1. NEW GENERA OF PURBECK AND WEALDEN OSTRACODA

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2. OSTRACODS FROM THE PORTLAND BEDS OF DORSET

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3. OSTRACODS FROM THE PORTLAND AND PURBECK BEDS OF THE AYLESBURY DISTRICT

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NEW GENERA OF PURBECK AND WEALDEN OSTRACODA

By F. W. ANDERSON*

SYNOPSIS

Three new genera are proposed for certain species of ostracoda from the Purbeck and Wealden strata hitherto referred to the Recent genera Cypris, Candona, Cythere and Bythocypris.

Candona mantelli Jones, Candona phillipsiana Jones and Cypris purbeckensis Forbes are assigned to a new genus Mantelliana, Cypris pygmaea Anderson and Bythocypris ellipsoidea Wolburg to Damonella gen. nov., Cythere visceralis Anderson to Wolburgia gen. nov.

Some additional species are described i.e. Damonella buchaniana sp. nov., Wolburgia otherfieldensis sp. nov., W. tavola sp. nov. and W. polyphema sp. nov.

All forms are believed to have lived in a marine or quasimarine environment.

INTRODUCTION

At many horizons in the Purbeck and Wealden succession certain ostracod species are extremely abundant. They may be large forms like Mantelliana phillipsiana (over 1.5 mm. long) or very small like Damonella buchaniana (less than 0.5 mm. in length) but in all cases they are rather featureless, thin-shelled forms in which the shell surface is smooth or at most very finely pustulate or punctate. Preservation is usually poor and it is unusual to find an undamaged specimen. It is not surprising that the classification of these forms has long caused difficulty. Forbes (1855) assigned his species purbeckensis to the genus Cypris, followed in this by Jones (1885) who placed his own new species mantelli and phillipsiana in Candona (1888), and Anderson (1940) who assigned a new species, pygmaea, to Cypris.

The resemblance of these shells to the Recent freshwater forms included in the subfamily Cypridinae is, however, largely superficial. Sylvester Bradley’s (1941) study of the type species of Cypris and Candona and an increased knowledge of the Purbeck and Wealden forms assigned to these two genera make it quite clear that any genetic relationship between them is unlikely. In the writer’s opinion no genus has been previously described to which these Purbeck and Wealden species can be assigned. There is, however, a general resemblance to some species of Bythocypris and Wolburg (1962) placed his new species ellipsoidea in that genus.

In association with the common forms here assigned to the new genera Mantelliana and Damonella are a number of species of rare occurrence. Anderson (1940) described one of these from the Purbeck beds of Swindon as Cythere visceralis. Since then more material has been found and a study of the hinge structure leaves no doubt that this species together with three other apparently related forms cannot be included in the genus Cythere. In these the hinge structure is not unlike that of Campylocythere but the carapace is quite different in shape and the type of ornamentation unique. Thus a new genus, Wolburgia, is proposed to receive them.

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GEOL. II, 9
Family **CYPRIDIDAE** Baird 1845  
Genus **MANTELLIANA** nov.

**Diagnosis.** Carapace thin, elongate to sub-ovate in lateral view, compressed, valves sub-equal.  
Anterior and posterior margins carrying a very narrow flange which in turn may support a thin delicate fringe. Adductor muscle scars a close group of four to six scars with two others antero-ventrally. Hinge simple, adont; margin of right valve with a marginal groove which receives the margin of the left valve.  
Outer shell surface smooth or ornamented with extremely small close pustules arranged in longitudinal rows. Marked sexual dimorphism, female higher in posterior half of shell than male.

**Type species.** *Candona mantelli* Jones 1888.

**Mantelliana mantelli** (Jones)  
(Text-figs. 1, 9)

1888 *Candona mantelli* Jones: 536, text-fig. 2a–b.

**Diagnosis.** Carapace delicate subreniform, higher in anterior half. Bearing narrow fringe on anterior and antero-ventral margins and on posterior and postero-ventral margins. Shell surface generally smooth, sometimes very finely and closely pustulate. Female more nearly reniform than male.

**Lectotype.** GSM Mik(M)1004001. Left valve only. Male. Length 1.425 mm. (excluding fringe), height 0.760 mm., width of anterior fringe 0.030 mm., posterior fringe 0.020 mm.

**Horizon and locality.** Weald Shales, Wealden (*Cypridea valdensis* Zone); between Shepherd’s Chine and Atherfield Point, Isle of Wight.

**Discussion.** Jones (1888) did not designate a holotype for this species and a lectotype has been selected from the rock fragment to which he refers (No. 3791, p. 535) which is probably the specimen figured by him in his text-fig. 2a. In his description the anterior fringe is referred to but not figured. The posterior fringe is not mentioned. Juveniles are similar to the adult male in outline except in the earliest instars where the posterior half of the shell is less acute.

The pattern of the adductor muscle scars was not quite like that figured by Jones (1888, text-fig. 2a) in any of the specimens seen, moreover he regarded the narrow end of the shell as the anterior but the arrangement of the hinge so far as can be seen suggests that the shell is highest in the anterior half. The hinge is simple, apparently consisting of narrow flange-like teeth or thickenings of the shell margin joined by a narrow marginal groove. In the left valve are two elongate sockets joined by a straight marginal bar.

According to Jones the shell surface is very finely punctate, but the type material and the majority of other specimens examined appear to be quite smooth. Unusually
well-preserved carapaces, however, have an outer shell surface closely covered with very minute pustules, a type of ornamentation which appears to be a characteristic of the genus.

*Mantelliana mantelli* appears to be confined to the Weald Clay of the Weald and the Weald Shales of the Isle of Wight. It is commonly found, sometimes in great abundance, in the marine and quasi-marine beds associated with forms such as *Theriosynocum fittoni* (Mantell) and *Sternbergella cornigera* (Jones).

**Figs.** 1–11. *Mantelliana mantelli* (Jones); *M. purbeckensis* (Forbes); *M. phillipsiana* (Jones). Fig. 1. *M. mantelli*. Lectotype. Left valve, male. Mik(M)1004001, ×30. Fig. 2. *M. purbeckensis*. Lectotype. Anterior, male. Mik(M)2000001, ×33. Fig. 3. *M. phillipsiana*. Topotype. Right valve, male. Oxford Mus.K.1010, ×36. Fig. 4. *M. purbeckensis*. Lectotype. Left valve, male. ×33. Fig. 5. *M. purbeckensis*. Lectotype. Right valve, male. ×33. Fig. 6. *M. purbeckensis*. Lectotype. Dorsum, male. ×33. Fig. 7. *M. purbeckensis*. Left valve, female. Mik(M)2682001, ×33. Fig. 8. *M. phillipsiana*. Holotype. Left valve, female. Oxford Mus.K.1003, ×36. Fig. 9. *M. mantelli*. Adductor muscle scars. Mik(M)1873001, ×40. Fig. 10. *M. phillipsiana*. Adductor muscle scars. Mik(M)1008016; ×40. Fig. 11. *M. purbeckensis*. Adductor muscle scars. BM(NH) I.1668, ×40.
Mantelliana phillipsiana (Jones)
(Text-figs. 3, 8, 10)

1878 Candona phillipsiana Jones: 108, pl. 3, fig. 3.

Diagnosis. Carapace large, thin-shelled, subreniform in lateral view. Sexual dimorphism marked, male carapace tapering towards posterior with delicate anterior and posterior fringes, female higher in posterior half and only fringed anteriorly. External surface covered with minute, closely-set pustules.

Holotype. Oxford University Museum No. K1003. Internal mould of left valve. Length 1.620 mm., height (less fringe) 0.995 mm., fringe 0.045 mm. wide.

Horizon and locality. ? Wealden (Hastings Beds); Shotover Common, near Oxford.

Discussion. Jones’ original description of the species is quite clear and includes a reference to the very characteristic striated fringe. These delicate extensions of the shell are rarely found intact. In M. phillipsiana the fringes are more extensive than in M. mantelli; in the male only the dorsal margin and a small part of the ventral margin are without them. Sexual dimorphism is more marked than in M. mantelli; the male carapace in M. phillipsiana (Text-fig. 3) though not unlike M. mantelli is more regularly reniform and less tapering posteriorly, whilst the female is quite different in outline being high posteriorly and tapering towards the anterior.

Pre-maturation instars resemble the adult male in outline.

The species is often very abundant in the marine and quasi-marine beds of the Wadhurst Clay and Tunbridge Wells Sand in the Weald. It has not been found in the Weald Clay.

Mantelliana purbeckensis (Forbes)
(Text-figs. 2, 4-7, 11)

1855 Cypris purbeckensis Forbes in Lyell: 297, text-fig. 339a.
1865 Cypris purbeckensis Forbes; Forbes in Lyell: 387, text-fig. 375a.
1865 Cypris purbeckensis Forbes; Loriol & Jaccard, pl. 2, figs. 1-3.
1885 Cypris purbeckensis Forbes; Jones: 347-348, pl. 9, figs. 1-6.
1886 Cypris purbeckensis Forbes; Jones: 147, pl. 4, figs. 5a-c.
1963 "Cypris" purbeckensis Forbes; Oertli: 18, pl. 5, figs. 28-32.

Diagnosis. A large carapace. In side view subreniform, dorsally convex with greatest height anterior to centre of valve. Venter slightly concave. In dorsal view the shell is an elongate ovoid with greatest width posterior to centre. In end view bluntly ovoid with greatest width ventral to centre. The left valve little larger than the right overlapping it ventrally but with no appreciable overlap anteriorly and posteriorly. Outer shell surface generally smooth, sometimes faintly punctate near posterior end. Sexual dimorphism as for genus but not very marked.

Lectotype. GSM Mik(M)2090001. A complete carapace. Length 1.050 mm., height 0.660 mm., width 0.540 mm.

Horizon and locality. Lower Purbeck; Swanage.
Discussion. A fragment of hard limestone (GSM 4273) from the Lower Purbeck Beds in Durlston Bay, Swanage, Dorset, may be part of the material examined by Forbes (1855) and a lectotype for the species has been selected from it.

M. purbeckensis is a common species in the Lower Purbeck of England and a large number of specimens have been examined and utilized in this description. The muscle scar pattern is drawn from a specimen in the T. R. Jones Collection (BMNH., I.1668) and the internal details have been compiled from specimens in the Geological Survey Collections.

Jones' figures (1885, pl. 9, figs. 1–6) are fairly good except fig. 4, which incorrectly shows the shell gaping at both ends, and fig. 6 which appears to be of a monstrosity. A small percentage of the specimens examined, however, show similar outgrowths. All the Jones material came from the Lower Purbeck of the Vale of Wardour.

The largest specimen found measures 1.32 mm. in length but the majority of adult shells are between 1.05 and 1.23 mm. long. As Jones remarked (1885: 348) the shape is somewhat variable. This is illustrated by the length/height ratios which vary from low forms with a L/H ratio of 1.79 to high forms with a L/H ratio of 1.47. Those thought to be females (Text-fig. 7) are high reniform variants with a L/H ratio between 1.47 and 1.64. Forms with a more acute posterior end and with a L/H ratio between 1.57 and 1.79 are believed to be the males.

The mean dimensions of the adult are, length 1.15 mm., height 0.69 mm. Prematuration growth stages generally resemble the male carapace in outline. Only two instars have been recognised, one with mean dimensions, length 0.85 mm., height 0.55 mm. and the other length 0.63 mm. and height 0.44 mm.

M. purbeckensis is the earliest species recorded from the Purbeck Beds appearing immediately above the Portland Stone. Later it is associated with Fabanella boloniensis (Jones) and F. ansata (Jones) and like them appears to have flourished in saline or hypersaline water. Frequently these three species are the only ones found in the gypsum-bearing strata of the Lower Purbeck. M. purbeckensis is not known to occur in strata higher than the lower part of the Middle Purbeck.

The species is a more robust than either M. mantelli or M. phillipsiana and appears to be the only species of Mantelliana without a fringe. There are, however, undescribed species of the genus in the Purbeck Beds in which the fringe is rarely seen and even when present is very narrow.

Family **ILYOCYPRIDIDAE** Kaufmann 1900

Subfamily **CYPRIDEINAE** Martin 1940

Genus **DAMONELLA** nov.

Diagnosis. Carapace small, ovoid in lateral view. Shell surface smooth or punctate. Adductor muscle scars as for Scabriculocypris and Cypridea i.e. a vertical arc, convex forward, of three scars, one behind and ventral and usually two small antennal scars anterior and ventral. Hinge simple; in right valve a small flange-like tooth which may be denticulate, in front joined by a shallow groove to a smaller
posterior adont flange-like tooth; in left valve a groove receives the dorsal margin of right valve and a parallel bar fits into groove of right valve ventral to it; shallow elongate sockets at each end of bar receive the flange-like teeth of right valve. Right valve smaller than left which extends downwards well beyond ventral contact margin.

**Type species.** *Cypris pygmaea* Anderson 1940.

**Discussion.** This genus has many of the characteristics of both *Cypridea* and *Scabriculocypris* i.e. hinge pattern, adductor muscle scar arrangement and strong ventral overlap of the valves. The right valve is slightly swollen dorsally and the

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**Figs. 12-22.** *Wolburgia* and *Damonella* species. Fig. 12. *W. visceralis* (Anderson). Holotype. Right valve. Mik(M)722001, x65. Fig. 13. *W. polyphema* sp. n. Holotype. Right valve. Mik(M)2488001, x65. Fig. 14. *W. tavola* sp. n. Holotype. Left valve. Mik(M)2487001, x92. Fig. 15. *W. atherfieldensis* sp. n. Holotype. Right valve. Mik(M)673001, x145. Fig. 16. *D. punctatula* sp. n. Holotype. Right valve. Mik(M)2486001, x65. Fig. 17. *D. buchaniana* sp. n. Holotype. Right valve. Mik(M)2483001, x65. Fig. 18. *D. ellipsoidea* (Wolburg). Right valve. Mik(M)2484001, x65. Fig. 19. *D. denticulata* sp. n. Holotype. Right valve. Mik(M)2485001, x65. Fig. 20. *D. ellipsoidea* (Wolburg). Posterior. Mik(M)2484001, x30. Fig. 21. *D. buchaniana* sp. n. Holotype. Posterior. Mik(M)2483001, x30. Fig. 22. *D. pygmaea* (Anderson). Topotype. Right valve. Mik(M)732001, x65.
left considerably swollen ventrally producing an asymmetry in end view which is quite typical and is also seen in *Scabriculocypris* and in the Carboniferous genus *Carbonita*.

*Damonella* lacks the beak and notch of *Cypridea* and though apparently closely related to *Scabriculocypris* the outline is more oval than in that genus and the shell surface is smooth not punctate. There is a superficial resemblance to *Bythocypris* but the adductor muscle scars are quite different.

### Damonella pygmaea (Anderson)

(Text-figs. 22, 30)

1941 *Cypris pygmaea* Anderson : 379, pl. 19, fig. 17.
1951 *Cytherella pygmaea* (Anderson) Anderson : 211.
1963 " *Cypris " pygmaea* Anderson ; Oertli : 19, pl. 5, figs. 34, 35.

**Diagnosis.** Small bean-shaped carapace very little higher in front than behind; narrow oval when seen from above. Left valve the larger. Shell surface smooth and glossy. Shell substance thin.

**Holotype.** GSM Mik(M)2482001. Complete carapace. Length 0·51 mm., height 0·30 mm., width 0·17 mm.

**Horizon and Locality.** Upper Pebbly Beds, Lower Purbeck; Town Gardens Quarry, Swindon, Wiltshire.

**Discussion.** This is one of the most ubiquitous marine or quasi-marine species in the Purbeck and Wealden and ranges throughout. It is often very abundant, covering a bedding-plane almost to the exclusion of any other species. The shell is fragile and is is rare to find an undamaged specimen.

*D. pygmaea* is a flatter, larger shell than *D. buchaniana*, not so robust or regularly oval as *D. ellipsoidea*.

### Damonella buchaniana sp. nov.

(Text-figs. 17, 21, 24)

**Diagnosis.** Carapace sub-ovate in lateral view, oval from above and almost circular in end view. Shell surface smooth and glossy. Left valve the larger.

**Holotype.** GSM Mik(M)2483001. A complete carapace. Length 0·460 mm., height 0·300 mm., width 0·245 mm.

**Horizon and Locality.** Upper Purbeck; Portsdown No. 1. Borehole, Paulsgrove, Hampshire.

**Discussion.** A very small shell with much the same stratigraphical range as *D. pygmaea* and often accompanying it. It is smaller, fatter and more robust than that species. *D. ellipsoidea* is larger, more regularly oval and proportionately lower.
Damonella ellipsoidea (Wolburg)
(Text-figs. 18, 20, 25, 26)

1940 Cypria sp.? Martin: 356, pl. 8, figs. 119-20.
1962 Bythocypris ellipsoidea Wolburg: 223, table 16, pl. 32b, fig. 20.

Figured specimen. GSM Mik(M)2484001. Complete carapace. Length 0.66 mm., height 0.4 mm., width 0.315 mm.

Horizon and locality. At a depth of 1438-40 ft., Lower Purbeck; Henfield No. 1 Borehole, Sussex.

Discussion. The carapace is regularly oval in both lateral and dorsal view. The outer shell surface is smooth. The left valve is the larger.

D. ellipsoidea ranges from the basal Purbeck to the base of the Weald Clay and is a common form in many of the marine or quasi-marine bands. It is distinguished from D. pygmaea by its more regular outline and by its more robust appearance. It is considerably larger than D. buchaniana and is relatively lower.

Damonella denticulata sp. nov.
(Text-figs. 19, 23)

Diagnosis. A small delicate shell closely resembling D. pygmaea but with minute denticulations along the antero and postero-ventral margins. Shell surface smooth and glossy.

Holotype. GSM Mik(M)2485001. Right valve. Length 0.570 mm., height 0.340 mm.

Horizon and locality. Bed 12, Upper part of Weald Clay, Wealden; Gillman’s Brick Pit, Billingshurst, Sussex.

Discussion. This species is externally distinguishable from D. pygmaea only by the denticulation of the margin. Internally the dentition is like that of the other species of the genus except that in two specimens, Mik(M)2485001 (Text-fig. 23) and Mik(M)613048, there is an indication that there may be four or five small denticles on the anterior flange-like tooth and that the shell margin just posterior to it may also be finely denticulate. These minute structures are difficult to see and only then when the preservation is perfect. The general organization of the hinge structures is, however, like that of the other species of the genus and it may be that these additional features will prove not to be confined to D. denticulata when better material becomes available.

Denticulation of the margins has not been seen in D. pygmaea, D. ellipsoidea, D. buchaniana or D. punctatula, even in D. denticulata it is not easily visible except in very well preserved material and it is probable that some of the specimens from the Weald Clay, identified as D. pygmaea, may in fact belong to the former species.
**Damonella punctatula** sp. nov.

*(Text-fig. 16)*

**Diagnosis.** A small delicate carapace like *D. buchaniana* in shape but with more conspicuous anterior flange. Surface covered with circular punctations arranged in curved rows concentric near margins.

**Holotype.** GSM Mik(M)2486001. Right valve. Length 0.450 mm., height 0.310 mm.

**Horizon and locality.** At a depth of 33-34 ft., Wadhurst Clay, Wealden; Wadhurst No. 3 Borehole, Sussex.

**Discussion.** This rare species can be easily distinguished from *D. buchaniana* by the punctate surface. The punctations are very regular and uniform in size in the centre of the valve becoming smaller towards the margin. The carapace is not so wide as *D. buchaniana*.

This species has only been found in the Wadhurst Clay of Sussex.

**Family ? CYThERIDeIADAe** Sars 1925  
**Genus WOLBURGIA** nov.

**Diagnosis.** Carapace small, sub-oblong, flanged anteriorly and posteriorly. Dorsal margin straight, ventral margin reflexed. Adductor muscle scars in front of and lying obliquely to the upper scar of the row. Vestibule small. Normal pore canals large and widely spaced. Radial canals few and straight.

Dentition similar to that of *Campylocythere*. In right valve small flange-like teeth which may be denticulate, joined by narrow groove. Anterior and posterior sockets of left valve joined by bar which may be finely denticulate.

Valves ornamented with relatively large protuberances which may be rounded or flattened or with wide deep pits which leave raised ribs between in a reticulate pattern.

**Type species.** *Cythere visceralis* Anderson 1940.

**Wolburgia visceralis** (Anderson)  
*(Text-figs. 12, 27)*

1941 *Cythere visceralis* Anderson : 374, pl. 9, fig. 11.

**Diagnosis.** Surface ornamented with elongate rounded protuberances which may coalesce especially near shell margins to form periodically constricted ribs.

**Holotype.** GSM Mik(M)722001. Right valve. Length 0.670 mm., height 0.360 mm., width of single valve 0.190 mm.

**Horizon and locality.** Swindon Sands and Stone, Lower Purbeck; Town Gardens Quarry, Swindon, Wiltshire.
Discussion. The ornamentation distinguishes *W. visceralis* from the other members of the genus. It is a rare species known only from the Lower Purbeck. The form recorded by Klingler (1955, pl. 10, fig. 7) from the Kimmeridge as *Clithrocytheridea? iuglandiformis* is not unlike *W. visceralis* but is a more elongate shell with a slightly different ornamentation.

**Wolburgia atherfieldensis** sp. nov.

(Text-figs. 15, 28, 29)

**Diagnosis.** Carapace very small, ornamented with relatively large, flat, rounded subangular protuberances, upper surface of protuberances apparently perforated by numerous small pores. Protuberances generally concentrated in dorsal half of shell, giving way to irregular, rounded ribs running parallel to ventral margin in ventral half of shell.

**Holotype.** GSM Mik(M)673001. Right valve. Length 0.290 mm., height 0.170 mm.

**Horizon and locality.** Weald Shales (Uppermost Wealden); Atherfield, Isle of Wight.

**Discussion.** This is the smallest species of the genus yet found. The ornamentation is similar to that of *W. tavola* but in the latter the flat domes cover most of the shell surface and the carapace is more acute posteriorly. *W. atherfieldensis* is known only from the Weald Shales of the Isle of Wight.

**Wolburgia tavola** sp. nov.

(Text-fig. 14)

**Diagnosis.** Carapace rather low, elongate and narrowing posteriorly. Shell surface finely reticulate and ornamented with large flattened domes over most of surface. Carapace crossed by shallow, vertical median sulcus.

**Holotype.** GSM Mik(M)2487001. Left valve. Length 0.410 mm., height 0.215 mm.

**Horizon and locality.** At a depth of 1777 ft., basal beds of the Upper Purbeck; Winchester No. 1 Borehole, Hampshire.

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Figs. 23–30. *Damonella* and *Wolburgia* species. Fig. 23. *D. denticulata* sp. n. Holotype. Interior of right valve. Mik(M)2485001, x 220. Fig. 24. *D. buchaniana* sp. n. Interior of right valve. Mik(M)2684001, x 220. Fig. 25. *D. ellipsoidea*. Interior of right valve. Mik(M)2680001, x 105. Fig. 26. *D. ellipsoidea*. Interior of left valve. Mik(M)268001, x 105. Fig. 27. *W. visceralis*. Holotype. Interior of right valve. Mik(M)722001, x 95. Fig. 28. *W. atherfieldensis* sp. n. Holotype. Interior of right valve. Mik(M)673001, x 200. Fig. 29. *W. atherfieldensis* sp. n. Topotype. Interior of left valve. Mik(M)674001, x 200. Fig. 30. *D. pygmaea*. Interior of right valve. Mik(M)2683001, x 105.
DISCUSSION. A larger and more elongate carapace than *W. atherfieldensis* but with similar ornamentation. A median sulcus was not seen in *W. atherfieldensis*. *W. tavola* is very rare, known only from the Upper Purbeck.

**Wolburgia polyphema** sp. nov.

(Text-fig. 13)

**Diagnosis.** Carapace sub-oblong in lateral view. Anterior with wide smooth flange; posterior with narrower flange. Two sulci reach middle line of shell from dorsal margin separated by pear-shaped lobe. Surface covered by large, widely-spaced, shallow depressions which leave the shell coarsely reticulate. Postero-dorsal area almost at right angles to shell margin and bearing four rounded tubercles.

**Holotype.** GSM Mik(M)2488001. Right valve. Length 0·460 mm., height 0·270 mm.

**Horizon and Locality.** Hard Cockle Beds, Lower Purbeck; Mountfield No. 4 Borehole, Sussex.

**Discussion.** The ornamentation in this species differs considerably from that of the other members of the genus, but the shape of the carapace and the organization of the hinge link them together. This is a rare species known only from the Hard Cockle Beds of the Lower Purbeck.

**References**

See p. 485.
OSTRACODS FROM THE PORTLAND BEDS OF DORSET

By DENNIS BARKER

Ostracods are described from the Portland Beds of four localities in Dorset. Twelve genera and nineteen species are recorded, of which three species are new. The stratigraphical distribution of the various species for each horizon are indicated on the diagram.

INTRODUCTION AND ACKNOWLEDGEMENTS

Hitherto, the only attempt to describe ostracods from the Portland Beds of England has been a short paper by Anderson (1941). This made incidental reference to a few species collected by Sylvester-Bradley from the top few feet of strata overlain by the "Swindon Series", which formed the main subject of the paper. The present survey is, therefore, the first to attempt a comprehensive description, and even now (owing to paucity of exposures in the inland area of the outcrop) it is not as complete a survey as could have been hoped.

In a paper to the colloquium on the Jurassic System—1962, Sylvester-Bradley suggested that the Portland Beds of Dorset should be regarded as the standard section ("stratotype") of the Portlandian stage. Although the lower boundary to this succession presents no problem, the upper boundary has become the subject of debate in the last few years. This is because the upper boundary of the Portland Beds has been found to vary from place to place, and also to interdigitate with the Lower Purbeck Beds. In fact the Swindon Roach is evidence of the last incursion of Portland facies from a sea lying to the South. (Sylvester-Bradley in press). The Lower Purbeck Beds therefore, are taken to be a facies of the uppermost Portlandian in England and consequently the question of the age of those beds above the Lower Purbeck deposits does not come within the scope of this paper.

Ostracods have been examined from Portland Beds at the following localities in Dorset: Poxwell Quarry SY/743835, Hounstout Cliff, SY/952772, Friar Waddon from beside the track above Corton Farm SY/636855 and West Weare Cliff SY/681720. Samples from other localities were also examined but yielded no ostracods.

The samples from Poxwell Quarry were collected from about 45 ft. of beds ranging in age from the Cherty Series to the Lower Purbeck Beds. An interesting feature is the way in which the ostracod fauna illustrates the boundary between the Portland Stone and the Lower Purbeck Beds. The Roach and the beds below it contain a marine ostracod fauna whereas the laminated limestones and the beds above contain a brackish water fauna. *Cypridea dunkeri* occurs at the very top of the section.

Samples from beds 10 ft. below the Massive Bed to the Lower Parallel Band at Hounstout Cliff have yielded a characteristic marine ostracod fauna, as also have
beds at West Weare Cliff from 10 ft. below the Black Nore Sandstone to the Basal Shell Bed. The ostracod fauna consists of the following species:

- *Macrodentina (Macrodentina) transiens* (Jones)
- *Macrodentina (Dictyocythere) retirugata* (Jones)
- *Macrodentina (Polydentina) rudis* Malz
- *Galliaecytheridea wolburgi* (Steghaus)
- *Galliaecytheridea postrotunda* Oertli
- *Orthonotacythere rimosu* Martin
- *Orthonotacythere elongata* sp. nov.
- *Orthonotacythere levis* sp. nov.
- *Cytherelloidea cf. paraweberi* Oertli

The Portland Sand at Friar Waddon consists of about twenty-five feet of green cementstones with occasional *Exogyra* scattered through them. These beds mark the upper middle part of the Portland Sand and they have a fauna slightly different from those of Hounstout Cliff and West Weare Cliff. This is probably because the beds are more sandy. Samples of the sands beside the track at Coryates SY/630857, just west of Corton Farm, were also collected. These sands are below the cementstone mentioned above but do not contain ostracods.

From the following list and the one above it can be seen that this set of samples from Friar Waddon has a reduced fauna which shows similarities to both the Portland Stone and Portland Sand faunas. It would appear, therefore, that it is not yet possible to separate the Portland Sand and Stone by using ostracods alone.

The beds at Friar Waddon contain the following ostracods:

- *Macrodentina (Dictyocythere) retirugata* (Jones)
- *Protocythere serpentina* (Anderson)
- *Paraschuleridea eусarca* (Anderson)
- *Cytherelloidea cf. paraweberi* Oertli

See Table I for a comparison of the ostracod faunas from the Portland Beds of Dorset.

The author would like to record his sincere thanks to Prof. P. C. Sylvester-Bradley for his guidance throughout the work and for the use of the facilities of the Department of Geology at the University of Leicester. Thanks are also due to Dr. R. H. Bate of the British Museum (Natural History) and to Dr. F. W. Anderson of the Geological Survey and Museum for many helpful discussions and access to the ostracod collections under their care. The award of a University of Leicester Research Scholarship is gratefully acknowledged.

All the figured material forming the basis of the present paper has been deposited in the collections of the British Museum (Natural History).

Reference numbers prefixed by P.Q., H., W.W. and F.W. are the collection numbers of the author.
Table I. A comparison of the Ostracod faunas from the Portlandian Beds of Dorset

<table>
<thead>
<tr>
<th>Portland Sand</th>
<th>Portland Stone</th>
<th>Lower Purbeck Beds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Cypridea dunkeri</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Theriosynoecum forbesii</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fabanella boloniensis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fabanella ansata</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mantelliana purbeckensis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Paracypris sp. ?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Procytheropteron bicosta</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Macrodentina (Macrodentina) rugulata</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Macrodentina (Macrodentina) transiens</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Macrodentina (Dictyocythere) retirugata</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Paraschuleridea eusarca</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Protocythere serpentina</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Orthonotacythere rimosae</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Orthonotacythere levis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Orthonotacythere elongata</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Macrodentina (Polydentina) rudis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Galliaecytheridea wolburgi</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Galliaecytheridea postrotunda</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cytherelloidea paraweberi</td>
</tr>
</tbody>
</table>

II SYSTEMATIC DESCRIPTIONS

Superfamily CYPRIDACEA Baird 1845

Family PARACYPRIDIDAE Sars 1923

Genus PARACYPRIS Sars 1866

Paracypris? sp.

(Pl. 3, figs. 10-13)

1955 Paracypris? sp. B, Schmidt: 52, pl. 1, figs. 3-4.

Material. One carapace and one valve from Bed P.Q. 7 and eight valves from Bed P.Q. 12 at Poxwell Quarry.

Description. Carapace elongate, tapering to a pointed posterior. Dorsal margin convex and smoothly curved, while ventral margin is very slightly concave. Greatest height is to anterior of the centre and anterior margin smoothly rounded. Carapace is narrowly pyriform in dorsal view, greatest inflation being at the position of greatest height and narrowing to posterior.

<table>
<thead>
<tr>
<th>Dimensions in mm.</th>
<th>Proportions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L   H   I</td>
</tr>
<tr>
<td>Carapace</td>
<td>0.79 0.31 0.23</td>
</tr>
<tr>
<td>Left valve</td>
<td>0.77 0.31 —</td>
</tr>
<tr>
<td>Left valve juvenile</td>
<td>0.64 0.25 —</td>
</tr>
</tbody>
</table>
Remarks. The few specimens (9 valves and fragments and 1 carapace) of this species do not show any internal details and were found only in the Portland Stone of Poxwell Quarry.

Superfamily **Cyttheracea** Baird 1850
Family **Cyttherideidae** Sars 1925
Subfamily **Cyttherideinae** Sars 1925
Genus **Galliaecytheridea** Oertli 1957

*Galliaecytheridea wolburgi* (Steghaus) (Pl. 2, figs. 1–8)

1951 *Cyprideis wolburgi* Steghaus : 213, pl. 14, figs. 24, 25 ; pl. 15, fig. 26.
1955 *Cyprideis wolburgi wolburgi* (Steghaus) ; Schmidt : 58, pl. 2, figs. 25, 26.
1955 *Cyprideis wolburgi minuta* Schmidt : 58, pl. 2, figs. 27–30.
1957 *Galliaecytheridea wolburgi* (Steghaus) Oertli : 657, pl. 2, figs. 56–60, pl. 3, figs. 61–68.

**Material.** Numerous valves and carapaces from various beds at Hounstout Cliff. Sixty-two valves and sixteen carapaces from various beds at West Weare Cliff.

<table>
<thead>
<tr>
<th>Dimensions in mm.</th>
<th>Proportions</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>H</td>
</tr>
<tr>
<td>Carapace .</td>
<td>0.83</td>
</tr>
<tr>
<td>Right valve .</td>
<td>0.83</td>
</tr>
<tr>
<td>Left valve .</td>
<td>0.97</td>
</tr>
<tr>
<td>Right valve .</td>
<td>0.96</td>
</tr>
<tr>
<td>Carapace .</td>
<td>1.12</td>
</tr>
</tbody>
</table>

Remarks. This is the first time *Galliaecytheridea wolburgi* has been recorded from the Portland Beds of England. These numerous specimens are characteristic of the species in shape and hinge but are much larger than the French material, \( x \pm 2s = 1.00 \text{ mm.} \pm 0.12 \text{ mm.}, \ x \pm 2s = 0.83 \text{ mm.} \pm 0.06 \text{ mm.} \)

*Galliaecytheridea postrotunda* Oertli (Pl. 3, figs. 1–6)

1957 *Galliaecytheridea postrotunda* Oertli : 656, pl. 2, figs. 45–55.

**Material.** Numerous specimens from various beds at Hounstout Cliff.

---

**Fig. 31.** Diagrams to show the size distribution of *Galliaecytheridea postrotunda* from Bed H.8, *Orthonotacythere elongata* and *Orthonacythere rimosa* from Bed H.7, and *Macrodentina (Macrodentina) rugulata* from Bed PQ. 8.
\( \frac{L}{H} \) ratio for Orthotocythere elongata

\( \frac{L}{H} \) ratio for Orthotocythere rimoso

Size distribution of Calligocythereidea postrotundo

Size distribution of Macrodentina (M) rugulata
BRITISH JURASSIC AND CRETACEOUS OSTRACODA

Dimensions in mm. Proportions

<table>
<thead>
<tr>
<th>Specimen Number</th>
<th>Left valve</th>
<th>Carapace</th>
<th>Carapace</th>
</tr>
</thead>
<tbody>
<tr>
<td>Io. 2159</td>
<td>0.71</td>
<td>0.47</td>
<td>0.27</td>
</tr>
<tr>
<td>Io. 2160</td>
<td>0.71</td>
<td>0.45</td>
<td>0.63</td>
</tr>
<tr>
<td>Io. 2159</td>
<td>0.71</td>
<td>0.45</td>
<td>0.63</td>
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<tr>
<td>Io. 2160</td>
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<td>0.71</td>
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<tr>
<td>Io. 2159</td>
<td>0.71</td>
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<td>0.63</td>
</tr>
<tr>
<td>Io. 2160</td>
<td>0.71</td>
<td>0.45</td>
<td>0.63</td>
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<tr>
<td>Io. 2159</td>
<td>0.71</td>
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<tr>
<td>Io. 2160</td>
<td>0.71</td>
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<td>0.71</td>
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<td>Io. 2159</td>
<td>0.71</td>
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<td>0.63</td>
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<tr>
<td>Io. 2160</td>
<td>0.71</td>
<td>0.45</td>
<td>0.63</td>
</tr>
<tr>
<td>Io. 2159</td>
<td>0.71</td>
<td>0.45</td>
<td>0.63</td>
</tr>
<tr>
<td>Io. 2160</td>
<td>0.71</td>
<td>0.45</td>
<td>0.63</td>
</tr>
<tr>
<td>Io. 2159</td>
<td>0.71</td>
<td>0.45</td>
<td>0.63</td>
</tr>
<tr>
<td>Io. 2160</td>
<td>0.71</td>
<td>0.45</td>
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</tr>
<tr>
<td>Io. 2159</td>
<td>0.71</td>
<td>0.45</td>
<td>0.63</td>
</tr>
<tr>
<td>Io. 2160</td>
<td>0.71</td>
<td>0.45</td>
<td>0.63</td>
</tr>
<tr>
<td>Io. 2159</td>
<td>0.71</td>
<td>0.45</td>
<td>0.63</td>
</tr>
<tr>
<td>Io. 2160</td>
<td>0.71</td>
<td>0.45</td>
<td>0.63</td>
</tr>
</tbody>
</table>

**Remarks.** These specimens correspond to the holotype, the size distribution as indicated in Text-figure 31, showing a slight difference in length between males and females.

**Family BRACHYCYTHERIDAE** Puri 1954

**Genus MACRODENTINA** Martin 1940

**Subgenus MACRODENTINA** Martin 1940

*Macrodentina (Macroductina) rugulata* (Jones)

(Pl. 2, figs. 9–12)

1885 *Cythere retirugata* var. *rugulata* Jones : 350, pl. 9, figs. 17–20.
1941 *Cythere retirugata* Jones var. *rugulata* Jones ; Anderson : 373, pl. 18, fig. 1.
1956 *Dictyocythere (Rhysocythere) rugulata* (Jones) Sylvester-Bradley : 18, pl. 4, figs. 1, 2, 5–10, 12–15.
1958 *Macrodentina (Macroductina) rugulata* (Jones) Malz : 18, pl. 6, figs. 83–86.

**Material.** Thirty-six valves from Bed P.Q. 12 at Poxwell Quarry.

**Remarks.** Specimens of *Macrodentina (M.) rugulata* are only found in the Roach of Poxwell Quarry. These specimens (see Text-fig. 1) are much smaller than those described from the Aylesbury district and Portesham Quarry (Barker 1964a, b). The largest forms have a paramphidont hinge and are therefore thought to be adult. The reasons for this reduction in size must be left unexplained until more specimens have been obtained from the Portland Stone of other localities.

*Macrodentina (Macroductina) transiens* (Jones)

(Pl. 2, figs. 13–15)

1885 *Cythere transiens* Jones : 349, pl. 9, figs. 13–16.
1956 *Dictyocythere (Rhysocythere) transiens* (Jones) Sylvester-Bradley : 19, pl. 3, figs. 11–13.
1958 *Macrodentina (Macroductina) transiens* (Jones) ; Malz : 17, pl. 6, figs. 81, 82.

**Material.** Fourteen valves and sixty-seven carapaces from various beds on West Weare Cliff. One hundred and seventeen valves from various beds at Poxwell Quarry.
A carapace from Bed P.Q. 12 has the following dimensions: length 0.58 mm., height 0.35 mm., inflation 0.33 mm.

These specimens correspond in all details to those described by Sylvester-Bradley 1956.

Subgenus **DICTYOCYTHERE** Sylvester-Bradley 1956

*Macrodentina (Dictyocythere) retirugata* (Jones)

(Pl. 1, figs. 1-8)

1885 *Cythere retirugata* Jones : 350, pl. 9, figs. 21, 23.
1885 *Cythere retirugata* var. *textilis* Jones : 350, pl. 19, fig. 24.
1941 *Cythere retirugata* var. *textilis* Jones ; Anderson : 374, pl. 18, fig. 3.
1941 *Cythere retirugata* var. *decorata* Anderson : 374, pl. 18, fig. 4.
1956 *Dictyocythere (Dictyocythere) retirugata* (Jones) Sylvester-Bradley : 15, pl. 3, figs. 7-10, pl. 4, figs. 3, 4, 11, 16, 17.
1956 *Dictyocythere (Dictyocythere) decorata* (Anderson) Sylvester-Bradley : 17, pl. 3, fig. 1.
1958 *Macrodentina (Dictyocythere) decorata* (Anderson) Malz ; 25, pl. 6, figs. 87, 88.
1958 *Macrodentina (Dictyocythere) textilis* (Jones) Malz : 26, pl. 6, figs. 80-91.

**Material.** Five valves from Bed P.Q. 12 at Poxwell Quarry. Sixty-one valves and three carapaces from various beds at Hounstout Cliff. One hundred and fifty-eight valves and ten carapaces from various beds at Friar Waddon. Thirty-eight valves and four carapaces from Bed W.W. 9 at West Weare Cliff.

<table>
<thead>
<tr>
<th>Dimensions in mm.</th>
<th>Proportions</th>
<th>Specimen Number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Right valve</strong></td>
<td>L 0.70</td>
<td>H 0.45</td>
</tr>
<tr>
<td><strong>Left valve</strong></td>
<td>L 0.70</td>
<td>H 0.52</td>
</tr>
<tr>
<td><strong>Carapace</strong></td>
<td>L 0.73</td>
<td>H 0.49 O.45</td>
</tr>
<tr>
<td><strong>Carapace</strong></td>
<td>L 0.81</td>
<td>H 0.47 O.41</td>
</tr>
</tbody>
</table>

**Remarks.** These specimens are similar to those from the Aylesbury district except that they are smaller. They are presumably adult since they have the adult hinge.

Subgenus **POLYDENTINA** Malz 1958

*Macrodentina (Polydentina) rudis* Malz

(Pl. 6, figs. 1-8)

1958 *Macrodentina (Polydentina) rudis* Malz : 31, pl. 4, figs. 57-64.

**Material.** Three carapaces and thirty-seven valves from Bed H.7, three carapaces from Bed H.8 at Hounstout Cliff and four valves from Bed W.W.9 at West Weare Cliff.

**Description.** Carapace somewhat triangular in lateral outline with a more or less straight dorsal margin which slopes down towards the posterior. Ventral margin very slightly convex. Anterior smoothly curved, meeting the dorsal margin at a
slight angle where there is a slight swelling formed by the anterior hinge teeth and
socket. Posterior is narrower than the anterior and is bluntly rounded. The valves
are inturned slightly on the dorsal margin. Ventral margin concave to form a concave
ventral surface. Greatest inflation to posterior. In dorsal view the sides are rather
flat and the ends are slightly pointed. Left valve larger than right and overreaching
it all round, most strongly to anterior and posterior. Males are longer than the
females.

The lateral surfaces are reticulate, the dominant pattern being concentric round
the margins and more or less vertical in the central region. Normal pore canals
irregularly spaced over the carapace. Radial pore canals not observed. Muscle
scars not seen. Hinge paramphidont. There are slight anterior and postero-ventral
vestibules. The line of concrescence parallels the outer margin.

REMARKS. This is the first recorded occurrence of *Macrodentina* (*Polydentina*)
rudis in England.

Family **CYTHERURIDAE** Müller 1894
Genus **ORTHONOTACYTHERE** Alexander 1933

*Orthonotacythere rimosa* Martin

(Pl. 5, figs. 7, 8, 11, 12)

1940 *Orthonotacythere rimosa* Martin : 335, pl. 6, figs. 84–86
1961 *Orthonotocythere* cf. *rimosa* Martin ; Martin : 117, pl. 14, fig. 21a–c.

**Material.** Three valves from Bed P.Q. 7 and two carapaces and twenty valves
from Bed P.Q. 12 at Poxwell Quarry. Twelve carapaces and fifty-eight valves from
various beds on Hounstout Cliff.

Measurements of two specimens are :

<table>
<thead>
<tr>
<th>Dimensions in mm.</th>
<th>Proportions</th>
<th>Specimen Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>H</td>
<td>I</td>
</tr>
<tr>
<td>Carapace</td>
<td>0.50</td>
<td>0.27</td>
</tr>
<tr>
<td>Right valve</td>
<td>0.54</td>
<td>0.33</td>
</tr>
<tr>
<td>fragment</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

REMARKS. These specimens correspond in all details to those described from the
Aylesbury district but the valves are badly encrusted.

*Orthonotacythere levis* sp. nov.

(Pl. 5, figs. 10, 13, 14)

**Diagnosis.** *Orthonotacythere* with rounded caudal region and well rounded,
smooth lateral surfaces.

**Holotype.** Io. 2755. Left valve, from Poxwell Quarry. Length 0.45 mm.
height 0.25 mm.
Paratype. Io. 2756, from Poxwell Quarry.

Other material. Three right and two left valves from Bed P.Q.12 at Poxwell Quarry. Two right and four left valves from Bed H.7 at Hounstout Cliff.

Description. Lateral outline subtrapezoidal with dorsal and ventral margins subparallel. Anterior margin smoothly and evenly rounded, with the posterior margin obliquely rounded, sharpest towards the dorsal margin. Greatest height and inflation just posterior of centre.

Lateral surface covered by many small, faint puncta. Valves swollen towards the ventral margins, particularly near the postero ventral margin. Radial and normal pore canals and muscle scars are not seen. Hinge antimerodont. Inner margin and line of concrescence coincide.

Remarks. This species is distinguished from others of the genus *Orthonotacythere* by its more rounded outline and smooth lateral surfaces.

*Orthonotacythere elongata* sp. nov.

(Pl. 6, figs. 9–11)

Diagnosis. *Orthonotacythere* with ventral margin sloping upwards to posterior dorsal corner in lateral view. Adults with reticulate ornamentation, juveniles also with spines.

Holotype. Io. 2760. Left valve from Poxwell Quarry Bed P.Q.12. Length 0.45 mm., height 0.25 mm.

Other material. One hundred and eight valves and twenty-five carapaces, adults and juveniles, from various beds at Hounstout Cliff.

Description. Carapace somewhat triangular in outline, the dorsal margin being long and straight. Ventral margin slightly irregularly convex and closing with the dorsal margin forming a blunt point. The anterior margin is smoothly rounded but forms a slight angle with the dorsal margin. The greatest inflation is centrally since the dorsal outline is sub rectangular and the greatest height is near the anterior.

The lateral surfaces are reticulate with a major ridge running parallel to the dorsal margin just ventral of the centre of the valve and ending before reaching the anterior and posterior borders. Towards the posterior this ridge becomes stronger to form a slight ala and may be at the position of greatest inflation. There is a central deep narrow sulcus from the dorsal margin almost to the venter of each valve.

The internals of the valves are not seen but the hinge consists of notched terminal teeth with straight connecting crenulate socket. The line of concrescence appears to be parallel to the inner margin.

Remarks. This species differs from others of *Orthonotacythere* by its characteristic shape, see Pl. 6. Proportions of adults and juveniles are given in the Text-figure on p. 451.
Genus *PROCYTHEROPTERON* Ljubimova 1955

*Procythereopteron bicosta* sp. nov.

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

**Diagnosis.** A *Procythereopteron* with sharp ventro-lateral angle, smooth lateral surfaces, and a slight longitudinal ridge running just below middle height.

**Holotype.** A right valve from Poxwell Quarry Bed P.Q. 7. Length 0.54 mm., height 0.29 mm. Io. 2752.

**Paratypes.** Io. 2750-51, from Poxwell Quarry.

**Other material.** Twenty-one left valves and twelve right valves from various beds at Poxwell Quarry.

**Description.** Lateral outline subelliptical. Both the dorsal and ventral margins are smoothly and strongly convex. The anterior is slightly pointed and the posterior is slightly drawn out to a point, particularly in the left valve. The right valve is longer but less high than the left.

Both valves are strongly swollen near the ventral margins to form a sharp angle or ridge and a ventral surface which is flat and slopes inwards. The inner ventral margin of the valves is almost straight. On the lateral surface there is a slight sigmoidal shaped ridge a short distance above the antero ventral margin. The lateral surfaces are smooth. Muscle scars are in a vertical row of four to the anterior of the centre at the position of greatest height. The normal and radial pore canals are not seen. The hinge is entomodont and the line of concrescence coincides with the inner margin.

**Remarks.** This species can be easily recognised by its characteristic shape, particularly in end view.

Family *PROGONOCYTHERIDAE* Sylvester-Bradley 1948

Subfamily *PROTOCYTHERINAE* Lyubimova 1955

Genus *PROTOCYTHERE* Triebel 1938

*Protocythere serpentina* (Anderson)

(Pl. 4, figs. 1, 3-7)

1941 *Cythereis serpentina* Anderson : 375, pl. 19, fig. 12.
1951 *Protocythere sigmoidea* Steghaus : 219, pl. 15, figs. 42-45.
1958 *Protocythere bireticulata* Malz : 39, pl. 11, fig. 69.
1960 *Protocythere sigmoidea* Steghaus ; Fernet : 21, Pl. 1, figs. 11-13.
1963 *Protocythere serpentina* (Anderson) Oertli : 22, pl. 7, fig. 57.

**Material.** Seventy-five valves and seven carapaces from various beds at Poxwell Quarry. Two valves from Bed W.W.9 and two carapaces from Bed W.W.13 at West Weare Cliff. Eleven valves and two carapaces from various beds at Friar Waddon.
Dimensions in mm. | Proportions | Specimen Number
---|---|---
Left valve | 0.79 | 0.41 | 1.00 | 0.52 | Io. 2747
Right valve | 0.54 | 0.25 | 1.00 | 0.46 | Io. 2745
(juvenile) | Left valve | 0.62 | 0.33 | 1.00 | 0.53 | Io. 2171
(juvenile) | Right valve | 0.83 | 0.43 | 1.00 | 0.52 | Io. 2746

Remarks. These specimens show the same wide variation in ornamentation as in specimens from the Aylesbury district.

Genus **Paraschuleridea** Swartz & Swain 1946

*Paraschuleridea ? eusarca* (Anderson)

(Pl. 4, figs. 2, 8–10)

1941 *Cytheridea ? eusarca* Anderson : 376, pl. 19, fig. 15.

Material. Over two hundred valves and carapaces from various beds at Poxwell Quarry, two carapaces and five valves from Bed F.W.7 and three valves from Bed F.W.11 at Friar Waddon.

Description. Lateral outline subelliptical with a convex dorsal margin. Anterior more broadly rounded than the posterior. Ventral margin antero-marginally concave. Outline in dorsal view elliptical with the left valve overreaching the right.

Shell surface is smooth with some irregularly spaced normal pore canals. Approximately 18 straight, irregularly spaced, radial pore canals anteriorly and up to 10 posteriorly. Hinge hemimerodont. Line of concrescence and inner margin coincide. Muscle scars in a vertical row of four just anterior of the valve centre, with one large frontal scar opposite the top two adductors.

Remarks. This species has been placed in the genus *Paraschuleridea* rather than *Eocytheridea* Bate (1963 : 35) although further research into *P. eusarca* may extend the range of *Eocytheridea* and necessitate the discarding of *Paraschuleridea* for this species.

Family **Cytherelloidea** Sars 1866

Genus **Cytherelloidea** Alexander 1933

*Cytherelloidea paraweberi* Oertli

(Pl. 3, figs. 7–9)

1957 *Cytherelloidea paraweberi* Oertli : 651, pl. 1, figs. 12–15.

Material. One carapace from Bed W.W.9 at West Weare Cliff and three valves and one carapace from Bed F.W.4 at Friar Waddon. The carapace from Bed W.W.9 measures : length 0.68 mm., height 0.39 mm., inflation 0.25 mm.

Remarks. Very few specimens have been found but they correspond closely with the type specimen.

References

See p. 485.
OSTRACODS FROM THE PORTLAND AND PURBECK BEDS OF THE AYLESBURY DISTRICT

By DENNIS BARKER

SYNOPSIS

The transition from Portland to Purbeck conditions in the Aylesbury district is discussed with the aid of three sections which are described and their ostracod faunas compared. A series of facies marking the transition can be recognized by means of the lithology, macrofauna and ostracods. No evidence of Middle or Upper Purbeck ostracods has been found. Seventeen genera and twenty-two species are described, of which three species are new.

INTRODUCTION AND ACKNOWLEDGEMENTS

The Portland and Purbeck Beds of the Aylesbury District have been the subject of study by geologists since the middle of last century. At that time Morris (1856) was able to demonstrate, with the aid of the lithology and macrofaunas of the beds exposed in the Bugle Pit, Hartwell, a change from marine Portland conditions through estuarine to freshwater Purbeck conditions. Jones (1885) described the ostracods from the Lower Purbeck Beds of this area and thought that the mingling of the marine with freshwater ostracods would repay careful study. Jukes-Browne (in Woodward 1895), Chapman (1899), Merrett (1924) and Sylvester-Bradley (1941) have each noted a transition from marine Portland to freshwater Purbeck based on the study of the ostracods. Some geologists such as Jones (1885), Chapman (1899) and Merrett (1924) have suggested that Middle and even Upper Purbeck ostracods may be present in places. This has not been confirmed in the present investigation, though Casey & Bristow (1963, 1964) believe sands (previously regarded as Cretaceous) containing Middle Purbeck lamellibranchs, in the Whitchurch and Stewkley area, can be interpreted as the transgressive margin of the Cinder Bed.

The present paper attempts to investigate the nature of the transition from Portlandian to Purbeckian conditions in the Aylesbury district by means of a study of the ostracod fauna. The work is based mainly on the fieldwork and collections made by Prof. P. C. Sylvester-Bradley in the Thame Valley during the summer of 1939. Samples were examined from exposures at the following localities:

1. AY Aylesbury. A pit about half a mile south west of Walton Court Farm—on the footpath that leads from Bishopstone to Ceely Road, Southcourt Estate, 42/806112.
2. BP Bugle Pit, Hartwell near Aylesbury, 42/794121.
3. CH Coneyhill. Field pit near the lodge to Eyethorpe, 42/759151.
4. CL Creslow. Small overgrown pit near cottages, 42/811219.
The sections then extant are now filled in or overgrown but the three most complete sections are described below.

The author is indebted to Prof. P. C. Sylvester-Bradley, who suggested the work, for his help and encouragement and for the use of the facilities of the Department of Geology, University of Leicester. Thanks are also due to Dr. R. H. Bate of the British Museum (Natural History) and to Dr. F. W. Anderson of the Geological Survey and Museum for many helpful discussions and access to the ostracod collections under their care. This work was carried out partly during the tenure of a University of Leicester Research Scholarship.

All the figured material forming the basis of the present paper has been deposited in the collections of the British Museum (Natural History).

FACIES

Davies (1899) stated that he used the term Purbeck as a facies name and not as a time name. This use of the term is followed here and five successive facies are distinguished in the Portland and Purbeck Beds of the Aylesbury district. These facies are listed in ascending order as follows:

A. At the base are massive cream coloured limestones of the Portlandian containing ammonites such as *Titanites giganteus* (J. Sowerby), *Titanites pseudogigas* (Blake), which were described from this area. Woodward (1895) noted large lamellibranchs which he identified as *Perna bouchardi*, *Cardium dissimile*, *Pecten lamellosus*, *Trigonia gibbosa* var. *manselli*. Marine ostracods are also present. This is referred to as the Portland facies.

B. Laminated marls and limestones with, according to Woodward (1895), *Trigonia gibbosa* var. *manselli* and *Ostrea expansa*, together with fish remains and a mixture of marine and euryhaline ostracods. This is referred to as the marine Purbeck facies.
C. Laminated marls and limestones containing gastropods which Davies (1899) tentatively identified as species of *Paludina*. Fitton (1836) reported *Cyclas parva*, modiolae, *Planorbis* and mytili from these beds. Fish remains and euryhaline ostracods are also to be found. This is the brackish Purbeck facies.

D. Marls and limestones becoming sandy upwards with *Paludina* and small modiolae and a *Cyclas?* reported by Fitton (1836). Freshwater beds of similar age at Swindon have yielded (Sylvester-Bradley 1941) *Physa bristovii* (Forbes MS) Phillips, *Valvata helicoidea* (Forbes MS) de Loriol, *Viviparus inflatus* (Sandberger), *Clavator reidi* Groves and *Clavator grovesi* Harris. This is the oligohaline Purbeck facies.

E. Sands and sandstones of the Whitchurch region containing marine lamellibranchs. Casey has recently identified some specimens first collected by Bristow as Middle Purbeck in age. (Casey & Bristow 1963). No ostracods have been obtained from these beds.

These five facies demonstrate a gradual change from marine Portland to more or less freshwater beds of the Lower Purbeck and back again to the marine sands of the Middle Purbeck.

The beds classed as Middle or Upper Purbeck in age by Jones, Chapman and Merrett were of facies D, i.e. oligohaline. The occurrence of Middle Purbeck ostracods is based on two figures of *Cypridea granulosa* var. *paucigranulata* Jones (1885). The specimen on which his figures are based comes from a locality called Whitchurch, the existence and position of which is very doubtful, (see Sylvester-Bradley 1949). I have not found any specimens of *Cypridea granulosa* or its varieties in the Aylesbury district.

In many descriptions of the Purbeck Beds, the terms freshwater, marine, estuarine and brackish have been used without discussion. The writer considers the Purbeck ostracods to be either oligohaline, euryhaline or marine, partly on account of relationships to living representatives of known habitat, partly according to their association with other fossils, and partly on account of the lithological conditions of the beds enclosing them. Those ostracods found in both oligohaline and marine conditions are considered to be euryhaline, i.e. capable of existing under widely varying conditions of salinity. When euryhaline forms are found in the absence of marine or oligohaline ostracods it would appear that conditions of salinity variation were at their maximum. In the beds under discussion the marine ostracod fauna is characterized by:

- *Macrodentina (Macrodentina) rugulata* (Jones)
- *Macrodentina (Macrodentina) transiens* (Jones)
- *Macrodentina (Dictyocythere) retirugata* (Jones)
- *Protocythere serpentina* (Anderson)
- "*Macrocypris*"? sp. Anderson
- *Paraschuleridea buglensis* sp. nov.
- *Orthonotacythere rimosas* Martin
- *Procytheropteron brodiei* (Jones)
- *Wolburgia visceralis* (Anderson)
<table>
<thead>
<tr>
<th>Table I</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Macroductina (Macroductina) rugulata</td>
</tr>
<tr>
<td>Macroductina (Macroductina) transiens</td>
</tr>
<tr>
<td>Macroductina (Dicyocythere) retirugata</td>
</tr>
<tr>
<td>Procythere serpentina</td>
</tr>
<tr>
<td>&quot;Macrocypris&quot;? sp.</td>
</tr>
<tr>
<td>Paspashuleridea bugensis</td>
</tr>
<tr>
<td>Orthonotecythere imosa</td>
</tr>
<tr>
<td>Procytherepteron brodii</td>
</tr>
<tr>
<td>Woleburgia visceralis</td>
</tr>
<tr>
<td>Fabanella boloniensis</td>
</tr>
<tr>
<td>Fabanella ansata</td>
</tr>
<tr>
<td>Mantelliana purbeckensis</td>
</tr>
<tr>
<td>Cypridea tuncens praecursor</td>
</tr>
<tr>
<td>Cypridea dunkeri</td>
</tr>
<tr>
<td>Klieana alata</td>
</tr>
<tr>
<td>Darwinula leguminellla</td>
</tr>
<tr>
<td>Ilyocypris (Rhinocypris) jurassica</td>
</tr>
<tr>
<td>Ilyocypris fragilis</td>
</tr>
<tr>
<td>Ilyocypris decipiens</td>
</tr>
</tbody>
</table>
FIG. 32. Lithological variation and proportion of marine, euryhaline and oligohaline ostracods present in the sections at Hartwell, Whitchurch and Stewkley. Numbers on the columns refer to those given in the text description of each section.
The euryhaline fauna is characterized by:

- *Fabanella bolonensis* (Jones)
- *Fabanella ansata* (Jones)
- *Mantelliana purbeckensis* (Forbes)

The oligohaline fauna is characterized by:

- *Cypridea tumescens* (Anderson) *praecursor* Oertli
- *Cypridea dunkeri*
- *Klieana alata* Martin
- *Scabriculocypris trapezoides* Anderson
- *Darwinula leguminella* (Forbes)
- *Rhinocypris jurassica jurassica* (Martin)
- *Dicrorygma fragilis* Martin
- *Dicrorygma decipiens* (Anderson)

The ostracod faunas for the sections described below are given in Tables I—III, which show the number of valves found in the beds which contain ostracods.

**THE BUGLE PIT, HARTWELL**

The Bugle Pit seems to have been mentioned first in the literature by Morris (1856). Since then it has been described repeatedly. A comparison of the sections obtained by Woodward (1895), Merrett (1924) and Sylvester-Bradley (1939) is shown below.

In 1939 Professor Sylvester-Bradley examined the exposure and collected carefully from all the beds present. The material was subjected to a preliminary examination in the production of his papers of 1940 and 1941. This section is important in that it exposed the thickest continuous section in the Portland and Purbeck Beds in this area. The section has now almost disappeared under tip; only about three feet of the upper beds could be seen at the south east of the quarry in 1962.

The ostracods obtained from the Bugle Pit have been plotted as shown in Table I. The sections at the three localities are drawn to scale and the relative percentages of the three faunas indicated for each bed in which ostracods are found. Four of the five facies indicated above are well developed in the Bugle Pit; facies E and the upper part of the facies D are absent.

**The Bugle Pit, Hartwell**

| BP 22 | Very coarse grit (infilling what is apparently a solution pipe in the beds below) |
| BP 21 | Fine grained limestone, with occasional disseminated shells seen to 1 6 |
| BP 20 | Soft grey marl 1 4 |
| BP 19 | Grey pebbly marl up to 4 0 |

This bed cuts down and across an extremely uneven and eroded surface of the beds below.
In 1939 Sylvester-Bradley opened up trenches by the roadside north of Whitchurch. The accompanying section is a composite one made up from the sections exposed in the trenches and at a pit in the field south of Hurdlesgrove Farm. Text-figure 32 shows the section and the proportions and ranges of the three ostracod faunas. Facies A, B, C and D can be recognized in this section and facies E is reported to be present near Whitchurch itself (Casey & Bristow 1964).
<table>
<thead>
<tr>
<th>Table II</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Macrodentina (Macrodentina)</strong></td>
</tr>
<tr>
<td>rugulata</td>
</tr>
<tr>
<td>3 4 5 6 7a 7b 7c 8 9 10 12 13 14 15 16 22 23 24 25 26 28 29 30 31</td>
</tr>
<tr>
<td>40 44 85 5 6 40 51 12 14</td>
</tr>
<tr>
<td><strong>Macrodentina (Macrodentina)</strong></td>
</tr>
<tr>
<td>transiens</td>
</tr>
<tr>
<td>3 4 5 6 7a 7b 7c 8 9 10 12 13 14 15 16 22 23 24 25 26 28 29 30 31</td>
</tr>
<tr>
<td>51 28 5 2 14 13 1</td>
</tr>
<tr>
<td><strong>Macrodentina (Dictyocythere)</strong></td>
</tr>
<tr>
<td>retirugata</td>
</tr>
<tr>
<td>3 4 5 6 7a 7b 7c 8 9 10 12 13 14 15 16 22 23 24 25 26 28 29 30 31</td>
</tr>
<tr>
<td>51 169 6 37</td>
</tr>
<tr>
<td><strong>Protocythere serpentina</strong></td>
</tr>
<tr>
<td>3 4 5 6 7a 7b 7c 8 9 10 12 13 14 15 16 22 23 24 25 26 28 29 30 31</td>
</tr>
<tr>
<td>9 7</td>
</tr>
<tr>
<td><strong>Paraschuleridea buglensis</strong></td>
</tr>
<tr>
<td>3 4 5 6 7a 7b 7c 8 9 10 12 13 14 15 16 22 23 24 25 26 28 29 30 31</td>
</tr>
<tr>
<td>5 1 2 10</td>
</tr>
<tr>
<td><strong>Procytheropteron brodiei</strong></td>
</tr>
<tr>
<td>3 4 5 6 7a 7b 7c 8 9 10 12 13 14 15 16 22 23 24 25 26 28 29 30 31</td>
</tr>
<tr>
<td>2 62 8</td>
</tr>
<tr>
<td><strong>Cythere sp.</strong></td>
</tr>
<tr>
<td>3 4 5 6 7a 7b 7c 8 9 10 12 13 14 15 16 22 23 24 25 26 28 29 30 31</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td><strong>Fabanella boloniensis</strong></td>
</tr>
<tr>
<td>3 4 5 6 7a 7b 7c 8 9 10 12 13 14 15 16 22 23 24 25 26 28 29 30 31</td>
</tr>
<tr>
<td>94 50 41 14 43 46</td>
</tr>
<tr>
<td><strong>Fabanella ansata</strong></td>
</tr>
<tr>
<td>3 4 5 6 7a 7b 7c 8 9 10 12 13 14 15 16 22 23 24 25 26 28 29 30 31</td>
</tr>
<tr>
<td>318 38 71 19 12 32 18</td>
</tr>
<tr>
<td><strong>Mantelliana purbeckensis</strong></td>
</tr>
<tr>
<td>3 4 5 6 7a 7b 7c 8 9 10 12 13 14 15 16 22 23 24 25 26 28 29 30 31</td>
</tr>
<tr>
<td>32 14 4 14</td>
</tr>
<tr>
<td><strong>Cypridea tumescens praecursor</strong></td>
</tr>
<tr>
<td>3 4 5 6 7a 7b 7c 8 9 10 12 13 14 15 16 22 23 24 25 26 28 29 30 31</td>
</tr>
<tr>
<td>1 48 57 32 17 2</td>
</tr>
<tr>
<td><strong>Cypridea dunkeri</strong></td>
</tr>
<tr>
<td>3 4 5 6 7a 7b 7c 8 9 10 12 13 14 15 16 22 23 24 25 26 28 29 30 31</td>
</tr>
<tr>
<td>4 6 1</td>
</tr>
<tr>
<td><strong>Scabriculocypris trapezoides</strong></td>
</tr>
<tr>
<td>3 4 5 6 7a 7b 7c 8 9 10 12 13 14 15 16 22 23 24 25 26 28 29 30 31</td>
</tr>
<tr>
<td>1 1 2 1 1</td>
</tr>
</tbody>
</table>

British Jurassic and Cretaceous Ostracoda
The samples were collected from excavations one mile north of Whitchurch on the Buckingham road, also from a field pit a little south of Hurdlesgrove Farm, about one mile north of Whitchurch on the western side of the Buckingham road.

**North Whitchurch**

<table>
<thead>
<tr>
<th>NWD.</th>
<th>Description</th>
<th>ft.</th>
<th>in.</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>Sand and slipped material about 5 ft.</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>34</td>
<td>Yellow sandy clay</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>33</td>
<td>Tough grey sandy clay</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>32</td>
<td>Yellow sand about</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>31</td>
<td>Tough sandy clay</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>30</td>
<td>Soft white marl</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>29</td>
<td>Grey clay</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>28</td>
<td>Yellow sand and clay</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Black clay</td>
<td></td>
<td>1-2</td>
</tr>
<tr>
<td>26</td>
<td>Crumbly white marl and clay</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>25</td>
<td>Grey marlstone seen to</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

**Possible gap in section**

<table>
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<th>NWE.</th>
<th>Description</th>
<th></th>
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<tbody>
<tr>
<td>24</td>
<td>Crumbly white marl</td>
<td>9</td>
</tr>
<tr>
<td>23</td>
<td>Marlstone</td>
<td>1</td>
</tr>
<tr>
<td>22</td>
<td>Marly and sand clay</td>
<td>8</td>
</tr>
<tr>
<td>21</td>
<td>Marlstone and soft marl</td>
<td>2</td>
</tr>
<tr>
<td>20</td>
<td>Grey sand and clay</td>
<td>5</td>
</tr>
<tr>
<td>19</td>
<td>Crumbly hard marl stone, top a mass of gastropod casts</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NWF.</th>
<th>Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>Thinly laminated grey sand and clay in alternate layers</td>
<td>1</td>
</tr>
<tr>
<td>17</td>
<td>Black clay</td>
<td>6</td>
</tr>
<tr>
<td>16</td>
<td>Mottled red and green clay and marl with oysters</td>
<td>6</td>
</tr>
<tr>
<td>15</td>
<td>Brittle marlstone</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>Hard fine grained limestone or calcite mudstone</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>Laminated marl and clay</td>
<td>4</td>
</tr>
<tr>
<td>12</td>
<td>Hard brittle marl stone, greenstained down joints</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>Soft grey clayey marl</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>Sandstone</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>Loose sand, highly bituminous smell</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Shelly clay with boulders and pebbles of limestone</td>
<td>6</td>
</tr>
<tr>
<td>7c</td>
<td>Shelly oolite with large lamellibranchs</td>
<td>3</td>
</tr>
<tr>
<td>7b</td>
<td>Hard laminated Pendle</td>
<td>1</td>
</tr>
<tr>
<td>7a</td>
<td>Soft Pendle, alternating layers of marlstone and ostracods (ooliths?)</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>Shelly clay</td>
<td>2</td>
</tr>
</tbody>
</table>
WARREN HOUSE FARM, STEWKLEY

The old pit to the south of this farm forms the most northerly outcrop of the Portland and Purbeck Beds in England. It is a very small outlier and is probably preserved due to being downfaulted at some time. The section exposed in 1939 is shown below. The quarry is now overgrown and only about three feet of the topmost beds can be seen. It was first described by Fitton (1836) and in 1962 C. R. Bristow and M. J. Hughes were able to expose beds containing large Portland lamellibranchs by means of excavation (Bristow personal communication), i.e. beds 2 and 3 of the section below. Text-fig. 1 shows that marine influence is strong all through the section. The marine ostracod fauna is present throughout but is soon joined first by the euryhaline and then by the oligohaline ostracod faunas.

The earliest appearance of oligohaline ostracods is notable since they are to be found in a bed (WH 7) containing *Trigonia* and *Protocardia* sp. (Nos. 11928-31 in Leicester University Coll). This is the only bed containing a few *Cypridea* sp., the fauna being mainly euryhaline with some marine ostracods. It would appear that some form of mixing had occurred or that seasonal variation in salinity and fauna was possible so that *Cypridea* could live in the same place as the marine ostracods. A surprising feature of the bed WH 7 is its similarity to the Swindon Roach, the difference being in the ostracod faunas. This is the bed referred to by Jones (1885: 328) as containing *Trigonia* and as being underlain by a cypridiferous marl.

The oligohaline faunas in the rest of the beds do not contain *Cypridea* and form about twenty per cent or less of the whole fauna.

Bed WH 8 is a shelly marl containing *Ostrea expansa* (11926-27 in Leicester University Coll.) and other lamellibranchs together with a dominantly marine ostracod fauna. This is a typical marine deposit.

Beds WH 8, 10, 11 have a dominantly marine ostracod fauna with both euryhaline and oligohaline ostracod species present, whereas Bed WH 9 has a dominantly euryhaline ostracod fauna with a small percentage of marine and oligohaline ostracods. In both cases some form of mixing or seasonal variation in salinity and faunas could have occurred.

The conclusions to be made are as follows:

1. Conditions of deposition were rapidly changing;
2. The limestones of beds WH 1, 2, 3 can be easily correlated with similar beds at the Bugle Pit and at North Whitchurch. This is facies A. The rest of the
beds can be classed as facies B, but representing a more changeable region possibly a shallow embayment with a river emptying into it. Facies C and D are missing but facies E comes in at the top in the form of bed WH 14.

3. A likely explanation for the mixing of the faunas is the erosion and redeposition of oligohaline and euryhaline ostracods into deposits of marine ostracods.

### Table III

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
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<td>2</td>
<td>3</td>
<td>10</td>
<td>25</td>
<td>17</td>
<td>116</td>
<td>89</td>
<td>10</td>
<td>133</td>
<td>190</td>
<td>49</td>
</tr>
<tr>
<td><strong>Macroductina (Macroductina) transiens</strong></td>
<td>20</td>
<td>.</td>
<td>.</td>
<td>16</td>
<td>1</td>
<td>20</td>
<td>3</td>
<td>7</td>
<td>3</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Macroductina (Dictocythere) retirugata</strong></td>
<td>.</td>
<td>21</td>
<td>.</td>
<td>21</td>
<td>6</td>
<td>.</td>
<td>.</td>
<td>6</td>
<td>10</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Protocythere serpentina</strong></td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>9</td>
<td>.</td>
<td>.</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>&quot;<strong>Macrocystis</strong>&quot; ? sp.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>14</td>
<td>8</td>
<td>6</td>
<td>5</td>
<td>.</td>
<td>.</td>
<td>.</td>
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</tr>
<tr>
<td><strong>Paraschuleridea bugensis</strong></td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>4</td>
<td>.</td>
<td>2</td>
<td>8</td>
<td>.</td>
<td>28</td>
<td>.</td>
<td>.</td>
<td>1</td>
</tr>
<tr>
<td><strong>Orthonotocythere rimosa</strong></td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
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<td>3</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>1</td>
<td></td>
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<tr>
<td><strong>Procyclotheropteron brodiei</strong></td>
<td>.</td>
<td>.</td>
<td>.</td>
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<td>2</td>
<td>.</td>
<td>3</td>
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<td>1</td>
</tr>
<tr>
<td><strong>Wolburgia visceralis</strong></td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>1</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>1</td>
</tr>
<tr>
<td><strong>Fabanella boloniensis</strong></td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>35</td>
<td>6</td>
<td>4</td>
<td>199</td>
</tr>
<tr>
<td><strong>Fabanella ansata</strong></td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>8</td>
<td>1</td>
<td>4</td>
<td>13</td>
<td>79</td>
<td>18</td>
<td>49</td>
<td>79</td>
</tr>
<tr>
<td><strong>Mantelliana pukeheensis</strong></td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>52</td>
<td>65</td>
<td>100</td>
<td>.</td>
</tr>
<tr>
<td><strong>Cypridea tumescens praecursor</strong></td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>10</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td><strong>Kleina alata</strong></td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>6</td>
<td>4</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td><strong>Scabriculocypris trapezoides</strong></td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>44</td>
<td>25</td>
<td>28</td>
<td>.</td>
</tr>
</tbody>
</table>

**Warren House Farm, Stewkley**

<table>
<thead>
<tr>
<th>WH</th>
<th>Quarry to the south of the farm house</th>
<th>ft.</th>
<th>in.</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>Red subsoil .</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>13</td>
<td>Grey marl .</td>
<td>.</td>
<td>2</td>
</tr>
<tr>
<td>12</td>
<td>Crumbly white and grey marl</td>
<td>.</td>
<td>3</td>
</tr>
<tr>
<td>11</td>
<td>Shaley marl with layers of ostracods</td>
<td>.</td>
<td>6</td>
</tr>
<tr>
<td>10</td>
<td>Grey marl</td>
<td>.</td>
<td>9</td>
</tr>
<tr>
<td>9</td>
<td>White laminated marl with ostracods and disseminated vegetation specks</td>
<td>.</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Crumbly shelly marl, <em>Ostrea expansa</em> and medium sized lamellibranchs</td>
<td>.</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>Marlstone with <em>Trigonia</em> and <em>Protocardia</em></td>
<td>.</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Grey marl, ostracods abundant</td>
<td>.</td>
<td>9</td>
</tr>
<tr>
<td>5</td>
<td>Shaley shelly marl with large oysters</td>
<td>.</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>Shelly limestone with <em>Trigonia</em> etc.</td>
<td>.</td>
<td>5-7</td>
</tr>
<tr>
<td>3</td>
<td>Shaley shelly marl with large oysters</td>
<td>.</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Rubbly limestone with <em>Trigonia</em>, <em>Protocardia</em>, <em>Pecten</em>, <em>Exogyra</em> spp., etc.</td>
<td>.</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>Sand, seen to</td>
<td>.</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>.</td>
<td>6</td>
</tr>
</tbody>
</table>
SUMMARY OF RESULTS

The major marker horizon in all three sections is the Crendon Sand at the base. Above this are the Creamy Limestones with large lamellibranchs and ammonites, some of which Buckman (1923: 24, 26), had described from localities nearby. The ammonites from the topmost beds in the Long Crendon area were considered by Buckman to be younger than any from the Dorset coast. This marine facies is followed by facies B, C and D as indicated earlier, especially in the Bugle Pit and at North Whitchurch. At Warren House Farm conditions have changed; facies C and D are missing and facies B modified to take their place.

An examination of the ostracods shown in the Text-figure indicates that the euryhaline forms *Fabanella boloniensis* and *Fabanella ansata* are present in facies B, C and D. On the Dorset coast *Fabanella boloniensis* and *Mantelliana purbeckensis* are to be found in supersaline conditions (Anderson 1958).

Since the ostracods *Fabanella ansata* and *Mantelliana purbeckensis* are characteristic of the Lower Purbeck Beds of Dorset and as they appear in the upper part of the Creamy Limestones of the Aylesbury district, it would appear that Lower Purbeck conditions had set in before the end of Portland times in the Aylesbury district (cf. Casey & Bristow 1963: 4).

No evidence has been found of Middle or Upper Purbeck ostracods in these sections but Middle Purbeck lamellibranchs have been obtained from the so-called Wealden Beds above the Purbecks of this region, (Casey & Bristow 1963, 1964).

In conclusion it can be stated that the transition from Portland to Purbeck conditions is marked by a series of facies which can be recognized by means of lithology, macrofauna and ostracods.

SYSTEMATIC DESCRIPTIONS

Suborder PODOCOPINA Sars 1866

Superfamily CYPRIDACEA

Family CYPRIDIDAE

Subfamily CYPRIDINAE Baird 1845

Genus MANTELLIANA Anderson

*Mantelliana purbeckensis* (Forbes)  
(Pl. 7, fig. 5)

For complete synonymy see Anderson p. 438.

MATERIAL. Two hundred and thirty-nine valves and carapaces from the Bugle Pit (see Table I). Three hundred and twenty-six valves and carapaces from North Whitchurch (see Table II). Two hundred and seventeen valves and carapaces from Warren House Farm, Stewkley (see Table III). Other specimens were also obtained from similar horizons at Haddenham and Towersey.

REMARKS. This species is believed to be euryhaline in the Aylesbury district. It is seldom well preserved but muscle scars have been seen and cross-sections through the shell have indicated the size and shape of the duplicature and vestibule (see Barker in press).
Subfamily ILYOCYPRIDINAE Kaufman 1960
Genus RHINOCYPRIS Anderson 1941

**Rhinocypris jurassica** (Martin)

(Pl. 7, figs. 17, 18)

1940 *Ilyocypris jurassica jurassica* Martin: 312, pl. 4, figs. 51–54.
1941 *Rhinocypris scabra* var. *hamata* Anderson: 378, pl. 19, fig. 19.
1963 *Rhinocypris jurassica jurassica* (Martin) Oertli: 18, pl. 5, figs. 25–27.

**Material.** Six valves from Bed 16 at the Bugle Pit.

**Description.** Carapace thin shelled with a sub-elliptical lateral outline. The anterior margin is slightly larger than the posterior and both are evenly and smoothly curved. Dorsal margin slightly convex, ventral margin slightly concave. Greatest height midway between centre and anterior. The left valve overreaches the right valve around the free margin but not along the dorsal margin.

Shell surface covered by many small pustules closely arranged and of uniform size. Three major spines or hollow tubercles are present near the dorsal margin, separated by two transverse grooves, one medially from the dorsal margin to the centre of the valve and another smaller groove to anterior of this. There are about six to eight smaller spines of more or less equal size situated mainly posterior to the large anterior spine. Those nearer the posterior dorsal margin are curved to the rear. Hinge adont. The line of concrescence is parallel to and a short distance from the outer margin, a slight vestibule around the anterior border and at the posterior ventral corner being formed.

Muscles scars seen internally on a central node but not distinguishable. Normal and radial pore canals not clearly seen.

**Remarks.** Mandelstam (1956) has described what appears to be the same genus under the name *Origoilyocypris*. The specimen figured by Oertli (1963) as *Rhinocypris jurassica jurassica* is much smoother and not so spinose as the specimens described here.

Subfamily CYPRIDEINAE
Genus CYPRIDEA Bosquet 1952

**Cypridea dunkeri** Jones

(Pl. 7, figs. 1, 2)

1885 *Cypridea dunkeri* Jones: 339, pl. 8, figs. 9, 10, 17.
1941 *Ulwellia papulata* Anderson: 381, pl. 18, fig. 8.
1963 *Cypridea dunkeri* Jones; Oertli: 15, pl. 1, fig. 6.

**Material.** Six valves and carapaces from the Bugle Pit (see Table I). Five valves and carapaces from North Whitchurch (see Table II). One carapace from Haddenham.

**Remarks.** *Cypridea dunkeri* is characteristic of the oligohaline facies but few specimens are usually found.
Cypridea tumescens (Anderson) *praecursor* Oertli
(Pl. 7, fig. 4)

1940 *Cypridea valdensis* (Fitton); Martin: 288, pl. 1, figs. 1-4.
1939 *Cyamocypris tumescens* Anderson: 306, pl. 13, figs. 4, 7.
1963 *Cypridea valdensis praecursor* Oertli: 16, pl. 3, figs. 13-19, pl. 4, fig. 20.

**Material.** Forty-five valves and carapaces from the Bugle Pit (see Table I). Forty-one valves and carapaces from North Whitchurch (see Table II). Ten valves and carapaces from Bed 7 at Warren House Farm, Stewkley. Eighty-three valves and carapaces from similar beds at Haddenham, and thirty-four specimens at Towsey.

<table>
<thead>
<tr>
<th>Dimensions in mm.</th>
<th>Proportions</th>
<th>Specimen Number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Carapace</strong></td>
<td>L 1.17</td>
<td>H 0.71</td>
</tr>
<tr>
<td><strong>Left valve</strong></td>
<td>L 1.17</td>
<td>H 0.73</td>
</tr>
<tr>
<td><strong>Right valve</strong></td>
<td>L 1.02</td>
<td>H 0.61</td>
</tr>
</tbody>
</table>

**Remarks.** This species is characteristic of the oligohaline facies. Specimens are few and some are broken. There is variation in lateral outline as suggested by Oertli (1963). Specimens from other horizons in the Purbeck Beds show a wide variation in shape (cf. those figured by Anderson) but all the specimens probably belong to the same group.

Family **PARACYPRIDIDAE** Sars 1923
Genus **PARACYPRIS** Sars

**Paracypris?** sp.
(Pl. 9, figs. 9, 10)

**Material.** Four carapaces from Bed NW 5 at North Whitchurch (see Table II). Two hundred and sixty-eight carapaces from various beds at Haddenham of similar age to the North Whitchurch material.

**Description.** Characteristic elongate shape with the greatest height just anterior of the centre. The dorsal margin is short and straight or obliquely convex. The ventral margin is longer and concave. Anterior margin is obliquely curved, sharpest towards the venter. Carapace smooth on external surface.

The internal details have not been seen but in some specimens there are faint indications of elongate muscle scars in a vertical row of four at the position of greatest height.

**Remarks.** This form shows many similarities in shape to *Paracypris* although not definitely identified as such at the present time.
Superfamily **DARWINULACEA** Brady & Norman 1889
Family **DARWINULIDAE** Brady & Norman 1889
Genus **DARWINULA** Brady & Robertson 1885

*Darwinula leguminella* (Forbes)

(Pl. 7, fig. 9)

1855 *Cypris leguminella* Forbes *in* Lyell : 294, text-fig. 334c.
1885 *Darwinula leguminella* (Forbes) Jones : 346, pl. 8, figs. 80, 31.
1885 *Cyprione Bristovii* Jones : 344, pl. 8, figs. 27–29, 32.

**Remarks.** A rare species in the Aylesbury district.

Superfamily **CYTHERACEA** Baird 1850
Family **CYTHERIDAE** Baird 1850
Genus **FABANELLA** Martin 1961

*Fabanella boloniensis* (Jones)\(^1\)

(Pl. 7, fig. 7)

1882 *Cythere boloniensis* Jones : 615–616, text-figs. A, B.
1883 *Cythere ? boloniensis* Jones : 58, text-figs. 1–9.
1885 *Candona boloniensis* (Jones) Jones : 348, pl. 9, figs. 7, 8.
1940 *Cyprideis polita* Martin : 352, pl. 7, figs. 110–113, pl. 9, figs. 149–151.
1961\(^a\) *Fabanella polita* (Martin) Martin : 186, 190–192, pl. 1, figs. 1–4, 10–12.
1961\(^b\) *Fabanella polita polita* (Martin) ; Martin : 113, pl. 14, fig. 9.
1963 *Fabanella polita polita* (Martin) ; Oertli : 21, pl. 7, figs. 46–52.

**Material.** Five hundred and six valves and carapaces from various beds at the Bugle Pit (see Table I). Three hundred and eighty valves and carapaces from various beds at North Whitchurch, (see Table II). Three hundred and sixty-two valves and carapaces from various beds at Warren House Farm, Stewkley, (see Table III). Beds of similar age have yielded three hundred and eighty-eight valves and carapaces at Haddenham, ninety-nine valves and carapaces at Towesey and seven valves and carapaces at Coneyhill.

**Remarks.** In the Aylesbury district *Fabanella boloniensis* has been shown to be an euryhaline ostracod capable of existing in various environments (Barker 1963). It is smallest in the oligohaline facies and largest in the marine facies.

*Fabanella ansata* (Jones)

(Pl. 7, fig. 8)

1885 *Candona ansata* Jones : 349, pl. 9, figs. 9–12.
1947 *Candona ansata* Jones ; Anderson *in* Arkell : 129, text-fig. 28 (9).
1963 *Fabanella ansata* (Jones) Oertli : 22, pl. 16, figs. 43–45.

**Material.** Nine hundred and fifty-five valves and carapaces from various beds at the Bugle Pit (see Table I). Five hundred and thirty valves and carapaces from

\(^1\) Anderson & Barker consider *Fabanella polita* (Martin) to be a synonym of *Fabanella boloniensis* (Jones). They propose a fuller discussion of this species elsewhere.
various beds at North Whitchurch, (see Table II). Four hundred and thirty-six valves and carapaces from various beds at Warren House Farm, Stewkley, (see Table III). Beds of similar age have yielded five hundred and ten valves and carapaces at Haddenham, one hundred and eighty valves and carapaces at Towersey and seven at Coneyhill.

**Description.** The lateral outline is subreniform with the greatest height towards the posterior and the greatest inflation central. Anterior and posterior margins obliquely curved, slightly sharper towards the venter. Ventral margin concave and slightly inturned. Dorsal margin slightly inturned and more or less straight. In dorsal view carapace is acutely elliptical. Left valve is larger than and overreaches the right valve. External surface smooth with a few normal pore canals irregularly spaced. Radial pore canals numerous, fine straight and closely spaced around the anterior, posterior and ventral borders. Adductor muscle scars in a vertical row of four just anterior of centre. Frontal scars situated to anterior of adductors opposite the top and bottom scars. In some specimens a small fifth scar can be seen above and in line with the four adductors; this may be the “fulcral point” (Van Morkhoven 1962: 48) rather than a muscle scar. Hinge lophodont. A small anterior vestibule widest antero-ventrally and a narrow posterior vestibule parallel to the outer margin.

<table>
<thead>
<tr>
<th>Dimensions in mm.</th>
<th>Proportions</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>H</td>
</tr>
<tr>
<td>Carapace</td>
<td>1.17</td>
</tr>
<tr>
<td>Left valve</td>
<td>1.00</td>
</tr>
<tr>
<td>Right valve</td>
<td>0.95</td>
</tr>
<tr>
<td>Carapace</td>
<td>0.96</td>
</tr>
</tbody>
</table>

**Remarks.** This species is characteristic of euryhaline conditions in the Aylesbury district and varies in size according to the salinity. It is smallest in the oligohaline facies and largest in the marine facies (Barker 1963).

Family **CYTHERIDEIDAE** Sars 1925

Subfamily **CYTHERIDEINAE** Sars 1925

**Genus** **GALLIAECYTHERIDEA** Oertli 1957

**Galliaecytheridea crendonensis** sp. nov. (Pl. 8, figs. 7–11)

**Holotype.** Io. 1257, carapace from Bed CWE 2, Long Crendon. Length 0.68 mm., height 0.39 mm., inflation 0.31 mm.

**Paratypes.** Io. 1258–59 from Bed CWE 2, Long Crendon.
Diagnosis. *Gallicyatheridea* with pronounced caudal process.

Material. Six valves from Bed CWE 2 and one valve from Bed CWE 3 at Long Crendon. Also six valves from Bed CH 8 and one valve from Bed CH 7 at Coneyhill.

Description. Carapace asymmetrically subelliptical in lateral outline. Right valve with a pronounced caudal process. Dorsal of the right valve more or less straight, converging posteriorly with the ventral margin. Anterior margin obliquely curved, sharper towards the venter. Left valve has a more rounded outline with a very much reduced and rounded caudal process. Dorsal margin more or less straight, converging towards the posterior. Ventral margin convex. Anterior margin smoothly and obliquely curved, slightly sharper towards the venter. Greatest height at the centre. In dorsal view the outline is elliptical with the greatest inflation in the centre. The left valve is greater in height than the right, but the right valve is greater in length due to the caudal process.

The outer surface is ornamented by irregularly spaced and sized pits, the larger usually being near the centre. In both valves there is a slight furrow just behind the anterior margin. Line of concrescence and inner margin coincide throughout. The selvage forms the outer margin all round except anteriorly in the right valve where it runs a short distance inside the outer margin. Pore canals not seen. Hinge hemimerodont, consisting of two terminal teeth subdivided into six or seven toothlets and connected by a smooth narrow groove in the right valve. The left valve has complementary elements and also an accommodation groove behind the median ridge. There are four adductor muscle scars in a vertical row slightly concave to the anterior. A frontal scar is situated opposite the top adductor and a rather large mandible scar, possibly made up of two scars, somewhat below and anterior to the bottom adductor.

Remarks. Sexual dimorphism has not been observed in this species. The shape of the posterior is characteristic of the species. So far it has only been found at Long Crendon and Coneyhill.

Family **BRACHYCYTHERIDAE** Puri 1954

Genus *MACRODENTINA* Martin 1940

Remarks. Sylvester-Bradley (1956) considered the genus *Dictyocythere* (Jones) to consist of two subgenera, *Dictyocythere* and *Rhysocythere*, differentiated on the basis of hinge structure. However, Malz (1958) showed that *Rhysocythere* is a junior synonym of Martin's genus *Macroductina*, and subdivided this genus into three subgenera on the basis of hinge structure, *Macroductina* ss. *Macroductina* (*Dictyocythere*) and *Macroductina* (*Polyductina*). The differences between the three subgenera of Malz were considered to be strong enough to raise them to full generic level in Volume Q of the *Treatise on Invertebrate Palaeontology*. In the present work the differences between the subgenera are thought to be insufficient to give them full generic status and the classification of Malz is followed.
Subgenus **MACRODENTINA** Martin 1940

*Macrodentina (Macrodentina) rugulata* (Jones)

(Pl. 8, figs. 16, 17)

1885 *Cythere retirugata* var. *rugulata* Jones: 350, pl. 9, figs. 17-20.
1940 *Cythere retirugata* Jones var. *rugulata* Jones; Anderson: 373, pl. 18, fig. 1.
1956 *Dictyocythere (Rhysocythere) rugulata* (Jones) Sylvester-Bradley: 18, pl. 4, figs. 1, 2, 5-15.
1958 *Macrodentina (Macrodentina) rugulata* (Jones) Malz: 18, pl. 6, figs. 83-86.

**Material.** Six hundred and six valves and carapaces from various beds at the Bugle Pit (see Table I). Two hundred and ninety-seven valves and carapaces from various beds at North Whitchurch (see Table II). Five hundred and sixty-four valves and carapaces from various beds at Warren House Farm, Stewkley (see Table III). Beds of similar age have yielded one hundred and thirteen valves and carapaces at Haddenham, ten valves at Towesey and twenty valves and carapaces at Coneyhill.

**Description.** Carapace subtrapezoidal in lateral outline with greatest height to the anterior of centre. Dorsal view inflated elliptical with the greatest inflation medially and towards the venter. Ventral surface has about eight subparallel longitudinal ridges. The dorsal and ventral margins are convex outwards. Anterior and posterior margins obliquely rounded, sharper towards the venter. The left valve is larger than the right.

Lateral surfaces smooth except near the ventral margins where there are three long ridges similar to those on the ventral surface but decreasing in length towards the centre of the valve. Normal pore canals regularly spaced over the carapace. Radial pore canals straight, about twenty being irregularly spaced around the anterior border and very few on the posterior border. Four adductor muscle scars in a vertical row of four just anterior of the valve centre. Hinge paramphidont. Line of concrescence parallel to the outer margin except at the anterior ventral corner where it forms a slight vestibule.

<table>
<thead>
<tr>
<th>Dimensions in mm.</th>
<th>Proportions</th>
<th>Specimen Number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L</td>
<td>H</td>
</tr>
<tr>
<td>Carapace ♂</td>
<td>0.83</td>
<td>0.54</td>
</tr>
<tr>
<td>Left valve ♂</td>
<td>0.95</td>
<td>0.56</td>
</tr>
<tr>
<td>Left valve ♀</td>
<td>0.88</td>
<td>0.56</td>
</tr>
<tr>
<td>Right valve ♂</td>
<td>0.83</td>
<td>0.54</td>
</tr>
<tr>
<td>Right valve ♀</td>
<td>0.90</td>
<td>0.51</td>
</tr>
<tr>
<td>Carapace ♂</td>
<td>0.96</td>
<td>0.58</td>
</tr>
<tr>
<td>Left valve ♂</td>
<td>0.88</td>
<td>0.58</td>
</tr>
<tr>
<td>Carapace ♀</td>
<td>0.78</td>
<td>0.48</td>
</tr>
</tbody>
</table>

**Remarks.** A common easily recognized species in the Aylesbury district.
Macrodentina (Macrodentina) transiens (Jones)
(Pl. 8, figs. 1–6)

1885 Cythere transiens Jones: 349, pl. 9, figs. 13–16.
1956 Dictyocythere (Rhysocythere) transiens (Jones) Sylvester-Bradley: 19, pl. 3, figs. 11–13.
1958 Macrodentina (Macrodentina) transiens (Jones) Malz: 17, pl. 6, figs. 81, 82.

Diagnosis. Small reticulate Macrodentina tapering strongly to the posterior in lateral view. No sexual dimorphism.

Material. Four hundred and eighty three valves and carapaces from various beds at the Bugle Pit (see Table I). One hundred and fourteen valves and carapaces from various beds at North Whitchurch (see Table II). Ninety valves and carapaces from various beds at Warren House Farm, Stewkley (see Table III). Beds of similar age have yielded forty two valves and carapaces at Towersey, three hundred and fifty-seven valves and carapaces at Long Crendon and two hundred and twenty valves and carapaces at Coneyhill.

Description. Broadly ovate asymmetrical lateral outline, greatest height being anterior of the centre. In dorsal view the sides are subparallel and the ends rounded, the posterior being more pointed. Dorsal margin straight or very slightly convex and slopes down towards the posterior. Ventral margin slightly convex, the ventral surface being slightly ridged longitudinally. The anterior margin is more broadly rounded than the posterior.

Shell surface strongly pitted. The pits arranged in rows near the margins but more irregularly situated towards the centre. On the left valve there is a small posteriorly directed spine at the posterior ventral corner. Normal pore canals are situated in a pit. Radial pore canals are present not difficult to distinguish. Four adductor muscle scars are situated in a vertical row about the centre of the valves. Hinge paramphidont.

<table>
<thead>
<tr>
<th>Dimensions in mm.</th>
<th>Proportions</th>
<th>Specimen Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carapace</td>
<td>.0·61 0·37 0·32</td>
<td>1·00 0·61 0·52</td>
</tr>
<tr>
<td>Carapace</td>
<td>.0·59 0·37 0·32</td>
<td>1·00 0·63 0·49</td>
</tr>
<tr>
<td>Right valve</td>
<td>.0·61 0·32 —</td>
<td>1·00 0·52 —</td>
</tr>
<tr>
<td>Left valve</td>
<td>.0·59 0·37 —</td>
<td>1·00 0·63 —</td>
</tr>
</tbody>
</table>

Remarks. This species is smaller than and easily distinguished from the other species of Macrodentina by means of its shape.

Subgenus DICTYOCYTHERE Sylvester-Bradley 1956

Macrodentina (Dictyocythere) retirugata (Jones)
(Pl. 8, figs. 18–22)

1885 Cythere retirugata Jones: 350, pl. 9, figs. 21–23.
1885 Cythere retirugata var. textilis Jones: 350, pl. 9, fig. 24.
1941 Cythere retirugata Jones var. textilis Jones; Anderson: 374, pl. 18, fig. 3.
1941 Cythere retirugata Jones var. decorata Anderson: 374, pl. 18, fig. 4.
1956 *Dictyocythere* (*Dictyocythere*) *retirugata* (Jones) Sylvester-Bradley: 15, pl. 3, figs. 7–10, pl. 4, figs. 3, 4, 11, 16, 17.

1956 *Dictyocythere* (*Dictyocythere*) *decorata* (Anderson) Sylvester-Bradley: pl. 17, pl. 3, fig. 1.

1958 *Macrodentina* (*Dictyocythere*) *retirugata* (Jones) Malz: 25, pl. 6, figs. 87, 88.

1958 *Macrodentina* (*Dictyocythere*) *textilis* (Jones) Malz: 26, pl. 6, figs. 89–91.

**Material.** Five hundred and twenty-seven valves and carapaces from various beds at the Bugle Pit (see Table I). Two hundred and sixty-three valves and carapaces from various beds at North Whitchurch (see Table II). Sixty-six valves and carapaces from various beds at Warren House Farm, Stewkley (see Table III). Beds of similar age have yielded six valves at Coneyhill.

**Description.** Lateral outline subtrapezoidal with greatest height to anterior of centre. Pyriform in dorsal view with greatest inflation towards the posterior. The dorsal margin is straight and the ventral margin is sinuous, slightly concave medially. Anterior margin smoothly and obliquely rounded, sharper towards the venter. Posterior margin smaller and almost straight forming a posterior dorsal slope. The inflation is greatest towards the venter so that the ventral surface is almost flat with about six rows of elongate reticulae more or less parallel to its length.

The surface is strongly reticulate, the reticulation arranged in rows parallel to the margins near the venter, posterior and anterior but irregularly elsewhere. Normal pore canals large, situated in each cell of the reticulum. Inside these polygonal areas fine "second order" reticulations can often be seen. In some specimens the reticulation has been smoothed out to form circular rather than polygonal pits, leaving faint indications for the fine reticulations in some places. The radial pore canals are sparse and straight, with about twelve to the anterior border and eight to the posterior. Four adductor muscle scars are in a vertical row just posterior of the position of greatest height. A single frontal scar is situated in line with the second dorsal adductor. Hinge holamphidont. Line of concrescence not clear but there are vestibules around the anterior and at the posterior ventral corner. The right valve overlaps the left around the anterior half of the carapace and the left valve overlaps the right around the posterior half of the carapace.

**Remarks.** The variation in ornamentation of this species is so continuous when a large number of specimens are examined that it is impossible to separate the three morphological types shown in Pl. 8.

Family **CYTHERURIDAE** Müller 1894

Genus **PROCYTHEROPTERON** Ljubimova 1955

*Procytheropteron brodiei* (Jones)

(Pl. 8, figs. 23–26, Pl. 9, fig. 8)

1894 *Cytheropteron brodiei* Jones: 167, pl. 9, fig. 12.

1964 *Procytheropteron brodiei* (Jones) Anderson: 154, pl. 11, figs. 41, 42.

**Material.** Two hundred and thirty-five valves and carapaces from various beds at the Bugle Pit (see Table I). Seventy-two valves and carapaces from various beds...
at North Whitchurch (see Table II). Five valves from beds four and six at Warren House Farm, Stewkley (see Table III). Beds of similar age have yielded ten valves and carapaces at Haddenham, and two valves at Long Grendon.

**DESCRIPTION.** Carapace smooth and glossy with a sub-circular lateral outline drawn out slightly to posterior, and with the greatest height to the anterior. Swollen in dorsal view with the greatest inflation centrally situated. Anterior margin is obliquely curved, sharpest towards the venter. Posterior margin is drawn out in a projection. Both valves are swollen near the ventral margins and form an angle with the concave ventral surface which is ornamented with three or four longitudinal subparallel ridges to each valve.

Ornamentation consists of faint longitudinal reticulations on the lateral surfaces. Normal pore canals are regularly distributed. Anterior border has about seven straight radial pore canals. Line of concrescence and inner margin coincide. Hinge hemimerodont. Four poorly distinguished adductor muscle scars are in a vertical row just anterior of the centre. Outer margin forms a lip centrally on the ventral margin. Posterior projection is slightly hollow so forms a slight tube with the opposite valve.

**Dimensions in mm.**

<table>
<thead>
<tr>
<th></th>
<th>Carapace</th>
<th>Left valve</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>L</strong></td>
<td>0.48</td>
<td>0.47</td>
</tr>
<tr>
<td><strong>H</strong></td>
<td>0.29</td>
<td>0.29</td>
</tr>
<tr>
<td><strong>I</strong></td>
<td>0.29</td>
<td>—</td>
</tr>
</tbody>
</table>

**Proportions**

<table>
<thead>
<tr>
<th></th>
<th>L</th>
<th>H</th>
<th>I</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Carapace</strong></td>
<td>1.00</td>
<td>0.60</td>
<td>0.60</td>
</tr>
<tr>
<td><strong>Left valve</strong></td>
<td>1.00</td>
<td>0.62</td>
<td>—</td>
</tr>
</tbody>
</table>

**Remarks.** This species differs from those of *Cytheropteron* by having a smooth median portion to the hinge and a more rounded lateral outline.

**Genus ORTHONOTACYTHERE** Alexander 1933

**Orthonotacythere rimosa** Martin

(Pl. 8, figs. 12, 13)

1940 *Orthonotacythere rimosa* Martin : 335, pl. 6, figs. 84–86.
1961 *Orthonotacythere rimosa* Martin ; Martin : 117, pl. 14, fig. 21a–c.

**Material.** Seventy-eight valves and carapaces from various beds at the Bugle Pit (see Table I). Four valves from beds 6 and 11 at Warren House Farm, Stewkley (see Table III).

**Description.** Subtrapezoidal in lateral outline with the dorsal and ventral margins subparallel. Greatest height and greatest inflation are posterior of centre. Anterior margin is obliquely rounded sharper to venter; posterior margin subtriangular forming a caudal process to the posterior corner. Ventral margin slightly convex; dorsal margin long and straight. The ornamentation consists of an irregular reticulate rib pattern with a few strong ridges radiating from the ventral margin just posterior of the centre where the inflation is greatest. The major ridge is inside but more or less parallel to the anterior,
ventral and posterior margins. A few short radial pore canals are to be seen at the anterior and posterior margins. The muscle scars are not clear. Inner margin and line of concrescence coincide.

<table>
<thead>
<tr>
<th>Dimensions in mm.</th>
<th>Proportions</th>
<th>Specimen Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carapace</td>
<td>L H I</td>
<td>L H I</td>
</tr>
<tr>
<td>Right valve</td>
<td>0.59 0.39 0.32</td>
<td>1.00 0.58 0.54</td>
</tr>
<tr>
<td>Left valve</td>
<td>0.73 0.39 —</td>
<td>1.00 0.53 —</td>
</tr>
<tr>
<td></td>
<td>0.66 0.37 —</td>
<td>1.00 0.56 —</td>
</tr>
</tbody>
</table>

**Remarks.** The rib pattern appears to be slightly stronger than the figured specimens of Martin (1940), but since the specimens described here are larger they may represent a later instar.

*O. rimosa* differs from *O. diglypta* Triebel by having weaker ornamentation and a straight dorsal margin. The sulcus is not so deep in *O. rimosa* as it is in *O. interrupta*.

**Family LIMNOCYTHERIDAE** Klie 1938

**Genus DICRORYGMA** Poag 1962

*Dicrorygma fragilis* (Martin)

(Pl. 7, figs. 19, 20)

1940 *Limnocythere fragilis* Martin: 348, pl. 7, figs. 105–109, pl. 9, fig. 152.

**Material.** Six valves from Bed BP 16 at the Bugle Pit, (see Table I).

**Description.** Valves thin and fragile, subreniform in lateral outline. Dorsal margin straight, ventral margin longer but sinuous. Anterior and posterior obliquely rounded, the posterior being the larger, and both are slightly compressed near the margins. Shell surface smooth. A subcentral sulcus occurs near the venter just posterior of the centre and another very faint one near to the dorsal margin just above the muscle scars. Normal pore canals few in number, sieve type and irregularly distributed. There are about ten radial pore canals to the posterior margin and fewer to the anterior. They are fairly straight and irregularly spaced. Hinge is weakly developed lophodont. Four adductor muscle scars are arranged in a slight curve concave to the anterior just in front of the centre. A frontal scar occurs opposite to the top adductor with possibly a fulcral point just below it. Two mandibular scars are arranged anterodorsally to the adductors. The line of concrescence runs parallel to the outer margin and a short distance inside it forming a vestibule to the anterior and posterior ventral borders.

**Remarks.** Very few specimens are to be found in this region.

*Dicrorygma decipiens* (Anderson)

(Pl. 7, figs. 15, 16)

1941 *Cytherella ? decipiens* Anderson: 380, pl. 19, figs. 20, 21.

**Material.** Three valves from Bed 16 at the Bugle Pit (see Table I).
Description. Thin fragile valves are subreniform in lateral outline. The dorsal margin and the ventral longer and concave medially. Posterior is larger and more obliquely rounded than the anterior and both are slightly flattened round the margins. Surfaces of the valves are covered by numerous discontinuous ridges more or less parallel to the outer margins. There is a slight subcentral sulcus just posterior of the centre and a much fainter one near the dorsal margin just above the muscle scars. A few normal pore canals of the sieve type are distributed irregularly. About ten fairly straight and irregularly spaced radial pore canals are in the posterior margin and fewer in the anterior. Hinge is lophodont. Four adductor muscle scars are in slight curve, concave to the anterior, and situated just anterior of the valve centre. There is also a frontal scar and two mandibular scars though they are difficult to see because of the ornament. The line of concrescence runs parallel to the outer margin and a short distance inside it forming a vestibule to the anterior and posterior ventral borders.

Remarks. Dicorygma decipiens is easily distinguished from D. fragilis by means of its lateral outline and its distinctive ornamentation. This species is very rare.

Genus THERIOSYNOECUM Branson 1933

Theriosynoecum forbesii (Jones)
(Pl. 7, fig. 6, Pl. 9, figs. 11, 12)

1885 Metacypris forbesii Jones : 344, pl. 8, figs. 11-16.
1940 Metacypris forbesii Jones ; Martin : 336, pl. 6, figs. 89-94.
1957 Gomphocythere forbesii forbesii (Jones) Wicher : 270.
1962 Bisulcocypris forbesii (Jones) Pinto & Sanguinetti : 39, pl. 3, figs. 1-4, pl. 12, figs. 1a-d.

Material. Five carapaces and six valves from Bed TW 2 at Towersey. Twenty-seven carapaces and thirty-one valves from Bed HDB la at Haddenham.

Remarks. According to Pinto & Sanguinetti (1962) Theriosynoecum differs from Bisulcocypris in having a less well-defined hinge, accommodation groove and velate ridges. The species considered here has no accommodation groove but otherwise corresponds to Theriosynoecum. Plate 9, figs. 11, 12, show the wide variation in ornamentation of Theriosynoecum forbesii which approaches that of Bisulcocypris verrucosa (Jones) described by Pinto & Sanguinetti. (See discussion by Sohn & Anderson 1964).

Family PROGONOCYTHERIDAE Sylvester-Bradley 1948
Subfamily PROTOCYTHERINAE Ljubimova 1955
Genus KLIEANA Martin 1940

Klieana alata Martin
(Pl. 7, figs. 10-14)

1940 Klieana alata Martin : 322, pl. 5, figs. 64-73 ; pl. 11, figs. 158-161.
1963 Klieana alata Martin ; Oertli : 22, pl. 7. figs. 53-56.

Diagnosis. A Klieana with almost reticulate pitting and distinct sexual dimorphism.
Holotype. Senckenberg Museum Nr. X/E 319, female carapace.

Material. Five hundred and ninety-two valves and carapaces from various beds at the Bugle Pit (see Table I). Seventy valves and carapaces from various beds at North Whitchurch (see Table II). Twenty-six valves and carapaces from various beds at Warren Farm, Stewkley (see Table III). Beds of similar age have yielded three hundred and thirty valves and carapaces at Haddenham and two hundred and sixty-five valves and carapaces at Towersey.

Description. Females: lateral outline subdeltoidal with the greatest height anterior of the centre. Dorsal outline similar to a broad arrow head with the greatest inflation to the posterior of centre. Anterior margin slightly swollen, smooth and obliquely rounded, sharpest to venter. The posterior margin is similar but not so swollen. A strongly developed posteriorly directed winglike process near the ventral margin is smooth and shiny showing only faint relics of pitting. Ventral surface flat with four subparallel longitudinal ridges to each valve. The dorsal margin is slightly convex. Left valve larger than right. Males: Dorsal outline irregularly elliptical with the greatest inflation to the posterior of the centre. Both anterior and posterior margins are slightly swollen, smooth and obliquely curved, sharpest to the venter. The flat ventral surface has four subparallel longitudinal ridges to each valve. Dorsal margin is slightly concave and the left valve is larger than the right.

Both the males and females have the lateral surfaces covered by small pits, almost reticulate in pattern in the case of the female but much finer in the male. There are about six straight evenly spaced radial pore canals to the anterior border and three similarly to the posterior. Four muscle scars are placed centrally in a vertical row slightly concave to the anterior. Hinge hemimerodont. Line of concrescence follows the inner margin all round and the selvage forms the principle ridge round the contact margin, forming a strong lip medially on the female venter and just posteriorly on the male venter.

<table>
<thead>
<tr>
<th>Dimensions in mm.</th>
<th>Proportions</th>
<th>Specimen Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carapace ♂</td>
<td>0.56 0.39 0.37</td>
<td>1.00 0.70 0.66</td>
</tr>
<tr>
<td>Carapace ♀</td>
<td>0.71 0.39 0.34</td>
<td>1.00 0.55 0.48</td>
</tr>
<tr>
<td>Right valve ♂</td>
<td>0.59 0.37 —</td>
<td>1.00 0.63 —</td>
</tr>
<tr>
<td>Left valve ♂</td>
<td>0.59 0.41 —</td>
<td>1.00 0.69 —</td>
</tr>
<tr>
<td>Right valve ♀</td>
<td>0.76 0.39 —</td>
<td>1.00 0.51 —</td>
</tr>
<tr>
<td>Left valve ♀</td>
<td>0.69 0.37 —</td>
<td>1.00 0.54 —</td>
</tr>
</tbody>
</table>

Remarks. These specimens show the characteristic features of *Klieana alata*, but occasionally there is some variation in ornamentation. In some specimens the posteriorly directed wing-like process is reduced so that the valve becomes almost smoothly rounded. There may also be some reduction in the strength of the pitting which is often reduced or lost completely near the margins of the specimens.
Genus **PROTOCYTHERE** Triebel 1938

**Protocythere serpentina** (Anderson)

(Pl. 9, figs. 13-18)

1941 *Cythereis serpentina* Anderson : 375, pl. 19, fig. 12.
1951 *Protocythere sigmoidea* Steghaus : 219, pl. 15, figs. 42-45.
1958 *Protocythere bireticulata* Malz : 39, pl. 11, fig. 69.
1960 *Protocythere sigmoidea* Steghaus ; Fernet : 21, pl. 11, figs. 11-13.
1963 *Protocythere serpentina* (Anderson) Oertli : 22, pl. 7, fig. 57.

**Material.** Four hundred and fifty-five valves and carapaces from various beds at the Bugle Pit (see Table I). Eighty valves and carapaces from various beds at North Whitchurch (see Table II). Fourteen valves and carapaces from various beds at Warren House Farm, Stewkley (see Table III). Beds of similar age have yielded twenty-three valves and carapaces at Haddenham, seventy-eight valves and carapaces at Towersey, three hundred and thirty-eight valves and carapaces at Coneyhill.

**Description.** Carapace subrectangular in outline with dorsal and ventral margins almost parallel. Anterior margin broadly rounded and denticulate on the inner edge. Posterior margin angular with the ventral part denticulate. The ventral margin is more or less straight whereas the dorsal margin is straight with a dorsal bulge forming a prominent anterior hinge ear or eye tubercle. Left valve is larger than right.

Major ornamentation consists of two ribs, one parallel to the dorsal margin, the other parallel to the ventral margin. A third rib runs from the posterior dorsal corner to the anterior ventral corner just before which it usually swells to form a node. The ribs make a continuous Z shape on the lateral surface and are usually roughly rounded and increase in size from dorsal to ventral. Anterior margin well rounded and inflated. Shell surface is usually covered by fine reticulations. There are occasional small tubercles in various positions. The strength and variation in shape and ornamentation is shown in Pl. 9. The normal pore canals are not seen. There are about thirteen radial pore canals around the anterior border associated with the denticles and also about fifteen radial pore canals on the posterior ventral margin associated with denticles. Adductor scars in a vertical row of four situated on the posterior side of a pit in the anterior part of the shell. Hinge hemimerodont. Line of concrescence follows the inner margin all round.

**Remarks.** *Protocythere serpentina* has been described by Oertli (1963) from Middle Kimmeridge to Lower Purbeck Beds in Villemoyenne 2. *P. bireticulata* was described from twelve metres below Purbeck ostracods in the Ile d'Oleron by Malz (1958). *P. sigmoidea* was described from the Kimmeridge 3a of Fuhrberg by Steghaus (1951). In England *P. serpentina* has so far only been described from the uppermost Portland beds.

A single population of the present species exhibits all the variations described for the species mentioned above (see Pl. 9, fig. 13). As a consequence all are considered to be conspecific.
Genus **PARASCHULERIDEA** Swartz & Swain 1946

*Paraschuleridea buglensis* sp. nov.

(Pl. 9, figs. 5-7)

1941 *Cytheridea politula* Jones & Sherborn; Anderson: 375, pl. 19, fig. 14.

**Diagnosis.** Elliptical in dorsal outline with subreniform lateral outline. Hinge antimerodont. Outer surface smooth with left valve larger than and overreaching the right all round.

**Holotype.** GSM Mik (M) 72401. Figured Anderson (1941, pl. 19, fig. 14).

**Paratypes.** II. 1227-29, from bed BP 6a, Bugle Pit, Hartwell.

**Material.** Two hundred and fifty-seven valves and carapaces from various beds at the bugle Pit (see Table I). Two hundred and fifty-four valves and carapaces from various beds at North Whitchurch (see Table II). Fifty-four valves and carapaces from various beds at Warren House Farm, Stewkley (see Table III). Beds of similar age have yielded fifty-six valves and carapaces at Haddenham, fifty-five valves and carapaces at Towersey, one hundred and fifty-six valves and carapaces at Long Crendon and eighty-nine valves and carapaces at Coneyhill.

**Remarks.** A robust carapace, reniform in lateral outline and characteristic of the marine faies in the Aylesbury district. It is placed in the genus *Paraschuleridea* because of the similarity in the hinge and muscle scar pattern to the type species. However, the shape is even more smoothly rounded especially in dorsal view. No sexual dimorphism has been observed. The only other comparable genus is *Galliae-cytheridea*, but it differs in lateral outline and is therefore not considered to be related.

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Family uncertain

Genus **WOLBURGIA** Anderson 1965

*Wolburgia visceralis* (Anderson)

(Pl. 8, figs. 14, 15)

1940 *Cythere visceralis* Anderson: 374, pl. 19, fig. 11.

1966 *Wolburgia visceralis* (Anderson) Anderson: 443, text-figs. 12, 27

**Material.** Seventy-six valves and carapaces from various beds at the Bugle Pit (see Table I). One valve from Bed WH 6 at Warren House Farm, Stewkley (see Table III). Beds of similar age have yielded seventy-seven valves and carapaces at Long Crendon and one hundred and three valves and carapaces at Coneyhill.

**Description.** Lateral outline subtrapezoidal with the greatest height at the centre. Anterior margin is obliquely rounded, sharpest towards the venter. Posterior margin also oblique forming a rounded angle with the dorsal margin. The left valve is slightly larger than the right valve. Carapace is subelliptical in dorsal view with the greatest inflation at the centre.
Ornamentation of rounded ridges constricted irregularly and arranged concentrically around the margins. The anterior margin is the thicker and is separated from the lateral surfaces by a furrow. There are many normal canals arranged irregularly over the surface. About nine radial pore canals are evenly spaced around the anterior margin with five around the posterior margin. Hinge adont and is a long straight groove about 2/3 the length and narrowing to the posterior in the right valve. In the left valve there is a ridge narrowing to the posterior and possibly slightly serrate in the posterior third. Inner margin and line of concrescence are coincident.

<table>
<thead>
<tr>
<th>Dimensions in mm.</th>
<th>Proportions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carapace</td>
<td>L 0.56 H 0.34 I 0.34</td>
</tr>
<tr>
<td>Right valve</td>
<td>L 0.69 H 0.37 —</td>
</tr>
<tr>
<td>Left valve</td>
<td>L 0.64 H 0.34 —</td>
</tr>
</tbody>
</table>

**Remarks.** This species is characteristic of the marine horizons in the Aylesbury district.

Genus *Scabriculocypris* Anderson 1941

*Scabriculocypris trapezoides* Anderson  
(Pl. 7, fig. 3)

1941 *Scabriculocypris trapezoides* Anderson : 377, pl. 18, fig. 5.  
1963 *Scabriculocypris trapezoides* Anderson ; Oertli : 20, pl. 6, figs. 37–39.

**Material.** Ninety-seven valves and carapaces from various beds at Warren House Farm, Stewkley (see Table III).

**Remarks.** Specimens have characteristic fine reticulate ornamentation and asymmetrical view from anterior and posterior. Inflation is less than indicated by Oertli (1963, pl. 6, fig. 39b).

**Incertae Sedis**

? ‘‘*Macrocypris*’’ sp.  
(Pl. 9, figs. 3, 4)

1940 *Macrocypris horatiana* Jones & Sherborn ; Anderson : 380, pl. 19, fig. 16.

**Material.** Thirteen valves and carapaces from various beds at the Bugle Pit, Hartwell. Twenty-eight valves and carapaces from various beds at Warren House Farm, Stewkley.

**Remarks.** These specimens correspond closely to those of Anderson but the hinge and muscle scars were not seen.
Suborder PLATYCOPINA Sars 1866
Family CYTHERELLIDAE Sars 1866
Genus CYTHERELLOIDEA Alexander 1933

Cytherelloidea cf. paraweberi Oertli

(Pl. 9, figs. 1, 2)


Material. Six valves from Bed CWE 2 and one valve from Bed CWE 3 at Long Crendon.

Description. A species of Cytherelloidea showing external and internal features characteristic of that genus but being more rectangular in outline and having a straight ventral margin. The ornament consists of a continuous ridge just anterior of and parallel to the outer margin and tending to be most prominent towards the posterior and venter. There is a slight depression situated centrally in each valve. In the females each valve also has two shallow posterior cavities internally, one postero-ventral and one postero-dorsal. The right valve has a slight groove internally round the margin of the valve which is deeper towards the dorsal and ventral.

Length of right valve from Bed CWE 2b Long Crendon 0.64 mm., and height 0.37 mm.

Remarks. This species is very similar in shape and of similar age to C. paraweberi Oertli but differs in being not quite so long and having a slightly more arched dorsal margin and a straighter venter.

REFERENCES


PLATE 1

*Macrodentina (Dictyocythere) retirugata* (Jones) p. 453

All specimens from Houstout Cliff Bed. 6.

Figs. 1, 3, 4. Left, right and dorsal views of female carapace, Io. 2152, length 0.79 mm.

Figs. 2, 8. Internal and external views of female right valve, Io. 2153, length 0.70 mm.

Figs. 5-7. Right, dorsal and left views of male carapace, Io. 2154, length 0.83 mm.
PLATE 2

*Galliaecytheridea wolburgi* (Steghaus)  p. 450

All specimens from Hounstout Cliff, Bed 7.

Figs. 1, 2. Internal and external views of male left valve, Io. 2155, length 1.02 mm.
Fig. 3. Dorsal view of male carapace, Io. 2156, length 1.12 mm.
Figs. 4, 5. Internal and external views of male right valve, Io. 2157, length 0.98 mm.
Figs. 6–8. Left, right and dorsal views of female carapace, Io. 2158, length 0.85 mm.

*Macrodentina (Macrodentina) rugulata* (Jones)  p. 452

All specimens from Hounstout Cliff Bed 6.

External views.

Fig. 9. Left valve, Io. 2159, length 0.72 mm.
Fig. 10. Right valve, Io. 2160, length 0.73 mm.
Fig. 11. Juvenile right valve, Io. 2161, length 0.62 mm.
Fig. 12. Juvenile right valve, Io. 2162, length 0.46 mm.

*Macrodentina (Macrodentina) transiens* (Jones)  p. 452

Specimen from Poxwell Quarry, Bed 12.

Figs. 13–15. Right, left and dorsal views of carapace, Io. 2163, length 0.79 mm.
**PLATE 3**

*Galliaecytheridea postrotunda* Oertli p. 450

All specimens from Hounstout Cliff, Bed 8.

Figs. 1–4. Right and left views of carapace, Io.2164, length 0.66 mm.
Figs. 2, 3, 5. Right, left and dorsal views of juvenile carapace, Io. 2165, length 0.50 mm.
Fig. 6. External view of left valve, Io. 2166, length 0.73 mm.

*Cytherelloidea paraweberi* Oertli p. 457

Specimen from Friar Waddon, Bed 4.

Figs. 7–9. Right, dorsal and left views of carapace, Io.2167, length 0.68 mm.

*Paracypris* ? sp. p. 471

All specimens from Poxwell Quarry.

Figs. 10, 11. Right and left views of carapace, Io. 2168, length 0.79 mm.
Fig. 12. External view of juvenile left valve, Io. 2169, length 0.64 mm.
Fig. 13. External view of left valve, Io. 2170, length 0.75 mm.
All specimens are from Poxwell Quarry, Bed 12.

**Protocythere serpentina** (Anderson) p. 456

Fig. 1. External view of juvenile left valve, Io. 2171, length 0.62 mm.

Fig. 3. External view of juvenile right valve, Io. 2745, length 0.50 mm.

Figs. 4, 5. External and internal views of right valve, Io. 2746, length 0.79 mm.

Figs. 6, 7. External and internal views of left valve, Io. 2747, length 0.83 mm.

**Paraschuleridea ? eusarca** (Anderson) p. 457

Figs. 2, 8. External and internal views of left valve, Io. 2748, length 0.68 mm.

Figs. 9, 10. External and internal views of juvenile right valve, Io. 2749, length 0.56 mm.
All specimens from Poxwell Quarry, Bed 12.

*Procytheropteron bicosta* sp. nov. p. 456

Figs. 1, 2, 4. Internal, external and dorsal views of left valve, Io. 2750, length 0.48 mm.
Fig. 3. External view of left valve, Io. 2751, length 0.43 mm.
Figs. 5, 6, 9. External, ventral and dorsal views of right valve, Io. 2752, length 0.54 mm.

*Orthonotacythere rimosa* Martin p. 454

Fig. 7. External view of right valve, Io. 2753, length 0.52 mm.
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