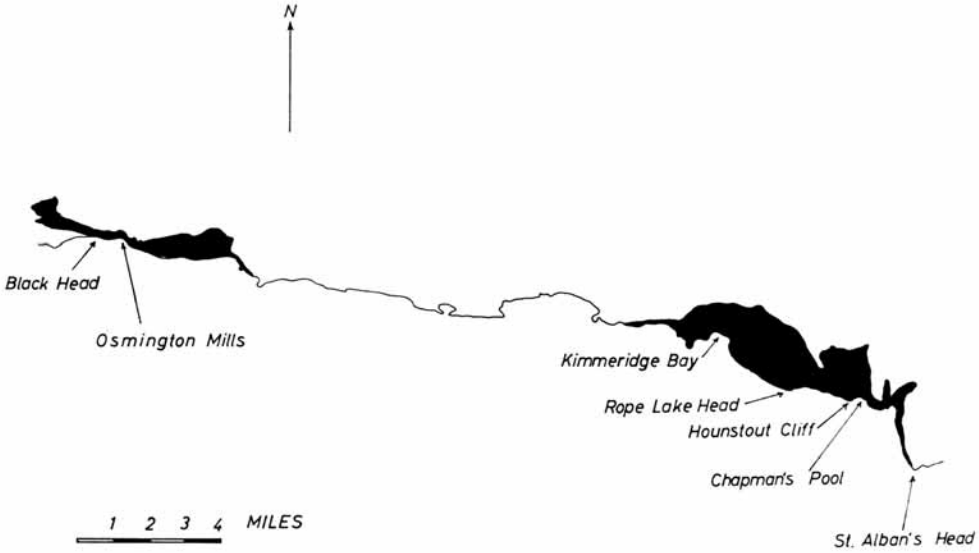
THE OSTRACODA OF THE DORSET KIMMERIDGE CLAY

by T. I. KILENYI

ABSTRACT. Fifty-nine species of Ostracoda are recorded and figured from the Kimmeridge Clay of Dorset, the type area of the Kimmeridgian Stage. Fifteen new species and one new subspecies are described. The classification of some Jurassic ostracod genera is critically reviewed and the stratigraphical distribution of each recorded species is given.

THE best exposures of the Kimmeridge Clay in Dorset are found in two main areas (text-fig. 1). The most complete section extends from the west side of Kimmeridge Bay to Chapman's Pool, a distance of some 6 miles, exposing a thickness of almost 1,100 ft. (Arkell 1947). At the time of collecting the entire section was accessible except for a



TEXT-FIG. 1. Sketch map of the coast of south-east Dorset to show the outcrop of the Kimmeridge Clay and important localities.

50-ft. gap in the Rhynchonella Marls (Rotunda Zone), which was obscured by landslips. The section does not expose, however, the lower part of the Kimmeridge Clay, including the Baylei, and Cymodoce, Mutabilis Zones and the lower portion of the Pseudomutabilis Zone. These are accessible further to the west, between Osmington Mills and Shortlake at a locality referred to in the text as 'Black Head' section. The section here is much disturbed by landslips due to the soft nature of the shales. Arkell (1947) recorded at

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Black Head about 500 ft. of shales, extending as far up in the succession as the Pectinatus Zone. Only 180 ft. of this section was sampled, reaching up to and including the basal 35 ft. of the Pseudomutabilis Zone, the rest being obscured by landslips and mudflows.

Altogether 125 samples were collected, 106 from the Kimmeridge Bay—Chapman's Pool section and 19 from the Black Head section. In addition Dr. A. J. Lloyd was kind enough to let me have ten washed samples from the Grandis, Wheatleyensis, and Pectinatus Zones. Samples were collected at 10-ft. intervals, but where an obvious lithological change occurred, an additional sample was taken. In the lowest three Zones the sampling was carried out at much more frequent intervals (text-fig. 2). The stratigraphical horizon of each sample was determined by accurately measuring the vertical distance from the nearest 'stone band' or other well-marked bed (Arkell 1947). About 1,000 g. of each shale sample was washed. Some of the harder shales were extremely difficult to break down and very harsh methods had to be employed. This may be responsible for the almost complete lack of ostracods in the higher Pseudomutabilis, Gigas, and Vimineus Zones.

The ostracod terminology is essentially that adopted in the Treatise, Part Q. Some difficulty arises, however, in applying the hinge terminology, especially in some species of *Amphicythere* where the hinge structure seems to be transitional between the types described as paramphidont and schizodont in the Treatise (text-fig. 6).

The classification adopted here is basically that of the Treatise but with some significant differences. Species of *Schuleridea* and *Nodophthalmocythere* are placed in the family Schulerideidae (Schulerideinae Mandelstam 1959, raised to family status by Bate 1963). In the writer's opinion this is justified by the distinct, fan-shaped arrangement of the radial pore canals. The Treatise included Protocytherinae Ljubimova 1955 in the family Progonocytheridae Sylvester-Bradley 1948. Bate (1963) raised Protocytherinae to family status and this practice is followed by the writer. *Mandelstamia* is retained in Loxoconchinae Sars 1925 (Neale and Kilenyi 1961; Kaye 1963).

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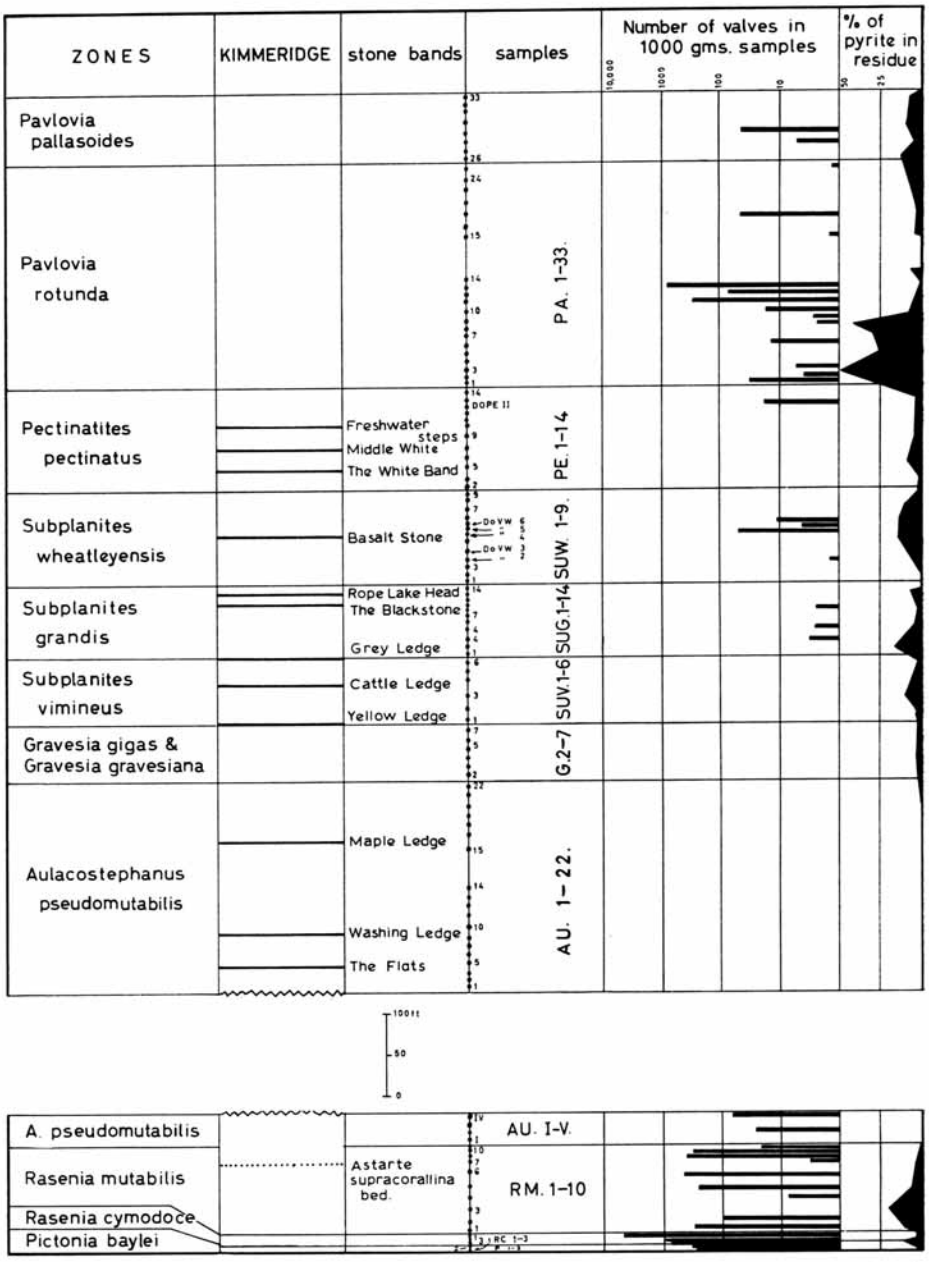
Abbreviations. The sample numbers are prefixed by letters referring to the ammonite zones according to the following code: P. = Pictonia baylei; RC. = Rasenia cymodoce; RM. = R. mutabilis; AU. = Aulacostephanus pseudomutabilis; G. = Gravesia gigas; SUV. = Subplanites vimineus; SUG. = S. grandis; SUW. = S. wheatleyensis; PE. = Pectinatites pectinatus; PA. = Pavlovia rotunda and P. pallasoides Zones. The letters DO. preceding the codes refer to samples received from Dr. A. J. Lloyd.

In giving the dimensions of ostracod valves the following abbreviations are used throughout the text: *L*, length; *H*, height; *W*, width; *M*/*a*, width of anterior margin. Dimensions are given in millimetres, and are averages except in the case of numbered specimens.

Repository. All figured and described specimens are stored in the Geology Department, University of Hull. Specimen numbers are indicated by the prefix HU.



TEXT-FIG. 2. Zonal classification of the Kimmeridge Clay (as in Arkell 1956) and the distribution of samples throughout the section.

SYSTEMATIC DESCRIPTIONS

Subclass OSTRACODA Latreille 1806
Order PODOCOPIDA Müller 1894
Suborder PLATYCOPINA Sars 1866
Genus CYTHERELLA Jones 1849
Cytherella recta Sharapova 1939

Plate 23, figs. 1–5

1939 *Cytherella ovalis* Terquem var. *recta* Sharapova, p. 34, pl. 4, figs. 45, 46 (♂).
1955 *Cytherella recta* Sharapova; Ljubimova, p. 105, pl. 12, figs. 3*a*, *b* (♂).
1955 *Cytherella ukrainensis* Ljubimova, p. 106, pl. 12, figs. 6*a*, *b* (♀).

Material. 15 valves and carapaces. HU 2.J.2.1–15.

Dimensions (*mm.*).	*L*	*H*	*W*
♀ Left valve	0·68–0·70	0·35	0·13
♀ Right valve	0·69–0·70	0·43–0·44	0·14
♂ Left valve	0·68	0·36	0·12
♂ Right valve	0·69	0·38	0·12

Occurrence. Baylei and Cymodoce Zones, P. 1, RC. 3.

Diagnosis. Large, sub-rectangular carapace with equally rounded anterior and posterior ends. Right valve higher than left, overlapping it strongly ventrally and dorsally. Dorsal margin straight, ventral slightly concave in middle. Sexual dimorphism strong.

Remarks. In the recent literature on Mesozoic ostracods a large number of species of *Cytherella* have been described based on slight differences in the outline of the carapace. In the author's opinion a critical study would drastically reduce the number of species, but at present only a few, obvious examples are included in the synonymy.

Genus CYTHERELLOIDEA Alexander 1929
Cytherelloidea weberi Steghaus 1951

Plate 23, figs. 6, 7

1951 *Cytherelloidea weberi* Steghaus, p. 207, pl. 14, figs. 4–6, *non* figs. 3, 5.
1955 *Cytherelloidea weberi* Steghaus; Schmidt, p. 51.
1957 *Cytherelloidea weberi* Steghaus; Oertli, p. 650, pl. 1, fig. 11.
1959 *Cytherelloidea weberi* Steghaus; Oertli, p. 17, pl. 2, figs. 28, 29.
1960 *Cytherelloidea weberi* Steghaus, var. *reticulata* Donze, pp. 10, 11, pl. 1, figs. 3–6.
1962 *Cytherelloidea weberi* Steghaus; Klinger, Malz, and Martin, p. 168, pl. 25, fig. 21.
1964 *Cytherelloidea weberi* Steghaus; Glasshof, p. 52.

Material. 1 carapace. HU 2.J.4.1–2.

Dimensions (*mm.*).	*L*	*H*
Left valve	0·65	0·34
Right valve	0·69	0·37

Occurrence. Mutabilis Zone, RM. 6.

Diagnosis. Carapace quadrangular. Each valve has peripheral ridge which runs parallel with edge of valve, equidistant from margin. Ridge may be interrupted antero-dorsally. On posterior part of both valves two rounded 'swellings' occur in vertical superposition.

Median rib branches out from upper one, descends to middle of valve, where it turns to run parallel with dorsal margin.

Remarks. The above diagnosis is based on the carapace found in the Dorset material. Oertli (1957, p. 650) does not mention the posterior 'swelling', while Steghaus (1951, pp. 207, 208) describes one.

Cytherelloidea paraweberi Oertli 1957

Plate 23, figs. 8, 9; text-fig. 5*a*

1951 *Cytherelloidea weberi* (*pars*) Steghaus, p. 207, pl. 14, figs. 3, 5, *non* figs. 4, 6.
1955 *Cytherelloidea weberi* Steghaus (*pars*?); Schmidt, p. 51.
1957 *Cytherelloidea paraweberi* Oertli, p. 651, pl. 1, figs. 12–15.
1959 *Cytherelloidea paraweberi* Oertli; Oertli, p. 18, pl. 2, figs. 26, 27.
1964 *Cytherelloidea paraweberi* Oertli; Glasshof, p. 52.
1966 *Cytherelloidea paraweberi* Oertli; Barker, p. 457, pl. 3, figs. 7–9; p. 485, pl. 9, figs. 1, 2.

Material. 2 valves. HU 2.J.5.1–2.

Dimensions (*mm.*).

	L	*H*	*W*
Right valve	0·57	0·28	0·09

EXPLANATION OF PLATE 23

All figures × 50.

Figs. 1–5. *Cytherella recta* Sharapova, Cymodoce Zone, RC. 3, Lower Kimmeridgian. 1, Right valve, male, external view, HU 2.J.2.1. 2, Right valve, female, external view, HU 2.J.2.6. 3, Carapace, male, dorsal view, HU 2.J.2.9–10. 4, Left valve, male, external view, HU 2.J.2.5. 5, Right valve, female, transmitted light, HU 2.J.2.6.

Figs. 6, 7. *Cytherelloidea weberi* Steghaus, Mutabilis Zone, RM. 6, Lower Kimmeridgian. 6, Carapace, dorsal view. 7, Carapace, left side, external view, HU 2.J.4.1.

Figs. 8, 9. *Cytherelloidea paraweberi* Oertli, Mutabilis Zone, RM. 9, Lower Kimmeridgian. 8, Right valve, external view. 9, Right valve, dorsal view, HU 2.J.5.1.

Figs. 10–13. *Paracypris* sp. C. Oertli, Baylei Zone, P. 1, Lower Kimmeridgian. 10, Right valve, external view, HU 2.J.6.1. 11, Right valve, internal view, transmitted light, HU 2.J.6.1. 12–13, Right valve, internal view, polarized light, HU 2.J.6.1.

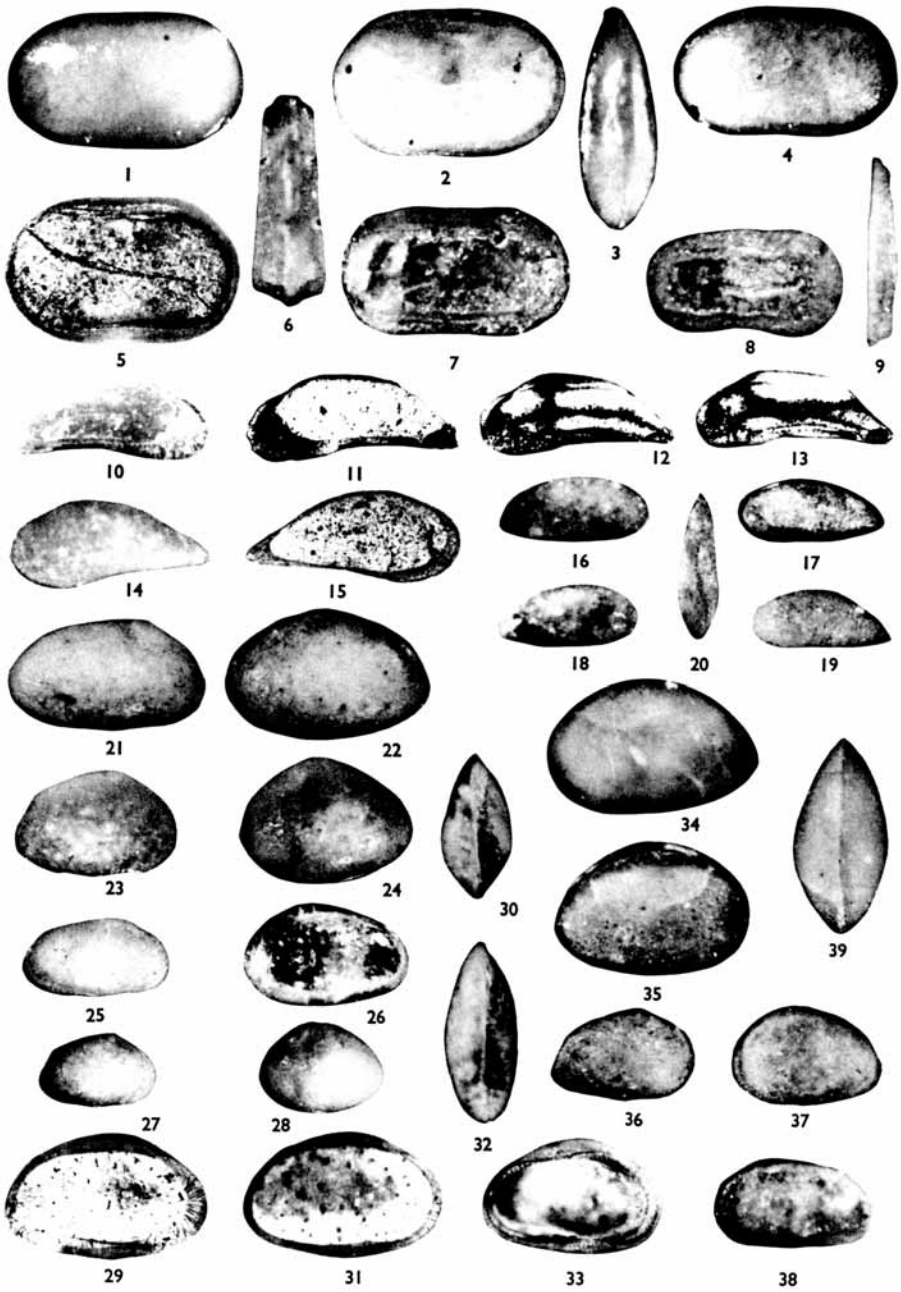
Figs. 14, 15. *Paracypris* sp. 1, Rotunda Zone, PA. 1, Upper Kimmeridgian. 14, Left valve, external view, HU 2.J.8.1. 15, Left valve, internal view, transmitted light, HU 2.J.8.1.

Figs. 16–20. ? *Paracypris problematica* sp. nov., Rotunda Zone, PA. 21, Upper Kimmeridgian. 16, Right valve, female, external view, HU 2.J.7.2. 17, Left valve, female, external view, holotype, HU 2.J.1.1. 18, Right valve, male, external view, HU 2.J.7.3. 19, Left valve, male, external view, HU 2.J.7.4. 20, Carapace, male, dorsal view, HU 2.J.7.5–6.

Figs. 21–33. *Schuleridea triebeli* (Steghaus), Baylei Zone, P. 2, Lower Kimmeridgian. 21, Right valve, male, external view, HU 2.J.9.1. 22, Left valve, male, external view, HU 2.J.9.2. 23, Right valve, female, external view, HU 2.J.9.7. 24, Left valve, female, external view, HU 2.J.1.32. 25, Right valve, juvenile male, external view, HU 2.J.9.13. 26, Left valve, juvenile male, external view, HU 2.J.9.12. 27, Right valve, juvenile female, external view, HU 2.J.9.15. 28, Left valve, juvenile female, external view, HU 2.J.9.16. 29, Left valve, male, with broad duplicature, transmitted light, HU 2.J.9.18. 30, Carapace, female, dorsal view, HU 2.J.9.20–21. 31, Left valve, male, with narrow duplicature, HU 2.J.9.26. 32, Carapace, male, dorsal view, HU 2.J.9.22–23. 33, Left valve, male, internal view, HU 2.J.9.17.

Figs. 34, 35, 39. *Schuleridea* sp. 1, Wheatleyensis Zone, DO VW. 6, Middle Kimmeridgian. 34, Carapace, left side, external view, HU 2.J.1.2. 35, Carapace, right side, external view, HU 2.J.1.2. 39, Carapace, dorsal view, HU 2.J.1.2.

Figs. 36, 38. ? *Schuleridea* sp. 1, Wheatleyensis Zone, DO VW. 4, Middle Kimmeridgian. 36, Right valve, female, external view, HU 3.J.1.5. 37, Left valve, female, external view, HU 3.J.1.4. 38, Left valve, male, external view, HU 3.J.1.7.



KILENYI, Kimmeridge Clay ostracods

Occurrence. Mutabilis Zone, RM. 9.

Diagnosis. Similar to *Cytherelloidea weberi* except for peripheral ridge, which is continuous. Median rib curved.

Remarks. Oertli separated *C. paraweberi* from *C. weberi* on the basis of the presence of a continuous peripheral ridge. Equally diagnostic, it seems, are the lack of posterior 'swellings' in *C. paraweberi* and different dorsal silhouette.

Suborder PODOCOPINA Sars 1866
Superfamily CYPRIDACEA Baird 1845
Family PARACYPRIDIDAE Sars 1923
Genus PARACYPRIS Sars 1866

Paracypris sp. C, Oertli 1957

Plate 23, figs. 10–13; text-fig. 5*b*

1957 *Paracypris* sp. C, Oertli, p. 653, pl. 1, fig. 24.

Material. 1 broken right valve. HU 2.J.6.1.

Dimensions (mm.). *L*: 0·60; *H*: 0·24.

Occurrence. Baylei Zone, P. 1.

Paracypris sp. 1

Plate 23, figs. 14, 15

Material. 2 left valves. HU 2.J.8.1–2.

Dimensions (mm.). *L*: 0·58; *H*: 0·26.

Occurrence. Base of Rotunda Zone, PA. 1.

Description. Left valve elongated, greatest height near anterior end. Dorsal margin strongly convex, ventral slightly concave. Posterior end terminates in sharp point.

Marginal areas relatively narrow, posterior duplicature slightly wider than anterior. Inner margin and line of concrescence seem to coincide. Radial pore canals straight, simple, numerous. Muscle scar pattern not seen.

? *Paracypris problematica* sp. nov.

Plate 23, figs. 16–20; text-fig. 5*c*

Holotype. A female left valve, HU 2.J.1.1.

Paratypes. 23 valves, HU 2.J.7.2–24.

Type locality and horizon. Hounstout Cliff, Kimmeridge, Dorset. Rotunda Zone, Upper Kimmeridgian.

Dimensions (mm.).

	L	*H*	*W*
♀ Left valve (holotype)	0·45	0·19	0·05
♀ Right valve	0·44	0·18	0·04
♂ Left valve	0·44	0·17	0·05
♂ Right valve	0·42	0·17	0·05

Occurrence. Rotunda Zone, PA. 21.

Diagnosis. Shape elongated, with pointed posterior end. Marginal areas extremely narrow. Seven irregularly spaced muscle scars. Strong sexual dimorphism.

Description. Shell minute, anterior end rounded, posterior pointed. Dorsal margin strongly convex, ventral straight. Left valve slightly larger than right, overlapping it dorsally and ventrally. Valve surface smooth.

Marginal areas narrow, line of concrescence and inner margin seem to coincide. Number and nature of radial pore canals not seen. No hinge structure observed. Muscle scar pattern consists of 7 irregularly spaced scars, 6 together in two groups of three and 1 anterior. Sexual dimorphism strong; presumed female valves much higher posteriorly.

Remarks. The generic position of this species is doubtful. In shape it is closest to *Paracypris*, but it differs in the narrower marginal areas and the slightly different muscle scar pattern. The genus *Pontocypris* has a similar shape and relatively narrow marginal areas, but the muscle scars are definitely different, and in the case of *Pontocypris* always constant. *Macrocypris* has a wide anterior margin with a broad inner lamella.

Superfamily CYTHERACEA Baird 1850
Family SCHULERIDEIDAE Mandelstam 1959
Subfamily SCHULERIDEINAE Mandelstam 1959
Genus SCHULERIDEA Swartz and Swain 1946
Schuleridea triebeli (Steghaus 1951)

Plate 23, figs. 21–33

1951 *Haplocytheridea triebeli* Steghaus, p. 214, pl. 15, figs. 27–29.
1955 *Haplocytheridea triebeli* Steghaus; Schmidt, p. 58, pl. 4, fig. 4; pl. 5, fig. 2.
1957 *Schuleridea triebeli* (Steghaus); Oertli, p. 654, pl. 1, figs. 25–29.
1958 *Schuleridea triebeli* (Steghaus); Bizon, p. 23, pl. 5, figs. 4–6.
1959 *Schuleridea triebeli* (Steghaus); Oertli, p. 25, pl. 3, figs. 87, 88.
1960 *Schuleridea* cf. *triebeli* (Steghaus); Lutze, p. 433, pl. 37, fig. 9.
1964 *Schuleridea triebeli* (Steghaus); Glasshof, pp. 40, 41.

Material. 585 valves and carapaces. HU 2.J.1.32, HU 2.J.9.1–584.

Dimensions (*mm.*).	*L*	*H*	*W*	*M*/*a*
♀ Left valve	0·42–0·50	0·31–0·37	0·14	0·05
♀ Right valve	0·44–0·46	0·30–0·31	0·10	0·05
♂ Left valve	0·49–0·62	0·31–0·37	0·13	0·05
♂ Right valve	0·45–0·62	0·25–0·26	0·13	0·05

Occurrence. Baylei, Cymodoce, and Mutabilis Zones, P. 1, 2, RC. 1–3, RM. 7, 9.

Diagnosis. Species of *Schuleridea* with very strong sexual dimorphism. Female carapace with ovoid outline, tapering towards posterior, males elongated. Faint depression in ocular region. Peripheral sulcus developed along anterior and posterior border. Overlap of left valve very pronounced, especially in females.

Remarks. This is an extremely common species in the Upper Jurassic of western Europe, ranging from the Mariae Zone (Lower Oxfordian) to the top of the Mutabilis Zone (Lower Kimmeridgian). There seems to be a considerable variation in the forms described from the various localities, especially in size and degree of sexual dimorphism. The median element of the hinge has been described as smooth or finely denticulate; the Dorset specimens seem to belong to the latter type. An unusual phenomenon was

observed in a large population of *S. triebeli* from the Lower Kimmeridgian; the width of the duplicature was reduced by half in some specimens which in all other respects conformed to the type. This is certainly not a variation as it is observed in the final instar only, in both males and females.

Schuleridea sp. 1

Plate 23, figs. 34–39

Material. 30 valves and carapaces. HU 2.J.1.2, HU 3.J.1.2–30.

Dimensions (*mm.*).	*L*	*H*	*W*
Carapace	0·60–0·65	0·40–0·42	0·30
? Juvenile forms			
♀ (?) Left valve	0·45–0·48	0·30	0·12–0·14
♀ (?) Right valve	0·45	0·26	0·11–0·12
♂ (?) Left valve	0·49	0·27	0·11

Occurrence. The larger, closed carapaces occur in DO VW. 6, the smaller valves in DO VW. 4, Wheatleyensis Zone.

Description. Carapace ovoid, well rounded, without marked cardinal angles. Left valve larger than right, overlapping it along dorsal and ventral margins. Contours of both valves similar, right valve being slightly less high. Only closed carapaces found.

From slightly lower horizon similar, but smaller, forms were found, which may represent earlier instar. These specimens have rather more angular appearance, and since found as separate valves, characteristic hinge and duplicature of *Schuleridea* could be observed. These smaller valves show sexual dimorphism, a feature not definitely established in larger, closed carapaces. Smaller forms therefore included only tentatively in *Schuleridea* sp. 1.

Remarks. This form is close to *S. triebeli* but differs from it in the far less pronounced overlap of the left valve and the outline of the right valve; the state of preservation does not allow the establishment of a new species.

? *Schuleridea* sp. 2

Plate 24, fig. 1

Material. 1 right valve. HU 2.J.10.1.

Dimensions (*mm.*).	*L*	*H*	*W*	*M*/*a*
Right valve	0·62	0·37	0·16	0·05

Occurrence. Top of Pectinatus Zone, DO PE. 11.

Description. In side view valve ovoid, slightly triangular, with rounded anterior, straight dorsal and ventral margins. Posterior end more angular. Greatest height at prominent anterior cardinal angle.

Surface finely punctate, and normal pore canals plainly visible. Inner margin and line of concrescence coincide. About 25–30 anterior radial pore canals occur, arranged in shape of fan. Hinge structure (owing to poor preservation) not seen clearly, but gives impression that all positive hinge elements are in right valve.

Remarks. The number and arrangement of the radial pore canals are typical of *Schuleridea*. The hinge structure would give the decisive identification.

Genus NODOPHTHALMOCYTHERE Malz 1958

Nodophthalmocythere tripartita Malz 1958

Plate 24, figs. 2–7

1958*a* *Nodophthalmocythere tripartita* Malz, pp. 125, 126, pl. 1, figs. 1–8; pl. 3, figs. 25, 26.

Material. 24 valves and carapaces. HU 2.J.11.1–24.

Dimensions (*mm.*).	*L*	*H*	*W*
♀ Left valve	0·48	0·31	0·12
♀ Right valve	0·47	0·28	0·12
♂ Left valve	0·54	0·30	0·13
♂ Right valve	0·54	0·28	0·13

Occurrence. Mutabilis Zone, RM. 6.

Diagnosis. Species of *Nodophthalmocythere* with upside down T-shaped median sulcus. Two bulges in front and behind sulcus, and long one underneath. Eye tubercules developed. Sexual dimorphism pronounced.

Remarks. This species was first described by Malz (1958*a*) from the Pseudomutabilis Zone of the Black Head section, and he mentioned that it occurred with *Exophthalmocythere fuhrbergensis* Steghaus. *N. tripartita* is here recorded with *E. fuhrbergensis*, from the middle of the Mutabilis Zone but no trace of it has been found in the Pseudomutabilis Zone. It is very likely, therefore, that Malz's horizon and locality corresponds with the writer's and not to the Pseudomutabilis Zone as first suggested.

Family CYTHERIDEIDAE Sars 1925

Subfamily CYTHERIDEINAE Sars 1925

Genus GALLIAECYTHERIDEA Oertli 1957

Galliaecytheridea dissimilis Oertli 1957

Plate 24, figs. 8–20; text-figs. 3*a*, 5*d*

EXPLANATION OF PLATE 24

All figures × 50, unless otherwise stated.

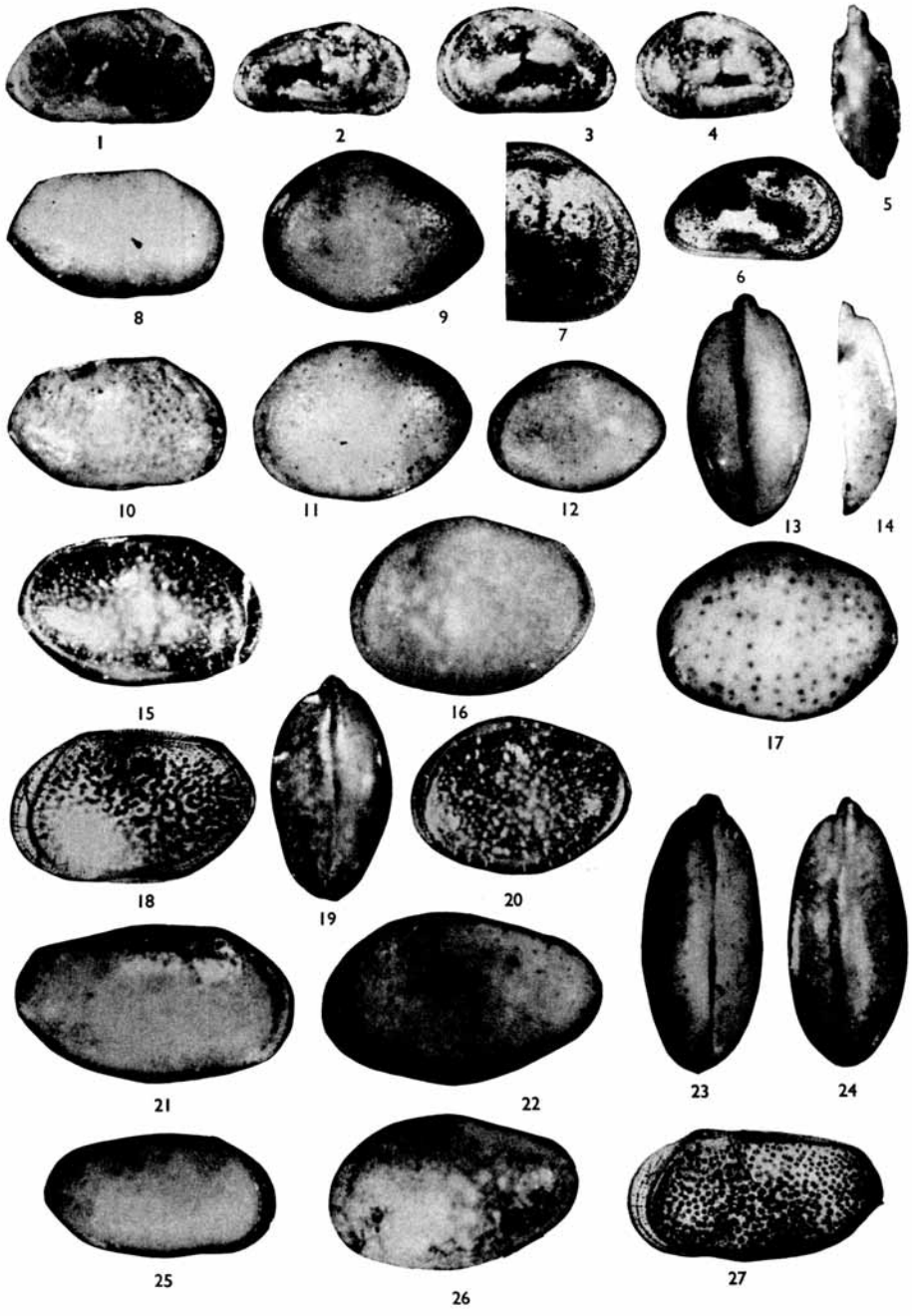
Fig. 1. ? *Schuleridea* sp. 2, Pectinatus Zone, DO PE. 11, Upper Kimmeridgian. Right valve, external view, HU 2.J.10.1.

Figs. 2–7. *Nodophthalmocythere tripartita* Malz, Mutabilis Zone, RM. 6, Lower Kimmeridgian. 2, Right valve, male, external view, HU 2.J.11.1. 3, Left valve, male, external view, HU 2.J.11.2. 4, Left valve, female, external view, HU 2.J.11.4. 5, Carapace, male, dorsal view, HU 2.J.11.5. 6, Left valve, male, internal view, transmitted light, HU 2.J.11.9. 7, Left valve, male, anterior margin, transmitted light, HU 2.J.11.2, × 85.

Figs. 8–14. *Galliaecytheridea dissimilis* Oertli, Cymodoce Zone, RC. 3, Lower Kimmeridgian. 8, Right valve, male, external view, HU 2.J.12.1. 9, Left valve, male, external view, HU 2.J.12.2. 10, Right valve, female, external view, HU2. J.12.6. 11, Left valve, female, external view, HU 2.J.12.4. 12, Left valve, juvenile, external view, HU 2.J.12.5. 13, Carapace, female, ventral view, HU 2.J.12.10–11. 14, Right valve, female, dorsal view, HU 2.J.12.12.

Figs. 15–20. *Galliaecytheridea dissimilis* Oertli, Pseudomutabilis Zone, AU. II, Lower Kimmeridgian. 15, Right valve, ? female, external view, HU 3.J.2.2. 16, Left valve, ? female, external view, HU 2.J.1.3. 17, Left valve, ? male, external view, HU 3.J.2.4. 18, Right valve, ? female, internal view, transmitted light, HU 3.J.2.2. 19, Carapace, ? female, ventral view, HU 3.J.2.7–8. 20, Left valve, juvenile, external view, HU 3.J.2.3.

Figs. 21–27. *Galliaecytheridea wolburgi* (Steghaus), Mutabilis Zone, RM. 1, Lower Kimmeridgian. 21, Right valve, external view, HU 2.J.13.1. 22, Left valve, external view, HU 2.J.13.2. 23, Carapace, dorsal view, HU 2.J.13.8–9. 24, Carapace, ventral view, HU 2.J.13.8–9. 25, Right valve, juvenile, external view, HU 2.J.13.5. 26, Left valve, juvenile, external view, HU 2.J.13.3. 27, Right valve, juvenile, internal view, transmitted light, HU 2.J.13.5.



KILENYI, Kimmeridge Clay ostracods

1957 *Galliaecytheridea dissimilis* Oertli, p. 655, pl. 1, figs. 32–9; pl. 2, figs. 40–44.
1964 *Galliaecytheridea dissimilis* Oertli; Glasshof, pl. 4, figs. 8–11.

Material. 1,396 valves and carapaces. HU 2.J.12.1–1,387, HU 3.J.1–9.

Dimensions (*mm.*).	*L*	*H*	*W*	*M*/*a*
♀ Left valve	0·64–0·73	0·45–0·52	0·20	0·06
♀ Right valve	0·63–0·71	0·36–0·40	0·16	0·07
♂ Left valve	0·67	0·46	0·21	
♂ Right valve	0·64	0·39	0·16	

Occurrence. Baylei, Cymodoce, Mutabilis, and Pseudomutabilis Zones, P. 1, RM. 2, RC. 1–3, AU. II.

Diagnosis. Left valve much larger than right and more rounded in side view. Dorsal margin of left valve strongly convex, of right valve straight. Right valve posterior end pointed. Surface smooth or finely punctate. Radial pore canals straight, simple, and few. Sexual dimorphism occurs.

Remarks. The Dorset specimens are appreciably larger than the specimens described by Oertli (1957) from the Paris basin, but sexual dimorphism is less prominent.

Galliaecytheridea wolburgi (Steghaus 1951)

Plate 24, figs. 21–27; text-figs. 3*e*, 5*e*

1951 *Cyprideis wolburgi* Steghaus, p. 213, pl. 14, figs. 24, 25; pl. 15, fig. 26.
1955 *Cyprideis wolburgi wolburgi* Steghaus; Schmidt, p. 58, pl. 2, figs. 25, 26.
1955 *Cyprideis wolburgi minuta* Schmidt, p. 58, pl. 2, figs. 27–30.
1957 *Galliaecytheridea wolburgi* (Steghaus); Oertli, p. 657, pl. 2, figs. 56–60; pl. 3, figs. 61–68.
1959 *Galliaecytheridea wolburgi* (Steghaus); Oertli, p. 14.
1964 *Galliaecytheridea wolburgi* (Steghaus); Glasshof, p. 39, pl. 4, figs. 1–3.
1966*a* *Galliaecytheridea wolburgi* (Steghaus); Barker, p. 450, pl. 2, figs. 1–8.

Material. 347 valves and carapaces. HU 2.J.13.1–347.

Dimensions (*mm.*).	*L*	*H*	*W*	*M*/*a*
Left valve	0·75	0·50	0·18	0·08
Right valve	0·74	0·40	0·16	0·06

Occurrence. Baylei, Cymodoce, and Mutabilis Zones, P. 2, RC. 1–3, RM. 1, 2, 5, 9, 10.

Diagnosis. Carapace elongate, tapering posteriorly. Posterior cardinal angle about 45°. Posterior end angular. Left valve overlapping dorsally and ventrally.

Remarks. Sexual dimorphism was not observed in the Dorset material.

Galliaecytheridea punctata sp. nov.

Plate 25, figs. 1–4; text-fig. 3*c*

Holotype. A left valve. HU 2.J.1.4.

Paratypes. 342 valves and carapaces. HU 3.J.3.1–342.

Type locality and horizon. Black Head, Dorset. Cymodoce Zone, Lower Kimmeridgian.

Dimensions (*mm.*).	*L*	*H*	*W*	*M*/*a*
Holotype	0·63	0·42	0·14	0·06
Left valve	0·55–0·64	0·39–0·42	0·14	0·06
Right valve	0·54–0·61	0·34–0·35	0·13	0·05

Occurrence. Pictonia and Cymodoce Zones, P. 1, 2, RC. 1, 3.

Diagnosis. Species of *Galliaecytheridea* with ovoid shape, tapering strongly towards posterior. Dorsal margin straight on both valves. Surface ornamented with small pits. Radial pore canals straight, widening towards middle. Sexual dimorphism not present.

Description. Carapace ovoid, anterior rounded, posterior more angular, both valves taper strongly towards posterior. Left valve much larger than right, overlapping it dorsally and ventrally. Dorsal margin of both valves straight, ventral margin convex, more so in left valve. In dorsal and ventral views carapace elliptical with greatest width in middle. In side view greatest height one-third of length from anterior end. Posterior end of valve often bears 1 or 2 spines.

Inner margin and line of concrescence coincide. Radial pore canals (10–15 anteriorly) straight, widening towards middle. Surface of valve coarsely punctate with ends of normal pore canals.

Hinge robust. Right valve has dentate anterior ridge with 6 strong denticles, smooth median groove and posterior dentate ridge, slightly larger than anterior one. Denticles on anterior element increase in size towards middle, third from front being largest while most posterior one reduced to small rounded knob-like projection. In posterior element size of denticles increases posteriorly. Left valve carries corresponding structure with smooth median bar. Above bar is fairly wide accommodation groove.

Muscle scar pattern shows usual arrangement of 4 vertical scars with 2 anterior ones. Lower 2 scars in vertical row usually bigger.

Remarks. G. punctata resembles the type species *G. dissimilis* but differs from it in the structure of the hinge (terminal elements), shape of the radial pore canals, and surface ornamentation.

EXPLANATION OF PLATE 25

All figures × 50.

Figs. 1–4. *Galliaecytheridea punctata* sp. nov., Cymodoce Zone, RC. 3, Lower Kimmeridgian. 1, Right valve, external view, HU 3.J.3.2. 2, Left valve, external view, holotype, HU 2.J.1.4. 3, Carapace, dorsal view, HU 3.J.3.6–7. 4, Left valve, external view, HU 3.J.3.3.

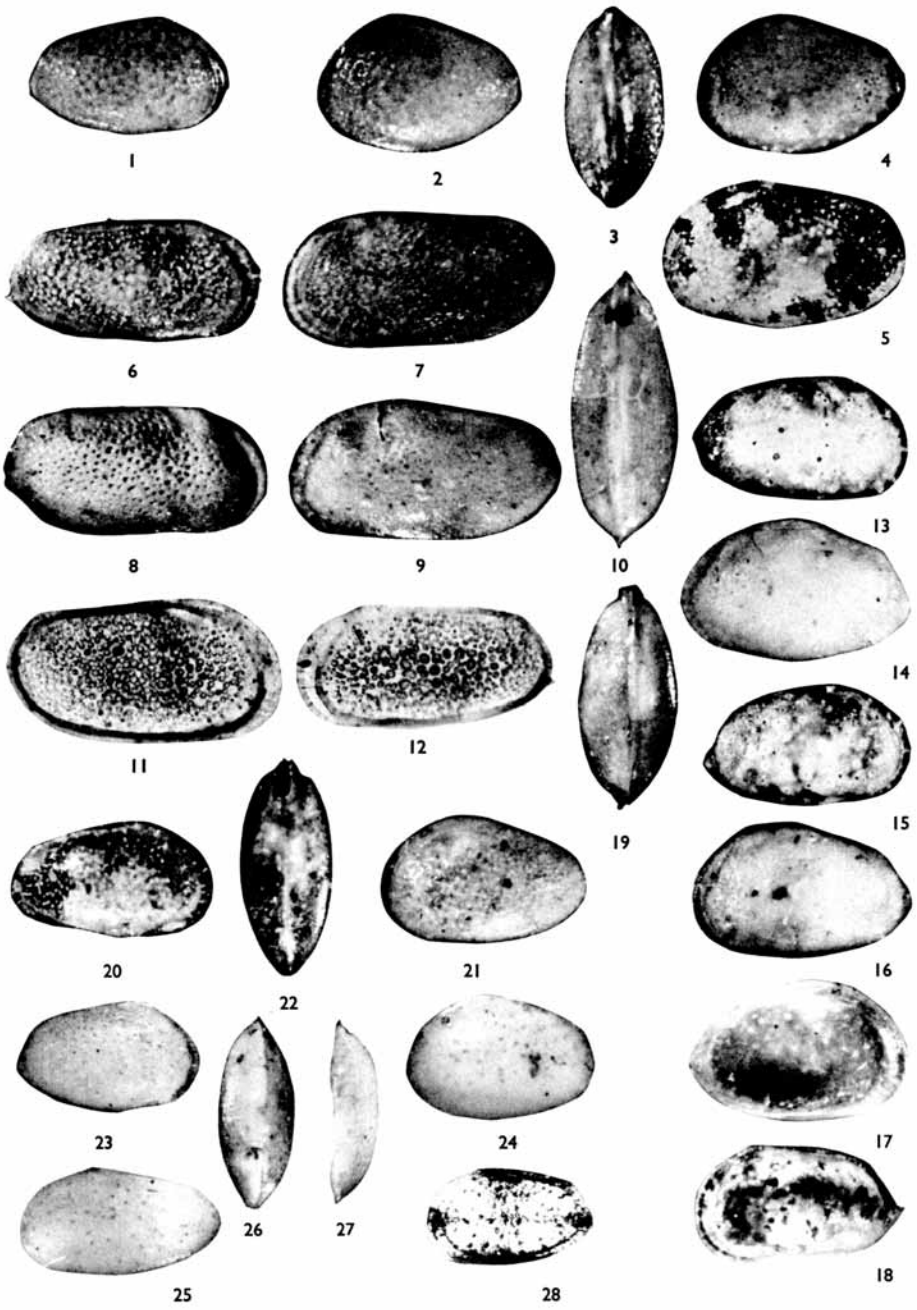
Fig. 5. *Galliaecytheridea* sp. 1, Mutabilis Zone, RM. 9, Lower Kimmeridgian, HU 2.J.1.5. Left valve, external view.

Figs. 6–12. *Galliaecytheridea elongata* sp. nov., Mutabilis Zone, RM. 8, Lower Kimmeridgian. 6, Right valve, ? male, external view, HU 3.J.5.2. 7, Left valve, ? female, external view, holotype, HU 2.J.1.6. 8, Right valve, ? female, external view, HU 3.J.5.3. 9, Left valve, ? male, external view, HU 3.J.5.4. 10, Carapace, ? male, ventral view, HU 3.J.5.6. 11, Left valve, ? female, internal view, transmitted light, holotype, HU 2.J.1.6. 12, Right valve, ? male, internal view, transmitted light, HU 3.J.5.2.

Figs. 13–19. *Galliaecytheridea trapezoidalis* sp. nov., Mutabilis Zone, RM. 8, Lower Kimmeridgian. 13, Right valve, female, external view, HU 3.J.7.2. 14, Left valve, female, external view, holotype, HU 2.J.1.8. 15, Right valve, male, external view, HU 3.J.7.3. 16, Left valve, male, external view, HU 3.J.7.4. 17, Left valve, female, internal view, holotype, HU 2.J.1.8. 18, Right valve, female, internal view, HU 3.J.7.2. 19, Carapace, male, dorsal view, HU 3.J.7.11–12.

Figs. 20–22. *Galliaecytheridea malzi* sp. nov., Baylei Zone, P. 1, Lower Kimmeridgian. 20, Right valve, external view, HU 3.J.6.2. 21, Left valve, external view, holotype, HU 2.J.1.7. 22, Carapace, dorsal view, HU 3.J.6.9–10.

Figs. 23–28. *Galliaecytheridea confundens* sp. nov., Cymodoce Zone, RC. 2, Lower Kimmeridgian. 23, Right valve, female, external view, HU 3.J.8.7. 24, Left valve, female, external view, holotype, HU 2.J.1.9. 25, Left valve, male, external view, HU 3.J.8.8. 26, Carapace, female, dorsal view, HU 3.J.8.10–11. 27, Right valve, female, dorsal view, HU 3.J.8.7. 28, Right valve, female, internal view, transmitted polarized light, HU 3.J.8.7.



KILENYI, Kimmeridge Clay ostracods

Galliaecytheridea elongata sp. nov.

Plate 25, figs. 6–12; text-fig. 3*i*

Holotype. A female (?) left valve. HU 2.J.1.6.

Paratypes. 26 valves and carapaces. HU 3.J.5.1–26.

Type locality and horizon. Black Head, Dorset. Mutabilis Zone, Lower Kimmeridgian.

Dimensions (mm.).	*L*	*H*	*W*	*M/a*
Holotype	0·82	0·43	0·16	0·06
Left valve	0·72–0·82	0·37–0·43	0·11–0·16	
Right valve	0·68–0·79	0·34–0·40	0·10–0·14	

Occurrence. Mutabilis Zone, RM. 8.

Diagnosis. Species of *Galliaecytheridea* with very elongated carapace, dorsal and ventral margins running parallel. Posterior end often bears postero-ventral spine. Left valve overlaps right dorsally and ventrally. Surface finely punctate.

Description. Carapace very elongated. Left valve larger than right, overlapping it ventrally and dorsally. Carapace elliptical in dorsal view; greatest width at middle. Straight dorsal and ventral margins run parallel. Anterior cardinal angle rounded, posterior prominently angular. Anterior end rounded, posterior ends in blunt angle at mid-height. Postero-ventral spine often present.

Surface smooth or finely punctate, with very numerous normal pore canals, covering surface of valve densely. Slight depression developed in eye region.

Anterior duplicature broad, with strongly developed selvage running at moderate distance from outer margin. Inner margin and line of concrescence coincide. Radial pore canals few, only about 7 or 8, straight, simple. Selvage lip narrow, more prominent on right valve. Often 1 or 2 septae on inner side of duplicature.

Hinge follows usual hemimerodont structure found in *Galliaecytheridea* but very thin. Denticles on anterior and posterior elements of right valve small, rounded, situated on spindle-like, slightly curved ridge. 5 or 6 denticles and corresponding loculi in left valve. Median element of right valve is wide smooth groove, occupying nearly whole width of hinge margin. Bar on left valve slender and straight, accommodation groove above it narrow.

Shell structure characterized by dense system of pits, round or sometimes more angular. Sexual dimorphism doubtful. Some valves relatively higher than others and may be considered females.

Galliaecytheridea malzi sp. nov.

Plate 25, figs. 20–22; text-figs. 3*h*, 5*f*

Holotype. A left valve. HU 2.J.1.7.

Paratypes. 85 valves and carapaces. HU 3.J.6.22–86.

Type locality and horizon. Black Head, Dorset. Baylei Zone, Lower Kimmeridgian.

Dimensions (mm.).	*L*	*H*	*W*	*M/a*
Holotype	0·63	0·39	0·14	0·05
Left valve	0·61–0·64	0·38–0·42	0·14	0·05
Right valve	0·63	0·39	0·14	0·05

Occurrence. Baylei Zone, P. 1.

Diagnosis. Carapace tapering posteriorly. Posterior end rounded. Surface finely punctate. Dorsal margin straight, ventral margin slightly convex. Radial pore canals few and thick. Left valve higher than right. Teeth on right valve's hinge very small. Sexual dimorphism not apparent.

Description. Carapace ovoid. In dorsal and ventral view carapace elliptical, greatest width around middle. Left valve larger than right, overlap being most prominent ventrally. Dorsal margin straight, ventral margin slightly convex, both margins converging towards posterior end. Posterior cardinal angle marked, anterior rounded. In side view greatest height one-third of length from anterior.

Surface smooth or finely punctate. Normal pore canals clearly visible on surface. Eye depression not developed.

Marginal areas narrow, especially hinge margin. Inner margin and line of concrescence coincide. Radial pore canals straight, simple, relatively broad, about 6–8 anteriorly, 2–3 posteriorly.

Hinge rather delicate, denticles weakly developed on terminal ridges of right valve as 4 or 5 rounded projections. Median groove on same valve smooth, shallow, rather narrow. Median element on left valve smooth, narrow bar. Accommodation groove present but hardly noticeable.

Muscle scar pattern shows oblique row of 4 scars, with 2 more in front. Upper anterior scar larger than others, pear-shaped, pointing downwards.

Remarks. This species closely resembles *G. punctata* in many features but is more elongated and its hinge is weakly developed (in contrast to the robust hinge of the latter). Sexual dimorphism was not observed.

Galliaecytheridea trapezoidalis sp. nov.

Plate 25, figs. 13–19; text-figs. 3*f*, 5*g*

Holotype. A female left valve. HU 2.J.1.8.

Paratypes. 30 valves and carapaces. HU 3.J.7.1–30.

Type locality and horizon. Black Head, Dorset. Upper part of Mutabilis Zone, Lower Kimmeridgian.

Dimensions (mm.).	*L*	*H*	*W*	*M/a*
♀ Left valve (holotype)	0·70	0·44	0·13	0·05
♀ Right valve	0·68	0·38	0·12	0·06
♂ Left valve	0·66–0·73	0·37–0·44	0·12	
♂ Right valve	0·69	0·36	0·11	

Occurrence. Mutabilis Zone RM. 6, 8, 10.

Diagnosis. Species of *Galliaecytheridea* with trapezoidal outline. Straight margin between posterior cardinal angle and posterior end. Hinge strongly developed, with prominent teeth in right valve. Sexual dimorphism occurs.

Description. Carapace trapezoidal in side view, spindle-shaped in dorsal view. Left valve larger than right, overlapping it ventrally and dorsally. Left valve dorsal margin slightly concave, posterior cardinal angle marked, postero-dorsal margin straight or very slightly concave. Posterior end angular, but rounded at extreme end. Ventral margin convex. Right valve dorsal margin straight, posterior extremity angular, carrying

upward-pointing spine. Sexual dimorphism fairly strong, female carapace being higher and more rounded ventrally. Shell heavy, thick.

Surface of valve smooth. Normal pore canals fairly numerous. Slight depression around ocular region. Marginal areas fairly narrow, except at strongly developed hinge margin. Inner margin and line of concrescence coincide. About 10–12 simple, straight radial pore canals occur on anterior margin.

Hinge in right valve consists of 2 terminal dentate ridges, both spindle-shaped, curved, with 6 strong denticles on each. Anterior element larger than posterior. Median element wide smooth groove, widest in anterior quarter of its length. In left valve median bar narrow at posterior end, widening anteriorly. Same applies to accommodation groove.

Muscle scars follow usual pattern in *Galliaecytheridea*, but 2 anterior scars much bigger than scars of vertical row.

Galliaecytheridea confundens sp. nov.

Plate 25, figs. 23–28; text-fig. 3*d*

Holotype. A female left valve. HU 2.J.1.9.

Paratypes. 33 valves and carapaces. HU 3.J.8.2–34.

Type locality and horizon. Black Head, Dorset. Cymodoce Zone, Lower Kimmeridgian.

Dimensions (mm.).	*L*	*H*	*W*	*M/a*
Holotype	0·58	0·37	0·13	0·04
♀ Left valve	0·54–0·58	0·33–0·38	0·13	0·04
♀ Right valve	0·54	0·33	0·12	0·04
♂ Left valve	0·58–0·61	0·31–0·34	0·11	0·04
♂ Right valve	0·52–0·57	0·28–0·31	0·10	0·04

Occurrence. From Baylei to Pseudomutabilis Zones, P. 2, RC. 2, 3, RM. 2, AU. II.

Diagnosis. Short, rather tumid form. Dorsal margin straight, ventral slightly curved. Posterior end rounded, postero-dorsal margin straight. Surface of valve smooth. Hinge robust, teeth on right valve elevated. Sexual dimorphism pronounced.

Description. Carapace ovoid (♀) or elongated (♂). Left valve larger, overlapping right dorsally and ventrally. Anterior end rounded, posterior more or less angular. Dorsal margin straight, ventral slightly convex. Postero-dorsal part of margin straight also, and spine often occurs postero-ventrally.

Surface smooth, ends of normal pore canals very conspicuous. Marginal areas narrow, selvage hardly visible. About 12 radial pore canals, straight, equally spaced.

Hinge robust, strongly developed. Right valve terminal elements are prominent ridges with 5 equally spaced denticles on each. Denticles strong, high. Median groove widens towards middle, where it is exceptionally wide. Terminal elements on left valve equally strongly developed, and median bar bent towards centre of valve. Accommodation groove widest near anterior end.

Sexual dimorphism prominent, males being longer and less high than females.

Remarks. Specimens of this species vary considerably and it is not easy to delimit them from similar forms. *G. punctata* is similar in shape but differs markedly in the hinge structure (the median element is straight and narrow in *G. punctata*) and there is also a

great difference in the shape of the radial pore canals. *G. malzi* differs in hinge structure, having a much more delicately built hinge.

Galliaecytheridea cf. *mandelstami* (Ljubimova 1955)

Plate 26, figs. 1–9; text-fig. 3*g*

1955 *Palaeocytheridea mandelstami* Ljubimova, p. 42, pl. 4, figs. 4*a*, *b*.

Material. 75 valves and carapaces. HU 3.J.9.2–75, HU 2.J.1.10.

Dimensions (*mm.*).	*L*	*H*	*W*	*M*/*a*
Left valve	0·71–0·75	0·43–0·46	0·17–0·19	0·06
Right valve	0·70–0·72	0·38–0·40	0·16–0·18	0·06

Occurrence. Middle of Mutabilis Zone, RM. 6.

Diagnosis. Carapace high with marked posterior cardinal angle, ending in blunt point. Surface finely punctate. Marginal areas broad. Sexual dimorphism doubtful.

Description. Carapace ovoid in side view, elliptical in dorsal view, greatest height and width in middle. Left valve only slightly larger than right, two valves similar in shape. Dorsal margin straight on both valves, ventral margin straight or slightly concave. Marked posterior cardinal angle, postero-dorsal margin straight. Posterior ends in blunt point.

Surface punctate, densely covered with system of small pits, size of which varies, largest concentrated on middle of valve.

Duplicature wide, inner margin and line of concrescence coincide. Radial pore canals straight, simple, few, only 6–8 anteriorly.

EXPLANATION OF PLATE 26

All figures × 50, unless otherwise stated.

Figs. 1–9. *Galliaecytheridea* cf. *mandelstami* (Ljubimova), Mutabilis Zone, RM. 6, Lower Kimmeridgian. 1, Right valve, ? female, external view, HU 3.J.9.2. 2, Left valve, ? female, external view, HU 2.J.1.10. 3, Left valve, ? male, external view, HU 3.J.9.6. 4, Carapace, ? female, ventral view, HU 3.J.9.8–9. 5, Left valve, juvenile, external view, HU 3.J.9.3. 6, Right valve, ? female, internal view, transmitted light, HU 3.J.9.2. 7, Left valve, ? female, internal view, transmitted light, HU 2.J.1.10. 8, Right valve, ? female, dorsal view, HU 3.J.9.4. 9, Left valve, ? female, dorsal view, HU 3.J.9.5.

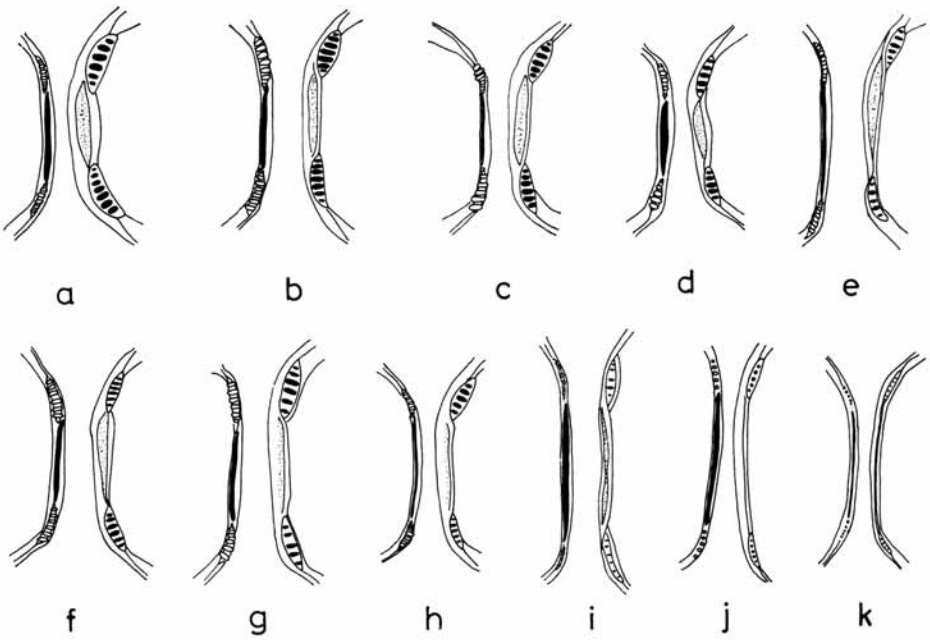
Figs. 10–13, 16, 17. *Galliaecytheridea spinosa* sp. nov., Rotunda Zone, PA. 11, Upper Kimmeridgian. 10, Right valve, female, external view, HU 3.J.10.3. 11, Left valve, female, external view, holotype, HU 2.J.1.11. 12, Right valve, female, internal view, HU 3.J.10.3. 13, Left valve, female, internal view, holotype, HU 2.J.1.11. 16, Right valve, male, external view, HU 3.J.10.5. 17, Left valve, male, external view, HU 3.J.10.4.

Figs. 14, 15, 18–20. *Galliaecytheridea spinosa* sp. nov., Rotunda Zone, PA. 21, Upper Kimmeridgian. 14, Right valve, female, external view, HU 3.J.10.10. 15, Left valve, female, external view, HU 3.J.10.11. 18, Right valve, female, anterior margin in transmitted light, HU 3.J.10.22, × 125. 19, Left valve, female, dorsal view, HU 3.J.10.15. 20, Right valve, female, dorsal view, HU 3.J.10.15.

Figs. 21–26. ? *Galliaecytheridea polita* sp. nov., Pallasoides Zone, PA. 30, Upper Kimmeridgian. 21, Right valve, female, external view, HU 3.J.11.2. 22, Left valve, female, external view, holotype, HU 2.J.1.12. 23, Right valve, male, external view, HU 3.J.11.4. 24, Left valve, male, external view, HU 3.J.11.5. 25, Carapace, female, dorsal view, HU 3.J.11.7–8. 26, Carapace, female, ventral view, HU 3.J.11.7–8.

KILENYI, Kimmeridge Clay ostracods

Hinge in right valve consists of 2 terminal dentate ridges, connected with smooth groove. Very long, curved anterior element, spindle-shaped, highly elevated, with 6 denticles. Width of middle 4 denticles greater than that of ridge itself. Posterior element similar, but only 5 denticles. Median groove slightly curved. Special feature in left hinge is wide edge between terminal sockets and inside of valve. Median bar in this valve smooth, curving slightly inwards. Accommodation groove narrow.



TEXT-FIG. 3. Hinge structures in various species of *Galliaecytheridea* Oertli. Hinges are oriented with the anterior end upwards. ×60. *a*, *G. dissimilis* Oertli. *b*, ? *G. polita* sp. nov. *c*, *G. punctata* sp. nov. *d*, *G. confundens* sp. nov. *e*, *G. wolburgi* Steghaus. *f*, *G. trapezoidalis* sp. nov. *g*, *G.* cf. *mandelstami* (Ljubimova). *h*, *G. malzi* sp. nov. *i*, *G. selongata* sp. nov. *j*, *G. postrotunda* Oertli. *k*, *G. fragilis* sp. nov.

Muscle scars form usual pattern of *Galliaecytheridea*, but 2 anterior scars set well apart from row of 4.

Sexual dimorphism doubtful; slightly more elongated specimens considered to be males.

Remarks. The specimens seem to agree well with Ljubimova's figures, but are slightly smaller and more elongated. In many respects this species is reminiscent of the Upper Kimmeridgian *G. spinosa* but the latter has a more angular appearance, and the posterior end always bears a few spines. Its sexual dimorphism is also very pronounced, in contrast to *G.* cf. *mandelstami*.

Galliaecytheridea spinosa sp. nov.

Plate 26, figs. 10–20

Holotype. A female left valve. HU 2.J.1.11.

Paratypes. 387 valves and carapaces. HU 3.J.10.2–388.

Type locality and horizon. Hounstout Cliff, Kimmeridge, Dorset. Rotunda Zone, Upper Kimmeridgian.

Dimensions (*mm.*).	*L*	*H*	*W*	*M*/*a*
Holotype	0·79	0·45	0·20	0·07
♀ Left valve	0·74–0·81	0·43–0·48	0·18–0·21	
♀ Right valve	0·71–0·77	0·38–0·42	0·17–0·19	
♂ Left valve	0·89–0·95	0·44–0·46	0·20	
♂ Right valve	0·85–0·91	0·42–0·46	0·19	

Occurrence. Rotunda and Pallasoides Zones, PA. 8, 10–13, 19, 21, 25.

Diagnosis. Species of *Galliaecytheridea* with extremely pointed posterior end. 2 or 3 little spines usually on posterior extremity. Sexual dimorphism very strong, males much longer than females. Surface of valve pitted.

Description. Carapace ovoid (♀) or elliptical (♂). In side view greatest height one-third length from anterior end. Left valve larger than right, overlapping it dorsally and ventrally. In dorsal view greatest width one-third distance from posterior end.

Anterior margin rounded; dorsal, postero-dorsal, and postero-ventral margins straight. Ventral part of valve gently rounded. Posterior end on both valves sharply pointed, carrying 2–5 spines which point downwards. Often denticulation on anterior flange.

Surface ornamented with pits of varying sizes, largest occurring in central parts of valve.

Duplicature wide, with inner margin and line of concrescence coinciding. Selvage prominent, running some distance away from outer margin. Selvage lip wide, long. Radial pore canals straight, thin, about 10–15 anteriorly, 2–6 posteriorly.

Hinge well developed, with 6 denticles on terminal elements of right valve. Median element straight in both valves. Accommodation groove much wider on female valves.

Sexual dimorphism striking. Males 10–15% longer than females.

Remarks. See *Galliaecytheridea* cf. *mandelstami* (Ljubimova 1955).

? *Galliaecytheridea polita* sp. nov.

Plate 26, figs. 21–26; text-fig. 3*b*

Holotype. A female left valve. HU 2.J.1.12.

Paratypes. 58 valves and carapaces. HU 3.J.11.2–59.

Type locality and horizon. Hounstout Cliff, Kimmeridge, Dorset. Pallasoides Zone, Upper Kimmeridgian.

Dimensions (*mm.*).	*L*	*H*	*W*
Holotype	0·70	0·44	0·18
♀ Left valve	0·68–0·71	0·42–0·44	0·18
♀ Right valve	0·67–0·69	0·38–0·39	0·16
♂ Left valve	0·78	0·45	0·19
♂ Right valve	0·77	0·40	0·17

Occurrence. Pallasoides Zone, PA. 29, 29/A, 30.

Diagnosis. Carapace elongated. Left valve only slightly larger than right. Dorsal and ventral margins straight and parallel. Posterior end rounded. Sexual dimorphism pronounced.

Description. Carapace elongated, ovoid (♀) or elliptical (♂). Left valve only slightly larger than right, overlapping it along ventral and dorsal margins. Dorsal margin straight on both valves, ventral margin almost straight, with small convexity in middle. Postero-dorsal margin straight in females but slightly convex in males. Posterior end of valves is rounded angle, left valve ending more pointedly than right. In side view greatest height of valves falls in middle. Sexual dimorphism very pronounced, males 10–12% longer than females.

Surface of valve completely smooth. Faint depression around ocular region.

Hinge differs from usual arrangement in *Galliaecytheridea* in number and size of denticles on right valve terminal elements. 7 denticles, decreasing in size towards median element, which is smooth groove.

Duplicature and structure of valve not observed owing to infilling matrix in valves.

Remarks. ? *G. polita* differs from all the other species of the genus in lacking the peripheral furrow along the anterior margin on the outside of the valve and it possibly belongs to *Paraschuleridea* Swartz and Swain 1946. This genus was described from the Upper Jurassic of the Western Interior of the United States. It lacks the peripheral furrow of the anterior margin, as does ? *G. polita*, but the well-developed accommodation groove on the left valve is perhaps more typical of *Galliaecytheridae*.

Galliaecytheridea postrotunda Oertli 1957

Plate 27, figs. 5–14; text-figs. 3*j*, 5*h*

1957 *Galliaecytheridea postrotunda* Oertli, pp. 656–7, pl. 2, figs. 45–55.
1959 *Galliaecytheridea postrotunda* Oertli; Oertli, p. 25, pl. 3, fig. 89.
1964 *Galliaecytheridea postrotunda* Oertli; Glasshof, p. 38, pl. 4, figs. 4–7.
1966*a* *Galliaecytheridea postrotunda* Oertli; Barker, p. 450, pl. 3, figs. 1–6.

Material. 19 valves and carapaces. HU 2.J.14.1–19.

Dimensions (*mm.*).	*L*	*H*	*W*
Left valve	0·83	0·41	0·18
Right valve	0·82	0·39	0·18

Occurrence. Baylei Zone, P. 1.

Diagnosis. Carapace an elongate oval. Dorsal margin straight or slightly convex. Posterior cardinal angle marked. Surface finely punctate. Hinge relatively narrow. Sexual dimorphism occurs.

Remarks. There are some differences between Oertli's original description and the specimens from Dorset. The anterior margin is dentate on Oertli's specimens, whilst the present material shows no traces of this. Sexual dimorphism is very doubtful in the Dorset specimens, whereas according to Oertli it is very pronounced.

Galliaecytheridea fragilis sp. nov.

Plate 27, figs. 17–24; text-figs. 3*k*, 5*i*

Holotype. A left valve. HU 2.J.1.14.

Paratypes. 36 valves and carapaces. HU 3.J.14.2–37.

Type locality and horizon. Black Head, Dorset. Cymodoce Zone, Lower Kimmeridgian.

Dimensions (mm.).	*L*	*H*	*W*	*M/a*
Holotype	0·64	0·35	0·11	0·06
Right valve	0·60	0·33	0·11	0·06

Occurrence. Baylei and Cymodoce Zones, P. 1, RC. 2, 3.

Diagnosis. Carapace elongated, fragile, tapering towards posterior. Both ends rounded. Left valve slightly larger than right, overlap restricted to dorsal region and part of anterior margin. Hinge weakly developed, teeth minute, rounded. No sexual dimorphism.

Description. Carapace elongated, with pronounced taper towards posterior. Left valve slightly larger than right, overlapping it along dorsal and anterior margins. In dorsal and ventral view carapace elliptical, greatest width around middle. Right valve shows slight sulcus in middle. Two valves differ in shape, dorsal margin straight on left valve, slightly arched on right. Both valves highest at anterior cardinal angle. Posterior end rounded with several weakly developed spines postero-dorsally.

EXPLANATION OF PLATE 27

All figures × 50, unless otherwise stated.

Figs. 1–4. *Galliaecytheridea* sp. 2, Cymodoce Zone, RC. 3, Lower Kimmeridgian. 1, Right valve, ? juvenile, external view, HU 3.J.12.2. 2, Left valve, ? juvenile, external view, HU 3.J.12.3. 3, Right valve, ? juvenile, external view, HU 3.J.12.4. 4, Left valve, external view, HU 2.J.1.13.

Figs. 5–14. *Galliaecytheridea postrotunda* Oertli, Baylei Zone, P. 1, Lower Kimmeridgian. 5, Right valve, ? female, external view, HU 2.J.14.1. 6, Left valve, ? female, external view, HU 2.J.14.2. 7, Right valve, ? male, external view, HU 2.J.14.3, ×40. 8, Left valve, ? male, external view, HU 2.J.14.4, ×40. 9, Carapace, ? female, dorsal view, HU 2.J.14.9–10. 10, Carapace, ? female, ventral view, HU 2.J.14.9–10. 11, Left valve, ? female, internal view, transmitted light, HU 2.J.14.2. 12, Right valve, ? female, internal view, transmitted light, HU 2.J.14.1. 13, Left valve, ? female, internal view, transmitted polarized light, HU 2.J.14.2. 14, Right valve, ? female, internal view, transmitted polarized light, HU 2.J.14.1.

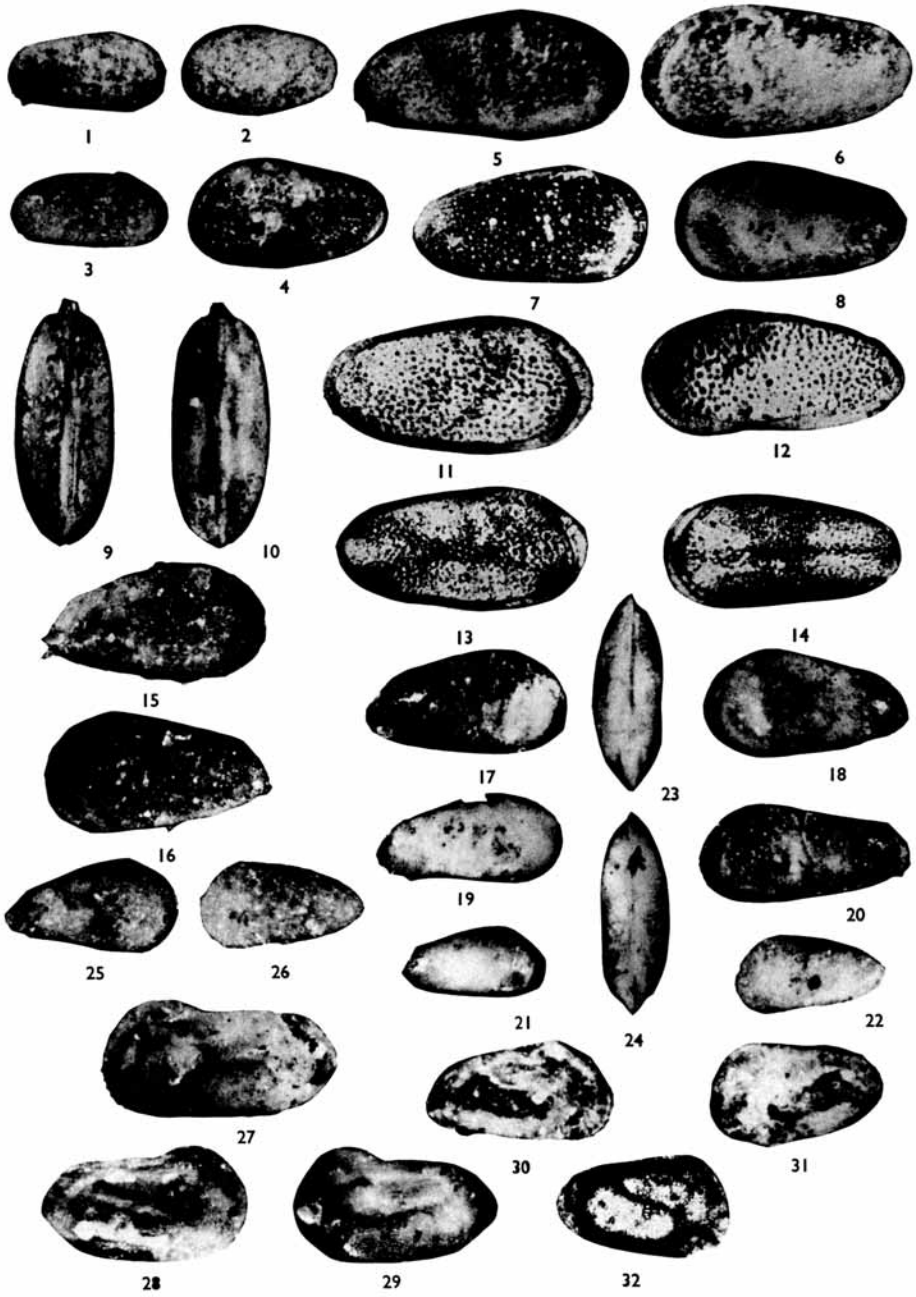
Figs. 15, 16. *Galliaecytheridea* sp. 3, Rotunda Zone, PA. 11, Upper Kimmeridgian. 15, Right valve, external view, HU 2.J.15.1. 16, Left valve, external view, HU 2.J.15.2.

Figs. 17–24. *Galliaecytheridea fragilis* sp. nov., Cymodoce Zone, RC. 3, Lower Kimmeridgian. 17, Right valve, external view, HU 3.J.14.2. 18, Left valve, external view, holotype, HU 2.J.1.14. 19, Right valve, external view, HU 3.J.14.3. 20, Left valve, external view, HU 3.J.14.4. 21, Right valve, juvenile, external view, HU 3.J.14.9. 22, Left valve, juvenile, external view, HU 3.J.14.10. 23, Carapace, dorsal view, HU 3.J.14.7–8. 24, Carapace, ventral view, HU 3.J.14.7–8.

Figs. 25, 26. ? *Pyrocytheridea* sp., Rotunda Zone, PA. 11, Upper Kimmeridgian. 25, Right valve, external view, HU 2.J.16.1. 26, Left valve, external view, HU 2.J.16.2.

Figs. 27–29. *Protocythere sigmoidea* Steghaus, Rotunda Zone, PA. 21, Upper Kimmeridgian. 27, Left valve, male, external view, HU 2.J.17.4. 28, Right valve, female, external view, HU 2.J.17.1. 29, Left valve, female, external view, HU 2.J.17.2.

Figs. 30–32. *Protocythere rodewaldensis* (Klingler), Baylei Zone, P. 1, Lower Kimmeridgian. 30, Right valve, external view, HU 2.J.18.1. 31, Left valve, external view, HU 2.J.18.2. 32, Left valve, internal view, transmitted light, HU 2.J.18.2.



KILENYI, Kimmeridge Clay ostracods

Surface of valve smooth, slight depression around ocular region. Normal pore canals small but clearly visible.

Duplicature rather narrow. Selvage weakly developed, selvage lip scarcely noticeable. Inner margin and line of concrescence coincide. 10 to 12 thin straight radial pore canals on anterior margin.

Muscle scars as in other species of *Galliaecytheridea*, but upper anterior scars much larger than others.

Hinge structure is 'weak' type of hinge found in some species of *Galliaecytheridea*, e.g. denticles on right valve terminal elements small, rounded, also corresponding loculi on other valve. Median element of left valve is bar which runs separate from inner edge of hinge margin; no accommodation groove present. Median groove on right valve is smooth and narrow.

Galliaecytheridea sp. 1

Plate 25, fig. 5

Material. 27 valves. HU 3.J.4.2–27, HU 2.J.1.5.

Dimensions (*mm.*).

	L	*H*	*W*
Left valve	0·75	0·45	0·22

Occurrence. Upper part of the Mutabilis Zone, RM. 9, 10.

Description. Carapace ovoid, both ends rounded. Left valve only slightly larger than right, overlapping it ventrally. Dorsal margin straight on both valves, both cardinal angles rounded. Ventral margin only very slightly convex in both valves.

Surface smooth, ends of numerous normal pore canals plainly visible. Marginal areas broad, with inner margin and line of concrescence coinciding. Radial pore canals straight, simple, about 10 on anterior and 5 on posterior margin. Selvage follows outer margin closely. Hinge shows usual hemimerodont arrangement of *Galliaecytheridea*.

Remarks. This form is close to *G. punctata* in shape, but has a more rounded outline, especially the posterior end, and the surface is smooth not punctate. There is also a considerable difference in the hinge.

Galliaecytheridea sp. 2

Plate 27, figs. 1–4

Material. 25 valves. HU 3.J.12.2–25, HU 2.J.1.13.

Dimensions (*mm.*).

	L	*H*	*W*
Left valve	0·59	0·34	0·14

Occurrence. Cymodoce Zone, RC. 3.

Description. Carapace elongate, tapering posteriorly. Left valve larger than right and very different in shape, having convex ventral margin and greatest height at anterior quarter of valve. Right valve much more elliptical in shape, tapering far less towards posterior, more rounded.

Surface of valve smooth; end of wide normal pore canals conspicuous. About 12 radial pore canals on anterior.

Remarks. Only one adult specimen has been found, the rest being immature valves. It is certainly different from other species of *Galliaecytheridea*, mainly in the outline of the right valve.

Galliaecytheridea sp. 3

Plate 27, figs. 15, 16

Material. 60 valves and carapaces. HU 2.J.15.1–60.

Dimensions (*mm.*).	*L*	*H*	*W*
Left valve	0·65–0·79	0·37–0·40	0·20
Right valve	0·64–0·73	0·35–0·37	0·18

Occurrence. Pectinatus and Rotunda Zones, PA. 1, 3, 6, 10–13, DO PE. 11.

Description. Carapace elongated, tapering posteriorly. Left valve overlaps right along entire margin. Valves nearly identical in shape. Dorsal margin straight on both valves, ventral margin slightly convex. Anterior end broadly rounded, posterior pointed downwards with single strong spine also pointing downwards. Posterior cardinal angle prominent, postero-dorsal margin straight. Poor preservation of material prevented

EXPLANATION OF PLATE 28

All figures × 50.

Figs. 1–4. *Protocythere nealei* sp. nov., Pallasoides Zone, PA. 21, Lower Kimmeridgian. 1, Right valve, external view, HU 3.J.15.2. 2, Left valve, external view, holotype, HU 2.J.1.15. 3, Left valve, dorsal view, holotype, HU 2.J.1.15. 4, Right valve, dorsal view, HU 3.J.15.2.

Figs. 5–7. *Cytheropteron* sp., Wheatleyensis Zone, DO VW. 2, Middle Kimmeridgian. 5, Left valve, female, external view, HU 2.J.20.1. 6, Left valve, male, external view, HU 2.J.20.2. 7, Left valve, female, dorsal view, HU 2.J.20.1.

Figs. 8–11. *Cytheropteron aquitanum* Donze, Wheatleyensis Zone, DO VW. 7, Middle Kimmeridgian. 8, Carapace, right side, external view; 9, Carapace, left side; 10, Carapace, anterior view; 11, Carapace, dorsal view, HU 2.J.1.16.

Figs. 12, 13. *Exophthalmocythere fuhrbergensis* Steghaus, Mutabilis Zone, RM. 6, Lower Kimmeridgian. 12, Left valve, external view, HU 2.J.19.2. 13, Left valve, external view, HU 2.J.19.3.

Figs. 14–17. *Eocytheropteron decoratum* Schmidt, Baylei Zone, P. 1, Lower Kimmeridgian. 14, Right valve, external view, HU 2.J.21.1. 15, Left valve, external view, HU 2.J.21.2. 16, Right valve, dorsal view, HU 2.J.21.1. 17, Left valve, dorsal view, HU 2.J.21.2.

Figs. 18–24. *Procytheropteron* sp. 1, Baylei Zone, P. 1, Lower Kimmeridgian. 18, Left valve, male, external view; 19, Left valve, male, internal view, HU 2.J.1.18. 20, Left valve, female, internal view, transmitted light, HU 2.J.1.17. 21, Right valve, female, HU 3.J.16.7. 22, Left valve, female, external view, HU 2.J.1.17. 23, Right valve, female, external view, HU 3.J.16.6. 24, Left valve, female, external view, HU 3.J.16.8.

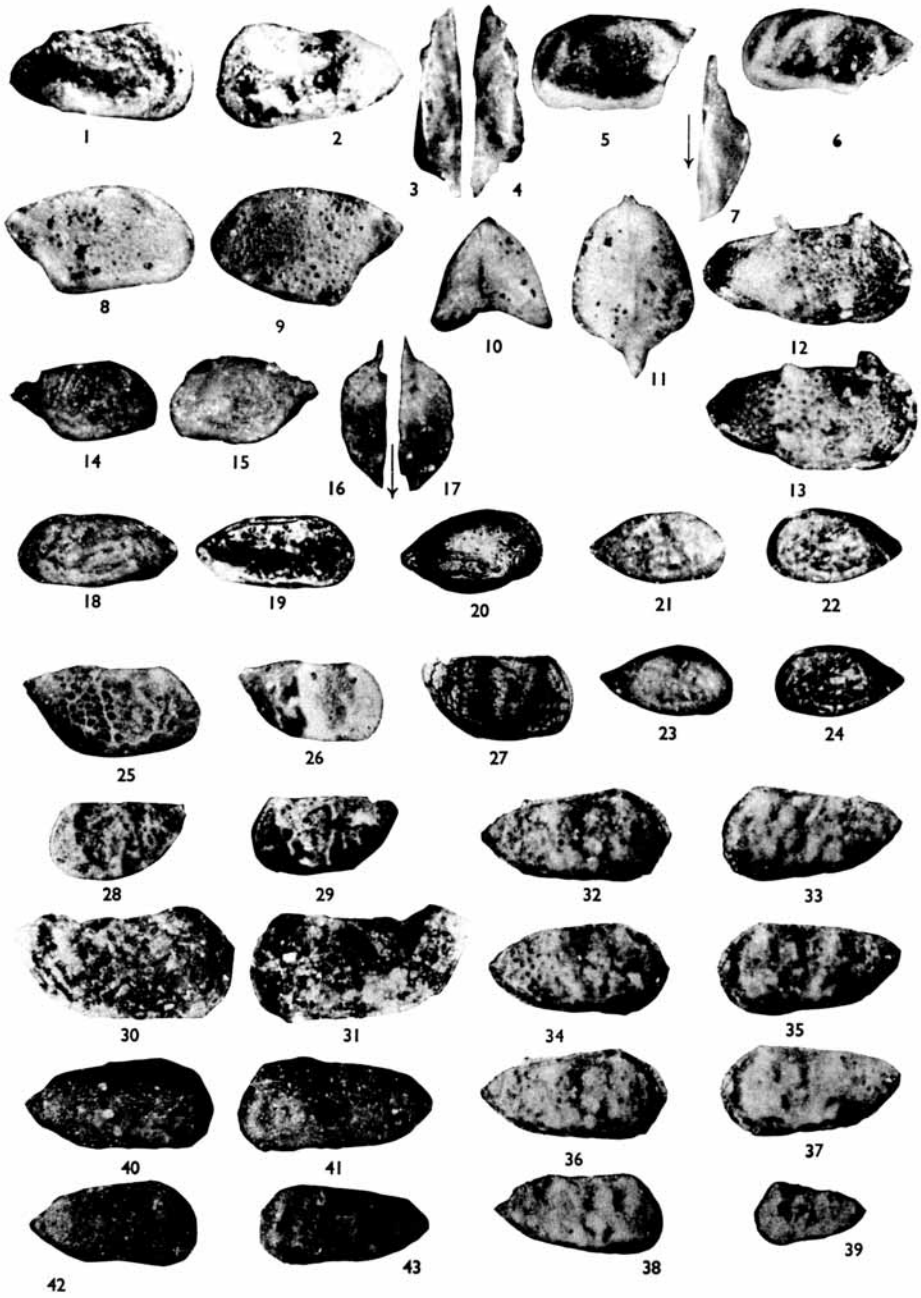
Fig. 25. *Orthonotacythere interrupta* Triebel, Mutabilis Zone, RM. 2, Lower Kimmeridgian. Right valve, external view, HU 2.J.22.1.

Figs. 26–9. *Orthonotacythere interrupta* Triebel, Mutabilis Zone, RM. 7, Lower Kimmeridgian. 26, Right valve, external view, HU 2.J.22.3. 27, Left valve, internal view, transmitted light, HU 2.J.22.4. 28, Left valve, external view, HU 2.J.22.6. 29, Left valve, external view, HU 2.J.22.4.

Figs. 30, 31. *Orthonotacythere* sp., Rotunda Zone, PA. 6, Upper Kimmeridgian. 30, Right valve, external view, HU 3.J.30.1. 31, Left valve, external view, HU 3.J.30.1.

Figs. 32–9. *Orthonotacythere pustulata* sp. nov., Rotunda Zone, PA. 21, Upper Kimmeridgian. 32, Right valve, external view, HU 3.J.18.6. 33, Left valve, external view, holotype, 2.J.1.19. 34, Right valve, external view, HU 3.J.18.3. 35, Left valve, external view, HU 3.J.18.4. 36, Right valve, external view, HU 3.J.18.2. 37, Left valve, external view, HU 3.J.18.4. 38, Right valve, juvenile, external view, HU 3.J.18.5. 39, Left valve, juvenile, external view, HU 3.J.18.7.

Figs. 40–43. ? *Acrocythere inornata* sp. nov., Rotunda Zone, PA. 13, Upper Kimmeridgian. 40, Right valve, external view, HU 3.J.19.2. 41, Left valve, external view, holotype, HU 2.J.1.20. 42, Right valve, juvenile, external view, HU 3.J.19.3. 43, Left valve, juvenile, external view, HU 3.J.19.4.



KILENYI, Kimmeridge Clay ostracods

observation of internal structures of valve; one left valve, however, showed typical hinge of *Galliaecytheridea*.

Subfamily EUCYTHERINAE Puri 1954
Genus PYROCYTHERIDEA Ljubimova 1955
? *Pyrocytheridea* sp.

Plate 27, figs. 25, 26

Material. 7 valves. HU 2.J.16.1–7.

Dimensions (*mm.*).	*L*	*H*	*W*
Left valve	0·53	0·28	0·10
Right valve	0·51	0·26	0·10

Occurrence. Rotunda Zone, PA. 11.

Description. Carapace elongated, tapering strongly towards posterior end. Both valves end in slightly blunted point. In dorsal view, carapace elliptical, greatest width at middle. Valves seem to be equal in size, shape nearly identical, right valve slightly more angular at anterior cardinal angle and at posterior end. Greatest height of valves at anterior cardinal angle. Dorsal margin straight. Surface of valve smooth.

Details of interior structure of valves not discernible owing to bad state of preservation, although duplicature seems to be very narrow.

Remarks. Species of *Pyrocytheridea* have a similar shape, and they occur at about the same horizon in the Upper Jurassic of the Ural region of the U.S.S.R. Unfortunately the typical hinge structure of *Pyrocytheridea* could not be seen and therefore the identification is queried.

Subfamily LOXOCONCHINAE Sars 1925
Genus MANDELSTAMIA (MANDELSTAMIA) Ljubimova 1955
Mandelstamia (*Mandelstamia*) *rectilinea* Malz 1958

Plate 29, figs. 1–6; text-figs. 4*a*, *b*

1958 *Mandelstamia rectilinea* Malz, p. 38, pl. 11, figs. 58–63.
1961 *Mandelstamia rectilinea* Malz; Neale and Kilenyi, pp. 440–2, pl. 71, figs. 1–4, 6.
1964 *Mandelstamia rectilinea* Malz; Glasshof, p. 48.

Material. 52 valves and carapaces. HU 2.J.1.21, HU 3.J.20.2–52.

Dimensions (*mm.*).	*L*	*H*	*W*	*M*/*a*
Left valve	0·66–0·73	0·38–0·40	0·16	0·06
Right valve	0·67–0·72	0·39–0·40	0·16	0·06

Occurrence. Mutabilis Zone, RM. 5, 6.

Diagnosis. Species of *Mandelstamia* (*M.*) with oblong shape. Valves about equal in size. Posterior end sometimes higher than anterior. Dorsal margin straight, ventral concave. Valve surface ornamented by pits, larger on anterior part of valve.

Mandelstamia (*M.*) *triebeli* Kilenyi 1961

Plate 29, figs. 9, 10; text-figs. 4*c*, *d*, 5*k*

1961 *Mandelstamia triebeli* Kilenyi; Neale and Kilenyi, pp. 442–3, pl. 71, figs. 5, 9, 10, 14, 15.

Material. 513 valves and carapaces. HU 2.J.1.22, HU 3.J.21.2–513.

Dimensions (mm.).	*L*	*H*	*W*	*M/a*
Left valve	0·55–0·61	0·30–0·35	0·15–0·17	0·05
Right valve	0·57–0·64	0·32–0·36	0·15–0·17	0·05

Occurrence. Mutabilis and Pseudomutabilis Zones, RM. 1, 2, 5, 6, 9, AU. II, IV.

Diagnosis. Species of *Mandelstamia* (*M.*) in which valves are equal in size, carapace tapering towards posterior end. Anterior end rounded, posterior cardinal angle more or less prominent; dorsal margin straight, ventral convex. Marginal areas broad.

Mandelstamia (*M.*) *angulata* Kilenyi 1961

Plate 29, figs. 11–16

1961 *Mandelstamia angulata* Kilenyi; Neale and Kilenyi, pp. 443–4, pl. 71, figs. 11, 12, 16–18.

Material. 56 valves and carapaces. HU 2.J.1.23, HU 3.J.22.2–56.

Dimensions (mm.).	*L*	*H*	*M/a*
Left valve	0·42–0·45	0·25–0·27	0·03
Right valve	0·42–0·44	0·22–0·23	0·03

Occurrence. Baylei and Cymodoce Zones, P. 1, RC. 3.

EXPLANATION OF PLATE 29

All figures × 50, unless otherwise stated.

Figs. 1–6. *Mandelstamia* (*M.*) *rectilinea* Malz, Mutabilis Zone, RM. 6, Lower Kimmeridgian. 1, Right valve, external view, HU 3.J.20.2. 2, Left valve, external view, HU 3.J.20.3. 3, Left valve, external view, HU 2.J.1.21. 4, Carapace, dorsal view, HU 3.J.20.7; 5, Left valve, central part in transmitted light, × 150; 6, Left valve, central part in polarized light, × 150.

Figs. 7, 8. *Mandelstamia* (*Xeromandelstamia*) sp. 1. Kilenyi, Rotunda Zone, PA. 1, Upper Kimmeridgian. 7, Right valve, external view, HU 3.J.30.1. 8, Left valve, external view, HU 3.J.30.2.

Figs. 9, 10. *Mandelstamia* (*M.*) *triebeli* Kilenyi, Mutabilis Zone, RM. 6, Lower Kimmeridgian. 9, Right valve, external view, HU 3.J.21.2. 10, Left valve, external view, HU 2.J.1.22.

Figs. 11–16. *Mandelstamia* (*M.*) *angulata* Kilenyi, Cymodoce Zone, RC. 3, Lower Kimmeridgian. 11, Right valve, ? male, external view, HU 3.J.22.2. 12, Left valve, ? female, external view, HU 2.J.1.23. 13, Right valve, male, HU 3.J.22.7. 14, Left valve, male, external view, HU 3.J.22.8. 15, Carapace, female, dorsal view, HU 3.J.22.10–11. 16, Carapace, female, ventral view, HU 3.J.22.10–11.

Figs. 17, 18, 21. *Monoceratina* sp. 2, Rotunda Zone, PA. 9, Upper Kimmeridgian. 17, Right valve, external view, HU 2.J.26.1. 18, Left valve, external view, HU 2.J.26.2. 21, Carapace, dorsal view, HU 2.J.26.1–2.

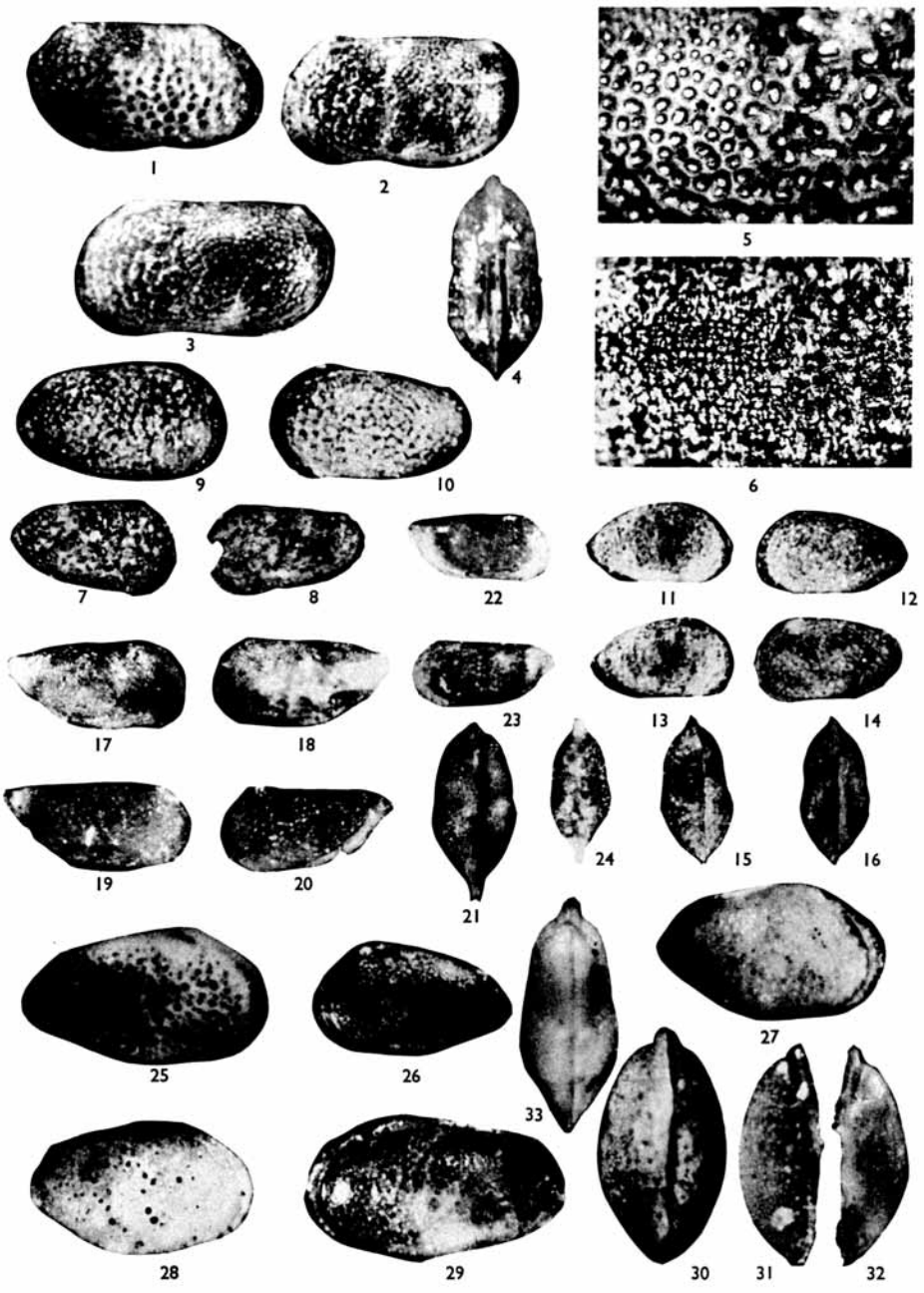
Figs. 19, 20. *Monoceratina* sp. 2, Rotunda Zone, PA. 21, Upper Kimmeridgian. 19, Right valve, external view, HU 2.J.26.1. 20, Left valve, external view, HU 2.J.26.2.

Figs. 22–24. *Monoceratina* sp. 1, Rotunda Zone, PA. 3, Upper Kimmeridgian. 22, Right valve, external view, HU 2.J.25.1. 23, Left valve, external view, HU 2.J.25.2. 24, Carapace, dorsal view, HU 2.J.25.1–2.

Figs. 25, 26. *Amphicythere confundens* Oertli, Cymodoce Zone, RC. 2, Lower Kimmeridgian. 25, Right valve, external view, HU 2.J.27.1. 26, Left valve, juvenile, HU 2.J.27.4.

Figs. 27–32. *Amphicythere pennyi* sp. nov., Baylei Zone, P. 1, Lower Kimmeridgian. 27, Right valve, female, external view, holotype, HU 2.J.1.26. 28, Right valve, female, external view, HU 3.J.24.6. 29, Left valve, male, external view, HU 3.J.24.3. 30, Carapace, female, dorsal view, HU 3.J.24.10–11. 31, Left valve, female, dorsal view, HU 3.J.24.8. 32, Right valve, female, dorsal view, HU 3.J.24.12.

Fig. 33. *Mandelstamia* (*Xeromandelstamia*) *maculata* Kilenyi, Grandis Zone, SUG. 5, Middle Kimmeridgian. Carapace, female, dorsal view, HU 2.J.1.24.



KILENYI, Kimmeridge Clay ostracods

Diagnosis. Small species of *Mandelstamia* (*M.*) with pointed posterior end. Dorsal margin of right valve convex, that of left valve straight. Left valve slightly rounded posteriorly, right valve pointed. Sexual dimorphism doubtful.

Subgenus MANDELSTAMIA (XEROMANDELSTAMIA) Beutler and Gründel 1963
Mandelstamia (*Xeromandelstamia*) *maculata* Kilenyi 1961

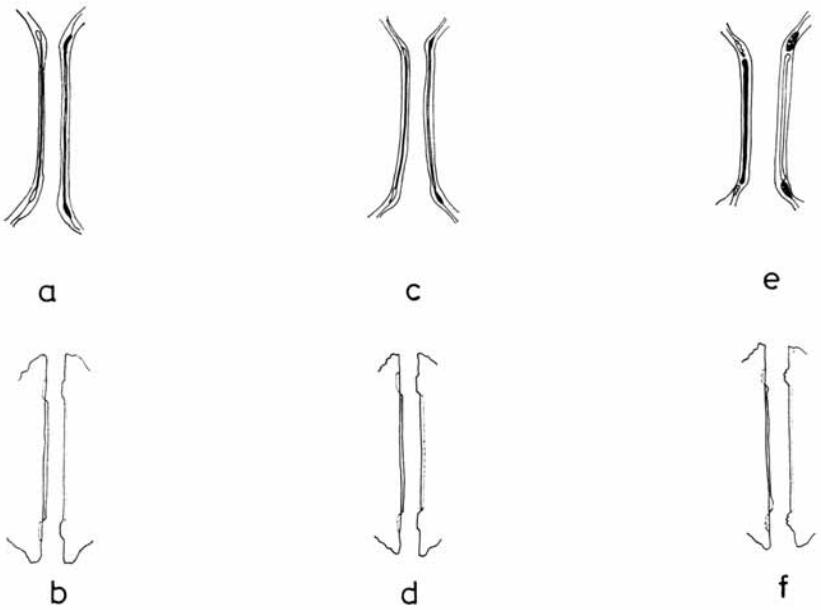
Plate 29, fig. 33; text-figs. 4*e*, *f*

1961 *Mandelstamia maculata* Kilenyi; Neale and Kilenyi, pp. 444–6, pl. 71, figs. 19–25.

Material. 89 valves and carapaces. HU 2.J.1.24, HU 3.J.23.2–89.

Dimensions (*mm.*).	*L*	*H*	*W*	*M*/*a*
♀ Left valve	0·72	0·40–0·41	0·17	0·08
♀ Right valve	0·72	0·42	0·17	0·07
♂ Right valve	0·86	0·45	0·18	0·07

Occurrence. Grandis Zone, SUG. 3, 5, 8.



TEXT-FIG. 4. Hinge structures in species of *Mandelstamia* Ljubimova. Hinges are oriented with the anterior end upwards. ×60. *a*, *M. rectilinea* Malz. *b*, same, dorsal view. *c*, *M. triebeli* Kilenyi. *d*, same, dorsal view. *e*, *M.* (*X.*) *maculata* Kilenyi. *f*, same, dorsal view.

Diagnosis. Carapace elongated, tapering posteriorly. Anterior end rounded, posterior more angular. Ventral margin of right valve strongly concave, that of left valve straight,

ventral side of valves overhanging ventral margins to form sort of ala. Surface covered with equally dispersed pits. Hinge of right valve has following structure: anterior element is minute, oval-shaped ridge with 4 small rounded projections, middle 2 of which are larger than others. Median element wide, smooth groove, ending on both sides in rounded pit slightly deeper than groove itself. Posterior element like anterior, but smaller. Left valve terminal elements are oval-shaped sockets with 3 or 4 faint loculi in them. Median element lies in middle of contact margin and consists of smooth bar, both ends thickened, slightly projecting. Marginal areas relatively broad with few straight, simple pore canals. Sexual dimorphism very pronounced.

Mandelstamia (*X.*) sp. 1, Kilenyi 1961

Plate 29, figs. 7, 8

1961 *Mandelstamia* sp. 1, Kilenyi; Neale and Kilenyi, p. 446, pl. 71, figs. 7, 8, 13.

Material. 23 valves. HU 3.J.30.1–23.

Dimensions (*mm.*).	*L*	*H*	*W*	*M*/*a*
Left valve	0·50	0·32	0·16	0·04
Right valve	0·48	0·28	0·15	0·04

Occurrence. Pectinatus and Rotunda Zones, DO PE 11, PA. 1, 3.

Diagnosis. Shape like *M. maculata* but with the hinge more advanced towards the hemimerodont type, the terminal teeth being more markedly dentate. The median ridge on the left valve is straight and has no terminal widening. Radial pore canals few.

EXPLANATION OF PLATE 30

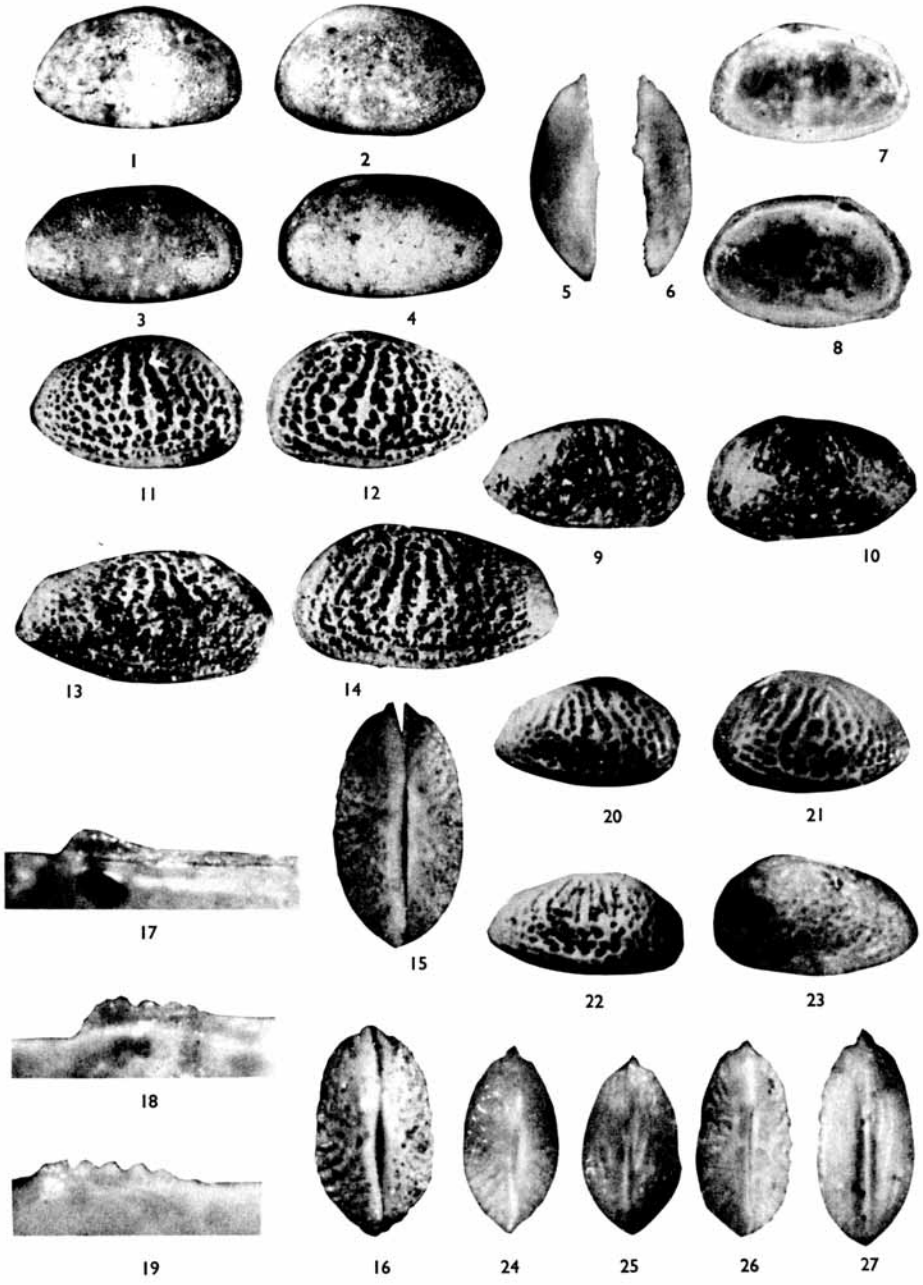
All figures × 50, unless otherwise stated.

Figs. 1–8. *Amphicythere sphaerulata* sp. nov., Cymodoce Zone, RC. 1, Lower Kimmeridgian. 1, Right valve, female, external view, HU 3.J.26.2. 2, Left valve, female, external view, holotype, HU 2.J.1.28. 3, Right valve, male, external view, HU 3.J.26.3. 4, Left valve, male, external view, HU 3.J.26.4. 5, Left valve, male, dorsal view, HU 3.J.26.4. 6, Right valve, male, dorsal view, HU 3.J.26.3. 7, Left valve, female, internal view, holotype, HU 2.J.1.28. 8, Right valve, female, internal view, HU 3.J.26.2.

Figs. 9, 10. *Macrodentina* (*M.*) sp. 1, Mutabilis Zone, RM. 9, Lower Kimmeridgian. 9, Right valve, female, external view, HU 2.J.30.1. 10, Left valve, female, external view, HU 2.J.30.2.

Figs. 11–19. *Macrodentina* (*M.*) *cicatricosa* Malz, Cymodoce Zone, RC. 3, Lower Kimmeridgian. 11, Right valve, female, external view, HU 2.J.29.1. 12, Left valve, female, external view, HU 2.J.29.2. 13, Right valve, male, external view, HU 2.J.29.5. 14, Left valve, male, external view, HU 2.J.29.6. 15, Carapace, male, dorsal view, HU 2.J.29.20–1. 16, Carapace, female, dorsal view, HU 2.J.29.16–17. 17, Left valve, female, hinge median element, × 175; 18, Right valve, female, hinge anterior element, × 175; 19, Right valve, hinge posterior element, × 175.

Figs. 20–27. *Macrodentina* (*Polydentina*) *proclivis striata* subsp. nov., Pseudomutabilis Zone, AU. IV, Lower Kimmeridgian. 20, Right valve, female, external view, HU 2.J.30.1. 21, Left valve, female, external view, holotype, HU 2.J.1.36. 22, Right valve, male, external view, HU 2.J.30.2. 23, Left valve, male, external view, HU 2.J.30.3. 24, Carapace, female, dorsal view, HU 2.J.30.8–9. 25, Carapace, female, ventral view, HU 2.J.30.8–9. 26, Carapace, male, dorsal view, HU 2.J.30.6–7. 27, Carapace, male, ventral view, HU 2.J.30.6–7.



KILENYI, Kimmeridge Clay ostracods

Subfamily Uncertain
Genus DICRORYGMA Poag 1962
Subgenus DICRORYGMA (ORTHORYGMA) Christensen 1965
Dicrorygma (*Orthorygma*) *kimmeridgensis* (Kilenyi 1965)

Plate 31, figs. 22–31

1957 *Cytherideinarum* ? sp. 1, Oertli, p. 661, pl. 3, figs. 86–91.
1965 *Oertliana kimmeridgensis* Kilenyi, pp. 573–4, pl. 79, figs. 1–12; text-fig. 1.

Material. 101 valves and carapaces. HU 2.J.31.1, HU 3.J.29.1–100.

Dimensions (*mm.*).	*L*	*H*	*W*	*M*/*a*
♀ Left valve	0·36–0·38	0·20–0·21	0·08	0·03
♀ Right valve	0·35–0·37	0·18–0·20	0·07	0·03
♂ Left valve	0·43–0·45	0·21–0·23	0·08	0·04
♂ Right valve	0·43–0·45	0·20–0·22	0·07	0·03

Occurrence. Mutabilis Zone, RM. 9.

Diagnosis. Carapace elliptical, anterior end rounded, posterior slightly pointed. Valves subequal, left slightly larger. Surface of valves slightly punctate. Radial pore canals relatively thick in middle, narrowing suddenly near both ends. Sexual dimorphism strong.

Remarks. D. (*O.*) *kimmeridgensis* is distinguished from *D.* (*O.*) *maior* Christensen 1965 by its almost straight ventral margin, lacking the marked antero-ventral concavity of the dorsal margin in the latter species.

Dicrorygma (*Orthorygma*) sp. 1 (Kilenyi 1965)

Plate 31, figs. 32, 33

1965 *Oertliana* sp. 1, Kilenyi, pp. 574–5, pl. 79, figs. 13–16.

Material. 39 valves. HU 2.J.34.1–39.

Dimensions (*mm.*).	*L*	*H*
Left valve	0·45	0·24
Right valve	0·44	0·23

Occurrence. Rotunda Zone, PA. 1, 6, 11, 13.

Diagnosis. Elongate, almost oblong-shaped carapace. Valves equal in size. Surface very finely punctate, almost smooth. No eye depression.

Indet. gen. A. sp. 1

Plate 31, figs. 20, 21

Material. 2 valves (1 destroyed). HU 2.J.1.25 (left valve).

Dimensions (*mm.*).	*L*	*H*
Left valve	0·54	0·30
Right valve	0·54	0·30

Occurrence. Cymodoce Zone, RC. 3.

Description. Carapace ovoid, valves similar in shape. Anterior broadly rounded, posterior blunt. Surface of valves covered by rather irregular system of thick ribs, knobs, and

bulges. Semicircular dorsal rib starts from posterior cardinal angle, first rising slightly above dorsal margin, then turning back and ending on lateral part of valve at about its mid-point. Second dorsal rib starts from just below first and runs across valve, apparently ending on antero-ventral side without reaching margin. Third rib ventral, roughly following ventral margin. Between these ribs, bulges and knobs occur apparently without definite pattern.

Inner margin and line of concrescence coincide. Only few radial pore canals, 7 at most, straight, simple, widest at their middle. Selvage only weakly developed.

Hinge lophodont, with very small drop-shaped terminal teeth and wide, smooth median groove in right valve.

Muscle scars arranged in oblique row of 4 scars with 1 additional scar level with top one of row.

Remarks. Indet. gen. A. sp. 1. resembles species of *Wolburgia* Anderson 1966 in shape and surface ornamentation. There are, however, differences in the hinge and duplicature. *Wolburgia* has denticulate terminal hinge elements and a narrow vestibule is present, whereas in Indet. gen. A. sp. 1, the hinge teeth are definitely smooth and the inner margin and line of concrescence coincide. Since only 3 species of *Wolburgia* have been

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EXPLANATION OF PLATE 31

All figures × 50, unless otherwise stated.

Figs. 1–5. *Macrodentina* (*Polydentina*) *parvapunctata* sp. nov., Mutabilis Zone, RM. 5, Lower Kimmeridgian. 1, Right valve, external view, HU 3.J.28.3. 2, Left valve, external view, holotype, HU 2.J.1.30. 3, Left valve, dorsal view, HU 3.J.28.4. 4, Left valve, external view, HU 3.J.28.4. 5, Left valve, internal view, HU 3.J.28.4.

Figs. 6–11, 17, 18. *Macrodentina* (*Polydentina*) *proclivis proclivis* Malz, Pseudomutabilis Zone, AU. II, Lower Kimmeridgian. 6, Left valve, male, external view, HU 2.J.32.1. 7, Left valve, female, external view, HU 3.J.27.2. 8, Right valve, female, external view, HU 2.J.1.29. 9, Right valve, male, external view, HU 3.J.27.3. 10, Left valve, male, external view, HU 3.J.27.4. 11, Carapace, male, dorsal view, HU 3.J.27.6–7. 17, Left valve, female, internal view, HU 2.J.1.29. 18, Right valve, female, internal view, HU 3.J.27.2.

Figs. 12–16, 19. *Macrodentina* (*M.*) *maculata* Malz, Mutabilis Zone, RM. 9, Lower Kimmeridgian. 12, Right valve, female, external view, HU 2.J.31.1. 13, Left valve, female, external view, HU 2.J.31.2. 14, Right valve, male, external view, HU 2.J.31.4. 15, Left valve, male, external view, HU 2.J.31.5. 16, Carapace, male, dorsal view, HU 2.J.31.8–9. 19, Carapace, female, dorsal view, HU 2.J.31.6–7.

Figs. 20, 21. Indet. gen. A. sp. 1, Cymodoce Zone, RC. 3, Lower Kimmeridgian. 20, Right valve, external view, (destroyed). 21, Left valve, external view, HU 2.J.1.25.

Figs. 22–31. *Dicrorygma* (*Orthorygma*) *kimmeridgensis* (Kilenyi), Mutabilis Zone, RM. 9, Lower Kimmeridgian. 22, Right valve, female, external view, HU 3.J.29.17. 23, Left valve, female, external view, HU 2.J.31.1. 24, Left valve, male, external view, HU 3.J.29.7. 25, Right valve, male, external view, HU 3.J.29.6. 26, Left valve, male, external view, HU 3.J.29.2. 27, Right valve, female, external view, HU 3.J.29.22. 28, Right valve, male, external view, HU 3.J.29.17. 29, Right valve, ? male, external view, HU 3.J.29.23. 30, Right valve, female, external view, HU 3.J.29.3. 31, Right valve, male, internal view, transmitted light, HU 3.J.29.15, × 125.

Figs. 32, 33. *Dicrorygma* (*Orthorygma*) sp. 1 (Kilenyi), Rotunda Zone, PA. 13, Upper Kimmeridgian. 32, Right valve, ? male, external view, HU 2.J.34.1. 33, Left valve, ? male, external view, HU 2.J.34.3.

Fig. 34. Indet. gen. B. sp. 1, Rotunda Zone, PA. 11, Upper Kimmeridgian. Left (?) valve, external view, HU 2.J.35.1.

KILENYI, Kimmeridge Clay ostracods

described, all from the Purbeck–Wealden beds, the assignment of this form to *Wolburgia* would be premature.

Family PROTOCYTHERIDAE Ljubimova 1955
Subfamily PROTOCYTHERINAE Ljubimova 1955
Genus PROTOCYTHERE Triebel 1938
Protocythere sigmoidea Steghaus 1951

Plate 27, figs. 27–29

1951 *Protocythere sigmoidea* Steghaus, p. 219, pl. 15, figs. 42–45.
1955 *Protocythere sigmoidea* Steghaus; Klingler, pl. 11, figs. 11*a–d*.
1955 *Protocythere sigmoidea* Steghaus; Schmidt, p. 59.
1957 *Protocythere sigmoidea* Steghaus; Oertli, p. 661, pl. 3, figs. 92–94.
1959 *Protocythere sigmoidea* Steghaus; Oertli, p. 31, pl. 4, fig. 126.
1964 *Protocythere sigmoidea* Steghaus; Glasshof, p. 45.

Material. 12 valves and carapaces. HU 2.J.17.1–12.

Dimensions (*mm.*).	*L*	*H*	*W*	*M*/*a*
♀ Left valve	0·62	0·36	0·20	0·08
♀ Right valve	0·63	0·34	0·19	0·08
♂ Left valve	0·70	0·36	0·22	0·08
♂ Right valve	not found			

Occurrence. Rotunda Zone, PA. 19, 21.

Diagnosis. Species of *Protocythere* in which median rib joins dorsal rib at posterior end, and ventral rib at anterior end. Result is sigmoidal surface ornament. Surface is smooth. Duplicature broad. Sexual dimorphism strong.

Remarks. According to Steghaus (1951), Schmidt (1955), and Oertli (1957) the median element of the left valve hinge is denticulate. In the rather poorly preserved specimens from Dorset the bar appears to be smooth.

Protocythere rodewaldensis (Klingler 1955)

Plate 27, figs. 30–32; text-fig. 5*j*

1955 *Pleurocythere* ? *rodewaldensis* Klingler, p. 198, pl. 10, figs. 10*a–c*; pl. 11, fig. 10*d*.
1955 *Protocythere* ? n. sp. Schmidt, p. 59, pl. 2, fig. 33.
1957 *Protocythere rodewaldensis* (Klingler); Oertli, p. 662, pl. 3, figs. 95–97.
1959 *Protocythere rodewaldensis* (Klingler); Oertli, p. 31, pl. 4, fig. 127.
1964 *Protocythere rodewaldensis* (Klingler); Glasshof, p. 46.

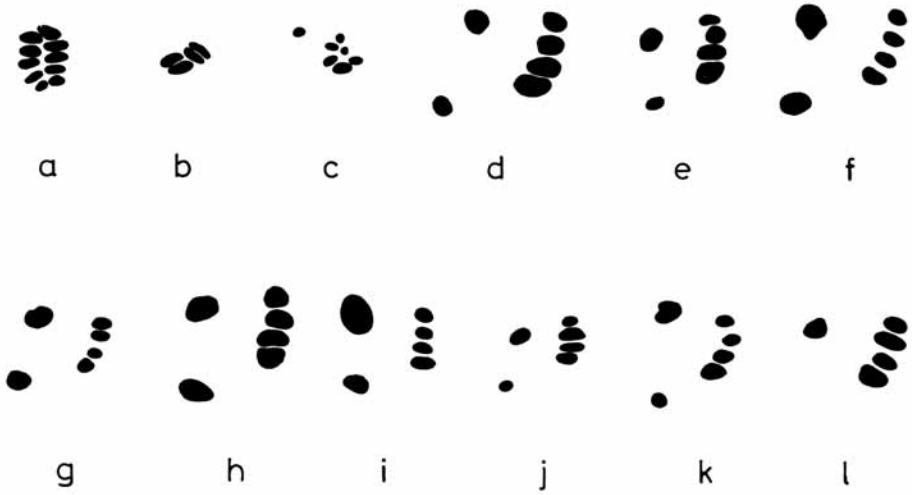
Material. 4 valves. HU 2.J.18.1–4.

Dimensions (*mm.*). (females?)	*L*	*H*	*W*	*M*/*a*
Left valve	0·52	0·32	0·17	0·08
Right valve	0·55	0·29	0·13	0·08

Occurrence. Baylei Zone, P. 1.

Diagnosis. Surface ornamentation of 3 main ribs. Median rib starts from posterior cardinal angle and joins ventral rib antero-ventrally. Additional fine rib runs parallel with anterior margin. Eye tubercle well developed. Surface of valve reticulate.

Remarks. The sexual dimorphism mentioned by Klingler (1955), was not observed in the Dorset material and it is very likely that only female valves were represented.



TEXT-FIG. 5. Muscle scar patterns (right valves), ×250. *a*, *Cytherelloidea paraweberi* Oertli. *b*, *Paracypris* sp. C. Oertli. *c*, ? *Paracypris problematica* sp. nov. *d*, *Galliaecytheridea dissimilis* Oertli. *e*, *G. wolburgi* (Steghaus). *f*, *G. malzi* sp. nov. *g*, *G. trapezoidalis* sp. nov. *h*, *G. postrotunda* Oertli. *i*, *G. fragilis* sp. nov. *j*, *Protocythere rodewaldensis* (Klingler). *k*, *Mandelstamia triebeli* Kilenyi. *l*, *Amphicythere sphaerulata* sp. nov.

Protocythere nealei sp. nov.

Plate 28, figs. 1–4

Holotype. A female left valve. HU 2.J.1.15.

Paratypes. 8 valves. HU 3.J.15.2–9.

Type locality and horizon. Hounstout Cliff, Kimmeridge, Dorset. Pallasoides Zone, Upper Kimmeridgian.

Dimensions (*mm.*).	*L*	*H*	*W*	*M*/*a*
Holotype	0·58	0·34	0·15	0·06
Right valve	0·60	0·30	0·15	0·06

Occurrence. Pallasoides Zone, PA. 21.

Diagnosis. Species of *Protocythere* with following surface ornamentation: dorsal and median ribs joined together at posterior end. Median rib branches out from dorsal rib near posterior cardinal angle where a characteristic knob-like structure is found which projects above dorsal margin of valve when viewed from side. Valve surface reticulate. Hinge hemimerodont, delicate. Sexual dimorphism doubtful.

Description. Carapace triangular, highest at anterior cardinal angle. Left valve slightly larger than right, but as only separate valves found, degree of overlap not observed. In dorsal view valves alike, roughly triangular in shape. Greatest width about one-fifth distance from posterior end.

Valves similar in shape, but left valve higher at anterior cardinal angle, and its anterior end less rounded. Dorsal margin straight on both valves. Cardinal angles more marked on right valve, as edge of terminal sockets in left valve form two half-circles, giving more rounded appearance to cardinal angles. Postero-dorsal margin very short, concave, more conspicuous on left valve. Posterior end more or less a rounded right-angle. Ventral margin straight on both valves. Sexual dimorphism doubtful; some valves somewhat longer and less high than others and probably males.

Surface ornamented by system of 3 quasi-horizontal ribs between which surface is reticulate; 'secondary' ribs may occur. Three main ribs form main ornamentation. Upper one starts from posterior part of valve, just in front of posterior cardinal angle. Here knob-like protuberance occurs, usually more strongly developed on left valve, protruding above dorsal margin in side view. Rib itself runs parallel with dorsal margin for about half its length and then for short distance leaves dorsal margin, forming semi-circular depression, rejoining dorsal margin at anterior cardinal angle. Rib continues round anterior margin, joining ventral rib. This runs parallel with dorsal rib, becoming very prominent towards its posterior end, where it ends abruptly. On left valve these 2 ribs seem to join at their posterior ends. Median rib branches out from dorsal one at posterior cardinal angle, where protuberance occurs, and from this point forms a straight line to exact centre of valve, where it turns upwards and joins dorsal rib near anterior. Faint 'secondary' rib (crest) branches out from median rib near centre of valve and joins anterior part of ventral rib. Exact structure of rib system best observed in transmitted light. In side view all 3 ribs are highest at their posterior end and slope gradually towards anterior, ventral rib being highest of 3.

Duplicature broad. Line of concrescence coincides with inner margin; radial pore canals straight, thin, few.

Hinge delicate; consists of 2 terminal dentate ridges connected with long, straight, apparently smooth groove (right valve). Five denticles on terminal elements. Complementary arrangement of left valve has 2 elongate, loculate sockets and straight smooth bar.

Remarks. P. nealei resembles *P. rodewaldensis* (Klingler 1955) but is easily distinguishable from it by its more angular appearance and the ornamentation of the valves.

Family CYTHERURIDAE Müller 1894
Genus CYTHEROPTERON Sars 1865
Cytheropteron aquitanum Donze 1960

Plate 28, figs. 8–11

1960 *Cytheropteron aquitanum* Donze, p. 21, pl. 4, figs. 48–51.

Material. 1 carapace. HU 2.J.1.16.

Dimensions (mm.).	*L*	*H*	*W*
Left valve	0·59	0·35	0·19
Right valve	0·57	0·33	0·15

Occurrence. Wheatleyensis Zone, DO VW. 7.

Diagnosis. Species of *Cytheropteron* with inflated ventral border and strongly developed alae.

Cytheropteron sp.

Plate 28, figs. 5–7

Material. 2 valves. HU 2.J.20.1–2.

Dimensions (*mm.*).	*L*	*H*
♀ Left valve	0·45	0·28
♂ Left valve	0·48	0·26

Occurrence. Wheatleyensis Zone, DO VW. 2, 4.

Description. Species of *Cytheropteron* with flat wing-like alae. Four ribs on surface of valve, none of them very marked. First connects anterior cardinal angle with posterior part of ala. Second and third arch to dorsal margin from anterior and posterior parts. Fourth runs vertically in middle of valve. Longer, vertically more compressed valves are considered males.

Genus EOCYTHEROPTERON Alexander 1933

Eocytheropteron decoratum (Schmidt 1954)

Plate 28, figs. 14–17

1954 *Cytheropteron* (*C.*) *decoratum* Schmidt, p. 82, pl. 5, figs. 1, 2; pl. 6, figs. 16–18.
1955 *Cytheropteron* (*C.*) *decoratum* Schmidt; Schmidt, p. 59.
1957 *Eocytheropteron* ? *decoratum* (Schmidt); Oertli, p. 663, pl. 4, figs. 109–112.

Material. 8 valves. HU 2.J.21.1–8.

Dimensions (*mm.*).	*L*	*H*	*W*	*M*/*a*
Left valve	0·46	0·28	0·14	0·03
Right valve	0·41	0·25	0·15	0·03

Occurrence. Baylei Zone, P. 1.

Diagnosis. Carapace bud-shaped, posterior end pointed. Surface ornamented with fine vertical ribs radiating from centre of dorsal margin, ventral part of valve bearing few longitudinal ribs. Hinge on the right valve consists of 2 terminal dentate ridges with 6 denticles each connected with smooth median bar. Accommodation groove present on left valve.

Remarks. There seems to be some difference between Schmidt's and Oertli's figures, the Dorset specimens being closer to the latter. The sexual dimorphism mentioned by Schmidt is not apparent in the Kimmeridge material.

Genus PROCYTHEROPTERON Ljubimova 1955

Procytheropteron sp. 1

Plate 28, figs. 18–24

Material. 25 valves. HU 3.J.16.1–18, HU 3.J.17.1–5, HU 2.J.1.17–18.

Dimensions (*mm.*).	*L*	*H*	*W*	*M*/*a*
♀ Left valve	0·42	0·24	0·11	0·05
♀ Right valve	0·40	0·23	0·11	0·05
♂ Left valve	0·48	0·22		

Occurrence. Baylei Zone, P. 1, 2.

Remarks. Species of *Procytheropteron* with ventral longitudinal ridges and with irregularly spaced tubercles and short ridges on upper half of valve. This form will be described as a new species of *Procytheropteron* by R. C. Whatley in his forthcoming study of Oxfordian–Corallian ostracods.

Genus ORTHONOTACYTHERE Alexander 1933
Orthonotacythere interrupta Triebel 1941

Plate 28, figs. 25–29

1941 *Orthonotacythere interrupta* Triebel, p. 394, pl. 4, figs. 31, 32.
1955 *Orthonotacythere interrupta* Triebel; Schmidt, p. 60.
1957 *Orthonotacythere interrupta* Triebel; Oertli, p. 666, pl. 4, figs. 127–130.
1960 *Orthonotacythere interrupta* Triebel var. *reticulosa* Donze, p. 23, pl. 5, figs. 56–59.
1964 *Orthonotacythere interrupta* Triebel; Glasshof, p. 43.

Material. 19 valves. HU 2.J.22.1–19.

Dimensions (*mm.*).	*L*	*H*
♀ (?) Left valve	0·40	0·24
♀ (?) Right valve	0·40	0·24
♂ (?) Left valve	0·49	0·26
♂ (?) Right valve	0·47	0·27

Occurrence. Cymodoce and Mutabilis Zones, RC. 3, RM. 2, 7, 9.

Diagnosis. Species of *Orthonotacythere* with well-developed median furrow in middle of valve. Surface strongly reticulate except in furrow. Two characteristic ridges present, one running straight from postero-dorsal part of valve to middle, other from anterior cardinal angle, joining first one in knob-like protuberance near ventral edge.

Remarks. The specimens from Dorset are rather badly preserved, but they show the definite specific characteristics, especially the smooth median furrow and the prominent lateral ribs which border the furrow. Specimens from the lower part of the Mutabilis Zone (RM. 2) are larger than specimens from the top part of the Zone (RM. 7 and 9). The sexual dimorphism mentioned by Triebel (1951) and Oertli (1957) is not very prominent or convincing in the Dorset material. The different sized specimens which are regarded as belonging to different sexes were not found in the same sample.

Orthonotacythere pustulata sp. nov.

Plate 28, figs. 32–39

Holotype. A left valve. HU 2.J.1.19.

Paratypes. 54 valves and carapaces. HU 3.J.18.2–55.

Type locality and horizon. Hounstout Cliff, Kimmeridge, Dorset. Rotunda Zone, Upper Kimmeridgian.

Dimensions (*mm.*).	*L*	*H*	*W*	*M*/*a*
Holotype	0·55	0·30	0·10	0·06
Left valve	0·49–0·56	0·25–0·30	0·08–0·11	0·06
Right valve	0·48–0·55	0·25–0·28	0·08–0·11	0·05

Occurrence. Pectinatus, Rotunda, and Pallasoides Zones, DO PE. 11, PA. 1, 2, 21.

Diagnosis. Species of *Orthonotacythere* with elongate carapace. Posterior part of valve reticulate, anterior covered with irregularly spaced bulges. Median furrow on central

part of valve is present but not so prominent as in *O. interrupta* Triebel. Sexual dimorphism not apparent.

Description. Carapace elongate, more or less angular. Valves nearly same size, left slightly larger. Valves differ only slightly in shape. Dorsal margin straight on both valves, cardinal angles marked, with exception of posterior one in right valve, which is rounded. Posterior end pointed at slightly above mid-height, slightly higher on left valve than on right. Ventral margin convex, running to posterior end without forming an angle.

Surface ornamentation very complex, with great range of variation. Three main elements in ornamentation, a coarse reticulation, bulges, and ribs. Ventral, longitudinal rib occurs on every valve. Another constant feature is faint median furrow which divides surface of valve into two separate parts. Bulges occur irregularly, one or two prominent ones usually near ocular region, and fairly constant bulge appears posteroventrally forming end of ventral rib. On most valves large swelling occurs posterodorsally, near posterior cardinal angle. Surface of valve coarsely reticulate, reticulation being more prominent on posterior half of valve.

Inner margin and line of concrescence coincide. Other details not observed.

Hinge rather long but narrow, hemimerodont type, with smooth median element. Right valve hinge consists of 2 terminal, dentate ridges and straight, wide, smooth groove as median element. Five denticles on each terminal element, their size gradually decreasing towards median groove. Left valve shows corresponding loculate socket—smooth bar—loculate socket arrangement. No accommodation groove.

Sexual dimorphism may be present but owing to small number and different stratigraphical position of specimens, could not be established.

Orthonotacythere sp.

Plate 28, figs. 30, 31

Material. 1 carapace. HU 3.J.30.1.

Dimensions (mm.). *L*: 0·64; *H*: 0·32.

Occurrence. Rotunda Zone, PA. 6.

Description. Relatively large form. Dorsal margin straight, ventral margin curves upwards reaching dorsal margin without an angle. Surface strongly ornamented with reticulation and spines.

Genus ACROCYTHERE Neale 1960

? *Acrocythere inornata* sp. nov.

Plate 28, figs. 40–43

Holotype. A left valve. HU 2.J.1.20.

Paratypes. 13 valves HU. 3.J.19.2–14.

Type locality and horizon. Hounstout Cliff, Kimmeridge, Dorset. Rotunda Zone, Upper Kimmeridgian.

Dimensions (*mm.*).	*L*	*H*	*W*	*M*/*a*
Holotype	0·66	0·32	0·12	0·05
Left valve	0·56–0·66	0·26–0·32	0·10–0·12	0·05
Right valve	0·56–0·64	0·26–0·31	0·10–0·12	0·05

Occurrence. Rotunda Zone, PA. 11, 12, 13.

Diagnosis. Species of *Acrocythere* with smooth valve surface. Caudal process well developed.

Description. Carapace elongated, tapering slightly towards posterior end. Valves equal in size. Dorsal margin straight in both valves, anterior end rounded. Middle portion of ventral margin concave, more conspicuously on right valve. Both cardinal angles strongly angular. Postero-dorsal margin concave on both valves forming a caudal process, and posterior part pointed at mid-height. Surface of valve smooth.

Inside of valve, owing to bad preservation, not suitable for examination. Inner margin and line of concrescence seem to coincide, while hinge definitely of simple merodont type, although further details not discernible.

Remarks. This species is placed tentatively in the genus *Acrocythere* on the basis of the shape of the carapace. Neale (1960) separated *Acrocythere* from *Orthonotacythere* on the absence of a central sulcus and on the position of the posterior end of the shell, which is markedly dorsal in the latter and at mid-height in the former. The smooth surface of the valve is certainly unknown in other species of *Acrocythere* but the outline of the shell, and especially the position of the caudal process, agrees very well with *Acrocythere*.

Family BYTHOCYTHERIDAE Sars 1926
Genus MONOCERATINA Roth 1928
Monoceratina sp. 1

Plate 29, figs. 22–24

Material. 1 carapace. HU 2.J.25.1–2.

Dimensions (*mm.*). *L*: 0·44; *H*: 0·18; *W*: 0·20.

Occurrence. Rotunda Zone, PA. 3.

Description. Carapace quadrangular. Left valve slightly larger than right. Anterior end rounded, posterior end beak-like, protruding. Dorsal margin straight, ventral margin slightly concave in middle. Ventral side of valve forms weakly developed ala.

In dorsal and ventral view carapace oval-shaped, with greatest width slightly posterior of middle. Both ends appear compressed in this view, posterior end being more drawn out than anterior. Surface of valve reticulate.

Monoceratina sp. 2

Plate 29, figs. 17–21

Material. 3 carapaces. HU 2.J.26.1–6.

Dimensions (*mm.*). *L*: 0·55; *H*: 0·27; *W*: 0·14.

Occurrence. Rotunda and Pallasoides Zones, PA. 9, 21.

Description. Carapace quadrate, posterior half triangular. Anterior end rounded. Dorsal margin straight, valves ending in blunt point. Ventral margin convex, and from its middle

curves upwards to posterior end. In dorsal view carapace oval-shaped, posterior end rather drawn out. Two valves about equal in size. Valve surface has ornamentation of small pits, giving punctate appearance. Alae do not seem to be developed.

Family BRACHYCYTHERIDAE Puri 1954
Genus AMPHICYTHERE Triebel 1954
Amphicythere confundens Oertli 1957

Plate 29, figs. 25, 26; text-figs. 6*a*, *b*

1957 *Amphicythere* (*A.*?) *confundens* Oertli, pp. 674–5, pl. 8, figs. 219–226.
non 1958*b* *Amphicythere* (*A.*?) *confundens* Oertli; Malz, p. 33, pl. 11, figs. 55, 56.
1959 *Amphicythere* (*A.*?) *confundens* Oertli; Oertli, p. 37, pl. 6, figs. 164–165.
1964 *Amphicythere confundens* Oertli; Glasshof, p. 32.

Material. 19 valves and carapaces. HU 2.J.27.1–19.

Dimensions (*mm.*).

	L	*H*	*W*
Left valve	0·76	0·44	0·16
Right valve	0·76	0·42	0·16

Occurrence. Cymodoce Zone, RC. 2.

Diagnosis. Species of *Amphicythere* with weakly developed paramphidont hinge and slight ocular depression.

Remarks. The paramphidont nature of the hinge is clearly demonstrated in the specimens and therefore they can safely be included in *Amphicythere*. The hinge, however does not completely correspond with that of the type species (*Amphicythere semisulcata* Triebel 1954) as the median bar appears to be smooth in the Dorset specimens and denticulate as in *A. semisulcata*.

Amphicythere pennyi sp. nov.

Plate 29, figs. 27–32; text-figs. 6*c*, *d*

1958*b* *Amphicythere* (*A.*) cf. *confundens* Oertli; Malz, pp. 33–4, pl. 11, figs. 55, 56.

Holotype. A female right valve. HU 2.J.1.26.

Paratypes. 74 valves and carapaces. HU 3.J.24.1–74.

Type locality and horizon. Black Head, Dorset. Baylei Zone, Lower Kimmeridgian.

Dimensions (*mm.*).

	L	*H*	*W*	*M*/*a*
Holotype	0·66	0·45	0·25	0·07
♀ Left valve	0·65	0·45	0·25	0·07
♀ Right valve	0·66	0·44	0·24	0·07
♂ Left valve	0·77	0·45	0·25	0·07
♂ Right valve	0·78	0·44	0·25	0·07

Occurrence. Baylei and Cymodoce Zones, P. 1, 2, RC. 3.

Diagnosis. Species of *Amphicythere* with following characteristics: hinge strongly paramphidont with especially conspicuous antero-median socket in right valve, broad marginal areas with 12 straight radial pore canals anteriorly. Sexual dimorphism strong. Valve surface densely pitted.

Description. Carapace elongate-ovoid. Two valves about equal in size, left valve little higher than right. Anterior end rounded, as is posterior end of left valve. Posterior end of right valve drawn out, extreme end rounded. Dorsal margin straight, both cardinal angles marked. Ventral margin gently rounded, in middle ventral side of valve strongly convex, overhanging ventral margin. Surface of valve coarsely pitted; slight depression in ocular region.

Inner lamella well developed, inner margin and line of concrescence coinciding. Selvage strongly developed and wide, forming rather prominent selvage lip on ventral side. Radial pore canals simple, straight, widest at their base; 12 on anterior margin and 3 or 4 on posterior.

Hinge strongly paramphidont. Right valve hinge consists of 4 elements, anterior one a bipartite ridge, bearing 3–4 small rounded denticles followed by large conical tooth. Antero-median element is deep, elongated pit continuing in median groove, which is smooth, straight, wide, tapering posteriorly. Posterior dentate ridge carries 5–8 denticles, centre one largest. Anterior element of left valve is loculate socket, its posterior end characterized by large single socket for receiving corresponding tooth on other valve. Antero-median element is smooth conical boss, continuing in smooth, straight bar (median element). Posterior part of hinge is elongated loculate socket with 5–8 loculi.

Muscle scar pattern consists of oblique row of 4 equally sized scars with 2 rounded anterior scars, upper of two being the larger. Sexual dimorphism strong, males about 15% longer than females.

Remarks. A. pennyi is close to *A. confundens* Oertli 1957, but differs in its more rounded outline and the strongly paramphidont hinge.

Amphicythere sphaerulata sp. nov.

Plate 30, figs. 1–8; text-figs. *5l*, *6e*, *f*

Holotype. A female left valve. HU 2.J.1.28.

Paratypes. 73 valves and carapaces. HU 3.J.26.2–74.

Type locality and horizon. Black Head, Dorset. Cymodoce Zone, Lower Kimmeridgian.

Dimensions (*mm.*).	*L*	*H*	*W*	*M*/*a*
Holotype	0·62	0·38	0·20	0·05
♀ Left valve	0·60–0·63	0·37–0·40	0·20	0·05
♀ Right valve	0·59–0·61	0·35–0·37	0·19	0·05
♂ Left valve	0·66–0·68	0·34–0·36	0·18	0·06
♂ Right valve	0·64–0·69	0·33–0·35	0·18	0·06

Occurrence. Cymodoce Zone, RC. 1.

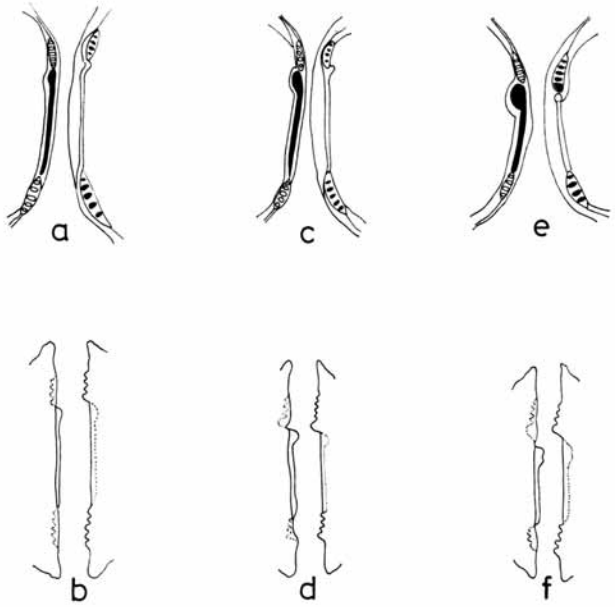
Diagnosis. Species of *Amphicythere* with bean-shaped carapace. Hinge strong, with large antero-median socket on left valve. Corresponding tooth on left valve high, rounded. Sexual dimorphism strong, males longer and less high than females.

Description. Carapace bean-shaped, ovoid. Left valve larger than right, overlapping it along entire margin, except posterior part. In dorsal view carapace oval in shape, greatest width at middle. In side view carapace highest at middle, left valve much higher than right. Anterior end rounded on both valves. Dorsal and ventral margins convex.

Postero-dorsal margin more or less straight, meeting dorsal margin in an angle to form posterior cardinal angle. Posterior end rounded, but has somewhat angular appearance.

Surface of valve finely punctate, eye depression slightly developed.

Inner lamella relatively broad, inner margin and line of concrescence coinciding. Selvage only weakly developed, but forms wide selvage lip on both valves. Radial pore canals simple, straight, about 10 on anterior margin. Often fine septae ornament inner part of inner lamella.



TEXT-FIG. 6. Hinge structures in species of *Amphicythere* Triebel. *a*, *A. confundens* Oertli. *b*, same, dorsal view. *c*, *A. pennyi* sp. nov. *d*, same, dorsal view. *e*, *A. sphaerulata* sp. nov. *f*, same, dorsal view.

Hinge very unusual paramphidont type. Right valve anterior element is bipartite ridge with 3 small teeth and 1 large one. Ridge probably more accurately described as lobate than dentate. Antero-median element is large, deep, circular pit, continuing in median element, a smooth groove. Posterior element is dentate ridge with 4 triangular denticles. In left valve anterior element is elongate, oval-shaped socket with 3 to 4 loculi, posterior part of socket a separate deep pit. Antero-median element is high, bilobate boss and its continuation is smooth wide median bar. Posterior element is loculate socket. This description does not accord with any accepted hinge types; it is perhaps a transitional form between schizodont and paramphidont.

Muscle scar pattern usual oblique row of 4 scars with 1 anterior scar. Presence of second anterior scar doubtful. Sexual dimorphism pronounced, males more elliptical, less high, longer than females.

Remarks. A. sphaerulata is easily distinguished from all other species of *Amphicythere* by its elliptical shape and extremely robust hinge.

Genus MACRODENTINA Martin 1940

Macrodentina (*Macrodentina*) *cicatricosa* Malz 1958

Plate 30, figs. 11–19

1958*b* *Macrodentina* (*M.*) *cicatricosa* Malz, pp. 17–18, pl. 5, figs. 70–75.

Material. 826 valves and carapaces. HU 2.J.29.1–826.

Dimensions (*mm.*).	*L*	*H*	*W*	*M*/*a*
♀ Left valve	0·62–0·69	0·41–0·43	0·18–0·20	0·06
♀ Right valve	0·62–0·66	0·39–0·41	0·17–0·19	0·06
♂ Left valve	0·80	0·44	0·19	0·06
♂ Right valve	0·80	0·41	0·19	0·06
Juvenile forms (left valves)				
Instar 8	0·51–0·58	0·30–0·39		
,, 7	0·42–0·49	0·26–0·32		
,, 6	0·34–0·40	0·20–0·25		
,, 5	0·28	0·18		

Occurrence. Baylei and Cymodoce Zones, P. 1, RC. 1–3.

Diagnosis. Relatively small species of *Macrodentina* s. str. with straight and sloping dorsal margin. Posterior end pointed. Two ventral longitudinal ribs not very conspicuous, in dorsal view not visible at all. Central vertical rib broadens out suddenly at centre of valve into knob-like bulge. Sexual dimorphism very pronounced.

Macrodentina (*Macrodentina*) *maculata* Malz 1957

Plate 31, figs. 12–16, 19

1953 *Macrodentina retirugata* Martin; Steghaus, p. 41.
1957 *Macrodentina* cf. *retirugata* Martin; Martin and Weiler, pp. 126–8.
1957 *Macrodentina maculata* Malz, p. 250.
1957 *Macrodentina maculata* Malz; Malz, p. 218, pl. 1, fig. 2.
1958*b* *Macrodentina* (*M.*) *maculata* Malz; Malz, p. 25, pl. 8, figs. 10–20.

Material. 103 valves and carapaces. HU 2.J.31.1–102, HU 2.J.32.1.

Dimensions (*mm.*).	*L*	*H*	*W*	*M*/*a*
♀ Left valve	0·55	0·32	0·14	0·07
♀ Right valve	0·55	0·28	0·14	0·07
♂ Left valve	0·63	0·32	0·15	0·06
♂ Right valve	0·63	0·28	0·15	0·06

Occurrence. Mutabilis Zone, RM. 9.

Diagnosis. Oblong-shaped form with rounded posterior end. Surface ornamentation strongly reticulate, irregular, with sharp bars separating pits. Sexual dimorphism strong.

Remarks. The specimens from Dorset exhibit a hinge structure which is much closer to hemimerodont than paramphidont and on this basis the species should be included in the subgenus *Polydentina*. In all other respects, however, there is complete agreement between the Dorset specimens and Malz's material, except in size, the former being

about 12% shorter. On this basis the Dorset specimens are considered as juvenile forms probably belonging to the pre-adult instar, and this explains the more hemimerodont nature of the hinge. Malz (1956, 1958*b*) demonstrated that in the ontogeny of *Macrodentina* (*M.*) the juvenile instars have a hemimerodont hinge.

Macrodentina (*M.*) sp. 1

Plate 30, figs. 9, 10

Material. 6 valves. HU 2.J.30.1–6.

Dimensions (*mm.*).	*L*	*H*	*W*	*M*/*a*
Left valve	0·62	0·38	0·17	0·07
Right valve	0·60	0·34	0·17	0·07

Occurrence. Mutabilis Zone, RM. 9.

Diagnosis. Carapace elongate-trapezoid. Surface rather regularly reticulate. Vertical ribs less prominent than in other species.

Description. Shape of valve similar to that of *M.* (*M.*) *cicatricosa* Malz 1958, but more elongated. Main difference is in surface ornamentation. Vertical ribs less prominent; on lateral side longitudinal ribs developed, producing net-like pattern.

Hinge like that of *M.* (*M.*) *cicatricosa*, although antero-median element of right valve more like a pessular tooth.

Subgenus POLYDENTINA Malz 1958
Macrodentina (*Polydentina*) *proclivis proclivis* Malz 1958

Plate 31, figs. 6–11, 17, 18

1958*b* *Macrodentina* (*Polydentina*) *proclivis* Malz, p. 33, pl. 5, figs. 76–80.

Material. 40 valves and carapaces. HU 2.J.1.29, HU 3.J.27.1–39, HU 2.5.32.1.

Dimensions (*mm.*).	*L*	*H*	*W*	*M*/*a*
♀ Left valve	0·52–0·59	0·35	0·16	0·04
♀ Right valve	0·52–0·57	0·33	0·14	0·03
♂ Left valve	0·59	0·31	0·11	0·04
♂ Right valve	0·60	0·31	0·11	0·04

Occurrence. Pseudomutabilis Zone, AU. II.

Diagnosis. Small species of *Macrodentina* (*Polydentina*) with pointed posterior end. Surface almost uniformly pitted, vertical or longitudinal ridges inconspicuous.

Remarks. Malz (1958*b*) described *M.* (*P.*) *proclivis proclivis* from the Cymodoce Zone of the Black Head section. This discrepancy may be attributed to the frequent landslips in this area which make sampling very difficult at times.

Macrodentina (*Polydentina*) *proclivis striata* subsp. nov.

Plate 30, figs. 20–27

Holotype. A female left valve. HU 2.J.1.36.

Paratypes. 62 valves. HU 2.J.30.1–62.

Type locality and horizon. Black Head, Dorset. Pseudomutabilis Zone, Lower Kimmeridgian.

Dimensions (*mm.*).	*L*	*H*	*W*	*M*/*a*
♀ Left valve (holotype)	0·56	0·36	0·15	0·05
♀ Right valve	0·56	0·32	0·15	0·05
♂ Left valve	0·59	0·32	0·14	0·05
♂ Right valve	0·58	0·30	0·14	0·05

Occurrence. Pseudomutabilis Zone, AU. IV.

Diagnosis. Subspecies of *Macrodentina* (*Polydentina*) *proclivis* having same outline and internal characteristics but different surface ornamentation. Vertical and ventral longitudinal ribs well developed and together with pitting give reticulate appearance to valve. Weak sexual dimorphism.

Description. Shape and internal characteristics as for *Macrodentina* (*P.*) *proclivis proclivis*. Surface strongly reticulate with well developed vertical ribs radiating from antero-dorsal part of valve. Slight broadening on central rib, which branches out into 2 separate ribs under the broadening. On lateral part of valve longitudinal ribs fairly well developed, combination of two rib systems producing square-shaped pits, most conspicuous on central part of valve. On ventral part of valve about 6 strongly developed longitudinal ridges present; second from dorsal side strongest, giving the ventral 'edge' of valve in dorsal view. Between first and second ribs (counting dorsally), still some trace of vertical ribs and so pits appear, but remainder of ventral ribs run on completely smooth surface.

Macrodentina (*Polydentina*) *parvapunctata* sp. nov.

Plate 31, figs. 1–5

Holotype. A left valve. HU 2.J.1.30.

Paratypes. 13 valves. HU 3.J.28.1–13.

Type locality and horizon. Black Head, Dorset. Mutabilis Zone, Lower Kimmeridgian.

Dimensions (*mm.*).	*L*	*H*	*W*	*M*/*a*
Holotype	0·77	0·44	0·20	0·06
Left valve	0·74	0·45	0·20	0·06
Right valve	0·72	0·40	0·19	0·06

Occurrence. Mutabilis Zone, RM. 5, 6.

Diagnosis. Elongate carapace, strongly tapering towards posterior. Tapering much more conspicuous in right valve, consequently valves differ strongly in shape. Surface of valve has ornament of sparsely spaced pits. Sexual dimorphism not apparent.

Description. Carapace elongated, strongly tapering towards posterior end. Left valve larger than right, overlapping it mainly along ventral margin. Dorsal margin straight in both valves, posterior end of left valve blunt, that of right valve strongly pointed. In side view ventral edge of valve overhangs ventral margin. Valve highest at anterior cardinal angle, about one quarter of length from anterior end.

In dorsal view carapace elliptical, greatest width at middle. Flat carina developed on both ends, especially anterior. Surface of valve has ornament of more or less rounded pits, on lateral parts only, ventral part of valve smooth. Pits arranged in vertical rows, ribs between rows absent or only very weakly developed.

Inner margin and line of concrescence coincide, inner lamella broad. Selvage strong,

wide. Radial pore canals not discernible. Hinge robust, typically hemimerodont. Right valve terminal elements carry 6 very strongly developed denticles, median element is smooth, narrow groove. Corresponding structure in left valve consists of 2 terminal sockets and smooth, straight median bar. In side view bar equally high at both ends.

Family Uncertain

Genus EXOPHTHALMOCYTHERE Triebel 1938

Exophthalmocythere fuhrbergensis Steghaus 1951

Plate 28, figs. 12, 13

1951 *Exophthalmocythere fuhrbergensis* Steghaus, p. 220, pl. 15, figs. 46–48.
1955 *Exophthalmocythere fuhrbergensis* Steghaus; Schmidt, p. 59.
1955 *Exophthalmocythere tricornis* Ljubimova, p. 87, pl. 10, figs. 2*a*, *b*.
1957 *Exophthalmocythere fuhrbergensis* Steghaus; Oertli, pp. 662–3, pl. 3, figs. 98–100.
1958 *Exophthalmocythere fuhrbergensis* Steghaus; Malz (1958*b*), pp. 39–40, pl. 11, figs. 70*a*, *b*.
1964 *Exophthalmocythere fuhrbergensis* Steghaus; Glasshof, p. 48.

Material. 17 valves and carapaces. HU 2.J.19.1–17.

Dimensions (*mm.*).

	L	*H*
♀ Left valve	0·75	0·40
♀ Right valve	0·77	0·38
♂ Left valve	0·78	0·41
♂ Right valve	0·77	0·44

Occurrence. Mutabilis Zone, RM. 6, 9.

Diagnosis. Species of *Exophthalmocythere* with 4 tubercles, 2 of them near dorsal margin (anterior one the eye tubercle), 2 others near ventral margin. Occasionally 1 more tubercle appears centrally. Sexual dimorphism may occur.

Remarks. Steghaus's and Oertli's figures correspond with the young specimens from Dorset and it is very likely that all specimens of these authors are young moults. *Exophthalmocythere tricornis* (Ljubimova 1955), from the Lower Volgian of the Ural region, corresponds in every respect with *E. fuhrbergensis* Steghaus 1955. The fifth tubercle, not mentioned by either of the above authors, may be found only on adult carapaces. Sexual dimorphism is not mentioned by Steghaus, but in the Dorset material it seems fairly convincing.

Indet. gen. B. sp. 1

Plate 31, fig. 34

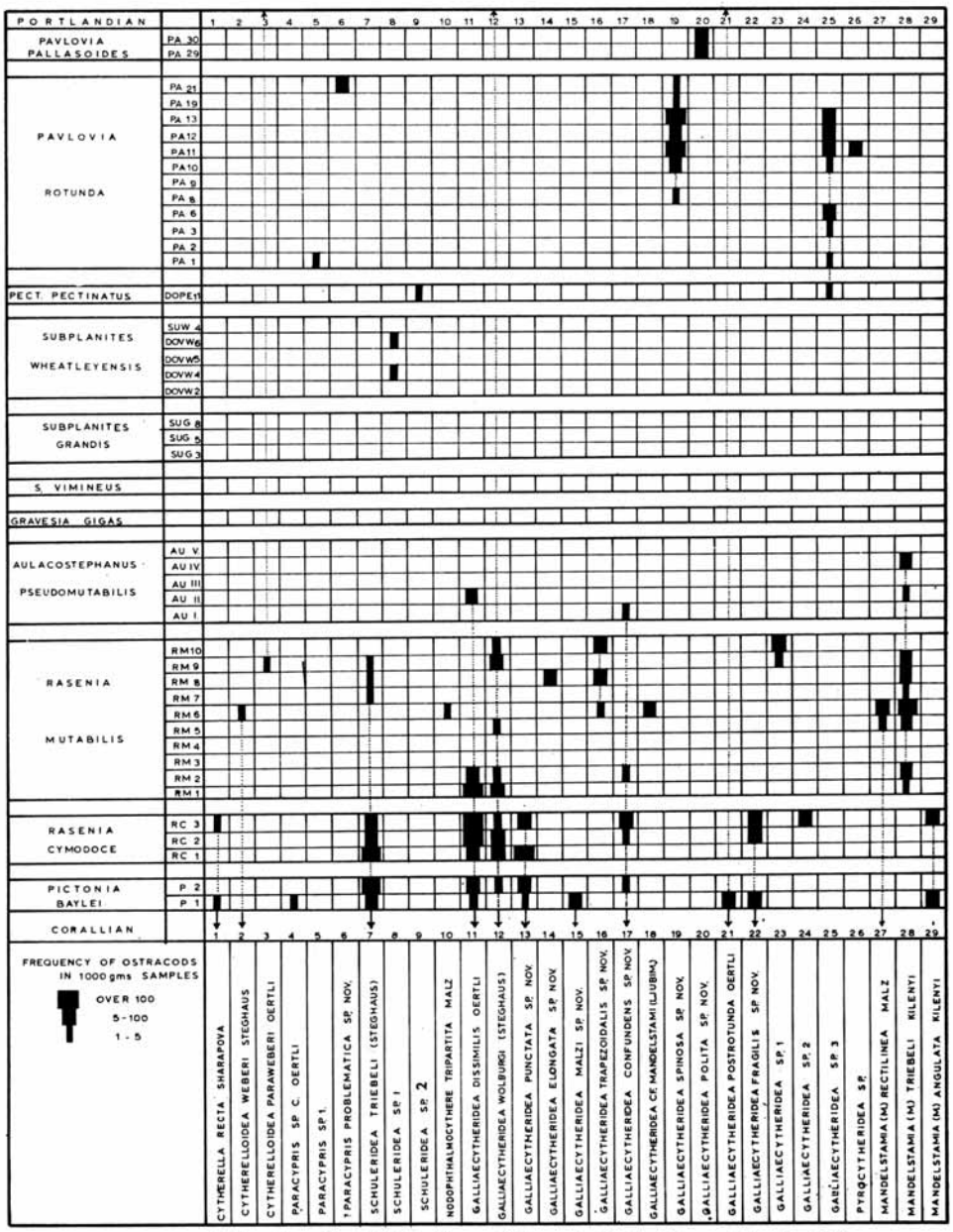
Material. 1 (?)left valve. HU 2.J.35.1.

Dimensions (*mm.*). *L*: 0·60; *H*: 0·23; *W*: 0·11.

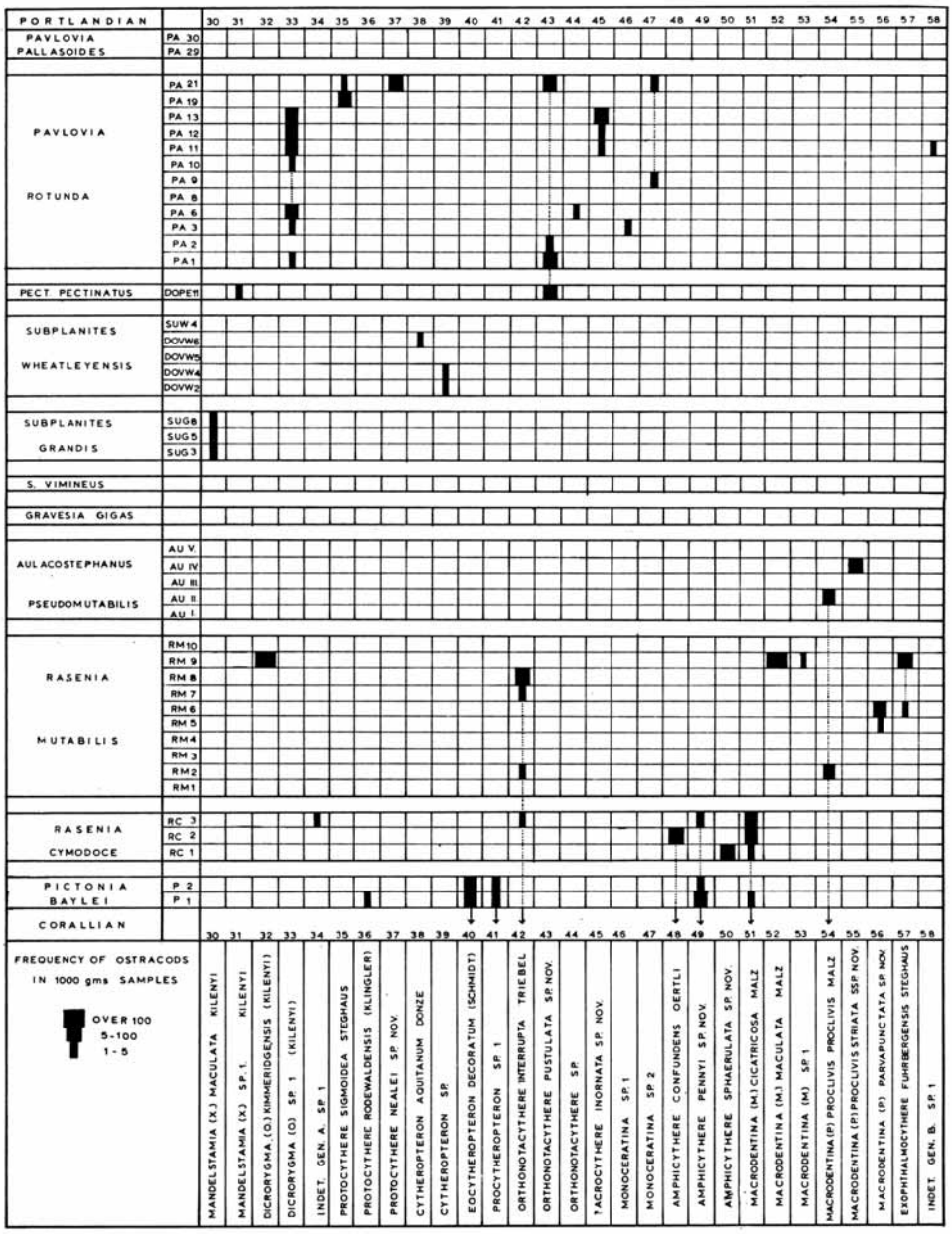
Occurrence. Rotunda Zone, PA. 11.

Description. Left valve (?) very elongated, javelin-shaped. Dorsal margin straight, anterior end rounded. Ventral margin convex, drawn out posterior end pointing downwards. Greatest height just posterior of middle. Surface of valve smooth.

Inner lamella broad, line of concrescence and inner margin do not appear to coincide anteriorly. Radial pore canals straight, probably quite numerous. Contact margin narrow, no hinge structure observed.



TEXT-FIG. 7. Stratigraphical distribution of Ostracoda in the Kimmeridge Clay (1).



TEXT-FIG. 8. Stratigraphical distribution of Ostracoda in the Kimmeridge Clay (2).

Remarks. As no hinge or muscle scars were observable the taxonomic position is unknown and the orientation of the valve is doubtful.

STRATIGRAPHICAL DISTRIBUTION

Many of the Upper Jurassic marine ostracod species are long ranging forms, and only a limited number of species have vertical ranges comparable with those of ammonites. Some of these long ranging forms occur intermittently, giving the impression of zonal significance if only a limited vertical range is explored. For example, *Galliaecytheridea postrotunda* appears to be restricted to the Baylei Zone of the Lower Kimmeridge Clay, yet it has been found by Whatley (1965) in the Plicatilis and Pseudocordata Zones, and by Barker (1966*a*) in the Portland Sand. Since ecological factors play an important part in the distribution of the benthonic ostracods the vertical range of a species does not necessarily coincide with its life span.

The distribution of ostracods in the Kimmeridge Clay of Dorset is very uneven; most of the species described were found in the Lower Kimmeridge Clay of the Black Head section, where the Baylei, Cymodoce, and Mutabilis Zones are especially rich in ostracods. The Pseudomutabilis, Grandis, Gigas, Vimineus, and Wheatleyensis Zones of the type section (Kimmeridge Bay to Chapman's Pool) are almost completely barren of ostracods, although this is largely due to the lithology of the rocks (paper and hard shales). The Pectinatus and Rotunda Zones contain ostracods in large numbers, a completely new assemblage, far less rich in both individuals and species than the fauna of the Lower Kimmeridge Clay.

TABLE 1

(Data from Whatley (1965) and Barker (1966*a*, *b*).)

	Callovian	*L. Oxfordian*	*U. Oxfordian*	*L. Kimmeridgian*	*U. Kimmeridgian*	*Portland Sand*	*Portland Stone*
Total number of species		18	67	36		11	9
Number of typically L. Kimmeridgian species	0	1	15	35	0	3	0
Number of typically U. Kimmeridgian species	1	0	2	1	21	0	0

Of the 21 genera found in the Dorset Kimmeridge Clay 16 occur in the Dorset Oxfordian as well (Whatley 1965) but only 7 continue into the Portlandian (Barker 1966*a*, *b*). A very close relationship exists between the fauna of the Upper Oxfordian (Corallian) and the Lower Kimmeridgian, as illustrated by Table 1.

The following conclusions can be drawn from Table 1:

1. From their maximum in the Upper Oxfordian there is a marked and progressive reduction in the number of ostracod species towards the end of the Jurassic. This decline is further accentuated by the establishment of fresh–brackish water conditions in the Purbeck.

2. The base of the Kimmeridgian is not very distinctly reflected in changes in the ostracod faunas. The most conspicuous feature is the extinction of *Lophocythere*, an

extremely prolific genus in the Callovian and Oxfordian. Only two genera make their first appearance in the Lower Kimmeridgian: *Exophthalmocythere* and *Nodophthalmocythere*.

3. Two major faunal breaks exist within the Kimmeridge Clay. The first occurs between the Lower and Upper divisions, which have 36 and 21 species respectively, and only 1 species common to both. This sharp difference between Lower and Upper Kimmeridgian faunas is accentuated by the intervening ostracod-barren beds. The second faunal break is between the Upper Kimmeridgian and the Portlandian.

Stratigraphically important species

(*a*) Species restricted to one ammonite Zone

Paracypris sp. C. Oertli	Baylei
Amphicythere sphaerulata sp. nov.	Cymodoce
Exophthalmocythere fuhrbergensis Steghaus	Mutabilis
Macrodentina (*M.*) *parvapunctata* sp. nov.	,,
Macrodentina (*M.*) *maculata* Malz	,,
Galliaecytheridea cf. *mandelstami* (Ljubimova)	,,
Galliaecytheridea trapezoidalis sp. nov.	,,
Galliaecytheridea elongata sp. nov.	,,
Nodophthalmocythere tripartita Malz	,,
Mandelstamia (*X.*) *maculata* Kilenyi	Grandis
? *Paracypris problematica* sp. nov.	Rotunda
Galliaecytheridea spinosa sp. nov.	,,
Protocythere nealei sp. nov.	,,
? *Acrocythere inornata* sp. nov.	,,
Galliaecytheridea polita sp. nov.	Pallasoides

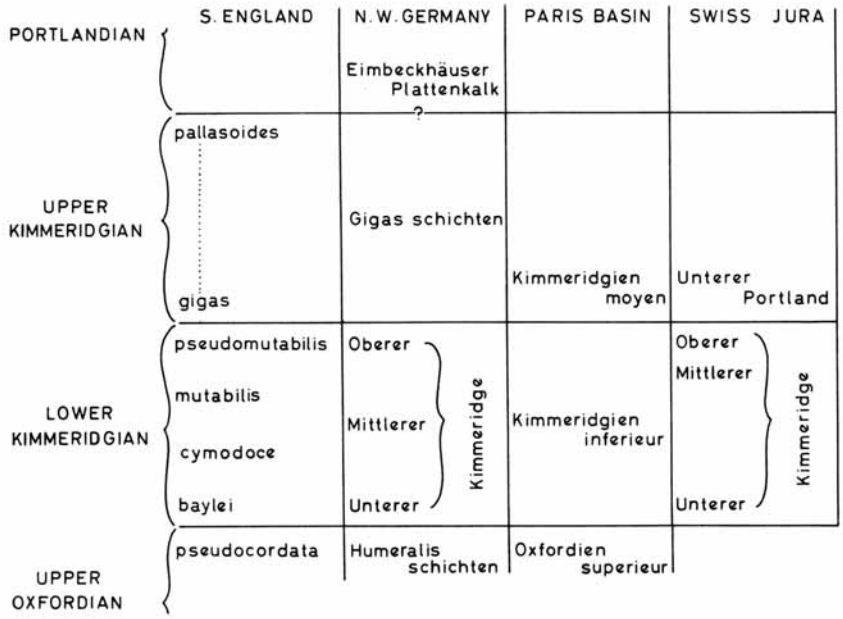
(*b*) Species with restricted vertical range

Cytherella recta Sharapova	Baylei–Cymodoce
Cytherelloidea weberi Steghaus	Plicatilis–Mutabilis
Galliaecytheridea dissimilis Oertli	Cautisnigrae–Pseudomutabilis
Galliaecytheridea punctata sp. nov.	Pseudocordata–Cymodoce
Galliaecytheridea malzi sp. nov.	Plicatilis–Baylei
Galliaecytheridea confundens sp. nov.	Pseudocordata–Pseudomutabilis
Galliaecytheridea fragilis sp. nov.	Pseudocordata–Cymodoce
Mandelstamia (*M.*) *rectilinea* Malz	Cautisnigrae–Mutabilis
Mandelstamia (*M.*) *triebeli* Kilenyi	Cautisnigrae–Pseudomutabilis
Mandelstamia (*M.*) *angulata* Kilenyi	Cordatum–Cymodoce
Dicrorygma (*O.*) *kimmeridgensis* (Kilenyi)	Cautisnigrae–Mutabilis
Protocythere rodewaldensis (Klingler)	Pseudocordata–Baylei
Eocytheropteron decoratum (Schmidt)	Cautisnigrae–Baylei
Orthonotacythere interrupta Triebel	Plicatilis–Mutabilis
Orthonotacythere pustulata sp. nov.	Pectinatus–Rotunda
Amphicythere confundens Oertli	Cautisnigrae–Cymodoce
Amphicythere pennyi sp. nov.	Pseudocordata–Cymodoce
Macrodentina (*M.*) *cicatricosa* Malz	Cautisnigrae–Cymodoce
Macrodentina (*P.*) *proclivis proclivis* Malz	Plicatilis–Pseudomutabilis

(*c*) Long ranging species

Galliaecytheridea wolburgi (Steghaus)	Corallian–Portlandian
Galliaecytheridea postrotunda Oertli	,, ,,
Protocythere sigmoidea Steghaus	Corallian–U. Kimmeridgian
Cytheropteron aquitanum Donze	Callovian–U. Kimmeridgian

The ostracod fauna of the Lower Kimmeridge Clay shows a close affinity to faunas described from the equivalent beds of the Paris basin (Oertli 1957) (12 species common to both localities), NW. Germany (Steghaus 1951; Schmidt 1954, 1955; Klingler, Malz, and Martin 1962) (9 species). A lesser degree of similarity is found to faunas of the Swiss Jura (Oertli 1959) (8 species) and the Ile d'Oleron, SW. France (Donze 1960)



TEXT-FIG. 9. The correlation of the Upper Jurassic in western Europe (after Arkell 1956 and Oertli 1957).

(2 species). In spite of this close similarity of Lower Kimmeridgian ostracod faunas in western Europe only a few species show more or less identical and restricted vertical ranges and are thus useful zonal fossils. The author considers the following species to belong to this category:

1. *Exophthalmocythere fuhrbergensis* Steghaus occurs in Dorset in the higher Mutabilis Zone, in the Paris basin in the 'middle part of the Lower Kimmeridgian', and in NW. Germany in the 'Middle Kimmeridgian' (text-fig. 9). In all the localities the vertical range is very short and identical.

2. *Cytherelloidea weberi* Steghaus is a widespread species, occurring in all the five above-mentioned localities. It marks the Lower Kimmeridgian up to and including the Mutabilis Zone in Europe, whereas in Dorset it extends down to the Plicatilis Zone.

3. *Eocytheropteron decoratum* (Schmidt). In Dorset it ranges from the Plicatilis to the Baylei Zone, in NW. Germany and the Paris basin it is confined to the Lower and Middle

Kimmeridgian (in the continental sense), and in the Swiss Jura its range extends into the Lower 'Portlandian' (? Gigas Zone).

4. *Protocythere rodewaldensis* (Klingler) characterizes the basal Kimmeridgian in NW. Germany, the Paris basin, and in the Swiss Juras. In Dorset it is confined to the Corallian–Kimmeridgian border (Pseudocordata–Baylei).

5. *Galliaecytheridea dissimilis* Oertli is characteristic of the Upper Corallian (Pseudocordata Zone) and the whole of the Lower Kimmeridgian in Dorset and in the Paris basin.

6. *Amphicythere confundens* Oertli ranges from the Cautisnigrae to the Cymodoce Zone in Dorset, with similar ranges in NW. Germany and in the Paris basin.

One constant feature appears in the comparison of the vertical ranges of these ostracod species, namely the somewhat earlier appearance of each of these in England compared with the continent, which suggests an easterly migration direction.

EVOLUTIONARY TRENDS

Most Mesozoic marine ostracods evolve at comparatively slow rates and successive lineages can rarely be established. Some trends are, however, discernible in the Kimmeridge Clay faunas. A common tendency, not confined to the Kimmeridgian, is seen in the evolution of the hinge structure, which tends to become progressively more complex. This is clearly shown in *Mandelstamia* (text-fig. 4). In the Corallian–Lower Kimmeridgian the hinge is a simple lophodont type with undifferentiated terminal elements. The Upper Kimmeridgian *Mandelstamia* (*Xeromandelstamia*) shows a more complex hinge; first the terminal elements divide into 3 or 4 denticles and later the ends of the median element tend to broaden and deepen, the hinge now approaching the paramphidont type. The same tendency towards more complex hinges appears in *Protocythere*. Upper Jurassic species of this genus have either smooth or finely denticulate/loculate median elements whereas in Cretaceous species the median element is always coarsely denticulate.

In *Galliaecytheridea* a definite trend towards the development of a caudal process can be detected. In early species (up to the Baylei Zone) there is no sign of a caudal process (e.g. *G. dissimilis*). In the Mutabilis and Pseudomutabilis Zones a slight elongation of the posterior end is evident (*G. trapezoidalis*). In *G. spinosa* (Rotunda Zone) a caudal process is present, and the Portlandian *G. credonensis* Barker exhibits a well drawn out caudal process.

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