

REVISION OF BRITISH MARINE
CRETACEOUS OSTRACODA WITH
NOTES ON ADDITIONAL FORMS

BY

PETER KAYE, Ph.D.

(Department of Geology, Reading University)

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SYNOPSIS

The marine Cretaceous Ostracoda figured in Jones (1849), Jones & Hinde (1890), Chapman & Sherborn (1893) and Chapman (1898) are revised and refigured. Some comparative forms including five new species are described and illustrated. Four species have been renamed. Of the 98 specific units considered 55 are retained as valid species.

I. INTRODUCTION AND ACKNOWLEDGEMENTS

THE earliest work on marine British Cretaceous Ostracoda was the description of a few species by Williamson (1847) in a paper dealing with a variety of micropalaeontological objects. However, it was not until two years later (Jones 1849) that any advance was made on this subject. Jones referred most of his species to previously described forms, particularly those of Roemer (1838, 1840), Reuss (1845, 1846) and Cornuel (1846, 1848) but many were subsequently proved to be distinct. Later, Jones (1870) and Jones & Hinde (1890) revised many of the forms and greatly enlarged the number of species. Papers by Chapman & Sherborn (1893) and Chapman (1898) on Gault Ostracoda are almost the sum total of early works additional to that of Jones and it is only recently that papers by Neale (1960, 1962), on the previously undescribed British basal Cretaceous faunas, have renewed interest in British marine Cretaceous Ostracoda.

Since the publication of the early works a large number of important articles have appeared (Alexander 1929, 1933, 1934 ; Triebel 1938, 1938*a*, 1940, 1941 ; Deroo 1956 ; Mertens 1956 ; Oertli 1958) which have fundamentally altered the taxonomic concepts of Cretaceous Ostracoda and consequently Jones' and other material has been urgently in need of revision for some time. The poor figures of many of the species have made some of them unusable in the practical sense and the complete lack of designation of type specimens has left interpretation in all cases difficult. Certain of the species have been used, often without reference to the original specimens, as the type members for higher taxonomic units and in some cases well known species that have been perpetuated without reference to the original material now need renaming.

The present work is an attempt to refigure and redescribe as many of the original species as possible and interpret them within the existing classification. Descriptions of certain new and comparative forms are included where necessary and particular attention has been paid to relating more recent work to the early groupings. The museum registration numbers of all the revised material are included together with details of additional comparative material placed by the writer in the British Museum (Natural History) collections.

Most of the redescribed specimens are in the British Museum (Natural History) where the material figured by Jones (1849) and Jones & Hinde (1890) is to be found. Also in the Museum is the material described by Chapman & Sherborn (1893) and Bonnema's material from the Chalk of Limburg. Valuable comparative material was found in the British Museum collections of Morris, Gamble, Vine, Mockler, Lang, Metcalfe and Rowe whilst further specimens attributed to Chapman were examined in the collection of the Geological Survey & Museum. The material from Chapman (1894) Bargate Beds and Chapman (1898) Cambridge Greensand is in the Sedgwick Museum at Cambridge. Further comparative material was obtained from the writer's extensive collection of British Cretaceous material and by the sampling of topotypic horizons. In addition, various workers in Western Europe and North America have been kind enough to furnish the writer with specimens and washed residues from a variety of Cretaceous formations.

In certain cases the original figured material can no longer be traced and in other cases there is no available material at all so that it is impossible to refigure all of the early species. Most prominent of the omissions are several species described by Jones & Hinde (1890) and material referable to this work is on the whole rather limited. This can partly be explained by the fact that many of the figures are reproductions from the 1849 plates and that some of the specimens refigured were loaned to Jones by other workers, e.g. Chapman. It is most unfortunate that this shortage of material should correspond with the poor quality illustrations, the collection from the comparatively well figured 1849 monograph being preserved almost intact.

Many of Jones & Hinde's species falling within the superfamily Cypridacea from the Chalk formation have not been included as the writer is reluctant to interpret species based on a single specimen before a thorough study of the ostracod populations of the Chalk has been undertaken. The limits and validity of the various species can only be decided upon after consideration of such a project the scope of which is outside the limits of this present work.

Only valid references have been included in the synonymies of species described in this paper. This study has been carried out during the tenure of a D.S.I.R. Research Fellowship at the Sedimentology Laboratory, Department of Geology, Reading, and I am extremely grateful to Professor P. Allen for all his help and encouragement. I would also like to express my gratitude to the Trustees of the British Museum (Natural History) and to the Authorities at the Sedgwick Museum (Cambridge) for the loan of much of the type material in their care and also to Dr. R. H. Bate of the British Museum (Natural History) and Dr. F. W. Anderson, Chief Palaeontologist at the Geological Survey for their help and criticism and for providing facilities for study at their respective establishments.

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II. STRATIGRAPHIC POSITION AND LOCATION OF SAMPLES

Almost all the specimens figured by the earlier workers came from horizons now considered to be Upper Cretaceous ; the only pre-Albian references being Chapman's paper (1894) on the Aptian Bargate beds of Surrey and a few forms recorded by Jones from the Aptian sponge gravels at Faringdon, Berkshire. The Bargate beds material, the subject of a further paper (Kaye 1964) is not considered further here.

Chapman concentrated on Ostracoda from the Gault Clay (Middle and Upper Albian) whilst Jones' material came from the Gault Clay and the Chalk. Many of

Jones' Chalk localities are somewhat uncertain as to horizon. The major localities from which ostracoda were described by these early workers are listed below :

JONES 1849.

- | | | |
|-----|--------|---|
| (A) | APTIAN | Sponge gravels at Faringdon, Berks. |
| (B) | ALBIAN | (i) Gault Clay at Folkestone, Kent. |
| | | (ii) Gault Clay at Leacon Hill, Kent. |
| | | (iii) Red Chalk at Speeton, E. Yorks. |
| | | (iv) Upper Greensand at Warminster, Wilts. |
| (C) | CHALK | (i) Chalk Detritus (Mainly Cenomanian) at Charing, Kent. |
| | | (ii) Chalk marl and Grey Chalk from Dover, Kent
(<i>S. varians</i>). |
| | | (iii) Chalk at Gravesend, Kent. |
| | | (iv) Upper Chalk at Norwich (<i>B. mucronata</i>). |
| | | (v) Chalk at Charlton, London. |

JONES & HINDE 1890. Additional localities.

- | | | |
|-----|--------|---|
| (A) | CHALK | (i) Upper Chalk at Thorpe, Norwich, Norfolk
(<i>B. mucronata</i>). |
| | | (ii) Flint meal, Upper Chalk at Horstead, Norfolk
(<i>B. mucronata</i>). |
| | | (iii) Flint meal, Upper Chalk of Antrim, various localities—
(<i>B. mucronata</i>). |
| | | (a) Black Hill near Hannahstown, (b) Ballytober,
Isle of Magee, (c) Whiteabbey, (d) Maghera-
morne, (e) Gobbins, (f) Glenarm. |
| | | (iv) Flint meal, Upper Chalk at Keady Hill. Londonderry
(<i>B. mucronata</i>). |
| | | (v) Chalk rock of Bedfordshire, Buckinghamshire and
Oxfordshire (<i>H. planus</i>). |
| | | (vi) Chalk rock at Dunstable, Bedfordshire (<i>H. planus</i>). |
| | | (vii) Chalk marl at Didcot Station, Berkshire (<i>S. varians</i>). |
| (B) | ALBIAN | (i) Gault Clay at Godstone, Surrey. |
| | | (ii) Gault Clay in Meux's Well, London. |
| | | (iii) Upper Greensand, Ventnor, Isle of Wight. |

CHAPMAN & SHERBORN 1893. All from the Gault Clay at Folkestone, Kent.

CHAPMAN 1898. All from the Cambridge Greensand at Swaffham, Cambridge.

AUTHOR'S LOCALITIES.

- | | | |
|-----|--------|---|
| (A) | APTIAN | (i) Speeton Clay at Speeton E. Yorks. (<i>P. bodei</i> subzone)
Grid Ref. TA150758. |
| | | (ii) Sponge gravel at Coxwell Pit, Faringdon, Berks.
(<i>P. nutfieldensis</i> subzone) Grid Ref. SU288943. |
| | | (iii) Bargate beds at the mortuary pit Compton near Guild-
ford (<i>P. nutfieldensis</i> subzone) Grid Ref. SU962481. |

- (iv) Upper *Crioceras* Beds in Chale Bay, Isle of Wight (*C. debile* subzone). Grid Ref. SZ473780.
- (B) ALBIAN (i) Gault Clay (Middle Albian) at Speeton, E. Yorks.
(ii) Red Chalk (Upper Albian) at Speeton, E. Yorks.
(iii) Lower Gault at Culham near Abingdon, Berks. Grid Ref. SU510949.
(iv) Lower and Upper Gault in the British Portland Cement Co's. pit at Small Dole near Henfield, Sussex. Grid Ref. TV218131.
(v) Upper Gault in the Rugby Portland Cement Co's. pit at Paddlesworth, near Maidstone, Kent. Grid Ref. TQ695623.
(vi) Upper Gault in Fisons Brick pit at Burwell, Cambs. Grid Ref. TL516691.
(vii) Upper Gault and Cambridge Greensand in Messrs. Eastwoods Cement pit at Barrington, Cambs. Grid Ref. TL394507.
(viii) Lower and Upper Gault in Munday's Hill pit at Leighton Buzzard, Beds. Grid Ref. TL915978.
- (C) UPPER CHALK (i) Thorpe Norwich (*B. mucronata* Zone).
(ii) Flint meal, Sonning, Berks. (*M. coranguinum* Zone). Grid Ref. SU750778.

III. SYSTEMATIC DESCRIPTIONS

Order **PODOCOPIDA**Sub order **PODOCOPINA**Superfamily **BAIRDIACEA**Family **MACROCYPRIDIDAE**Genus **MACROCYPRIS** Brady 1867**Macrocypris exquisita** sp. nov.

(Pl. 4, figs. 12, 16)

DERIVATION OF NAME. *exquisita*; referring to the excellent preservation of the type material.

DIAGNOSIS. *Macrocypris*, with strongly acuminate posterior. Ventral margin slightly convex, greatest height just anterior to mid-length.

HOLOTYPE. A right valve, B.M.N.H., Io. 1270, from the Upper Gault at Burwell, Cambs.

PARATYPES. Four specimens from the same horizon and locality, B.M.N.H., Io. 1271-74.

MEASUREMENTS.

	Length	Height
Right Valve (B.M.N.H., Io. 1270, holotype)	1.54 mm.	0.52 mm.

DESCRIPTION. Carapace large and elongate. Greatest height at two-fifths length, greatest width at mid-length. Posterior end strongly acuminate. Dorsal

margin arched, ventral margin weakly convex in its central portion in the right valves but straight or slightly concave in front of mid length in the left valves. Lateral surface smooth. Right valve larger than left overlapping strongly dorsally and ventrally. Duplicature broad, large vestibules occurring both anteriorly and posteriorly. Radial pore canals short and numerous, normal pore canals large but few in number, well scattered. The muscle group consists of a central rosette of scars, upper half of rosette formed of a row of 3 large scars in contact, lower half formed of a row of four smaller scars in contact. A group of two small scars lies antero-dorsal to the main rosette. The hinge is complex being composed in the right valve of two short terminal smooth ridges separated by a long narrow shelf within the margin. This shelf is deeper at its ends and in its central portion is strongly overhung by a long, high, smooth bar.

REMARKS. *M. exquisita* is very closely related to *M. siliqua*. The principal difference is the lower degree of arching of the dorsal margin in the former causing the posterior end to be more strongly acuminate.

Macrocypris muensteriana Jones & Hinde

(Pl. 4, figs. 9, 10)

1849 *Bairdia siliqua* var. α Jones : 25, pl. 5, figs. 16e-g.

1870 *Macrocypris* ? *arcuata* (Munster) ; Jones : 75, 77.

1890 *Macrocypris muensteriana* Jones & Hinde : 10, pl. 2, figs. 45-47.

DIAGNOSIS. *Macrocypris* with short ventral margin and strongly arched dorsal margin. Height/Length ratio small for the genus.

LECTOTYPE. B.M.N.H., In. 51622, figured Jones (1849, pl. 5, figs. 16f, g) from the Detritus at Charing, here designated.

PARALECTOTYPE. B.M.N.H., In. 51618, figured Jones (1849, pl. 5, fig. 16e) from the same locality.

MEASUREMENTS.

	Length	Height
Carapace (B.M.N.H., In. 51622, lectotype) .	1.07 mm.	0.48 mm.
Carapace (B.M.N.H., In. 51618, paralectotype)	1.05 mm.	0.48 mm.

REMARKS. This species grouped at first with *M. siliqua* was erected as a distinct species by Jones & Hinde (1890). It differs from the aforementioned form in its shorter length and proportionally greater height. The posterior end is less drawn out and the dorsal margin is more strongly convex. The greatest height is just posterior to mid-length.

Macrocypris siliqua (Jones)

(Pl. 4, figs. 11, 14, 15, 18)

1849 *Cythere* (*Bairdia*) *siliqua* Jones : 25, pl. 5, figs. 16a-d (non figs. 16e-h).

1870 *Macrocypris siliqua* (Jones) Jones : 75, 77.

1890 *Macrocypris siliqua* (Jones) ; Jones & Hinde : 9, pl. 2, figs. 38-41.

?1898 *Macrocypris siliqua* (Jones) ; Chapman : 333.

DIAGNOSIS. *Macrocypris* with greater height at mid-length. Dorsal margin evenly arched, posterior margin drawn out to form an acute point.

LECTOTYPE. B.M.N.H., In. 51617, figured Jones (1849, pl. 5, fig. 16a) from the Detritus at Charing, here designated.

PARALECTOTYPES. B.M.N.H., In. 51619-20, figured Jones (1849, pl. 5, figs. 16c, d) from the Chalk at Gravesend.

OTHER MATERIALS. (i) Two specimens (B.M.N.H., Io. 1593-94) from the Upper Chalk, Keady Hill, N. Ireland (Jones & Hinde 1890). (ii) Two specimens (B.M.N.H., Io. 1276) from Sonning, Berkshire.

MEASUREMENTS.

	Length	Height
Carapace (B.M.N.H., In. 51617, lectotype) . . .	1.70 mm.	0.57 mm.
Right valve (B.M.N.H., Io. 1594) . . .	2.12 mm.	0.75 mm.
Right valve (B.M.N.H., Io. 1276) . . .	1.60 mm.	0.62 mm.
Left valve (B.M.N.H., Io. 1276) . . .	1.58 mm.	0.55 mm.

REMARKS. *Macrocypris siliqua* differs from the other members of this genus found in the English Chalk in having the greatest height at mid-length rather than at one-third length as in *M. simplex* or at two-thirds length as in *M. wrightii*. The ventral margin is straight or slightly convex in the larger right valves but is slightly incurved antero-ventrally in the left valves. This incurving of the margin is absent in *M. simplex* but is more prominent in *M. wrightii*. These differences may reflect the phylogeny of the genus and form an evolutionary sequence throughout the British Cretaceous but the differences in size of the type material of the three species may indicate an ontogenetic relationship. A statistical study of a large quantity of material from a wide range of horizons and localities is required before the true relationships of the three species can be determined.

Macrocypris simplex Chapman

(Pl. 4, fig. 13)

1898 *Macrocypris simplex* Chapman : 333, text-figs. 1a-c.

HOLOTYPE. Sedgwick Museum No. B40618, Cambridge Greensand ; Swaffham.

OTHER MATERIAL. One specimen (B.M.N.H., Io. 1275) from the Red Chalk at South Cave, E. Yorks.

MEASUREMENTS.

	Length	Height
Carapace (B40618, holotype) . . .	1.35 mm.	0.46 mm.
Left valve (B.M.N.H., Io. 1275) . . .	1.15 mm.	0.40 mm.

REMARKS. The holotype is rather badly preserved but shows significant differences from *M. siliqua*. The carapace is more elongated and tapers more strongly posteriorly. The ventral margin is straight ; the greatest height is at one-third length. *Macrocypris concinna* Jones & Hinde may be conspecific with this form but no figured material is available.

Macrocypris wrightii Jones & Hinde

(Pl. 4, fig. 17)

1890 *Macrocypris wrightii* Jones & Hinde : 10, pl. 2, figs. 42, 44.

DIAGNOSIS. A large elongate *Macrocypris* with greatest height at two-thirds length. There is a convexity of the ventral margin anteriorly in the right valve.

LECTOTYPE. B.M.N.H., Io. 1595, figured Jones & Hinde (1890, pl. 2, fig. 44) from the Upper Chalk of Magee, Antrim, N. Ireland, here designated.

PARALECTOTYPE. B.M.N.H., I. 2473. A broken right valve from the same locality.

MEASUREMENTS.

	Length	Height
Left valve (B.M.N.H., Io. 1595, lectotype)	2.46 mm.	0.75 mm.
Right valve (B.M.N.H., I. 2473, paralectotype)	broken	0.92 mm.

REMARKS. This species is much more elongated than the other species of this genus found in the Cretaceous. Apart from size it differs from *M. siliqua* in having the greatest height set further back (at two-thirds length) and in being more strongly drawn out anteriorly. As there is only one complete specimen, and this being the smaller valve the true nature of the species is still somewhat in doubt.

Superfamily **CYTHERACEA**

Family **CYTHERIDEIDAE**

Genus **SCHULERIDEA** Swartz & Swain 1946

Schuleridea jonesiana (Bosquet)

(Pl. I, figs. 1-5)

1849 *Cythere hilseana* (Roemer) ; Jones : 10, pl. 1, figs. 1a-g.

1852 *Cytheridea jonesiana* Bosquet : 38.

1870 *Cytheridea perforata* (Roemer) ; Jones : 74.

1890 *Cytheridea perforata* (Roemer) ; Jones & Hinde : 29, pl. 1, figs. 1-4.

1893 *Cytheridea perforata* (Roemer) ; Chapman & Sherborn : 349.

1893 *Cytheridea perforata insignis* Chapman & Sherborn : 349, pl. 14, fig. 10.

1893 *Cytheridea rotundata* Chapman & Sherborn : 349, pl. 14, fig. 11.

1893 *Cythere ? spinifera* Chapman & Sherborn : 348, pl. 14, fig. 3.

1938 *Cytheridea (Haplocytheridea) jonesiana* Bosquet ; Triebel : 480, pl. 2, figs. 21-25.

?1954 *Haplocytheridea jonesiana* (Bosquet) ; Stchépinsky, pl. 2, figs. 13, 14.

1956 *Schuleridea jonesiana* (Bosquet) Mertens : 193, pl. 10, figs. 38-40.

1956 *Schuleridea jonesiana* (Bosquet) ; Deroo : 1512, pl. 2, figs. 26-31.

1958 *Schuleridea jonesiana* (Bosquet) ; Oertli : 1507, pl. 5, figs. 105-113.

1963b *Schuleridea jonesiana* (Bosquet) ; Kaye : 31, pl. 2, figs. 9-13.

DIAGNOSIS. Large *Schuleridea* with strongly pitted surface. Eye tubercle prominent, sexual dimorphism well marked. Median hinge groove in left valve often overhung by the strong bar dorsal of it.

LECTOTYPE. B.M.N.H., In. 51637, figured Jones (1849, pl. 1, fig. 1d), from the Gault Clay at Folkestone, here designated.

PARALECTOTYPES. B.M.N.H., In. 51634, 36, 38, 39, 40, figured Jones (1849, pl. 5, figs. 1a-c, e-g) from the Detritus at Charing (1a, b, f, g) and the Gault at Folkestone (1c, e).

OTHER MATERIAL. (i) B.M.N.H., Io. 347, from the Chalk marl at Didcot (Jones & Hinde 1890). (ii) B.M.N.H., I. 2708, Gault Clay, Folkestone (Chapman & Sherborn 1893, pl. 14, fig. 10, *C. perforata* var. *insignis*). (iii) B.M.N.H., I. 2709, Gault Clay, Folkestone (Chapman & Sherborn 1893, pl. 14, fig. 11, *Cytheridea rotundata*). (iv) Sedgwick Museum B.40601, 2, Cambridge Greensand, Swaffham (Chapman 1898). (v) B.M.N.H., Io. 308, Detritus, Charing (Morris collection). (vi) B.M.N.H., Io. 1207, Lower Gault, Culham, Oxon.

MEASUREMENTS.

	Length	Height
Female Left Valve (B.M.N.H., In. 51634)	0.84 mm.	0.58 mm.
Male Left valve (B.M.N.H., In. 51637, lectotype)	0.92 mm.	0.60 mm.
Male left valve (B.M.N.H., I. 2708)	1.00 mm.	0.58 mm.
Female left valve (B.M.N.H., I. 2709)	0.85 mm.	0.62 mm.

REMARKS. This characteristic species was originally included by Jones within the Hauterivian form *Dolococytheridea hilseana* (Roemer). Bosquet (1852) realised the differences in shape and hingement between the two species and renamed Jones' form *Cytheridea jonesiana*. Jones (1870, 1890), though agreeing with Bosquet that it was not *C. hilseana* Roemer equated his form with another of Roemer's species *Cytherina perforata*. This Tertiary species is undoubtedly specifically distinct from Jones' form and Bosquet's interpretation of the latter is now followed. Chapman & Sherborn (1893) erected further species, which are now considered to be conspecific with Bosquet's species. The form figured as *Cytheridea perforata* var. *insignis* is a male left valve, whilst the holotype of *Cytheridea rotundata* is a female left valve. The form figured and described by Chapman & Sherborn (1893) as *Cythere ? spinifera* is an instar of *Schuleridea jonesiana*.

The species has been adequately described but no type specimen or type horizon has ever been designated.

Genus **DOLOCYTHERIDEA** Triebel 1938
Dolococytheridea bosquetiana (Jones & Hinde)
 (Pl. I, figs. 18-20)

1849 *Bairdia angusta* (Munster) ; Jones : 26, pl. 6, figs. 18a-f.

1890 *Pontocypris bosquetiana* Jones & Hinde : 4, pl. 2, figs. 65, pl. 4, fig. 3.

1890 *Pontocypris triquetra* Jones ; Jones & Hinde : 4, pl. 3, figs. 35-37.

1890 *Bythocypris reussiana* Jones & Hinde : 12, pl. 2, figs. 56, 61-63.

1893 *Pontocypris bosquetiana* Jones & Hinde ; Chapman & Sherborn : 346.

1898 *Pontocypris bosquetiana* Jones & Hinde ; Chapman : 332.

1938 *Cytheridea (Dolococytheridea) bosquetiana* (Jones & Hinde) Triebel : 498, pl. 5, figs. 80-83, pl. 6, fig. 91.

1956 *Dolococytheridea bosquetiana* (Jones & Hinde) ; Mertens : 196, pl. 10, figs. 45-47.

1956 *Dolococytheridea bosquetiana* (Jones & Hinde) ; Deroo : 1511.

1958 *Dolococytheridea bosquetiana* (Jones & Hinde) ; Oertli : pl. 4, figs. 85, 86.

DIAGNOSIS. *Dolococytheridea* with straight ventral margin and convex dorsal margin. Greatest height one-quarter to one-third length. Hinge simple, without terminal teeth or crenulations.

LECTOTYPE. B.M.N.H., In. 51629, figured Jones (1849, pl. 6, fig. 18a). Gault, Folkestone, here designated.

PARALECTOTYPES. B.M.N.H., In. 51628, In. 51630-31, figured Jones (1849, pl. 6, figs. 18b, c, f), Gault, Folkestone.

OTHER MATERIAL. (i) B.M.N.H., I. 2457 and Io. 1566, figured Jones & Hinde (1890, pl. 3, figs. 35-37 as *Pontocypris triquetra*), Detritus, Charing, Kent. (ii) B.M.N.H., I. 2696, (Chapman & Sherborn, 1893 *Pontocypris bosquetiana*) ; B.M.N.H., I. 2692-93 (Chapman & Sherborn 1893, *Bythocypris silicula* and var. *minor*) ;

B.M.N.H., I. 2710 (Chapman & Sherborn 1893, *Pseudocythere simplex*). All from the Gault at Folkestone. (iv) Sedgwick Museum B.40566 (Chapman 1898), Cambridge Greensand, Swaffham. (v) B.M.N.H., Io. 1277, Io. 1565. Six specimens (one figured) from the Upper Gault, Maidstone, Kent.

MEASUREMENTS.

	Length	Height
Carapace (B.M.N.H., In. 51629, lectotype)	0.77 mm.	0.37 mm.
Carapace (B.M.N.H., Io. 1565)	0.75 mm.	0.37 mm.
Left valve (B.M.N.H., I. 2696)	0.79 mm.	0.42 mm.

REMARKS. This species has been well described in the past decade but no lectotype has ever been erected. Early authors have confused this species with *Pontocyprilla harrisiana* (Jones) which occurs at the same horizon. The latter species has been refigured by Neale (1962) and is consequently not referred to here.

Family **PROGONOCYTHERIDAE**Genus **NEOCYTHERE** Mertens 1956**Neocythere (Centrocythere) denticulata** Mertens

(Pl. I, figs. 8, 12, 13)

1849 *Cythere punctatula* (Roemer) ; Jones : 11, pl. 1, figs. 2c-m (non figs. 2a, b).

1870 *Cytheropteron concentricum* (Reuss) Jones : 74, 76.

1890 *Cytheropteron concentricum* (Reuss) ; Jones & Hinde : 31, pl. 1, figs. 5, 6, 8-10.

1893 *Cytheropteron concentricum* (Reuss) ; Chapman & Sherborn : 347.

1956 *Centrocythere denticulata* Mertens : 204, pl. 11, figs. 66-71, pl. 14, figs. 97-99.

1963 *Neocythere (Centrocythere) denticulata* Mertens, Kaye : 280, pl. 41, fig. 13.

MATERIAL. (i) B.M.N.H., In. 51644-55, figured Jones (1849, pl. 1, figs. 2c-m) all except figs. 2i, j, l, from the Gault Clay at Folkestone the latter three being from the Detritus at Charing (2i, l) and from the Upper Greensand at Warminster respectively. (ii) B.M.N.H., Io. 1185. Six specimens from the Lower Gault of Culham, Oxfordshire.

MEASUREMENTS.

	Length	Height
Left valve, In. 51649	0.68 mm.	0.43 mm.
Right valve, In. 51656	0.68 mm.	0.42 mm.

REMARKS. Jones described and figured (1849, pl. 1, figs. 2a-m) specimens from the British Albian and Cenomanian as *Cythere punctatula* (Roemer). Subsequent correspondence with Bosquet caused Jones (1870) to place his specimens within *Cytherina concentrica* Reuss (1846). Almost all small ovate Cretaceous species with a concentric ornament were identified by early authors as *Cytherina concentrica* Reuss although the generic allocation varied considerably. Recent work by Mertens (1956) on Reuss' type material has shown that the specimens though too poorly preserved to be adequately described and classified are found to occur in the Turonian. Jones' specimens belong to species erected by Mertens for forms occurring lower in the Cretaceous. The specimens from the Albian (Gault) nearly all belong to *Neocythere (Centrocythere) denticulata* Mertens whilst those from the basal Cenomanian (Charing) can be referred largely to *Neocythere (N.) vanveeni* Mertens. The specimens described by Jones (1849) as *Cytheropteron punctatula* var. *virginia* belong to a distinct species.

Neocythere (Physocythere) virginea (Jones)

(Pl. I, figs. II, 14-17)

- 1849 *Cythere punctatula* var. *virginea*. Jones : 12, pl. 1, fig. 2n.
 ?1852 *Cythere punctatula* var. *virginea*. Jones ; Bosquet : 73, 74, pl. 3, figs. 10a-d.
 1890 *Cythere concentrica* var. *virginea*. Jones & Hinde : 32, 33, pl. 1, figs. 14-17.
 1938 *Cythere slavantensis* Veen : 2, pl. 1, figs. 9-15.
 1940 *Cythere slavantensis* Veen ; Bonnema : 129, pl. 4, figs. 1-4.
 ?1956 *Procytheropteron virgineum* (Jones) Mandelstam : 131, text-figs. 4a, b.

DIAGNOSIS. *Neocythere* with poorly developed concentric ornament, the dorso-lateral surface being smooth. Hinge strong, crenulate merodont with a marginal shelf in the left valves.

LECTOTYPE. B.M.N.H., In. 51656. A juvenile carapace figured Jones (1849, pl. 1, fig. 2n) from the Chalk at Gravesend.

OTHER MATERIAL. (i) B.M.N.H., I. 2489, Io. 1562 (Jones & Hinde 1890) from Magheramorne, N. Ireland and B.M.N.H., Io. 378 (Jones & Hinde 1890) from Keady Hill. (ii) B.M.N.H., In. 53170-71, In. 53096, In. 53256, Io. 1563-64 ; (Rowe) from the Upper Chalk at Norwich. (iii) B.M.N.H., Io. 1181 from the Upper Chalk *coranguinum* Zone, Sonning.

MEASUREMENTS.

	Length	Height
Carapace (B.M.N.H., In. 51656, lectotype) .	0.54 mm.	0.32 mm.
Juvenile left valve (B.M.N.H., Io. 378)	0.53 mm.	0.32 mm.
Juvenile left valve (B.M.N.H., Io. 378)	0.55 mm.	0.34 mm.
Left valve (B.M.N.H., I. 2489)	0.64 mm.	0.45 mm.
Left valve (B.M.N.H., I. 2489)	0.70 mm.	0.50 mm.
Left valve (B.M.N.H., Io. 1562)	0.83 mm.	0.45 mm.
Rowe collection, Norwich (16 specimens)	0.70-82 mm.	0.46-53 mm.
Veen (1938)	0.80 mm.	—

DESCRIPTION. Valves ovate, strongly tumid ventrally. Dorsal margin strongly arched, without cardinal angles. Ventral margin convex but obscured in lateral view. Lateral surface basically smooth but with faint concentric ribs appearing antero-ventrally, postero-ventrally and on the ventral surface in the adults. Greatest height just anterior to mid-length, greatest width just posterior to mid-length. Duplicature narrow crossed by a small number (15 anteriorly) of thick straight radial pore canals. A small crescentic vestibule occurs anteriorly. Normal pore canals abundant, arranged concentrically. Hinge strong, crenulate merodont ; consisting in right valve of terminal denticulate teeth separated by a locellate groove. In the left valve there are two divided sockets separated by a strong denticulate bar. Above the median element is a broad shallow depressed shelf.

REMARKS. The instar figured by Jones is conspecific with larger specimens figured by Veen (1938) and Bonnema (1940) as *Cythere slavantensis*. Specimens of this species reported from the Aptian, Albian and Cenomanian are worn species of *Neocythere* (*N.*) *vanveeni* and other related forms.

The degree of ornamentation appears to be variable as forms with slightly more pronounced concentric ribbing have been found by the writer from flint meal of *Micraster coranguinum* age from Sonning, Berkshire. The measurements of the

British specimens agree well with Veen ; Jones' original specimen being a juvenile.

"Cythere" bairdiana Jones

(Pl. I, fig. 9)

1849 *Cythere bairdiana* Jones : 13, pl. 2, figs. 5a-c.

1870 *Cythere bairdiana* Jones ; Jones : 74.

1890 *Cythere bairdiana* Jones ; Jones & Hinde : 15, pl. 1, figs. 30-32.

MATERIAL. A single right valve, B.M.N.H., In. 51633, from the Lower Greensand (Aptian) of Faringdon.

MEASUREMENTS.

	Length	Height
Right valve (B.M.N.H., In. 51633)	0.63 mm.	0.35 mm.

REMARKS. This species is represented by a single very worn right valve from the Faringdon Greensand. The shape, pitted ornament and amphidont hinge suggests that it is a species of *Macrodentina* s.l. Derivation from Upper Jurassic sediments is possible but other comparable specimens have been found in equivalent strata (Bargate Beds) near Guildford (Kaye 1964).

Family **CYTHERURIDAE**

Genus **AMPHICYTHERURA** Butler & Jones 1957

Amphicytherura chelodon (Marsson)

(Pl. I, figs. 6, 7)

1849 *Cythere (Cythereis) macrophthalma* (Bosquet) ; Jones : 17, pl. 2, figs. 8a-b.

1870 *Cythere macrophthalma* (Bosquet) ; Jones : 75, 76.

1880 *Cythere chelodon* Marsson : 43, pl. 3, figs. 13a-f.

1890 *Cythereis icenica* Jones & Hinde : 26, pl. 1, figs. 37-39.

1958 *Amphicytherura chelodon* (Marsson) Howe & Laurencich : 46.

1958 *Amphicytherura icenica* (Jones & Hinde) Howe & Laurencich : 48.

MATERIAL. B.M.N.H., Io. 1560-61, Io. 1208 from the uppermost Chalk at Norwich.

MEASUREMENTS.

	Length	Height
Left valve (B.M.N.H., Io. 1560)	0.53 mm.	0.33 mm.

REMARKS. Jones records only two specimens of this species, which have since been lost. He does, however, remark on the similarity of his specimens and those of Marsson. The figures and redescription of Marsson's form in Howe & Laurencich (1958) fit these specimens and Jones' figures well and therefore all are assumed to be conspecific.

The hinge is strongly amphidont with divided terminal elements. The ornament of three longitudinal ribs with subsidiary cross ribs fit the description exactly.

There is no trace of the specimens described by Jones & Hinde (1890) as *Cythereis icenica quadrata* but from their figures the specimens look to be of a young stage of a species of *Cythereis*, possibly akin to *Cythereis semiplicata* (Reuss). Until additional material can be found no further progress can be made.

Family **BRACHYCYTHERIDAE**Genus **BRACHYCYTHERE** Alexander 1933**Brachycythere** cf. **sphenoides** (Reuss)

(Plate 2, fig. 5)

?1854 *Cythere sphenoides* Reuss : 141, pl. 27, figs. 2a-c.1890 *Cytheropteron sphenoides* (Reuss) Jones & Hinde : 33, 34, pl. 1, figs. 18-20.

MATERIAL. B.M.N.H., Io. 1575. A right valve, presumably the one figured by Jones & Hinde (1890) from the Chalk Rock at Dunstable.

MEASUREMENTS.	Length	Height	Width
Right valve (B.M.N.H., Io. 1575)	0.80 mm.	0.47 mm.	0.27 mm.

REMARKS. This single specimen is compared to *Brachycythere sphenoides* Reuss on a basis of similarity to the published figures and on Jones & Hinde's identification. The valve is smooth and swollen ventrally. The ventral rib though directed posteriorly is not drawn out to form an ala. The eye tubercle is particularly prominent. The hinge is strongly amphidont having a high smooth anterior tooth and an elongate divided posterior tooth in the right valve. As there is only a right valve the details of an accommodation groove are lacking.

The species resembles *Brachycythere laticristata* (Bosquet), which is found at somewhat higher horizons, but has the ventral rib less drawn out posteriorly and the long margins more strongly convergent.

Brachycythere laticristata (Bosquet)

(Pl. 2, figs. 1-4, 6)

1854 *Cythere laticristata* Bosquet : 118, pl. 7, figs. 11a-d.1940 *Brachycythere laticristata* (Bosquet) Bonnema : 129, pl. 4, figs. 5-7.

MATERIAL. B.M.N.H., In. 53142, 53249-54, Io. 1567-71. Several specimens in slides from the Rowe collection, Upper Chalk, Norwich.

MEASUREMENTS	Length	Height	Width
Left valve (B.M.N.H., Io. 1569)	0.95 mm.	0.60 mm.	0.37 mm.

DESCRIPTION. Valves smooth and inflated ; strongly tumid ventrally but not alate. The ventral rib is strongly drawn out posteriorly and has a small laterally directed spine on its crest. Eye tubercle prominent ; lower half of anterior and posterior margins dentate. A weak longitudinal ridge occurs on the ventral surface. Duplicature broad, crossed by numerous radial pore canals which show a tendency to branch antero-ventrally. Hinge strongly amphidont ; in the right valve a high smooth anterior tooth with a small anterior extension and an elongate divided posterior tooth (6 denticles) ; median element of the left valve with a marked accommodation groove above it.

REMARKS. This species is rather similar to *B. sphenoides* but is more inflated and has the ventral rib more strongly drawn out posteriorly. The long margins are not as strongly convergent.

Genus *ALATACYTHERE* Murray & Hussy 1942*Alatacythere robusta* (Jones & Hinde)

(Pl. 2, figs. 7-16, 18)

- 1849 *Cythereis alata* (Bosquet) ; Jones : 21, pl. 5, figs. 14a-d.
 1890 *Cytheropteron alatum robustum* Jones & Hinde : 36, pl. 2, figs. 24-27.
 1890 *Cytheropteron alatum fortis* Jones & Hinde : 36, pl. 2, figs. 20, 21.
 ?1890 *Cytheropteron alatum cornuta* Jones & Hinde : 36, pl. 4, fig. 36.
 ?1890 *Cytheropteron hibernicum* Jones & Hinde : 36, pl. 6, figs. 22, 23.
 1893 *Cytheropteron alatum cornuta* Jones & Hinde ; Chapman & Sherborn : 347.

MATERIAL. (i) B.M.N.H., In. 51689-90, figured Jones (1849, pl. 5, figs. 14a, b) from the Upper Chalk, Norwich. (ii) B.M.N.H., Io. 362, Io. 1576 from Dunstable, I. 2458 from Kent, I. 2480 from Gobbins (all Jones & Hinde 1890, var. *robustum*), Upper Chalk. (iii) B.M.N.H., Io. 1577-78 from Keady Hill, I. 2481 from Magee (Jones & Hinde 1890, var. *fortis*), Upper Chalk. (iv) B.M.N.H., Io. 2207 from between Black Head and Gobbins, I. 2476 from Keady Hill (Jones & Hinde 1890), Upper Chalk. (v) B.M.N.H., I. 2678 (Chapman & Sherborn 1893), Gault, Folkestone. (vi) B.M.N.H., In. 53172, In. 53249-54, Io. 1572-74 (Rowe) Upper Chalk, Norwich.

MEASUREMENTS.

	Length	Height
Jones', Rowe's specimens	0.76-0.80 mm.	0.44-0.52 mm.
B.M.N.H., I. 2678	1.00 mm.	0.58 mm.
B.M.N.H., In. 53172	0.88 mm.	0.52 mm.

REMARKS. The available specimens of this species show that there is an intergradation between most of Jones & Hinde's varieties. There appear to be no representatives among their specimens showing the large size indicated for many of the varieties, the form from the Gault clay (Chapman collection) being the only large individual found. The bulk of the forms seem to approximate to var. *robusta* in size and consequently that name is taken for the species. The degree of inflation, the size and shape of the ala, the arching of the dorsal margin and the denticulation of the anterior and posterior margins is extremely variable ; all intermediates being seen to occur. A thorough statistical study of a large number of specimens may, however, enable the species to be subdivided.

The species is referred to the genus *Alatacythere* on the basis of its amphidont hinge ; the posterior tooth in the right valve being elongate and divided ; there is no accommodation groove in the left valve.

Alatacythere ? phylloptera (Bosquet)

(Pl. 2, figs. 17, 19)

- ?1854 *Cythere phylloptera* Bosquet : 116, pl. 7, figs. 10a-d.
 1890 *Cytheropteron ? phyllopterum* (Bosquet) Jones & Hinde : 37, pl. 3, figs. 9, 10.
 1940 *Cythereis (Pterygocythereis) phylloptera* (Bosquet) Bonnema : 132, pl. 4, figs. 37-41.

MATERIAL. B.M.N.H., Io. 377, Io. 1579-80, four specimens from the Jones & Hinde collection labelled *Cytheropteron* sp., from Upper Chalk, Keady Hill, Londonderry.

MEASUREMENTS

	Length	Height
4 specimens	0.78-0.80 mm.	0.38 mm.

DESCRIPTION. Valves small, laterally compressed. Dorsal and ventral margins straight, converging slightly posteriorly. Dorsal margin with three large equally spaced spines; anterior and posterior margins similarly spined particularly on their lower halves. A narrow ventral ala occurs with subsidiary spines along its crest. Lateral surface smooth, eye tubercle prominent. A low anterior marginal rib occurs which is continued into the ala ventrally.

Hinge strongly amphidont, having an elongate crenulate posterior tooth and a high smooth anterior tooth in the right valve. There is no accommodation groove in the left valve.

REMARKS. This species is rather similar to *A. robusta* but the ala is much narrower and more laterally directed. The strong spination of the margins is the most easily distinguishable feature.

Family **BYTHOCYTHERIDAE**Genus **MONOCERATINA** Roth 1928**Monoceratina acanthoptera** (Marsson)

(Pl. 3, fig. 2)

1880 *Cythere acanthoptera* Marsson : 45, pl. 3.1938 *Monoceratina acanthoptera* (Marsson) ; Veen : 3.

MATERIAL. A right valve, B.M.N.H., Io. 1206, from the Upper Chalk at Norwich.

MEASUREMENTS

	Length	Height
Right valve (B.M.N.H., Io. 1206)	0.52 mm.	0.26 mm.

REMARKS. This species, which appears to be confined to the topmost Chalk was not recorded by Jones. His form *Cythere umbonata acanthoptera* (Jones & Hinde 1890 : 41) is much larger, and reticulate. *M. acanthoptera* has often been confused with *Monoceratina longispina* (Bosquet) but is smaller, less inflated and has the lateral spine behind rather than below the median sulcus. The sulcus therefore is not terminated abruptly. The surface in both species is smooth.

Monoceratina bonnemai sp. nov.

(Pl. 3, figs. 5, 6)

DERIVATION OF NAME. After J. H. Bonnema in recognition of his work on the Chalk of W. Europe.

DIAGNOSIS. *Monoceratina*, with smooth surface and two laterally directed spines on ventro-lateral surface. Prominent bulbous tubercle occurs on anterior half of dorso-lateral surface.

HOLOTYPE. B.M.N.H., Io. 1169, a right valve from the Cambridge Greensand of Barrington (Cambs.).

PARATYPES. B.M.N.H., Io. 1170-71, left and right valves from the same locality.

MEASUREMENTS

	Length	Height	Width
Left valve (B.M.N.H., Io. 1169, holotype)	0.75 mm.	0.32 mm.	0.33 mm.

DESCRIPTION. Valves smooth, elongated. Dorsal and ventral margins straight and parallel; posterior drawn out into a blunt postero-dorsal caudal extension. Lateral surface divided by a vertical median sulcus. Ventrally there are two prominent horn-like spines; a large one posterior to the sulcus and a smaller one anterior to it. The two spines are partially fused at their base and limit the sulcus ventrally. A large circular bulbous node occurs on the dorsal part of the antero-lateral surface. The valve margin bears a series of small tubercles antero-ventrally. A narrow ridge runs along the posterior half of the dorsal margin.

REMARKS. The ornament of this species is quite unlike any other published Cretaceous species.

Monoceratina cf. longispina (Bosquet)

(Pl. 3, fig. 1)

1854 *Cythere longispina* Bosquet : 86, pl. 6, figs. 7a-d.

1941 *Monoceratina longispina* (Bosquet) Bonnema : 40, pl. 6, figs. 67-76.

MATERIAL. B.M.N.H., Io. 1204, Io. 1581, from the Cambridge Greensand of Barrington (Cambs.).

REMARKS. This form was not recorded by Jones from the British Cretaceous. In some ways it is similar to his *Cythere umbonata acanthoptera* and the latter was thought to be conspecific with this species by Bonnema (1941). It differs, however, in being smooth or only faintly reticulate and more inflated. The lateral spine is conical in shape being short with a wide base whilst *C. umbonata acanthoptera* has a longer and more slender spine. The sulcus is very strong but is terminated abruptly against the swollen base of the lateral spine.

Bosquet records this species from the Senonian whilst the British specimens are from the Cambridge Greensand of Albian/Cenomanian age. As I have not seen Bosquet's specimens the identification of this species is based on Bonnema's material and figures.

Monoceratina montuosa (Jones & Hinde)

(Pl. 3, fig. 3)

1890 *Cytheropteron cuspidatum montuosa* Jones & Hinde : 38, pl. 3, figs. 14-16.

?1934 *Monoceratina montuosa* (Jones & Hinde) Alexander : 62, pl. 8, fig. 5.

1941 *Monoceratina montuosa* (Jones & Hinde) ; Bonnema : 41, pl. 7.

DIAGNOSIS. *Monoceratina* with two prominent ventro-lateral spines. Dorsal and ventral margins straight and parallel. Dorsal margin with a row of four tubercles, the anterior one being the eye tubercle. Lateral surface smooth.

LECTOTYPE. A right valve, B.M.N.H., I. 2478, from the Island of Magee though labelled as *Cytheropteron cuspidatum* the specimen undoubtedly belongs to Jones' form *Cytheropteron cuspidatum montuosa* and is here considered as lectotype.

C. cuspidatum montuosa is said by Jones to come from Magee whilst he records true *C. cuspidatum* from Norfolk.

MEASUREMENTS

	Length	Height	Width
Right valve (B.M.N.H., I. 2478)	0.78 mm.	0.30 mm.	0.27 mm.

DESCRIPTION. The shape and ornament of this species make it distinct. It bears two rather thick short lateral spines, the posterior of the two being the larger. The valves are strongly compressed laterally. Four tubercles occur along the dorsal margin, the one immediately anterior to the median sulcus being about twice the size of the others. The dorsal margin is long and straight, the ventral margin is short, straight and parallel. It is strongly spined anteriorly and tuberculate posteriorly.

REMARKS. This species differs from *M. cuspidata* s.s. in having two ventral spines. Specimens of the latter species are missing from the Jones collection and its exact interpretation is therefore doubtful. *M. tricuspidata* (Jones & Hinde) is smaller and has three long ventral spines.

***Monoceratina pedata pedata* (Marsson)**

(Pl. 3, figs. 9-14)

1880 *Cythere pedata* Marsson : 46, pl. 3, fig. 16a.

1890 *Cytheropteron pedatum* (Marsson) Jones & Hinde : 38, pl. 4, figs. 33-35.

?1929 *Cytherura spooneri* Israelsky : 6, pl. 4a, fig. 7.

1933 *Monoceratina pedata* (Marsson) Alexander : 203, pl. 27, figs. 15a, b.

1934 *Monoceratina pedata* (Marsson) ; Alexander : 60.

1939 *Monoceratina pedata* (Marsson) ; Alexander : 66.

1941 *Monoceratina pedata* (Marsson) ; Bonnema : 29, pl. 6, figs. 27-30.

1957 *Monoceratina pedata* (Marsson) ; Butler & Jones : 24, pl. 4, fig. 3.

MATERIAL. (i) B.M.N.H., Io. 355 (Jones & Hinde), Chalk, Dunstable. (ii) B.M.N.H., Io. 372, Io. 1588 (Jones & Hinde), Chalk, Keady Hill. (iii) B.M.N.H., I. 2492, Io. 1587 (Jones & Hinde, 1890, pl. 4, figs. 33-35), Upper Chalk, Gobbins. (iv) B.M.N.H., In. 53094-95, In. 53236-41, In. 53242-47, Io. 1584-86 (Rowe), Upper Chalk, Norwich.

MEASUREMENTS

	Length	Height
Left valves	1.10-1.12 mm.	0.52-0.55 mm.

REMARKS. The species is abundant in the uppermost Chalk in this country but is found occasionally as low as the Cambridge Greensand. It has in the past been confused with *M. umbonata* but is larger and more triangular lacking the strong median sulcus of the latter and having a thicker and longer spine. The reticulate ornament bears no relationship to this spine, being a regular mesh over the whole of the lateral surface. Small tubercles often occur at the intersections in the reticulation. *M. umbonata* has parallel dorsal and ventral margins and is not as drawn out posteriorly. One of the clearest characteristics of *M. pedata pedata* is the double row of spines along the anterior margin and the single row of spines along the posterior and ventral marginal areas. Apart from the spine the lateral surface is devoid of major nodes and spines.

***Monoceratina pedata salebrosa* (Jones & Hinde)**

(Pl. 3, figs. 15, 16)

1890 *Cytheropteron pedatum salebrosa* Jones & Hinde : 39, pl. 3, fig. 8 ; pl. 4, fig. 32.

DIAGNOSIS. A subspecies of *Monoceratina pedata* with subdued reticulate

ornament and a series of small tubercles sporadically located upon the lateral surface. Tubercles most prominent in a line ventral of the major lateral spine.

LECTOTYPE. B.M.N.H., Io. 2208, a left valve (Jones & Hinde 1890, pl. 3, fig. 8) from the Upper Chalk of Whiteabbey, Antrim, here designated.

PARALECTOTYPE. A right valve Io. 2209, from the same locality.

MEASUREMENTS

	Length	Height
Left valve (B.M.N.H., Io. 2208, lectotype)	0.91 mm.	0.47 mm.

REMARKS. The two specimens are undoubtedly Jones' original material. They are very closely related to *M. pedata pedata*. They differ principally in the nature of the surface ornament. The reticulation is subdued and the valves have a rather undulating appearance. Small tubercles are found, particularly clustered around the large lateral spine and in a row below it. The left valve possesses a marked median sulcus but in the right valve it is hardly visible. In shape and marginal ornament the subspecies is identical with *M. pedata pedata*.

***Monoceratina pedata laevoides* Bonnema**

(Pl. 3, fig. 17)

?1880 *Cythere pedata laevis* Marsson : 45, pl. 3, figs. 16b, c.

1941 *Monoceratina laevoides* Bonnema : 29, pl. 6, figs. 47-53.

MATERIAL. (i) B.M.N.H., Io. 355 (Jones & Hinde 1890) from the Chalk of Dunstable. (ii) B.M.N.H., Io. 1589 (Rowe), Upper Chalk, Norwich.

MEASUREMENTS

	Length	Height
Left valve (B.M.N.H., Io. 1589)	0.96 mm.	0.49 mm.

REMARKS. Identical with *M. pedata pedata* apart from the lack of reticulation on the lateral surface. The valves are smooth and shiny with a well marked median sulcus. Small tubercles are scattered over the surface particularly dorsally and in a line below the large lateral spine. The largest of the specimens is rather smaller than adults of *M. pedata pedata*. The close association and similarity of this form with *M. pedata pedata* suggest that this subspecies could be an extreme variant of the latter. However, until further material is available, it is preferred to consider these forms as separate subspecies.

***Monoceratina sherborni* (Jones & Hinde)**

(Pl. 3, fig. 4)

1890 *Cytheropteron sherborni* Jones & Hinde : 42, pl. 1, figs. 33, 34 ; pl. 4, figs. 20, 21.

MATERIAL. B.M.N.H., In. 53166, a left valve (Rowe) Upper Chalk, Norwich.

MEASUREMENTS

	Length	Height
Left valve (B.M.N.H., In. 53166)	0.86 mm.	0.47 mm.

REMARKS. There is no trace of the original material but a comparative specimen is figured. The species lacks the prominent lateral spine but shows all the internal features of the genus *Monoceratina*. The surface is strongly divided by the median sulcus. The lateral surface is ornamented by concentric ridges bearing small spines. The hinge is a simple bar. The shape and inflation are somewhat reminiscent of *M. umbonatooides* but it is not as elongate, and lacks the spine and flattened anterior and posterior marginal areas.

Monoceratina tricuspidata (Jones & Hinde)

(Pl. 3, figs. 7, 8)

1890 *Cytheropteron cuspidatum tricuspidata* Jones & Hinde : 38, pl. 3, figs. 6, 7.1936 *Monoceratina tricuspidata* (Jones & Hinde) Veen : 9, 42, 43, pl. 2, figs. 4-11.1941 *Monoceratina tricuspidata* (Jones & Hinde) ; Bonnema : 40, pl. 6, figs. 77-80.1941 *Monoceratina tricuspidata* (Jones & Hinde) ; Triebel : 353.

DIAGNOSIS. Small *Monoceratina* with three prominent ventro-lateral spines. Other subsidiary tubercles occur over the lateral surface but no reticulation. Eye tubercle well developed.

LECTOTYPE. B.M.N.H., Io. 1583 (Jones & Hinde 1890), Upper Chalk, Keady Hill.

OTHER MATERIAL. B.M.N.H., Io. 1202, Io. 1582, two specimens from the Upper Chalk, *coranguinum* Zone, Sonning, Berks.

MEASUREMENTS

	Length	Height
Right valve (B.M.N.H., Io. 1583, lectotype) .	0.65 mm.	0.25 mm.

REMARKS. The species is similar in shape to *M. montuosa* but is smaller and has three very prominent lateral spines. It occurs throughout the Upper Chalk in Britain, but is never very abundant.

Monoceratina umbonata (Williamson)

(Pl. 4, figs. 3, 4, 6-8)

1847 *Cytherina umbonata* Williamson : 82, pl. 4, fig. 78.1849 *Cythere umbonata* (Williamson) Jones : 12, pl. 2, figs. 3a-g.1870 *Cytheropteron umbonatum* (Williamson) Jones : 74, 76.1872 *Cytheroptera umbonata* (Williamson) Williamson : 136.?1880 *Cythere umbonata* (Williamson) ; Marsson : 45, pl. 3, figs. 15a-c.1890 *Cytheropteron umbonatum* (Williamson) ; Jones & Hinde : 40, pl. 1, figs. 21-26.1890 *Cytheropteron umbonatum longispinata* Jones & Hinde : 41, 42, pl. 3, figs. 11, 12 ; pl. 4, figs. 30, 31.1893 *Cytheropteron umbonatum* (Williamson) ; Chapman & Sherborn : 347.?1934 *Monoceratina umbonata* (Williamson) Alexander : 62, pl. 8, fig. 9.1941 *Monoceratina umbonata* (Williamson) ; Bonnema : 29, pl. 6, figs. 54-62.

MATERIAL. (i) B.M.N.H., In. 51595-51601, figured Jones (1849, pl. 2, figs. 3a-g) from the Chalk Detritus at Charing. (ii) B.M.N.H., Io. 314 (Morris) Charing ; B.M.N.H., In. 19382-85 (Hinde) Upper Greensand, Warminster ; B.M.N.H., I. 2676-77 (Chapman) Gault Clay, Folkestone. (iii) B.M.N.H., Io. 1203, Io. 1590, Cambridge Greensand, Barrington (Cambs.). (iv) Hull University 17.C.8.1, Red Chalk, Speeton, E. Yorks.

MEASUREMENTS

	Length	Height
Adult left valve (B.M.N.H., Io. 1203) .	0.78 mm.	0.34 mm.

REMARKS. This species is extremely variable in ornament and degree of inflation, the ornament being reticulate but also often strongly spinose. The original figure by Williamson is drawn from an oblique angle and those of Jones (1849) from the same locality are generally taken as typical. Most of Jones' figured specimens are pre-adults, the larger adult forms being rare. The spinose variants were grouped by Jones & Hinde (1890) into a distinct variety : var. *longispinata*. All

intermediates between the spinose and simple reticulate forms are however found and therefore no separation can be made on this basis. The forms figured by Jones & Hinde as var. *longispinata* were adult specimens which would be expected to have a more strongly developed ornament than the young moults. The length and changes in shape of the lateral spine described as a varietal difference are due to breakage and forms described as having a short, broad, flat topped spine have the spine broken.

The degree of inflation is particularly variable. The lateral surface anterior to the median sulcus is generally flattened in true *M. umbonata*. Forms with inflated anterior lateral areas described by Jones & Hinde (1890) as var. *acanthoptera* Marsson are renamed *Monoceratina umbonatoides* (see below). These forms, often with a pronounced node on the antero-lateral area, have almost certainly evolved from *M. umbonata* and transitional forms do occur. *M. umbonata* is largely confined to Albian and Cenomanian sediments, however, whilst the Upper Cretaceous members of this plexus are found to be *M. umbonatoides*.

M. umbonata differs from *M. pedata pedata* principally in shape. It has a well marked median sulcus and the reticulation is often arranged concentrically around the lateral spine.

Monoceratina umbonatoides nom. nov.

(Pl. 4, figs. 5, 6)

1890 *Cythere umbonatum acanthoptera* (Marsson) ; Jones & Hinde : 41, pl. 1, figs. 11-13 ; pl. 4, figs. 22-29.

LECTOTYPE. B.M.N.H., Io. 1592 (Jones), Magee, Antrim, here designated.

OTHER MATERIAL. (i) B.M.N.H., Io. 374 (Jones & Hinde) Upper Chalk, Keady Hill, Derry. (ii) B.M.N.H., Io. 1205, Io. 1591, three specimens from the Upper Chalk, *coranguinum* Zone, Sonning, Berks.

MEASUREMENTS

	Length	Height
Left valve (B.M.N.H., Io. 1205)	0.65 mm.	0.39 mm.

REMARKS. This species differs from *M. umbonata* in the strong inflation of the antero-lateral area. A large node is usually present antero-dorsal to the median sulcus. The species seems to be restricted to the Upper Chalk and is probably a direct descendent from *M. umbonata*. It differs from Marsson's form (1880, pl. 3, figs. 14a-c) in the reticulate ornament and in having the spine posterior to rather than below the median sulcus.

Family **PROTOCYTHERIDAE**

Genus **PROTOCYTHERE** Triebel 1938

Protocythere consobrina Triebel

(Pl. 5, figs. 17-19)

1938 *Protocythere consobrina* Triebel : 184, pl. 1, figs. 6, 7.

MATERIAL. B.M.N.H., Io. 1190, Io. 1603-05 from the Lower Gault, Culham, Oxfordshire.

MEASUREMENTS	Length	Height
Male left valve (Io. 1605)	1.05 mm.	0.57 mm.
Female left valve (Io. 1190)	0.92 mm.	0.57 mm.

REMARKS. This species is very similar to *Protocythere triplicata* (Roemer) from the Hauterivian and Barremian. The principal differences are that the ribs are less convex and the anterior hinge element is set slightly out of line, the median groove in the right valve passing above the anterior tooth. Specimens of *P. triplicata* from the Middle Barremian at Speeton, E. Yorkshire, are figured on Pl. 5, figs. 12, 13, 15.

P. consobrina lacks the ventral riblets of *P. lineata* and has smooth intercostal areas. The instars have subdued ribbing whilst those of *P. lineata* are still strongly emphasised, obscuring the dorsal margin.

Protocythere lineata (Chapman & Sherborn)
(Pl. 5, figs. 1-8)

1849 *Cythere* (*Cythereis*) *triplicata* (Roemer) ; Jones : 18, pl. 3, figs. 9a-h.

1870 *Cythereis triplicata* (Roemer) Jones : 75-76.

1890 *Cythereis triplicata* (Roemer) ; Jones & Hinde : 19, pl. 1, figs. 56-61.

1893 *Cythereis triplicata lineata* Chapman & Sherborn : 348, pl. 14, fig. 5.

1898 *Cythereis triplicata lineata* Chapman & Sherborn ; Chapman : 338.

1938 *Protocythere jonesi* Triebel : 186, pl. 1, figs. 8-10.

1956 *Protocythere jonesi* Triebel ; Deroo : 1514.

DIAGNOSIS. *Protocythere* with three prominent longitudinal ribs. The ventral one bears small longitudinal riblets upon its surface. Intercostal areas with irregular network of small cross ribs.

LECTOTYPE. B.M.N.H., I. 2704, figured Chapman & Sherborn (1893, pl. 14, fig. 5) from the Gault Clay, Middle Albian at Folkestone, Kent, here designated.

OTHER MATERIAL. (i) B.M.N.H., In. 51665-66, In. 51668-72 figured Jones (1849, pl. 3, figs. 9a-g) from the Detritus at Charing and from Folkestone Gault Clay. (ii) B.M.N.H., Io. 309 (Morris) from the Detritus at Charing. (iii) B.M.N.H., I. 2464 (Jones & Hinde 1890) from the Chalk marl at Didcot. (iv) B.M.N.H., Io. 1187, Io. 1596-1600 from the Upper Gault at Burwell, Cambs.

MEASUREMENTS	Length	Height
Right valve (B.M.N.H., I. 2704, lectotype)	0.60 mm	0.30 mm.

REMARKS. This species identified by Jones (1849) as *Cythereis triplicata* (Roemer). was renamed by Triebel (1938). Unfortunately a specimen described as a subspecies by Chapman & Sherborn (1893) has been found to be a young stage of *C. triplicata* sensu Jones. This subspecies *C. triplicata lineata* has priority over Triebel's subsequent correction and therefore provides the valid specific name.

The species has been well described by Triebel. Its particular characteristics include the longitudinal riblets upon the ventral rib and the numerous small ribs which cross the inter-costal areas. The prominence of these ribs is variable, a fact which is particularly apparent amongst specimens of different states of preservation. *P. lineata* is closely related to *P. consobrina* which occurs in equivalent strata in

Southern England. The latter is, however, more strongly inflated and lacks the ventral riblets. The intercostal areas are smooth and the dorsal and ventral ribs are less arched.

Another related form is *P. tricostata* which has the intercostal areas strongly reticulate. The longitudinal ribs are longer and keel-like and do not obscure the dorsal and ventral margins to the same extent.

***Protocythere tricostata* Triebel**

(Pl. 5, figs. 14, 16)

1938 *Protocythere tricostata* Triebel : 190, pl. 2, figs. 17-22.

MATERIAL. B.M.N.H., Io. 1188, four specimens from the Middle Albian at Speeton, E. Yorkshire.

MEASUREMENTS

	Length	Height
Male left valve (B.M.N.H., Io. 1188) .	0.90 mm.	0.47 mm.
Female left valve (B.M.N.H., Io. 1188)	0.80 mm.	0.47 mm.

***Protocythere rudispinata* (Chapman & Sherborn)**

(Pl. 5, figs. 9-11)

1893 *Cythereis rudispinata* Chapman & Sherborn : 348, pl. 14, figs. 6, 7.

DIAGNOSIS. Small *Protocythere* with three longitudinal rows of large flat topped spines running across the lateral surface. Anterior margin bearing a row of spines. Intercostal areas smooth.

LECTOTYPE. B.M.N.H., I. 2705 figured Chapman & Sherborn (1893, pl. 14, fig. 6), a left valve from the Lower Gault at Folkestone, here designated.

PARALECTOTYPE. B.M.N.H., I. 2705 figured Chapman & Sherborn (1893, pl. 14, fig. 7), a right valve from the same locality.

OTHER MATERIAL. B.M.N.H., Io. 1189 from the Lower Gault at Henfield, Sussex.

MEASUREMENTS

	Length	Height
Left valve (B.M.N.H., I. 2705, lectotype) .	0.59 mm.	0.33 mm.

DESCRIPTION. Valves relatively small, compressed laterally. Dorsal and ventral margins straight and subparallel. The lateral surface bears three longitudinal rows of stout flat-topped spines. A further row of similar spines runs along the ventral surface, whilst smaller spines are often found between the two major ventral rows. The weak anterior marginal rib bears a double row of laterally directed spines. Anterior and posterior margins tuberculate. Intercostal areas smooth. Normal pore canals rare, usually connected with a spine on lateral surface.

Duplicature broad and crossed by numerous radial pore canals which curve upwards antero-dorsally. Hinge crenulate merodont with strongly divided stepped terminal elements.

REMARKS. The shape, marginal features and hinge place Chapman & Sherborn's specimens in the genus *Protocythere* rather than *Cythereis*. The form described by Triebel (1940, pl. 4, figs. 47-50) and by Deroo (1956) differs fundamentally, being larger, compressed dorsally, more strongly convergent posteriorly and lacks the

prominent hinge ear in the left valve. It also differs in the details of the marginal area, hinge, and normal pore canals and falls within the latter genus. Further differences are in the shorter nature of the spines and the absence of spines along the ventral surface.

Genus *VEENIA* Butler & Jones 1957

Venia barringtonensis sp. nov.

(Pl. 6, figs. 1-3)

DIAGNOSIS. *Venia*, with three longitudinal ribs which almost join posteriorly. Ventral rib connected to anterior margin at one-third height, also bears row of laterally divided tubercles at posterior end.

HOLOTYPE. B.M.N.H., Io. 1172, a female left valve from 1 ft. below the Cambridge Greensand, Barrington (Cambs.).

PARATYPES. Four specimens, B.M.N.H., Io. 1173-76, from the same horizon.

MEASUREMENTS

	Length	Height
Male left valve (B.M.N.H., Io. 1173, paratype)	0.87 mm.	0.47 mm.
Female left valve (B.M.N.H., Io. 1172 holotype)	0.79 mm.	0.47 mm.

DESCRIPTION. Valves elongate, compressed, anterior broadly rounded, posterior pointed at mid-height in the right valve but forming a blunt point at the postero-dorsal angle in the left valve. Dorsal margin straight, ventral margin straight or weakly convex. Three longitudinal ribs cross the lateral surface. The dorsal rib is rather sinuous and is equal in length to the median hinge element, obscuring the margin in its central part but curving downwards anteriorly and posteriorly. The median rib is shorter and straight, being connected with a low muscle node anteriorly. The ventral rib is strongly convex. Anteriorly it is connected to the margin at one-third height by a short horizontal cross rib, posteriorly it bears a row of 5 or 6 small laterally directed tubercles on its crest. The anterior and posterior margins are tuberculate, each tubercle corresponding to the extremity of a radial pore canal.

Duplicature broad, crossed by a few, thick, radial pore canals. These number 10 anteriorly and 6 posteriorly, being concentrated antero- and postero-ventrally, the upper ones curving dorsally. Inner margin and line of concrescence coincide.

Hinge strongly amphidont having in the right valve two high, divided, terminal teeth separated by a long, locellate, median groove deepened anteriorly into a smooth socket. The socket and groove are open ventrally but are bounded dorsally by a high, smooth bar. The median groove extends somewhat above the terminal elements. In the left valve there are two strong, divided sockets, separated by a high strongly denticulate bar. The bar bears a prominent smooth tooth at its anterior end and is separated from the dorsal margin by a narrow shelf. In front of the anterior socket the margin is elongated into a keel-like process which fits into a depression above the anterior tooth in the right valve.

REMARKS. *V. barringtonensis* differs from the closely related *V. harrisiana* in the shape of the longitudinal ribs and the greater emphasis of the ornament.

Veenia harrisiana (Jones)
(Pl. 4, fig. 1 ; Pl. 6, figs. 4-11)

- 1849 *Cythere (Cythereis) interrupta* (Bosquet) ; Jones : 16, pl. 2, figs. 6a-g.
 1849 *Cythere (Cythereis) quadrilaterata* (Roemer) ; Jones : pl. 4, figs. 10h, i.
 1870 *Cythere harrisiana* Jones : 75, 76 (new name).
 1890 *Cythere harrisiana* Jones ; Jones & Hinde : 16, pl. 1, figs. 47-52.
 1890 *Cythere harrisiana reticosa* Jones & Hinde : 18, pl. 1, fig. 46.
 1890 *Cythere harrisiana setosa* Jones & Hinde : 17, pl. 1, figs. 43-45.
 1890 *Cythereis auriculata* (Cornuel) ; Jones & Hinde : 19, pl. 1, figs. 53-55.
 1893 *Cythere harrisiana* Jones ; Chapman & Sherborn : 346.
 1893 *Cythere harrisiana reticosa* Jones & Hinde ; Chapman & Sherborn : 346.
 1893 *Cythere harrisiana setosa* Jones & Hinde ; Chapman & Sherborn : 346.
 1893 *Cythere auriculata* (Cornuel) ; Chapman & Sherborn : 346.
 1893 *Cythere lineatopunctata* Chapman & Sherborn : 348, pl. 14, fig. 4.
 1893 *Cythere koninckiana* (Bosquet) ; Chapman & Sherborn : 348, pl. 14, fig. 2.
 1898 *Cythere harrisiana* Jones ; Chapman : 335.
 1898 *Cythere harrisiana reticosa* Jones & Hinde ; Chapman : 336.
 1898 *Cythere harrisiana setosa* Jones & Hinde ; Chapman : 335, 336.
 1898 *Cythere koninckiana* (Bosquet) ; Chapman : 337, 338, figs. 4a, b.
 1898 *Cythereis auriculata* (Cornuel) ; Chapman : 338.
 1938 *Protocythere auriculata* (Cornuel) Triebel : 195, pl. 2, figs. 27-31.
 1956 *Protocythere triebeli* Deroo : 1515 (new name).
 1963c *Veenia triebeli* (Deroo) Kaye : 233, pl. 18, figs. 10, 11.
 ?1963c *Homocythere reticulata* Kaye : 234, pl. 18, figs. 8, 9.

DIAGNOSIS. *Veenia* with three low, inflated, straight parallel longitudinal ribs. Hinge ears prominent in left valves. Lateral surface smooth-pitted. Marked changes occur in ornament throughout ontogeny.

LECTOTYPE. B.M.N.H., In. 51663 figured Jones (1849, pl. 2, fig. 6d), a pre-adult right valve from the Gault Clay, Folkestone, here designated.

PARALECTOTYPES. B.M.N.H., In. 51657-62 figured Jones (1849, pl. 2, figs. 6a-c, e-g), figs. 6b, c, g from the Gault at Folkestone, figs. 6a, e, f from the Detritus at Charing.

OTHER MATERIAL. (i) B.M.N.H., I. 2689 (Chapman & Sherborn) ; B.M.N.H., I. 2690 (Chapman & Sherborn var. *reticosa*) ; B.M.N.H., I. 2691, Io. 1610 (Chapman & Sherborn var. *setosa*) ; B.M.N.H., I. 2680 (Chapman & Sherborn *C. auriculata*) ; B.M.N.H., I. 2703 (Chapman & Sherborn *C. lineatopunctata* pl. 14, fig. 4) all from the Gault Clay at Folkestone. (ii) S.M.B. 40574-77, B. 40580-81, B. 40585-88, B. 40621 (Chapman 1898) all from the Cambridge Greensand at Swaffham. (iii) B.M.N.H., Io. 1606-09 from the Middle Albian at Speeton, E. Yorkshire.

MEASUREMENTS

	Length
Male left valves	0.96-1.00 mm.
Female left valve	0.86-0.90 mm.
Penultimate instars	0.66-0.75 mm.
Instars group A	0.52-0.56 mm.
Instars group B	0.43-0.45 mm.
Instars group C	0.36-0.38 mm.
Instars group D	0.30-0.32 mm.

REMARKS. This species must be amongst the most confused of all Cretaceous ostracoda. Most of the early references refer to pre-adult valves as the adult form was not described until 1890. The difference in shape and ornament between the adults and pre-adults led to their being considered as separate species for a considerable time. The adults, first included within *Protocythere auriculata* (Cornuel) were renamed *P. triebeli* by Deroo in 1956. The pre-adults, which offer the first valid specific name, were further subdivided on a basis of ornament. This ornament varies from completely smooth to strongly reticulate and all intermediate stages are usually seen within the same sample (Pl. 4, fig. 1). On a basis of the amphidont hinge the writer (1963c) placed the species within the genus *Veenia*.

A further confusing feature is that weak sexual dimorphism is shown by the penultimate moults; the valve proportions being interpreted as varietal differences by early authors.

The adult specimens differ from the pre-adults in the following ways:—The long margins are parallel, and a prominent hinge ear is developed in the left valve. The ornament of longitudinal ribs is increased in length and prominence and an anterior marginal rib is introduced. The muscle node is also subdivided. The duplicature doubles in width and the radial canals become longer and curve upwards antero-dorsally. The hinge is strengthened and changes from merodont to amphidont.

The synonymy only includes references with figures or those of which the author has seen the actual specimens. *Homocythere reticulata* Kaye is here tentatively included in the synonymy. Its intimate occurrence with pre-adults of *V. harrisiana* where adults are absent may indicate that it is a form of the adult found under unusual ecological conditions.

Family TRACHYLEBERIDIDAE

Genus *CYTHEREIS* Jones 1849

Cythereis corrigenda nom. nov.

(Pl. 7, figs. 6, 9)

1940 *Cythereis rudispinata* Chapman & Sherborn; Triebel, 200, pl. 4, figs. 47–50.

1956 *Cythereis rudispinata* Chapman & Sherborn; Deroo: 1516.

MATERIAL. B.M.N.H., Io. 1198, Io. 1616–17, from the Lower Gault, *dentatus* Zone, Culham, Oxfordshire.

MEASUREMENTS

	Length	Height
Male left valve (B.M.N.H., Io. 1617)	0.87 mm.	0.42 mm.
Female left valve (B.M.N.H., Io. 1198)	0.77 mm.	0.42 mm.

REMARKS. Triebel's specimens differ significantly in shape, size, nature and distribution of ornament, marginal features and hingement from Chapman & Sherborn's specimens (1893: 248, pl. 14, figs. 6, 7). The latter specimens falling within the genus *Protocythere*. Triebel's form has therefore been given a new name. *Cythereis matronae* Damotte & Grosdidier (1963) is very similar to *C. corrigenda*, but it is stated to differ in its greater size and lack of reticulation. Triebel's specimens, however, are of similar size and have smooth intercostal areas.

Cythereis folkstonensis nom. nov.

(Pl. 7, figs. 1-5)

1849 *Cythere* (*Cythereis*) *quadrilaterata* (Roemer) Jones : 18, pl. 3, figs. 10a-c, e-f (non pl. 3, fig. 10d ; pl. 4, figs. g-h).

1870 *Cythere quadrilaterata* (Roemer) ; Jones : 75, 76.

1890 *Cythereis quadrilaterata* (Roemer) ; Jones & Hinde : 20, pl. 1, figs. 69-71, 74-75.

DIAGNOSIS. Large *Cythereis* with three longitudinal rows of tubercles. Lateral surface devoid of reticulation. Eye tubercle and muscle node prominent.

LECTOTYPE. B.M.N.H., In. 51678 figured Jones (1849, pl. 3, fig. 10a) from the Gault Clay at Folkestone, here designated.

PARALECTOTYPES. B.M.N.H., In. 51679-80, In. 51682-83 figured Jones (1849 pl. 3, figs. 10b, c, e, f) from the Gault Clay at Folkestone.

OTHER MATERIAL. B.M.N.H., Io. 1192, Io. 1614-15, from the Upper Gault at Burwell, Cambs.

MEASUREMENTS

	Length	Height
Left valve (B.M.N.H., In. 51678, lectotype) .	1.12 mm.	0.60 mm.

REMARKS. This species having been wrongly attributed by Jones is here renamed. *C. folkstonensis* appears to be restricted to the Albian, most of the specimens from the Chalk are referable to such species as *C. lurmannae*, *C. cornueli*, *Veenia harrisiana*, etc.

The most diagnostic features of *C. folkstonensis* are the rows of tubercles along the longitudinal ribs ; the separation of the median longitudinal rib and the muscle node ; the smooth intercostal areas. *Cythereis folkstonensis* is most closely related to *Cythereis glabella* Triebel but is less inflated and has spines on the longitudinal ribs. It is likely that it is related to its reticulate counterpart *Cythereis reticulata* (Jones & Hinde).

Cythereis lonsdaleiana Jones

(Pl. 7, figs. 7, 10)

1849 *Cythere* (*Cythereis*) *lonsdaleiana* Jones : 20, pl. 5, figs. 12a, b (non fig. 12c).

1870 *Cythere lonsdaleiana* Jones : 75, 76.

1880 *Cythere filicosta* Marsson : 43, pl. 3, figs. 12a, b.

1890 *Cythereis lonsdaleiana* Jones ; Jones & Hinde : 27, pl. 1, figs. 64, 65.

1941 *Cythereis filicosta* (Marsson) ; Bonnema : 132, pl. 4, figs. 48-53 (non pl. 7, figs. 55-58).

DIAGNOSIS. *Cythereis* with keel-like longitudinal ribs. Dorsal rib formed of series of short oblique cross ribs. Median rib short and joined to large smooth muscle node.

LECTOTYPE. B.M.N.H., In. 39012 figured Jones (1849, pl. 5, fig. 12b) from the Upper Chalk at Norwich, here designated.

PARALECTOTYPE. B.M.N.H., In. 39011 figured Jones (1849, pl. 5, fig. 12a) from the same locality.

OTHER MATERIAL. B.M.N.H., Io. 1196 and Io. 1618 from the Upper Chalk at Norwich.

MEASUREMENTS

	Length	Height
Right valve (B.M.N.H., In. 39012, lectotype)	0.63 mm.	0.37 mm.

REMARKS. Jones' pl. 5, fig. 12c (B.M.N.H., In. 39013) is of a much larger, differently ornamented form. Marsson's species *Cythere filicosta* as redescribed after examination of the original types by Bonnema (1941) fits Jones' original description exactly. The multiple nature of the dorsal rib was the most diagnostic feature according to Bonnema who used this criterion for separating the form from *Cythereis semiplicata* (Reuss). The interior of the valves are shallow, with a wide duplicature. The hinge is strongly amphidont with high, weakly lobed terminal teeth in the right valves.

Specimens referred to this species by Chapman and other authors from the Gault Clay of S.E. England (B.M.N.H., I. 2683) are instars of *Cythereis reticulata* and allied forms.

***Cythereis macrophthalma* (Bosquet)**

(Pl. 6, figs. 12-15, 17)

1847 *Cypridina macrophthalma* Bosquet : 16, pl. 3, figs. 3a-d.

1936 *Cythereis macrophthalma* (Bosquet) Veen : 7, pl. 2, figs. 43-48.

1958 *Cythereis macrophthalma* (Bosquet) ; Howe & Laurencich : 212.

MATERIAL. (i) B.M.N.H., Io. 354 from the Chalk Rock at Dunstable ; B.M.N.H., Io. 351 from the Chalk at Norwich ; B.M.N.H., Io. 345 from the Chalk at Colchester all mounted by Jones & Hinde (1890) as *C. quadrilaterata*. (ii) B.M.N.H., Io. 1193 from the Upper Chalk at Norwich.

MEASUREMENTS

	Length	Height
Male carapace (B.M.N.H., Io. 345)	0.85 mm.	0.47 mm.
Female left valve (B.M.N.H., Io. 345).	0.77 mm.	0.47 mm.

REMARKS. *Cythereis quadrilaterata* sensu Jones appears to be confined to Albian sediments and the specimens from the Chalk so labelled by Jones are all referable to *C. macrophthalma*. Bosquet's original figures are so bad that identification is here largely based on Veen's illustrations.

In shape the species is somewhat akin to *Protocythere* or *Veenia* but possesses typical hinge and marginal features of the genus *Cythereis*. The intercostal areas are smooth and the muscle node is separated from the median rib. The species lacks the spination and inflation of true *Cythereis quadrilaterata*.

***Cythereis ornatissima* s.l. (Reuss 1846)**

(Pl. 8, figs. 1, 2, 4, 6)

1846 *Cytherina ornatissima* Reuss : 104, pl. 24, figs. 12, 18.

?1846 *Cytherina ciliata* Reuss : 104, pl. 24, fig. 17.

?1874 *Cythere ornatissima* Reuss : 146, pl. 2, figs. 5, 6.

?1887 *Cythere ornatissima* Reuss ; Kafka : 15, fig. 30.

1963 *Cythereis ornatissima* (Reuss) and subspecies ; Pokorny : 8-26, pl. 1, figs. 1-3 ; pl. 2, fig. 1 ; pl. 3, fig. 3 ; pl. 4, figs. 1-9 ; pl. 6, figs. 1, 2, 5, 6 ; pl. 7, fig. 3.

MATERIAL. (i) B.M.N.H., In. 53097, 53164, 53266, 53272, Io. 1622-25 (Rowe) from Upper Chalk, Norwich.

REMARKS. This species has been greatly confused in the past and large number of forms have been referred to it.

Triebel (1940) figured topotypic material from the Turonian of Bohemia and showed that forms attributed to this species by the majority of the early authors were almost without exception quite different. Jones (1849, plate 4, figs. 11a-h) figured a form which he referred to as *Cythereis ciliata* (Reuss). In a later paper (1870) he stated that Reuss had decided that the two species *C. ciliata* and *C. ornatissima* were con-specific and that the latter had preference. Jones & Hinde (1890) therefore referred to the 1849 material under *C. ornatissima* (Reuss). Jones' (1849) figured material came from the Detritus at Charing and the Gault at Folkestone but he recorded the species from other Cretaceous horizons (Chalk marl). The specimens figured by Williamson (1847) as *Cythere echinulata* were also included by Jones & Hinde (1890) in the synonymy. Jones states that *C. ornatissima* is most abundant in the Gault Clay. Between 1849 and 1890 a wide variety of forms were figured as *C. ornatissima* (Reuss) and in 1890 Jones & Hinde separated off five subspecies leaving Jones, 1849 material as *C. ornatissima s.s.* A form previously described by Jones (1849, pl. 5, figs. 13a-d) as *Cythereis cornuta* (Roemer) was included as a subspecies under the name *Cythereis ornatissima nuda*. Later work, particularly by Triebel (1940) has separated off many of those later forms, refiguring some and erecting new species for others. Jones and Jones & Hinde's specimens belong to a wide range of forms but lack of material makes the bulk of the varieties questionable.

Dr. Triebel of the Senckenberg Museum, Frankfurt am Main, has kindly sent me a topotypic specimen of his 1940 published material. On examination it was found that though none of the figured specimens attributed to this form by Jones belongs there, some of the specimens from the British Museum collection are comparable. These are included in slides from the Dunstable Chalk (I. 2466, Io. 388, Io. 1626) and from the Upper Chalk of Keady Hill, N. Ireland (Io. 375). Triebel's specimens have now been referred to *Cythereis longaeva longaeva* by Pokorny (1963). A number of specimens from the Rowe Norwich collections are larger and more spinose than Triebel's and probably belong to *Cythereis ornatissima s.l.* They are in slides B.M.N.H., In. 53097, 53164, 53266, 53272 and Io. 1622-25. Further study of the distribution in these and related forms throughout the Chalk are required before a final decision can be made.

All the species of *Cythereis* from the British Upper Cretaceous show a wide variability of ornament; particularly is the emphasis of the reticulation and spination. A thorough investigation of large numbers of specimens to determine the variability of the ornament is needed in most cases. Recently Pokorny (1963), working with topotypic material and some of Reuss' original material now deposited in the Natural History Museum, Vienna, has completely revised *Cythereis ornatissima* (Reuss) erecting two new species and three subspecies. The limited nature of this latter material does not entirely clarify the situation and in his opinion the two forms *C. ornatissima* and *C. ciliata* are by no means definitely conspecific. The wide variety of forms grouped by Reuss into *C. ornatissima* show that a large number of specimens are necessary for accurate study and the limited material of Jones is hard to place into Pokorny's excellent systematic divisions. Triebel's specimen (Pl. 8.

fig. 5) is certainly *C. longaeva longaeva* and the Jones material from Dunstable and Keady Hill (Pl. 7, fig. 12, Pl. 8, fig. 3) seems closest to that form. Rowe's specimens are closest to *C. ornatissima altinodosa* in lacking surface reticulation and matching well in the tuberculation and ribbing.

Cythereis ornatissima paupera Jones & Hinde

1890 *Cythereis ornatissima paupera* Jones & Hinde : 23, pl. 2, figs. 10, 11.

REMARKS. There is no trace of the figured material for this variety. The two slides of material from Dunstable in the Jones (1890) collection do not appear to resemble the figured specimens. These slides (B.M.N.H., I. 2466 and Io. 388) contain specimens of *Cythereis ornatissima* (Reuss) together with *Cythereis glabrella* Triebel. From the figure *C. ornatissima paupera* appears to be similar to *Cythereis nuda* or *Cythereis lurmannae* and possibly it is conspecific with one of these forms. The spinose outline makes it unlikely that this species could be *C. glabrella* and the absence of surface reticulation distinguishes it from *C. ornatissima s.s.*

Cythereis ornatissima radiata Jones & Hinde

1890 *Cythereis ornatissima radiata* Jones & Hinde : 25, pl. 4, fig. 13.

REMARKS. There is no trace of Jones' original specimen of this form nor is there any comparable material from the Cambridge Greensand. From an inspection of residues from the Cambridge Greensand (Barrington) I have found no form resembling the figure. The Mockler collection (1909 ; B.M.N.H.) of ostracoda from the Cambridge Greensand contains a number of slides labelled *C. ornatissima* (Reuss). These slides (B.M.N.H., In. 53344-56) contain a wide variety of forms : *Cythereis reticulata* (Jones & Hinde), *C. lurmannae* Triebel, *C. thorenensis* Triebel, *C. folkstonensis*, *C. bonnemai* Triebel, *Isocythereis fortinodis* Triebel and *Veenia harrisiana* (Jones). From Jones & Hinde's figure it seems likely that *C. ornatissima radiata* is a worn *C. thorenensis*.

Cythereis lurmannae Triebel

(Pl. 8, figs. 11-15)

1890 *Cythereis ornatissima* var. *stricta* Jones & Hinde : 25, pl. 1, fig. 63.

1940 *Cythereis lurmannae* Triebel : 201, pl. 6, figs. 63-66.

1956 *Cythereis lurmannae* Triebel ; Deroo : 1516.

MATERIAL. (i) B.M.N.H., Io. 346 (Jones & Hinde 1890) from the Chalk marl at Didcot. (ii) B.M.N.H., In. 39007-08 figured Jones (1849 ; *C. ciliata* Pl. 4, figs. 11g, g') from the Gault at Folkestone. (iii) B.M.N.H., In. 51686-88 figured Jones (1849 ; *C. cornuta* pl. 5, figs. 13c, d) from the Detritus at Charing. (iv) B.M.N.H., Io. 1194, Io. 1629-33, from the Upper Gault at Barrington, Cambs.

REMARKS. The single figured specimen of Jones & Hinde (1890) is not identified as such but a slide in the Jones collection from Didcot (B.M.N.H., Io. 346) appears to contain this or a strictly comparable form together with three *C. thorenensis* Triebel and one *C. reticulata* Jones & Hinde. The specimen is now found to belong to

Cythereis lurmannae Triebel. Jones, however, has figured *C. stricta* in so many different contexts that Triebel's name is much better upheld, particularly as Jones described the specimen as a variety and not a subspecies. The specimen labelled by Chapman (1893) as *C. stricta* (B.M.N.H., I. 2687) belongs to *Cythereis bonnemai* Triebel.

Cythereis nuda Jones & Hinde

(Pl. 7, figs. 11, 13, 16)

1849 *Cythere* (*Cythereis*) *lonsdaleiana* Jones : 20, pl. 5, fig. 12c (non fig. 12a, b).

1849 *Cythereis cornuta* (Roemer) ; Jones : 21, pl. 5, fig. 13b (non figs. 13a, c, d).

1849 *Cythereis ciliata* (Reuss) ; Jones : pl. 2, fig. 11h'.

1890 *Cythereis ornatissima nuda* Jones & Hinde : 23, pl. 2, fig. 9 (non figs. 8, 12-14).

1893 *Cythereis wrightii* Jones & Hinde ; Chapman : 370.

1898 *Cythereis ornatissima nuda* Jones & Hinde ; Chapman : 339.

?1956 *Cythereis nuda* Jones & Hinde ; Deroo : 1519, pl. 4, figs. 62-64.

LECTOTYPE. B.M.N.H., In. 51685 figured Jones (1849, pl. 5, fig. 13b) from the Detritus at Charing, here designated.

REMARKS. As the bulk of the specimens previously referred to *C. ornatissima nuda* can be attributed to well known species, the remaining specimen (B.M.N.H., In. 51685) is taken as lectotype of *Cythereis nuda*.

The additional material figured by Jones & Hinde (1890, pl. 1, fig. 76 ; pl. 4, fig. 14) appears to be lost and cannot, therefore, be determined.

A specimen attributed to Jones and labelled var. *nuda* from Keady Hill (B.M.N.H., Io. 376), differs considerably from the earlier forms, belonging either to a new species of *Cythereis* or to *C. wrightii* Jones & Hinde. A specimen in the Chapman collection from the Gault at Folkestone (B.M.N.H., I. 2685) is a young form of *C. reticulata* but the form described by Chapman (1898) from the Cambridge Greensand is a true *C. nuda* (Sedgwick Museum B.40597). Further specimens of *C. nuda* are those mentioned by Chapman (1893) as *Cythereis wrightii* Jones & Hinde from the phosphatic Chalk at Taplow, B.M.N.H., I. 2607. True *C. wrightii* was described from Keady Hill (Wright collection) and appears to approximate to the form described as *C. ornatissima nuda*, slide B.M.N.H., Io. 376 (see above), the figure, however, is that of a right valve whilst the British Museum specimen is a left valve. The absence of the figured specimen precludes further study of that species. The form described by Chapman & Sherborn (1893 (pl. 14, fig. 9) as *C. wrightii* var. *aculeata* (B.M.N.H., I. 2707) is a pre-adult of *Cythereis reticulata* Jones & Hinde.

Jones' specimen of *Cythereis lonsdaleiana*, B.M.N.H., In. 39013 (pl. 5, fig. 12c) from the Upper Chalk of Norwich is also *Cythereis nuda*.

Cythereis reticulata Jones & Hinde

(Pl. 8, figs. 16-19)

1890 *Cythereis ornatissima reticulata* Jones & Hinde : 24, pl. 1, fig. 68, ; pl. 4, figs. 9-12.

1940 *Cythereis reticulata* Jones & Hinde ; Triebel : 192, pl. 5, figs. 51-56.

1956 *Cythereis reticulata* Jones & Hinde ; Deroo : 1518, pl. 5, figs. 68-82.

MATERIAL. (i) B.M.N.H., Io. 1195, Io. 1634-37, from the Lower Gault Clay, Culham, Oxfordshire.

REMARKS. There is no trace of the figured material of this form. The only labelled specimen in the Jones collection is one from Keady Hill (not among his original localities) which is now seen to be of *C. ornatissima* s.l. Subsequent authors (Triebel, Deroo) have established the true nature of the species by reference to Albian forms which have the median longitudinal rib well developed. Of Jones' figures, pl. 1, fig. 68 and pl. 4, figs. 9-12 fit the species best in its now accepted sense. Such specimens are found commonly in the Gault Clay from which Jones inspected material and the species is now restricted to forms of Albian and Cenomanian age. References to the species from higher horizons are most likely to be of *C. ornatissima* s.s. Two slides from the Chapman (1893) collection from the Gault Clay Folkestone (B.M.N.H., I. 2686, I. 2684) contain *Cythereis thorenensis* Triebel. The records by Chapman (1893, 1898) and by Weber (1934) do not belong to *C. reticulata*. *Cythereis hirsuta* described by Damotte & Grosdidier (1963) is very similar to *C. reticulata* but differs in the prominence of the median rib and muscle node in the latter. The spination of the ribs is most pronounced in the former.

Cythereis thorenensis Triebel

(Pl. 7, figs. 14, 15, 17)

1849 *Cythereis ciliata* (Reuss) ; Jones : 19, pl. 2, figs. 11a-f (non figs. 11g, h).

1870 *Cythereis ornatissima* (Reuss) ; Jones : 75.

1890 *Cythereis ornatissima* (Reuss) ; Jones & Hinde : 21, pl. 2, figs. 1-5.

1940 *Cythereis thorenensis* Triebel : 195, pl. 5, figs. 57-59.

MATERIAL. (i) B.M.N.H., In. 39001-06 figured Jones (1849, pl. 2, figs. 11a-d), figs. 11a-e from the Detritus at Charing, fig. 11f from the Gault clay at Folkestone.

(ii) B.M.N.H., Io. 1197, Io. 1619-21 from the Upper Gault at Maidstone, Kent.

REMARKS. Most of Jones' original specimens attributed to *C. ornatissima* from the Gault Clay and Detritus (Albian-Cenomanian) belong to Triebel's species.

Genus **PLATYCYTHEREIS** Triebel 1940

Platycythereis gaultina (Jones)

(Pl. 8, fig. 9)

1849 *Cythere* (*Cythereis*) *gaultina* Jones : 17, pl. 2, figs. 7a-c.

1870 *Cythere gaultina* Jones ; Jones : 75, 76.

1890 *Cythere gaultina* Jones ; Jones & Hinde : 18, pl. 1, figs. 35, 36.

1893 *Cythere gaultina* Jones ; Chapman & Sherborn : 346.

1893 *Cythereis excavata* Chapman & Sherborn : 348, pl. 14, fig. 8.

1898 *Cythere gaultina* Jones ; Chapman : 336.

1940 *Platycythereis gaultina* (Jones) Triebel : 219, pl. 7, figs. 81-85 ; pl. 8, figs. 86, 87.

1956 *Platycythereis gaultina* (Jones) ; Mertens : 209, pl. 11, figs. 59, 60.

DIAGNOSIS. Small *Platycythereis* with strongly reticulate lateral surface. Complex anterior marginal rib but no longitudinal ribs. Hook-like process present over region of muscle scars.

LECTOTYPE. B.M.N.H., In. 52631 figured Jones (1849, pl. 2, fig. 7a) from the Gault Clay at Folkestone, here designated.

OTHER MATERIAL. (i) B.M.N.H., In. 52632 and In. 51664 figured Jones (1849, pl. 2, figs. 7*b*, *c*) from the Gault Clay at Folkestone. (ii) B.M.N.H., I. 2688, I. 2706 (Chapman & Sherborn 1893 ; latter figured pl. 14, fig. 8). Gault Clay, Folkestone.

REMARKS. This well known species occurs throughout the Albian. No description further to that of Triebel (1940) is required. The form figured by Chapman & Sherborn (1893) as *Cythereis excavata* is conspecific with *P. gaultina* and is therefore included in the synonymy. The specimen figured by Chapman (1898, text-figs. 2*a*, *b*) which has been taken as a typical *P. excavata* by later authors (Triebel 1940) differs fundamentally from the initial figures and is renamed below.

Platycythereis chapmani nom. nov.

(Pl. 6, figs. 16, 18, 20)

1898 *Cythere gaultina excavata* (Chapman & Sherborn) ; Chapman : 336, text-figs. 2*a*, *b*.

1898 *Cythere subtuberculata* Chapman : 337, text-figs. 3*a*, *b*.

1940 *Platycythereis excavata* (Chapman & Sherborn) ; Triebel : 315, pl. 7, figs. 78–80 ; pl. 10, fig. 110.

DIAGNOSIS. Large *Platycythereis* with prominent keel-like anterior marginal rib joined dorsally to the eye tubercle and ventrally to the ventral longitudinal rib. Lateral surface compressed and strongly reticulate.

HOLOTYPE. A right valve, Sedgwick Museum B40619, figured Chapman (1898, Text-figs. 2*a*, *b*) from the Cambridge Greensand of Swaffham, Cambs.

OTHER MATERIAL. (i) S.M.B. 40620 figured Chapman (1898, text-figs. 3*a*, *b*) from Swaffham. (ii) B.M.N.H., Io. 1201, Io. 1612–13 from the Cambridge Greensand at Barrington, Cambs.

REMARKS. As the initial specimens attributed to this species now prove to be wrongly identified a new name is required for the later forms. Chapman's (1898) later figured specimen is taken as holotype. Due to the rarity of the species at Swaffham, Chapman evidently did not recognise the form he figured as *C. subtuberculata* to be merely an instar of *P. chapmani*. *P. chapmani* is very similar to *P. laminata* Triebel, figures of which are included here for comparison. The major differences are that in *P. laminata* there is no rib along the ventral surface and the anterior marginal rib is not as distinct and is not continued antero-dorsally to join the eye tubercle. *P. laminata* is more triangular in shape, particularly the left valve ; the dorsal marginal rib is also strongly developed.

Platycythereis laminata Triebel

(Pl. 6, fig. 19)

1940 *Platycythereis laminata* Triebel : 217, pl. 8, figs. 88–90.

1956 *Platycythereis laminata* Triebel ; Deroo : 1520.

MATERIAL. B.M.N.H., Io. 1198 and Io. 1611 from the Lower Gault at Henfield, Sussex.

Genus *TRACHYLEBERIDEA* Bowen 1953*Trachyleberidea acutiloba* (Marsson)

(Pl. 8, figs. 7, 8, 10)

1880 *Cythere acutiloba* Marsson : 42, pl. 3, fig. 11.1890 *Cythereis spinicaudata* Jones & Hinde : 28, pl. 2, figs. 17, 18.1940 *Cythereis acutiloba* (Marsson) Bonnema : 132, pl. 4, figs. 59—66.

MATERIAL. (i) B.M.N.H., I. 2487 figured Jones & Hinde (1890, pl. 2, fig. 17) from the Upper Chalk, Keady Hill. (ii) B.M.N.H., Io. 359, Io. 1627—28 (Jones & Hinde 1890) from the Chalk Rock, Dunstable. (iii) B.M.N.H., Io. 1209, from the Upper Chalk, *coranguinum* Zone, Sonning.

MEASUREMENTS.

	Length	Height
Left valve (B.M.N.H., I. 2487)	0.65 mm.	0.35 mm.

REMARKS. As suggested by Bonnema (1940) Jones & Hinde's specimens appear to be conspecific with Marsson's. The shape and internal features of the species, however, fall within Haskin's (1963) redefinition of the genus *Trachyleberidea*.

The strongly convergent dorsal and ventral margins and lateral compression are the most distinct features of the species. The strong reticulation, weak dorsal, ventral and anterior marginal ribs together with the low muscle node are also well seen. The hinge is strongly amphidont, having the anterior tooth smooth and the posterior tooth divided in the right valve.

Suborder PLATYCOPINA

Family CYTHERELLIDAE

Genus *CYTHERELLOIDEA* Alexander 1929*Cytherelloidea chapmani* (Jones & Hinde)

(Pl. 9, figs. 15—19, 22)

1890 *Cytherella chapmani* Jones & Hinde : 49, pl. 3, fig. 70.1893 *Cytherella chapmani* Jones & Hinde ; Chapman & Sherborn : 346.?1898 *Cytherella chapmani* Jones & Hinde ; Chapman : 345.?1956 *Cytherelloidea chapmani* (Jones & Hinde) Deroo : 1909.

DIAGNOSIS. *Cytherelloidea* with the dorsal longitudinal rib connected to the anterior end of the median rib.

LECTOTYPE. B.M.N.H., Io. 1641 (Chapman 1893) from the Lower Gault, Folkestone.

OTHER MATERIAL. (i) B.M.N.H., I. 2669, I. 2671 (Chapman) from the Lower Gault, Folkestone. (ii) B.M.N.H., Io. 1293, Io. 1642—46, from the Lower Gault, Culham, Oxon.

MEASUREMENTS.

	Length	Height
Left valve (B.M.N.H., Io. 1641, lectotype)	0.52 mm.	0.29 mm.
Right valve (B.M.N.H., Io. 1642)	0.60 mm.	0.37 mm.

DESCRIPTION. Carapace elongate, subrectangular in lateral view. Lateral surface covered with a series of inflated ribs. A high, anterior marginal rib, discontinuous dorsally, is continued along the ventral margin as a low flat shelf. The valves are swollen posteriorly to form large connected postero-dorsal and postero-

ventral nodes. A long, high, slightly arcuate ventral longitudinal rib runs from the postero-ventral node, whilst a short, horizontal rib runs from the postero-dorsal node to terminate at two-thirds the valve length from the anterior margin. This rib is connected to a low oblique dorsal rib which traverses the central part of the dorsal margin. The dorsal rib is joined anteriorly to the anterior end of a prominent ventrally convex median rib. This latter rib is not joined posteriorly to either of the posterior nodes. The intercostal areas are smooth.

REMARKS. The original Jones & Hinde specimen of this species is now lost so the Chapman specimen mentioned by Jones is here erected lectotype. The lectotype is a juvenile and adult specimens from Culham are figured here.

C. chapmani most closely resembles *C. parawilliamsoni* Kaye but differs in having the median and dorsal ribs joined anteriorly and posteriorly. The prominent median rib differentiates it from *C. knaptonensis* Kaye and *C. stricta* (Jones & Hinde).

Cytherelloidea globosa sp. nov.

(Pl. 9, figs. 7, 9, 10)

DIAGNOSIS. An inflated species of *Cytherelloidea* with prominent vertical median sulcus limited laterally by longitudinal swelling.

HOLOTYPE. B.M.N.H., Io. 1283, a right valve from the Cambridge Greensand at Barrington, Cambs.

PARATYPES. B.M.N.H., Io. 1284-87 from the same locality.

MEASUREMENTS.

	Length	Height
Right valve (B.M.N.H., Io. 1283, holotype)	0.55 mm.	0.34 mm.
Left valve (B.M.N.H., Io. 1284, paratype)	0.53 mm.	0.30 mm.

DESCRIPTION. Valves small, elongate, subrectangular. Dorsal and ventral margins straight and subparallel; anterior and posterior margins semicircular. Lateral surface inflated but divided into two halves by a deep, prominent median sulcus. Below the sulcus lies a large smooth elongated node. The anterior lateral area is strongly and evenly inflated. The posterior lateral area bears two large nodes, the dorsal one being larger and more elongate than the ventral one. The postero-ventral node is connected by a swollen area to the postero-dorsal node but is separated from the ventral node by a prominent depression, which runs obliquely to join the median sulcus. In certain specimens the postero-ventral lobe is not developed and is possibly a dimorphic feature.

REMARKS. The strong sulcus, anterior and posterior inflation and lack of well-defined ribs distinguish this species from other described forms.

Cytherelloidea granulosa (Jones)

(Pl. 9, figs. 24-26)

1849 *Cytherella williamsoniana* var. *granulosa* Jones : 31, pl. 7, fig. 26i.

1880 *Cytherella williamsoniana bosqueti* Marsson : 33, pl. 2, figs. 8d, e.

1890 *Cytherella williamsoniana* var. *granulosa* Jones ; Jones & Hinde : 49, pl. 3, figs. 68, 69, 72.

1940 *Cytherelloidea williamsoniana* (Jones) ; Bonnema : 95, pl. 1, figs. 44-47.

DIAGNOSIS. Large *Cytherelloidea* with lateral surface covered with a series of

prominent pustules. Short separate dorsal and ventral longitudinal ribs are present but no median rib. Anterior marginal rib prominent.

LECTOTYPE. B.M.N.H., In. 51609 figured Jones (1849, pl. 7, fig. 26i) from the Upper Chalk, Norwich.

OTHER MATERIAL. (i) B.M.N.H., I. 2484 (Jones & Hinde 1890), Upper Chalk, Magheramorne, Antrim. (ii) B.M.N.H., In. 53110, In. 53232, Io. 1647-48 (Rowe), from the Upper Chalk, Norwich.

MEASUREMENTS.

	Length	Height
Right valve (B.M.N.H., In. 51609, lectotype)	0.80 mm.	0.45 mm.

DESCRIPTION. Valves quadrangular in shape with straight parallel dorsal and ventral margins and semicircular anterior and posterior margins. A high, semi-circular anterior marginal rib occurs which is often connected to a postero-ventral node by a flattened marginal shelf. A further large node occurs postero-dorsally which is somewhat elongated along the dorsal margin. The two posterior nodes are entirely separated. A low ventrally arcuate rib lies in line with the lower of these nodes but is not connected to it. A shallow muscle pit occurs centrally with a small culmination immediately above it on the dorsal margin. Except for the ribs and posterior nodes the whole of the lateral surface is covered with a series of prominent pustules.

Juveniles are fairly common and have the ribbing subdued but maintain the strong pustulation.

REMARKS. This species, originally described as a variety of *C. williamsoniana* by Jones, is characteristic of the Upper Chalk, and has not been found by the author below the *cor-anguinum* Zone. The strong pustulation makes the species distinct from others of the genus found in the Chalk. Specimens of Marsson's *C. williamsoniana* var. *bosqueti* from Rugen, kindly sent to the author by Dr. E. Herrig, show that the latter is conspecific with *C. granulosa*.

***Cytherelloidea hindei* sp. nov.**

(Pl. 9, figs. 4, 8, 11)

DIAGNOSIS. *Cytherelloidea*, with anterior marginal rib, ventral longitudinal rib and lower sinuous dorsal longitudinal rib all connected.

HOLOTYPE. B.M.N.H., Io. 1288 a right valve from the Upper Chalk at Norwich.

PARATYPES. B.M.N.H., Io. 1289-92, from the same locality.

OTHER MATERIAL. (i) B.M.N.H., Io. 344. Chalk, Colchester; Io. 339, Chalk, Luton. (ii) B.M.N.H., In. 53140, In. 53234. (Rowe), Upper Chalk, Norwich.

MEASUREMENTS.

	Length	Height
Right valve (B.M.N.H., Io. 1288, holotype)	0.75 mm.	0.42 mm.
Left valve (B.M.N.H., Io. 1289, paratype)	0.68 mm.	0.35 mm.

DESCRIPTION. Valves elongate, subrectangular in shape. Dorsal and ventral margins straight and parallel; anterior and posterior margins evenly rounded. Surface ornamented by a series of inflated ribs. Two large nodes joined by a short, high connecting rib occur posterior-dorsally and postero-ventrally. A high, straight rib runs along the ventral margin from the postero-ventral node and is

continued without a break into a prominent anterior marginal rib. A low, sinuous rib runs along the dorsal margin being connected to the anterior marginal rib anteriorly and weakly joined by a cross rib to the postero-dorsal node posteriorly. A ventrally convex median rib runs below the muscle scar pit being entirely separated both anteriorly and posteriorly. The intercostal areas are smooth. In the larger right valves a low flattened area lies between the dorsal rib and the margin but in both valves the ventral rib is not separated from the margin.

REMARKS. This species is easily distinguished by the connection of the ventral, anterior and dorsal ribs and the concurrence of the ventral rib and the margin.

Cytherelloidea knaptonensis Kaye

(Pl. 9, figs. 20, 21)

1963 *Cytherelloidea knaptonensis* Kaye : 114, pl. 19, figs. 10-12.

MATERIAL. B.M.N.H., Io. 1297 from the Upper Gault at Leighton Buzzard.

REMARKS. This species occurs in the Gault Clay at various levels at Speeton, Leighton Buzzard and Burwell. It is closely related to *C. parawilliamsoniana* Kaye and *C. chapmani* (Jones & Hinde). It differs from them in the poor development of the median rib.

Cytherelloidea obliquirugata (Jones & Hinde)

(Pl. 9, figs. 12-14)

1890 *Cytherella obliquirugata* Jones & Hinde : 50, pl. 3, fig. 73.

MATERIAL. B.M.N.H., Io. 1299, Io. 1638-40 from the Upper Chalk at Norwich.

MEASUREMENTS.

	Length	Height
Adult left valve (B.M.N.H., Io. 1640)	0.75 mm.	0.40 mm.
Pre adult right valve (B.M.N.H., Io. 1299)	0.50 mm.	0.34 mm.
Pre adult left valve (B.M.N.H., Io. 1299)	0.50 mm.	0.30 mm.

REMARKS. This species was originally erected on a juvenile specimen and consequently requires revision. Throughout the ontogeny of this species the median longitudinal rib becomes increasingly less prominent and at maturity is barely discernible. Sexual dimorphism is expressed by the existence of two large nodes postero-dorsally and postero-ventrally in the females. The characteristic flattened shelf along the ventral margin and the sinuous nature of the dorsal rib are the most characteristic features of the species. The ventral rib is also more strongly joined than in related forms such as *C. williamsoniana*, particularly in the males and juveniles.

Cytherelloidea parawilliamsoniana Kaye

(Pl. 9, fig. 23)

1963 *Cytherelloidea parawilliamsoniana* Kaye : 115, pl. 20, figs. 22, 23.

REMARKS. This species is strongly allied to the other members of the genus found in the Gault. It has not been found by the writer at any locality outside Yorkshire. It differs from the other forms in having a strong median rib which is separated anteriorly.

Cytherelloidea stricta (Jones & Hinde)

(Pl. 9, figs. 1-3, 5, 6)

- ?1847 *Cytherina serrata* Williamson : 79, pl. 4, fig. 79.
 1849 *Cytherella williamsoniana* Jones : 31, pl. 7, figs. 26a-d, g, h (non figs. 26e, f).
 1890 *Cytherella williamsoniana* Jones ; Jones & Hinde : 48, pl. 3, figs. 57-62.
 1890 *Cytherella williamsoniana stricta* Jones & Hinde : 48, pl. 3, fig. 71.
 1893 *Cytherella williamsoniana stricta* Jones & Hinde ; Chapman & Sherborn : 346.
 1956 *Cytherelloidea stricta* (Jones & Hinde) ; Deroo : 1509, pl. 1, figs. 7, 8.
 1958 *Cytherelloidea stricta* (Jones & Hinde) ; Howe & Laurencich : 270.
 1963 *Cytherelloidea stricta* (Jones & Hinde) ; Kaye : 117, pl. 19, figs. 14, 15.

DIAGNOSIS. *Cytherelloidea* with prominent straight dorsal and ventral longitudinal ribs but no median rib. The ventral rib is separate both anteriorly and posteriorly and set off from the margin by a shelf formed as a continuation of the anterior marginal rib. Dorsal rib joined to postero-dorsal process.

LECTOTYPE. B.M.N.H., In. 51604 figured Jones (1849, pl. 7, fig. 26c) Gault Clay, Folkestone.

OTHER MATERIAL. (i) B.M.N.H., In. 51602-03, In. 51605, In. 51608, figured Jones (1849, pl. 7, figs. 26a, b, d, h) Gault Clay, Folkestone. (ii) B.M.N.H., I. 2762 (Chapman & Sherborn 1893), Gault Clay, Folkestone. (iii) B.M.N.H., Io. 1294, Upper Gault, Leighton Buzzard.

MEASUREMENTS.

	Length	Height
Carapace (B.M.N.H., In. 51604, lectotype) .	0.71 mm.	0.37 mm.
Carapace (B.M.N.H., In. 51605) .	0.75 mm.	0.37 mm.
Left valve (B.M.N.H., In. 51607) .	0.73 mm.	0.37 mm.

REMARKS. *C. williamsoniana* has a particularly confused past and almost all Cretaceous species of what is now the genus *Cytherelloidea* were included in it by early authors. Jones included a variety of forms one of which pl. 7, fig. 26f, being the only clear external illustration was proposed as lectotype by Howe & Laurencich (1958). Unfortunately the specimen relating to this figure was lost long before 1958 and the concept of the species becomes *nomina dubium* being restricted to the single figure without specimens. The specimen from fig. 26e has been separated off into a new species by Kaye (1963) and the rest of the material, which is found to be conspecific recognised as *C. stricta* (Jones & Hinde) 1890. Thus the specimens from Jones (1849, pl. 7, figs. 26a-d, g, h) though originally defined as *C. williamsoniana* must now be withdrawn from that species in its restricted sense and included in *C. stricta*. Due to the absence of material from the Jones & Hinde 1890 collection one of these specimens is here erected lectotype.

The species is rather variable in the strength but not in the distribution of the ribbing. Sexual dimorphism is shown by greater inflation of the posterior end of the valves in females and such differences may have been thought to be valid varietal differences by Jones & Hinde in their erection of var. *stricta*.

The most marked features of the species are the absence of a median longitudinal rib, the long, straight dorsal rib and the short, arcuate ventral rib which is entirely separated from the posterior nodes. The strong anterior marginal rib is continued as a shelf along the ventral margin. The posterior margin bears a series of small

tubercles. As *C. williamsoniana*, which was made the type species of the genus (Alexander 1929), is a nomina dubium it is necessary to seek I.C.Z.N. ratification of an alternative type species for *Cytherelloidea*.

IV. SUMMARY

The various species described by Jones and Chapman etc. are listed below in tabular form together with their new classification ; of the 98 different specific references some 55 specific names are considered valid.

JONES 1849 :

ORIGINAL IDENTIFICATION	PRESENT IDENTIFICATION
(1) <i>Cythere hilseana</i> (Roemer)	. <i>Schuleridea jonesiana</i> (Bosquet)
(2) <i>Cythere punctatula</i> (Roemer)	. <i>Neocythere</i> (N.) <i>vanveeni</i> Mertens + <i>Neocythere</i> (<i>Centrocythere</i>) <i>denticulata</i> Mertens
(3) <i>Cythere punctatula</i> var. <i>virginica</i>	. <i>Neocythere</i> (<i>Physocythere</i>) <i>virginica</i> (Jones)
(4) <i>Cythere umbonata</i> (Williamson)	. <i>Monoceratina umbonata</i> (Williamson)
(5) <i>Cythere bairdiana</i> sp. nov.	. ? <i>Macrodentina</i> sp.
(6) <i>Cythereis triplicata</i> (Roemer)	. <i>Protocythere lineata</i> (Chapman & Sherborn)
(7) <i>Cythereis quadrilaterata</i> (Roemer)	. <i>Cythereis folkstonensis</i> nom. nov.
(8) <i>Cythereis ciliata</i> (Reuss)	. <i>Cythereis thorenensis</i> Triebel
(9) <i>Cythereis lonsdaleiana</i> sp. nov.	. <i>Cythereis lonsdaleiana</i> Jones
(10) <i>Cythereis cornuta</i> (Roemer)	. <i>Cythereis nuda</i> Jones & Hinde
(11) <i>Cythereis alata</i> (Bosquet)	. <i>Alatacythere robusta</i> (Jones & Hinde)
(12) <i>Bairdia siliqua</i> sp. nov.	. <i>Macrocypris siliqua</i> (Jones)
(13) <i>Bairdia siliqua</i> var. α	. <i>Macrocypris muensteriana</i> Jones & Hinde
(14) <i>Bairdia harrisiana</i> sp. nov.	. <i>Pontocyprilla harrisiana</i> Jones
(15) <i>Bairdia angusta</i> (Munster)	. <i>Doloccytheridea bosquetiana</i> (Jones & Hinde)
(16) <i>Cythereis interrupta</i> (Bosquet)	. <i>Veenia harrisiana</i> (Jones)
(17) <i>Cythereis gaultinu</i> sp. nov.	. <i>Platycythereis gaultina</i> (Jones)
(18) <i>Cythereis macrophthalma</i> (Bosquet)	. <i>Amphicytherura chelodon</i> (Marsson)
(19) <i>Cythere williamsoniana</i> sp. nov.	. <i>Cytherelloidea williamsoniana</i> (Jones) + <i>Cytherelloidea stricta</i> (Jones & Hinde)
(20) <i>Cythere williamsoniana</i> var. <i>granulosa</i>	. <i>Cytherelloidea granulosa</i> (Jones)

JONES 1870 :

ORIGINAL IDENTIFICATION	PRESENT IDENTIFICATION
(1) <i>Cytheridea perforata</i> (Roemer)	. <i>Schuleridea jonesiana</i> (Bosquet)
(2) <i>Cytheropteron concentricum</i> (Reuss)	. <i>Neocythere</i> (N.) <i>vanveeni</i> Mertens + <i>Neocythere</i> (C.) <i>denticulata</i> Mertens
(3) <i>Cythere harrisiana</i> sp. nov.	. <i>Veenia harrisiana</i> (Jones)
(4) <i>Cythereis ornatissima</i> (Reuss)	. <i>Cythereis thorenensis</i> Triebel

JONES & HINDE 1890 :

ORIGINAL IDENTIFICATION	PRESENT IDENTIFICATION
(1) <i>Pontocypris trigonalis</i> sp. nov.	. <i>Eucythere trigonalis</i> (Jones & Hinde)
(2) <i>Pontocypris bosquetiana</i> sp. nov.	. <i>Doloccytheridea bosquetiana</i> (Jones & Hinde)
(3) <i>Pontocypris triquetra</i> (Jones)	. <i>Doloccytheridea bosquetiana</i> (Jones & Hinde)
(4) <i>Macrocypris wrightii</i> sp. nov.	. <i>Macrocypris wrightii</i> (Jones & Hinde)
(5) <i>Macrocypris concinna</i> sp. nov.	. ? <i>Macrocypris simplex</i> Chapman
(6) <i>Bythocypris reussiana</i> sp. nov.	. <i>Doloccytheridea bosquetiana</i> (Jones & Hinde)
(7) <i>Cythere harrisiana</i> var. <i>setosa</i>	. <i>Veenia harrisiana</i> (Jones)
(8) <i>Cythere harrisiana</i> var. <i>reticosa</i>	. <i>Veenia harrisiana</i> (Jones)
(9) <i>Cythereis auriculata</i> (Cornuel)	. <i>Veenia harrisiana</i> (Jones)

(10) <i>Cythereis ornatissima paupera</i>	. No material
(11) <i>Cythereis ornatissima nuda</i>	. <i>Cythereis nuda</i> Jones & Hinde (in part)
(12) <i>Cythereis ornatissima reticulata</i>	. <i>Cythereis reticulata</i> Jones & Hinde
(13) <i>Cythereis ornatissima radiata</i>	. ? <i>Cythereis thorenensis</i> Triebel
(14) <i>Cythereis ornatissima stricta</i>	. <i>Cythereis lurmannae</i> Triebel
(15) <i>Cythereis wrightii</i> sp. nov.	. <i>Cythereis wrightii</i> Jones & Hinde
(16) <i>Cythereis tuberosa</i> sp. nov.	. No material
(17) <i>Cythereis tuberosa</i> var. <i>symmetrica</i>	. No material
(18) <i>Cythereis icenica</i> sp. nov.	. <i>Amphicytherura chelodon</i> (Marsson)
(19) <i>Cythereis icenica</i> var. <i>quadrata</i>	. No material
(20) <i>Cythereis vallata</i> sp. nov.	. No material
(21) <i>Cythereis spinicaudata</i> sp. nov.	. <i>Trachyleberidea acutiloba</i> (Marsson)
(22) <i>Cytheropteron sphenoides</i> (Reuss)	. <i>Brachycythere</i> cf. <i>sphenoides</i> (Reuss)
(23) <i>Cytheropteron alatum</i> var. <i>robusta</i>	. <i>Alatacythere robusta</i> (Jones & Hinde)
(24) <i>Cytheropteron alatum</i> var. <i>fortis</i>	. <i>Alatacythere robusta</i> (Jones & Hinde)
(25) <i>Cytheropteron alatum</i> var. <i>cornuta</i>	. ? <i>Alatacythere robusta</i> (Jones & Hinde)
(26) <i>Cytheropteron hibernicum</i> sp. nov.	. ? <i>Alatacythere robusta</i> (Jones & Hinde)
(27) <i>Cytheropteron</i> ? <i>phyllopteron</i> (Bosquet)	. <i>Alatacythere phylloptera</i> (Bosquet)
(28) <i>Cytheropteron cuspidatum</i> sp. nov.	. No material
(29) <i>Cytheropteron cuspidatum</i> var. <i>montuosa</i>	. <i>Monoceratina montuosa</i> (Jones & Hinde)
(30) <i>Cytheropteron cuspidatum</i> var. <i>tricuspidata</i>	. <i>Monoceratina tricuspidata</i> (Jones & Hinde)
(31) <i>Cytheropteron pedatum</i> (Marsson)	. <i>Monoceratina pedata pedata</i> (Marsson)
(32) <i>Cytheropteron pedatum salebrosa</i>	. <i>Monoceratina pedata salebrosa</i> (Jones & Hinde)
(33) <i>Cytheropteron umbonatum acanthoptera</i>	. <i>Monoceratina umbonatoidea</i> nom. nov.
(34) <i>Cytheropteron umbonatum longispina</i>	. <i>Monoceratina umbonata</i> (Williamson)
(35) <i>Cytheropteron sherborni</i> sp. nov.	. <i>Monoceratina sherborni</i> (Jones & Hinde)
(36) <i>Cytherella williamsoniana chapmani</i> sp. nov.	. <i>Cytherelloidea chapmani</i> (Jones & Hinde)
(37) <i>Cytherella oblinquirugata</i> sp. nov.	. <i>Cytherelloidea oblinquirugata</i> (Jones & Hinde)

CHAPMAN & SHERBORN 1893:

ORIGINAL IDENTIFICATION	PRESENT IDENTIFICATION
(1) <i>Cythere</i> ? <i>spinifera</i> sp. nov.	. <i>Schuleridea jonesiana</i> (Bosquet)
(2) <i>Cythereis triplicata lineata</i>	. <i>Protocythere lineata</i> (Chapman & Sherborn)
(3) <i>Cythereis rudispinata</i> sp. nov.	. <i>Protocythere rudispinata</i> (Chapman & Sherborn)
(4) <i>Cythereis wrightii aculeata</i>	. <i>Cythereis reticulata</i> (Jones & Hinde)
(5) <i>Cytheridea rotundata</i> sp. nov.	. <i>Schuleridea jonesiana</i> (Bosquet)
(6) <i>Cythereis excavata</i> sp. nov.	. <i>Platycythereis gaultina</i> (Jones)
(7) <i>Cytheridea perforata</i> var. <i>insignis</i>	. <i>Schuleridea jonesiana</i> (Bosquet)
(8) <i>Cythere koninckiana</i> (Bosquet)	. <i>Veenia harristiana</i> (Jones)
(9) <i>Pseudocythere simplex</i> (Jones & Hinde)	. <i>Doloccytheridea bosquetiana</i> (Jones & Hinde)

CHAPMAN 1898:

ORIGINAL IDENTIFICATION	PRESENT IDENTIFICATION
(1) <i>Macrocypris simplex</i> sp. nov.	. <i>Macrocypris simplex</i> Chapman
(2) <i>Cythere gaultina</i> var. <i>excavata</i>	. <i>Platycythereis chapmani</i> nom. nov.
(3) <i>Cythere subtuberculata</i> sp. nov.	. <i>Platycythereis chapmani</i> nom. nov.

OTHER COMPARATIVE SPECIES:

ORIGINAL IDENTIFICATION	PRESENT IDENTIFICATION
(1) —	. <i>Macrocypris exquisita</i> sp. nov.
(2) <i>Cythere slavantensis</i> Veen	. <i>Neocythere (Physocythere) virginea</i> (Jones)
(3) <i>Cythere acanthoptera</i> Marsson	. <i>Monoceratina acanthoptera</i> (Marsson)
(4) —	. <i>Monoceratina bonnemai</i> sp. nov.

- (5) *Cythere longispina* Bosquet . . . *Monoceratina longispina* (Bosquet)
 (6) *Monoceratina laevoides* Bonnema . . . *Monoceratina pedata laevoides* Bonnema
 (7) *Protocythere consobrina* Triebel . . . *Protocythere consobrina* Triebel
 (8) *Protocythere jonesi* Triebel . . . *Protocythere lineata* (Chapman & Sherborn)
 (9) *Protocythere tricostata* Triebel . . . *Protocythere tricostata* Triebel
 (10) ——— . . . *Veenia barringtonensis* sp. nov.
 (11) *Protocythere triebeli* Deroo . . . *Veenia harrisi* (Jones)
 (12) *Cythereis rudispinata* (Chapman & Sherborn) Triebel *Cythereis corrigenda* nom. nov.
 (13) *Cythere filicosta* Marsson . . . *Cythereis lonsdaleiana* Jones
 (14) *Cypridina macrophthalma* Bosquet . . . *Cythereis macrophthalma* (Bosquet)
 (15) *Cytherina ornatissima* Reuss . . . *Cythereis ornatissima* (Reuss)
 (16) *Platycythereis laminata* Triebel . . . *Platycythereis laminata* Triebel
 (17) *Cythere acutiloba* Marsson . . . *Trachyleberidea acutiloba* (Marsson)
 (18) *Cythere laticristata* Bosquet . . . *Brachycythere laticristata* (Bosquet)
 (19) *Cytherelloidea knaptonensis* Kaye . . . *Cytherelloidea knaptonensis* Kaye
 (20) ——— . . . *Cytherelloidea hindei* sp. nov.
 (21) *Cytherelloidea parawilliamsoniana* Kaye . . . *Cytherelloidea parawilliamsoniana* Kaye
 (22) ——— . . . *Cytherelloidea globosa* sp. nov.
 (23) *Cytherella williamsoniana bosqueti* Marsson *Cytherelloidea granulosa* (Jones)

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All specimens figured in the plates are in the collections of the British Museum (Natural History) unless otherwise stated.

PLATE I

All figures $\times 50$

- Schuleridea jonesiana* (Bosquet) p. 45
- FIG. 1. Male right valve, lateral view. I. 2708 (Chapman & Sherborn *C. perforata* var. *insignis*) Folkestone.
- FIG. 2. Male left valve, lectotype. *a*, dorsal view ; *b*, lateral view. In. 51637 (Jones) Folkestone.
- FIG. 3. Female right valve. *a*, dorsal view ; *b*, lateral view. In. 51638 (Jones) Folkestone.
- FIG. 4. Male carapace, from right. In. 51640 (Jones) Charing.
- FIG. 5. Female left valve, lateral view. I. 2709 (Chapman & Sherborn *C. rotundata*) Folkestone.
- Amphicytherura chelodon* (Marsson) p. 49
- FIG. 6. Left valve, lateral view. Io. 1560 Norwich.
- FIG. 7. Right valve, lateral view. Io. 1561 Norwich.
- " *Cythere* " *bairdiana* Jones p. 49
- FIG. 9. Right valve, lateral view. In. 51633 (Jones) Faringdon.
- Neocythere* (*N.*) *vanveeni* Mertens p. 47
- FIG. 10. Left valve, lateral view. In. 51643, (Jones) Folkestone.
- Neocythere* (*Centrocythere*) *denticulata* Mertens p. 47
- FIG. 8. Carapace, dorsal view. In. 51655, (Jones) Folkestone.
- FIG. 12. Right valve, lateral view. In. 51648, (Jones) Charing.
- FIG. 13. Right valve, lateral view. In. 51646, (Jones) Folkestone.
- Neocythere* (*Physocythere*) *virginea* (Jones) p. 48
- FIG. 11. Carapace, holotype, dorsal view. In. 51656 (Jones) Gravesend.
- FIG. 14. Carapace, holotype, from left. In. 51656 (Jones) Gravesend.
- FIG. 15. Left valve, lateral view. Io. 1562 (Jones & Hinde) Mageramorne, Antrim.
- FIG. 16. Left valve, lateral view. Io. 1563 (Rowe) Norwich.
- FIG. 17. Right valve, lateral view. Io. 1564 (Rowe) Norwich.
- Dolocytheridea bosquetiana* (Jones & Hinde) p. 46
- FIG. 18. Right valve, lateral view. Io. 1565 (authors coll.) Maidstone.
- FIG. 19. Carapace from right, lateral view. Io. 1566 (Jones & Hinde *Pontocypris triquetra*) Charing.
- FIG. 20. Carapace from left, lectotype, lateral view. In. 51629 (Jones) Folkestone.

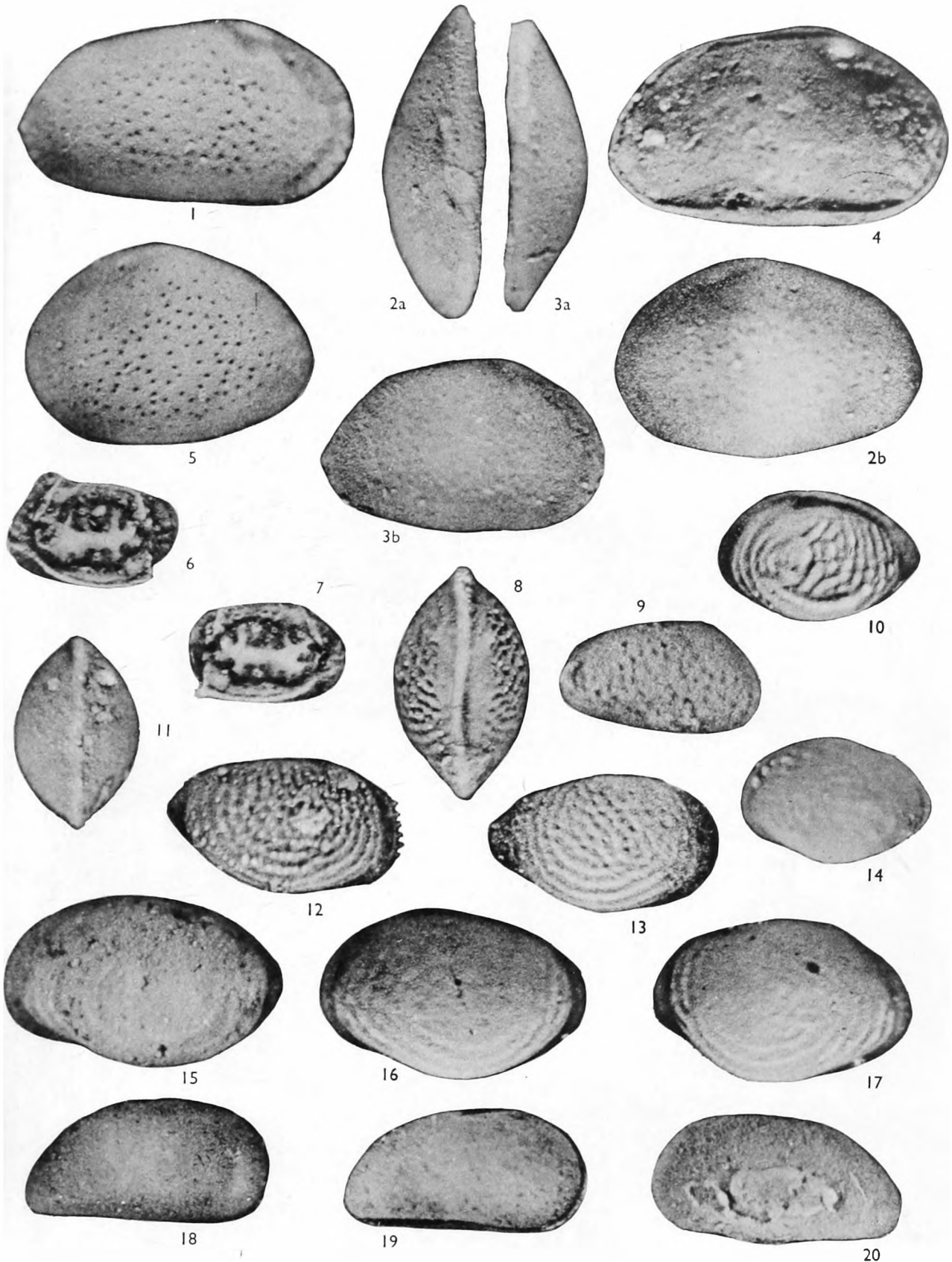


PLATE 2

All figures $\times 50$

- Brachycythere laticristata* (Bosquet) p. 50
- FIG. 1. Adult right valve, lateral view. Io. 1567 (Rowe) Norwich.
FIG. 2. Carapace, dorsal view. Io. 1568 (Rowe) Norwich.
FIG. 3. Adult left valve, lateral view. Io. 1569 (Rowe) Norwich.
FIG. 4. Adult left valve, internal view. Io. 1570 (Rowe) Norwich.
FIG. 6. Adult right valve, dorsal view. Io. 1571 (Rowe) Norwich.
- Brachycythere cf. sphenoides* (Reuss) p. 50
- FIG. 5. Right valve, lateral view. Io. 1575 (Jones & Hinde) Chalk rock at Dunstable.
- Alatacythere robusta* (Jones & Hinde) p. 51
- FIG. 7. Right valve, lateral view. Io. 1572 (Rowe) Norwich.
FIG. 8. Left valve, lateral view. Io. 362 (Jones & Hinde var. *robusta*) Dunstable.
FIG. 9. Left valve, lateral view. Io. 1576 (Jones & Hinde var. *robusta*) Dunstable.
FIG. 10. Right valve, dorsal view. Io. 1573 (Rowe) Norwich.
FIG. 11. Left valve, lateral view. Io. 1574 (Rowe) Norwich.
FIG. 12. Right valve, lateral view. Io. 1577 (Jones & Hinde var. *fortis*) Keady Hill.
FIG. 13. Left valve, lateral view. In. 53172 (Rowe) Norwich.
FIG. 14. Left valve, lateral view. Io. 2207 (Jones & Hinde *hibernicum*) between Black Head and Gobbins.
FIG. 15. Carapace, dorsal view. In. 51690, (Jones pl. 5, fig. 14b) Norwich.
FIG. 16. Left valve, lateral view. Io. 1578, (Jones & Hinde ?*hibernicum*) Keady Hill.
FIG. 18. Left valve, lateral view. I. 2678 (Chapman) Folkestone.
- Alatacythere ? phylloptera* (Bosquet 1854) p. 51
- FIG. 17. Left valve, lateral view. Io. 1579 (Jones & Hinde) Keady Hill.
FIG. 19. Right valve, lateral view. Io. 1580 (Jones & Hinde) Keady Hill.

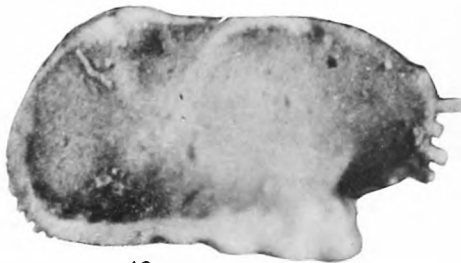
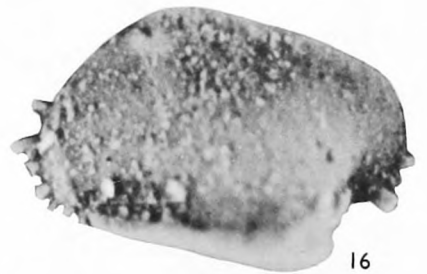
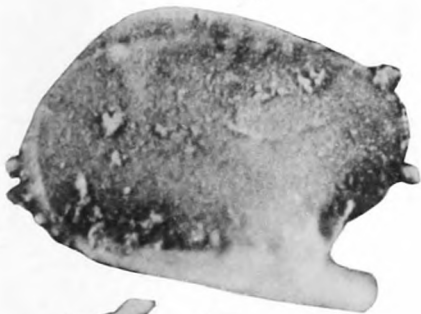
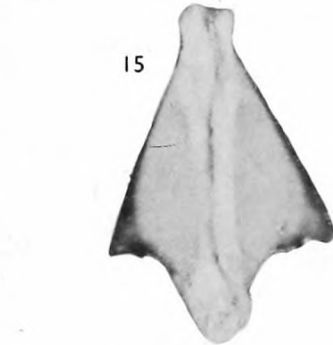
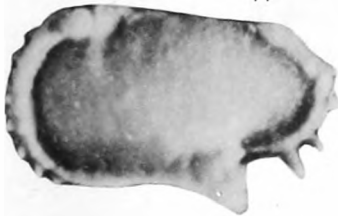
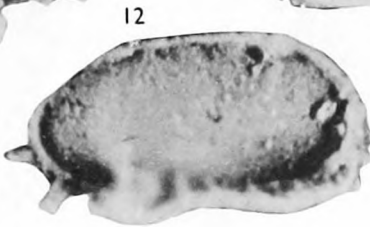
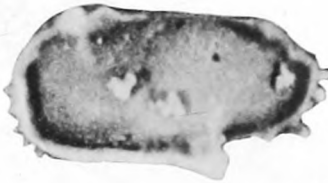
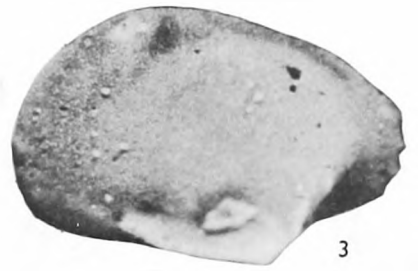
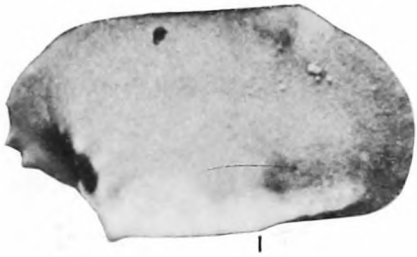


PLATE 3

All figures $\times 50$

- Monoceratina cf. longispina* (Bosquet) p. 53
- FIG. 1. Right valve (broken), lateral view. Io. 1581 Barrington.
- Monoceratina acanthoptera* (Marsson) p. 52
- FIG. 2. Left valve. *a*, lateral view ; *b*, dorsal view. Io. 1206 Norwich.
- Monoceratina montuosa* (Jones & Hinde) p. 53
- FIG. 3. Right valve, lectotype. *a*, dorsal view ; *b*, lateral view. I. 2478 (Jones & Hinde) Magee.
- Monoceratina sherborni* (Jones & Hinde) p. 55
- FIG. 4. Left valve, lateral view. In. 53166 (Rowe) Norwich.
- Monoceratina bonnemai* sp. nov. p. 52
- FIG. 5. Right valve, holotype. *a*, dorsal view ; *b*, lateral view. Io. 1169, Barrington.
- FIG. 6. Left valve (broken) paratype, lateral view. Io. 1171 Barrington.
- Monoceratina tricuspidata* (Jones & Hinde) p. 56
- FIG. 7. Left valve, lateral view. Io. 1582 Sonning.
- FIG. 8. Right valve, lectotype. *a*, dorsal view ; *b*, lateral view. Io. 1583 (Jones & Hinde) Keady Hill.
- Monoceratina pedata pedata* (Marsson) p. 54
- FIG. 9. Left valve, lateral view. Io. 1584 (Rowe) Norwich.
- FIG. 10. Left valve, dorsal view. Io. 1584 (Rowe) Norwich.
- FIG. 11. Right valve, lateral view. Io. 1586 (Rowe) Norwich.
- FIG. 12. Left valve, lateral view. Io. 1585 (Rowe) Norwich.
- FIG. 13. Right valve, lateral view. Io. 1587 (Jones & Hinde) Ballytober, Antrim.
- FIG. 14. Pre-adult right valve, lateral view. Io. 1588 (Jones & Hinde) Keady Hill.
- Monoceratina pedata salebrosa* (Jones & Hinde) p. 54
- FIG. 15. Left valve, lectotype, lateral view. Io. 2208 (Jones & Hinde) Whiteabbey, Antrim.
- FIG. 16. Right valve, lateral view. Io. 2209 (Jones & Hinde) Whiteabbey, Antrim.
- Monoceratina pedata laevoides* Bonnema p. 55
- FIG. 17. Left valve, lateral view. Io. 1589 (Rowe) Norwich.

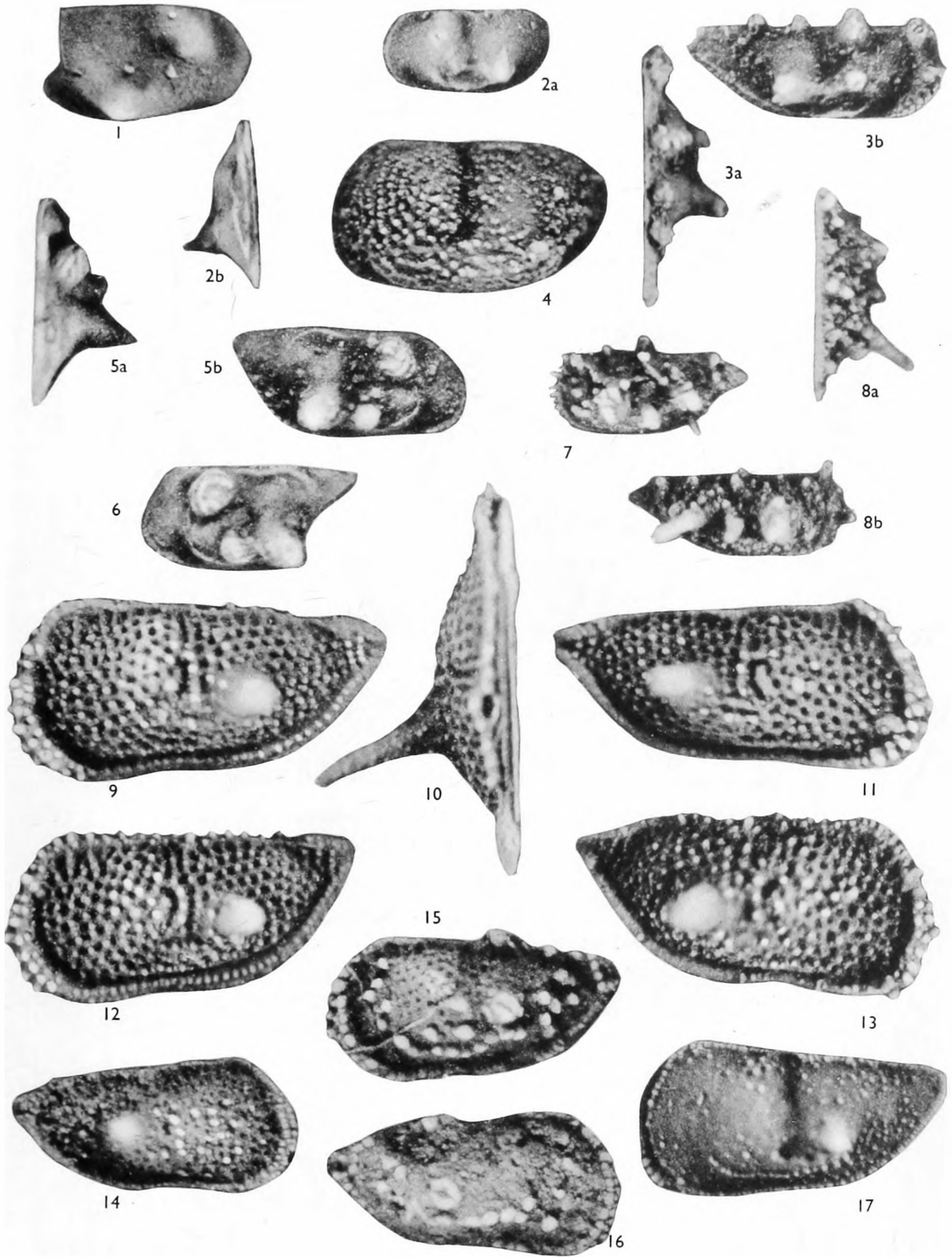


PLATE 4

Veenia harrisiana (Jones) p. 61

FIG. 1. Assemblage of adult and pre-adult specimens showing the variation in size and ornament. Io. 1210 Burwell. × 25.

Monoceratina umbonata (Williamson) p. 56

All figures × 50

FIG. 3. Left valve, lateral view. I. 2677 (Chapman) Folkestone.

FIG. 4. Left valve, lateral view. In. 51601 (Jones) Charing.

FIG. 6. Right valve, lateral view. Io. 1590 Barrington.

FIG. 7. Carapace, dorsal view. I. 2676 (Chapman) Folkestone.

FIG. 8. Left valve, lateral view. HU.17.C.8.1 (author's coll., Hull University) Speeton.

Monoceratina umbonatooides nom. nov. p. 57

All figures × 50

FIG. 2. Right valve, lateral view. Io. 1591 Sonning.

FIG. 5. Left valve, lateral view. Io. 1592 (Jones & Hinde) Magee.

Macrocypris muensteriana Jones & Hinde p. 43

All figures × 25

FIG. 9. Carapace, lectotype, from left. In. 51622 (Jones) Charing.

FIG. 10. Carapace, from right. In. 51618 (Jones) Charing.

Macrocypris siliqua (Jones) p. 43

All figures × 25

FIG. 11. Left valve, lateral view. Io. 1593 (Jones & Hinde) Keady Hill.

FIG. 14. Right valve, lateral view. Io. 1276 Sonning.

FIG. 15. Carapace, lectotype, from left. In. 51617 (Jones) Charing.

FIG. 18. Right valve, lateral view. Io. 1594 (Jones & Hinde) Keady Hill.

Macrocypris exquisita sp. nov. p. 42

All figures × 25

FIG. 12. Right valve, holotype, lateral view. Io. 1270 Burwell.

FIG. 16. Carapace, paratype, dorsal view. Io. 1272 Burwell.

Macrocypris simplex Chapman p. 44

FIG. 13. Left valve, lateral view. Io. 1275 S. Cave, E. Yorks. × 25.

Macrocypris wrighti Jones & Hinde p. 44

FIG. 17. Left valve, lectotype, lateral view. Io. 1595 (Jones & Hinde) Magee, Antrim. × 25.

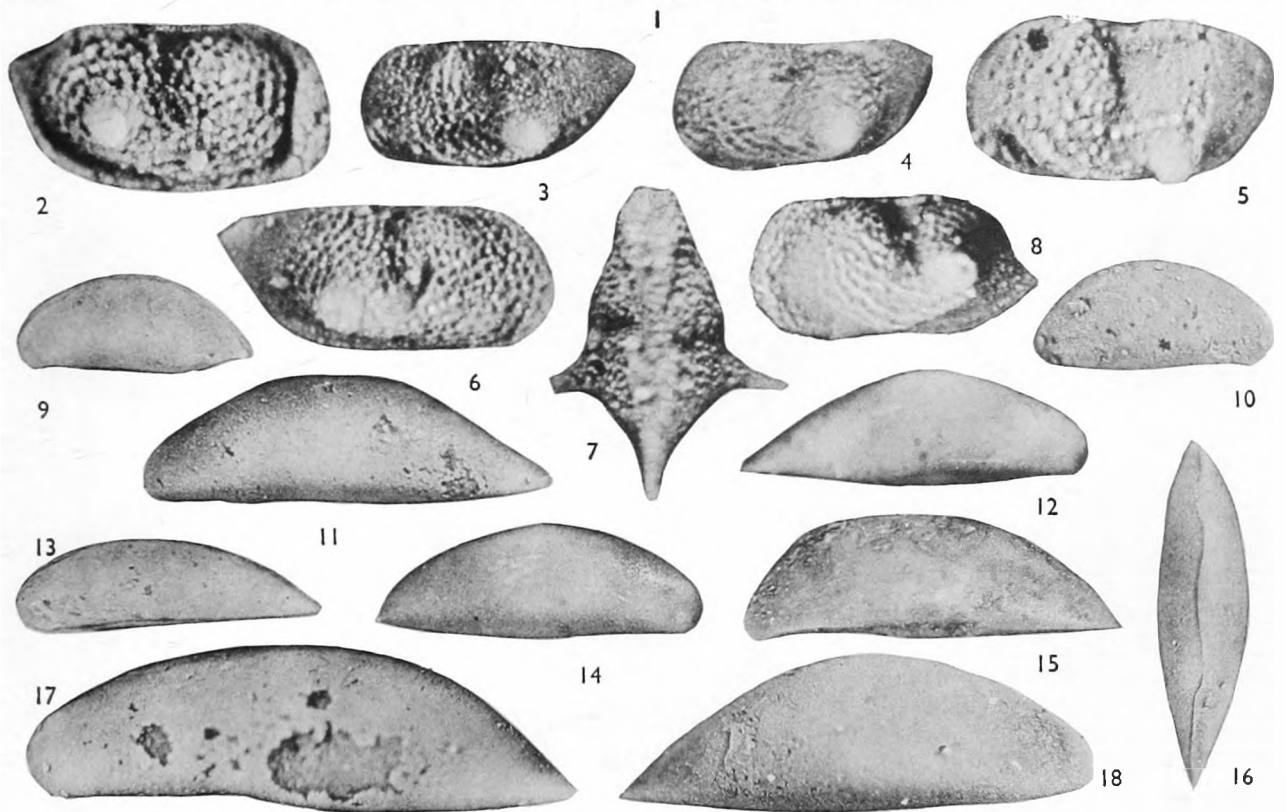


PLATE 5

All figures $\times 50$.

Protocythere lineata (Chapman & Sherborn) . . . p. 58

- FIG. 1. Right valve, lateral view. Io. 1596 Burwell.
FIG. 2. Juvenile right valve, lectotype, lateral view. I. 2704 (Chapman) Folkestone.
FIG. 3. Left valve, lateral view. Io. 1597 Burwell.
FIG. 4. Left valve, lateral view. In. 51665 (Jones) Charing.
FIG. 5. Carapace, dorsal view. Io. 1598 Burwell.
FIG. 6. Right valve, lateral view. In. 51667 (Jones) Charing.
FIG. 7. Juvenile right valve, lateral view. Io. 1599 Burwell.
FIG. 8. Juvenile left valve, lateral view. Io. 1600 Burwell.

Protocythere rudispinata (Chapman & Sherborn) . . . p. 59

- FIG. 9. Left valve, lectotype, lateral view. I. 2705 (Chapman) Folkestone.
FIG. 10. Left valve lateral view. Io. 1189 Henfield.
FIG. 11. Right valve, lateral view. Io. 1189 Henfield.

Protocythere triplicata (Roemer) . . . p. 58

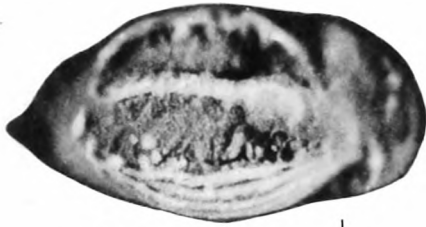
- FIG. 12. Right valve, lateral view. Io. 1601 Speeton.
FIG. 13. Left valve, lateral view. Io. 1602 Speeton.
FIG. 15. Right valve, internal view. HU.16.C.16.1 (author's coll.) Speeton.

Protocythere tricostata Triebel . . . p. 59

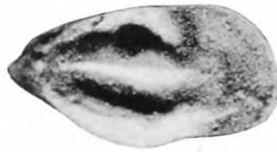
- FIG. 14. Left valve, lateral view. HU.17.C.3.3 (author's coll.) Speeton.
FIG. 16. Right valve, lateral view. HU.17.C.3.2 (author's coll.) Speeton.

Protocythere consobrina Triebel . . . p. 57

- FIG. 17. Right valve, lateral view. Io. 1603 Culham.
FIG. 18. Juvenile right valve, lateral view. Io. 1604 Culham.
FIG. 19. Left valve, lateral view. Io. 1605 Culham.



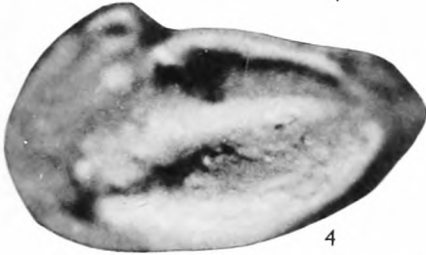
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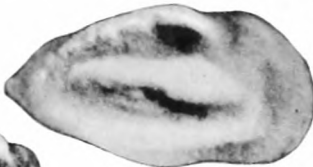
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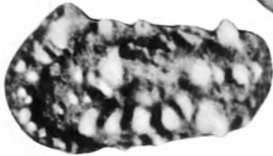
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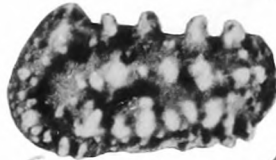
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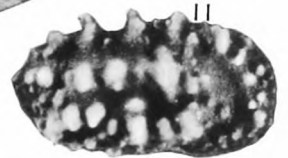
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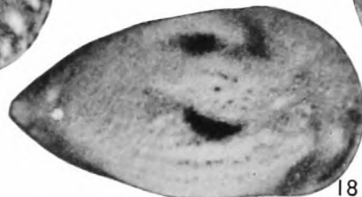
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PLATE 6

All figures $\times 50$.

- Veenia barringtonensis* sp. nov. p. 60
- FIG. 1. Male left valve, paratype, lateral view. Io. 1173 Barrington.
FIG. 2. Female right valve, paratype. *a*, dorsal view ; *b*, lateral view. Io. 1175 Barrington.
FIG. 3. Female left valve, holotype. *a*, lateral view ; *b*, internal view. Io. 1172 Barrington.
- Veenia harrisiana* (Jones) p. 61
- FIG. 4. Adult male carapace, dorsal view. Io. 1606 Speeton.
FIG. 5. Adult male left valve, dorsal view. Io. 1607 Speeton.
FIG. 6. Adult male right valve, dorsal view. Io. 1608 Speeton.
FIG. 7. Pre-adult right valve, lateral view. I. 2703 (Chapman & Sherborn *Cythere lineatopunctata*) Folkestone.
FIG. 8. Adult male left valve, lateral view. Io. 1609 Speeton.
FIG. 9. Pre-adult right valve, lectotype, lateral view. In. 51663 (Jones) Folkestone.
FIG. 10. Pre-adult right valve, lateral view. Io. 1610 (Chapman & Sherborn var. *setosa*) Folkestone.
FIG. 11. Pre-adult left valve, lateral view. I. 2691 (Chapman & Sherborn) Folkestone.
- Cythereis macrophthalma* (Bosquet) p. 64
- FIG. 12. Female left valve, lateral view. Io. 345 (Jones & Hinde) Colchester.
FIG. 13. Male carapace, dorsal view. Io. 345 (Jones & Hinde) Colchester.
FIG. 14. Male right valve, lateral view. Io. 351 (Jones & Hinde) Norwich.
FIG. 15. Female left valve, internal view. Io. 1193 Norwich.
FIG. 17. Male right valve, internal view. Io. 1193 Norwich.
- Platycythereis chapmani* nom. nov. p. 69
- FIG. 16. Right valve, lectotype, lateral view. B.40619 (Chapman 1898) Swaffham.
FIG. 18. Right valve, lateral view. Io. 1612 Barrington.
FIG. 20. Left valve, lateral view. Io. 1613 Barrington.
- Platycythereis laminata* Triebel p. 69
- FIG. 19. Left valve, lateral view. Io. 1611 Henfield.

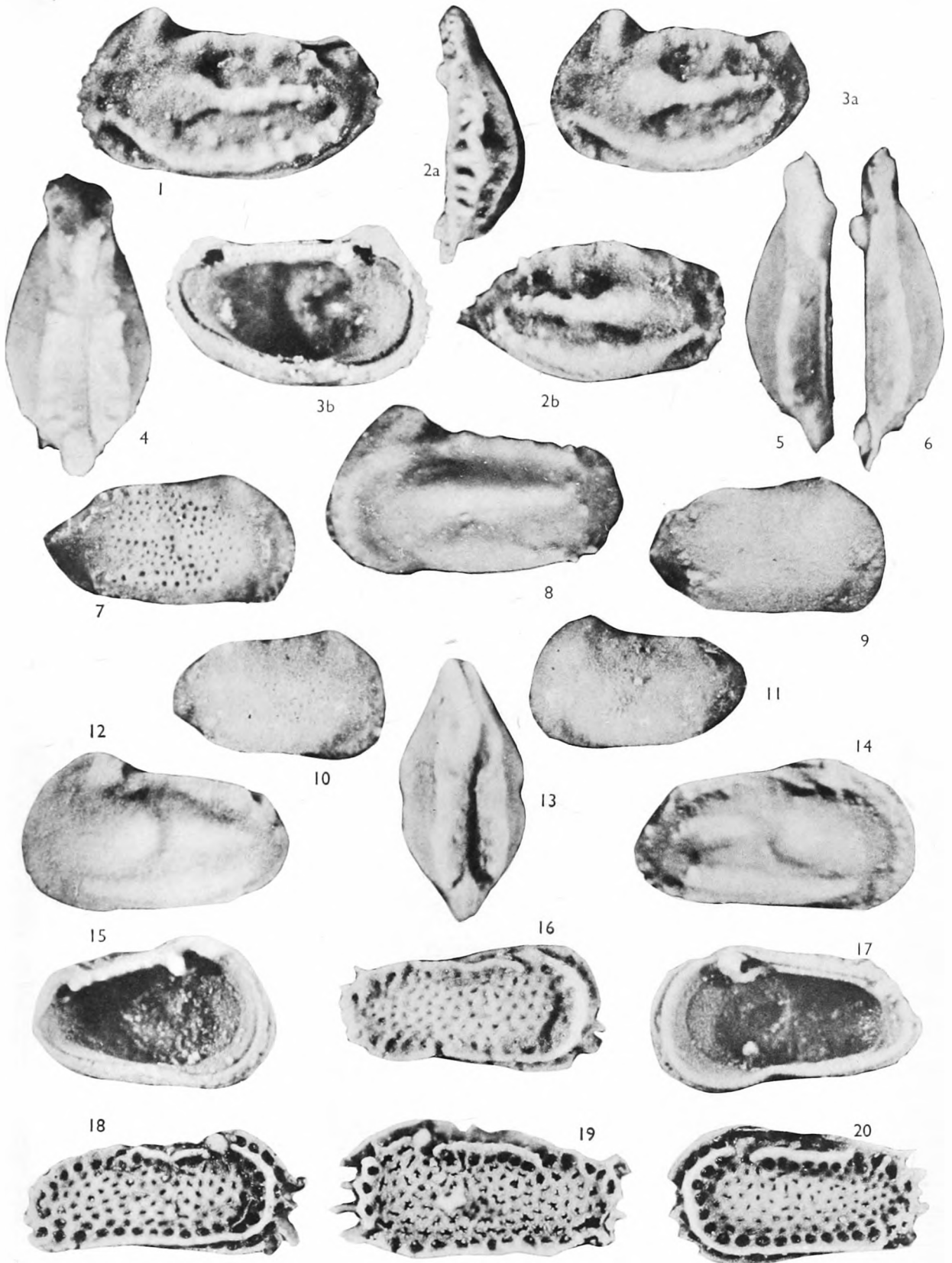


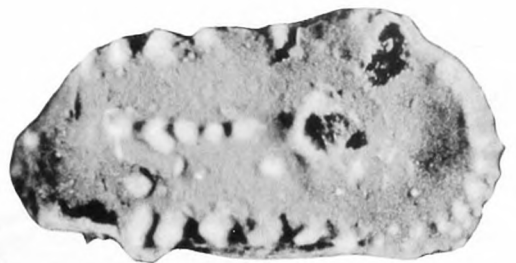
PLATE 7

All figures $\times 50$.

- Cythereis folkestonensis* nom. nov. p. 63
- FIG. 1. Male left valve, lectotype, lateral view. In. 51678 (Jones) Folkestone.
FIG. 2. Male right valve, lateral view. In. 51679 (Jones) Folkestone.
FIG. 3. Female right valve, internal view. Io. 1614 Burwell.
FIG. 4. Male carapace, dorsal view. In. 51683 (Jones) Folkestone.
FIG. 5. Female left valve, internal view. Io. 1615 Burwell.
- Cythereis corrigenda* nom. nov. p. 62
- FIG. 6. Male right valve, lateral view. Io. 1616 Culham.
FIG. 9. Male left valve, lateral view. Io. 1617 Culham.
- Cythereis lonsdaleiana* Jones p. 63
- FIG. 7. Left valve, lateral view. Io. 1618 Norwich.
FIG. 10. Right valve, lectotype, lateral view. In. 39012 (Jones) Norwich.
- Cythereis ? wrightii* Jones & Hinde p. 67
- FIG. 8. Left valve, lateral view. Io. 376 (Jones & Hinde var. *nuda*) Keady Hill.
- Cythereis nuda* Jones & Hinde p. 67
- FIG. 11. Carapace from left. B.40597 (Chapman 1898) Swaffham.
FIG. 13. Left valve, lectotype. In. 51685 (Jones) Charing.
FIG. 16. Carapace, dorsal view. B.40597 (Chapman 1898) Swaffham.
- Cythereis longaeva longaeva* Pokorny p. 64
- FIG. 12. Left valve, lateral view. Io. 375 (Jones & Hinde) Keady Hill.
- Cythereis thorenensis* Triebel p. 67
- FIG. 14. Pre-adult, right valve, lateral view. Io. 1619 Maidstone.
FIG. 15. Adult, right valve, lateral view. Io. 1620 Maidstone.
FIG. 17. Adult, left valve, lateral view. Io. 1621 Maidstone.



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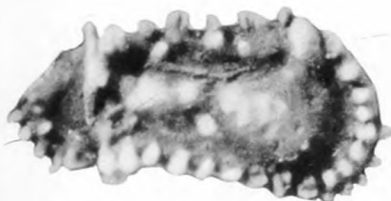
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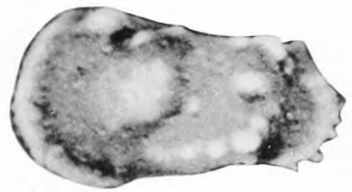
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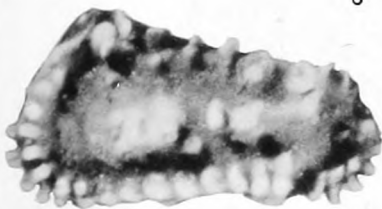
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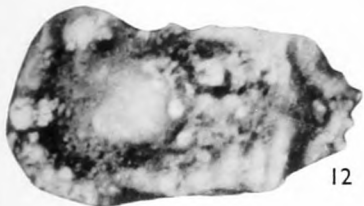
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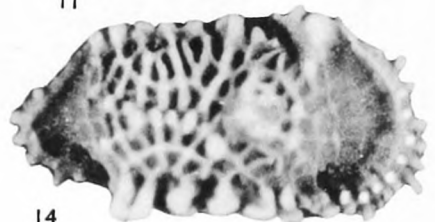
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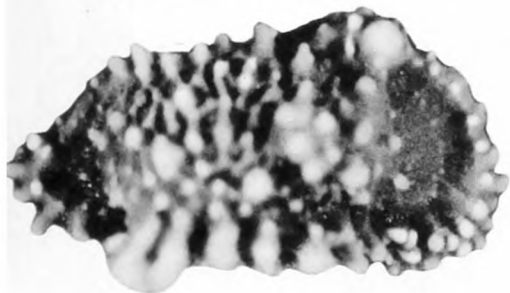
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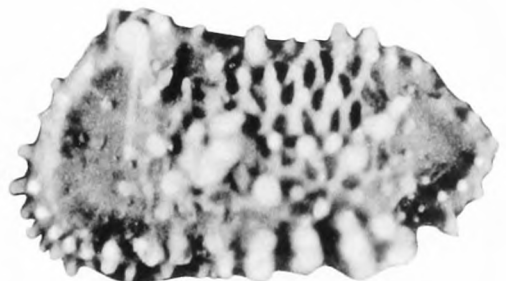
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PLATE 8

All figures $\times 50$.

- Cythereis ornatissima* (Reuss) p. 64
- FIG. 1. Adult left valve, lateral view. Io. 1622 (Rowe) Norwich
FIG. 2. Adult right valve, lateral view. Io. 1623 (Rowe) Norwich.
FIG. 4. Adult left valve, internal view. Io. 1624 (Rowe) Norwich.
FIG. 6. Adult right valve, internal view. Io. 1625 (Rowe) Norwich.
- Cythereis longaeva longaeva* Pokorný p. 64
- FIG. 3. Left valve lateral view. Io. 1626 (Jones & Hinde) Dunstable.
FIG. 5. Right valve, lateral view. (Triebel) Köstice, Bohemia (author's collection).
- Trachyleberidea acutiloba* (Marsson) p. 70
- FIG. 7. Right valve, lateral view. Io. 1627 (Jones & Hinde) Dunstable.
FIG. 8. Left valve. *a*, lateral view; *b*, internal view. I. 2487 (Jones & Hinde) Keady Hill.
FIG. 10. Carapace, dorsal view. Io. 1628 (Jones & Hinde) Dunstable.
- Platycythereis gaultina* (Jones) p. 68
- FIG. 9. Lectotype, right valve, lateral view. In. 52631 (Jones) Folkestone.
- Cythereis lurmannae* Triebel p. 66
- FIG. 11. Male carapace, dorsal view. Io. 1629, Barrington.
FIG. 12. Male left valve, lateral view. Io. 1630, Barrington.
FIG. 13. Female left valve, lateral view. Io. 1631, Barrington.
FIG. 14. Male right valve, lateral view. Io. 1632, Barrington.
FIG. 15. Male right valve, lateral view. Io. 1633 (Jones & Hinde *C. stricta*) Didcot.
- Cythereis reticulata* (Jones & Hinde) p. 67
- FIG. 16. Left valve, dorsal view. Io. 1634, Culham.
FIG. 17. Left valve, lateral view. Io. 1635, Culham.
FIG. 18. Carapace, dorsal view. Io. 1636, Culham.
FIG. 19. Right valve, lateral view. Io. 1637, Culham.

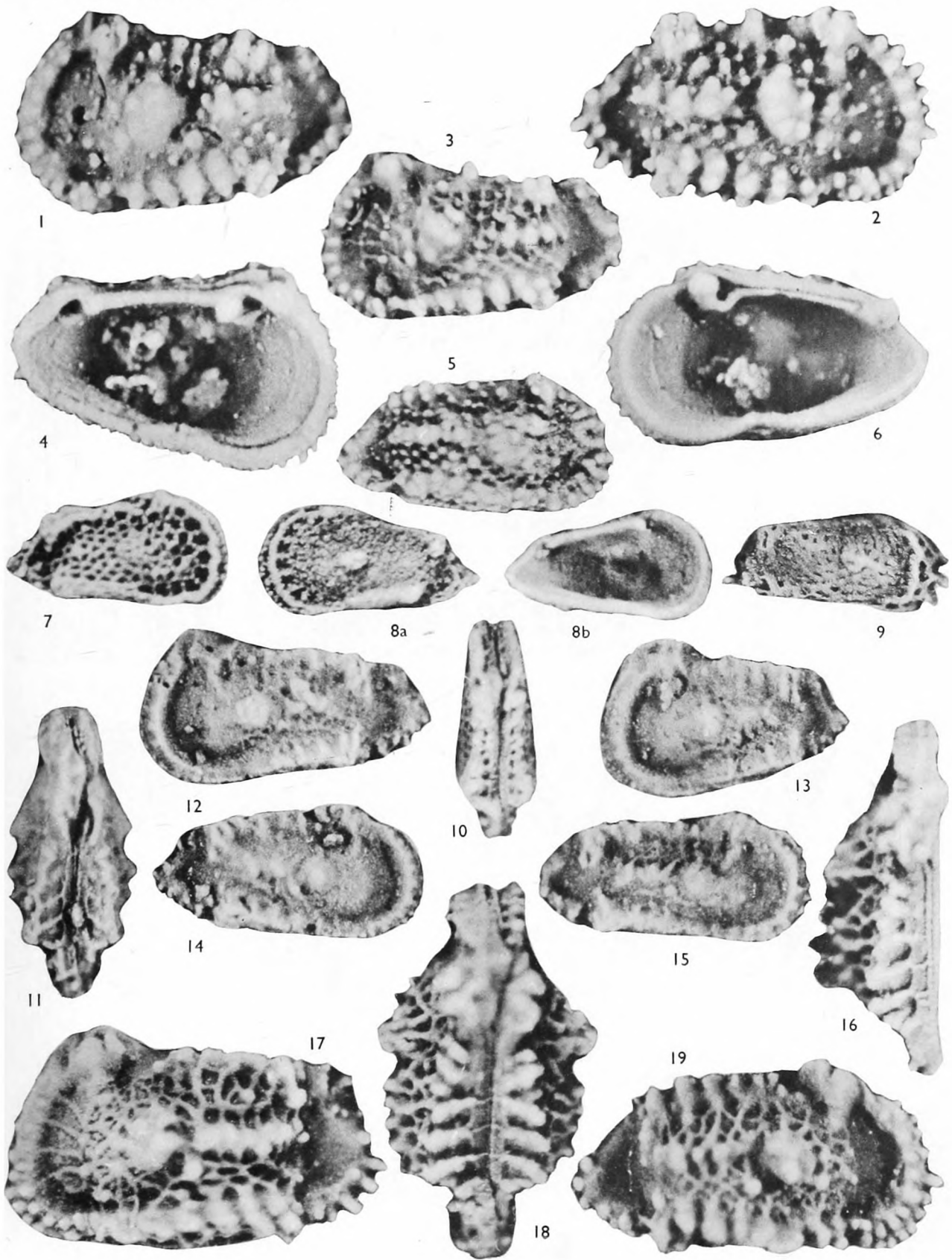


PLATE 9

All figures × 50.

- Cytherelloidea stricta* (Jones & Hinde) P. 74
- FIG. 1. Male carapace, lectotype, from right. In. 51604 (Jones) Folkestone.
 FIG. 2. Male right valve, lateral view. Io. 2212 Leighton Buzzard.
 FIG. 3. Female carapace from right, lateral view. In. 51605 (Jones) Charing.
 FIG. 5. Male left valve, lateral view. Io. 2213 Leighton Buzzard.
 FIG. 6. Female right valve, lateral view. Io. 2214 Leighton Buzzard.
- Cytherelloidea hindei* sp. nov. P. 72
- FIG. 4. Right valve, holotype, dorsal view. Io. 1288 Norwich.
 FIG. 8. Left valve, paratype, lateral view. Io. 1289 Norwich.
 FIG. 11. Right valve, holotype, lateral view. Io. 1288 Norwich.
- Cytherelloidea globosa* sp. nov. P. 71
- FIG. 7. Right valve, holotype, dorsal view. Io. 1283 Barrington.
 FIG. 9. Right valve, holotype, lateral view. Io. 1283 Barrington.
 FIG. 10. Left valve, paratype, lateral view. Io. 1284 Barrington.
- Cytherelloidea obliquirugata* (Jones & Hinde) P. 73
- FIG. 12. Right valve, juvenile, lateral view. Io. 1638 Norwich.
 FIG. 13. Left valve, juvenile, lateral view. Io. 1639 Norwich.
 FIG. 14. Left valve, adult, lateral view. Io. 1640 Norwich.
- Cytherelloidea chapmani* (Jones & Hinde) P. 70
- FIG. 15. Right valve, adult, lateral view. Io. 1642 Culham.
 FIG. 16. Left valve, pre-adult, lectotype, lateral view. Io. 1641 (Chapman) Folkestone.
 FIG. 17. Right valve, adult, dorsal view. Io. 1643 Culham.
 FIG. 18. Right valve, pre-adult, lateral view. Io. 1644 Culham.
 FIG. 19. Left valve, adult, lateral view. Io. 1645 Culham.
 FIG. 22. Left valve, juvenile, lateral view. Io. 1646 Culham.
- Cytherelloidea knaptonensis* Kaye P. 73
- FIG. 20. Left valve, paratype, lateral view. Hull University.20.c.19.1 Speeton.
 FIG. 21. Left valve, holotype, lateral view. Hull University.20.c.18.1 Speeton.
- Cytherelloidea parawilliamsoniana* Kaye P. 73
- FIG. 23. Right valve, holotype, lateral view. Hull University.20.c.23.1 Speeton.
- Cytherelloidea granulosa* (Jones) P. 71
- FIG. 24. Right valve, lateral view. Io. 1647 (Rowe) Norwich.
 FIG. 25. Right valve, lectotype, lateral view. In. 51609 (Jones) Norwich.
 FIG. 26. Left valve, lateral view. Io. 1648 (Rowe) Norwich.

