A MONOGRAPH

OF THE

TERTIARY ENTOMOSTRACA

OF

ENGLAND.

BY

T. RUPERT JONES, F.G.S.

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INTRODUCTION.

The Tertiary Entomostraca of Britain have hitherto received but little notice. In my 'Monograph of the Cretaceous Entomostraca,' 1849, published by the Palæontographical Society, I referred to the occurrence of some of the Cretaceous species in our Tertiary deposits.[1] Dr. Reuss, about the same time, figured and described two forms which he had received from the Barton Clay of Hampshire; and I have since described a few species from Woolwich and Colwell.[2] Several of the Post-tertiary fresh-water Entomostraca, however, have been noticed by me, in 1850, in the 'Annals of Natural History.' To these latter species I have now to add two others; and of the Tertiary Entomostraca I am enabled, from my own collection and with the aid of my friends, to enumerate 50 species; altogether amounting to 58 species. Of these, 30 (including three described by me in the 'Memoirs of the Geological Survey' whilst preparing this Monograph) are new.

The Post-tertiary species are included in this Monograph for the sake of convenience, and to render the subject as perfect as circumstances will permit. The recent forms which have become fossilized in the Post-tertiary deposits, either of fresh-water, estuarine, or marine origin, not only complete the geological series up to the present day, but are of considerable value in assisting us in the identification of some carapace-remains, otherwise obscure in their relations. The list of these later species of Ostracoda may be also regarded as a not uninteresting addition to the valuable *résumé* of the Molluscan fauna of the Post-tertiary and Pleistocene eras, with which Mr. S. V. Wood has enriched his elaborate and valuable 'Monograph on the Mollusca of the Crag.'

[1] In a few instances the determination of the species or of the deposits has since appeared to me to be unsatisfactory: the localities, therefore, given in the present Monograph are to be considered as corrected in such cases.

[2] With respect to the Colwell species which were inadvertently quoted as from Woolwich, see further on, p. 26.

With regard to the sources from whence I have derived the materials for the present Monograph, I have first to acknowledge the value of Mr. S. V. Wood's extensive series of Entomostraca from the Crag of Suffolk (chiefly from Sutton), which he most liberally confided to my care for description.

Mr. F. Edwards also kindly placed his numerous specimens from Barton, High Cliff, Colwell, and Bracklesham in my hands; Mr. H. C. Sorby supplied the Bridlington specimens; and I have the pleasure of noticing in the Monograph my debts to Mr. Brown, Mr. Pickering, Mr. Harris, Mr. Wetherell, Mr. Parker, Mr. Prestwich, and other friends for like assistance.

The London Clay specimens were chiefly collected by Mr. J. Purdue from the Copenhagen Fields.

To Mr. Morris and Mr. Salter I am especially obliged for the opportunity of examining an extensive series of "Cypris-shales" from the Hempstead and the Osborne Series of the Isle of Wight, chiefly collected by the officers of the Geological Survey, and some by Mr. Morris himself. Previously I possessed but a limited supply of these shales; but the new materials, though too late for illustration in the plates of this Monograph, enabled me to determine one additional species, and to add to my descriptions of some others.

The specimens at my command from several of the localities referred to in the Monograph represent tolerably well the Entomostracan fauna of the deposits yielding them. The following may be considered as more or less fully illustrated, viz. the Newbury peat-beds (indifferently), the Cambridgeshire peat-marl, the Copford fresh-water deposits (indifferently), the Pleistocene beds at Grays, Clacton (indifferently), and Wear Farm, the Crag of Sutton, the Upper Eocene shales of Hempstead Cliff, the Middle Eocene beds at Colwell, Barton, and Bracklesham, and the London Clay at Copenhagen Fields.

The distribution of the Tertiary Ostracoda and their proportional occurrence are generally indicated in the text; but the synoptical tables of the distribution and relative abundance of the species, given in the Appendix (Tables I, II, III), will, it is hoped, materially assist the student and collector in this respect.

Frequently a deposit has been too imperfectly worked for a sufficiently good result for the purposes of comparison to have been obtained,—such as at Edwardstone, Alum Bay, East Woodhay, &c. Still the Post-tertiary era and each of the divisions of the Tertiary formation are perhaps, as far as the South East of England is concerned, fully represented by the combined product of the several localities where the different deposits have been met with.

In indicating the geological series to which the several deposits both in England and on the Continent belong, I have chiefly followed the valuable Table at p. 105, of Lyell's 'Manual of Elementary Geology,' 5th edition.

M. Bosquet's elaborate Table[1] of the distribution of the French and Belgian species refers to the Upper, Middle, and Lower Tertiaries of those countries respectively; but, as the "Lower Tertiaries" therein indicated do not necessarily include the *Lower Eocene*, which is but sparingly exhibited in France, it has been requisite, for the sake of comparison, to work out the serial position of the several deposits in which the species of Ostracoda found in England occur also on the Continent; and the result is given in Table IV in the Appendix.

Tables V and VI in the Appendix will assist the reader in remembering the relations of the English and the Continental Tertiary deposits. Table VI comprises some of the latest corrections introduced by Mr. Prestwich, to whom geologists are greatly indebted for important information on the correlation of the Tertiaries of England, France, and Belgium.

I have prefaced the descriptive portion of the Monograph with as complete a general notice of the zoological characters of the animals whose carapaces are under consideration, as the means and time at my disposal have allowed me to do. I regret that the minute anatomical research is almost denied to me now by impaired eyesight; nor have I been enabled, for the same reason, to fully examine the "lucid spots" in the carapaces, as I once intended.

In a zoological point of view, the species about to be described offer us some interesting peculiarities in the structure of the carapaces and in their hingement and ornamentation. Geologically, it is interesting to observe that considerable uniformity in the distribution of certain species, and of groups of closely allied species, obtain in England and the neighbouring European districts. Several forms belong exclusively to the Middle Eocene, and some are confined to the Lower Eocene, or to other stratigraphical series. On the contrary, some species belong to several deposits of different ages, and of wide geographical range,—such as *Cythere* (*Cytheridea*) *Mulleri* and *C.* (*Bairdia*) *subdeltoidea*, which latter is found from the Cretaceous to the recent period.

I sincerely thank Mr. George West for the beautiful illustrations he has produced of these remains;—often obscure and always minute, they have taxed his skill and patience; and I owe him much, too, in the elucidation of many points of structure which would have been indifferently noticed had he not, with the eye of a naturalist and geologist, worked out obscure characters at the expense of much time and labour.

In figuring the specimens I have placed the carapaces and single valves with the anterior end upwards; this being the most convenient, when carapace-remains only have to be represented. It has therefore to be borne in mind that the upper and lower borders of the carapace-valves are right and left in the figures.

[1] 'Descript. Entom. Terr. Tert.,' p. 134, &c.

The natural position of the carapace and animal, when alive, is shown in the woodcuts 1 and 2, at p. 16.

M. Reuss's plan of placing the anterior end downwards is rather confusing; more especially since others follow a different plan.

In the Plates the species are arranged, with some few exceptions,[1] in stratigraphical order; so that the general *facies* of each geological group is represented with tolerable clearness.

November, 1856.

[1] Especially of the Woolwich Series.

CONTENTS.

ERRATA.

Page 5, line 2 from bottom, *for* cleanse *read* cleansed.

Page 15, line 3 from top, *for* 13—17 *read* 13, 14, 17.

Page 17, line 16 from top, *for* Candona lucens *read* Candona candida.

Page 30, line 18 from top, *for* Pleistocene *read* Pliocene.

Page 33, line 5 from top, *for* laticostata *read* Laticosta.

Page 47, line 10 from bottom, *for* Pleistocene *read* Pliocene.

Page 49, line 7 from bottom, *for* Upper Eocene *read* Middle Eocene.

Page 50, line 2 from top, and line 10 from bottom, *for* Upper Eocene *read* Middle Eocene.

Page 51, line 3 from top, *for* Upper Eocene Lands *read* Middle Eocene Sands.

Page 58, in the last column but one, and towards the lower right-hand corner of the table, some lines of letters have slipped from their places: their right position is thus—

M. E.	M. E.
Plioc.	M. E.
Plioc.	
Plioc.	
Plioc.	
Plioc.	
L. E.	
M. E.	U. E.? & M. E.
Plioc.	U. E. & M. E.
M. E.	M. E.
L. E.	

ADDITIONAL ERRATA.

In Tables II and III, "Colwell Bay" should be tabulated as UPPER EOCENE. The numerical results given at the foot of Table III will consequently be—

Upper Eocene	..	1	..	3	1	3	4	..	1	12
Middle Eocene	..	..	..	8	2	2	1	2	2	17

At pages 26, 33, 34, and 39, the Colwell Bay Sands, &c. have been wrongly termed *Middle* Eocene. At page 49, near the bottom of page 50, and at page 51, they are correctly referred to as *Upper* Eocene.

Besides the accidental shifting of the letters at the bottom of the nineteenth column in Table II, p. 58, the letters in that column opposite to species 18 and 19 have also dropped too low.

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In the introductory portion of my 'Monograph of the Entomostraca of the Cretaceous Formation of England,' published by the Palæontographical Society, 1849, and also in my Notes on the Permian Entomostraca, at p. 58 of Professor King's Monograph, of the same date, I offered some general remarks on fossil and recent Entomostraca, and supplied numerous references to earlier observers who had written on the subject.[1]

I need not repeat what is there stated. Since 1849 some highly important works on the recent Entomostraca by Baird, Dana, Liljeborg, Zenker, Fischer, &c., have appeared;[2] and numerous valuable papers, illustrative of the fossil forms, have been published by foreign Academies and Institutions. Amongst these palæontographical works, the two Memoirs by M. J. Bosquet, of Maestricht, on Tertiary and Cretaceous Entomostraca, are pre-eminent; and, at the same time, Dr. A. E. Reuss, of Prague, has indefatigably produced several valuable and highly illustrated Memoirs, some of considerable extent, on similar fossils.

I do not propose to enter into a critical examination of the Tertiary species described by these and other contemporary authors, for the figures published by some of these writers are, either from their indefiniteness or the want of the illustration of details, of little use, even with the aid of the descriptions given, in satisfactorily determining the differences or the specific identity of specimens;[3] and I greatly regret that I trusted too much to the illustrations of former authors, when I was comparing

[1] See also Bibliographical List, 'Monog. Ent. Cret.,' p. 38. [2] See Bibliographical List, Appendix.

[3] Owing to the kindness of M. Bosquet, however, who has furnished me with a series of the Cretaceous and Tertiary Entomostraca of Belgium and France, I have been enabled to compare many of the forms described in this Monograph with their European congeners.

the English with the foreign Cretaceous Entomostraca. With regard to the generic arrangements adopted in the palæontographical works referred to, I shall only observe that, for the most part, the fossil carapace-valves have been studied and arranged with but an indifferent knowledge of the relations of the carapace and animal. Hence, as soon as the misapplication of the generic term "Cypridina" to the *Cytherinæ* was corrected, the sub-generic divisions of *Bairdia*, *Cytherella*, &c., were erected into independent genera on account of difference of carapace-structure; a reason which does not appear to me to be substantial, but requires other accompanying differences of organization in the animal to render it good for generic distinctions. As far as we yet know, the animal of *Bairdia* resembles that of *Cythere* proper, and so does that of *Cytheridea*, judging from Dana's figure of *Cythere Americana*[1] and Zenker's figure of *C. viridis*.[2] The animals with the other forms of carapace (*Cythereis*, *Cytherella*, &c.), although they exist, have not yet been met with alive.

If future investigations in the *Cytherinæ* by such close observers as Zenker and Liljeborg should determine the existence of differences in internal organization (as these authors already have in the *Cyprinæ*) among animals which differ but slightly in the character and arrangement of the masticatory and locomotive limbs, the division of *Cythere* into genera will become necessary; but at present, with carapaces only before us, however these may differ among themselves, I think we had better keep the genus intact, and regard the subordinate forms of carapace (which often pass insensibly from one to another) as indicating only sub-genera or artificial divisions, convenient in the studies of zoologists and palæontologists.

By pointing out, in my former Monograph, how frequently one and the same form of carapace among the *Ostracoda* was represented in different eras—in strata greatly differing in age, or in recent seas as well as even sometimes in palæozoic deposits—I have so much astonished some Continental palæontologists (who have found it necessary to point out that I have mixed together what they regard as "incongruities," both geological and palæontological),[3] that I shall abstain from troubling myself with enumerating all the close resemblances of form, and limit myself to the most obvious, assuring my readers that these incongruities do exist, and that very similar forms of carapace, both in the *Ostracoda* and in other *Entomostraca*, occur throughout nearly all epochs; although each geologic division of time has nevertheless had its peculiar *facies* as regards the Entomostraca, as it has had of other groups of animal existences.

[1] Dana's 'Crustacea,' pl. 89, fig. 9.

[2] 'Archiv f. Nat.,' 1854, t. 4, fig. 10, &c.

[3] Pictet 'Traité de Paléontologie,' 2d edit., vol. ii, p. 532; Reuss, 'Zeitsch. Deutsch. Geol. Ges.,' vol. vii, p. 278.

Division—ENTOMOSTRACA, *Müller*.[1]

Animal aquatic, covered with a shell or carapace of a horny consistence, formed of one or more pieces; in some genera resembling a cuirass or buckler, and in others a bivalve shell, which completely or in great part envelopes the body and limbs of the animal; in other genera the animal is invested with a multivalve carapace, like jointed plate-armour: the branchiæ are attached either to the feet or to the organs of mastication; the limbs are jointed, and more or less setiferous. The animals, for the most part, undergo a regular moulting or change of shell as they grow; in some cases this amounts to a species of transformation.[2]

The following is Mr. Dana's classification of this division:

Division—ENTOMOSTRACA.

Order 1. Gnathostomata.
Legion I. Lophyropoda.
Tribe 1. Cyclopoidea.
,, 2. Daphnioidea.
,, 3. Cyproidea.
Legion II. Phyllopoda.

Order 2. Cormostomata.
Legion I. Pœcilopoda.
,, II. Arachnopoda.

I have elsewhere observed that, in the case of the fossil Entomostraca, the soft parts, including the branchial, maxillary, and locomotive organs, on which the generic, and sometimes the specific, distinctions of the recent forms are mainly established, have quite disappeared, the hard carapace-valves alone remaining to guide us in the recognition of genera and species. It is fortunate, however, that the families, and most of the genera even, of the existing bivalved Entomostracans have carapaces sufficiently characteristic to enable us to co-ordinate the fossil forms by the analogies presented in the form and structure of the valves. When we refer, however, to the *minute distinctions of form, hingement, and ornamentation*, we find that among the recent bivalved Entomostraca some families, and even genera, have carapaces peculiar to them (*Nebalia*, *Limnadia*, and *Cypridina*); whilst in other families a nearly similar carapace belongs to two genera (*Cypris* and *Candona*, *Daphnia* and *Lynceus*); and, on the contrary, even two characteristically different carapaces occur among the species of one genus (*Cythere* and its sub-genus *Bairdia*).

In the case of two or more genera presenting a similar form of carapace, we

[1] For synonyms see Dr. Baird's 'Nat. Hist. Brit. Entom.,' p. 16.

[2] Zenker observes that there is no casting of the carapace in the Ostracoda.

necessarily meet with considerable difficulty in dealing with fossil carapaces referable to such genera. Thus we cannot be satisfactorily guided in our determination of fossil *Cyprides* and *Candonæ* except by the identification of fossil with known recent forms of carapace; and, were it not that several such identifications are readily made (many of the recent species having existed in the pleistocene period), the general term "Cypris" might have been conveniently applied (with but little zoological licence, owing to the close alliance of *Cypris* and *Candona*) to the Cypris-like carapaces from fresh-water deposits. Where, however, marked differences of structure occur among fossil carapaces of doubtful relationship, we may readily, for the sake of convenience, group the several varieties of form under sub-generic appellations, without hazarding a decision as to their exact zoological value.

Tribe—Ostracoda, *Latreille*.[1]

Cyproïdes, *Milne Edwards*.
Cypridacea, *Dana*.
Cyproidea, *Dana*.

Animal enclosed in a bivalved carapace (which presents some modifications of form and structure according to the gender of the animal). The two valves of the carapace are united along the back by a membrane, with their edges either simply in contact, or more or less closely fitting to each other by means of ridges and furrows, or toothed hinges: the other marginal edges are either trenchant and provided with internal narrow lamelliform plates—in which case, when the valves are closed, the edges of the smaller valve lie within those of the other; or they are thickened, and fit against each other with grooved and flanged contact-surfaces. The valves are closed together by the transverse muscle of the animal; the place of the attachment of this muscle[2] is indicated on the interior of each valve by a sub-central tubercle (in *Cytherella*),—by a sub-central shallow pit,—or by a small group of translucent spots,—or a combination of spots and pit. The posterior, and sometimes the anterior jaws are branchiferous. There are two or three pairs of feet, and two pairs of antennæ. Some of the *Ostracoda* have a single (coalesced) eye; and others have two distinct eyes.

[1] See also 'Nat. Hist. Brit. Entom.,' p. 138; and 'Monog. Cret. Entom.,' p. 7.

[2] We are indebted to M. Zenker for a clear exposition of the relation of the transverse muscle of the animal to the "lucid spots" on the carapace-valves. See his Memoir in the 'Archiv für Naturgeschichte,' for 1854. The existence of the muscle and its place of attachment to the interior of the valves in *Estheria* and *Cypridina* have been pointed out elsewhere, as mentioned in my paper on *Leperditia*, 'Annals and Mag. Nat. Hist.,' Feb. 1856, p. 97. I much regret that I was not acquainted with M. Zenker's paper when I wrote on *Leperditia*.

The "lucid spots," or mark of the place of muscular attachment, afford an interesting subject for examination and comparison. It is generally impossible to see them fairly in the living carapace or in the uncleaned dead valves. Some fossil valves present them clearly; but mineralization frequently obscures them. To facilitate the examination of the spots, it is necessary to boil the valves, both recent and fossil, in a weak solution of potash,[1] after which their structure is much more easily observed. The boiling may be carried on in a flask over a spirit- or gas-lamp for ten minutes or more,—as long as an hour, if found requisite. My friend Mr. W. K. Parker, who has kindly favoured me with some of the finest and cleanest specimens in my collection, informs me that the process above mentioned is appropriate and indeed necessary for the preparation of *Foraminifera* and other microzoa for the cabinet.

Baird, Fischer, Zenker, and Liljeborg have indicated the lucid spots in their figures of *Cyprides* and *Cytheres;* but frequently, owing to the partial opacity of the valves in the recent state, and the difficulty of defining the spots externally, only portions of the groups of spots are given; and in some of the figures by Fischer and Liljeborg the spots appear to have been sketched in without exact reference to their position on the valve, since they are in these instances represented parallel with the upper and lower borders of the valves, whereas the elongate spots are, as a rule, obliquely situated.

The lucid spots occupy a sub-oval space, or follow a short transverse linear sulcus, near the middle of each valve, and rather towards the ventral border; usually slightly in advance of the centre, but sometimes behind it. The sub-oval space is sometimes faintly raised externally; the spots themselves, however, are almost always concave externally and convex internally.

Among the *Cyprinæ* three styles or systems of arrangement of the spots obtain. These are illustrated by some of the figures in the accompanying Plates, and will serve as terms of comparison.

A. A system of about seven elongate oval spots, arranged in four unequal parallel oblique rows; the two outer (upper and lower) rows are each formed of two long spots, frequently coalescent. The obliquity is directed in a line from about the antero-dorsal angle, or the anterior hinge, towards the posterior third of the ventral margin. (See Plate I, figs. 7 *a*, 7 *b*, 7 *c*, 9 *a*.)

B. A system of six sub-oval spots arranged in two transverse (vertical) rows; the front row consisting of four, and the hinder row of two spots; the hinder spots are

[1] About 1 part of *liquor potassæ* with 19 parts of water (and more of the potash if required, according to the coarseness and foulness of the specimens, up to 1 part in 4).

My friend Mr. Harris, of Charing, also has shown me some of his Cretaceous Entomostraca, &c., thoroughly cleanse by the action of water only, in a phial, half-filled with water, lashed to a small barrel (externally fitted as a water-wheel, and propelled by a stream), in which he washes his Chalk-detritus.

usually placed behind the lower or most ventral spots of the front rank. (See Plate I, figs. 1 *a*, 1 *b*, 1 *c*, 5 *b*, 8 *a*, 8 *e*, 8 *f*.)

c. A system of four or five sub-oval spots, arranged in a transverse row, more or less curved, and set in a linear sulcus. (See Plate II, figs. 1 *a*, 1 *e*, 1 *f*; Plate IV, fig. 6 *d*.)

The lucid spots in the *Cytherinæ* are not yet well examined. In some species they are very similar to one or other of the systems above described as occurring among the *Cyprinæ*,—in others the modifications are more distinct,—and, lastly, in *Cytherella* the arrangement of the spots resembles that of some *Cypridinæ*.

The following is Mr. Dana's classification[1] of the *Ostracoda* (*Cypridacea* and *Cyproidea*, Dana), founded on the study of the limbs or articulate appendages:

Tribe—CYPROIDEA vel OSTRACODA.[2]

In the *Cyproidea* there are two pairs of antennæ and a pair of mandibles, and the pairs of appendages posterior to the mandibles—in number four pairs—are divided variously between the mouth and the legs, as follows:

1. One pair of maxillæ and three pairs of legs, as in *Cythere*.
2. Two pairs of maxillæ and two pairs of legs, as in *Cypris*, *Conchœcia*, and *Halocypris*.
3. Three pairs of maxillæ and one pair of legs, as in *Cypridina*.

Fam. I. CYPRIDÆ. *Antennæ secundæ subteretes*, 3—5 *articulatæ. Mandibulæ apice productæ et denticulatæ et lateraliter palpigeræ, palpo ad mandibulæ apicem remoto. Oculi pigmento unico minuto conjuncti, lenticulis duobus sphæricis. Pedes duo vel plures tenuiter pediformes.*

Sub-fam. 1. CYPRINÆ (*Cyprididæ*, Baird). *Pedes numero quatuor; anteriores tenues pediformes, posteriores debiles. Abdomen elongatum stylis duobus confectum.*

Genus 1. CYPRIS, Müller. *Antennæ secundæ ad articuli tertii apicem bene setigeræ. Species natatoriæ.*

Genus 2. CANDONA, Baird. *Antennæ secundæ ad articuli tertii apicem vix setigeræ. Species gressoriæ.*

[1] 'Exploring Expedition: Crustacea,' p. 1277, &c.

[2] Dr. Baird's classification of this group is very similar to Dana's, viz.:

OSTRACODA.

Cyprididæ, Cytheridæ, Cypridinadæ.

In Dr. Baird's work the term "Cypridæ" is corrected as an *erratum* at p. viii.

Sub-fam. 2. CYTHERINÆ (*Cytheridæ*, Baird). *Pedes numero sex, toti tenues, consimiles, pediformes.*

Genus 1. CYTHERE, Müller. *Testa tenuis, lævis. Cauda brevis.*

Genus 2. CYTHEREIS,[1] Jones. [*Sub-genus*, Jones.] *Testa rugulis vel tuberculis ornata.* (*Animal ignotum. An hujus sedis?*)

Fam. II. HALOCYPRIDÆ.
Sub-fam. 1. CYPRIDININÆ.
Genus 1. CYPRIDINA.[2]
Sub-fam. 2. HALOCYPRINÆ.
Genus 1. CONCHÆCIA.
Genus 2. HALOCYPRIS.

The minute anatomy of the internal organs supplies some very important characteristics in addition to those derived from the limbs. Zenker, who has published[3] copious anatomical details of the internal organization of some of the *Cyprinæ* and *Cytherinæ*, and has somewhat modified the generic arrangement of the former group, has still other species to examine before a complete classification on his plan can be arrived at. This observer finds reason to divide the *Cypris* of authors into *Cypris* proper, a sub-genus *Cypria*, and a genus *Cyprois*.

The elaborate and highly illustrated work by M. Liljeborg, of Lund, published in 1853, has added greatly to our knowledge of the anatomical structure of a considerable number of species of *Cypris*, as well as of other genera of *Entomostraca;* and, by his careful comparison of the Swedish species with published descriptions (as far as the figures and descriptions of former authors serve), this author has advanced the arrangement of specific forms.

[1] *Cythereis* was not established by me as a *genus*, but as a *sub-genus*. See 'Monog. Entom. Cretac.,' p. 14. Its animal was unknown in 1849, and still remains so; and the gradual passage of the carapace of *Cythereis* into that of *Cythere* proper was too well recognised to allow of the difference of the two forms being dwelt upon in any other light than as sub-generic, and as a convenient distinction for the sake of palæontologists. My friend Dr. Baird, from whose beautiful work on the 'British Entomostraca' (Ray Society, 1850) Dana has apparently derived his information on this point, recognising the marked difference between some extreme forms of recent *Cythereis* and that of the common *Cythere*, figured and described some carapaces of the former as generically distinct, and inadvertently omitted, when enumerating the synonyms (p. 174), the word "sub-genus" in his reference to my detailed description of the carapace of *Cythereis*. On subsequently seeing a series of the various modifications of the carapace in fossil specimens of *Cythere* and *Cythereis*, Dr. Baird has expressed himself quite willing to regard the latter as a sub-genus, until something at least is known of the animal itself.

[2] M. Liljeborg has also established a cognate genus, *Philomedes*. ('De Crustaceis,' &c., 1853, p. 175.)

[3] 'Archiv f. Anat.,' 1850; 'Archiv für Naturgeschichte,' for 1854.

Liljeborg divides the *Cyprinæ* into three genera, characterised as follows:

Eye double.	Second pair of maxillæ without branchial appendage.	Lower pair of antennæ provided with a pencil of setæ, or filamentous plume.	Setæ long, reaching much beyond the apex of the terminal hook.	Notodromas.
			Setæ reaching as far as or beyond the apex of the terminal hook.	Cypris.
Eye single (coalesced).	Both pairs of maxillæ provided with branchial appendage.		Setæ short.[1]	
	Second pair of maxillæ without branchial appendage.	Lower pair of antennæ without a pencil of setæ.	. . .	Candona.

The researches of Liljeborg and Zenker often coincide in their results; but these authors differ widely in their views as to the synonymy of several forms, owing to the often imperfect accounts and figures by earlier naturalists,—to the different extent or direction of the zootomical examinations made by these two authors respectively,—and to the different appreciation of the value of the form of the carapace entertained by them.

As it is necessary that the anatomy of all the species must be fully and equally well examined previously to a complete classification on anatomical grounds being made, it is evident that any arrangement is incomplete until each known species has been subjected to such a minute examination as that instituted by the crustaceologists above referred to.

In the meantime palæontologists must be guided in the recognition of specific forms by the characters of the carapace-valves, which, however, among the *Cyprinæ* do not present satisfactory generic differences of character. The carapaces of *Cypris* proper, *Cypria*, and *Notodromas* or *Cyprois* are similar in general structure and form. The carapaces of the *Candonæ*, or the group which are destitute of the plume on the lower antennæ, for the most part resemble those of *Cyprides*, but are conspicuous for their great relative size and oblong shape. A distinct hingement, however, is present in a Candona-like species which occurs recent at Gravesend, and fossil in our pleistocene deposits. This animal resembles *Candona* in its plumeless lower antennæ; but minute anatomical examination is required to determine its exact relations. In the meantime, on account of the hinge and the comparative coarseness of the carapace, I shall regard this as a sub-generic form, under the appellation of *Cyprideis*.

In the 'Munich Transactions,' of 1855, Dr. S. Fischer has given us an additional memoir on the *Ostracoda*, in which he refers to some of Zenker's and his own

[1] These short setæ do not form a *plume*, and characterise forms which are included in Baird's genus *Candona*.

discoveries in the anatomy and habits of these animals, and describes seventeen species of *Cypris*, nearly all of which are new, also three *Cytheres* (two of them new), and a new genus (*Paradoxostoma*), from the coast of Madeira, differing from *Cythere*[1] in having its masticatory organs blended together in a conical mass. Lastly he notices a new species of *Asterope* (=*Cypridina*).

Including the new generic divisions established by Liljeborg and Zenker, together with the sub-genera proposed for the various fossil and recent forms referable to *Cythere*, the family *Cypridæ* will stand thus:

Fam.—CYPRIDÆ, *Dana*.

Sub-family CYPRINÆ, *Dana*.	Sub-family CYTHERINÆ, *Dana*.
Genus CYPRIS, *Müller*.	Genus CYTHERE,[4] *Müller*.
Sub-genus CYPRIA, *Zenker*.	Sub-genus CYTHEREIS, *Jones*.
Genus CYPROIS, *Zenker*. } Probably	,, CYTHERIDEA,[5] *Bosquet*.
,, NOTODROMAS, *Liljeborg*. } the same.	,, CYTHERIDEIS, *Jones*.
,, CANDONA, *Baird*.	,, BAIRDIA,[6] *M'Coy*.
Sub-gen. [?] CYPRIDEIS,[2] *Jones*.	,, [?] CYTHERELLA,[7] *Jones*.
,, [?] CYPRIDEA,[3] *Bosquet*.	Genus [?] PARADOXOSTOMA, *Fischer*.

I may here mention that *Cyprella* and *Cypridella*, of M. De Koninck, probably belong to a different group of the Entomostraca,—that Bosquet's "Cyprellæ" of the Cretaceous and Tertiary deposits are true *Cypridinæ*,—and that De Koninck's "Cypridina" (of the Carboniferous Limestone) is not the *Cypridina* of Milne Edwards. In a courteous reply to an inquiry with which I lately troubled M. Milne Edwards, he kindly informed me that the *Cypridina* described in the 'Hist. Nat. des Crust.' has really the antero-ventral notch so characteristic of the genus.

[1] It resembles in carapace *C. variabilis* of Baird.

[2] Having lately again endeavoured to obtain clearer anatomical characters from the few dried specimens I possess of this form, I find that the upper antennæ are plumeless, as well as the lower pair (see fig. 2, p. 16); and the fragmentary posterior limbs appear to be referable to more than two pairs of feet. Under these circumstances we have indications of a fresh or brackish water *Cythere*. (Oct. 1856.)

[3] Proposed by M. Bosquet as a genus for the "Cyprides" of the Wealden and Purbeck deposits ('Descript. Entom. Tert.,' p. 48); their thick and often tuberculated valves have some analogy with those of *Cyprideis*.

[4] Zenker observes that *Cythere* is perhaps divisible into two genera at least, by the distinctive characters of the spermatozoa; but further anatomical research is required on this point.

[5] Proposed as a genus by M. Bosquet. [6] Proposed as a genus by Mr. M'Coy.

[7] This division is more likely to prove to be a true "genus," when the recent animal is examined, than either of the other fossil forms here indicated as sub-genera; for it presents a wider departure from the type of carapace of *Cythere* than any of the others, and intermediate forms appear to be wanting: in its system of "lucid spots" also it differs from *Cythere*; approaching *Cypridina* in this respect.

For the purposes of the palæontologist a succinct table of the characters of the carapace of the chief forms of the *Ostracoda* will be useful:

	Carapace-valves.				
		Shape.	Contact-margins.		Hinge-margins.
Cypris, genus	Thin.	Ovate or oblong.	Bevilled off inside, and lined with a more or less developed narrow laminar plate, which is largest in *Cypris*, *Candona*, and *Bairdia*.	. . . .	Simple, inclined to be sulcate.
Candona, genus	Thin.	Long-ovate or oblong.		Larger than *Cypris*.	
Cyprideis, sub-gen. ?	Thickish.	Oblong.		. . . .	Knurled.
Cypridea, sub-gen. ?	Thick.			Notched at the antero-ventral angle.	?
Cythere, genus	Thickish.	Ovate. Oblong.		Peach-stone-shaped. Often showing one central and two posterior tubercles.	Hinge consisting of bar and furrow, with terminal teeth.
Cythereis, sub-gen.	Thick.	Oblong.		The three tubercles strongly shown; the postero-ventral one developed into a long ventral ridge.	Hinge consisting of terminal teeth; bar and furrow obsolete.
Cytheridea, sub-gen.	Thickish.	Triangular or ovate-oblong.		. . . .	Knurled.
Cytherideis, sub-gen.	Thin.			. . . .	Simple and sulcate, as in *Cypris*.
Bairdia, sub-gen.	Thin.	Triangular.		. . .	Quite simple.
Cytherella, sub-gen. ?	Thick.	Ovate or oblong.	Grooved and furrowed.	. . .	No special hinge.

Sub-family—Cyprinæ, *Dana*. (*Cyprididæ*, Baird.)

I have alluded to the difficulties in the way of the palæontologist when comparing the Tertiary *Cyprinæ* with their existing representatives; and in the following descriptions I shall not dwell on the probabilities of the agreement of any of our few fossil forms with the carapaces of *Cypria*, *Cyprois*, and *Notodromas*, but arrange them in two groups accordingly as the carapaces more or less resemble those of the known recent species of the genera Cypris and Candona.

At the same time it will be advisable to point out the anatomical characteristics of all the above-mentioned divisions, that the subject may be fairly presented in its zoological aspect.

Genus—CYPRIS, *Müller*. (*Monoculus*, Auct. prior.)

Animal swimming and creeping; inhabiting fresh water: eye single (coalesced): both pairs of antennæ plumed. Carapace more or less oblong, generally smooth and more or less setigerous; occasionally punctate; contact-margins thin and trenchant, furnished on the anterior, ventral, and posterior borders with an internal lamellar plate which projects freely and obliquely into the cavity of the valves, and is broadest at the anterior end of the valves; the edge of the right valve received within that of the left: dorsal edge simple; its central third (and sometimes more) slightly thickened, and more or less distinctly defined by an anterior and a posterior angle; these angles in general faintly project, the central portion of the margin between them being straight or slightly incurved: the ventral margin of each valve has its central portion somewhat incurved.

[*Sub-genus*—CYPRIA, *Zenker*.[1] 1854. (*Cypris*, Auct.)

Animal like *Cypris*, but having a broader eye, more slender limbs with longer setæ (hence greater briskness of motion in swimming), a peculiar bag-like prolongation of the mucous gland in the male genital apparatus, longer and thinner spermatozoa, and a bending downwards of the ovary at first between the valves instead of upwards. Carapace like that of *Cypris*. (This includes, according to Zenker, *C. punctata*, Jurine, *C. Joanna*, Baird, *C. vidua*, Müller, *C. semilunaris* (?), S. Fischer, and *C. ovum*, Jurine.)

[1] Zenker has studied the anatomy of *Cypris* and *Cythere* with great care, and has published the result of his researches in considerable detail ('Archiv für Naturgeschichte,' 1854). Besides pointing out important distinctions in the limbs, shell-structure, chitine-skeleton, and eyes of these minute animals (and herein adding some valuable information to what has been before observed), he lays great stress on the structure of the alimentary and generative organs, and on the form of the spermatozoa, as characteristic of genera and species; and, although he has on these points accumulated a great mass of observations, both novel and important, yet he rightly intimates that the field is still open to investigators. His sub-genus *Cypria* and new genus *Cyprois*, mainly founded on peculiarities of internal structure, are introduced here to render the treatment of the subject more complete; although, for the purposes of the palæontologist, as I have already noticed, the distinction of these, and even of *Candona*, from *Cypris* is scarcely advantageous. Indeed, were it not that some of the fossil forms have been recognised in the recent state, and their generic characters in consequence definitely known, it would not be always practicable to decide to what divisions of the *Cyprinæ* the several carapaces really belong.

Genus—CYPROIS, *Zenker*. 1854. (*Cypris*, Auct. *? Notodromas*, Liljeb. 1853.)

Animal like *Cypris*, excepting that the eye is almost completely divided, and the mucus-gland of the male genital apparatus is differently constructed. Carapace like that of *Cypris*. (To this genus Zenker refers *C. monacha*, Müller, and *C. dispar*, Fischer.)

Genus—NOTODROMAS, Liljeborg. 1853. (*Cypris*, Auct. *? Cyprois*, Zenker. 1854.)

Animal like *Cypris*, excepting that the eye is double,—the second pair of maxillæ have no branchial appendage,—and the pencil of setæ on the lower pair of antennæ is very long. Carapace resembling that of *Cypris*. Liljeborg quotes *C. monacha*, Müller, only as belonging to this genus. Probably Zenker's genus *Cyprois* is the same as this; but some important points of comparison are still required to be worked out before, in this as in other instances, the researches of MM. Liljeborg and Zenker can be estimated at their full value.]

No. 1. CYPRIS SETIGERA, *Jones*. Plate I, fig. 6 *a*—6 *d*.

CYPRIS SETIGERA, *Jones*. Annals and Mag. Nat. Hist., 2d ser., vi, p. 25, t. 3, fig. 3 *a*—*c*.

INCH.	
Length, $\frac{1}{25}$	Recent?
	Post-tertiary: Berkshire and Cambridgeshire.

Carapace ovate, somewhat pear-shaped: *valves* convex; obliquely curved on the dorsal, and nearly straight and somewhat incurved on the ventral border; narrower and tapering anteriorly; bordered by a narrow rounded marginal rim; covered with fine spines: *hinge-line* occupying rather more than the central third of the dorsal edge: *right valve* narrower, straighter on the dorsal, and more incurved on the ventral margin, than the left valve. *Lucid spots* six, arranged on two transverse parallel rows. (System B, see p. 5.)

Dorsal aspect acute-oval; *anterior*, oval.

Plentiful[1] in the Peat-deposits of the Kennet Valley[2] at Newbury, and in the Peat-marl of Cambridgeshire.[3]

[1] Probably this is also a *recent* species, although it has as yet apparently escaped notice. The somewhat similar carapaces figured and described by earlier authors are not sufficiently elucidated for exact and satisfactory comparison.

[2] For an account of these Peat-deposits, see the Appendix to my *Lecture on the Geology of Newbury*, &c., p. 40, 1854.

[3] See 'Quart. Journal Geol. Soc.,' vi, p. 451.

In this species the dorsal edge is more angular, owing to the greater definition of the hinge-line, than in *Cypris aurantia*, Jurine, sp., to which *C. setigera* is nearly allied in general form.[1]

Its ventral margin, also, is somewhat more inturned. The very spinous surface, so well preserved even in the fossil state, is markedly characteristic, in comparison with the partial distribution of setæ in *C. aurantia*. Its lucid spots are altogether differently arranged from those in the last-mentioned species, in which there are eight, forming a set of four, irregular, parallel, oblique lines (System A). And lastly the valves are smaller and somewhat less gibbose than those of *C. aurantia*.

No. 2. CYPRIS BROWNIANA, *Jones*. Plate I, fig. 1 *a*—1 *d*.

CYPRIS BROWNIANA, *Jones*. Annals and Mag. Nat. Hist., 2d ser., vi, p. 25, t. 3, fig. 1.

	INCH.	
Length,	$\frac{1}{28}$	Pleistocene: Clacton, Essex.

Carapace short and broad, somewhat square: *valves* convex, depressed anteriorly, smooth, with a few scattered pedicles of setæ; edges of the valves rather thickened; inner marginal plate well developed: *hinge-line* occupying the central third of the dorsal border: *left valve* sub-quadrangular, obliquely rounded anteriorly, semicircular behind; ventral border and central third of dorsal border almost straight: *right valve* smaller than the left, sub-reniform. Lucid spots six, placed according to System B.

Dorsal aspect elongate and obtuse ovate; *anterior*, broad ovate.

Plentiful in the fresh-water deposit at Clacton, in Essex.

For these and other specimens of Entomostraca from Clacton I have to thank John Brown, Esq., F.G.S., of Stanway, near Colchester, who has assiduously worked out the fossil fauna of the Clacton, Copford, and other Pleistocene and Post-tertiary deposits, and after whom the species under notice has been named.

Var. TUMIDA, *Jones*. Plate I, fig. 2 *a*, 2 *b*.

CYPRIS TUMIDA, *Jones*. Annals and Mag. Nat. Hist., 2d ser., vi, p. 26, t. 3, fig. 2.

	INCH.	
Length,	$\frac{1}{35}$	Pleistocene: Grays, Essex.

[1] *Cypris pubescens*, Koch, 'Deutsch. Crust.,' 1837, Heft xi, t. 6; *C. ovato-conchacea*, De Geer, sp., 'Hist. Insect.,' vii, t. 29. figs. 5—7; *C. conchacea*, Jurine, sp., 'Hist. Monocl.,' t. 17, fig. 7; and *C. conchacea*, Koch, 'Deutsch. Crust.,' 1838, Heft xxi, t. 12—14, also more or less resemble the species under notice.

Carapace tumid, rounded: *valves* strongly convex, especially on the posterior third; rounded obliquely and subacute anteriorly, semicircular posteriorly; arched on the dorsal, nearly straight on the ventral border: *surface* finely punctate with pedicles of setæ. *Lucid spots* in System B.

Dorsal aspect sub-oblong; *anterior*, broadly ovate.

This variety differs from *C. Browniana*, from Clacton, in its smaller size, greater rotundity, more acute anterior extremity, and more frequent setation. It is of rare occurrence, and found as yet only in the fresh-water clayey sand of Grays in Essex.[1]

For these and other specimens from Grays and Copford I am indebted to John Pickering, Esq.

No. 3. Cypris Ovum, *Jurine*, sp. Plate I, fig. 4 *a*, 4 *b*.

Monoculus Ovum, *Jurine*. 1820. Hist. des Monocles, &c., p. 179, t. 19, figs. 18, 19.
Cypris vulgaris, *Zadduch*. 1844. Synop. Crust. Pruss. Prodomus, p. 35.
— minuta, *Baird*. 1850. Nat. Hist. Brit. Entom., p. 155, t. 18, figs. 7, 8.
— — *Jones*. 1850. Ann. and Mag. Nat. Hist., 2d ser., vi, p. 28.
— pantherina, *S. Fischer*. 1851. Ueber das Genus Cypris, &c., p. 163, t. 11, figs. 6—8.
— Ovum, *Liljeborg*. 1853. De Crustaceis, &c., p. 113, t. 10, figs. 13—15.
— (Cypria) Ovum, *Zenker*. 1854. Monographie der Ostracoden, &c., p. 79, t. 3, B.

	INCH.	
Length,	$\frac{1}{40}$	Recent: England; Europe. Post-tertiary: Cambridgeshire.

Carapace small, tumid, egg-shaped: *valves* highly convex, triangularly oval; dorsal margin arched and almost angular, ventral straight; ends rounded, posterior extremity broadest: *surface* finely punctate. In the recent state the valves are beset all round towards the margins with short hairs; and they are of a light-brown colour, with a tinge of green (*Baird*).

Dorsal aspect broadly ovate; *anterior*, nearly round.

Common in ponds and stream. Abundant in the marl of the Peat-deposits of Cambridgeshire described by Mr. Hamilton in the 'Quart. Journ. Geol. Soc.,' vi, p. 451.

[1] For the geological conditions of the Pleistocene and Post-tertiary deposits in Essex, see (*Grays*) Loudon's 'Mag. Nat. Hist.,' 1836, ix, p. 261; 'Mag. Nat. Hist.,' n. s., 1838, ii, p. 546; (*Clacton*) 'Mag. Nat. Hist.,' n. s., 1838, ii, p. 163, and 1840, iv, p. 197; 'Proc. Geol. Soc.,' 1845, iv, p. 523, and 'Quart. Journ. Geol. Soc.,' i, p. 341; (*Copford*) Loudon's 'Mag. Nat. Hist.,' 1834, vii, p. 436, and 1836, ix, p. 429; 'Proc. Geol. Soc.,' 1843, iv, p. 164; 'Quart. Journ. Geol. Soc.,' 1852, viii, p. 184.

No. 4. CYPRIS GIBBA, *Ramdohr*. Plate I, fig. 3 *a—f;* and Woodcut, fig. 1, p. 16.

CYPRIS GIBBA, *Ramdohr*. Magaz. d. Gesellsch. Naturforsch. Freunde zu Berlin, 1808, ii, p. 91, t. 3, figs. 13—17.
MONOCULUS BISTRIGATUS, *Jurine*. Hist. des Monocles, p. 177, t. 19, figs. 12, 13.
CYPRIS BIPLICATA, *Koch*. Deutschlands Crustac., &c., Heft 21, t. 16.
— — *S. Fischer*. Mém. Sav. Etrang. Petersburg, vii, p. 150, t. 5, figs. 5—8.
— SINUATA, *Ib*. Mém. Sav. Etrang. Petersburg, vi, p. 193, t. 10, fig. 4.
— BISTRIGATA, *Liljeborg*. De Crustaceis, &c., p. 121, t. 11, figs. 17, 18.
— GIBBA, *Jones*. Ann. and Mag. Nat. Hist., 2d ser., vi, p. 26, t. 3, fig. 4.

	INCH.	
Length,	$\frac{1}{25}$	Recent: England; Europe. Post-tertiary: Cambridgeshire. Pleistocene: Kent; Essex.

Carapace oblong, compressed: *valves* larger anteriorly than posteriorly; rounded obliquely in front; rounded behind; straight on the dorsal, incurved at the middle of the ventral border; marked across the middle by two unequal parallel furrows, situated side by side, and strongest towards the dorsal border; these two sulci (the foremost of which often becomes obsolete) form an irregular impression which divides the surface into two nearly equal, slightly gibbose portions, each of which in old specimens is sometimes surmounted with a tubercle (Plate I, fig. 3 *a*). In young individuals the impression is scarcely perceptible (fig. 3 *e*). *Surface* of the valves impressed with closely set circular punctations (fig. 3 *f*), which are either irregular in their disposition, or follow wavy lines, rather concentric as to the two halves (anterior and posterior) of the valves. Irregular pits and knobs are frequent near the middle of the adult valve.

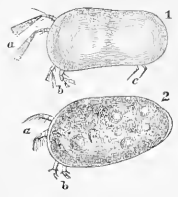
The *hinge* is well seen on the smaller (right) valve, and consists of a straight, simple, smooth ridge, extending nearly the whole length of the dorsal border, and slightly modified at its posterior portion, where it becomes somewhat broader and sulcated. The *inner marginal plates* of the valves are rather feebly developed.

The recent individuals have usually a dull yellowish colour, and, like the fossil forms, vary considerably both as to the extent to which the ventral border is incurved, and as to the development of the vertical median sulci and their attendant pits and varices, and other irregularities of the surface.

Dorsal aspect elongate-oval or lanceolate; *anterior*, ovate.

This is a very common species in our fresh-water ponds and rivers; but, as Ramdohr has remarked (*loc. cit.*), it has the habit of remaining on or in the mud rather

than swimming in the water and crawling on the weeds. Hence it has escaped observation to some extent, and is not noticed in Dr. Baird's 'History of the British Entomostraca.' In its love of the mud and habit of crawling, it so much resembles the *Candonæ* that I have been anxious to verify Dr. Ramdohr's description of the species; and I find that it truly possesses the pencilled tufts characteristic of the genus *Cypris*. See Woodcut, fig. 1. (See also the figures by Fischer, Koch, &c.)



1. *Cypris gibba.*
2. *Cyprideis torosa*
aa. Upper pair of antennæ.
bb. Lower or pediform antennæ.
c. First pair of feet.

Cypris gibba occurs fossil in the Peat-marl of Cambridgeshire before referred to (where, however, only young specimens were met with); in a Pleistocene deposit at Wear Farm, near the Reculvers, described by Mr. Prestwich in the 'Quart. Journ. Geol. Soc.,' xi, p. 112; and plentifully in the fluviatile deposits of Grays and Clacton, in Essex.

From the association of a few marine or estuarine fossils (*Balanus* and *Globulina*) with *C. gibba* in the Pleistocene sands near the Reculvers, it appears that this species can inhabit brackish water.

Genus—Candona, *Baird.* (*Cypris*, Auctorum.)

Animal creeping; (inhabiting fresh water and found on or in the mud; generally larger than *Cypris*;) eye single (coalesced); the upper pair of antennæ plumed; the lower pair plumeless, merely setiferous and hooked.[1] *Carapace* like that of *Cypris*.

No. 1. Candona reptans, *Baird.* Plate I, figs. 7 *a*—7 *e*.

Cāndona reptans,[2] *Baird.* Hist. Brit. Entom., p. 160, t. 19, fig. 3.
— — *Jones.* Annals and Mag. Nat. Hist., 2d ser., vi, p. 27, t. 3, fig. 7.
Cypris reptans, *Liljeborg.* De Crustaceis, &c., p. 123, t. xi, figs. 21—23; t. xii, figs. 7—9.

	inch.	
Length,	$\frac{1}{9}$	Recent: Britain; Europe.
		Post-tertiary: Berkshire; Cambridgeshire; Lincolnshire; Essex.
		Pleistocene: Essex.

[1] According to Liljeborg, in the species which he refers to *Candona* the second pair of maxillæ are without branchial appendages.

[2] Leach's *Cypris viridis* ('Edinb. Encycl.,' t. 221, fig. 2), and *C. nephroides* ('Encycl. Brit. Suppl.,' 20, figs. 1, 2), somewhat resemble *Candona reptans* (as pointed out to me by Dr. Baird); but it is impossible to come to a satisfactory determination from Leach's figures and notes.

Carapace large, oblong, almost cylindrical, smooth, shining, beset with scattered setæ (of a greenish colour, with variations of tint in patches, and hairy at the margins, in the recent state); anterior portion compressed, obliquely rounded, and tapering forwards and downwards; posterior rather less compressed than the anterior extremity, almost squared, but with the angles well rounded; dorsal margin straight along the middle, suddenly rounded posteriorly, and gently curving anteriorly towards the antero-ventral margin; ventral margin slightly incurved.

Hingement simple. *Lucid spots* large, elongate, 6—8, arranged in four irregular, parallel, oblique rows (System A); in the outside pairs the spots coalescing one with another.

Dorsal profile lanceolate; *end view* broadly and acutely ovate.

Fig. 7 *a* represents a variety, from Clacton, which was much more setiferous (as evidenced by the remaining pedicles of setæ), and usually of smaller size, and marked with proportionally larger lucid spots. I have met with this variety in a recent state in beach-sand from Pegwell Bay, with which my friend Mr. Pickering has favoured me, where it was associated with *Candona lucens* and *Cytherideis trigonalis;* but of the exact habitat of these specimens I have no precise information.[1]

Candona reptans is referred by Liljeborg to his section of *Cyprides* with very short setæ on the pediform antennæ. I cannot find on our specimens even the six setæ mentioned by this author. The one large and three small setæ at the third joint of the second pair of antennæ poorly represent the filamentous brush of the *Cypris*. The character of the second pair of maxillæ, referred to by Liljeborg, is an important peculiarity; possibly the two animals are distinct. I prefer following Baird in the allocation of the species under notice, which is characteristically a *Candona* in its make and habits.

Candona reptans is one of the largest of the bivalve Entomostracans met with in our fresh waters, and is of frequent occurrence. It is plentiful in a fossil state in the peat-deposits of Berkshire, at Newbury, and in the fresh-water marl in the fens of Cambridgeshire, described by Mr. Hamilton;[2] it occurred also in the fresh-water deposit met with in the Casewick railway-cutting, in Lincolnshire, and described by Mr. Morris, 'Quart. Journ. Geol. Soc.,' ix, p. 321, and at Edwardstone;[3] and it is not rare in the pleistocene sands and clays of Clacton and Grays, in Essex. The specimens from Clacton, as already mentioned, are comparatively small; those from Grays are often very large.

[1] They were probably brought down by the river Stour.

[2] *Loc. cit.*

[3] About thirteen miles from Stanway, Essex. Mr. J. Brown kindly communicated some fine specimens obtained from the post-tertiary deposits at this place.

No. 2. Candona Forbesii, *Jones*. Plate IV, figs. 8, 9, 11 *a*, 11 *b*.

Candona Forbesii, *Jones*. Memoirs Geol. Survey, p. 157, t. 7, fig. 22.

	INCH.	
Length,	$\frac{1}{14}$	Upper Eocene: Isle of Wight and Hampshire.

Valves oblong, rounded at the extremities, narrowest and most depressed anteriorly, most convex at the posterior third; hinder border margined with a slightly raised rim; dorsal border arched, ventral slightly incurved; surface smooth; fine punctations are visible in transparent specimens under the microscope with transmitted light. *Lucid spots* according to System A.

This species much resembles the recent *Candona reptans* and *C. Richardsoni* (Jones) of the Woolwich Beds; but certain modifications of shape and proportional size separate all these forms.

Candona Forbesii occurs in great numbers, and in different stages of growth, chiefly as single valves, compressed between the laminæ of the shales of the Upper, Middle, and Lower Hempstead Series at Hempstead Cliff, Isle of Wight; and in a better state of preservation in the pyritous bands occurring in that series. It is met with also compressed in the Shales of the Osborne Series at Cliff End, Colwell Bay; and is found also at Hordwell (Mr. F. Edwards's collection).

I have dedicated this abundant and characteristic species to Edward Forbes, whose name is so intimately associated with the Hempstead deposits and their fossils.

No. 3. Candona Richardsoni, *Jones*. Plate IV, figs. 12 *a*, 12 *b*.

Candona Richardsoni, *Jones*. Quart. Journal Geol. Soc., x, p. 162, t. 3, fig. 13.

	INCH.	
Length,	$\frac{1}{20}$	Lower Eocene: Woolwich.

Valves oblong, smooth, rounded at the extremities, depressed anteriorly, most convex just posterior to the centre; ventral border straight, dorsal border very slightly curved.

This species approaches in shape to the recent *Candona reptans;* but it is more oblong, and in size it is much inferior. It also resembles *C. Forbesii* of the Isle of Wight.

Candona Richardsoni was found by Mr. W. H. Baily, in the thin band with *Hydrobia, Planorbis,* and *Cyrena,* in the Woolwich sand-pit. The individuals are

numerous, compressed between the laminæ of the clay. Casts of valves possibly referable to the same species were collected by the late Rev. H. M. de la Condamine, F.G.S., of Blackheath, in the Planorbis-bed at Counter Hill, near Lewisham.

No. 4. CANDONA CANDIDA,[1] *Müller*. Plate I, figs. 8 *a*—8 *f*, 5 *a*, 5 *b*.

CYPRIS CANDIDA, *Müller*. Entom., p. 62, t. 6, figs. 7—9.
MONOCULUS CANDIDUS, *Jurine*. Hist. des Monocles, p. 176, t. 19, figs. 7, 8.
CYPRIS LUCENS, *Baird*. Trans. Berwick Nat. Club, i, p. 100, t. 3, fig. 15.
— CANDIDA, *Ib*. Mag. Zool. Bot., ii, p. 134, t. 5, fig. 3.
— — *Zaddach*. Synops. Crust. Pruss. Prodomus, p. 38.
CANDONA CANDIDA, *Baird*. Trans. Berwick Nat. Club, ii, p. 153.
CYPRIS PELLUCIDA, *Koch*. Deutschland's Crust., &c., xi Heft, t. 5.
— LUCIDA (?), *Ib*. Deutschland's Crust., &c., xxi Heft, t. 18.
CANDONA LUCENS, *Baird*. Hist. Brit. Entom., p. 160, t. 19, fig. 1. [Adult female.]
— — *Jones*. Annals and Mag. Nat. Hist., vi, p. 26, t. 3, fig. 8.
CYPRIS PELLUCIDA, *S. Fischer*. Ueber das Gen. Cypris, &c., p. 148, t. 5, figs. 1—4. [Female.]
CANDONA CANDIDA, *Liljeborg*. De Crustaceis, &c., p. 127, t. 11, figs. 19, 20; t. 25, figs. 13—15.

	INCH.	
Length,	$\frac{1}{15}$	Recent: England; Europe.
		Post-tertiary: Forfarshire; Berkshire; Cambridgeshire; and Essex.
		Pleistocene: Essex.

Carapace rather large, long kidney-shaped, somewhat cylindrical, smooth, shining (pearly white in the recent state; often milky white when fossil); beset with scattered pedicles of setæ (and fringed with hairs, when recent); posterior portion larger than the anterior, in the adult female curving boldly backwards and downwards, and terminating in a blunt point (injured in the lithograph, fig. 8 *a*); dorsal margin arched, especially behind; ventral margin more or less incurved. *Lucid spots* six in a group, forming a transverse, curved, front row of four, with two other spots behind the lowest two of the front row (System B), figs. 8 *e*, 8 *f*; this arrangement is subject to a variation, by which the lower five spots in the two rows lose their linear regularity (fig. 5 *b*), and sometimes become so obliquely arranged as to converge into a radiate figure, forming a star or rosette, accompanied by the upper isolated sixth spot, as seen in the fragment of a valve, fig. 5 *a*.

[1] Zenker (1854), *op. cit.* p. 76, refers to this species as a *Cypris*, with the following synonyms:

CYPRIS CANDIDA, *Müller*; C. COMPRESSA, *Koch*; C. PELLUCIDA, *Ib.*; C. PUBESCENS, *Ib.*; C. PELLUCIDA, *S. Fischer*; C. PIGRA, *Ib.*; C. COMPRESSA, *Ib.*

Dorsal profile lanceolate, or elongate-oval, with the ends acute and nearly equal: *anterior*, broadly ovate.

Candona candida is very common in the mud of ponds and rivers; and occurs equally abundantly in the peat-deposits of Berkshire (at Newbury), and Cambridgeshire; in the shell-marl of the Forfarshire lakes, described by Sir C. Lyell, 'Geol. Trans.,' 2d ser., vol. ii, p. 73; in the fresh-water beds at Copford; and in the pleistocene beds of Clacton and Grays, in Essex.

No. 5. CANDONA (?) SUBÆQUALIS, *spec. nov.* Plate I, fig. 9 *a*—9 *c*.

	INCH.	
Length,	$\frac{1}{15}$	Recent?
		Post-tertiary: Essex.

Carapace rather large, very convex, reniform; anterior and posterior extremities nearly equal; dorsal margin arched, the curve being nearly uniform throughout its length; ventral margin incurved. *Surface* thickly studded with fine pimples, or pedicles of setæ. *Lucid spots* 7—8, forming four irregular oblique rows (System A).

This species differs from *C. candida* in its shape, setation, and lucid spots; but resembles it in general character. It much resembles in outline *Cypris lutraria*, Koch ('Deutsch. Crust.,' xxi Heft, t. 15), and *C. elliptica*, Baird ('Hist. Brit. Entom.,' p. 158, t. 19, fig. 12); but the means of comparison at command are unsatisfactory.

Candona (?) *subæqualis* occurs not uncommonly in the post-tertiary fresh-water deposit at Copford, near Colchester.

Sub-genus (?)—CYPRIDEIS, *nov.*

[At page 9 (in a note added while these sheets were in the press,) I have mentioned my reasons for expecting that, on further examination, this form will prove to be a *Cythere*. As I have not had any opportunity of getting living specimens, I leave the description of this interesting and peculiar form in the place it occupied in my MS., and under the same provisional subgeneric heading. (November, 1856.)]

Animal[1] having the pediform antennæ hooked, not plumous, and the superior antennæ apparently simply setiferous. *Carapace* oblong; marginal edges thickened,

[1] Not yet examined in a fresh state.

inner plates obsolete; contact-margin of the left valve grooved or rabbeted for the reception of the slightly flanged edge of the opposite valve, and the dorsal edge provided with hinge-teeth, consisting of a longitudinal series of numerous minute tubercles, with corresponding pits; on the right valve the dorsal edge is tubercled or toothed along its anterior and posterior thirds, and pitted in the central portion; whilst the left valve has fine teeth on the middle part, and pits on the rest of its dorsal edge: *surface* of the valves punctated. In its hingement, *Cyprideis* closely resembles the marine form *Cytheridea*.

No. 1. CYPRIDEIS TOROSA, *Jones*. Plate II, figs. 1 *a*—1 *i*; and WOODCUT, fig. 2 p. 16.

CANDONA TOROSA, *Jones*. Annals and Mag. Nat. Hist., 2d ser., vi, p. 27, t. 3, fig. 6.

INCH.

Length, $\frac{1}{20}$

Recent: Gravesend.
Pleistocene: Essex and Kent.

Carapace oblong, varying in its proportions according to age. *Valves* convex; bearing for the most part a slightly raised marginal rim on all edges except the dorsal; rounded before and behind; straight on the ventral, and more or less arched on the dorsal border; right valve less oblong, smaller, and narrower posteriorly than the left valve. The *surface* of the valves is marked with closely set angular pittings (fig. 1 *i*), coarse in the older specimens, and is raised in adult specimens into 5—7 tubercles. Young individuals in general have the surface almost even, or marked by a slight transverse sulcus near the centre and just posterior to the lucid spots, which indicate the position of the first-developed tubercle; 3—4 tubercles on the posterior moiety of the valve, and 1—3 smaller tubercles anteriorly, become apparent afterwards. Occasionally well-developed tubercles are present in small, and even in young specimens; and, on the other hand, individuals reach a large size without being marked with more than one (anterior) tubercle.

The *hinge* is considerably developed (figs. 1 *g*, 1 *h*); the hinge-margin of the right valve bearing anterior and posterior sets of "knurlings," which are received into corresponding pittings on the hinge-margin of the opposite valve; whilst the central portion of the hinge has a smaller set of similar pits and teeth, but inversely arranged.

Lucid spots small, four, arranged in a single transverse, or vertical, row immediately behind the chief, or anterior, tubercle (System c).

Dorsal aspect irregular-acute-oval; *anterior*, somewhat hexagonal.

This well-marked species occurs abundantly in the pleistocene sands of Grays, Essex, and was found in equal profusion in deposits of similar age at Wear Farm.

near the Reculvers,[1] Kent, by Mr. Prestwich, and at Chislet, between Wear Farm and the Grove Ferry Station, by Mr. J. Brown, of Stanway; to both of whom I am indebted for a liberal supply of specimens. At the two last-mentioned localities the carapaces are not so strongly tubercled as they are at Grays.

Cyprideis torosa is also a recent species, living in the Gravesend ditches, where Mr. Pickering (who kindly favoured me with my recent specimens of this species) found it in great numbers, attached to the cases of Caddis-worms, "in a ditch which runs on the land-side of the Thames Bank, between Gravesend Town and Coal House Point, near an old mill: the water flowing into and not from the Thames, except at high tides."

Sub-family—Cytherinæ, *Dana*. (*Cytheridæ*, Baird.)

In this second sub-family of the *Cypridæ* (Dana) we meet with similar difficulties in the allocation of the fossil carapaces to generic forms as among the *Cyprinæ;* for, although the carapaces are readily arranged into natural groups according to their peculiarities of structure, yet these peculiarities do not necessarily indicate generic differences among the animals to which they belonged; and, in fact, in this branch of palæontology, as in others, we have still to wait for an intimate knowledge of living animals before we can confidently speak of the exact relations of the fossil remains of earlier creatures, which they more or less closely represent. *Cytherella*, *Bairdia*, *Cytherideis*, *Cytheridea*, and *Cythereis* exist in the present seas, as well as *Cythere* proper; and favorable opportunities will, it is hoped, occur for their minute examination in a fresh state.

The *Cytheres* of the Baltic have been carefully examined by Liljeborg and Zenker, but the result of their examinations does not much assist the palæontologist in the comparison of the recent and fossil forms. The views of these two authors on the synonymy of some of the best known of the recent species are at variance;[2] nor do

[1] Where it seems to have inhabited brackish water; 'Quart. Journ. Geol. Soc.' xi, p. 112.

[2] According to Liljeborg, the Swedish species which he examined are three, viz.:

Cythere gibbera, *Müller.*
— viridis, *Ib.* Syn. *C. lutea*, Müller; *C. albomaculata*, Baird; and *C. alba*, Baird (young).
— nitida, *Liljeborg.*

Zenker arranges his species from the Cattegat and the Baltic thus—

Cythere lutea, *Müller.* Syn. *C. reniformis*, Baird.
— gibba, *Ib.* Syn. *C. gibbera*, Müller. (Male and Female.)
flavida, *Ib.*
— viridis, *Ib.* Syn. *C. variabilis*, Baird.

they even recognise the same forms for Müller's species, except in the case of *C. gibba* and *C. gibbera*. Liljeborg figures as *C. viridis* of Müller what Zenker figures as Müller's *C. flavida;* and Zenker figures as *C. viridis* a form that approximates to Liljeborg's *C. nitida*. Liljeborg's view of *C. viridis* appears to me to be correct: Zenker's *C. flavida* should be referred to the same species; Müller's *C. flavida* being a different form.

S. Fischer has lately ('Munich Transactions,' 1855) further illustrated one of of Müller's species, and two new forms.

Genus—Cythere,[1] *Muller*.

Animal creeping; chiefly marine.[2] Eye single, the coalescence of which is more or less imperfect: upper antennæ setiferous, but not presenting a filamentous plume; lower antennæ hooked and furnished with a single, long, jointed filament; feet three pairs. The *carapace-valves* are usually ornamented on their anterior and posterior borders with a marginal series of fine spines or denticulations, which are coarsest in the sub-genus *Cythereis* and finest in *Bairdia*.

Cythere proper.

Carapace often very convex, especially on the ventral portion; sometimes smooth and setigerous, generally pitted, and occasionally reticulated; varying in outline from an acute-oval to an irregular oblong; in the first case it often resembles a peach-stone in miniature; in the latter case a central and two posterior tubercles sometimes give a character to the valves;[3] and in each case the anterior, and sometimes the posterior, hinge forms an indistinct angle on the dorsal edge; the hinge-line of each valve occupies about the middle third of the dorsal margin, and presents a ridge or bar and a furrow, the bar on one valve corresponding to the furrow on the other; the bar is sometimes blended with the edge of the valve, and is occasionally finely crenulated;

[1] For synonyms, see 'Monog. Entom. Cret., 1849, p. 8.

[2] *Cythere inopinata*, Baird, and another species referred to by Say, are the exceptional species in this respect. According to Zenker, one species, at least, of marine *Cytheres* can live for several days in fresh water; and, on the other hand, S. Fischer describes a *Cypris* from saltish water at the mouth of the Neva, and another from the sea-water of the harbour at Alexandria.

[3] The central tubercle is internally a shallow pit, associated with lucid spots and marking the place of muscular attachment.

it is more or less developed at its extremities into cardinal processes or teeth, which, with still stronger, but isolated, teeth at the ends of the furrow on the opposite valve form the anterior and posterior hinges of the carapace: the ventral margin of each valve is more or less incurved near the middle, where its edge is frequently produced (as also occasionally in *Cypris*) into a thin projecting laminar curvilinear plate. The posterior border being always depressed and contracted, and frequently notched at its dorsal angle, forms a low subacute marginal rim or "posterior lobe," of varying breadth.

[*Oval forms of* CYTHERE proper.]

No. 1. CYTHERE PUNCTATA, *Münster*. Plate II, figs. 5 *a*—5 *h*.

CYTHERE PUNCTATA, *Münster*. Jahrb. f. Min., &c., 1830, p. 62.
CYTHERINA PUNCTATA, *Roemer*. Neues Jahrb. f. Min., &c., 1838, p. 515, t. 6, fig. 2.
CYPRIDINA PUNCTATA, *Reuss*. Haidinger's Abhandl., iii, p. 68, t. 9, fig. 24.
— PUNCTATELLA, *Ib*. Haidinger's Abhandl., iii, p. 65, t. 9, fig. 15. (Young of *C. punctata?*)
CYTHERE PUNCTATELLA, *Bosquet*. Mém. Couron. Acad. Belg., xxiv, p. 75, t. 3, fig. 12. (Young of *C. punctata?*)

INCH.
Length, $\frac{1}{30}$

Recent: Britain; Europe.
Pliocene: Suffolk.
Upper and Middle Tertiary: Europe.
Middle Tertiary: Maryland?

Carapace broadly sub-ovate, resembling a peach-stone in miniature, most convex towards the middle of the ventral portion; right valve (fig. 5 *b*) narrower than the left, and its hinge-line more oblique: *surface* of the valves coarsely pitted with sub-hexagonal serial punctations (fig. 5 *h*), and in the old specimen[1] (fig. 5 *a*), marked on the anterior portion with concentric raised lines, or faint ridges, near the margin; the pittings and the marginal concentric lines (which latter rarely occur) are both subject to variation in their relative size and distinctness, according to the age of the individuals. In young specimens (fig. 5 *e*), both the shape and the punctation resemble that of *C. punctatella*, Reuss.

This species occurs plentifully in the Crag of Suffolk, together with *C. Woodiana*, &c. It has been found also in the Austro-Hungarian Tertiaries by Reuss; and at Palermo and Castell' Arquato by Münster. I have it from the Bordeaux sand, and a scarcely distinguishable variety from Maryland, United States. *C. punctatella* occurs also in the Austro-Hungarian Tertiaries, and at Castell' Arquato, Bordeaux, and Perpignan.

[1] This specimen is not quite perfect, the posterior lobe having been broken away.

The following localities yield varieties apparently indistinguishable from *C. punctata*, —Southend (near the mouth of the Thames), Poole Bay (Dorset), Devonshire Coast, Tenby, and Arran; also Australia.

Numerous allied forms of this punctated peach-stone-like group of *Cytheres*, generally of small size, are common in the Oolitic, Cretaceous, and Tertiary deposits, and in the present seas.

No. 2. CYTHERE TRIGONULA, *spec. nov.* PLATE III, figs. 1, *a*—1, *h*.

	INCH.	
Length,	$\frac{1}{20}$	Pliocene: Suffolk.

Carapace ovately subtriangular, depressed on the anterior, dorsal, and posterior borders, and strongly convex ventrally, where the valves are, as it were, pinched up into an obtuse ventral ridge, surmounted by a slight longitudinal fold; the surface of each valve gradually rises outwards from the dorsal edge to the ventral border, and is then suddenly bent inwards, so that the ventral surface of the closed carapace is flat, and that of the dorsal culminate; the transverse section of the carapace being triangular: *surface* finely punctate, with small round pits (fig. 1 *h*): *hinges* strongly developed.

Dorsal aspect lanceolate; *end view* triangular.

Cythere trigonula is plentiful, and accompanies *C. punctata*, in the Crag of Suffolk. Its triangular shape and larger size well distinguish it from its companion; and the pits of its punctation are relatively smaller.

No. 3. CYTHERE TRIANGULARIS, *Reuss*. PLATE VII, figs. 5 *a*—5 *g*.

CYTHERE TRIANGULARIS, *Reuss*. Zeitsch. Deutsch. Geol. Gesell., vii, p. 279, t. 10, fig. 3.

	INCH.	
Length,	$\frac{1}{20}$	Lower Eocene: London. Cretaceous: Basdorf, Mecklenburg.

Carapace gibbose, ovato-triangular; dorsal margin straight; extremities obliquely rounded and toothed; hinder end narrowest; ventral portion of each valve strongly convex, surmounted by a narrow, well-defined, spinous, longitudinal, slightly curved ridge or fold, and turned suddenly inwards, so as to form a flat ventral face to the closed carapace: *valves* thin, smooth, shining, and beset with scattered setæ: *hinge*

long, delicate, and well-defined, the median bar and furrow elongate and simple, but the anterior and posterior isolated teeth on the right valve are knurled or crenulated, their surfaces presenting 4—5 minute rounded knobs or denticles, which fit crenulate furrows on the other valve.

Dorsal aspect irregularly ovate, with the ends produced; *end-view* triangular, with the lateral lines slightly curved.

The specimens which I here refer to *C. triangularis*, Reuss,—agreeing with that species in all essential particulars,—occurred not unfrequently in the London Clay, from the excavations made for the Great Northern Railway in the Copenhagen Fields, north of London, and were obtained by Mr. J. Purdue, to whom I am indebted for the majority of my specimens from the London Clay. Reuss describes his specimens as occurring in the Cretaceous deposits at Basdorf, near Kröpelin, in Mecklenburg; several of the microzoa of these beds, as Reuss well remarks, have a tertiary aspect.

No. 4. CYTHERE WETHERELLII, *Jones*. PLATE IV, fig. 15; Pl. VI, figs. 16 *a*—16 *d*.

CYTHERE WETHERELLI, *Jones*. Quart. Journ. Geol. Soc., x, p. 161, t. 3, fig. 9.

	INCH.	
Length,	$\frac{1}{30}$	Middle Eocene: Isle of Wight.

Carapace irregularly ovate; contracted posteriorly; convex and somewhat flattened towards the ventral portion; suddenly inturned and flattened along the ventral border; bearing a subtriangular impression at about the middle of the dorsal portion of each valve; *surface* of the valves ornamented by a delicate reticulation, the meshes of which are formed by slightly raised anastomosing borders; reticulation fading away towards the dorsal margin: *hinge* delicate, presenting a modification of the hind and front teeth of the right valve, which are finely knurled, and connected by a continued fine knurling of the edge of the valve, whilst the median bar and furrow are obsolete.

Dorsal aspect narrow-oblong, with the ends angular and produced, *end-view* almost quadrangular, somewhat pentagonal.

Cythere Wetherellii is not uncommon in the Middle Eocene Sands of Colwell Bay, Isle of Wight, and also in an Oyster-band[1] of this series at the same locality. One

[1] Some years since a handful of this clay with remains of oysters was given to me as having been brought from Woolwich; and the species of *Entomostraca* which I had obtained from it (viz., *C. Wetherellii*, *C. plicata*, and *C. angulatopora*) were in consequence enumerated in the 'Quart. Journ. Geol. Soc.,' vol. x. p. 160, as belonging to the Woolwich series. Since then I have satisfied myself of the incorrectness of the stated locality of this clay. The above-mentioned species must therefore be regarded as belonging to the Middle, and not the Lower, Eocene.

specimen was also received from Mr. F. Edwards among his specimens of Entomostraca from Barton.

No. 5. CYTHERE STRIATOPUNCTATA, *Roemer*, *sp.* PLATE V, figs. 6, 7 *a*—7 *c*, 10.

CYTHERINA STRIATOPUNCTATA, *Roemer*. Neues Jahrb. f. Min., &c., 1838, p. 515, t. 6, fig. 2.
CYTHERE STRIATOPUNCTATA, *Bosquet*. Mém. Couron. Acad. Belg., xxiv, p. 62, t. 3, fig. 1.

	INCH.	
Length,	$\frac{1}{20}$	Middle Eocene: England and Europe.

Carapace ovate, very convex, subcylindrical, somewhat resembling a walnut in miniature; right valve (pl. 5, figs. 6, 10) less uniformly ovate than the left valve (pl. 5, figs. 7 *a*), narrower, and more angular on the dorsal border; anterior and posterior margins of the valves usually denticulate: *surface* ornamented with deep concentric furrows, curving round the anterior part of the valve, converging posteriorly, and becoming more or less straight and parallel at the centre; the furrows are crossed at short intervals by slight ridges, connecting the stronger concentric ridges which define the furrows, and forming unequal reticulation, each mesh of which is, for the most part, pierced at its centre by a well-marked pit.

M. Bosquet has examined the specimen on which *C. pertusa*, Roemer, *loc. cit.* t. 6, f. 2, was founded as a species, and he regards it as the young of *C. striatopunctata*.

Cythere striatopunctata is very abundant in the Barton Clay of the Hampshire Coast (Middle Eocene), and is plentiful in equivalent deposits at High Cliff, on the same coast. It occurs also at Bracklesham, and in a bed of sandy clay with green grains (silicate of iron) at Alum Bay, Isle of Wight (numbered 29 in Mr. Prestwich's section, 'Quart. Journ. Geol. Soc.,' ii. p. 257, t. 9), containing a small, depressed, undescribed Nummulite,[1] and belonging to the Barton series (Middle Eocene).

M. Bosquet has found it in the "Sables moyens," the "Calcaire grossier," and the "Sables inférieurs" of France, and in the "Sable à grès calcifère" and the Lower Tongrian beds of Belgium. Roemer described it from the Paris Tertiaries.

No. 6. CYTHERE CONSOBRINA, *spec. nov.*

	INCH.	
Length,	$\frac{1}{20}$	Middle Eocene: Barton, Hants.

Carapace elongate-oval, subcylindrical; obliquely rounded in front; contracted

[1] See also 'Quart. Journ. Geol. Soc.,' viii, p. 334, *note*.

behind; posterior lobe narrow, depressed, and rounded; dorsal border slightly arched; ventral border nearly straight: *valves* gibbous, smooth, faintly punctate, most convex posteriorly and ventrally.

Dorsal aspect elongate-ovate; *end-view* orbicular.

The species here described [which was found after the plates were finished] is very near to *Cythere Favrodiana*, Bosquet ('Mém. Commiss. Carte géol. Neerl.,' p. 80, t. 8, f. 7; and 'Mém. Soc. Roy. Liége,' iv., p. 361, t. 1, f. 5); its outline, however, is more oval; its posterior lobe is not so acute; and its surface is more uniformly convex, and is punctate. It has other allies in *C. fusiformis*, Bosquet, and *C. attenuata*, presently to be described.

Cythere consobrina occurs rarely in the Barton Clay, Hampshire. [Mr. F. Edward's Collection.]

No. 7. CYTHERE ATTENUATA, *spec. nov.* PLATE V, fig. 11.

	INCH.	
Length,	$\frac{1}{30}$	Middle Eocene: Isle of Wight.

Carapace elongate-ovate, subcylindrical, rounded and slightly tapering anteriorly; obliquely acuminate posteriorly; dorsal border slightly oblique, and forming an angle with the posterior border; ventral border curved; valves somewhat depressed in front, and produced behind into an angular, suddenly flattened posterior lobe: *surface* smooth, convex, and marked on the middle of the ventral portion with a slight triangular impression [not well shown in the figure].

Cythere attenuata approaches *C. inornata*, Bosquet (Entom. Tert, p. 71, t. 3, f. 7), but is narrower, and more tapering and acute.

One specimen from the Clay with green sand (No. 29, of Mr. Prestwich's section[1]) at Alum Bay, Isle of Wight, represents this species.

[B. *Oblong forms of* CYTHERE, proper.]

No. 8. CYTHERE KOSTELENSIS (?), *Reuss sp.* PLATE VI, figs. 14 *a*, 14 *b*.

CYPRIDINA KOSTELENSIS, *Reuss*. Haidinger's Abhandl., iii, p. 68, t. 9, fig. 22.
CYTHERE KOSTELENSIS, *Jones*. Quart. Journ. Geol. Soc., x, p. 161, t. 3, fig. 10.

	INCH.	
Length,	$\frac{1}{40}$	Middle Tertiary: Austria, &c. Lower Eocene: Woolwich, Kent.

[1] See above, p. 27.

Carapace small, oblong, depressed, flattest anteriorly; obliquely rounded in front, semicircular behind; upper and lower margins slightly incurved; extremities bearing slightly raised marginal rims: *surface* roughened with irregular punctations.

Dorsal aspect elongate-acute-ovate; *end-view* suboval.

Two specimens of this minute species (which agrees with Reuss's *C. Kostelensis*, except in the condition of the posterior margin) were found by Mr. Rosser in the Woolwich beds (Lower Eocene). *C. Kostelensis* occurs in the Leitha-Kalk of Moravia and Austria, in clay-beds near Vienna, in the salt-rock of Galicia, and in Tertiary beds of Upper Silesia.

No. 9. CYTHERE CONCINNA, *spec. nov.* PLATE IV, figs. 7 *a*—7 *f*.

	INCH.	
Length,	$\frac{1}{20}$	Pleistocene: Bridlington, Yorkshire.

Carapace triangular-oblong; rounded in front, obliquely truncate behind; straight on the ventral, and obtusely angular on the dorsal border, the anterior hinge forming a low blunt angle: *surface* of valves depressed; marked by three low tubercles (one central and two posterior), minutely punctated, and perforated at points as wide apart as the distance of 3—4 of the superficial pits (fig. 7 *f*); the valves have also a slightly elevated anterior margin, and are sometimes beset with obscure scattered tubercles, forming an irregular rugosity of the surface.

Dorsal aspect narrow-oblong with rounded ends; *end-view* narrow-ovate.

Cythere concinna was found in some numbers—together with *Cythere* (*Cytheridea*) *Sorbyana*—by Mr. H. C. Sorby in the Bridlington Crag, at Bridlington, Yorkshire.

No. 10. CYTHERE WOODIANA, *spec. nov.* PLATE III, figs. 2 *a*—2 *g*.

	INCH.	
Length,	$\frac{1}{18}$	Pliocene: Suffolk.

Carapace oblong, rounded obliquely at the extremities, upper and lower borders nearly straight; valves depressed anteriorly, most convex just behind the centre and towards the ventral border; right valve markedly narrower than the left; its hinge-line outstanding, being notched fore and aft: *surface* ornamented with small well-marked sub-hexagonal or circular pits, arranged in longitudinal lines, except on the anterior portion of the valves, where the pitting affects transverse and concentric lines;

punctation very fine, and lying in depressed lines or striæ in young individuals; coarser and less distinctly linear, and somewhat transverse, in old specimens. A variety, white and smooth, almost destitute of punctations, or rather with exceedingly minute linear pittings, is common; and some individuals are partially punctated. The *hinge* is strongly developed.

Dorsal aspect elongate-acute-ovate; *end-view* suborbicular.

This species appears to belong to the same type as *C. Jurinei*, Münster, and its varieties, figured and described by Bosquet ('Descript. Entom. Tert.,' p. 56, t. 2, figs. 9, 10), *C. Meyni*, Reuss ('Zeitsch. Deut. geol. Ges.,' viii, p. 279, t. 10, fig. 5), and *Bairdia* (?) *semipunctata*, Bornemann (*Ibid.*, vii, p. 359, t. 21, fig. 1). I have met with a very similar form in Tertiary sand from Bordeaux.

Cythere Woodiana occurs very plentifully, in different stages of growth, and with several variations as to intensity of punctation, in the Crag of Suffolk,—and bears the name of Mr. Searles N. Wood, who has for many years, and with great success, collected, studied, and elucidated the fossils of the Crag. To Mr. Wood I am indebted for the majority of the specimens from the Crag described in this Monograph.

No. 11. Cythere laqueata, *spec. nov.* Plate III, figs. 3 *a*—3 *h*.

	INCH.	
Length,	$\frac{1}{18}$	Pleistocene: Red Crag, Essex. Pliocene: Crag, Suffolk.

Carapace broad-ovate-oblong, rounded somewhat obliquely in front, contracted and rounded behind; extremities denticulate, depressed; dorsal margin slightly arched: ventral margin somewhat sinuous: *valves* nearly equal; surface coarsely punctate with large subquadrate pits: *hinges* very strong.

Dorsal profile broadly acute-ovate; *end-view* subovate.

In a translucent young valve the surface is smooth, but a distinct coarse reticulation is seen by the opacity of the parietes of its meshes in the tissue of the valve: these meshes appear to be subsequently represented by the superficial pittings.

Cythere laqueata is rather rare in the Crag of Sutton, &c., in Suffolk, where it occurs with *C. Woodiana*, *C. Macropora*, &c. It occurs also in the Upper or Red Crag at Walton-on-Naze, Essex.

No. 12. Cythere Dictyosigma, *spec. nov.*

	INCH.	
Length,	$\frac{1}{24}$	Pliocene: Suffolk.

Carapace oblong; extremities obliquely rounded: *valves* thick, somewhat depressed, showing more or less distinctly the central and two posterior tubercles; surface finely reticulated, the meshes small, angular, and deep, the parietes of the meshes thick, squared, and strong; on the ventral slopes the longitudinal parietes of the reticulation are the most distinct (as is usual in reticulated carapaces), on the rest of the surface the reticulation is irregular or labyrinthine.

Dorsal aspect narrow-obtuse-ovate; *end-view* subovate.

Cythere Dictyosigma somewhat resembles *C. bidentata*, Bosquet ('Entom. Tert.,' p. 72, t. 3, fig. 9), from Dax. It is not uncommon in the Crag of Suffolk; but the specimens were overlooked when the plates were being prepared.

No. 13. CYTHERE LACUNOSA, *spec. nov.* Plate III, figs. 5 *a*, 5 *b*.

	INCH.	
Length,	$\frac{1}{27}$	Recent: Norway. Pliocene: Suffolk.

Carapace oblong, slightly tapering backwards; rounded obliquely at the extremities; posterior lobe narrow and thickened; dorsal and ventral edges nearly straight; valves somewhat depressed, with the centre sunken and occupied by a large tubercle; margins depressed and thickened: *surface* of valves marked by 3—4 concentric riblets towards the anterior margin, one of which is continued along the dorsal part of the valve; parallel with and inside this slight dorsal ridge is a row of coarse, quadrangular, shallow pits; an obscure punctation and scattered pimples occupy the middle part of the valves, especially around the great central tubercle.

Dorsal aspect irregular-narrow-oblong.

This species occurs in the Crag of Suffolk, where it is rather rare. It is plentiful in the deeply dredged shell- and sponge-sand from the Norway coast, with which I have been favoured by Messrs. MacAndrew and Barrett.

No. 14. CYTHERE SCABROPAPULOSA, *spec. nov.* Plate V, fig. 16.

	INCH.	
Length,	$\frac{1}{29}$	Middle Eocene: Bracklesham.

Carapace sub-oblong; tapering backwards, and ending in a flattened, angular, denticulate, posterior lobe; anterior extremity obliquely rounded, bordered by a thickened and raised margin: *surface* of valves thickly beset with low and rounded tubercles; anterior hinge marked by a strong tubercle.

Dorsal aspect elongate-subovate.

This species closely resembles *C. scabra*, Münster, figured and described by Bosquet, 'Descrip. Entom. Tert.,' p. 103, t. 5, fig. 7; but, instead of smooth tubercles, the latter has ragged lamellar tubercles. Such exogenous growths as tubercles and spines are subject to great variations of development, and must be used with caution for specific characters; still I prefer to regard the form under notice as distinct from *C. scabra*.

Cythere scabropapulosa occurs at Bracklesham, and is rare. *C. scabra*, according to Bosquet, belongs to the Subapennine deposits of the South of France, and the Miocene beds of Dax; Roemer derived it from the North-west of Germany (Osnabruck), and from Bordeaux.

No. 15. CYTHERE COSTELLATA, *Roemer, sp.* Plate V, fig. 11.

CYTHERINA COSTELLATA, *Roemer*. Neues Jahrb. f. Min., &c., 1838, p. 517, t. 6, fig. 24.
CYTHERE COSTELLATA, *Bosquet*. Mém. Couron. Acad. Belg., xxiv, p. 58, t. 2, fig. 11.

	INCH.	
Length,	$\frac{1}{28}$	Middle Eocene: England and France.

Carapace ovato-oblong; rounded before, narrow behind; dorsal border straight, ventral slightly convex: *valves* most convex posterior to the centre, depressed anteriorly; front and hind margins more or less denticulate; surface covered by several narrow, rounded, longitudinal, slightly sinuous ribs, placed side by side (10 or 11 in my specimens, 7 or 8 in M. Bosquet's, and "about six" in M. Roemer's).

Dorsal aspect elongate-acute-ovate; *end-view* ovate.

A slight difference in the number of the superficial riblets exists amongst the specimens figured and described,—as above noticed; and there also appears to be a somewhat greater convexity in Roemer's 6-ribbed form than in Bosquet's 7- or 8-ribbed specimens, and in the latter than in my 10-ribbed specimens.

Bosquet enumerates several localities for *C. costellata* in the "Sables moyens," the "Calcaire grossier," and in the "Sables inférieurs" of France. Roemer's specimens also came from the Paris Tertiaries. In England I have only met with this species in the sandy blue clay at Bracklesham, where a single specimen (perfect carapace) was obtained.

No. 16. CYTHERE PLICATA, *Münster*. Plate IV, fig. 16; Pl. V, figs. 8 *a*—8 *d*; Pl. V, fig. 17.

CYTHERE PLICATA, *Münster*. Jahrb. f. Min., &c., 1830, p. 63; and Neues Jahrb., &c. 1835, p. 446.
CYTHERINA PLICATA, *Roemer*. Neues Jahrb. f. Min., &c., 1838, p. 518, t. 6, fig. 26.
CYPRIDINA PLICATA, *Reuss*. Haidinger's Abhandl., iii, p. 43, t. 10, fig. 21.
— LATICOSTATA, *Ib*. Haidinger's Abhandl., iii, p. 87, t. 11, fig. 13. [*C. plicata*, var.]
CYTHERE PLICATA, *Bosquet*. Mém. Couron. Acad. Belg., xxiv, p. 60, t. 2, fig. 13.
— (CYTHEREIS) PLICATA, *Jones*. Quart. Journ. Geol. Soc., x, p. 162, t. 2, fig. 13.

INCH.
Length, $\frac{1}{20}$ — Middle Eocene: Isle of Wight, and Hampshire. Upper and Middle Eocene: Europe.

Carapace ovato-oblong; anteriorly oblique, with the antero-ventral angle rounded; posteriorly narrower and obliquely rounded; dorsal margin straight; ventral margin convex or somewhat sinuate: *valves* most convex at the posterior third; bearing three raised longitudinal ridges,—one on either side of, and parallel with, the median line of the valve (the ventral one the most convex and gently curving downwards, the other weaker and sinuous), and another (the third) ridge occupying the dorsal part of the valve, shorter than the others and curved, its most convex central portion more or less projecting over the dorsal edge; the ventral portion of the valve suddenly slopes inwards and downwards from the summit of the ventral ridge, so as to form a blunt keel to the closed carapace; front and hind margins more or less denticulate: *surface* of the valves usually ornamented with faint longitudinal wrinkles and obscure pittings and reticulations on and between the ridges.

Dorsal profile elongate-subovate, with angular ends; *end-view* broad-irregular-ovate, modified by the lateral ridges.

This species, like *C. triplicata* of the Chalk, is one of the passage-forms between *Cythere* proper and *Cythereis*.

Var. *laticosta* (Reuss, *Loc. cit.*), from the Barton Clay of Hampshire, is decidedly identical with the form (from the same deposit) figured at pl. 5, fig. 8; and is merely a more ovate, shorter, plumper, and more strongly ribbed variety of *C. plicata*.

This species has been found in the Miocene deposits of Dax, and in the Eocene of France, Belgium, North-western Germany, Bohemia, Austria, and Moravia. It occurs abundantly in the white Tertiary sands and in an Oyster-band at Colwell Bay, Isle of Wight; also in the clays at Barton, Highcliff, and Bracklesham, in Hampshire.

The specimens from Colwell are opaque, white, and fragile; those from the Hampshire clays are brown, tough, and somewhat translucent.

No. 17. CYTHERE SCROBICULOPLICATA, *spec. nov.* Plate VI, figs. 4, 6 *a*—6 *d*.

INCH.
Length, $\frac{1}{25}$ — Lower Eocene: London.

Carapace ovato-oblong; extremities obliquely rounded; posterior end narrowest and most oblique; ventral margin curved from its centre towards the posterior extremity; dorsal margin straight: *surface* of the valves raised into three obscure longitudinal ridges, holding the same relative position as the ridges on *C. plicata;* valves covered with a coarse reticulation of sub-quadrangular pits, arranged somewhat concentrically.

Dorsal aspect acute-ovate; *end-view* sub-ovate.

This species differs from *C. scrobiculata*, Münster, in the ridged character of the valves, in being more oblong, in having the longitudinal parietes of the pits on the central part of the valves more developed than the transverse, and in the absence of the faint semicircular riblets which traverse the anterior portion of *C. scrobiculata*.

The latter occurs in the Eocene deposits of France and Belgium, and in Tertiary deposits of the North-west of Germany; also at Dax in France, and near Parma in Italy.

Cythere scrobiculoplicata is not rare in the London Clay of Copenhagen Fields, London; and Mr. Wetherell has favoured me with a fine specimen from the London Clay of Finchley, near London.

Var. RECTA, *nov.* Plate VI, fig. 9.

	INCH.	
Length,	$\frac{1}{33}$	Middle Eocene: East Woodhay, Hampshire.

Carapace smaller than that of *C. scrobiculoplicata*, triangularly ovate, obliquely rounded in front, and tapering symmetrically towards the rounded posterior extremity; the anterior portion of the valves not reticulated, but obscurely punctate, and bordered by a narrow, raised, marginal rim; the rest of the surface is ridged and reticulated on the plan of *C. scrobiculoplicata*.

A single valve occurred in some blue clay, from East Woodhay, Hampshire, probably belonging to the Bagshot and Bracklesham series.

No. 18. CYTHERE ANGULATOPORA, *Reuss, sp.* Plate IV, figs. 17, 18 *a*, 18 *b;* and Pl. VI, fig. 18.

CYPRIDINA ANGULATOPORA, *Reuss.* Haidinger's Abhandl., iii, p. 86, t. 10, fig. 32.
CYTHERE ANGULATOPORA, *Bosquet.* Mém. Couron. Acad. Belg., xxiv, p. 68, t. 3, fig. 5.
— (CYTHEREIS) ANGULATOPORA, *Jones.* Quart. Journ. Geol. Soc., p. 162, t. 3, fig. 12.

	INCH.	
Length,	$\frac{1}{25}$ to $\frac{1}{16}$	Middle Eocene: England; France; Belgium.

Carapace oblong; obliquely rounded in front, rounded behind; dorsal and ventral edges nearly straight: *surface* of valves ornamented with a bold reticulation of large square meshes, the longitudinal parietes being strongly developed; a somewhat concentric arrangement of the meshes occurs at the central tubercle or place of the lucid spots. [The markings of the surface are not drawn sufficiently distinct in fig. 17.]

Dorsal aspect elongate-ovate, with the ends produced and truncate; *end-view* broadly sub-ovate.

When some of the longitudinal parietes of the reticulation are more strongly developed than the others, this form approaches *C. plicatula* and *C. Gracilicosta*, Reuss.

Cythere Angulatopora is not uncommon in the Tertiary sands and Oyster-band of Colwell Bay, Isle of Wight.

M. Bosquet has obtained this species from the "Calcaire grossier" and "Sables moyens" of France; and Dr. Reuss's specimens came from the "Calcaire grossier" of Epernay. I have found it also in a Middle Eocene deposit from Ghent, Belgium.

No. 19. CYTHERE MACROPORA, *Bosquet*. Plate III, figs. 9 *a*—9 *e*.

CYTHERE MACROPORA, *Bosquet*. Mém. Couron. Acad. Belg., xxiv, p. 97, t. 5, fig. 2.

	INCH.	
Length,	$\frac{1}{17}$	Pliocene: Suffolk. Middle Eocene: France.

Carapace oblong; slightly tapering and rounded behind; obliquely rounded in front; somewhat incurved on the upper and lower borders: *valves* thick, denticulate at the extremities, most convex posteriorly, anterior portion raised by the great central tubercle; ventral and dorsal portions sloping suddenly inwards, leaving an oblong superficial plateau, the posterior angles of which are defined by the two posterior tubercles: *surface* covered by a coarse reticulation of large quadrangular pits, separated by strong squared parietes; the pits on the dorsal portion of the plateau forming two curved longitudinal series, those on the ventral portion arranged in three or four obliquely transverse rows; the ventral and dorsal slopes also coarsely reticulated.

Dorsal aspect irregular oblong, with produced ends; *end-view* sub-quadrangular.

The very young form (fig. 9 *e*) exhibits the three tubercles (central and two posterior) very distinctly.

Cythere Macropora is rather rare in the Crag of Sutton and elsewhere in Suffolk. According to M. Bosquet, this species occurs very sparingly in the "Grès de Fontainebleau" and the "Sables moyens" of France.

No. 20. Cythere Trachypora, *spec. nov.* Plate III, figs. 9 *f*—9 *i*.

INCH.	
Length, $\frac{1}{25}$	Recent: Norway.
	Pliocene: Suffolk.

Carapace sub-quadrangular; somewhat tapering posteriorly; rounded obliquely in front; contracted behind: *valves* showing the three tubercles, the two posterior of which are prolonged forwards as faint ridges: *surface* roughly reticulato-punctate.

Dorsal aspect compressed-subovate, with produced ends.

Cythere Trachyopora differs from *C. Macropora* (with which at first I associated it as a dwarfed variety) in being smaller, with a more depressed and uneven surface, on which the posterior tubercles are more apparent; also in being less angular, and in having its ornamentation less distinctly sculptured. It appears to stand between *C. Macropora* and *C. Hebertiana*, Bosquet.

This species is frequent in the Crag of Suffolk. It occurs also recent on the coast of Norway, where it was dredged by MM. MacAndrew and Barrett. I believe that I also have had it from the Red Crag of Walton, Essex.

No. 21. Cythere retifastigata, *spec. nov.* Plate III, fig. 7.

INCH.	
Length, $\frac{1}{25}$	Pliocene: Suffolk.

Carapace-valve oblong, tapering backwards, rounded at the ends; raised by three obscure, longitudinal, parallel ridges into an oblong raised plateau, with sudden slopes towards the margins: *surface* marked with a strong punctation; the pits circular and regular in their arrangement, coarsest anteriorly.

A few specimens only of the valves of this species have as yet occurred in my examination of the Suffolk Crag.

No. 22. Cythere sphærulolineata, *spec. nov.* Plate III, fig. 6.

INCH.	
Length, $\frac{1}{24}$	Pliocene: Suffolk.

Carapace-valve oblong; obliquely rounded in front, almost truncate behind; most

convex posteriorly and ventrally; sloping suddenly towards the borders, slope steepest on the ventral border: *surface* ornamented with a large central tubercle and two thin longitudinal, parallel, beaded ridges; one of which is placed at the edge of the dorsal, the other at that of the ventral slope; and both are connected by a similar, short, transverse ridge along the edge of the posterior slope; the area between and outside the ridges is faintly punctate.

Dorsal aspect elongate-acute-ovate, nearly cuneiform; *end-view* sub-ovate.

I have met with only three specimens in the Crag of Suffolk.

Sub-genus—CYTHEREIS,[1] *Jones*.

Animal probably a *Cythere*. *Carapace* oblong; variously ornamented with reticulations, tubercles, spines, and ridges: the bar and furrow of the hinge are nearly or quite obsolete; but the anterior and posterior hinges are well defined, and isolated, marking definite angles in the outline of the carapace-valves: the central and posterior tubercles on the surface of each valve are strongly marked, passing into more or less developed longitudinal ridges, the ventral one of which is always raised, and often greatly produced, giving a flat ventral surface and a somewhat triangular end-view to the closed carapace.

No. 1. CYTHEREIS SENILIS, *spec. nov.* Plate III, figs. 8 *a*, 8 *b*.

	INCH.	
Length,	$\frac{1}{29}$	Pliocene: Suffolk.

Carapace-valve oblong, rounded in front, truncate and denticulate behind; margins thickened; surface bearing three disconnected, squared ridges; the one towards the ventral border running the length of the raised plateau of the surface and curving round its anterior portion; the central ridge shorter and nearly straight; the dorsal one shortest and oblique; exposed edge of the ridges beaded, or rather marked with lozenge-shaped spots, which possibly indicate that the ridges were once higher and perforate, as in *Cythereis fistulosa*, *C. runcinata*, and *C. prava*, Baird,—the lozenge-markings being perhaps the bases of the minute interstitial pillars of the raised perforate edges of the ridges.

[1] For synonyms and greater detail of description, see 'Monog. Entom. Cret.,' 1849, p. 14. Since 1849, *Cythereis* has been in some cases erected into a genus, in others merged into *Cythere* proper, and rarely accepted as a sub-genus. See Note above, p. 7.

Cythere (*Cythereis*) *senilis* is very nearly allied to *C. fistulosa* and *C. runcinata*, Baird:[1] it is represented by one specimen only from the Crag of Suffolk.

No. 2. Cythereis Bowerbankiana, *spec. nov.* Plate VI, figs. 7, 8.

	INCH.	
Length,	$\frac{1}{19}$	Eocene: London.

Carapace-valves oblong, obliquely rounded in front, contracted behind, most convex posteriorly and ventrally; margins of the extremities depressed, more or less coarsely denticulate; ventral portion strongly ridged and coarsely spined: *surface* of valves coarsely and irregularly reticulate; bearing coarse irregular spines along the dorsal portion, and scattered short spines or tubercles about the central portion; both spines and reticulations variable in their development.

Dorsal profile sagittate with jagged outline; *end-view* triangular.

A few specimens of single valves of this species occurred in the London Clay of the Copenhagen Fields at the Great Northern Railway cutting; and Mr. W. K. Parker has lately favoured me with two fine perfect carapaces from the London Clay of Wimbledon Common.

I associate with this characteristic and remarkably fine species the name of one of the most successful and distinguished of the geologists who have studied the natural history of the London Clay, and of the British fossiliferous deposits generally.

No. 3. Cythereis horrescens, *Bosquet*. Plate V, figs. 9, 17 *a*, 17 *b*.

Cythere horrescens, *Bosquet*. Mém. Couron. Acad. Belg., xxiv, p. 116, t. 6, fig. 5.
? — latidentata, *Bornemann*. Zeitsch. Deutsch. geol. Ges., vii, p. 366, t. 21, fig. 6.

	INCH.	
Length,	$\frac{1}{25}$	Recent: Norway.
		Eocene: England; France.

Carapace-valves oblong, rounded at the ends, which are more or less coarsely denticulate; ventral ridge coarsely spined: *surface* beset with scattered blunt spines[2] and

[1] 'Proceed. Zool. Soc. London,' 1850, p. 256: Annulosa, t. 18, figs. 1—3, 7—9. Possibly these are varieties of one species.

[2] In fig. 9 the dorsal portion of the valve ought to bear blunt spines, not tubercles.

tubercles, varying (like the spines of the ventral ridge and the extremities) in their development in different individuals.

Dorsal profile sagittate and jagged; *end-view* triangular.

Cythere (*Cythereis*) *horrescens* occurs both at Barton and Bracklesham, in the Tertiary clays. According to M. Bosquet, this species and its varieties are found in the "Sables moyens," the "Calcaire grossier," and the "Sables glauconifères" of France.

I have found two specimens of this fine species in the sand dredged by Messrs. MacAndrew and Barrett on the Norway Coast.

No. 4. CYTHEREIS CERATOPTERA, *Bosquet*. Plate IV, fig. 1.

CYTHERE CERATOPTERA, *Bosquet*. Mém. Couron. Acad. Belg., xxiv, p. 114, t. 5, fig. 2.

	INCH.	
Length,	$\frac{1}{16}$	Pliocene: Suffolk. Upper and Middle Eocene: Belgium and France.

Carapace sub-oblong, tapering posteriorly; smooth; strongly and coarsely spined on the anterior, dorsal, and posterior margins, and along the ventral ridge, which is very much produced.

Dorsal aspect sagittate, with the edges jagged; *end-view triangular*.

From the Crag of Sutton, Suffolk, where it appears to be rare. Bosquet obtained it in Belgium from the Basele Clay near Rupelmonde, and from the Nucula-bed at Berg, near Klein-Spawen; and in France from Tertiary sands near Etampes.

No. 5. CYTHEREIS CORNUTA, *Roemer, sp.* Plate IV, fig. 19; Pl. V, figs. 15 *a*, 15 *b*.

CYTHERINA CORNUTA, *Roemer*. Neues Jahrb. f. Min., &c., p. 518, t. 6, fig. 31.
— — *Reuss*. Verstein. Böhm. Kreid., p. 105, t. 24, fig. 20.
CYTHERE CORNUTA, *Bosquet*. Mém. Couron. Acad. Belg., xxiv, p. 117, t. 6, fig. 4.
— — *Reuss*. Zeitsch. Deutsch. geol. Ges., vii, p. 282, t. 10, fig. 10.
— (CYTHEREIS) ALATA (?), *Bosq.*, *Jones*, Monog. Entom. Cret., p. 21, t. 5, fig. 14.

	INCH.	
Length,	$\frac{1}{28}$	Middle Eocene: England and Europe. Cretaceous: England and Europe.

Carapace sub-oblong; oblique and somewhat rounded in front; posterior lobe sub-angular; extremities denticulate; surface smooth, occasionally marked with one or

more obscure tubercles near the centre, and with one, and sometimes two slight semi-lunar ridges near the dorsal margin; ventral ridge strongly produced, narrow, and smooth.

Dorsal aspect sagittate; *end-view* triangular.

Cythere (*Cythereis*) *cornuta* has many near allies. M. Bosquet has separated (under the name of *C. calcarata*) the form figured by Reuss ('Haid. Abh.,' iii, t. 10, fig. 18) as *C. cornuta* [and subsequently referred by him—fig. 18 *b* to *C. ceratoptera*, Bosquet, and fig. 18 *a* to *C. coronata*, Roemer], because it is spiny on the dorsal and ventral borders, though Roemer's figure of *C. cornuta* appears to indicate a tendency to spinosity on the ventral ridges. *C. ceratoptera* is of the same typical form, but presenting spines or serrations at every margin. Nor is there much to distinguish *C. serrulata*, Bosquet, from *C. cornuta;* and the cretaceous form from the English Chalk which I referred to Bosquet's *C. alata* has, I believe, no distinction from the *C. cornuta* of Colwell and Bracklesham (pl. 4, fig. 19, and pl. 5, fig. 15), except in its somewhat greater squareness and convexity, and the possession of a few more spines.

The specimens of *C. cornuta* here figured and described are from the Tertiary sands of Colwell Bay, Isle of Wight, and from the Tertiary blue clay of Bracklesham Bay, Hampshire.

No. 6. CYTHEREIS, *sp. indeterm.* Plate VI, fig. 17.

Lower Eocene: Thanet Sands, Kent.

This fragment from the antero-dorsal angle of the left valve of a *Cythereis*, indicating a ridged valve, possibly resembling *C. quadrilatera* of the Chalk, occurred in some of the Thanet Sand from Pegwell Bay, near Ramsgate.

As, from the nature of the deposit, calcareous organisms of any kind are rare,[1] and as this is the only indication of an Entomostracon met with, though I have examined several specimens of the Thanet Sands from Mr. Prestwich's cabinet, I have figured the fragment in this place, as at least an interesting, if not an instructive specimen.

Sub-genus—CYTHERIDEA, *Bosquet*,[2] *genus*. *Cytherinæ* et *Cytheres*, Auctorum.

Animal a *Cythere*. *Carapace* somewhat triangular, or triangularly ovate, the widest part (vertically) being at the anterior third, beneath the anterior hinge; surface usually pitted, occasionally reticulated: *hinge-margin* of one valve (right) marked by a series

[1] 'Quart. Journ. Geol. Soc.,' vol. viii, p. 245. [2] 'Descript. Entom. foss. Terr. Tert.,' p. 37.

of small tubercles, forming a knurling or fine crenulation on this edge, somewhat like the hinge-teeth of *Nucula*, the other valve having corresponding pits on its dorsal margin: these rows of small hinge-teeth are either continuous along the hinge-margin (as in Dana's figure of *Cythere Americana*), or are discontinued (to a greater or less extent) in the central part and form isolated groups at the anterior and posterior angles of the dorsal margin; whilst the intermediate portion of the margin has still smaller tubercles on the *left*, and corresponding pittings on the right valve[1] (this is also the case in *Cyprideis* [*Cythere?*] *torosa*): ventral margins somewhat incurved.

No. 1. CYTHERIDEA MULLERI, *Münster, sp.* Plate V, figs. 4 *a*—4 *c*, and 5; Pl. VI, figs. 10 *a*, 10 *b*, and 11—13.

CYTHERE MULLERI, *Münster*. Jahrb. f. Min., &c., 1830, p. 62; and Neues Jahrb., &c., 1835, p. 446.
CYTHERINA MULLERI, *Roemer*. *Ibid.*, 1838, p. 516, t. 6, fig. 6.
— — *Reuss*. Haidinger's Abhandl., iii, p. 55, t. 8, fig. 21.
— INTERMEDIA, *Reuss*. *Ibid.*, p. 86, t. 11, fig. 12. [*C. Mulleri*, var.]
CYTHERIDEA MULLERI, *Bosquet*. Mém. Couron. Acad. Belg., xxiv, p. 39, t. 2, fig. 4.
— — *Jones*. Quart. Journ. Geol. Soc., x, p. 160, t. 3, fig. 7; and Mem. Geol. Survey, 1856, p. 158, t. 7, fig. 28.

INCH.
Length, $\frac{1}{20}$

Recent: Holland; Australia.
Tertiary: England; Europe; Australia?

Carapace ovately triangular, rounded anteriorly, obliquely pointed behind; dorsal margin arched; ventral margin straight or slightly incurved; anterior margin spinous: *surface* coarsely punctate; the pits generally associated with semicircular furrows on the fore part of the valves, and with longitudinal furrows on the ventral part; on the posterior half of the valve the pittings follow transverse sunken lines, parallel with the transverse sulcus which is more or less apparent on the centre of each valve, at the place of the lucid spots.

Anterior to this median furrow frequently occurs a tubercle (pl. 6, fig. 11), or at least a marked elevation of the surface (pl. 6, fig. 10 *a*). In some specimens from the Barton Clay, however, the furrow and tubercle are absent (pl. 5, fig. 4 *a*).

Lucid spots small, four, arranged in a transverse row (System c, see page 6).

Dorsal profile narrow oblong, very slightly incurved at the sides, and obtusely angular at the ends; *end-view* ovate.

[1] This form of hingement is also apparent in Zenker's figure of the hinge-line of the species which he has described as *Cythere viridis*, 'Archiv f. Natur.,' *loc. cit.* t. 4, fig. 10.

Generally the English specimens slightly differ from M. Bosquet's figures in almost wholly wanting the longitudinal parallel furrows on the ventral surface, which are continued transversely and concentrically across the anterior half of the valve; faint traces only of the concentric furrows being occasionally seen, though irregular transverse furrows, full of pittings, are conspicuous in old specimens. One such transverse furrow, immediately posterior to the lucid spots, near the centre of the valve, is nearly always present, even in young specimens. I have not met with individuals retaining the setæ of the surface.

Cythere (*Cytheridea*) *Mulleri* occurs throughout the Tertiary formations of Europe; being found in Austria, Bohemia, Hesse, Westphalia, France, Belgium, and the Netherlands, in the *Eocene;* in Touraine (*Miocene*); and in the Netherlands (*Pliocene*). In England it occurs abundantly in many of the shales of the Hempstead series, at Hempstead Cliff, Isle of Wight; and one specimen was met with in a green shale of the Osborne series, at Cliff End, Isle of Wight; it is not rare (as the var. *intermedia*) in the Barton Clay of Hampshire; and the clay with oysters from Colwell Bay, Isle of Wight, yielded three or four specimens; these deposits are of the Upper Eocene group: and in the Woolwich and Reading series (Lower Eocene) it has been found at Clay Hill,[1] near Newbury, Berks, and is abundant at Woolwich, Kent. This species also occurs in a tertiary blue clay, given to me as having been brought from Australia; and I have a small recent specimen from the Australian seas. M. Bosquet also records this species as living in the Zuyderzee, Holland.

M. Reuss has figured under the name of *Cytherina intermedia* a form which he derived from the Barton Clay of Hampshire: this is evidently identical with the unfurrowed variety (pl. 5, fig. 4) from the same deposit. M. Reuss regards it as intermediate between *C. Mulleri*, Münster, and *C. seminulum*, Reuss (*loc. cit.*, p. 59, t. 9, figs. 5—8), which latter in all its varieties appears to me to belong to Von Münster's species.

Var. TOROSA, *Jones*. Plate VI, fig. 12.

CYTHERE (CYTHERIDEA) MULLERI, *var.* TOROSA, *Jones*. Quart. Journ. Geol. Soc., x, p. 161, t. 3, fig. 8; and Memoirs Geol. Survey, 1856, p. 158, t. 7, fig. 27.

INCH.

Length, $\frac{1}{30}$

Upper Eocene: Hempstead Cliff.
Lower Eocene: Woolwich.

This variety differs from the typical *C. Mulleri* in being generally smaller (although sometimes as long, though not so nigh as the type), and in having the surface of the

[1] In the sandy clay-beds with *Ostræa Bellovacina*.

valves raised up into irregular lumps or bosses. Of these knobs, which are often but ill defined, sometimes seven can be counted on one valve. The spots most usually occupied, when the bosses are but few, are the posterior part of the valve and especially the central part immediately in advance of the sulcus and the place of the lucid spots. In its general form *C. torosa* resembles that variety of *C. Mulleri* in which the posterior extremity is contracted and acuminate (var. *acuminata*, Bosquet).

This torose variety was found plentifully by Mr. Rosser in the same beds of the Woolwich series as yielded the typical *C. Mulleri*. It occurs also abundantly in some of the shales of the Hempstead series, in Hempstead Cliff, Isle of Wight.

No. 2. CYTHERIDEA DEBILIS, *spec. nov.* Plate V, fig. 5; Pl. VI, fig. 13.

	INCH.	
Length,	$\frac{1}{42}$	Recent: Norway. Upper Eocene: Isle of Wight.

This is a small form, nearly resembling *C. Mulleri* in outline, but much smaller, and more obtuse; not so acute posteriorly as *C. Mulleri*, var. *torosa;* often destitute of the median impression, and bearing a weakly marked punctation. It is sometimes, however, larger than usual, and more strongly punctate.

Cythere (*Cytheridea*) *debilis* occurs with the typical *C. Mulleri* in numbers in an Oyster-band, a Nucula-bed,[1] and other deposits, of the Upper Eocene series at Colwell Bay, Isle of Wight. A similar form occurs recent on the coast of Norway.

No. 3. CYTHERIDEA PINGUIS, *spec. nov.* Plate II, figs. 4 *a*—4 *h*.

	INCH.	
Length,	$\frac{1}{23}$	Pliocene: Suffolk.

Carapace thick, ovate-triangular; sub-cylindrical when young; lowest behind; highest at the anterior third, where it is also somewhat compressed; dorsal border more or less arched; ventral border straight, with its edge somewhat inturned: *surface* of valves in the young state finely punctate and beset with scattered papillæ (fig. 4 *g*), in older individuals coarsely punctate (fig. 4 *h*): *hinge* well developed.

Dorsal aspect sub-oblong; *end-view* sub-orbicular.

Cythere (*Cytheridea*) *pinguis* is nearly related to *C. Mulleri* on one side and

[1] The specimens from this bed were kindly communicated to me by my friend Mr. Harris, of Charing.

C. papillosa, Bosquet, on the other; and there are several allied forms figured by Reuss (Haidinger's Abhandl., iii, pl. 8), but they do not appear to be specifically identical. The species also figured and described by M. Bosquet as *Bairdia punctatella* (Descript. Entom. Tert. p. 75, tab. 1, fig. 10) is not unlike *C. pinguis*, although smaller; and, like several other species figured on the same plate, is decidedly not a *Bairdia*.

No. 4. CYTHERIDEA SORBYANA, *spec. nov.* Plate IV, figs. 6 *a*—6 *e*.

INCH.	
Length, $\frac{1}{18}$	Pleistocene: Bridlington.

Carapace irregularly triangular and approaching a pentagonal form,—of which the ventral border makes a long straight side, the dorsal two shorter straight sides, oblique to each other and to the remaining sides, whilst lastly the anterior and posterior extremities complete the pentagon,—the former with an obliquely rounded, and the latter with an oblique straight border; the junction of the ventral and posterior borders forms an angle very slightly rounded; the anterior border is strongly spined: *surface* of the valves marked towards the margins with concentric ridges, following the outline of the valve, and connected by short oblique ridges or wrinkles, which are continued over the middle of the valve, where the long ridges become nearly obsolete, forming with the others a strong angular reticulation, sometimes closing up and becoming granular in the centre of the surface; the long ridges are marked at short regular intervals with trumpet-shaped perforations[1] (fig. 6 *e*). *Lucid spots* four in one row (System c).

Dorsal aspect lanceolate; *anterior*, acute-oval.

Found by Mr. H. C. Sorby, F.G.S. (to whom, as an ardent and distinguished geologist, I have much pleasure in dedicating this peculiar species), in the Pleistocene deposit known as the Bridlington Crag, at Bridlington, Yorkshire.

No. 5. CYTHERIDEA PERFORATA, *Roemer*, *sp.* Plate IV, figs. 14 *a*—14 *e*.

CYTHERINA PERFORATA, *Roemer*. Neues Jahrb. f. Min., &c., 1838, p. 516, t. 6, fig. 11.
CYTHERE HILSEANA,[2] *Jones* (non *Roemer*). Monog. Entom. Cret., p. 10, t. 1, fig. 1.

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[1] Seen under the microscope by reflected light, these perforations, being visible in the translucent substance of the valve, appear on that side of the convex valve which is away from the direct rays of light like out-standing blunt spines. This phenomenon occurs also in the punctated and perforated valves of other species, when their substance is translucent

[2] M. Bosquet, having had the opportunity of examining both Roemer's *C. Hilseana* and my specimens which I referred to that species, has determined that they belong to distinct species.

CYTHERIDEA JONESIANA, *Bosquet*. Mém. Couron. Acad. Belg., xxiv, p. 38; and Mém. Comm. Carte Géol. Neerl., ii, p. 64, t. 8, fig. 5.
— — *Reuss*. Denksch. Akad. Wiss. Wien., vii, p. 141.
BAIRDIA PERFORATA, *Bosquet*. Mém. Couron. Acad. Belg., xxiv, p. 24, t. 1, fig. 8.

INCH.
Length, $\frac{1}{25}$

Tertiary: England; Europe.
Cretaceous: England; Europe.

Carapace sub-triangular or triangular-ovate; most convex at or just behind the centre of the ventral portion; ventral border straight, or faintly convex; dorsal border strongly arched and somewhat angular at the anterior hinge; anterior end broad and obliquely rounded; posterior tapering and obtuse; right valve much narrower than the left, its hinge-line oblique and terminating at the anterior hinge with a distinct angle; surface of the valves finely punctate and perforate, the perforations, obliquely seen in the translucent substance of the carapace, often appearing as projecting spines or hairs (see Note, p. 44).

Dorsal aspect more or less lanceolate; *end-view* nearly ovate.

The series of Tertiary and Cretaceous Entomostraca, from France and Belgium, with which M. Bosquet has kindly favoured me, comprises a specimen of *C. perforata*, Roemer; and hence I am enabled to point out that there are no essential differences between the forms enumerated above in the list of the Synonyms of this species. The greater relative size and ovateness of the left valve,—the apparent presence of setæ, arising from optical appearances under the microscope, in some specimens,—slight variations in the convexity of the surface and the coarseness of the punctations, and the occasional presence of marginal spines—constitute the differences among specimens from different localities.

Cytheridea incrassata, Bosquet ('Entom. Tert.,' p. 44, t. 3, f. 11), is evidently a closely allied form; and so also are *Bairdia sub-trigona*, Bornemann ('Zeitsch. Deut. geol. Ges.,' vii, p. 357, t. 20, f. 4), and *Cytheridea punctatella*, Bornemann (ibid., p. 360, t. 21, f. 2).

Cythere (*Cytheridea*) *perforata* occurs in the Upper Eocene Clays at Barton, on the Hampshire coast, and in the sands of the same age at Colwell Bay, Isle of Wight; (and two varieties in the London Clay, near London). M. Bosquet found it (*B. perforata*) in the "Sables moyens," Tancrou (Seine-et-Marne), and the "Calcaire grossier," Damery (Marne) and Montmirail (Aisne). Roemer derived his specimens from the Paris Tertiaries. I have it also from the "Calcaire grossier supérieur."

As a Cretaceous form, it occurs in the Maestricht Chalk at Kunraede (*Bosquet*), in the Chalk of Balsberg, in Sweden, and of Kent (rare), in the Chalk-marl of Charing and Dover, in the Gault of Kent, and the Greensand (so-called) of Blackdown.

Var. INSIGNIS, *nov.* Plate VI, figs. 3 *a*—3 *c*.

	INCH.	
Length,	$\frac{1}{24}$	Lower Eocene: London.

Right carapace-valve sub-triangular, depressed towards each end; anterior border with a slightly raised marginal rim: *surface* thickly punctate, pittings coarser towards the middle, where they follow short sunken transverse lines.

Dorsal aspect of carapace sub-fusiform.

From the London Clay of the Copenhagen Fields, near London; obtained with others by Mr. J. Purdue during the cutting of the Great Northern Railway.

Var. GLABRA, *nov.* Plate V, figs. 24 *a*, 24 *b*.

	INCH.	
Length,	$\frac{1}{27}$	Lower Eocene; London.

Right carapace-valve sub-triangular, depressed anteriorly; similar in outline to the right valve of *C. perforata,* but rather more angular before and behind; the two extremities bordered by a slightly raised, smooth, marginal rim: *surface* smooth, not punctate.

Dorsal aspect of carapace acute-lanceolate.

From the London Clay of the Copenhagen Fields, London.

Sub-genus—CYTHERIDEIS, *nov.* *Cythere*, Auctorum.

Animal a *Cythere?* *Carapace* more or less triangular; surface smooth, pitted, or tuberculate: *hinge-margin* simple, except that, the central portion of the dorsal margin of the left valve being somewhat incurved under that of the right valve (when they are closed), the anterior and posterior angles of the dorsal margin of the left valve remain somewhat projecting, and present internal shallow furrows for the reception of the corresponding angles of the opposite valve: ventral margin partially incurved.

This is a more distinct form of the hingement that generally obtains in *Cypris.*

No. 1. CYTHERIDEIS TRIGONALIS, *Jones*. Plate II, figs. 2 *a*—2 *h*.

CYTHERE TRIGONALIS, *Jones*. Annals and Mag. Nat. Hist., 2d ser., vi, p. 28, t. 3, fig. 5.

INCH.
Length, $\frac{1}{11}$

Recent: Pegwell Bay, Kent.
Pleistocene: Essex.

Carapace obtusely triangular, convex, finely punctated with angular pittings (fig. 2 *h*); extremities obliquely rounded; anterior portion much broader and somewhat more depressed than the posterior; ventral border nearly straight, dorsal angular; hinge-margin oblique and faintly developed, anterior hinge accompanied by slight marginal teeth. *Lucid spots* (fig. 2 *g*) of the System B, page 5.

Dorsal aspect acute-oval.

The outline-form of this species is not uncommon in the genera *Cypris* and *Cythere*, and especially in the sub-genus *Cytheridea*.

A unique specimen of this interesting form was obtained from the Pleistocene or Post-pliocene formation at Clacton, and is identical with a recent form from the sand of Pegwell Bay[1] (for which I am indebted to Mr. Pickering), except that the latter has denticles, or short blunt spines, on the anterior and posterior margins, as is usual with the genus *Cythere*.

A smooth form, Var. LÆVIS, which occurs plentifully in the pleistocene sand at Grays, differs from the Clacton specimen merely in the want of pittings.

No. 2. CYTHERIDEIS TUBERCULATA, *spec. nov.* Plate II, figs. 3 *a*—3 *f*.

INCH.
Length, $\frac{1}{27}$

Pleistocene: Red Crag, Essex.
Pliocene: Crag, Suffolk.

Carapace convex, sub-triangular, depressed anteriorly; extremities rounded; posterior end contracted; ventral border slightly incurved; dorsal border strongly angular; hinge-line occupying the posterior two thirds of the dorsal edge: *surface* of valves ornamented with tubercles arranged loosely in about eight longitudinal rows, with about twelve in the longest row.

Dorsal aspect acute-oval; *end-view* sub-ovate.

Cythere (*Cytherideis*) *tuberculata* occurs in the Crag of Suffolk, and in the Red Crag at Walton, Essex; but appears to be rare.

[1] Probably this, like the specimens of *Candona reptans* and *C. Candida*, mentioned at p. 17, was not of marine origin, but derived from the Stour River, which empties itself into the Bay.

No. 3. CYTHERIDEIS UNISULCATA, *Jones*. Plate IV, fig. 10.

CYTHERIDEIS UNISULCATA, *Jones*. Memoirs Geol. Survey, 1856, p. 157, t. 7, fig. 23.

	INCH.	
Length,	$\frac{1}{40}$	Upper Eocene: Isle of Wight.

Valve triangular, broadest anteriorly, convex, impressed across the middle by a transverse furrow.

The only specimen that I have met with is very small and not well preserved: its characters, however, are sufficiently distinct for notice.

It occurs with *Candona Forbesii* in the green shales of the Osborne series, at Cliff End, Colwell Bay, Isle of Wight.

No. 4. CYTHERIDEIS UNICORNIS, *Jones*.

CYTHERIDEIS UNICORNIS, *Jones*. Memoirs Geol. Survey, 1856, p. 158 t. 7, fig. 24—26.

	INCH.	
Length,	$\frac{1}{24}$	Upper Eocene: Isle of Wight.

Valves thick, sub-triangular in the young state, almost oblong when adult, broadest and most depressed anteriorly. Young individuals are impressed on the middle of the dorsal portion of each valve with two more or less distinct transverse furrows, the posterior of which is the largest and most constant. The anterior furrow is shorter and more oblique than the other, and often runs into it, forming a Y-like impression. The furrows are associated with several irregular tubercles, of slight elevation, one of which, placed behind the chief furrow, is persistent, and increases in size, whilst the others disappear as the animal grows older and the carapace enlarges. The furrows also gradually disappear with the advanced growth of the animal, until a single, slightly recurved spine, or pointed tubercle, remains on the postero-dorsal third of each valve. The surface of the valves is faintly and irregularly punctate.

Dorsal aspect narrow-acute-oval, modified by the lateral spines.

This interesting species has much of the general character of the oblong and tubercled *Cyprideis* (page 21); but it wants the knurled hinge-teeth of the latter sub-genus.

Cythere (*Cytherideis*) *unicornis* is very plentiful in a crushed state between the laminæ of a dark-grey marl of the Hempstead series, at Hempstead Cliff, Isle of Wight. The specimens were submitted to me, and have been described for the Geological Survey, whilst this Monograph was in progress, and since the plates were finished.

No. 5. Cytherideis (?), *spec.* Plate VI, fig. 15.

	INCH.	
Length,	$\frac{1}{17}$	Lower Eocene: Kent.

Casts of oblongo-triangular convex valves of a species probably referable to this sub-genus were found by the late Rev. H. M. De la Condamine in a black clay, belonging to the Woolwich Series, at New Cross. They somewhat resemble the more obtuse forms of *Cytherideis trigonalis*; but I hesitate to determine their specific relations.

No. 6. Cytherideis Tamarindus, *spec. nov.* Plate III, figs. 4 *a*, 4 b.

	INCH.	
Length,	$\frac{1}{27}$	Pliocene: Suffolk.

Carapace obliquely sub-oblong, or sub-rhomboidal, somewhat resembling a tamarind-stone in shape; extremities obliquely rounded; anterior extremity sloping towards the dorsal, and posterior border sloping towards the ventral margin; dorsal border straight, ventral somewhat sinuous: *valves* depressed, most convex backwards, thickened at the extremities, and bordered posteriorly by a narrow flattened rim; surface ornamented with a few faint concentric ridges towards the anterior and ventral margins, and marked all over with a faint reticulate punctation [not shown in the drawing, fig. 4].

Dorsal aspect elongate-compressed-ovate; *end-view* narrow-subovate.

Cythere (*Cytherideis*) *Tamarindus* is rare in the Crag of Suffolk.

No. 7. Cytherideis Colwellensis, *spec. nov.* Plate IV, figs. 13 *a*,—13 *c*, 20 *a*—20 *c*.

	INCH.	
Length,	$\frac{1}{25}$	Upper Eocene: Isle of Wight.

Carapace oblong, most convex posteriorly; extremities rounded, the anterior end more or less obliquely; dorsal border gently arched; ventral nearly straight: *surface* smooth or faintly punctate.

Dorsal aspect narrow-acute-ovate; *end-view* blunt-oval.

Cythere (*Cytherideis*) *Colwellensis* occurs at Colwell Bay, Isle of Wight, in the Nucula-bed (*Nucula deltoidea*) and other deposits; but is not abundant.

No. 8. Cytherideis Bartonensis, *spec. nov.* Plate V, figs. 2 *a*, 2 *b*, 3 *a*, 3 *b*.

INCH.	
Length, $\frac{1}{34}$	Upper Eocene: Barton, Hants.

Carapace oblong; rounded in front; rounded obliquely behind; dorsal and ventral borders straight, the surface of the valve suddenly sloping inwards at the latter border; most convex rather behind the centre; surface smooth.

Dorsal aspect elongate-sub-oval; *end-view* sub-ovate.

This species appears to be related to *Bairdia* [?] *lævissima*, Bornemann ('Zeitsch. Deut. geol. Ges.,' vii, p. 358, t. 20, fig. 6), and *Cytheridea* [?] *papillosa*, Bosquet ('Entom. Tert.,' p. 42, t. 2. fig. 5).

I have found *Cythere* (*Cytherideis*) *Bartonensis* only in the Barton Clay, where it is apparently rare.

No. 9. Cytherideis flavida, *Müller, sp.* Plate IV, figs. 4 *a*—4 *c*.

Cythere flavida,	*Müller.*	Entomostraca, p. 66, t. 7, figs. 5, 6.
—	— *Latreille.*	Hist. Nat. Crust., iv, p. 253.
—	— *Desmarest.*	Consid. Crust., p. 388.
—	— *Bosc.*	Man. d'Hist. Nat. Crust., ii, p. 284.
—	— *Baird.*	Mag. Zool. Bot., ii, p. 184; Trans. Berw. Nat. Club, ii, p. 153; Brit. Entom., p. 168, t. 21, fig. 12.
Monoculus flavidus,	*Gmelin.*	Linn. Syst. Nat., p. 3001, No. 33.
—	— *Fabricius.*	Ent. Syst., ii, p. 494.
—	— *Manuel.*	Enc. Méth., vii, p. 725, t. 266, figs. 10, 11.
—	— *Rees.*	Cyclopæd., art. Monoculus.

INCH.	
Length, $\frac{1}{25}$	Recent: Britain; Europe. Pliocene: Suffolk. Upper Eocene: Isle of Wight.

Carapace elongate, cylindrical, tapering in front, arched on the back, straight or gently incurved on the ventral border, rounded at the extremities, most convex and obtuse posteriorly; surface smooth or slightly papillate. [The specimen figured illustrates the narrower and more curved variety of this form.]

Dorsal aspect elongate-narrow-ovate; *end-view* sub-orbicular.

This species is near to *Cythere arcuata*, Münster, and some of its varieties (see Bosquet, 'Crust. foss. Limbourg,' p. 59); but its extreme convexity and the obtuseness of the hinder end sufficiently distinguish it. Among its many other allies, it also approaches *Bairdia* [?] *mytiloides*, Bosquet, in outline; but wants its ornamentation.

Cythere (*Cytherideis*) *flavida*[1] abounds in the recent state along the coasts of Britain,[2] and in the Baltic. It is abundant in the Crag of Suffolk; and occurs also, but much less frequently, in the Upper Eocene Lands of Colwell Bay, Isle of Wight.

No. 10. CYTHERIDEIS REN, *spec. nov.* Plate IV, figs. 5 *a*, 5 *b*.

INCH.	
Length, $\frac{1}{27}$	Pliocene: Suffolk.

Carapace quadrangularly reniform; extremities obliquely rounded, curving up to meet the short straight hinge-line occupying the central third of the dorsal border; anterior extremity smaller and more oblique than the posterior; ventral border sinuous, strongly incurved at the middle: *surface* rather depressed, smooth, with the exception of some obscure papillæ and pittings, partially distributed. *Lucid spots* eight, long-oval, arranged in two oblique transverse rows in the middle of the valve and rather ventrally.

Dorsal aspect narrow-oblong, slightly tapering, and with rounded ends; *end-view* sub-oval.

Cythere (*Cytherideis*) *Ren* is perhaps related to *C. pilosella*, Reuss.

This species is from the Crag of Suffolk, and is rare.

Sub-genus—BAIRDIA,[3] *M'Coy, gen.*

Animal a *Cythere*. *Carapace* varying from a broadly triangular to a narrow elongate sub-triangular form, with extremities more or less acute; surface smooth and setiferous or finely punctate; no central tubercle; lucid spots well marked: *margins* thin and trenchant; when closed, the edges of the right valve lie within those of the left: interior of the marginal borders (except on the dorsal edge) cased with a narrow lamelliform plate (as in *Cypris*): except that a slight fold or notch is frequently apparent at the angles of the hinge-line, the dorsal edge of the right valve is quite simple, and, in the closed carapace, underlies the dorsal edge of the left valve, which is larger and overlapping: ventral margin incurved.

Among the species which I assigned to *Bairdia*, in 1849, some appear to me to be sufficiently distinct, especially in their hingement, to be divided off and arranged

[1] Zenker has well remarked that colour is a bad characteristic for specific determinations of these Entomostraca; the colour often varying with different food and other circumstances. With regard to the species referred by Zenker to *C. flavida*, Müller, I have already remarked (see p. 23).

[2] I have procured it from Southend, Margate, Poole Bay, Tenby, and Scarborough; and Dr. Baird quotes it from Torquay and Berwickshire.

[3] See 'Monog. Entom. Cret.,' 1849, p. 22.

in a new sub-genus, *Cytherideis* (see p. 46); for instance, *C. angusta*, 'Monog. Cret. Entom.' pl. 6, fig. 18.

Amongst the "Bairdiæ" of Bosquet, Reuss, and Bornemann, there are, I believe, included several species both of *Cytheridea* and *Cytherideis*.

No. 1. BAIRDIA SUBDELTOIDEA, *Münster, sp.* Plate IV, figs. 2 *a*, 2 *b*, 3; Pl. VI, figs. 1 *a*, 1 *b*, 2.

CYTHERE SUBDELTOIDEA, *Münster*. Jahrb. f. Min., &c., 1830, p. 64; Neues Jahrb. f. Min., &c., 1835, p. 446.
CYTHERINA SUBDELTOIDEA, *F. A. Roemer*. *Ibid.*, 1838, p. 517, t. 6, fig. 16.
— — *Hauer*. *Ibid.*, 1839, p. 429.
— — *F. A. Roemer*. Verstein. Nordd. Kreid., p. 105, t. 16, fig. 22.
— — *Geinitz*. Charact. Sachs.-Böhm. Kreid., 3 Abth., p. 64.
— — *Ib.* Grund. Verstein., p. 244, t. 8, fig. 21.
— — *Reuss*. Verstein. Böhm. Kreid., 1 Abth., p. 16, t. 5, fig. 38; and 2 Abth., p. 104.
— — *Ib.* Haidinger's Abhandl., iii, p. 49, t. 8, fig. 1.
— — *Ib.* *Ibid.*, iv, p. 47.
— — *Ib.* Apud Geinitz, Quadersandst. oder Kreid. Deutsch., p. 98, No. 10.
— — *Eichwald*. Lethæa Rossica, t. 11, fig. 23.
— — *Naumann*. Lehrb. Geogn., 2. Hälfte, t. 60, fig. 24.
— TRIGONA, *Bosquet*. Mém. Soc. Roy. Liége, iv, p. 358, t. 1, fig. 3.
BAIRDIA SUBDELTOIDEA, *Ib.* Mém. Couron. Acad. Belg., xxiv, p. 29, t. 1, fig. 13.
CYTHERE (BAIRDIA) SUBDELTOIDEA, *Jones*. Monog. Entom. Cret., p. 23, t. 5, fig. 15.
— — — *Reuss*. Denkschrift. d. Akad. Wiss. Wien., vii, pp. 41, 139.

INCH.	
Length, $\frac{1}{41}$ $\frac{1}{26}$ $\frac{1}{15}$	Recent: Britain; West Indies; Mauritius; Manilla; Australia.
	Tertiary: Britain; Europe; Virginia.
	Cretaceous: Britain; Europe.

Carapace triangular, gibbous, acute at the extremities, smooth or setiferous and sometimes finely punctate; right valve smaller and more angular than the left. [For a fuller description of the valves, see 'Monog. Entom. Cret. Form.,' p. 23.]

Cythere (*Bairdia*) *subdeltoidea* is a common form in the Tertiary deposits throughout Europe; it is plentiful in the Tropical Seas,[1] and occurs also on the British coasts.[2]

[1] The *B. subdeltoidea* of Australia is punctate, and has the rosette-like lucid spots of the Chalk form of this species; that of Turk's Island, Bahamas, more resembles the Crag form both in its globosity and in the less compactness of the spots.

[2] The *B. subdeltoidea* of Arran, here referred to, is evidently a variety, being narrow and presenting a difference in the arrangement of its lucid spots.

It is abundant in the Chalk of England and Europe, and occurs also in the Upper Greensand, but not in the Gault. I have it also from the Miocene of Virginia, U.S. It has near allies in the Magnesian and Carboniferous Limestones of Britain, and in the Carboniferous Shales and "Bituminous Limestone" of Southern Australia.

With this extensive distribution of the species in question, there is, of course, much variation in comparatively unessential characters, especially in the superficial papillæ (bases of setæ) and punctation, and the setation of the surface and extremities; the relative size of the carapace and its angularity also vary considerably; and I believe that the lucid spots will be found on careful examination of transparent valves to present some differences of form (a character probably of more importance than any afforded by spines or pittings).

In the specimens from the Crag of Sutton and elsewhere in Suffolk, the carapace is larger, has a somewhat more rounded outline (fig. 2 *a*), and is more globose than the Chalk form; and the lucid spots, though arranged in a similar rosette-like pattern (fig. 2 *b*), are further apart, and, not being compressed one against the other, have more oval outlines. The surface of the valves, from the presence of papillæ, appears to have been setous. The very small individual (fig. 3) occurred in the Red Crag of Walton, Essex; and one specimen of a narrow variety was met with in the Suffolk Crag.

The London Clay of Copenhagen Fields, near London, has yielded some handsome specimens (pl. 6. figs. 1, 2), covered with a close punctation, and finely denticulated at the extremities,—conditions not unfrequently met with in recent specimens.

No. 2. BAIRDIA CONTRACTA, *spec. nov.* Plate V, figs. 1 *a*—1 *c*.

	INCH.	
Length,	$\frac{1}{22}$	Middle Eocene: Barton, Hampshire.

Carapace elongate-triangular, sub-cylindrical; most convex at the middle of the ventral portion; rounded in front; obliquely acute behind; sinuate on the ventral, and arched, with an obscure three-sided outline, on the dorsal border; hinge-line occupying the middle third of the dorsal edge: *surface* smooth.

Dorsal aspect narrow-acute-oval; *end-view* sub-ovate.

This species approaches *Bairdia cylindracea*, Bornemann ('Zeitsch. Deutsch. geol. Ges.,' vii, p. 359, t. 20, fig. 5), from the Septarian Clay of Hermsdorf, near Berlin.

Cythere (*Bairdia*) *contracta* was found by Mr. F. Edwards in the Barton Clay, Hampshire: it is rare.

Sub-genus—CYTHERELLA,[1] *Jones.*

Animal unknown. *Carapace* oblong, compressed; smooth or pitted; no terminal denticulations: contact-margins of the right (larger) valve grooved or rabbeted on its inner edge for the reception of a flange presented by the contact-margin of the left (smaller) valve; both groove and flange stronger at the posterior, than at the anterior portion of the valves.

The *lucid spots* (see p. 56) resemble those in *Cypridina* rather than those of *Cythere* and its sub-genera.

No. 1. CYTHERELLA COMPRESSA, *Münster, sp.* Plate V, figs. 21, 23.

CYTHERE COMPRESSA, *Münster*. Jahrb. f. Min., &c., 1830, p. 64; Neues Jahrb., &c., 1835, p. 445.
CYTHERINA COMPRESSA, *Roemer*. Neues Jahrb., &c., 1838, p. 517, t. 6, fig. 14.
— ACICULATA, *Ib.* *Ibid.*, t. 6, fig. 21. [According to M. Bosquet.]
— COMPRESSA, *Reuss*. Haidinger's Abhandl., iii, p. 54, t. 8, fig. 15.
— — *Bosquet*. Mém. Couron. Acad. Belg., xxiv, p. 11, t. 1, fig. 1.
? CYTHERELLA FABACEA, *Bornemann*. Zeitsch. Deutsch. geol. Ges., vii, p. 355, t. 20, fig. 2.

INCH.	
Length, $\frac{1}{30}$ to $\frac{1}{25}$	Recent: Australia (?); Norway.
	Tertiary: England; Europe.

Carapace ovate-oblong or oblong; rounded at the ends; more or less arched on the dorsal, nearly straight on the ventral border: *valves* smooth, sometimes faintly punctate, depressed, most convex posteriorly and rather ventrally, broadest anteriorly, with the anterior border sometimes raised into a slight marginal rim (fig. 23).

Dorsal profile narrow-acute-ovate or subcuneiform; *end-view* sub-ovate.

The blue clay of Bracklesham and the London Clay of the Copenhagen Fields, London, both yield this species; which has also been found at Castell' Arqauto and at Osnabrück, and in the Belgian and the Austro-Hungarian Tertiaries.

Cytherella compressa seems to replace in the Tertiary deposits the *C. ovata* of the Chalk,—to which it is nearly allied.

It occurs also as a finely punctate form on the Coast of Norway (from Messrs. M'Andrew and Barrett's dredgings); and I have a nearly related form from Australia.

[1] For synonyms see 'Monog. Entom. Cret.,' 1849, p. 28; where further details are also given of the form and character of the valves. Since the publication of the Monograph alluded to, *Cytherella*, like the other sub-genera there established has been referred to as a genus,—and perhaps on better grounds than in the other instances.

Var. 1. Plate V, fig. 18.

? Cytherella Beyrichi, *Bornemann.* [? *Cytherina Beyrichi*, Reuss.] Zeitsch. Deutsch. geol. Ges., vii, p. 354, t. 20, fig. 1.

	INCH.	
Length,	$\frac{1}{30}$	Lower Eocene: London.

Carapace sub-quadrangular; extremities rounded and more or less denticulate: *valves* depressed anteriorly, convex behind; marked with a strong uniform punctation.

Dorsal profile narrow-acute-ovate; *end-view* sub-oval.

From the London Clay of the Copenhagen Fields, near London.

Var. 2. Plate V, fig. 19.

? Cytherella intermedia, *Bornemann.* Zeitsch. Deutsch. geol. Ges., vii, p. 355, t. 20, fig. 3.

	INCH.	
Length,	$\frac{1}{28}$	Lower Eocene: London.

In this variety the valves are narrower and less square than in Var. 1 (fig. 18), and the punctation is obscure and partial; the convexity of the valves is more uniform, the anterior portion not being so much depressed as either in Var. 1, or in the typical form.

From the London Clay of Copenhagen Fields.

No. 2. Cytherella Londinensis, *spec. nov.* Plate V, figs. 20, 22.

	INCH.	
Length,	$\frac{1}{27}$	Lower Eocene: London.

Carapace nearly oblong, rounded at the ends, dorsal border slightly curved, sloping more rapidly towards the posterior than towards the anterior margin; ventral margin slightly incurved at the middle; left valve much narrower than the right; valves smooth, depressed, marked by an irregular triangular impression, sub-central and towards the dorsal edge [not well shown in the figures], and bearing slightly raised narrow marginal rims, variable in development; convexity nearly uniform, slightly stronger on the anterior than on the posterior moiety of the valves.

Dorsal profile narrow sub-oblong, slightly produced at the ends; *end-view* sub-oval.

Cytherella Londinensis is from the London Clay of the Copenhagen Fields, near

London, and is well distinguished from *C. compressa* by its marginal rims, central impression, and very different dorsal profile, arising from the more uniform convexity of the valves.

No. 3. Cytherella Munsteri, *Roemer, sp.* Plate V, figs. 12 *a*, 12 *b*, 13.

Cytherina Munsteri, *Roemer*. Neues Jahrb. f. Min., &c., 1838, p. 516, t. 6, fig. 13.
— parallela, *Reuss*. Verstein. Böhm. Kreid., 1 Abth., p. 16, t. 5, fig. 33; and Haidinger's Abhandl., iv, p. 48, t. 6, fig. 1.
Cythere truncata, *Bosquet*. Mém. Soc. Roy. Liége, iv, p. 357, t. 1, fig. 2.
— (Cytherella) truncata, *Jones*. Monog. Entom. Cret., p. 30, t. 7, fig. 35.
Cytherella Munsteri, *Bosquet*. Mém. Couron. Acad. Belg., xxiv, p. 13, t. 1, fig. 2.
— — *Ib.* Mém. Commiss. Carte géol. Neerl., ii, p. 58, t. 8, fig. 2.

	INCH.	
Length,	$\frac{1}{33}$	Recent: Australia; Norway. Tertiary: England; Europe; North America. Cretaceous: England; Europe.

Carapace oblong; extremities rounded; dorsal margin somewhat curved: *valves* depressed anteriorly, convex posteriorly, smooth, punctate with pits in linear arrangement, punctation sometimes strong (fig. 12), sometimes obsolete (fig. 13). [See 'Monog. Entom. Cret.,' p. 30, for fuller details.]

The *lucid spots* are numerous, small, and closely packed together; they occupy a sub-triangular space near the centre of the valve and rather ventrally, and are arranged in two parallel, slightly curved rows, the largest spots at the ventral end and the smaller ones gradually tapering upwards, so that the spots form a short broad feather-like patch.

Dorsal aspect elongate wedge-shaped; *end-view* sub-oval.

Cytherella Munsteri is very closely related to *C. compressa* and *C. ovata*.

Specimens of *C. Munsteri* occur at Colwell, Barton, Bracklesham, and in the London Clay of Copenhagen Fields and of Wimbledon Common, near London.

This species is also found in the Tertiary and the Cretaceous beds of Belgium and the Netherlands; the Cretaceous beds of Bohemia, Gallicia, and Sweden; and in the White Chalk, Chalk-marl, and Gault of England. I have also found it in a Tertiary sand from Alabama. Coarsely punctate valves of *C. Munsteri* occur in the dredged sand from the Norway Coast, with which Messrs. M'Andrew and Barrett have favoured me; and I have a delicate smooth variety from Australia (where also a *Cytherella* of the *C. Williamsoniana* type occurs recent).

APPENDIX.

TABLE I.—*Showing the Distribution of* CYPRIS, CANDONA, *and* CYPRIDEIS *in the Tertiary and Post-tertiary deposits of England.*

SPECIES.	Recent.	Berkshire.	Cambridgeshire.	Lincolnshire.	Forfarshire.	Edwardstone.	Copford.	Grays.	Clacton.	Chislet.	Wear Farm.	Cliff End.	Hempstead Cliff.	Hordwell.	Woolwich.
CYPRIS (*genus*).															
1. setigera, *Jones*	?	*	*												
2. Browniana, *Jones*	..	..	..	..	..	..	..	..	*						
— *var.* tumida, *Jones*	..	..	..	..	..	..	..	*							
3. Ovum, *Jurine*	*	..	*					*	*	..	*				
4. gibba, *Ramdohr*	*	..	*	..	..	..	..	*	*						
CANDONA (*genus*).															
1. reptans, *Baird*	*	*	*	*	..	*	..	*	*	..	..				
2. Forbesii, *Jones*	..	..	..	..	..	..	..	..	..	..	..	*	*	*	*
3. Richardsoni, *Jones*	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
4. candida, *Müller*	..	..	..	?	*	..	..	*	*						
5. subæqualis, *Jones*	*?	*	*	..	..	..	*	*							
CYPRIDEIS (*sub-genus*?).															
1. torosa, *Jones*	*	..	..	..	..	..	..	*	..	*	*				
	Recent.	Post-tertiary.						Pleistocene.				Eocene.			

TABLE II.—*Showing the relative abundance of the species of* CYTHERE *and its sub-genera at the several localities in England, and their Distribution in the Tertiary Series of England and Europe.*

[NOTE.—The numbers in the columns are proportional to the numbers of individuals collected. The asterisks indicate merely the occurrence of the species, the relative abundance not being specially indicated.]

ABBREVIATIONS.—Pleist., Pleistocene; Plioc., Pliocene; Mioc., Miocene; U. E., Upper Eocene; M. E., Middle Eocene; L. E., Lower Eocene.

SPECIES.	RECENT.	PLEISTOCENE.		PLIOCENE.		EOCENE.											TERTIARY.		CRETACEOUS.
						UPPER.		MIDDLE.						LOWER.			ENGLAND.	EUROPE.	ENGLAND and EUROPE.
		Grays and Clacton.	Bridlington.	Walton.	Suffolk Crag.	Hempstead Cliff.	Cliff End.	Colwell Bay.	Barton Cliff.	High Cliff.	Bracklesham.	Alum Bay.	East Woodhay.	London Clay.	Woolwich and Reading Series.	Thanet Sands.			
CYTHERE (Oval forms)—																			
1. punctata, *Münst.*	*				27												Plioc.	Plioc. & Mioc.	
2. trigonula, *Jones*					27												Plioc.		
3. triangularis, *Reuss.*														5			L. E.		*
4. Wetherellii, *Jones*								10	1								M. E.		
5. striato-punctata, *Roem.*									300	50	1	1					M. E.	M. E.	
6. consobrina, *Jones*									2								M. E.		
7. attenuata, *Jones*												1					M. E.		
(Oblong forms.)																			
8. Kostelensis? *Reuss.*															*		L. E.	Mioc.	
9. concinna, *Jones*			*														Pleist.		
10. Woodiana, *Jones*					280												Plioc.		
11. laqueata, *Jones*				1	4												Plioc.		
12. Dictyosigma, *Jones*					6												Plioc.		
13. lacunosa, *Jones*	*				6												Plioc.		
14. scabropapulosa, *Jones*											1						M. E.		
15. costellata, *Roem.*											1						M. E.	M. E.	
16. plicata, *Münst.*								50	12	1	5						M. E.	Mioc., U. E., & M. E.	
17. scrobiculoplicata, *Jones*														9			L. E.		
var. recta, *Jones*													1				M. E.		
18. Angulatopora, *Reuss.*								5									M. E.		
19. Macropora, *Bosq.*					5												Plioc.	M E.	
20. Trachypora, *Jones*	*			?	20												Plioc.	M. E.	
21. sphærulolineata, *Jones*					3												Plioc.		
22. retifastigata, *Jones*					3												Plioc.		
CYTHEREIS—																			
1. senilis, *Jones*	?				1												Plioc.		
2. Bowerbankiana, *Jones*														5			L. E.		
3. horrescens, *Bosq.*									2		2						M. E.		
4. Ceratoptera, *Bosq.*					1												Plioc.	U. E.? & M. E.	
5. cornuta, *Roem.*								3			3						M. E.	U. E. & M. E.	
6. *spec. indeterm.*																1	L. E.	M. E.	*

TABLE II (*continued*).

SPECIES.	RECENT.	PLEISTOCENE. Grays and Clacton.	PLEISTOCENE. Bridlington.	PLIOCENE. Walton.	PLIOCENE. Suffolk Crag.	EOCENE. UPPER. Hempstead Cliff.	EOCENE. UPPER. Cliff End.	EOCENE. MIDDLE. Colwell Bay.	EOCENE. MIDDLE. Barton Cliff.	EOCENE. MIDDLE. High Cliff.	EOCENE. MIDDLE. Bracklesham.	EOCENE. MIDDLE. Alum Bay.	EOCENE. MIDDLE. East Woodhay.	EOCENE. LOWER. London Clay.	EOCENE. LOWER. Reading Series.	EOCENE. LOWER. Woolwich and	EOCENE. LOWER. Thanet Sands.	TERTIARY. ENGLAND.	TERTIARY. EUROPE.	CRETACEOUS. ENGLAND and EUROPE.
CYTHERIDEA—																				
1. Mulleri, *Münst.*	*	..	..	..	..	*	*	3	15	..	..	..	..	..	*	..	..	U. E., M. E., & L. E.	Plioc., Mioc., U. E., & M. E.	
var. torosa, *Jones*	..	..	..	..	..	*	..	..	..	..	..	..	..	..	*	..	..	U. E. & L. E.		
2. debilis, *Jones*	*	..	..	..	..	..	..	35	..	..	..	..	..	..	..	..	..	M. E.		
3. pinguis, *Jones*	..	..	..	..	27	..	..	..	..	..	..	..	..	..	..	..	..	Plioc.		
4. Sorbyana, *Jones*	..	..	*	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Pleist.		
5. perforata, *Roem.*	..	..	..	..	..	..	..	3	6	..	..	..	..	..	..	..	..	M. E.	M. E.	*
var. insignis, *Jones*	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	..	..	L. E.		
var. glabra, *Jones*	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	L. E.		
CYTHERIDEIS—																				
1. trigonalis, *Jones*	*	*	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Pleist.		
2. tuberculata, *Jones*	..	..	..	1	3	..	..	..	..	..	..	..	..	..	..	..	..	Plioc.		
3. unisulcata, *Jones*	..	..	..	..	..	..	*	..	..	..	..	..	..	..	..	..	..	U. E.		
4. unicornis, *Jones*	..	..	..	..	..	*	..	..	..	..	..	..	..	..	..	..	..	U. E.		
5. *spec. indeterm.*	..	..	..	..	..	..	..	..	..	..	..	..	..	..	*	..	..	L. E.		
6. Tamarindus, *Jones*	..	..	..	..	3	..	..	..	..	..	..	..	..	..	..	..	..	Plioc.		
7. Colwellensis, *Jones*	..	..	..	..	..	..	..	5	..	..	..	..	..	..	..	..	..	M. E.		
8. Bartonensis, *Jones*	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	M. E.		
9. flavida, *Müller*	*	..	..	..	36	..	..	4	..	..	..	..	..	..	..	..	..	Plioc. & M. E		
10. Ren, *Jones*	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	Plioc.		
BAIRDIA—																				
1. subdeltoidea, *Münst.*	*	..	..	1	22	..	..	..	1	..	..	..	..	2	..	..	..	Plioc., M. E., & L. E.	Plioc., Mioc., U. E., & M. E.	*
2. contracta, Jones	..	..	..	..	..	..	..	..	3	..	..	..	..	..	..	..	..	M. E.		
CYTHERELLA—																				
1. compressa, *Münst.*	*	..	..	..	..	..	..	..	..	..	2	..	..	4	..	..	..	M. E. & L. E.	Plioc., Mioc., & U. E.	
var. 1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	L. E.		
var. 2	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	L. E.		
2. Londinensis, *Jones*	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	L. E.		
3. Munsteri, *Roem.*	*	..	..	..	..	..	..	1	3	..	2	..	..	3	..	..	..	M. E. & L. E.	M. E.	*

TABLE III.—*Showing the Distribution of species of the Tertiary and Post-tertiary Entomostraca of England.*

	LOCALITIES.	CYPRIS.	CANDONA.	CYPRIDEIS.	CYTHERE proper.	CYTHEREIS.	CYTHERIDEA.	CYTHERIDEIS.	BAIRDIA.	CYTHERELLA.	Number of Species enumerated from the several localities.
POST-TERTIARY.	Newbury	2	2	..	..	..	..	..	..	..	4
	Cambridgeshire	3	2	..	..	..	..	..	..	..	5
	Lincolnshire	..	1	..	..	..	..	..	..	..	1
	Loch Bakie	..	1	..	..	..	..	..	..	..	1
	Edwardstone	..	1	..	..	..	..	..	..	..	1
	Copford	..	2	..	..	..	..	..	..	..	2
PLEISTOCENE.	Grays	2	2	1	..	..	..	..	..	..	5
	Clacton	2	2	1	..	..	..	..	..	..	5
	Chislet	..	..	1	..	..	..	..	..	..	1
	Wear Farm	1	..	1	..	..	..	..	..	..	2
	Bridlington	..	..	..	1	..	1	..	..	..	2
PLIOCENE.	Walton	..	..	..	1	..	..	1	1	..	3
	Sutton, &c	..	..	..	10	2	1	4	1	..	18
EOCENE. Upper.	Hempstead Cliff	..	1	..	..	..	1	1	..	..	3
	Hordwell Cliff	..	1	..	..	..	..	..	..	..	1
	Cliff End	..	1	..	..	..	1	1	..	..	3
EOCENE. Middle.	Colwell Bay	..	..	..	3	1	3	2	..	1	10
	Barton Cliff	..	..	..	4	1	2	1	2	1	11
	High Cliff	..	..	..	2	..	..	..	..	..	2
	Bracklesham Bay	..	..	..	4	2	..	..	..	2	8
	Alum Bay	..	..	..	2	..	..	..	..	..	2
	East Woodhay	..	..	..	1	..	..	..	..	..	1
EOCENE. Lower.	London (Copenhagen Fields)	..	..	..	2	1	1	..	1	2	7
	Woolwich	..	1	..	1	..	1	1	..	..	4
	Clay Hill, Shaw	..	..	..	..	..	1	..	..	..	1
	Pegwell Bay	..	..	..	..	1	..	..	..	..	1

		CYPRIS.	CANDONA.	CYPRIDEIS.	CYTHERE proper.	CYTHEREIS.	CYTHERIDEA.	CYTHERIDEIS.	BAIRDIA.	CYTHERELLA.	TOTAL.
Number of Species in the	Post-tertiary	3	3	..	..	..	..	..	..	..	6
	Pleistocene	2	2	1	1	..	1	..	..	..	7
	Pliocene	..	..	..	11	2	1	5	1	..	20
	Upper Eocene	..	1	..	..	..	1	2	..	..	4
	Middle Eocene	..	..	..	9	2	3	3	2	2	21
	Lower Eocene	..	1	..	3	2	2	1	1	3	13
Number of Species described in this Monograph		4	5	1	22	6	5	10	2	3	58

TABLE IV.—*Showing the Distribution of the European Tertiary Entomostraca that have been recognised as occurring in England.*

SPECIES.	Upper Tertiary.				Middle Tertiary.									Middle Eocene, France.	Upper Eocene, France.	Upper Eocene, Belgium.	Septarian Clay of Berlin (Upper Eocene).	N.-W. Germany.	Upper Silesia.	Mayence Tertiaries.	Austro-Hungarian Tertiaries.	Touraine.	Bordeaux.	Dax.
	Palermo.	Castell Arquato.	Perpignan.	Antwerp Crag.																				
Cythere punctata, *Münst.*	*	*	*	..	..	*	..	*	..	..	..	..	..	*	..	..	..	..	*	..	..	*	..	..
— striato-punctata, *Roem.*	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	*	..	..	..	..	..	..	..	..
— Kostelensis, *Reuss.*	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	*	..	..	*	..	..
— costellata, *Roem.*	..	..	..	..	..	..	..	..	..	..	..	..	..	*	*	*	..	..	..	..	..	..	..	..
— plicata, *Münst.*	..	..	..	..	..	..	..	..	..	..	..	..	..	*	*	*	..	*	..	..	..	..	..	..
— Angulatopora, *Reuss.*	..	..	..	..	..	..	..	..	..	..	..	..	..	*	*	*	..	*	..	..	..	..	..	*
— Macropora, *Bosq.*	..	..	..	..	..	..	..	..	..	..	..	..	..	*	*	*	..	*	..	..	..	..	..	*
Cythereis horrescens, *Bosq.*	..	..	..	..	..	..	..	..	..	..	..	..	..	*	*	*	?	*	..	..	..	..	..	*
— Ceratoptera, *Bosq.*	..	..	..	..	..	..	..	..	..	..	..	..	..	*	*	*	..	*	..	..	..	..	..	*
— cornuta, *Roem.*	..	..	..	..	..	..	..	..	..	..	..	..	..	*	*	*	..	*	..	..	..	..	..	*
Cytheridea Mulleri, *Münst.*	..	..	..	*	..	*	..	*	..	*	..	*	..	*	*	*	..	*	..	*	*	*	..	*
— perforata, *Roem.*	..	..	..	..	..	..	..	..	..	..	..	..	..	*	*	*	..	*	..	*	*	*	..	*
Bairdia subdeltoidea, *Münst.*	..	*	..	..	..	*	..	*	..	*	..	*	..	*	*	*	..	*	..	*	*	*	..	*
Cytherella compressa, *Münst.*	..	..	..	..	..	?	..	*	..	*	..	*	..	*	*	*	?	*	..	*	*	*	..	*
— — *var.* 1	*	..	..	..	..	..	..	..	..	..	..	..	..	*	*	*	?	*	..	*	*	*	..	*
— — *var.* 2	..	..	..	..	..	..	..	..	..	..	..	..	..	*	*	*	?	*	..	*	*	*	..	*
— Munsteri, *Roem.*	..	..	..	..	..	..	..	..	..	..	..	..	..	*	*	*	..	*	?	*	*	*	..	*

NOTE.—The Nucula-bed (*N. deltoidea*) at Colwell Bay (mentioned at page 49 and elsewhere) contains *Cythere Colwellensis*, *C. debilis*, *C. angulatopora*, *C. cornuta*, and *C. plicata*; the last-mentioned species presenting the most numerous individuals.

NOTE.—I have not been able to recognise among the London Clay specimens the species figured as *Cytherina barbata*, by Mr. Sowerby, in the 'Geological Transactions,' 2d series, vol. v, pl. 9, fig. 1. The specimen itself has been lost. It is possibly referable to *Cytheridea perforata*.

TABLE V.—*Showing the Succession of the English Upper Tertiaries (beneath the "Glacial beds"), and of their Correlation with those of the Neighbouring Countries.*

	YORKSHIRE.	NORFOLK.	SUFFOLK.	BELGIUM.	FRANCE.	NETHERLANDS.
POST-PLIOCENE	Bridlington Crag.	Mammaliferous or Norwich Crag.[1]				
PLIOCENE.	... ...	... ...	Upper or Red Crag.[2]	Scaldesian Beds and Diest Sands.	Crag of Carentan, Normandy.	Antwerp Crag.
	... ...	... ...	Lower or Suffolk Crag.[3]			
MIOCENE.	... ...	... ...	... ...	Bolderberg Sands.	Faluns of the Loire.	

TABLE VI.—*Showing the Succession of the English Eocene Tertiaries, and of their Correlation with those of France and Belgium (after Prestwich and Lyell).*

	ISLE OF WIGHT AND HANTS.	LONDON DISTRICT.	BELGIUM.	FRANCE.
EOCENE. UPPER.	Hempstead Series. Bembridge Series. Osborne Series. Headon Series.	... ...	Limburg Beds (Rupelian and Tongrian).	Beauce Limestone. Fontainebleau Sands. Marls with Ostrea cyathula. Marls and Gypsum.
MIDDLE.	Barton Clays (Highcliff, Barton, and I. of W.)	... ...	Laecken Beds.	"Sables moyens," or Beauchamp Sands.
	Upper Bracklesham Sands. Middle Bracklesham Sands.	Upper Bagshot Sands. Middle Bagshot Sands.	Brussels Beds.	Fresh-water Marls of the Calcaire grossier. Upper Calcaire grossier. Middle Calcaire grossier. Lower Calcaire grossier, or Glauconie grossière.
	Lower Bracklesham Sands.	Lower Bagshot Sands.	Paniselian Beds. Upper Ypresian Beds.	1. Clays and Glauconiferous Sands. 2. Shell-beds. 3. Varied Sands, or Middle Glauconite.
	... ...	... ...		[London Clay; only at Dieppe.]
LOWER.	London Clay.	London Clay.	Lower Ypresian Beds.	...
	..	Basement-bed of the London Clay.		
	Woolwich and Reading Series.	Woolwich and Reading Series. (Upper. Middle. Lower.)	Upper Landenian Beds.	4. Sandstones, pudding-stones, and shelly sands. 5. Sandy clays, oyster-beds, marls, lignite, plastic clay. 6. Lower Glauconite.
	... ...	Thanet Sands.	Lower Landenian Beds.	... ...

"Sables Inférieurs."

[1] According to some observers, the Norwich Crag should not be separated either from the Red Crag below, or from the Glacial beds above.

[2] The Red Crag extends also through Suffolk to Walton-on-the-Naze, in Essex. The fresh-water deposits at Clacton, Stutton, and Grays Thurrock, in Essex, are probably the fresh-water equivalents of the Upper Crag. See the Introduction to Mr. Wood's 'Monograph of the Crag Mollusca;' and for the age of the Crag-beds, Mr. Wood's 'Monog.,' pp. 301, 302.

[3] Known also as the Coralline Crag; but, as the characteristic organic remains in this deposit are neither Corallines nor Corals, but Sponges and Bryozoans, the term "Coralline" is manifestly a misnomer.

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——— Ueber die in der Umgebung von St. Petersburg vorkommenden Crustaceen aus der Ordnung der Branchiopoden und Entomostraceen. Bulletin de la Classe Phys.-Math. de l'Acad. Imp. Sc. de St. Petersbourg, vol. vii, 1849, p. 36 and 97. Mémoires présentés à l'Académie Imperiale des Sciences de St. Pétersbourg par divers Savants Etrangers, vol. vi, p. 159, &c.; vol. vii, p. 1, &c., 1851. Plates.

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——— Notes on the Entomostraca of the Woolwich and Reading Series. Quart. Journal Geol. Soc., 1854, vol. x, p. 160, pl. 3.

King,[1] R. L. On Australian Entomostracans. Proceed. Royal Soc. Van Diemen's Land, vol. iii, part 1, 1855, p. 56, pl. 9 and 10.

[1] I have only just now seen this interesting Memoir [Nov. 1856]. Besides supplying us with the representative forms which Australia furnishes for comparison with the British species of Ostracoda, Mr. King figures and describes a highly interesting new generic form (*Newnhamia*), differing from *Cypris* chiefly in having two eyes, and in peculiarities of the carapace, which has an horizontal ventral plate, a tuberculose surface, and two projecting, transparent (?), ocular tubercles (one for each eye). This is the only instance, except among palæozoic forms, of bivalved Entomostraca having ocular tubercles. The probable affinity, however, of

Liljeborg, W. De Crustaceis ex Ordinibus tribus, Cladocera, Ostracoda, et Copepoda in Scaniâ occurrentibus. 8vo, Lund., 1853. Plates.

Reuss, A. E. Beiträge zur Charakteristik der Kreideschichten in den Ostalpen. Denkschriften d. k. Akad. d. Wissenschaft. zu Wien, 1854, vol. vii (p. 138), pl. 26 and 27.

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——— Die Crustaceen des Beckens von Rein in Steiermark. Berichte k. Akad. Wissen. zu Wien, vol. xiii, 1854, figs. 1, 2, 3, pp. 189, 190.

——— Die Foraminiferen und Entomostraceen des Kreidemergels von Lemberg. Naturw. Abhandl. Haidinger, 1851, vol. iv, part 1, p. 46, pl. 6.

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——— Ein Beitrag zur Paläontologie der Tertiärschichten Oberschlesiens. Zeitschrift der Deutschen geologischen Gesellschaft, 1851, vol iii, p. 176.

——— Ueber die fossilen Foraminiferen und Entomostraceen der Septarienthone der Umgegend von Berlin. Zeitschrift der Deutschen geologischen Gesellschaft, 1851, vol. iii, p. 89, figs.

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——— Ueber die Geschlechtsverhältnisse der Gattung Cypris. Archiv für Anatomie, Phys., &c., 1850, p. 193, &c., pl. 5.

these old genera to the Phyllopoda, rather than to the Lophyropoda, is not invalidated by this discovery (as Mr. King seems inclined to think, *loc. cit.*, p. 61, note); since other and more important structural differences exist between the palæozoic bivalved Entomostraca and this eye-tubercled *Cypris* of Australia. See 'Annals Nat. Hist.,' 2d ser., 1856, vol. xvii, p. 97.

Mr. King places my *Cythereis* (as described and figured by Dr. Baird) in relation with his new genus *Newnhamia* (*loc. cit.*, p. 60), and thinks that they are "closely connected" by each having "two eyes and a very tuberculose shell." *Cythereis*, being probably a *Cythere*, may be supposed to have two eyes, but they are not evidenced externally; the little crystalline tubercles seen at the antero-dorsal angle of its valves, being related to the anterior hinge and to nothing else. The carapaces of *Newnhamia* and *Cythereis* differ widely also in all other characteristics, not excepting their style of tuberculation.

[1] This Memoir, treating of the Foraminifera and Entomostraca of the Oligocene deposits (Upper Eocene in Table VI, p. 62; Lower Miocene according to some authors) of Northern and Central Germany, has come to hand whilst this sheet is in the press [Nov. 1856].

INDEX.

PLATE I.

Fig.			
1. *Cypris Browniana*, p. 13.			
a. Left valve, outside	× 25	Clacton.	
b. Right valve, inside	× 25		
c. Perfect carapace, dorsal aspect	× 25		
d. Perfect carapace, anterior aspect	× 25		
e. Part of the surface of right valve, with the lucid spots	× 150		
2. *Cypris Browniana*, var. *tumida*, p. 13.			
a. Perfect, left valve upwards	× 25	Grays.	
b. Perfect, dorsal aspect	× 25		
3. *Cypris gibba*, p. 15.			
a. Right valve, outside (Old individual.)	× 25	Grays.	
b. Right valve, inside (Old individual.)	× 25		
c. Perfect, dorsal aspect	× 25	Clacton.	
d. Perfect, anterior aspect	× 25		
e. Right valve, outside. Young individual	× 25	Cambridgeshire.	
f. Part of the surface of a valve	× 150	Grays.	
4. *Cypris Ovum*, p. 14.			
a. Right valve, outside	× 25	Cambridgeshire.	
b. Perfect, ventral aspect	× 25		
5 *a*. *Candona candida* (variety with rosette-like lucid spots), p. 20.			
Right valve, inside (broken)	× 25	Copford.	
5 *b*. *Candona candida* (variety with lucid spots in a radiating form), p. 20.			
Part of inside of left valve, showing the lucid spots	× 150	Copford.	
6. *Cypris setigera*, p. 12.			
a. Left valve, outside	× 25	Newbury.	
b. Left valve, inside	× 25		
c. Perfect, dorsal aspect	× 25		
d. Perfect, posterior aspect	× 25		
7. *Candona reptans*, p. 16.			
a. Left valve, outside	× 12	Clacton.	
b. Right valve, inside	× 12	Grays.	
c. Perfect, dorsal aspect	× 12	Recent: Annerley.	
d. Perfect, anterior aspect	× 12		
e. Part of inside of right valve, showing the lucid spots	× 30	Grays.	

Fig.

8. *Candona candida*, p. 19.

a. Left valve, outside . . . . . × 25
[Imperfect at the posterior angle.]
b. Perfect, ventral aspect . . . . . × 25
c. Perfect, anterior aspect . . . . . × 25
d. Inside of the closed ventral edges of the carapace, showing the inner marginal plates . . . . . × 25
e. Part of the inside of the right valve, showing the lucid spots × 150
f. Part of the surface of the left valve, showing the lucid spots × 150

Copford.

9. *Candona subæqualis*, p. 20.

a. Perfect, right valve upwards . . . . . × 25
b. Perfect, dorsal aspect . . . . . × 25
c. Perfect, posterior aspect . . . . . × 25

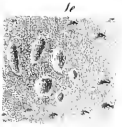
Copford.


1a


1b


1c


1d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2a


2b


3f


3a


3b


3c

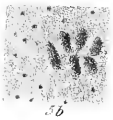

3d


3e


4a

4b


5a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6a


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7b


7c

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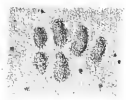

8c


8f


8a


8b


8e


8d


9a


9b


9c

Fig.

1. *Cyprideis torosa*, p. 21.

a. Left valve, ontside.	Old	× 25	Grays.
b. Right valve, outside.	Old	× 25	Grays.
c. Perfect, dorsal aspect.	Old	× 25	Grays.
d. Perfect, posterior aspect.	Old	× 25	Grays.
e. Left valve, outside		× 25	Grays.
f. Right valve, outside		× 25	Grays.
g. Right valve, hinge-line		× 50	Grays.
h. Left valve, hinge-line		× 50	Grays.
i. Part of surface		× 150	Grays.

2. *Cytherideis trigonalis*, p. 47.

a. Perfect, left valve upwards	× 12	Grays.
b. Left valve, dorsal view	× 12	Clacton.
c. Right valve, inside	× 12	Grays.
d. Left valve, anterior hinge	× 50	Grays.
e. Left valve, posterior hinge	× 50	Grays.
f. Left valve, inside	× 12	Grays.
g. Part of inside of right valve, showing lucid spots	× 30	Grays.
h. Part of surface of valve	× 150	Grays.

3. *Cytherideis tuberculata*, p. 47.

a. Left valve, inside (broken)	× 25	Crag.
b. Left valve, hinge-line	× 25	Crag.
c. Left valve, dorsal view	× 25	Crag.
d. Perfect, dorsal view	× 25	Crag.
e. Left valve, outside	× 25	Crag.
f. Left valve, inside	× 25	Crag.

4. *Cytheridea pinguis*, p. 43.

a. Perfect, right valve upwards	× 25	Crag.
b. Perfect, posterior aspect	× 25	Crag.
c. Perfect, dorsal aspect (young or male)	× 25	Crag.
d. Perfect, dorsal aspect (old or female)	× 25	Crag.
e. Right valve, inside	× 25	Crag.
f. Left valve, inside	× 25	Crag.
g. Portion of surface of 4 *c*, with papillæ and fine pits	× 150	Crag.
h. Portion of surface of 4 *b*, with pits	× 150	Crag.

5. *Cythere punctata*, p. 24.

a. Left valve, ontside (broken at posterior end, old)	× 25	Crag.
b. Right valve, outside	× 25	Crag.
c. Perfect, dorsal aspect	× 25	Crag.
d. Perfect, anterior aspect	× 25	Crag.
e. Left valve, inside (young)	× 25	Crag.
f. Left valve, inside	× 25	Crag.
g. Right valve, inside	× 25	Crag.
h. Part of surface of valve	× 150	Crag.

Geo. West lith.

Ford & West Imp.

PLATE III.

Fig.

1. *Cythere trigonula*, p. 25.

a. Perfect, right valve upwards	× 25	Crag.
b. Perfect, dorsal view	× 25	
c. Perfect, anterior view	× 25	
d. Right valve, dorsal view	× 25	
e. Right valve, inside	× 25	
f. Left valve, inside	× 25	
g. Left valve, dorsal view	× 25	
h. Portion of surface of valve	× 150	

2. *Cythere Woodiana* (old individuals), p. 29.

a. Left valve, outside	× 25	Crag.
b. Right valve, outside	× 25	
c. Perfect, dorsal view	× 25	
d. Perfect, anterior view	× 25	
e. Left valve, hinge-line	× 25	
f. Right valve	× 25	
g. Portion of surface of valve	× 150	

3. *Cythere laqueata*, p. 30

a. Right valve, outside	× 25	Crag.
b. Perfect, dorsal view	× 25	
c. Perfect, anterior view	× 25	
d. Left valve, dorsal view	× 25	
e. Left valve, hinge-line	× 25	
f. Right valve, hinge-line	× 25	
g. Right valve, dorsal view	× 25	
h. Portion of surface of valve	× 150	

4. *Cytherideis Tamarindus*, p. 49.

a. Perfect, left valve upwards [The faint reticulate punctation is not shown in the figure.]	× 25	Crag.
b. Perfect, dorsal aspect	× 25	

5. *Cythere lacunosa*, p. 31.

a. Right valve, outside	× 25	Crag.
b. Perfect, ventral aspect	× 25	

6. *Cythere sphærulolineata*, p. 36.

Right valve, outside	× 25	Crag.

7. *Cythere retifastigata*, p. 36.

Left valve, outside (old individual)	× 25	Crag.

Fig.

8. *Cythereis senilis*, p. 37.

a. Right valve, outside	× 25	Crag.
b. Right valve, ventral aspect	× 25	

9 *a*—*e*. *Cythere Macropora*, p. 35.

a. Right valve, outside	× 25	Crag.
b. Perfect, ventral aspect	× 25	
c. Perfect, dorsal aspect	× 25	
d. Perfect, anterior aspect	× 25	
e. Left valve, outside (yonng)	× 25	

9 *f*—*i*. *Cythere Trachypora*, p. 36.

f. Left valve, dorsal aspect	× 25	Crag.
g. Left valve, inside	× 25	
h. Right valve, inside	× 25	
i. Left valve, dorsal aspect	× 25	


1a


1b

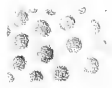

1c


1d


1e


1f


1g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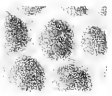
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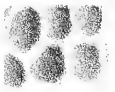
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4a


4b


5a


5b


6


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8a


8b


9a


9b


9c


9d


9e

9f


9g


9h

9i

Geo West lith.

Ford & West. Imp

PLATE IV.

Fig.

1. *Cythereis Ceratoptera*, p. 39.
   Left valve, outside . . . . × 25 Crag.

2, 3. *Bairdia subdeltoidea*, p. 52.
   2 *a*. Left valve, outside . . . . × 12 } Crag.
   2 *b*. Portion of surface, showing the lucid spots and fine papillæ × 75 }
   3. Right valve, inside (small individual) . . . × 12

4. *Cytherideis flavida*, p. 50.
   a. Right valve, outside (narrow var.) . . . × 25 } Crag.
   b. Perfect, dorsal aspect . . . . × 25 }
   c. Perfect, end view . . . . × 25

5. *Cytherideis Ren*, p. 51.
   a. Left valve, outside . . . . × 25 } Crag.
   b. Left valve, dorsal view . . . . × 25 }

6. *Cytheridea Sorbyana*, p. 44.
   a. Right valve, outside . . . × 25 } Bridlington.
   b. Right valve, ventral view . . . × 25 }
   c. Right valve, anterior view . . . . × 25 }
   d. Left valve, hinge-line . . . . × 55 }
   e. Part of surface, showing reticulations and perforations . × 150

7. *Cythere concinna*, p. 29.
   a. Right valve, outside . . . . × 25 } Bridlington.
   b. Right valve, ventral view . . . . × 25 }
   c. Right valve, anterior view . . . . × 25 }
   d. Right valve, hinge-line . . . . × 25 }
   e. Left valve, hinge-line . . . . × 25 }
   f. Part of surface, showing pittings and perforations . × 150 }

8, 9, 11. *Candona Forbesii*, p. 18.
   8. Right valve, outside (somewhat distorted) . . × 12 } Cliff End.
   9. Left valve, outside . . . . × 12 }
   11 *a*. Right valve, outside . . . . × 12 } Hordwell.
   18 *b*. Right valve, ventral view . . . . × 12 }

10. *Cytherideis unisulcata*, p. 48.
   Cast of right valve . . . . × 16 Cliff End.

12. *Candona Richardsoni*, p. 18.
   a. Left valve, outside . . . . × 25 } Woolwich.
   b. Left valve, ventral view . . . . × 25 }

Fig.

13, 20. *Cytherideis Colwellensis*, p. 49

13 *a*. Right valve, outside . . . . × 25
13 *b*. Perfect, dorsal aspect . . . . × 25
13 *c*. Perfect, posterior aspect . . . . × 25
20 *a*. Left valve, outside . . . . × 25
20 *b*. Left valve, dorsal aspect . . . . × 25
20 *c*. Left valve, hinge-line . . . . × 25

} Colwell Bay.

14. *Cytheridea perforata*, p. 44.

a. Left valve, outside . . . . × 25
b. Left valve, dorsal view . . . . × 25
c. Right valve, hinge-line . . . . × 25
d. Left valve, outside } Young . . . × 25
e. Perfect, dorsal aspect } Young . . . × 25

} Colwell Bay.

15. *Cythere Wetherellii*, p. 26.

Right valve, outside . . . . × 25 Colwell Bay.

16. *Cythere plicata*, p. 32.

Left valve, outside . . . . × 25 Colwell Bay.

17, 18. *Cythere angulatopora*, p. 34.

17. Left valve, outside . . . . × 25
[The ornamentation is not drawn strong enough.]
18 *a*. Perfect, dorsal aspect } Large individuals . . × 25
18 *b*. Perfect, anterior aspect } Large individuals . . × 25

} Colwell Bay.

19. *Cythereis cornuta*, p. 39.

Left valve, outside . . . . × 25 Colwell Bay.


1


2a


2b

3


4a


4b


4c


5a

5b


6a


6b

6c


6d


6e


7a

7b

7c


7d


7e


7f


8


9


10


11a

11b


12a

12b


13a


13b


13c


14a

14b


14c

14d

14e


15


16


17


18a


18b


19


20a


20b


20c

PLATE V.

Fig.

1. *Bairdia contracta*, p. 53.
   - *a*. Right valve, inside . . . . × 25
   - *b*. Perfect, dorsal aspect . . . . × 25
   - *c*. Perfect, right valve upwards . . . × 25

   } Barton Cliff.

2, 3. *Cytherideis Bartonensis*, p. 50.
   - 2 *a*. Right valve, outside . . . . × 25
   - 2 *b*. Right valve, dorsal aspect . . . . × 25
   - 3 *a*. Right valve, outside . . . . × 25
   - 3 *b*. Perfect, dorsal aspect . . . . × 25

   } Barton Cliff.

4, 5. *Cytheridea Mulleri*, var. *intermedia*, p. 42.
   - *a*. Perfect, right valve upwards . . . × 25
   - *b*. Perfect, dorsal aspect . . . . × 25
   - *c*. Perfect, posterior aspect . . . . × 25
   - 5. Right valve, outside: young (crushed) . . × 25

   } Barton Cliff.

6, 7, 10. *Cythere striatopunctata*, p. 27.
   - 6. Right valve, outside: young . . . × 25
   - 7 *a*. Perfect, left valve upwards . . . . × 25
   - 7 *b*. Perfect, dorsal view . . . . × 25
   - 7 *c*. Perfect, anterior view . . . . × 25

   } Barton Cliff.
   - 10. Right valve, outside . . . . × 25 — Alum Bay (Bed No. 29).

8. *Cythere plicata*, var. *Laticosta*, p. 33.
   - *a*. Left valve, outside . . . . × 25
   - *b*. Right valve, inside . . . . × 25
   - *c*. Perfect, dorsal aspect . . . . × 25
   - *d*. Perfect, anterior aspect . . . . × 25

   } Barton Cliff.

9, 17. *Cythereis horreseens*, p. 38.
   - 9. Left valve, outside . . . . × 25 — Barton Cliff.
     [The ornament on the surface should have been figured as blunt spines, not tubercles.]
   - 17 *a*. Left valve, outside: broken . . . × 25
   - 17 *b*. Left valve, dorsal aspect . . . . × 25

   } Bracklesham Bay.

11. *Cythere attenuata*, p. 28.
   Left valve, outside: broken at the antero-dorsal hinge . × 25 — Alum Bay (Bed No. 29).
   [The subcentral impression towards the dorsal border is not shown in this figure.]

12, 13. *Cytherella Munsteri*, p. 56.
   - 12 *a*. Left valve, outside . . . . × 25
   - 12 *b*. Left valve, dorsal aspect . . . . × 25
     [The posterior extremity is too acute in this figure.]
   - 13. Left valve, outside . . . . × 25

   } Bracklesham Bay.

Fig.

14. *Cythere costellata*, p. 32.
    Left valve, outside . . . . . × 25 Bracklesham Bay.

15. *Cythereis cornuta*, p. 39.
    a. Right valve, outside . . . . × 25 } Bracklesham Bay.
    b. Right valve, dorsal aspect . . . . × 25 }

16. *Cythere scabropapulosa*, p. 31.
    Right valve, outside . . . . . × 25 Bracklesham Bay.

18, 19, 21, 23. *Cytherella compressa*, p. 54.
    18. Left valve, outside. (Var. 1, p. 55.) . . . × 25 }
    19. Left valve, outside. (Var. 2, p. 55.) . . . × 25 } Copenhagen Fields,
    21. Right valve, outside. (Large individual.) . . × 25 } London.
    23. Right valve, outside . . . . × 25 }

20, 22. *Cytherella Londinensis*, p. 55.
    20. Left valve, outside . . . . × 25 } Copenhagen Fields,
    22. Right valve, outside . . . . × 25 } London.
    [The central depression is not sufficiently well marked in either of these figures.]

24. *Cytheridea perforata*, var. *glabra*, p. 46.
    a. Right valve, outside . . . . × 25 } Copenhagen Fields,
    b. Right valve, dorsal view . . . . × 25 } London.


1a
1b
1c
2a
2b
3a
3b
4a
4b
4c
5
6
7a
7b
7c
8a
8b
8c
8d
9
10
11
12a
12b
13
14
15a
15b
16
17a
17b
18
19
20
21
22
23
24a
24b

PLATE VI.

Fig.

1, 2, *Bairdia subdeltoidea*, p. 52.

1 *a*. Perfect, right valve upwards	× 25	Copenhagen Fields, London.
1 *b*. Perfect, dorsal aspect	× 25	
2. Perfect, right valve upwards. (Showing denticulations at the anterior and posterior margins.)	× 25	

3. *Cytheridea perforata*, var. *insignis*, p. 46.

a. Right valve, outside: imperfect	× 25	Copenhagen Fields, London.
b. Right valve, posterior aspect	× 25	
c. Right valve, dorsal aspect	× 25	

4, 6. *Cythere scrobiculoplicata*, p. 33.

4. Left valve, outside	× 25	Copenhagen Fields, London.
6 *a*. Left valve, outside	× 25	
6 *b*. Left valve, hinge-line	× 25	
6 *c*. Right valve, hinge-line	× 25	
6 *d*. Perfect, dorsal aspect	× 25	

5. *Cythere triangularis*, p. 25.

a. Left valve, outside	× 25	Copenhagen Fields, London.
b. Left valve, dorsal view	× 25	
c. Left valve, hinge-line	× 25	
d. Perfect, anterior aspect	× 25	
e. Right valve, hinge-line	× 25	
f. Right valve, dorsal aspect	× 25	
g. Right valve, outside	× 25	

7, 8. *Cythereis Bowerbankiana*, p. 38.

7. Left valve, outside	× 25	Copenhagen Fields, London.
8. Left valve, outside	× 25	

9. *Cythere scrobiculoplicata*, var. *recta*, p. 34.

Left valve, outside	× 25	East Woodhay, Hampsh.

10, 11. *Cytheridea Mulleri*, p. 41.

10 *a*. Left valve, outside	× 25	Colwell Bay.[1]
10 *b*. Perfect, dorsal aspect	× 25	
11. Left valve, outside	× 25	Woolwich.

12. *Cytheridea Mulleri*, var. *torosa*, p. 42.

Right valve, outside	× 25	Woolwich.

[1] This and the subsequent figures of species from Colwell Bay were introduced among the Woolwich species under the mistake explained at p. 26.

Fig.

13. *Cytheridea debilis*, p. 43.
    Left valve, outside . . . . . × 25 Colwell Bay.

14. *Cythere Kostelensis ?* p. 28.
    14 *a*. Left valve, outside . . . . × 25 } Woolwich.
    14 *b*. Perfect, dorsal aspect . . . . × 25 }

15. *Cytherideis ?* sp., p. 49.
    Cast of left valve . . . . . × 12 New Cross.

16. *Cythere Wetherellii*, p. 26.
    a. Left valve, outside . . . . × 25 }
    b. Right valve, hinge-line . . . × 25 }
    c. Right valve, dorsal aspect . . . × 25 } Colwell Bay.
    d. Right valve, posterior aspect . . . × 25 }

17. *Cythere plicata*, p. 32.
    Left valve, outside . . . . . × 25 Colwell Bay.

18. *Cythere angulatopora*, p. 34.
    Left valve, outside: broken . . . . × 25 Colwell Bay.

19. *Cythereis*, sp., p. 40.
    Fragment of left valve . . . . × 25 Pegwell Bay.


1a


1b


2


3a


4


5a


5b


5c


5e


5g


6a


6b


6c


6d


7


8


9


10a


10b


11


12


13


14a


14b


15


16a


16b


16c

16d


17


18


19

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