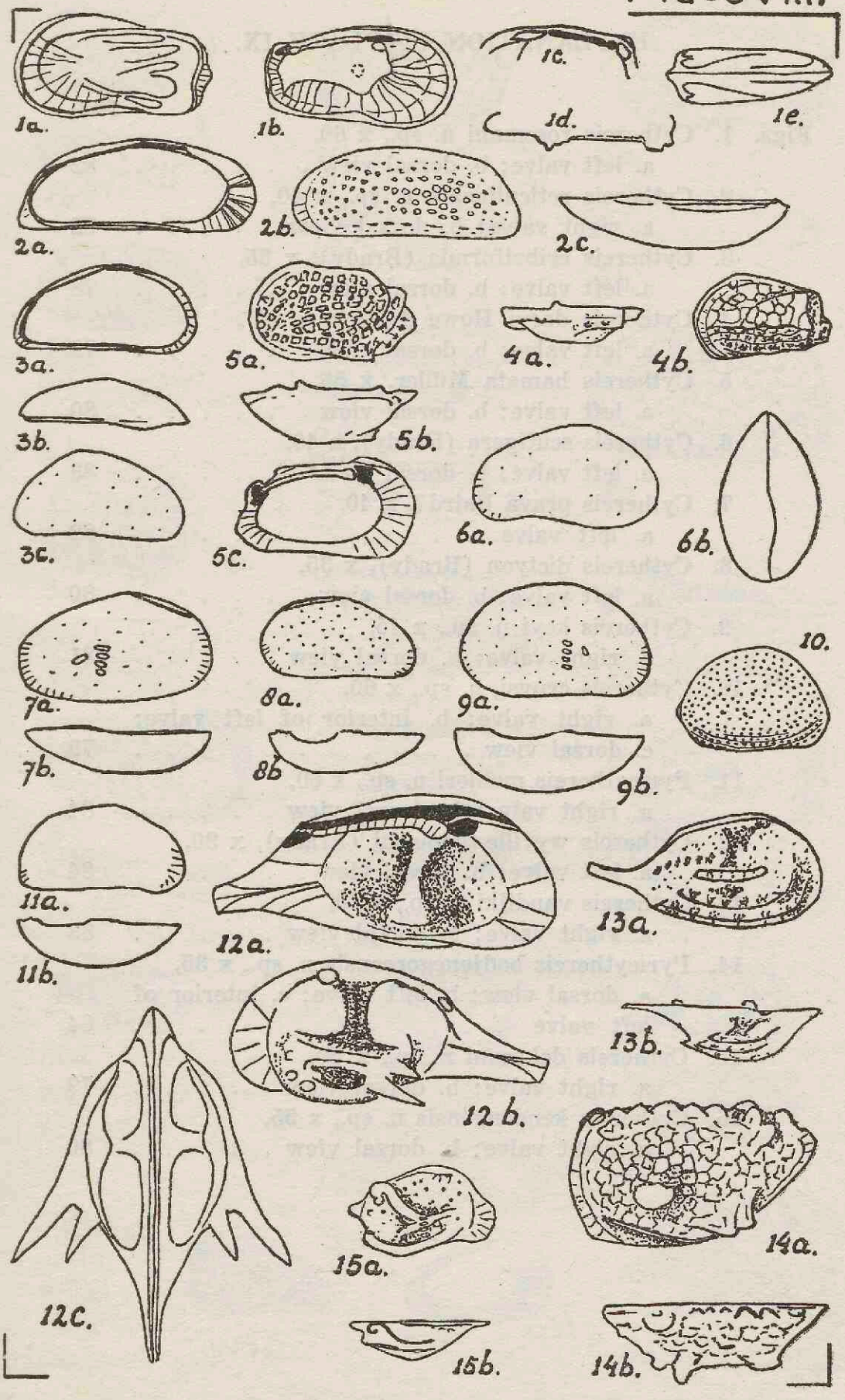
12. Paijenborchella iocosa n. sp., x 110,
a. interior of left valve; b. left valve, x 100; c. dorsal view 86

13. Paijenborchella malaiensis n. sp., x 60,
a. right valve; b. dorsal view 87

14. Orthonotacythere orientalis n. sp., x 120,
a. left valve; b. dorsal view 93

15. Kangarina sp., x 60,
a. right valve; b. dorsal view 92

Plate VIII.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10.
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11b.
12a.
12b.
12c.
13a.
13b.
14a.
14b.
15a.
15b.

EXPLANATION OF PLATE IX.

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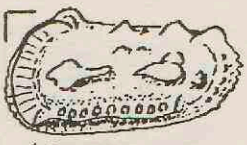
Figs. 1. Cythereis roesmani n. sp., x 60,
a. left valve; b. dorsal view 82
2. Cythereis reticulineata n. sp., x 40,
a. right valve; b. dorsal view 82
3. Cythereis cribriformis (Brady), x 35,
a. left valve; b. dorsal view 78
4. Cythereis dacyi Howe & Law, x 40 ,
a. left valve; b. dorsal view 79
5. Cythereis hamata Müller, x 55,
a. left valve; b. dorsal view 80
6. Cythereis scutigera (Brady), x 40,
a. left valve; b. dorsal view 83
7. Cythereis prava Baird?, x 40,
a. left valve 82
8. Cythereis dictyon (Brady), x 35,
a. left valve; b. dorsal view 80
9. Cythereis keyi n. sp., x 46,
a. right valve; b. dorsal view 81
10. Cythereis cruysi, n. sp., x 60,
a. right valve; b. interior of left valve;
c. dorsal view 79
11. Pyricythereis mohleri n. sp., x 60,
a. right valve; b. dorsal view 84
12. Cythereis wyville-thomsoni (Brady), x 30,
a. left valve; b. dorsal view 84
13. Cythereis vandijki n. sp., x 30,
a. right valve; b. dorsal view 83
14. Pyricythereis bodjonegoroensis n. sp., x 35,
a. dorsal view; b. left valve; c. interior of
left valve 84
15. Cythereis dekrooni n. sp., x 50,
a. right valve; b. dorsal view 79
16. Cythereis kendengensis n. sp., x 55,
a. right valve; b. dorsal view 80

Plate IX.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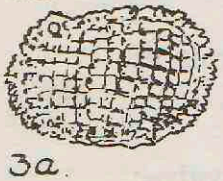
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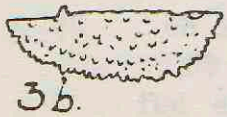
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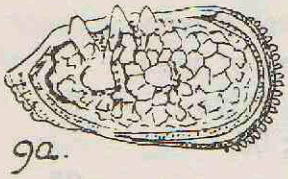
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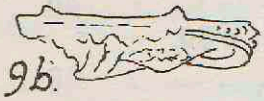
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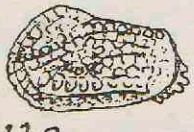
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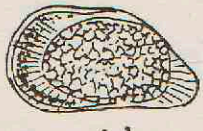
14a.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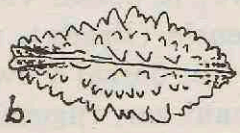
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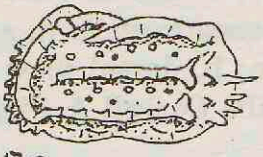
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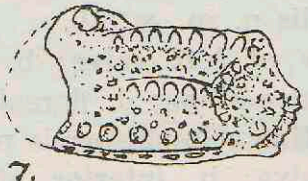
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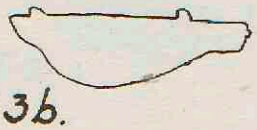
10b.


10c.


13a.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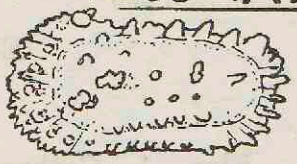
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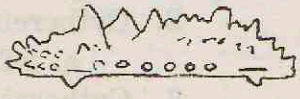
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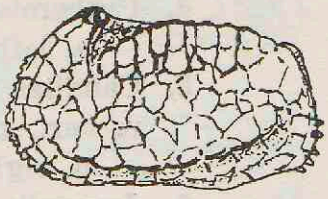
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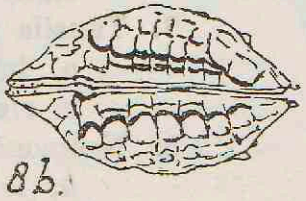
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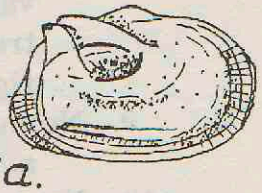
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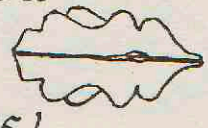
11b.


15a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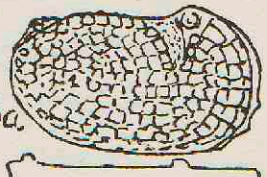

16a.


16b.

EXPLANATION OF PLATE X.

pag.

Figs. 1. Cythereis keutapangensis n. sp., x 40,
a. right valve; b. dorsal view 81

2. Cythereis papuensis (Brady), x 35,
a. left valve; b. dorsal view 81

3. Cythereis roesmani var. rugosa, n. var., x 55,
a. left valve; b. dorsal view 83

4. Cythereis bodjonegoroensis n. sp., x 35,
a. left valve; b. dorsal view 78

5. Caudites medialis Coryell & Fields var. javana, n. var., x 60.
a. right valve; b. dorsal view 85

6. Javanella kendengensis n. sp., x 55,
a. right valve; b. dorsal view; c. interior of right valve 89

7. Tanella gracilis n. sp., x 110,
a. interior of left valve; b. right valve; c. right-valve-hinge; d. dorsal view x 65 . 88

8. Neomonoceratina columbiformis n. sp., x 65,
a. left valve; b. interior of female left valve; c. dorsal view of right valve; d. ventral view of left valve; e. interior of male right valve; f. dorsal view of left valve . . 95

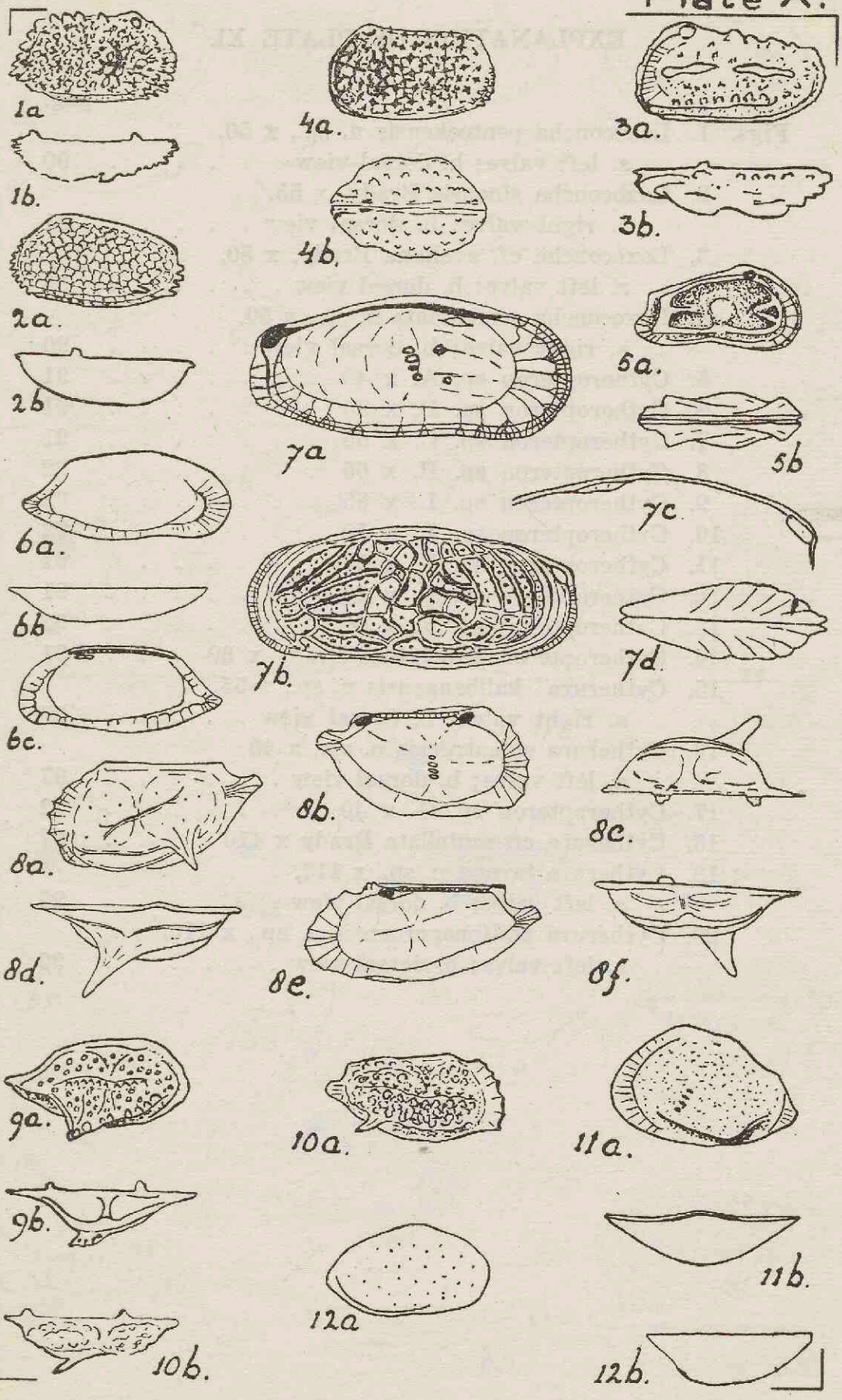
9. Neomonoceratina macropora n. sp., x 55,
a. right valve; b. dorsal view 95

10. Neomonoceratina microreticulata n. sp., x 50,
a. right valve; b. dorsal view 96

11. Eocytheropteron sp. 2, x 50,
a. left valve; b. dorsal view 92

12. Eocytheropteron sp. 1, x 50,
a. right valve; b. dorsal view 92

Plate X.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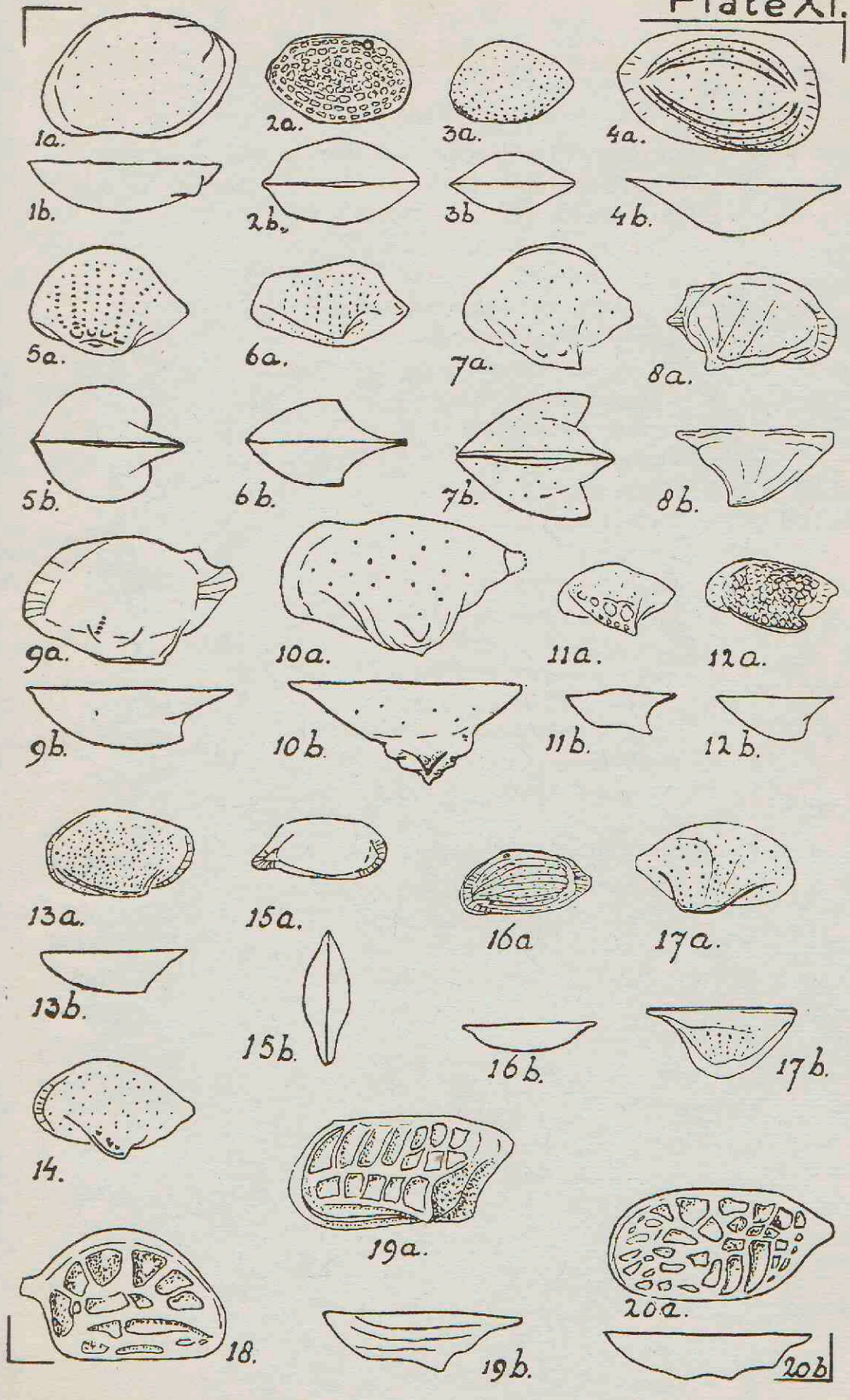
12b.

EXPLANATION OF PLATE XI.

Plate XI.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19a.
19b.
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20a.
20b

DISTRIBUTION-CHART

SPECIES	ATJEH													KENDENG			BODJONEGORO																																				JAVA-SEA		
	SEUROELA HORIZON						KEUTAPANG HORIZON				BORDER CLAY			KLOEMPRIT	PENTOEK	SANGIRAN	217—221.	244—264.	266—285.	292—296.	316—335.	339—355.	368—386.	390—412.	414—427.	505—511.	534—547.	557—577.	598—606.	620—630.	675—690.	729.	761.	822.	858—867.	885—903.	909—915.	950—956.	973—985.	1009.	1051.	1073—1089.	1161—1167.	1269.	1355—1361.	1476.	1531.	1555.	1598.	1656.	1708.	1877.	STATION 25	STATION 26	STATION 29
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* Cytherella cribrosa			R	R	R									R																																									
„ leroyi					R	R								R		C																																							
„ posterotuberculata																			R	R	C	R								R								R	C																
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„ sangiranensis																C																																							
* „ semitalis		R																																																				R	
* „ truncata																					R				R											R												R		R					
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„ bangkoensis var.		R												C		C											R											C	C	R															
„ bodjonegoroensis																																						R	C	R															
* „ cingulata																																																					R		
„ javana				R	R											R																																							
„ rimbai																						R															R		C	R	R														
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„ sp.													R																																										
Argilloecia hiwanneensis																	R	R	R	C	C		R	R					R	R						R		R	C			R			R						R	R			
Macrocypris sp.													R																																										
* Paracypris zealandica			R		R																																																R		
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„ sp.													R																																										
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„ gracilis																											R																												
„ cf. orientalis																																														R				R					
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Triebelina cf. cubensis				R																																																			
Cythere kloempritensis														R		R																																							
Clithrocytheridea atjehensis		C	C	VA	C										C																																								
Hemicytheridea reticulata			C	VA	A									R	R	C																																							
* Krithe bartonensis												R	R				R	R	R	R	C	R					R	R	R	R	R			R	R	R	C	R	C	R		R	R				R	R		R					R
„ javana																		R			C	R			R	R	R	R		R									R																
* „ radiolata																																																							R
Paracytheridea sp.																																							R																
„ tschoppi																								R	R		R																												
Cytherideis ashermanni		R		R																																																			
„ seuroelensis				R												R																																							
* Archycythereis cf. militaris																																																					R		
Atjehella semiplicata			R	VA	R										C	R																																							
* Paracytheretta snellii																																																					R		
Hemicythere pentoekensis															R	R																																							
„ sp.																									R																														
Cythereis bodjonegoroensis																		R	R	R	R		R																																
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„ dekrooni														R		R																																							
* „ dictyon	R				R		R	R	C		R	R					R	R	C	R	C	C	C	R	A	R	R	R				R			C		C	R	C	R		R		R			R	R	R		R				
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„ kendengensis														C		R																																							
* „ keutapangensis							C			R																																												R	
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* „ papuensis		R		A											R	R																																							
* „ prava?																																																							R
„ reticulineata		R	R	A	R										C																																								
„ roesmani														C	R	A																																							
„ „ var. rugosa														R	C																																								
* „ scutigera		R		A	R									R		C																																					C	R	
* „ vandijki		R	R											R																																							R	R	
* „ wyville thomsoni																																																							R
Pyricythereis bodjonegoroensis																									R										R		R			R															
„ mohleri																		C		R	R	R	R	R					R																										
Caudites medialis var. javana				R											R	C																																							
Paijenborchella iocosa																		R			R						R			R							R		R						R										
„ malaiensis										R							R	C	C	R				C	R	R	R	R		R	R	R	R	C		R	R	R	C		R		R		R			R							
Tanella gracilis		R		C										R	R	C																																							
Javanella kendengensis															R																																								
* Loxoconcha cf. avellana																																													R										
„ pentoekensis															R																																								
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Cytheropteron punctatum																													R	R									C																
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„ sp. F.				R																																																			
* „ sp. G.				R																																																			R
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* „ sp. J.																																																						R	
Eocytheropteron sp. 1																R																																							
* „ sp. 2																																																							R
Kangarina sp.																							R																																
Orthonotacythere orientalis																												R										R	R																
* Neomonoceratina columbiformis			R	VA																																																	C		
„ macropora																																							C																
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Cytherura bodjonegoroensis																																						R	R						R										
„ javana																																						R	R																
„ ? kalibengensis																																							C																
* „ cf. scutellata																																						R	R						R										
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* Xestoleberis curta																					R		R											R					C					R											
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* „ granulosa				R																																																				
„ kalibengensis																																							C																
„ sp.			R		R																																																		
* „ cf. variega															R	R																																							

R = rare (1—5 specimens).
C = common (6—20).
A = abundant (21—50).
VA = very abundant (more than 50).

Frequency indications for approximately 50 grams of material.

Depth of the ranges in the Bodjonegoro column in metres.

* Recent species are marked with asterisks.

KINGMA, 1948

VIII

Alvorens tot het opstellen van betrouwbare Mollusken-percent-getallen in het Javaansche Tertiair kan worden overgegaan, is een revisie der recente fauna van Noord- en Zuidkust wenschelijk.

IX

De wijze waarop Booy het uitsterven der Reptielen aan het einde van het Krijt tracht te verklaren, namelijk door middel van vira, moet beschouwd worden als een zeer aannemelijke verklaring voor dit merkwaardig gebeuren.

H. L. Booy: Aan de grens van het leven, 1947.

X

Bij de determinatie van Ostracoden moet meer aandacht besteed worden aan rui-vormen, opdat geen onnoodige genera meer opgericht worden.

XI

Er moet bij Scheepvaart Maatschappijen op aangedrongen worden, dat oliestookschepen hun verbruikte olie niet in den wilden weg op zee storten, daar het aantal zeevogels, dat hier door te gronde gaat, steeds grooter wordt.

XII

Eenige kennis der Algemeene en Indogermaansche taalwetenschappen zou van groot nut zijn voor leerlingen der Middelbare Scholen.

STELLINGEN

I

Een correlatie der Pleistocene Zoogdier-faunae van Australië en Zuid-Oost Azië zou mogelijk zijn met behulp van Tektieten.

II

De afstammingsreeks van den fossielen Mensch in Zuid-Oost Azië, zooals opgesteld door W e i d e n r e i c h, is niet te handhaven aangezien zij op zuiver morphologische gegevens berust en geen rekening houdt met stratigraphie.

F. W e i d e n r e i c h: Giant early man from Java and S. China, 1945.

III

Aan palaeontologische correlatie moet de voorkeur gegeven worden boven tectonische correlatie.

IV

Het „niche" begrip is ook voor palaeontologen en geologen van groot belang.

V

Gezien den huidigen stand van het onderzoek inzake Granitisatie, is het gewenscht voorloopig de gangbare magma-opvattingen te handhaven.

VI

Geologische en palaeontologische gegevens wijzen erop, dat Straat Soenda in sub-recenten tijd is ontstaan.

VII

De benedenloop van de Solo-rivier vanaf Ngawi, is op te vatten als de oorspronkelijke Madioen rivier en moet dus de bovenloop van de Bengawan Solo als een zijrivier beschouwd worden van deze Madioen rivier.