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THE

TRANSACTIONS

OF

THE LINNEAN SOCIETY

OF

LONDON.

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VOLUME XXVI.

PART THE SECOND.

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LONDON:

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SOLD AT THE SOCIETY'S APARTMENTS, BURLINGTON-HOUSE;

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C O N T E N T S.

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PART II.—1868.

- IX. *A Monograph of the Recent British Ostracoda.* By GEORGE STEWARDSON BRADY,  
*Esq. Communicated by Dr. SCLATER, F.L.S. &c.* . . . . . page 353



IX. *A Monograph of the Recent British Ostracoda.*

By GEORGE STEWARDSON BRADY, *Esq.* Communicated by Dr. SCLATER, *F.L.S. &c.*

(Plates XXIII.—XLI.).

Read May 3rd, 1866.

SINCE the publication, in 1850, of Dr. Baird's work on the British Entomostraca, much has been done towards the elucidation of the anatomy and physiology, as well as the distribution and zoological classification, of these animals, and probably no group has received a larger share of attention than the Ostracoda. The interest attaching to this group is much enhanced by the fact that they alone, of all the higher Microzoa, are found in the fossil state in sufficient numbers to afford grounds for any exact comparison between the fauna of the present and those of bygone ages; and it is, of course, only by the diligent collecting and accurate description, both by pen and pencil, of the forms now living in our lakes and seas, as well as of fossil species, that much progress in this direction can be made.

The classification hitherto in vogue has rested almost entirely upon external shell-characters and mode of hingement; and, seeing that by far the greater number of species have been described from fossil specimens, no other method was, of course, practicable. But though the careful study of the shells, which has necessarily accompanied such a plan of classification has been very advantageous, and has, indeed, resulted to a considerable extent in a really natural grouping and arrangement of genera and species, it is obviously an unsatisfactory and unsound basis of classification; and much has been recently done by various continental authors to increase our knowledge of the minute structure of the animals themselves. Among the naturalists who have been foremost in this work may be mentioned Professor Lilljeborg, Fischer, Zenker, and G. O. Sars. The admirable memoir of the last-named author, 'Oversigt af Norges marine Ostracoder,' published in 1865, contains descriptions of all known Norwegian marine species classified according to the anatomical characters of the animals, the structure of most of which is there for the first time minutely described. This work forms, indeed, an epoch in the study of the Ostracoda; and its author deserves the warmest acknowledgments of all carcinologists for the light which he has thrown, at the expense of much time and labour, on the minute structure and affinities of the creatures of which he treats. To British naturalists the work is, indeed, especially valuable, on account of the close relationship existing between the faunas of the two countries; and I have, in this monograph, adopted, with but little modification, the arrangement and classification propounded by the author of the 'Oversigt.' The greatest difficulty which I have myself experienced arises from the fact that by far the larger number of my deep-sea specimens have been dried in the first instance with the mud or sand in which they were

taken, and afterwards picked out one by one. By this method the animal structure contained in the shell is almost always entirely destroyed, or at any rate is so far decomposed as to be quite unfitted for any critical examination. On this account I have often been unable to give anatomical descriptions of deep-water species. There can be no doubt that by proper treatment of the dredged material shortly after its removal from the sea-bed, the contained Microzoa might to a large extent be obtained in a serviceable and perfect condition; while, in the case of material taken in the hand-net or towing-net, it need never be a difficult matter to separate the Ostracoda with the help of a simple pocket-lens.

As to the manipulation of the animals and their preparation for the microscope, it is seldom that much difficulty will be experienced in separating the valves by means of fine needles, and then detaching the contained animal; the various organs are rendered much more distinct by immersion for a short time in a solution of potash, by which the oleaginous and granular constituents are to a great extent removed, the chitinous structures remaining unaffected. If it be desired to mount permanently the dissection thus made, the best medium for the purpose is a compound of glycerine and gelatine with a slight addition of arsenic, the formula for which is given below\*. This preparation has the advantage of becoming fluid at a low temperature, of retaining its moisture sufficiently without any cementing of the glass cover, and of being colourless and very easy of application.

The geographical and bathymetrical distribution of the Ostracoda is a matter of the greatest interest as illustrating the probable conditions under which the various fossiliferous strata have been deposited. The data at present at our command are somewhat scanty, and negative evidence must be taken for no more than it is worth; but some portions of the British coasts, as, for example, those of Northumberland and Durham, and the Frith of Clyde, have been pretty diligently dredged and investigated with a view to the study of these organisms. I have therefore brought together, in a tabular form at the end of the monograph, the principal districts in which the marine species have been examined, and have endeavoured roughly to indicate their frequency and range of depth by means of signs, as explained in the Table. The two final columns indicate the occurrence or non-occurrence of the species in the Scandinavian seas, and in the Tertiary or Posttertiary deposits of Great Britain and Norway. For the information given respecting the recent Scandinavian species I am indebted entirely to Herr G. O. Sars and Professor Lilljeborg; the column relative to fossil species owes its completeness chiefly to the labours of Messrs. Crosskey and Robertson.

I must here express my great obligations to many kind friends for the communication of dredgings and specimens from various parts of the country,—to Mr. J. Gwyn Jeffreys and Mr. C. Spence Bate, Mr. E. C. Davison, of Sunderland, Mr. S. S. Stoddart, of Bristol, and

\* Take any quantity of Nelson's gelatine, and let it soak for two or three hours in cold water which has previously been saturated with arsenious acid; pour off the superfluous water, and heat the soaked gelatine until melted. To each fluid-ounce of the gelatine add one drachm of alcohol, and mix well; then add a fluid-drachm of the white of an egg; mix well while the gelatine is fluid but cool. Now boil until the albumen coagulates and the gelatine is quite clear. Filter through fine flannel and to each fluid-ounce of the clarified gelatine add six fluid-drachms of Price's pure glycerine, and mix well.—*Carpenter's Microscope and its Revelations*, 3rd edition, p. 775.



Mr. D. O. Drewett, of Jarrow. My thanks are also especially due to Dr. Baird, of the British Museum, Professor T. Rupert Jones, the Rev. Alfred Merle Norman, Dr. Alcock, of Manchester, and Mr. David Robertson, of Glasgow, for much valuable advice and assistance, and for the kind and liberal manner in which they have placed their collections at my disposal; lastly I owe similar thanks to M. Bosquet, of Maestricht, Dr. Oscar Speyer, of Hesse Cassel, and Herr G. O. Sars, of Christiania, for the good service which they have done me by the communication of their admirable memoirs and series of illustrative specimens. I am fully conscious that whatever value this monograph may possess is owing in great measure to the generosity of these naturalists, and their kind interest in the progress of my work.

The recent Ostracoda are divided by Sars into four great groups or sections, namely :— (1) Podocopa, including the two families Cypridæ and Cytheridæ; (2) Myodocopa, including the families Cypridinidæ and Conchœciadæ; (3) Cladocopa, containing one family, Polycopidæ; and (4) Platycopa, containing also one family, Cytherellidæ.

The characters of these four sections may (after Sars) be stated as follows :—

1. *PODOCOPA*.—This is by far the most extensive of the four sections, including all the freshwater, and a vast majority of the marine Ostracoda, and embracing all the forms classed by the earlier writers under the two great genera *Cypris* and *Cythere*. The lower antennæ are here simple, pediform, geniculate, armed at the apex with sharp claws, and are used for swimming (as in *Cypris*), for walking (as in *Cythere*), or as prehensile organs. The first pair of appendages following the mouth is always a distinct maxilla, bearing a large halfmoon-shaped branchial plate, which is bordered with numerous ciliated setæ. The next pair of appendages forms in the Cypridæ a jaw of somewhat similar shape, but in the Cytheridæ becomes pediform, owing to the atrophy of the jaw proper and the greater development of the palp. Of the two following pairs of limbs, the last is found, in the Cypridæ, to have lost its use as a locomotive organ, and is doubled up between the valves, whilst in the Cytheridæ it is used, like the foregoing pair, as a walking limb. The postabdomen is, in the Cytheridæ, rudimentary, but in the Cypridæ is mostly well developed, consisting of two elongated laminar processes, lying close together, and each armed at the extremity with two long claws. The eyes are simple, often so close together as to appear single. The heart is always wanting; the digestive cavity has two dilatations, of which the foremost is (in the Cypridæ) provided with two lateral blind sacs. In this last family the organs of generation are produced between the two laminæ of the shell. These animals live for the most part an idle life, crawling leisurely on the mud, on plants, or swimming through the water. Their motions are effected by the two pairs of antennæ, which move synchronously, the upper pair moving up and down, the lower backwards and forwards, thus propelling the whole animal in a straight line.

2. *MYODOCOPA*.—This group comprises the forms of which the genus *Cypridina* is the type, the characters indicating a higher organization and presenting well-marked differences, which show an approach to the higher order Branchiopoda. As a rule the lower antennæ are here the only true locomotive organs, whilst the upper antennæ (as in the Branchiopoda) wholly lose their importance in this respect, and become the seats

of a special sense (smell or hearing), being clothed with toothed club-shaped appendages, which either proceed directly from the antennæ (*Conchæcia*), or from its bristle-shaped appendages (*Cypridina*). The lower antennæ consist of a particularly large and muscular basal joint and two branches, one of which may be rudimentary, whilst the other is cylindrical, flexible, and composed of numerous short joints, each of which bears generally on one side a long ciliated swimming-seta. The way in which these antennæ move is also quite peculiar. Whilst those of the previous group move upwards and downwards, these move from side to side. To allow of this movement the valves are peculiarly formed, so that when quite closed there is always an opening (mostly heart-shaped) through which the movements of the antennæ take place. In conformity with the development of these antennæ as locomotive organs, we find that the other limbs more and more lose their importance as such, and become subservient to the mouth as jaws. In *Conchæcia* the two hinder pairs are somewhat pediform; but their use as feet must be but small, as they can scarcely reach out of the valves. In *Cypridina* and the allied forms, the three pairs of limbs following the mouth are completely jaw-shaped, and the fourth or last pair, as in the Cypridæ, is bent up within the valves. The structure of this limb is so peculiar that one can scarcely class it as a foot or a jaw. The first pair of jaws possesses no branchial plate, which is constantly present in the foregoing group, but this appendage is transferred to the second pair (*Cypridina*), or the second and third pairs (*Conchæcia*). The postabdomen is developed into two broad symmetrical plates, armed with sharp claws, and is not unlike the same organ in the Cladocera. The eyes, when present, are fixed, as in the Branchiopoda, to large separate peduncles. In *Conchæcia* there are, at the roots of the upper antennæ, certain small bodies which take the place of eyes. In this group appears for the first time an independent heart, of structure similar to that of the Branchiopoda. The digestive canal has a single capacious stomach, which is invested throughout its whole length by a thick layer of liver-cells. Most of the forms belonging to this group are pelagic, and occur often in the open sea, near the surface of the water, where they move actively by means of the largely developed lower antennæ. Many of them are strongly phosphorescent in the dark, and must contribute essentially to the extraordinary brilliance of the tropical seas.

3. CLADOCOPA.—The type of this group is *Polycope*, a genus recently described by G. O. Sars, which occurs on some parts of the coasts of the British islands and Norway, and in the Mediterranean. The lower antennæ are very similar to those of the foregoing group, but are divided into two distinct and well-developed natatory branches. The movements of these organs are quite different. Whilst in the Cypridinidæ their motion is from side to side, it is here upwards and downwards as in the Cypridæ; and, in conformity with this, we find that the characteristic notch of the former family is absent. For these reasons it is necessary that the upper antennæ also should become natatory organs in order to bring the movement into equilibrium. The most curious point in these animals, however, is that behind the mouth we find two pairs of limbs, the last of which is used entirely for respiration, whilst the first pair or its palp is developed into a powerful two-branched swimming-organ. We have therefore, in this case, a group provided with no less than six swimming-organs; and on this peculiarity the

name of the genus (*Polycope*) is founded. On account of the minuteness of the animals, Sars has not been able to observe accurately their internal organization; but he asserts that the eyes are entirely wanting, and that the heart also appears to be absent. The digestive canal has a single capacious stomach, as in the foregoing section.

4. PLATYCOPA.—This group is typified by the genus *Cytherella*, known, before Sars's researches, only from fossil specimens. The lower antennæ exhibit a structure so peculiar that this character alone would amply separate them from the other Ostracoda. They are very strongly developed, bearing considerable likeness to the swimming-feet of the Copepoda, but are still more muscular, and constitute very powerful swimming-organs. These consist of a broad flattened basal portion and two biarticulate broad branches, which bear numerous long bristles as in the Copepoda. The upper antennæ are of exceedingly robust build, and appear also to serve as locomotive organs. The mandibles are small and weak; but their palps are strongly developed, and that of the first jaw is armed internally with an elevated ridge which is beset with numerous toothed and flexuous setæ, bearing a remarkable likeness to the feet of the Cladocera (*Sida*, *Daphnia*). Behind the mouth follow, besides the first pair of jaws, only two pairs of limbs, of which neither has the remotest resemblance to feet; the last is, indeed, in the female, quite rudimentary, forming only a small setose lamina. Each of the two preceding pairs bears at the base a large halfmoon-shaped, numerously ciliated branchial plate. The abdomen is divided into several segments, most of which bear on the hinder part fasciculi of bristles. The postabdomen consists of two small plates, which are separate through their entire length, and bear at the extremity a number of slender spines. The shell is of very compact structure, so that it is found almost unaltered in very early geological formations. This group contains only one genus, *Cytherella*.

I have endeavoured to give, under each marine species, as accurate a statement of its distribution, both in the recent and fossil state, as the present state of our knowledge admits of; and with the view of indicating more clearly the relations of the species, I have classified them under several types, according to the geographical areas which they chiefly inhabit, the typical designation being always taken from the region in which the species appears at the present time to be most abundant.

We have at present scarcely sufficient knowledge of the distribution of the freshwater species to render a similar attempt with regard to them desirable.

The typical areas here adopted are as follows:—

1. ARCTIC TYPE, including all species attaining their greatest development north of the isothermal line of 32° Fahr. *Glacial* might perhaps have been a more appropriate term for this group, but would have been liable to be confounded with the post-tertiary geological formations which go under the same name. My very limited knowledge of species from this tract is derived from specimens dredged by Dr. Sutherland, and from some parcels of mud obtained from whaling-ships by D. Robertson, Esq., of Glasgow.
2. SCANDINAVIAN TYPE, comprehending the seas of Iceland, Norway, Sweden, Denmark, Shetland, and Northern Scotland. The Ostracoda of this district have been diligently collected by many naturalists, especially by Müller, Lilljeborg, G. O. Sars,

Norman, and Robertson; and our knowledge of them may be considered tolerably good.

3. BRITISH TYPE, comprising species diffused pretty evenly over the seas of Great Britain and Ireland.
4. ATLANTIC TYPE, referring to those which attain their greatest luxuriance on the south and south-western shores of England and Ireland.
5. MEDITERRANEAN TYPE, including species which attain their maximum of development in the Mediterranean. These are very imperfectly known, chiefly from specimens described by Dr. Baird and myself, and from some further dredgings which have been placed in my hands by M. de Folin of Pauillac, and which I have already partially described in a French publication, 'Les Fonds de la Mer.'

It will be seen that the above is a very imperfect attempt at typical distribution; but such as it is, it seems to me to be better than none at all, and to add considerably to the interest attaching to the various species.

For the details of geological distribution, I am indebted much to the works of Prof. T. Rupert Jones, Bosquet, G. O. Sars, Reuss, Speyer, and Egger, but chiefly to the large collections of posttertiary species made, in anticipation of a monograph of the subject, by Messrs. Crosskey and Robertson, of Glasgow.

The following classified Table of the Ostracoda is compiled from various authors, and exhibits the present state of our knowledge of the subject. Those marked with an asterisk are known only in the fossil state; whether a right situation is here assigned them must be doubtful:—

### Class CRUSTACEA.

#### Subclass ENTOMOSTRACA.

#### Order GNATHOSTOMATA.

#### Legion LOPHYROPODA.

#### Tribe OSTRACODA.

<p>Section PODOCOPA.</p> <p>Family 1. CYPRIDÆ.</p> <p>Genus Cypris.</p> <p>Chlamydotheca (?).</p> <p>Cypridopsis.</p> <p>Paracypris.</p> <p>Aglaia†.</p> <p>Notodromas.</p> <p>Candona.</p> <p>Pontocypris.</p> <p>Argillœcia.</p> <p>Bairdia.</p> <p>Macrocypris.</p> <p>Family 2. CYTHERIDÆ.</p> <p>Genus Cythere.</p> <p>Limnocythere.</p> <p>Cytheridea.</p> <p>Eucythere.</p>	<p>Genus Ilyobates.</p> <p>Loxococoncha.</p> <p>Xestoleberis.</p> <p>Cytherura.</p> <p>Cytheropteron.</p> <p>Bythocythere.</p> <p>Pseudocythere.</p> <p>Cytherideis.</p> <p>Sclerochilus.</p> <p>Paradoxostoma.</p> <p>Section MYODOCOPA.</p> <p>Family 3. CYPRIDINIDÆ.</p> <p>Genus Cypridina.</p> <p>Asterope(?).</p> <p>Bradycinetus.</p> <p>Eurypylus †.</p> <p>Philomedes.</p> <p>Cylindroleberis.</p>	<p>Genus Cypridella*.</p> <p>Cyprella*.</p> <p>Entomis*.</p> <p>Family 4. ENTOMOCONCHIDÆ.</p> <p>Genus Entomoconchus*.</p> <p>Heterodesmus.</p> <p>Family 5. CONCHÆCIADÆ.</p> <p>Genus Conchœcia.</p> <p>Halocypris.</p> <p>Section CLADOCOPA.</p> <p>Family 6. POLYCOPIDÆ.</p> <p>Genus Polycope.</p> <p>Section PLATYCOPA.</p> <p>Family 7. CYTHERELLIDÆ.</p> <p>Genus Cytherella.</p>
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† Described by the present author in 'Les Fonds de la Mer.'

The following synopsis of the sections and families here described is given by Sars :—

OSTRACODA.	Lower antennæ two-branched,	simple, subpediform, geniculate, clawed at the apex, not very unlike the upper antennæ. Both pairs of antennæ either bearing long setæ and adapted for swimming, or shortly setose and not used for swimming. Mandibles distinct, mostly strongly toothed at the lower extremity; palp of moderate size, and bearing a more or less developed branchial appendage. First pair of maxillæ bearing a large branchial plate. Feet	two pairs, the last bent up within the valves. Postabdomen forming two elongated narrow rami, which are usually clawed at the apex.	CYPRIDÆ.	} PODOCOPA.
		one branch rudimentary, immobile; the other elongated, cylindrical, flexible, many-jointed, armed with long natatory setæ, arranged in a single series; basal portion very large and stout, filled with muscular bands. Upper antennæ scarcely natatory. Mandibular palp very large, geniculate, subpediform, destitute of a branchial appendage. First pair of jaws without a branchial plate. Postabdomen divided into two broad plates, which are unguiferous behind. Feet	three pairs, all ambulatory, much alike in structure, and directed forwards. Postabdomen rudimentary, forming two very small lobes. Antennæ very little adapted for swimming.	CYTHERIDÆ.	
		one pair only, of singular shape, forming an elongated, curved, flexible, annulated, vermiform appendage, which is spiniferous towards the apex. Upper antennæ large, distinctly jointed, geniculate at the base. Mandibles proper obsolete. Second pair of jaws bearing a large branchial plate. Eyes compound, pedunculated, widely separated; between the two in front a large simple eye and a short frontal tentacle.	two pairs, the posterior very small and rudimentary; the anterior provided, like the second pair of jaws, with a small, lobed branchial plate. Upper antennæ of the female small and weak, immobile and indistinctly jointed. Mandibles distinct. No eyes. Frontal tentacle very large, and mostly dilated at the apex.	CYPRIDINIDÆ.	} MYODOCOPA.
		both branches well developed, moveable, and natatory. Upper antennæ also natatory, not geniculate, ending in a lash of long setæ. Mandibles distinct, palp short and scarcely pediform, provided with a small branchial appendage. Two pairs only of thoracic appendages; the anterior large, bifid, natatory; the posterior membranaceous and branchial. Eyes wanting. Postabdomen divided into two short laminae, spinous behind.	two pairs, the posterior very small and rudimentary; the anterior provided, like the second pair of jaws, with a small, lobed branchial plate. Upper antennæ of the female small and weak, immobile and indistinctly jointed. Mandibles distinct. No eyes. Frontal tentacle very large, and mostly dilated at the apex.	CONCHENCIADÆ.	
		flattened, similar to the feet of the Copepoda, basal portion biarticulate and geniculate; branches flattened, composed of few joints, and bearing numerous setæ on both margins. Upper antennæ very large and strong, many-jointed, geniculate at the base, shortly spiniferous. Mandibles small and weak, palp large. Three pairs only of thoracic appendages, all maxilliform. Palp of the mandible and first jaw bearing internally a comb of large setæ. First and second pairs of jaws provided with a large branchial plate; third pair rudimentary in the female, in the male well developed and prehensile. Postabdominal rami small and narrow, distinctly separated, and spiniferous at the apex.	both branches well developed, moveable, and natatory. Upper antennæ also natatory, not geniculate, ending in a lash of long setæ. Mandibles distinct, palp short and scarcely pediform, provided with a small branchial appendage. Two pairs only of thoracic appendages; the anterior large, bifid, natatory; the posterior membranaceous and branchial. Eyes wanting. Postabdomen divided into two short laminae, spinous behind.	POLYCOPIIDÆ.	} CLADOCOPA.
		flattened, similar to the feet of the Copepoda, basal portion biarticulate and geniculate; branches flattened, composed of few joints, and bearing numerous setæ on both margins. Upper antennæ very large and strong, many-jointed, geniculate at the base, shortly spiniferous. Mandibles small and weak, palp large. Three pairs only of thoracic appendages, all maxilliform. Palp of the mandible and first jaw bearing internally a comb of large setæ. First and second pairs of jaws provided with a large branchial plate; third pair rudimentary in the female, in the male well developed and prehensile. Postabdominal rami small and narrow, distinctly separated, and spiniferous at the apex.	flattened, similar to the feet of the Copepoda, basal portion biarticulate and geniculate; branches flattened, composed of few joints, and bearing numerous setæ on both margins. Upper antennæ very large and strong, many-jointed, geniculate at the base, shortly spiniferous. Mandibles small and weak, palp large. Three pairs only of thoracic appendages, all maxilliform. Palp of the mandible and first jaw bearing internally a comb of large setæ. First and second pairs of jaws provided with a large branchial plate; third pair rudimentary in the female, in the male well developed and prehensile. Postabdominal rami small and narrow, distinctly separated, and spiniferous at the apex.	CYTHERELLIDÆ.	} PLATYCOPA.

Section I. PODOCOPA.

Fam. 1. CYPRIDÆ.

Valves mostly thin and smooth, more or less sinuated below. Upper antennæ mostly seven-jointed, and beset with numerous setæ, which form a dense brush of greater or less length; lower antennæ geniculate and bent backwards, four- or five-jointed, armed at the distal extremity with from three to five long, slightly curved claws, and bearing commonly on the posterior aspect of the antepenultimate joint a bundle of setæ. Mandibles powerful, and divided at the extremity into several teeth, bearing a large four-jointed palp, the first joint of which is provided with a branchial appendage. Two pairs of jaws: the first large, and divided into four digital segments, the anterior segment being larger than the rest, two-jointed and giving attachment to a large branchial plate:

second pair small, simple; in the female bearing a simple subconical palp, in the male often pediform. Two pairs of feet: the first stout and five-jointed, terminated by a long curved claw; the second pair more slender, and usually bent upwards within the valves. Postabdomen forming two long moveable rami, which are sometimes rudimentary and setiform, but oftener well developed and terminating in two strong curved claws. Eye single or altogether wanting; rarely two. Intestinal canal forming two pouches; ovaries and testes lying immediately beneath the shell. Copulative organs of the male situated immediately in front of the postabdominal rami, and provided with testes or mucus-glands of complex structure.

The animals belonging to this family have been considered, until very recently, to be inhabitants exclusively of fresh water. G. O. Sars, however, has shown that several forms hitherto classed among the Cytheridæ properly belong to the Cypridæ; these species now constitute the genera *Pontocypris* and *Macrocypris*; in addition to which other entirely new forms have been described under the names *Paracypris*, *Aglaia*, and *Argillæcia*. Lastly, the genus *Bairdia*, M'Coy, is here shown to belong to the same family.

The annexed Table shows the chief distinctive characters of the different genera. *Aglaia* and *Argillæcia*, however, have not yet been found in the British seas:—

CYPRIDÆ.	Second pair of jaws	possessing a branchial appendage; palp subconical, indistinctly jointed, ending in 3 setæ. Second joint of lower antennæ	bearing a brush of setæ. Setæ of the upper antennæ very long. Postabdominal rami without a brush of setæ. Setæ of the upper antennæ very short. First and second pairs of feet	well developed, terminating in two strong curved claws rudimentary, setiform alike . . . dissimilar	} <i>Cypris</i> .  <i>Cypridopsis</i> .  <i>Paracypris</i> . <i>Aglaia</i> .			
						subconical, indistinctly jointed. Setæ of the lower antennæ	long, reaching beyond the apex of the terminal claws. Two eyes altogether wanting. One eye	} <i>Notodromas</i> .  <i>Candona</i> .
		destitute of a branchial appendage. Palp	3-jointed. Upper antennæ 4-jointed. Upper antennæ shortly setose. Postabdominal rami	} elongated, 7-jointed, armed with long setæ . . . } <i>Pontocypris</i> .  short and robust; 5-jointed, in the female shortly setose; in the male provided with a few long setæ . . . } <i>Argillæcia</i> .  largely developed, terminating in several long setæ . . . } <i>Bairdia</i> .  rudimentary . . . } <i>Macrocypris</i> .				

Genus 1. CYPRIS, Müller.

Valves mostly subreniform or elongate-oval, horny in texture. Upper antennæ seven-jointed, and beset with numerous long plumose setæ, which are mostly distributed as follows,—four from the apices of the fourth, fifth, and sixth joints, and three from the apex of the terminal or seventh joint. Lower antennæ five-jointed, bearing a fascicle of five or six setæ of variable length, and on the inner side of the third joint a short bi-articulate seta; terminating in four long curved and serrated claws; a few short setæ also arise from the sides of the fourth joint, near the middle. Second pair of jaws smaller than the first, in the male prehensile, and in the female consisting of a short, simple seti-

ferous lobe, a subconical, simple, or obscurely articulate palp, which projects backward, and terminates in three long setæ, and a small branchial plate, bearing six radiating respiratory setæ. Postabdominal rami long and slender, bearing at the apex two long and unequal curved claws, and a short seta; a short seta springs also from the inner margin of the ramus at or below the middle. The males furnished (mostly, if not always) with two mucus-glands, consisting of a cylindrical axis, on which are set seven whorls of radiating filaments, the whole connected with an efferent tube or "vas deferens."

The males of this genus are, except in a few instances, entirely unknown. Dr. Zenker has, indeed, in his excellent memoir on the anatomy of the lower Crustacea, given figures and descriptions of the males of three species; but two of these belong to the section comprised in the subgenus *Cypria* of that author, which may ultimately be found to present generic characters distinct from *Cypris* proper. Fischer has also figured and described the males of some few species. I have myself sought diligently for the males of many of the commoner species of *Cypris*, but have only seen one example belonging to *C. (Cypria) compressa*, Baird. This is one of the species figured by Zenker. Meantime the peculiarities of the group *Cypria* seem scarcely sufficient to warrant its separation as a distinct genus. The "testis," or "mucus-gland," though hitherto seen only in a few species, is doubtless present under some form in the males of all. And seeing that it is, to all appearance, the secretory gland of the spermatic filaments, or "spermatozoids," there seems no valid reason for applying to it any other name than that of *testis*.

The members of this genus inhabit exclusively fresh or slightly brackish water, and are mostly natatory animals; but a few of them, which have unusually short setæ attached to the lower antennæ, seem to be destitute of swimming-power, and constitute, in fact, a link between *Cypris* and *Candona*. In external appearance, as well as in habit of life, these approach the latter genus more closely than the former. To this category belong *C. reptans*, *serrata*, and *gibba*.

Though the structural differences observed amongst the Cyprides are not of generic importance, they are sufficient to form grounds of separation into several distinct sections as follows:—

- a. Setæ of lower antennæ plumose, subequal, reaching about as far as, or only slightly beyond, the apex of the terminal claws.
  - \* Second foot terminating in a short hooked claw, and one or more moderately long setæ.
  - \*\* Second foot without a claw, ending in three setæ.
- b. Setæ of lower antennæ non-plumose, very short, not reaching nearly to the apex of the terminal claws.
- c. Setæ of lower antennæ plumose, unequal; two or three exceedingly long, the rest short. Second foot ending in three unequal setæ, one of which is exceedingly long.

a. *Setæ of lower antennæ plumose, reaching about as far as, or only slightly beyond, the apex of the terminal claws.*

\* *Second foot terminating in a short hooked claw, and one or more moderately long setæ*

1. *CYPRIS FUSCA*, Straus. (Plate XXIII. figs. 10–15.)

*Cypris pilosa* (?), Müller, Entomostraca, p. 59, tab. vi. figs. 5, 6.

— *fusca*, Straus-Durekheim, Mémoires du Mus. d'Hist. Nat. vii. p. 59, tab. i. figs. 1–16 (*vide* Baird); Baird, Brit. Entom. p. 154, tab. xix. fig. 7.

— *oblonga*, Brady, Ann. & Mag. Nat. Hist. (1864) vol. xiii. p. 59, pl. iii. figs. 1–4; and Trans. Tyne-side Nat. Field Club, vol. vi. p. 104, pl. ii. figs. 1–4.

*Candona hispida*, Baird, Brit. Entom. p. 161, tab. xix. fig. 4.

Carapace\* oblong, oval; extremities rounded, the posterior somewhat narrowed; dorsal margin gently arched; ventral slightly sinuated. Seen from above, the carapace is broadly ovate, pointed in front and rounded behind; the greatest diameter a little behind the middle. End view suborbicular, somewhat angular above. The surface is rather thickly covered with long, fine hairs, and almost always bears patches of a dull furfuraceous character, apparently a desquamating epidermis; it is also superficially marked, more especially in young specimens, with a wrinkled or reticulated pattern. The colour is of variable shades of brown, with irregular transparent patches. Lucid spots about seven in number, long and narrow, and arranged obliquely across the valve. The abdominal rami are long and very slender, the terminal claws long and slender, subequal; marginal setæ very near the apices of the rami.

Length  $\frac{1}{8}$  in., height  $\frac{1}{30}$  in. † *1.4 mm X .83 mm.*

This is one of the commonest of British species, occurring abundantly in ponds and stagnant water. I do not, however, remember ever to have met with it in lakes or streams.

The form described by me under the name of *C. oblonga* appears to be nothing more than an unusually elongated variety of this species. Müller's figures and description of *C. pilosa*, not hitherto identified by authors with the present species, are so very characteristic, that I feel little doubt that his specific name should be adopted on the ground of priority. His figure is certainly somewhat too small in comparison with some other species; but much stress cannot be laid upon a difference of this kind. Yet, as the name *fusca* seems now to be generally accepted by authors, I have not thought it desirable to propose an alteration the correctness of which might be open to doubt.

2. *CYPRIS INCONGRUENS*, Ramdohr. (Plate XXIII. figs. 16–22.)

*Cypris incongruens*, Ramdohr, Ueber die Gattung Cypris; der Naturforsch. Freunde zu Berlin Magazin, 2. Jahrg. 1808, p. 86, tab. iii. figs. 1–12, 15, 16, 18–20 (*vide* Lilljeborg); Lilljeborg, De Crust. ex ord. trib. p. 119, tab. ix. figs. 6, 7, tab. xi. figs. 1–4, tab. xii. fig. 6.

— *aurantia*, Baird, Brit. Entom. p. 159, tab. xix. fig. 13.

\* The first clause of the specific descriptions refers in all cases to the *lateral* view of the carapace.

† The dimensions, and, indeed, all other portions of the specific descriptions, must in all cases be taken as applying to the *female*, unless otherwise stated.



*Monoculus aurantius*, Jurine, Hist. des Monocles, p. 173, pl. xviii. figs. 5-12.

— *ruber*, Idem, ibidem, p. 172, pl. xviii. figs. 3, 4.

Valves oblong, subreniform, narrowed in front. Anterior extremity narrow, bordered by a flattened encircling lamina; posterior broad and well rounded. The ventral margin is straight or slightly sinuated; the dorsal arched, highest at its posterior third. Seen from above, the carapace is oblong, ovate, tapering to the anterior extremity, which is acutely pointed, the right valve being considerably overlapped by the left. Front view ovate, the suddenly compressed anterior margins projecting sharply forward. The surface is indistinctly granular, and finely punctate. Colour ochreous yellow, marked with bands and blotches of deeper orange. Near the anterior third of the dorsum there is frequently a conspicuous deep-brown or black spot, marking probably the position of the eye. The arrangement of the antennal setæ is precisely like that of *C. virens*,—the upper antenna bearing nine long and several shorter plumose filaments; the lower five, which reach but slightly beyond the apices of the claws. Four much shorter and mostly non-plumose setæ rise from the middle of the fourth joint, and reach not very much beyond the bases of the claws. These are found in all members of the genus. Setæ of the abdominal rami four, the two shorter ones being much longer than those of *C. fusca* or *C. virens*. The anterior portion of the shell is not unfrequently studded with a number of minute tubercles, which along the margin are gathered into a regular row of from twenty to thirty (fig. 21), producing an appearance as of a finely crenated or serrated border. The *marginal* row of tubercles is present, however, only on the right or smaller valve, which is provided internally with a narrow laminar plate (fig. 22), and is received within the overlapping and perfectly simple margin of the left valve. The posterior margin is also occasionally, but less frequently, tuberculated in a similar manner.

Length  $\frac{1}{17}$  in., height  $\frac{1}{30}$  in. *1.5mm x .83 mm.*

*C. incongruens* seems to be one of the less common species of this genus. It has been found in Kent and Essex by Professor T. Rupert Jones, at Blackheath, Windsor, and Dover by Dr. Baird, in the island of Cumbrae and in a lagoon on the Ayrshire coast by Mr. D. Robertson, in the county of Durham and in the Isle of Arranmore (Galway) by myself. It has a wide range on the continent, being mentioned by various authors as occurring in Switzerland, Germany, Norway, and Sweden.

My figures and description of this species were completed before I became acquainted with the memoir of Fischer contained in the 'Transactions of the Munich Academy;' and it is satisfactory to find that the observations of that author as to the distinctive characters of *C. aurantia* are quite in unison with my own. Dr. Fischer, however, assigns a specific rank to *C. rubra*, Jurine, almost entirely on the ground of the want of tuberculation of the carapace, at the same time admitting that the subject wants investigation, and that the relations between *C. fusca*, *C. aurantia*, and *C. rubra* are far from being clearly made out\*. From what has been said above, it will be seen that I regard the two former species as distinct, not only from characters afforded by the carapace, but

\* Es muss übrigens erst weitere Beobachtung lehren, ob nicht Uebergangsformen zwischen *C. aurantia*, *fusca* und *rubra* stattfinden, und sie alle drei nur als eine Species zu betrachten sind, da ihr Körperbau durchaus keine wesentliche Verschiedenheit wahrnehmen lässt."

by the animal itself. And I feel no hesitation in uniting *C. aurantia* and *C. rubra*, as all the gatherings I have seen contain both tuberculated and non-tuberculated specimens.

3. *CYPRIS VIRENS* (Jurine). (Plate XXIII. figs. 23–32, and Plate XXXVI. fig. 1.)

*Monoculus virens*, Jurine, Hist. des Monocles, p. 174, pl. xviii. figs. 15, 16.

*Cypris tristriata*, Baird, Brit. Entom. p. 152, t. xviii. figs. 1, 1*a-i*, 2, 3.

— *virens*, Lilljeborg, Crust. ex ord. tribus, p. 117, tab. viii. fig. 16, tab. ix. figs. 4, 5, tab. x. figs. 23–25, tab. xii. fig. 5, tab. xix. fig. 8, tab. xxvi. fig. 8.

Valves oblong, reniform; the extremities rounded and nearly equal. Dorsal margin evenly arched, highest in the middle; ventral gently sinuated. Seen from above the shell is oblong, ovate, pointed in front, rounded and narrow behind. End view broadly oval. The surface is smooth or slightly pubescent and mostly marked with minute and closely set puncta. The colour varies from a light greenish drab to a grass-green, varied with striæ of a deeper hue running obliquely across the valves from above downwards and backwards. The lucid spots are large, oblong, irregular in size and shape, but mostly somewhat crescentic or sinuous in outline. They are arranged in a group of about seven, near the centre of the valve, and point obliquely from above downwards and backwards. Besides the main group, isolated spots often occur on other parts of the valves, especially near the dorsal margin. The two claws of the postabdominal rami are unequal in length, and in fine specimens are serrated on their inner edge towards the apex. The short seta on the inner margin of the ramus is not far removed from the terminal claws.

Length  $\frac{1}{4}$  in., height  $\frac{1}{25}$  in. *l. 1.2 mm x .6 mm.*

*Cypris virens* is a very common species, met with mostly in small ponds, and apparently very generally distributed throughout Britain and the continent. Like *C. fusca* it seems seldom to inhabit lakes or large sheets of water. The hingement of this species is a good example of the normal structure of the joint in *Cypris*. It is figured at Plate XXIII. figs. 28, 29.

4. *CYPRIS OBLIQUA*, n. sp. (Plate XXIII. figs. 33–38.)

Valves oblong, subreniform, not quite twice as long as broad. Extremities rounded and nearly equal. Dorsal margin gently and evenly arched, highest in the middle; ventral margin nearly straight, slightly sinuated near the front. The dorsal aspect is oblong-oval, broadest in the middle and tapering to the extremities, the anterior of which is more sharply pointed than the posterior. End view oblique, the right valve being on a higher plane than the left. Lucid spots nearly like those of *C. virens*. The surface of the shell is shining, very slightly hairy, and thickly impressed with rather large rounded puncta. Colour deep green or olive-brown, with three or four oblique darker bands. Postabdominal setæ stout and crowded together,—one long, two shorter and nearly equal, the uppermost very short.

Length  $\frac{1}{2}$  in., height  $\frac{1}{40}$  in. *l. 1.1 mm x .6 mm.*

I first took *C. obliqua* in Loughrigg Tarn, Westmoreland, in the summer of 1861, and for a considerable time thought it to be a very fine variety of *C. fusca*. Last year (1864),

however, I again met with it in the lakes at Rothley and at Belsay in Northumberland; Mr. Robertson has more recently taken it at Cumbrae; and it also occurs abundantly in a gathering taken by my brother, Mr. Alfred Brady, in a pond on Wandsworth Common.

In many respects this handsome species agrees with *C. virens*, but it is sufficiently distinct. The oblique end view (fig. 36) is especially characteristic. The shell is also much more strongly punctate than that of *C. virens*, the colour deeper, the setæ of the abdominal rami more crowded. The Westmoreland specimens are light olivaceous brown, those from Northumberland and Cumbrae are deep green; the Wandsworth specimens are more variable, and present an intermediate appearance. The figure and description of *C. elliptica* given in the 'Natural History of British Entomostraca' would apply tolerably well to the present species; but Dr. Baird has kindly compared one of my specimens of *C. obliqua* with those of *C. elliptica* preserved in the British Museum, and considers the two to be distinct.

##### 5. CYPRIIS ELLIPTICA, Baird.

*Cypris elliptica*, Baird, Trans. Berw. Nat. Club, ii. p. 152, 1846; Brit. Entom. p. 158, tab. xix. fig. 12.

"Shell nearly elliptical, of a light green colour, clouded with darker patches of the same colour on the sides of the shell. Valves glabrous, except round the edges, which are beset with long hairs. Filaments of inferior antennæ long. Pond at Highgate, July 1846."

I do not know this species, except from Dr. Baird's description quoted above.

##### 6. CYPRIIS PUNCTILLATA, Norman. (Plate XXVI. figs. 1-7, and Plate XXXVI. fig. 11.)

*Cypris cuneata*, Baird, Proc. Zool. Soc. Lond. 1850, p. 255, pl. xviii. (Annulosa) figs. 22-24.

— *punctillata*, Norman, Ann. & Mag. Nat. Hist. Jan. 1862, p. 43, pl. ii. figs. 11-14; and Trans. Tyneside Nat. Field Club, vol. v. p. 145, pl. iii. figs. 11-14.

Valves oblong, subovate, tumid. The anterior border is broad, well rounded, and armed on both valves with a series of eight sharp teeth; the posterior narrowed, rounded, and bears near the ventral angle of the right valve four or five spines, the lowest of which is much longer than the rest. Dorsal margin boldly arched, highest at its anterior third; ventral margin nearly straight, with a slight sinuation. Seen from above, the carapace is broadly ovate, pointed in front and rounded behind, the greatest breadth in the middle. The ventral aspect is marked by a conspicuous central fossa or sulcus formed by the depressed margins of the two valves. End view subpyramidal or cuneate, the height and width equal. Internally the front and hinder margins of the valves are produced into broad lamellar plates. Lucid spots about seven, oval, crowded, and placed obliquely near the centre of the valves. The surface is thickly beset with long hairs and marked by rather large closely set round pittings (fig. 6). Colour deep green.

Length  $\frac{1}{3}$  in., height  $\frac{1}{4}$  in. *1.9 mm x 1.0 mm*

First found at Duddingston Loch, Edinburgh, by Dr. Baird, and more recently by the Rev. A. M. Norman at Sedgfield, Durham.

This fine species was originally described by Dr. Baird from immature specimens, the name *cuneata* being meant to designate the lateral aspect of the shell. In the adult,

however, this term has no applicability; and I have therefore adopted Mr. Norman's specific name.

7. *CYPRIS BISPINOSA*, Lucas. (Plate XXVI. figs. 14–17.)

*Cypris bispinosa*, Lucas, Explorat. Scient. d'Algérie, Animal. Artic. Crustac. t. viii. figs. 7, 7a, b (*vide* Baird).

Carapace oblong, subpyramidal, very tumid on the ventral surface, and gradually narrowing towards the dorsum. The ventral margin is elevated into a broadly rounded ridge which runs backwards, becoming gradually narrower and more sharply defined, until it ends, considerably behind the middle of the valve, in a sharp, curved, projecting spine: anteriorly the ridge curves upwards, and is gradually lost on the surface of the shell. The anterior margin is narrow and rounded. Dorsal margin arched, highest a little in front of the middle, where it is angular or gibbous, sloping equally to each extremity. The posterior extremity forms a slightly produced beak a little below the median line of the valve, thence sloping steeply upwards to the dorsal, and curving gently downwards to the ventral margin. Seen from above, the outline is tumid, oval, with acutely pointed extremities, the anterior of which is produced so as to form an "ogee" outline; the lateral spines are very conspicuous both in the dorsal and ventral aspects. End view triangular, base flattened, sides convex, lateral angles produced and rounded. Surface smooth, very finely punctate. Colour light green.

Length  $\frac{1}{8}$  in., height  $\frac{1}{16}$  in.

For specimens of this noble species (the finest British *Cypris*) I am indebted to the Rev. A. M. Norman, to whom it was forwarded some years ago by Dr. Lukis of Guernsey, who took it in a freshwater pool in that island. Dr. Baird identifies the specimens with *Cypris bispinosa*, Lucas, which was found in Algeria "in a little streamlet of fresh water flowing from the Boudigma."

8. *CYPRIS GIBBOSA*, Baird.

*Cypris gibbosa*, Baird, Mag. Zool. & Bot. i. p. 137, t. v. fig. 15, 1837; and Nat. Hist. Brit. Entom. p. 156, t. xix. fig. 8.

"Shell ovate, and much elevated on the upper margin, the centre exhibiting a large gibbosity or hump; sinuated underneath. The valves are smooth, except round the edges, which are beset with short fine hairs, are nearly opaque, and of a light green colour, the anterior extremity being paler than the other parts of the shell. Filaments of both pairs of antennæ beautifully plumose.

"*Hab.* Ditch near the Surrey Zoological Gardens, June 1836."

I know nothing of *C. gibbosa*, except from Dr. Baird's description.

9. *CYPRIS TESSELLATA*, Fischer. (Plate XXIII. figs. 39–45.)

*Cypris tessellata*, Fischer, Mémoires des Savants Etrangers, St. Petersburg, vol. vii. p. 159, pl. x. figs. 1–5.  
— *affinis*, Lilljeborg, De Crust. ex ord. trib. p. 116, pl. xi. figs. 8–14; Brady, Ann. & Mag. Nat. Hist. vol. xiii. (1864) p. 60, pl. iii. figs. 6–11, and Trans. Tyneside Nat. Field Club, vol. vi. p. 105, pl. ii. figs. 6–11.

Carapace oblong, tumid, broad in front, and tapering backwards from the anterior third.

Anterior margin broad, well rounded, and encircled by a narrow flattened lamina. Posterior extremity narrow, rounded. Ventral margin slightly sinuated in the middle. The dorsal margin has a gibbous elevation a little in front of the middle, from which it slopes steeply backwards and more gradually towards the front. Dorsal aspect oval, tumid, widest in the middle, and tapering equally towards the somewhat sharply pointed extremities. Anterior view nearly circular, the height being very slightly greater than the width. The surface of the shell is slightly roughened, presenting a scaly appearance, the result of a peculiar reticulated sculpturing. Colour olivaceous or brown. Postabdominal rami rather stout; the two terminal claws about equal in length; lateral setæ short.

Length  $\frac{1}{25}$  in., height  $\frac{1}{45}$  in. *Ann. Mag. Nat. Hist.*

I have found this species near Belsay, and in pools on the bents north of Seaton Sluice, Northumberland; at Fenham, near Newcastle, at Whitburn and Boldon Flats, near Sunderland, and near Cotherston, Yorkshire. It has been taken also by the Rev. A. M. Norman at Sedgfield and at Osterley Park, near Brentford.

*C. tessellata* is, in many cases, easily distinguished by the peculiar sculpturing of the valves, which, in fine specimens, and with good illumination under the microscope, resembles an exquisitely wrought pattern of filigree-work. The reticulations of which the ornament is composed are largest towards the extremities of the valves; across the middle of the carapace they are not very conspicuous, the shell-structure being there much more condensed. The junction of the reticulation of the extremities with that of the closer central band is shown in Pl. XXIII. fig. 43. It will be seen that the tendency to a radiate arrangement is continuous throughout. Occasionally the surface-marking is almost entirely absent, the shell being nearly as smooth as that of *Cypris fusca*; some trace, however, of the peculiar ornament is always visible.

*Cypris tessellata* appears to haunt only small grassy pools, where the water is considerably impregnated with organic matter. At least I know of no instance of its capture in lakes or large sheets of water.

My original reference of this species to *C. affinis*, Fischer, seems to have been an error. I had not at that time seen Fischer's monograph, and judged of the species from the figures given by Lilljeborg, which doubtless refer to the present species, but agree much more closely with Fischer's figures of *C. tessellata* than of *C. affinis*.

#### 10. CYPRIS CLAVATA, Baird.

*Cypris clavata*, Baird, Mag. Zool. & Bot. i. p. 137, t. v. fig. 16, 1837; Brit. Entom. p. 157, t. xviii. fig. 4; Lilljeborg, Crust. ex ord. trib. p. 121, tab. xi. figs. 5-7.

"Shell oblong, narrower at posterior extremity than anterior, which is rather flattened, giving the shell the appearance of being club-shaped. The valves have the upper margin elevated, and the lower nearly straight. They are smooth and shining, but beset round the margin with short hairs; their colour is of a light grey, with an obscure dark-coloured ray running from the centre towards the posterior extremity, which again is distinctly marked with an orange-coloured spot. The antennæ and feet are short, compared with the size of the shell. The filaments of both pairs of antennæ are plumose.

This species approaches near to *C. crassa* of Müller, as described by him, but differs *in toto* from the figures which he gives of it.

“*Hab.* In a pond near Copenhagen Fields, July 1836” (*Dr. Baird*).

11. [CYPRIS SALINA, Brady.] (Plate XXVI. figs. 8–13.) *Cyprinus salina* (Baird)  
*Cypris strigata*, Baird, Brit. Entom. p. 157.

Valves reniform, compressed, about once and a half as long as broad. Extremities broadly rounded, nearly equal, and produced into flattened laminæ, which form a flange encircling nearly the whole shell. The ventral margin is slightly sinuate in the middle, and in the right valve is finely crenulated or toothed round each extremity: dorsal margin very strongly arched and highest rather in front of the middle. Seen from above, the carapace is compressed, oblong-ovate, acutely pointed in front and more obtusely behind, widest in the middle; there is a slight longitudinal sulcus on the hinge-line near the posterior extremity, formed by the juxtaposition of the incurved margins of the two valves. The contact-margins of the ventral surface are sinuous and remarkably prominent. End view ovate, compressed, the breadth equal to two-thirds of the height. Lucid spots similar to those of *C. fusca*. The surface of the valves is very finely punctate, and marked with a pattern of brown which may be described as follows:—Commencing under the middle of the dorsal margin a brown belt runs backwards, coursing nearly parallel to the circumference of the valve, and ceasing near the summit of the anterior border; on the central light-coloured patch thus nearly enclosed by a brown zone are two large, irregular, brown blotches, the hindermost of which sends upwards and forwards a prolongation connecting it with the marginal belt. Abdominal rami slender. Setæ three long and one short, all near together.

Length  $\frac{1}{8}$  in., height  $\frac{1}{5}$  in. *9 mm x .55*.

I first met with *C. salina* in a cooling-pond at Monkwearmouth Colliery, where it lives in great numbers together with *Cypridopsis aculeata*, *Cypris reptans*, and other species, in water which often reaches a temperature of 100° Fahr. and is so impregnated with earthy salts as to deposit a thick coating of carbonate of lime on the leaves of the plants which it supports. I have this year (1865) been fortunate enough to find the species in a second locality, namely, a small pool of somewhat brackish water, above high-water mark, in a salt marsh north of the river Coquet, below Warkworth. This habitat is particularly interesting, inasmuch as it leaves little doubt that the species here referred to must be the same as that discovered by Dr. Baird in a similar situation (“pool on seashore a little above high-water mark, at Thornton Loch, East Lothian, June 1835”)—a matter hitherto doubtful, owing to the fact that the Scotch specimens have not been preserved. Mr. D. Robertson has also lately found this species in a pond liable to tidal overflow at Cumbrae.

I much regret that I have not been able to obtain examples of the form known to continental naturalists as *C. strigata* (Müller); for though the written description given by that author\* accurately agrees with the British species, his figures are very far wrong.

\* Müller's description of the carapace is very terse and expressive:—“*Testa* subovata, glabra, margine ciliata, ad

As Fischer has identified Müller's *C. strigata* with a species which seems to be very different from the present, I have thought it best to describe our British species under a new name.

\*\* *Second foot without a claw, terminating in three moderately long and nearly equal setæ.*

12. CYPRIIS GIBBA, Ramdohr. (Plate XXIV. figs. 47-54, and Plate XXXVI. fig. 2.)

*Cypris gibba*, Ramdohr, Magaz. d. Gesellsch. naturforsch. Freunde zu Berlin, 1808, ii. p. 91, t. iii. figs. 13-17 (*vide* Jones); Jones, Tertiary Entom. p. 15, pl. i. figs. 3a-f, and woodcut, fig. 1, p. 16.

Valves oblong, oval, nearly equal in height throughout, marked generally, but not always, by two deep transverse sulci extending from the anterior half of the dorsum to the middle of the valve. Extremities well rounded and nearly equal, fringed with hairs. Dorsal margin straight; ventral deeply sinuate in the middle. Seen from above, the carapace is oblong-ovate, narrowed in front and rounded behind, marked on the anterior half by one or more deep transverse sulci. End view subquadrate, keeled. Surface of the shell deeply and coarsely punctate (fig. 51), cream-coloured or light brown, sometimes nearly white. The shell is much thicker and stronger than that of any other *Cypris* with which I am acquainted. The second foot bears at the apex of the terminal joint three long setæ, two of which are nearly equal in length, the other considerably shorter: the penultimate joint has also two long and equal setæ springing from its inner margin; and another, somewhat shorter, rises from the apex of the second joint. Postabdominal rami flexuous, ending in two long and equal claws, and one very short seta; the marginal seta is unusually long, and is attached somewhat below the middle of the ramus. Eye very black and conspicuous.

Length  $\frac{1}{28}$  in., height  $\frac{1}{55}$  in. *.9mm x .45mm*

*Cypris gibba* seems to be an almost ubiquitous species, but is liable to escape observation, owing to its habit of creeping on the bottom or imbedding itself in the mud or soft clay. It is nevertheless a true *Cypris*, the lower antennæ bearing a tuft of long setæ, and the second pair of jaws a branchial appendage. The armature of the second pair of feet is peculiar, and the shell-structure very different from that usually seen in this genus. The markings of the surface are very variable, some specimens being altogether devoid of grooving or tuberculation, while others are deeply uni-, bi-, or trisulcate. These variations do not seem to depend entirely upon age, though in young specimens the sulci and tubercles are, as a general rule, feebly developed or absent.

b. *Setæ of lower antennæ scarcely plumose, very short, not reaching to the apex of the terminal claws.*

13. CYPRIIS TRIGONELLA, n. sp. (Plate XXV. figs. 41-44.)

Valves elongated, subtriangular, highest in the middle; height equal to more than

aperturam sublinearis; valvulæ convexiusculæ, fuscæ, fasciis tribus albis, postica nempe lunata, media obliqua, antica arcuata; vel, si mavis, valvulæ albæ, margine dorsali cingulo fusco cinctæ, disco maculis duabus obliquis fuscis."

half the length. Extremities rounded and nearly equal, the anterior slightly narrowed. Ventral margin straight or slightly convex, dorsal arched, somewhat angular in the middle, where it is highest. The outline, as seen from above, is oval, tumid; width equal to half the length; extremities rounded and nearly equal; hinge-margins depressed posteriorly so as to form a longitudinal sulcus behind the centre of the carapace. End view circular. The surface is quite smooth and polished; colour sea-green, faintly mottled with patches of a deeper hue.

Length  $\frac{1}{42}$  in., height  $\frac{1}{80}$  in.

*Cypris trigonella* was found by the Rev. A. M. Norman amongst some freshwater shells collected by the late Mr. Barlee. From the character of the Mollusca with which it was associated (*Planorbis spirorbis* and *Limnæa peregra*) we may presume that it was taken probably in the south of England. The gathering contained several specimens of this *Cypris*, all of them agreeing in size and general character.

#### 14. CYPRIS REPTANS (Baird.) (Plate XXV. figs. 10-14, and Plate XXXVI. fig. 4.)

*Candona reptans*, Baird, Trans. Berw. Nat. Club, i. p. 99, t. iii. fig. 11, 1835; and Brit. Entom. p. 160, tab. xix. figs. 3, 3a; Jones, Tert. Entom. p. 16, pl. i. figs. 7a-7e.

*Cypris reptans*, Lilljeborg, De Crustaceis, p. 123, tab. xi. figs. 21-23, tab. xii. figs. 7-9.

*Candona virescens*, Brady, Ann. & Mag. Nat. Hist. vol. xiii. p. 61, pl. iv. figs. 1-5, and Trans. Tyneside Nat. Field Club, vol. vi. p. 106, pl. iii. figs. 1-5.

Valves oblong, subreniform, compressed, unequal, the left being considerably the larger. The anterior and posterior margins are obliquely rounded, somewhat angular below, and nearly equal in height, the posterior somewhat the higher. Ventral border slightly sinuated, dorsal straight or very slightly arched. Seen from above, the carapace is compressed, oblong-ovate, widest in the middle, the anterior extremity pointed. End view ovate, prominently keeled in front and below. The surface is smooth and shining, and bears a few scattered hairs. Colour greenish with patches of lighter and darker hue, sometimes banded with orange or brown. The limbs and their terminal claws are all long and slender. Setæ of the lower antennæ short and rigid, sometimes slightly plumose, but mostly quite simple; the principal bundle rises from the apex of the second joint, and consists of four long and one short seta; an auxiliary brush springs from the middle of the joint, two on the outer, and one on the inner side: none of the setæ reach as far as the apices of the terminal claws. The postabdominal rami are long, slender, and serrated on the internal border; the two larger terminal claws are also serrated in a similar manner.

Length  $\frac{1}{11}$  in., height  $\frac{1}{25}$  in.

A very common species, and (excepting *C. bispinosa*) the largest of all the British freshwater Ostracoda. It often occurs in very great abundance, especially in the "cooling-ponds" of collieries, &c., where the temperature of the water is higher than ordinary.

In external appearance, and in habits of life, this species bears much more resemblance to the *Candonæ* than to the true *Cyprides*; but the structure of the lower



antennæ and the second pair of jaws renders it impossible to retain it in the position which it at first occupied as a *Candonia*. The same remark applies also to the following species, *C. serrata*.

The species described by me in another place under the name *Candonia virescens*, I now believe to be the young of *C. reptans*.

15. CYPRIIS SERRATA (Norman). (Plate XXV. figs. 15–19, and Plate XXXVI. fig. 3.)

*Candonia serrata*, Norman, *Ann. & Mag. Nat. Hist.* vol. ix. (1862) p. 46, pl. ii. figs. 1–6; and *Trans. Tyneside Nat. Field Club*, vol. v. p. 148, pl. iii. figs. 1–6.

Valves subtriangular, oblong, broad and rather squared in front, narrow and obliquely rounded behind. The ventral margin is nearly straight, the dorsal margin much elevated, and gibbous at the anterior third, sloping steeply towards each extremity. Anterior margin broad and only slightly rounded at the angles, armed along the lower half of both valves with a row of from eight to ten spines. The posterior margin is, in like manner, set with six or seven spines. Seen from above, the outline of the shell is oblong-oval, widest in the middle and tapering to each extremity. End view tumid, broad and rounded at the base, pyramidal at the apex. The colour of the shell is pale grey, marked with a central patch of lighter hue and two large patches of deep brown, which form a broad but interrupted zone round the central space. The depth, as well as the disposition, of the colours, however, is subject to considerable variation. Surface marked with impressed punctures, and beset with scattered hairs. Lucid spots seven, oblong, arranged irregularly near the centre of the valve, with their long axes nearly parallel with that of the shell. The most usual arrangement of the spots in this species, as also in *C. reptans*, is as follows:—a central row of three spots placed parallel to each other and transversely across the shell; two spots slightly in advance, and often coalescing below; the remaining two behind. A comparison of the figures (Pl. XXV. figs. 14 & 19) will show that this arrangement differs only slightly from that of *C. reptans*. The second joint of the lower antenna bears a brush of five simple non-plumose and very short setæ, springing from near its apex, and reaching not much beyond the middle of the third joint, which also bears four or five similar setæ reaching scarcely beyond the base of the terminal claws (Plate XXXVI. fig. 3). The postabdominal rami and their terminal setæ are long, slender, and without serratures. The second foot, both in this species and in *C. reptans*, bears a small hooked claw and setæ, just as in *C. virescens*.

Length  $\frac{1}{23}$  in., height  $\frac{1}{40}$ . *1.04 mm x .6 mm*

*Hab.* *Cypris serrata* was first described by the Rev. A. M. Norman from specimens taken by him at Sedgefield. I have myself taken it at Fardingslake, near Sunderland; and I am indebted to Mr. W. W. Stoddart for specimens from Ashley Brook, Bristol, where it seems to be very abundant.

c. *Setæ* of lower antennæ plumose, unequal, two or three exceedingly long, the rest short. Second foot ending in three unequal setæ, one of which is excessively long.

(Subgenus *Cypria*, Zenker).

16. *CYPRIS COMPRESSA*, Baird. (Plate XXIV. figs. 1–5, and Plate XXXVI. fig. 6.)

*Cypria compressa*, Baird, Trans. Berw. Nat. Club, i. p. 100, t. iii. fig. 16, 1835; Brit. Entom. p. 154, t. xix. figs. 14, 14 a–c; Lilljeborg, De Crust. ex ord. trib. p. 112, t. x. fig. 16–18.

— *punctata*, Zenker, Anatomisch-system. Stud. über die Krebssthiere, p. 77, Taf. iii. a.

Valves compressed, reniform, about one-third longer than high. The dorsal margin is very much arched, highest in the middle; ventral margin straight or slightly sinuated; extremities broad and well-rounded. Outline, as seen from above, compressed, oblong, pointed in front, rounded behind; more than twice as long as broad. End view oval, equally rounded at base and apex; the height very much greater than the width. The shell is smooth and marked with distant but rather large puncta; colour light brown or straw-colour, transparent, with irregular opaque patches. The setæ of the lower antennæ are three very long (the apices of the claws reaching scarcely to the middle of the setæ), and three of about one-third this length. The biarticulate seta attached to the inner side of the second joint is considerably elongated, and has a distinctly tapering vesicular apex, which is also apparent in the other members of this section (see Plate XXXVI. fig. 5 b). The setæ attached to the inner side of the mandibular palp are very strongly plumose, and from their structure would almost appear to act as accessory respiratory organs (fig. 6 n)—a peculiarity which also exists throughout this section, and is sometimes, to a smaller extent, observable in other members of the genus. The mucus-gland of the male is terminated by a peculiar calyptra-like prolongation (fig. 6 m). The last joint of the second foot bears three setæ—one excessively long and more than equalling in length the three preceding joints, and two others much shorter, the shortest of all being slightly flexuous. The abdominal rami are rather short and stout, the terminal claws much curved, and bearing one or two teeth near the apices, the uppermost seta far removed from the rest and situate near the middle of the ramus.

Length  $\frac{1}{8}$  in., height  $\frac{1}{6\frac{1}{2}}$  in. .52 mm x .47

*C. compressa* is a common species in ponds and ditches, often living where there is little or no vegetation. Dr. Zenker identifies this species with the *C. punctata* of Jurine; but the figures and description of the latter author are so vague, and in some respects so unlike *C. compressa*, that I cannot coincide in this view.

17. *CYPRIS STRIOLATA*, Brady. (Plate XXIV. figs. 6–10.)

*Cypria striolata*, Brady, Ann. & Mag. Nat. Hist. vol. xiii. (1864) p. 60, pl. iii. figs. 12–17; and Trans. Tyneside Nat. Field Club, vol. vi. p. 105, pl. ii. figs. 12–17.

Carapace broadly subovate; greatest height in the middle, equal to about two-thirds of the length. Dorsal margin strongly arched, sloping with a gentle curve toward the anterior, but with a bolder sweep towards the posterior extremity, ventral margin mostly somewhat convex. Anterior and posterior margins rounded, the former somewhat narrowed. Seen from above, the outline is compressed, oval, rather narrowed

in front, the greatest breadth equal to less than half the length. End view oval. The surface of the shell is highly polished and marked by closely set longitudinal anastomosing striæ (fig. 10). Colour dark brown. The anatomical structure agrees closely with that of *C. compressa*.

Length  $\frac{1}{3}$  in., height  $\frac{1}{50}$  in. 76 mm x .5

*Hab.* Greenlea Lough, Northumberland; Mickle Fell, Yorkshire; Connemara (*G. S. B.*); Lochmaben (*Sir W. Jardine, Bart.*); Peterhead Canal (*Mr. D. Robertson*).

The form described by me (*loc. cit.*) as a distinct species under the name of *C. striolata*, is noticed by Dr. Zenker as a variety of *C. punctata (compressa)*; but the differences in size and surface-marking are so conspicuous as to form good specific characters; moreover the shells of the two species seem to retain their distinctive characters in all stages of growth. Dr. Zenker conjectures, but scarcely believes, that *C. striolata* may possibly be the very old state of *C. compressa*, inasmuch as he has never met with it except in the adult condition. I have, however, seen both young and old individuals, always retaining the distinctive characters of shell-sculpture &c. *Cypris prasina*, Fisch., and *C. exsculpta*, Fisch. (*Munich Transactions, Band xvii.*), bear some resemblance to the present species in their surface-marking; but the general form of the carapace seems to differ in both cases.

18. CYPRIIS OVUM (Jurine). (Plate XXIV. figs. 31–34, 43–45, and Plate XXXVI. fig. 8.)

*Monoculus ovum*, Jurine, Hist. des Monocles, p. 179, pl. xix. figs. 18, 19.

*Cypris minuta*, Baird, Brit. Entom. p. 155, tab. xviii. figs. 7, 8.

Valves subreniform, convex, greatest height equal to two-thirds of the length. Anterior and posterior margins rounded and nearly equal. Ventral margin distinctly sinuated near the middle; dorsal boldly arched, sloping more steeply behind than in front. Seen from above, the outline is ovate, widest behind the middle, broadly rounded behind, and tapering to a subacute extremity in front: greatest width equal to more than half the length. End view very broadly oval. Surface of the shell smooth or slightly punctate, sometimes slightly hispid. Colour yellowish or olivaceous brown, with irregular dark cloudings and transparent patches. The animal is almost precisely similar to that of *C. laevis*—two of the filaments of the second antennæ excessively long, the rest very short. The males, of which I have seen only one imperfect specimen, have the second jaws chelate.

Length  $\frac{1}{55}$  in., height  $\frac{1}{75}$  in. 40 mm x .07

This species is very common and widely distributed; but, as I for a long time supposed it to be a form of *C. laevis*, I am unable to specify exactly all the localities in which I have noticed it. The two species occur very generally in company with each other, but sometimes separately. The specimens from which my illustrations are drawn were taken at Axwell Park, in the county of Durham. Figs. 43–45 are more highly magnified representations of a form taken by me in the Loch o' the Lowes, Selkirkshire, perhaps the young of the present species, though the lower antennæ bore only *one* long seta.

19. *CYPRIS LÆVIS*, Müller. (Plate XXIV. figs. 21–26, and Plate XXXVI. fig. 5.)

*Cypris lævis*, Müller, Entomostraca, p. 52, tab. iii. figs. 7–9.

*Cypria ovum*, Zenker, Anatom.-syst. Studien, p. 79, taf. iii. B.

*Cypris ovum*, Jones, Tertiary Entomostraca, p. 14, pl. i. figs. 4a, 4b; Lilljeborg, De Crust. ex ord. tribus, p. 113, tab. x. fig. 13–15.

— ? *pantherina*, Fischer, Ueber das Genus *Cypris*, p. 163, tab. xi. figs. 6–8.

Carapace ovate, subglobose; greatest height equal to nearly three-fourths of the length. Dorsal margin very strongly arched, or even angular, highest in the middle; ventral margin straight or slightly convex. Extremities rounded and nearly equal. The dorsal aspect of the carapace is very broad, subglobose, pointed in front and very broadly rounded behind, broadest near the middle: length about one-third greater than the breadth. End view subcircular. Lucid spots four, quadrangular, crowded: three set transversely in front, and one behind. The shell is smooth and shining, distantly punctate; colour a transparent yellowish or olive-brown, clouded with patches of darker hue, which often form faint striæ (fig. 21) arranged as in *C. vidua*. These striæ, however, are mostly absent or reduced to one or two faint dorsal patches. The filaments of the upper antennæ are eight or nine in number. The lower antennæ have three excessively long setæ (Plate XXXVI. fig. 5), measuring more than twice the length of the apical portion of the antennæ, reckoning from the origin of the setæ to the extremity of the unguis. The postabdominal rami are rather stout, their claws sharply curved at the apices. The setæ of the second feet as in *C. compressa*.

Length  $\frac{1}{44}$  in., height  $\frac{1}{82}$  in. *of form x. 457*

20. *CYPRIS CINEREA*, n. sp. (Plate XXIV. figs. 39–42, and Plate XXXVI. fig. 7.)

Carapace oval, tumid, higher in front than behind; greatest height equal to nearly two-thirds of the length. Anterior margin broad and well rounded, posterior narrowed and rather obliquely rounded. Ventral margin straight or very slightly incurved, dorsal forming a flattened arch and sloping more steeply behind than in front. Seen from above, the outline is rhomboidal or lozenge-shaped, the greatest breadth in the middle, and equal to more than half the length; from the middle the sides taper evenly toward the extremities, the anterior of which is acutely, the posterior obtusely pointed. End view very broadly oval, pointed above and below. The right valve considerably overlaps the left. Surface of the shell very finely and closely punctate, slightly pubescent; colour ash-grey. The second antenna has three setæ very long, the rest short; its claws, as also those of the first foot, are long, slender, and destitute of serratures. The terminal setæ of the second foot (Plate XXXVI. fig. 7) are very stout from the base to the middle, then suddenly constricted and tapering to the points. Postabdominal rami very stout; their claws short and stout; the lateral seta and that on the inner border of the ramus very short and slender.

Length  $\frac{1}{35}$  in., height  $\frac{1}{55}$  in. *of form x. 457*

*Cypris cinerea* has hitherto occurred to me only in one locality, a pool not far from the summit of Mickle Fell in Yorkshire, at an elevation of about 2000 feet. In the same gathering were *C. compressa*, *striolata*, and other species. It is very distinct from any

other British *Cypris*, and I cannot identify it with any of the numerous species described by continental authors.

## 21. CYPRIS JOANNA, Baird.

*Cypris Joanna*, Baird, Trans. Berw. Nat. Club, i. p. 99, t. iii. fig. 8, 1835, and Brit. Entom. p. 155, t. xviii. fig. 5.

“Shell rounded, ovate, narrower anteriorly than posteriorly, of a brown colour, with an orange mark across the back of the shell and the lower margin. Shell beset all round with rigid hairs, and covered with minute black points or dots. Approaches the *C. pilosa* of Müller, but is smaller, and is otherwise distinguished from it by the orange mark across the back, and by not being glabrous, but marked all over with black, roughish-looking points. It is a little longer than *C. minuta*. *Hab.* Pool of water on one of the Lammermuir Hills, near Abbey St. Bathans, Berwickshire; August 1835.”—*Dr. Baird*.

I have never found this species, nor seen specimens of it. Can it be a moorland form of *C. lævis*?

## Genus 2. CYPRIDOPSIS, Brady\*.

Like *Cypris*, except that the postabdominal rami are rudimentary, consisting of two slender setiform prolongations (Plate XXXVI. figs. 9, 10), thickened below and rising together from a common base. The second feet are terminated by a short hooked claw, and two moderately long setæ.

The three species belonging to *Cypridopsis* have not much in external appearance to separate them from section *c* of the preceding genus; but the structure of the abdominal rami is of itself a character of sufficient importance to form a generic distinction. The characters of the second feet are the same as found in section *a* of the genus *Cypris*. The males have not yet been met with.

### 1. CYPRIDOPSIS VIDUA (Müller). (Plate XXIV. figs. 27–30, 46.)

*Cypris vidua*, Müller, Entomostraca, p. 55, tab. iv. figs. 7–9; Baird, Brit. Entom. p. 152, t. xix. figs. 10, 11;

Lilljeborg, De Crust. ex ord. trib. p. 111, tab. x. figs. 10–12.

— *sella*, Baird, Brit. Entom. p. 158, t. xix. figs. 5, 5a.

*Monoculus vidua*, Jurine, Hist. des Monocles, p. 175, pl. xix. figs. 5, 6.

Shell ovoid, very tumid: greatest height in the middle, equal to two-thirds of the length; extremities rounded, the anterior much the broadest. Dorsal margin arched and highest in the middle; ventral margin very slightly sinuated. Seen from above, the carapace is ovate, exceedingly tumid, narrowed in front, and broadly rounded behind, widest a little behind the middle; length about one-third longer than the breadth. The end view is very broad in proportion to its height, the diameter from side to side being nearly one-fifth more than that from base to apex. The setæ of the lower antennæ reach much beyond the apices of the claws. The short articulate appendage of the third joint bears at its extremity a very distinct subovoid hyaline vesicle (fig. 46). The limbs are uniformly very robust. The shell is smooth and mostly marked with small impressed puncta: colour dull white, with three black bands running transversely from the dorsal margin to the middle of each valve. The anterior band is the

\* Intellectual Observer, vol. xii. p. 117.

narrowest, the hindermost the broadest. On the ventral aspect the bands are not visible. The middle and posterior bands are sometimes connected along the hinge-margins by a broad longitudinal band of the same colour (see figs. 27, 28). In this condition it is *Cypris sellæ* (Baird).

Length  $\frac{1}{45}$  in., height  $\frac{1}{75}$  in. *.55 mm x .33 mm*

*C. vidua* is a common and widely distributed species. I have specimens from many different localities, ranging from Kent to Dumfriesshire.

2. CYPRIDOPSIS ACULEATA (Lilljeborg). (Plate XXIV. figs. 16–20, and Plate XXXVI. fig. 10.)

*Cypris aculeata*, Lillj. De Crust. ex ord. trib. p. 117, t. xi. figs. 15, 16; Norman, Ann. & Mag. Nat. Hist. vol. ix. (1862) p. 44, pl. ii. figs. 7–10, and Trans. Tynes. Nat. F. C. vol. v. p. 147, pl. iii. figs. 7–10.

Valves broadly reniform or subtriangular, convex; greatest height in the middle, equal to two-thirds of the length. The anterior and posterior margins are well rounded, the latter being somewhat the broader of the two. Ventral margin deeply sinuated in the middle; dorsal very boldly arched, almost angular in the middle. Seen from above, the carapace is ovate, pointed in front, and rounded behind, broadest in the middle; width equal to half the length. The end view is ovate, rounded at the base and rather pointed above. The whole surface of the shell is thickly pitted and beset with stiff hairs, mingled, more particularly near the dorsum, with strong, pointed spines (fig. 20). Colour bluish green or dirty brown. The limbs are altogether very robust. Setæ of the lower antennæ about equal, and reaching much beyond the apices of the terminal claws. The mandibular palp bears four strongly plumose setæ (much like those of *Cypris compressa*), the uppermost of which is broad and somewhat lancet-shaped. The terminal claw of the first foot is strongly curved, and serrated for a short distance near the apex; the serratures, however, do not extend quite to the point of the claw.

Length  $\frac{1}{45}$  in., height  $\frac{1}{75}$  in. *.55 mm x .33 mm*

*Hab.* Gravesend, in brackish water (*Prof. T. Rupert Jones*); brackish water in Suffolk and near Grimsby (*Mr. E. C. Davison*); Cowpen Marshes, Durham (*Rev. A. M. Norman*); Monkwearmouth Colliery Pond, Hylton Dene, and Warkworth (*G. S. B.*). In a pond a little above high-water mark, Cumbrae (*Mr. D. Robertson*).

This pretty species, though apparently much restricted in its range of habitat, occurs very abundantly in congenial situations, preferring, like *Cypris salina*, water impregnated with saline matters. Of the eight localities here mentioned, seven were slightly brackish in character, and the other was, as already noted (*C. salina*), loaded with salts of lime. At Monkwearmouth Colliery it occurred in company with *Cypridopsis vidua*, *Cypris reptans*, *C. salina*, *Daphnia vetula*, &c.; at Hylton Dene with *C. gibba*, *C. compressa*, *Candona candida*, *Mysis vulgaris*, *Palæmon varians*, *Corophium longicorne*, and many freshwater plants and animals; at Warkworth with *Cypris salina*, *Cytheridea torosa*, *Chydorus sphaericus*, and *Daphnia vetula*; at Gravesend with *C. gibba*, *Candona candida*, *Cytheridea torosa*, and *Crangon vulgaris*.

The only brown specimens I have seen were from Gravesend, Grimsby, and Warkworth; these have the appearance of being coloured by dirty water.

## 3. CYPRIDOPSIS VILLOSA (Jurine). (Plate XXIV. figs. 11–15, and Plate XXXVI. fig. 9.)

*Monoculus villosus*, Jurine, Hist. des Monocles, p. 178, pl. xix. figs. 14, 15.

*Cypris Westwoodii*, Baird, Brit. Entom. p. 156, pl. xix. fig. 9.

— ? *elongata*, Baird, Brit. Entom. p. 156, pl. xix. fig. 6.

Carapace compressed, oblong, reniform; height equal to more than half the length. The dorsal margin is boldly arched, highest in the middle; the ventral margin deeply incurved along its entire length. The anterior border is broad and rounded, the posterior somewhat produced, forming an obscure angle inferiorly. Outline, as seen from above, compressed, oval, pointed in front and rounded behind; about twice and a half as long as broad. End view oval, rounded at the base, pointed above. Surface of the shell covered with long, fine hairs. Colour light grass-green.

Length  $\frac{1}{40}$  in., height  $\frac{1}{75}$  in. (60 mm x .30 . . .)

This is one of the less common species of freshwater Cypridæ. It has been found at Yetholm Loch, Roxburghshire, by Dr. Baird; at Sedgefield, Durham, by the Rev. A. M. Norman; in moorland pools near Easedale Tarn, Westmoreland, in a pool near Cotherston, Yorkshire, in Belsay East Lake and near Crag Lake, Northumberland, and in ponds at Silksworth and Fulwell, near Sunderland, by myself; also by Mr. D. Robertson in a pool near Banff.

The nearest ally of this species is *C. aculeata* (Lillj.). *C. villosa*, however, is much less tumid, the ventral margin much more deeply arched, the dorsal margin not rising to a point, while the surface of the shell is destitute of spines, and clad with much less rigid hairs than those of *C. aculeata*.

*Cypris elongata*, Baird, appears to me to be the young form of *C. villosa*.

## Genus 3. PARACYPRIS, G. O. Sars.

Shell smooth, compact, much higher in front than behind. Upper antennæ seven-jointed, shortly setiferous; lower stout, terminating in four strong curved claws, three of which are nearly equal in length, the other considerably shorter, antepenultimate joint bearing at its base a pedicellated hyaline vesicle. Mandibles terminating in five or six rather long teeth, and bearing a four-jointed palp, from the basal joints of which springs a narrow branchial appendage. "The external lobe or palp of the first pair of jaws linear, scarcely broader than the rest. Second pair of jaws provided with a branchial appendage; the palp elongated, conical and inarticulate"\*. Last pair of feet similar to the first in form and size; both pairs five-jointed, and terminating in a long

\* I have had no opportunity of verifying these particulars, most of my British specimens having come into my hands either as mere empty shells, or containing, at best, mutilated animals. The portion of the generic definition contained within inverted commas is, therefore, quoted from G. O. Sars; and I may here, once for all, state that where similar quotations are made in subsequent parts of this memoir they are derived from the same source, and are inserted for the same reason. The drawings, however, it may be proper to say, have been in all cases done by myself, direct from nature; and through the kindness of Herr G. O. Sars in furnishing me with Norwegian specimens, I have, in some cases, been able to give illustrations of the anatomy of species which could not have been derived from British examples. These remarks apply almost exclusively to the very rarest species; but, when practicable, I have always preferred to draw from native specimens, and have never used foreign ones when there could be the least doubt as to their identity.

curved claw; the last pair armed also with a short seta, which is directed upwards. Postabdominal rami large, armed at the extremity with two strong curved claws, and a short slender seta; the posterior margin also bearing two long setæ. One eye.

This genus approaches very closely to the freshwater *Cyprides*, especially in the structure of the second pair of jaws, which have a distinct branchial appendage and a conical palp, ending in three setæ, as in *Cypris*, *Candona*, &c. From the genus *Candona* it is clearly separated by the presence of the branchial plate of the second maxillæ; and Sars observes that the second pair of feet, which in *Cypris* and *Candona* are slender, much bowed, and constantly tucked up within the valves, are here stronger and, during the movement of the animal, may often be seen partially to extrude themselves. The shell partakes much more of the characters of the Cytheridæ than of the Cypridæ, being very hard and compact in structure. The short antennal setæ are evidently adapted for a crawling motion in or on the mud, rather than for swimming. The only British member of the genus is

PARACYPRIS POLITA, G. O. Sars. (Plate XXVII. figs. 1-4, and Plate XXXVIII. fig. 2.)

*Paracypris polita*, Sars, *Oversigt af Norges marine Ostracoder*, p. 12.

Scandinavian type. DISTRIBUTION: *Recent*—Norway, Great Britain. *Fossil*—Scotland, Norway, glacial.

Seen from the side, the carapace is elongated, siliquose, or subtriangular; greatest height at the anterior third, and equal to more than one-third of the length. Anterior extremity evenly rounded, posterior much attenuated, pointed. Dorsal margin arched in front, and sloping steeply behind; ventral concave along the greater portion of its length. Seen from above, it is much compressed, oval, not quite four times as long as broad, greatest breadth in front of the middle; extremities obtusely pointed. End view oval. Shell smooth and polished, almost destitute of hairs: colour yellowish white. The setæ of the upper antennæ are nearly equal in length to the six preceding joints, sixth joint longer than the rest. The antepenultimate joint has at its inner apical angle two setæ; and from its basal portion springs a fine tubular filament, which ends in a pyriform sac or vesicle. The postabdominal rami are gently curved, the exterior claw somewhat longer than the other. Male unknown.

Length  $\frac{1}{2}$  in., height  $\frac{1}{5}$  in. 1.13 mm X .45 mm

*Hab.* In moderate depths of water, 3-30 fathoms. Channel Islands, and Loch Alsh, Hebrides (*Mr. Jeffreys*); Shetland (*Mr. Waller* and *Mr. Robertson*); Tobermory, at roots of *Laminariæ* (*Rev. A. M. Norman*).

In no British specimens have I seen the purple or reddish markings which are mentioned by Sars as characterizing the shell of this species, and which are quite distinct in specimens which I have received from him. But it is more than probable that the colours may have been destroyed, as well as the animal itself, by the prolonged drying amongst sand or mud to which my specimens have been subjected. The curious "hyaline vesicle" attached to the second antenna, which occurs in this genus and also in *Pontocypris*, is an organ the use of which it is difficult to conjecture. The vesicle itself appears sometimes as if filled with a granular matter; and the pedicle is, I think, tubular; but I have been unable to trace it further than its attachment to the antennal



joint. It occupies a position similar to that of the biarticulate seta which is uniformly present in the freshwater Cypridæ; and I have noticed that in some of these (e. g. *Cypridopsis vidua*) the extremity of the seta forms a sac somewhat similar, but not so largely developed.

Genus 4. NOTODROMAS, Lilljeborg.

(*Cyprois*, Zenker; *Newnhamia*, King.)

Carapace of very different shape in the male and female. Two eyes. Antennæ similar to those of *Cypris*; the superior composed of seven, the inferior of six joints. Setæ of the inferior antennæ reaching beyond the apex of the terminal claws. Second pair of jaws without a branchial appendage, pediform in the male. Abdominal rami long and slender. Mucus-gland of the male large, beset with very numerous closely set whorls of stout rigid setæ. Copulative organs of very complex structure.

The genera *Cyprois* (Zenker) and *Newnhamia* (King) seem to be identical, or nearly so, with *Notodromas* (Lilljeborg). The torose, tuberculated condition of the valves of *Newnhamia* cannot be considered as supplying a distinctive generic character; while the general contour of the carapace and the "boat-like plate" of the ventral surface are remarkably in accordance with the English species *N. monachus*. A more important difference (if borne out by further observation) is the presence in *Newnhamia* of a branchial appendage to the second pair of jaw-feet. Mr. King states that this is present in *all* the Australian Cypridæ, though he does not specially mention it in his definition of the genus or species of *Newnhamia*. But from the more general statement, we are left to infer the presence of this appendage. Mr. King describes *Newnhamia* as possessing also transparent ocular tubercles.

NOTODROMAS MONACHUS (Müller). (Plate XXIII. figs. 1-9, and Plate XXXVII. fig. 3.)

*Cypris monacha*, Müller, Entomostraca (1785), p. 60, tab. v. figs. 6-8; Baird, Natural History of

British Entomostraca, p. 153, tab. xviii. fig. 6.

*Monoculus monachus*, Jurine, Hist. des Monocles, p. 173, pl. xviii. figs. 13, 14.

*Notodromas monachus*, Lilljeborg, De Crustaceis ex ord. tribus, p. 95, tab. viii. figs. 1-15, tab. xii. figs. 1, 2, tab. xxv. fig. 16.

*Male*.—Carapace obliquely subquadrangular, greatest height equal to two-thirds of the length, situated in the middle. Anterior margin broad, rounded at the angles, and expanded into a flattened lamina or flange. Ventral margin straight for about two-thirds of its length, then bending upwards at an obtuse angle. Dorsal margin arched, almost angular in the middle, whence it slopes steeply to the anterior border, and with a bold curve towards the posterior extremity, joining the ventral margin at an acute angle. Seen from above, the carapace is ovate, pointed in front, and rounded behind; the greatest breadth in the middle. The ventral surface is bounded by two conspicuous, elevated, arcuate ridges (figs. 3, 6), one on each valve, which together enclose a flattened lozenge-shaped area. Parallel to the contact margin of each valve runs another straight but much less conspicuous ridge, which, towards the front, curves outward, and joins the external ridge at an acute angle, the union of the two forming a slight elevation (fig. 6*a*),

from which a single ridge runs forward, gradually merging in the flattened encircling flange of the anterior border. Seen from the front, the shell is subquadrangular, the sides convex, but flattened, the dorsum forming a flattened arch; the ventral border perfectly flat, and bounded by the projections of the outermost ventral ridges; the inner ridges form also conspicuous projections, which run obliquely upwards and inwards towards the flattened anterior flange. Lucid spots about six, oblong and irregularly placed, their long diameters pointing transversely across the valve. Surface of the shell smooth and shining, marked by fine impressed lines, forming a pattern similar to the imbrication of fish-scales. Colour pale greenish or white, transparent, with large and irregularly spread patches of deep olive-green or black.

*Female*.—Subquadrangular. Anterior border flattened, flanged, forming with the ventral margin a well-marked angle; rounded above. Dorsal margin boldly arched, highest at the posterior third, whence it sweeps round with a deep curve to the postero-ventral angle. Ventral margin straight, slightly rising behind, and terminating in a flattened squamous plate, which projects backwards, with the appearance of a spine. The other aspects are similar to those of the male shell, except that the ventral surface of the left valve has at the posterior extremity of its contact margin a flattened squamous plate (fig. 6*b*), which is received into a corresponding depression of the opposite valve.

The mandibles have a structure similar to those of other Cypridæ; but the branchial appendage rises from the lower instead of the upper border of the palp\* (Plate XXXVII. fig. 3*c*). The second pair of jaws have no branchial appendage. In the female (fig. 3*e'*) they possess a large subconical palp, which terminates in two setæ. In the male they are pediform; the last joint of the right side (fig. 3*e''*) is much elongated, and terminates in a short seta and a long flexuous claw, which is composed of a strong midrib, with lateral membranous expansions; the left jaw has its last joint (fig. 3*e'''*) shorter and wider, its inner margin having two strongly marked angles, one a little above the middle, the other near the lower extremity; the outer margin is flexuous, and is produced laterally near its distal extremity into an acutely angular projection; the terminal claw is falciform: the penultimate joint of both sides bears at its apex a dense tuft of short setæ. The first foot in both sexes terminates in three curved claws, the central one being much the strongest and longest (fig. 3*f', f''*). The second foot is slender and curved upward, like that of *Cypris*, terminating in three equal setæ, the second and third joints also giving off each a long apical seta (fig. 3*g*). The "glandula mucosa," or testis of the male, consists of a central cylinder, closely beset with radiating filaments (fig. 3*l*), arranged in 50–60 transverse rows, the whole organ being imbedded in a sort of glairy matrix. The two glands are connected each by an efferent duct with the "*bursa copulatrix*," an organ of very complicated structure (fig. 3*k*), and consisting essentially (so far as I can make out) of a much convoluted canal (? *vesicula seminalis*), an intromittent organ or *penis*, and two hooked appendages. The whole organ is very dense in structure, consisting probably of chitine, deep brown in colour, and, with the

\* I at first thought that this appearance must arise from distortion, the parts of the animal having probably got twisted during dissection and manipulation under the microscope; but in order to correct any error of this kind, I examined several animals, and always with the same result.

“glandulæ mucosæ,” constitutes a very considerable portion of the contents of the male carapace. It should be noted that the “*bursa copulatrix*,” as well as the testis, is a *double* organ, one on each side of the median line. The two bursæ lie closely in apposition, but are not in organic connexion except at the upper margin, where they are held together by a ligamentous tissue. The postabdominal rami are long and slender, and terminate in two unequal slender claws and a short seta.

Length  $\frac{1}{2}$  in., height  $\frac{1}{3}$  in.

*Notodromas monachus* is generally distributed throughout Britain, occurring often in very great abundance. It seems to delight chiefly in grassy pools, or lakes where there is a profusion of vegetation. Mr. Norman tells me that in sunny weather he has often seen it floating on the surface of the water in considerable numbers. Dr. Baird gives the neighbourhood of London and Rugby as localities for this species. It has been taken by Mr. Norman and myself in many places in the counties of Northumberland and Durham; and I have also met with it frequently in the lakes of Selkirkshire, Dumfriesshire, and Kirkcudbrightshire. Mr. Robertson has taken it in the island of Cumbrae.

The following remarks of Mr. King\* relative to the habits of the Australian species, “*Newnhamia fenestrata*,” are very interesting when considered in reference to those of *N. monachus*:—“This very common but interesting species lives almost wholly near the surface of the water, its boat-like plate enabling it to walk along the under surface, while its eyes, directed downwards, give immediate notice of the approach of an enemy. When alarmed, it immediately sinks to a little distance, and then swims off, only coming to the surface when all becomes tranquil. The hand passed over the water near the surface, so as to intercept the light, or the surface being disturbed by the slightest breath, instantly alarms them. They are the most active when the sun is shining; and often a whole troop of them may be noticed swimming round and round, and in and out, with a most lively and graceful motion, about an inch beneath the surface, in some spots more favoured than others by the warmth of the sun.”

#### Genus 5. CANDONA, Baird.

Like *Cypris*, except that the lower antennæ possess no tuft of setæ, and that the second pair of jaws are destitute of a branchial appendage. Setæ of the upper antennæ short. Above the base of the postabdominal rami there is a short seta springing from an enlarged base, somewhat similar to, but smaller than, that of *Pontocypris* (see Plate XXXVII. fig. 2*i*). The animals belonging to this genus have no swimming-power, and are very sluggish in their movements, crawling leisurely on the bottom, or on the stems of water-plants, or sometimes burying themselves in the mud.

#### 1. CANDONA ALBICANS, Brady. (Plate XXV. figs. 20–25, and Plate XXXVI. fig. 12.)

*Candona albicans*, Brady, Ann. & Mag. Nat. Hist. vol. xiii. (1864) p. 61, pl. iv. figs. 6–10, and Trans. Tyneside Nat. Field Club, vol. vi. p. 107, pl. iii. figs. 6–10.

Valves oblong, subreniform, nearly equal in height throughout, the left considerably overlapping the right; height equal to more than half the length. Anterior and pos-

\* Proc. Roy. Soc. Van Diemen's Land, vol. iii. part 1.

terior extremities rounded gradually towards the short and straight dorsal margin, suddenly towards the ventral margin, which is more or less deeply sinuated. Seen from above, the outline is compressed, ovate, oblong, pointed in front and rounded behind, the sides nearly parallel, width equal to much more than one-third of the length. End view broadly ovate, obtusely pointed above, rounded below. The shell is covered with rather large and closely set angular puncta, and bears a few scattered slender hairs round the anterior and posterior margins. Lucid spots six, irregularly quadrate (fig. 24). Colour opaque white, uniform or with pellucid patches.

Length  $\frac{1}{45}$  in., height  $\frac{1}{80}$  in.

*C. albicans* has been taken abundantly by the Rev. A. M. Norman in a small grassy pond at Sedgelyield (Durham), by Mr. D. Robertson in the Glasgow and Paisley Canal, and by myself near Sunderland. It is nearly allied to the following species, but smaller, more profusely punctate, and considerably less tumid.

## 2. CANDONA LACTEA, Baird. (Plate XXIV. figs. 55-58.)

*Candona lactea*, Baird, Proc. Zool. Soc. Lond. 1850, p. 255, pl. xviii. (Annulosa) figs. 25-27.

Lateral view oblong, subquadrangular, nearly equal in height throughout; height equal to half the length. Extremities obliquely rounded, equal. Dorsal margin straight, ventral gently sinuated. Seen from above, the shell is oblong-ovate in outline, somewhat pointed in front; greatest width about the middle, and equal to half the length; the left valve considerably overlapping the right. End view suborbicular, the width slightly less than the height. Surface smooth, finely and sparingly punctate. Colour greyish white.

Length  $\frac{1}{38}$  in., height  $\frac{1}{75}$  in.

*Hab.* "Freshwater pond at Charing, Kent; and Regent's Park—*T. Rupert Jones, Esq.*" (*Dr. Baird*)

## 3. CANDONA COMPRESSA (Koch). (Plate XXVI. figs. 22-27.)

*Cypris compressa*, Koch, Deutschlands Crustaceen, H. 21. pl. xvii. (*vide* Lilljeborg).

*Candona compressa*, Lilljeborg, De Crust. ex ord. tribus, p. 129, tab. xxvi. figs. 1-3.

*Cypris setigera*, Jones, Tertiary Entomostraca of England, p. 12, pl. i. figs. 6a-6d.

Lateral aspect compressed, subreniform, higher behind than in front; greatest height equal to more than half the length. Anterior extremity obliquely rounded, sloping steeply above to join the short and straight dorsal margin; the posterior broad and well rounded. Ventral margin incurved in front of the middle. Outline, as seen from above, compressed, oval, acuminate in front, widest in the middle, width equal to less than half the length. End view oval. Surface smooth, milk-white, thickly covered with very short and fine hairs, and often marked with a minutely reticulated pattern. Lucid spots six, arranged in two transverse rows.

Length  $\frac{1}{30}$  in., height  $\frac{1}{55}$  in.

*Candona compressa* was taken by Mr. D. Robertson in the Glasgow and Paisley Canal; and a single valve, apparently belonging to the same species, occurred amongst Ostracoda found by Dr. Alcock in shell-sand from Roundstone. The peculiar reticulated

ornament of the shell is not noticed by Lilljeborg, and is, indeed, visible only in specimens of moderate age, while they remain free from opacity.

4. *CANDONA CANDIDA* (Müller). (Plate XXV. figs. 1–9, Plate XXXVI. fig. 13, and Plate XXXVII. fig. 1.)

*Cypris candida*, Müller, Entomostraca, p. 62, tab. vi. figs. 7–9; Zenker, Anat.-syst. Studien, p. 76, Taf. i. figs. 1–10.

*Monoculus candidus*, Jurine, Hist. des Monocles, p. 176, pl. xix. figs. 7, 8.

*Candona lucens*, Baird, Brit. Entom. p. 160, tab. xix. fig. 1.

— (?) *similis*, idem, ibidem, p. 162, tab. xix. figs. 2, 2a.

— *candida*, Lilljeborg, De Crust. ex ord. trib. p. 127, tab. xi. figs. 19, 20, tab. xxv. figs. 13–15; Jones, Tertiary Entom. p. 19, pl. i. figs. 8a–8f, 5a, 5b.

Valves oblong, lower in front than behind, reniform in the male, subtriangular in the female; greatest height equal to more than half the length. Anterior margin rounded and narrow. Posterior margin obliquely rounded and produced into a more or less prominent angle inferiorly. The ventral margin is only slightly sinuated in the young and in adult female specimens, but in old examples and in the adult male is deeply sinuated at the anterior third, and bulges considerably behind (figs. 7, 8). The dorsal margin is highest at the posterior third, from which it slopes, in a flattened arch, to the front. The outline, as seen from above, is oblong-ovate, pointed in front, and rounded behind, widest in the middle; greatest width equal to half the length. End view broadly ovate, somewhat angular at the base, and rounded above. Lucid spots six, oblong, their long diameters nearly parallel to that of the shell, arranged in two lines—an anterior transverse row composed of four spots, and a posterior row of two, placed directly behind the lower spots of the front row. Surface of the shell smooth, pearly or yellowish white, with darker yellow cloudings toward the dorsal margin. Young specimens are regularly oval, and present none of the angulation characteristic of the adult. The setæ of the upper antennæ are very short, and arranged as in *Cypris*. The claws of the lower antennæ are long and slender. The mandibles and maxillæ do not differ from those of *Cypris*, except in the absence of the branchial appendage of the second pair of maxillæ. The palp of the second jaw in the male is pediform, ending in one strong curved claw and two shorter ones, which spring from the inner border of the last joint; the central part of the joint has a curious oval depression, perhaps indicating a muscular attachment; the palp in the female is subconical, and ends in three slender setæ. The second foot terminates in three setæ, two moderately long, the other rather shorter; the penultimate joint bears one apical seta. Postabdominal rami slender; the two terminal claws slender, and nearly equal in length; one short posterior seta, and one on the inner margin of the ramus below the middle. Testis composed of a central, cylindrical, transversely striated axis, bearing seven whorls of tapering filaments. The spermatozoids seem to be composed of two filaments, either spirally intertwined or laid side by side (see Plate XXXVII. fig. 1 t). Some large adult specimens, collected by Professor T. Rupert Jones in slightly brackish water at Gravesend, exhibit near the posterior extremity of the shell a peculiar reticulated pattern (fig. 9), very similar to that of

*Cytherideis nobilis* (Brady)\*, a marine species found on the coast of Crete. Curiously enough, this marine form is also not unlike *Candona candida* in shape and general appearance.

Length  $\frac{1}{25}$ – $\frac{1}{16}$  in., height  $\frac{1}{46}$ – $\frac{1}{30}$  in. *Length = 1.56 mm x .54 mm = .83*

The males of *C. candida* are much more abundant than those of any other species of the family; they appear, indeed, to be almost as plentiful as the females. When their scarcity in other species is borne in mind, this is a very remarkable fact: whether it is constantly the case, or only occurs at some particular seasons, or in favourable localities, I cannot at present confidently state. *C. candida* may be taken as the type of the genus *Candona*; and the anatomical description given above will apply in its main features to the other members of the genus.

It is an exceedingly common species, being found almost everywhere, in ponds, lakes, and slowly running streams, and even in brackish water.

5. *CANDONA DETECTA* (Müller). (Plate XXIV. figs. 35–38, and Plate XXXVII. fig. 2.)

*Cypris detecta*, Müller, Entomostraca, p. 49, tab. iii. figs. 1–3.

*Candona detecta*, Baird, Brit. Entom. p. 161.

Valves, as seen laterally, oblong, reniform, nearly equal in height throughout; height equal to less than half the length. Dorsal margin evenly and gently arched; ventral gently incurved in the middle. The extremities are nearly equal in height, and evenly rounded. Outline, as seen from above, oval, tapering equally to the extremities, which are pointed; greatest width in the middle, equal to more than one-third of the length. End view nearly circular. Surface of the shell quite smooth and shining, pellucid, white; often with patches of white opacity. The biarticulate seta on the third joint of the lower antenna is slender and tapering, the basal joint being very short (as also in *C. albicans*, see Plate XXXVI. fig. 12 m). The first foot is robust, its claw long and much curved. Last joint of the second foot very small, bearing two moderately long and one short, the penultimate joint one seta. Postabdominal rami robust; claws strong and flexuous, the inner and shorter pectinated on both margins (Plate XXXVII. fig. 2 i). Male unknown.

Length  $\frac{1}{40}$  in., height  $\frac{1}{90}$  in. *Length = 2.5 mm x .11 mm = .275*

*Hab.* *C. detecta* occurs pretty plentifully in the Glasgow and Paisley Canal, where it was found by Mr. D. Robertson. Dr. Baird gives as localities Beaumont Water and the neighbourhood of London.

Genus 6. PONTOCYPRIS, G. O. Sars.

Shell thin and fragile, higher in front than behind. The first joint of the upper antennæ gives origin to two short setæ, the four succeeding joints each to one, the sixth to four, and the seventh to four; those of the seventh joint being much the longest, the others gradually decreasing in length: the last joint of the lower antennæ is armed with four long and slender claws; and from the apex of the antepenultimate joint springs a brush of about five setæ, the longest of which do not much overreach the apices of the terminal claws; at the base of the joint is attached a pedicellated vesicle. Mandibles

\* Transactions of the Zoological Society, vol. v. p. 368.

slender, divided into several curved teeth, and bearing near the apex a long ciliated seta; palp robust, the basal joint large and bearing a branchial appendage, the last joint very short and armed with several long spines. External segment of the first pair of jaws very large, the rest very short and setose, bearing a branchial appendage. Second pair of jaws destitute of a branchial appendage; palp large and subpediform, three-jointed, last joint, in the female, armed with two long, slightly curved claws. First pair of feet five-jointed, terminal claw very long. Second pair of feet flexuous, four-jointed, last joint short, armed at the extremity with several stout setæ, the margin of one of which is conspicuously pectinated. Postabdominal rami well developed, bearing at the apex two curved claws and a slender seta, inner margin bearing three long setæ; at the base, close to the termination of the intestinal canal, is a long seta arising from a dilated base. The ovaries are contained between the valves, forming a convolution or loop posteriorly. "The testes extend round the whole circumference of the valves." Mucus-gland apparently wanting.

This genus is chiefly distinguished from the freshwater Cypridæ by the excessive development of the palp of the second jaw (which is distinctly three-jointed and pediform), by the armature of the last pair of feet, and other minor peculiarities. In shell-structure it is very similar to *Cypris*, but in the conformation of the second jaw it shows an approach to the Cytheridæ. Sars observes that the animals are not very active in their habits, though they are quite well able to swim, and are not, like *Paracypris*, compelled to a mere crawling existence by the structure of their antennæ. They appear, however, to delight especially in a muddy bottom, and probably do not stir far away from it. I have found them especially abundant amongst the mud of oyster-beds, and in very quiet waters, where the bottom is covered with a great depth of soft ooze. The genus contains at least three British species.

1. PONTOCYPRIS MYTILOIDES (Norman). (Plate XXV. figs. 26-30, Plate XXXVII. fig. 4, and Plate XXXVIII. fig. 1.)

*Cythere mytiloides*, Norman, Ann. & Mag. Nat. Hist. vol. ix. p. 50, pl. iii. figs. 1-3 (1862).

— *avena*, Norman, Nat. Hist. Trans. Northumberland & Durham, vol. i. p. 17.

*Cypris serrulata*, G. O. Sars, Zoologisk Reise i Sommeren 1862, p. 58 (1863).

*Pontocypris serrulata*, Sars, Oversigt af Norges marine Ostracoder, p. 15.

British type. DISTRIBUTION: *Recent*—Norway, Great Britain, Ireland. *Fossil*—Raised beaches and glacial clays, Scotland and Ireland.

Carapace, as seen from the side, elongated triangular, broad in front, tapering to a point behind; greatest height situated at the anterior third, equal to considerably less than half the length. Anterior margin broad and well rounded; posterior obtusely pointed. Dorsal margin very high and almost gibbous near the front, sloping steeply behind; ventral slightly sinuated in the middle. Outline, as seen from above, lanceolate, widest at the anterior third; greatest width equal to one-third of the length, extremities pointed. End view broadly oval. Surface of the shell granular or finely punctate, thickly set with short appressed hairs; colour purplish brown. The right valve is armed at the infero-posterior angle with 8-10 short marginal teeth. Hinge-margins simple,

except that each valve bears near the front a slightly projecting lamina, which articulates with that of the opposite side (fig. 30). Terminal claw of the first foot considerably longer than the united length of the three preceding joints; pectinated spine of the second foot much longer than the rest, and flexuous. Outer claw of the postabdominal ramus longer and stronger than the inner. Eye indistinct. The second pair of jaws, in the male, very strong, subchelate, unequal; the larger terminal claw of the right side very broad and triangular; that of the left side elongated, slender, and much curved. The terminal joint of each jaw bears also a smaller, obtuse and moveable claw, in opposition to the larger one; this smaller claw is, on the left side, armed with two unequal setæ, the longer springing from the base at the inner side, the shorter from near the middle of the outer margin. The copulative organs are of irregular shape, having two slender hooked processes, and two more-robust segments, which are also hooked at the extremity.

Length  $\frac{1}{35}$  in., height  $\frac{1}{80}$  in.

*Hab.* Chiefly on a soft muddy bottom in depths of 2-60 fathoms. Shetland, Hebrides (*Mr. Jeffreys\**); Skye, Lamlash, Tobermory (*Rev. A. M. Norman*); Cumbrae, Peterhead (*Mr. D. Robertson*); Aberdeenshire coast (*Mr. Dawson*); Plymouth, 5 and 60 fath. (*Mr. C. Spence Bate*); Stranraer, in oyster-ooze; Galway Bay, Birterbuy Bay, Channel Islands, and Northumberland coast (*G. S. B.*).

This is, as the foregoing list of localities sufficiently shows, a very widely distributed species, having been found at all extremities of the British seas, and also in Norway, where, however, it seems to be rare. The peculiar colour, texture, and shape of the shell at once distinguish it from all other species. *P. acupunctata* is, indeed, very similar in colour, but differs decidedly in shape, and is, besides, an excessively rare species.

The specific name *mytiloides*, under which this species was originally described by Mr. Norman, was afterwards withdrawn, on account of the name having been pre-occupied by Reuss. But as the animal can no longer be referred to the genus *Cythere*, I have thought it right to restore the original name on the ground of priority.

## 2. PONTOCYPRIS ACUPUNCTATA, Brady. (Plate XXV. figs. 53-56.)

*Pontocypris acupunctata*, Brady, Brit. Assoc. Report, 1866, p. 209.

Lateral view oblong, subreniform, or bean-shaped, highest in the middle; height equal to half the length. Anterior extremity rounded, posterior obtusely pointed. Dorsal margin arched, sloping more steeply behind than in front; ventral deeply sinuated at the anterior third. Outline, as seen from above, compressed, oval, widest about the middle; width equal to one-third of the length; pointed in front, rounded behind. End view oval. The surface of the shell, under a low power of the microscope, appears to be very finely punctate; but a higher power shows that each mark is really an exceedingly short hair. Colour purplish brown. Animal unknown.

Length  $\frac{1}{8}$  in., height  $\frac{1}{100}$  in.

*Hab.* The Minch, 45-60 fath. (*Mr. Jeffreys*); in shell-sand, Roundstone (*Dr. Alcock*).

\* The authority of several collectors might often be given for the same locality; but, for the sake of brevity, I have, in most cases, inserted one name only.



Of this pretty little species I have seen only three specimens—two found amongst shell-sand from Connemara by Dr. Alcock, the other dredged off the Hebrides by Mr. Jeffreys. The Irish specimens were completely bleached, but that from the Minch was well coloured. My drawings were taken from the former, and exhibit the lucid spots very distinctly. These are not visible in the fresh specimen. From the colour and general characters of the shell, I have no hesitation in assigning it a place under the genus *Pontocypris*. It seems to be quite distinct from any hitherto described species.

3. *PONTOCYPRIS TRIGONELLA*, G. O. Sars. (Plate XXV. figs. 31–34, and Plate XXXVIII. fig. 3.)

*Pontocypris trigonella*, Sars, Oversigt af Norges marine Ostracoder, p. 16.

British type. DISTRIBUTION: *Recent*—Norway, Great Britain, Ireland, Mediterranean, Cape Verde.

*Fossil*—Raised beaches and glacial clays, Scotland and Ireland.

Shell less compressed than in either of the foregoing species; seen from the side, subtriangular, rather higher in front than behind; greatest height nearly in the middle, and equal to half the length. Anterior extremity rounded, posterior obtusely pointed. Dorsal margin strongly arched, ventral gently sinuated in front, and sweeping upwards with a slight convexity behind. Seen from above, elongate oval, widest a little in front of the middle; width equal to more than one-third of the length; acutely pointed in front, obtusely behind. End view broadly oval. Shell very slightly pilose, dull white in colour, clouded with opaque patches. The terminal claw of the first pair of feet rather more than equalling in length the three preceding joints. Second joint of the last pair of feet more than equal in length to the following two joints; pectinated spine short. Post-abdominal rami obliquely truncate at the apex; terminal claws nearly equal; inner marginal setæ slender, and longer than the claws. Second jaws of the male strong and subchelate, alike on both sides, terminal claw of moderate length. Copulative organs subhamate. "Eye large and distinct, composed of three lenses, two lateral and one anterior."

Length  $\frac{1}{38}$  in., height  $\frac{1}{76}$  in.

*Hab.* In 3–30 fathoms. Plymouth (*Mr. Spence Bate*), Frith of Clyde (*Mr. D. Robertson*); in shell-sand from Guernsey and Birterbuy Bay, Galway Bay, and plentifully in oyster-ooze from Stranraer (*G. S. B.*); in tidal pools, Arran and Herm (*Rev. A. M. Norman*), Estuary of Thames (*Mr. E. C. Davison*).

A pretty species, and easily distinguished from others of the genus by its shape and colour.

4. *PONTOCYPRIS* (?) *ANGUSTA*, n. sp. (Plate XXXIV. figs. 43, 44.)

Carapace, as seen from the side, oblong, semiovate, highest in the middle; greatest height much less than half the length. Anterior extremity rounded, posterior narrowed and obliquely rounded; superior margin arcuate, highest in the middle, sloping steeply behind; inferior sinuated in front of the middle, straight behind. Outline, as seen

from above, ovate, widest in the middle; greatest width equal to more than one-third of the length. Shell smooth, pellucid, yellowish. Animal unknown.

Length  $\frac{1}{5}$  in.

*Hab.* Birterbuy Bay, 10 fathoms (*G. S. B.*).

Several examples of this species occurred in my dredgings; but, owing to their having been dried slowly with the mud in which they were taken, all trace of the animal structure has disappeared; and I can therefore only conjecture that they possibly belong to the genus *Pontocypris*\*.

#### Genus 7. BAIRDIA, M'Coy.

Valves unequal in size, the left being considerably the larger and overlapping the right both on the dorsal and ventral surfaces. Surface of the shell smooth or nearly so. Carapace, as seen from the side, mostly obliquely subquadrate. Animal imperfectly known. Postabdominal rami well developed, with long and slender terminal claws; marginal setæ long and crowded together near the apex.

Though examples of this genus are not particularly uncommon, I have only in one instance succeeded in finding a carapace containing the animal; and even this was so imperfect as to prevent my obtaining accurate information as to its structure. Such of the limbs as I was able to draw are figured in Pl. XXXVIII.; but I cannot name them with absolute certainty. The size of the various species would make it a very easy matter to determine their structural characters if they could be procured in a living state. The specimens in my collection have all been picked from masses of dried mud or sand; and in such cases it is seldom that the soft parts remain intact. The formation of the abdominal rami, however, shows distinctly that this genus must be classed amongst the Cypridæ; and, from the characters of the shell, I conclude that it is, in all probability, closely related to the following genus, *Macrocypris*.

The British species are four in number, and are exclusively inhabitants of moderately deep water †, ranging, in the British seas, from 10 to 60 fathoms.

The numerous fossil forms described under the generic name *Bairdia* seem to be referable to many distinct genera.

#### 1. BAIRDIA INFLATA (Norman). (Plate XXVII. figs. 9-17, & Plate XXXVIII. fig. 5.)

*Cythere inflata*, Norman, Ann. & Mag. Nat. Hist. vol. ix. p. 49, pl. iii. figs. 6-8.

— *subdeltoidea*, Brit. Mus. Cat. Brit. Crust. p. 108 (*vide* Norman).

*Bairdia subdeltoidea*, A. White, Pop. Hist. Brit. Crust. p. 293; narrow var., Jones, Entom. Cretaceous Formation of England, p. 23, and Tert. Entom. p. 52.

Atlantic type. DISTRIBUTION: *Recent*—Great Britain, Ireland. *Fossil*—Raised beaches, Scotland.

Shell tumid; as seen from the side subrhomboidal in outline, highest near the middle;

\* Since this was written the specimens on which the genus *Aglaia* is founded have come into my hands; and it is more than probable that the present species will prove to be referable to the same genus.

† I use the term "deep water" solely with reference to the depths attainable round the British Islands, which are, indeed, quite shallow in comparison with those met with in the open ocean, or even on such coasts as that of Norway, where 300 fathoms is frequently quoted.

greatest height equal to half the length. Anterior margin flattened, waved, running obliquely upwards and forwards, and bordered, in many cases, by a flattened spinous lamina (figs. 14–17). Dorsal margin forming a flattened arch, truncate in the middle; ventral straight or slightly waved, bulging into a protuberant angle at its junction with the anterior margin. Posterior margin narrow, rounded, or almost angular, and frequently encircled by a narrow squamous lamina, which is irregularly dentated or spinous (figs. 13–17). Outline as seen from above tumid, oval; greatest width in the middle, equal to rather less than half the length; extremities obtusely pointed; line of junction of the valves waved; on the ventral margin the left valve much overlaps the right. End view subtriangular, broad and rounded below; width and height nearly equal. Surface smooth and polished, or finely punctate; pearl-white or cream-coloured. The anterior extremity of the carapace bears sometimes, in old and well-grown specimens, a number of short pointed tubercles, and is occasionally, as also the hinder extremity, beset with coarse brown hairs (fig. 13). Lucid spots six to nine, arranged in a rosette. Postabdominal rami terminating in two slender curved claws; the internal very long and finely tapered, considerably exceeding in length the ramus itself; the external more slender and about half as long: on the internal border of the ramus, and very near its apex, are five slender setæ; the upper two very short, the rest about equal in length to the shorter claw.

Length  $\frac{1}{25}$  in., height  $\frac{1}{50}$  in.

*Hab.* Lamlash Bay (*Rev. A. M. Norman*); Channel Islands, 15–30 fath., Loch Alsh and the Minch (*Mr. Jeffreys's dredgings*); Shetland (*Mr. D. Robertson*), off Hoy Head (*Mr. D. O. Drewett*); Devonshire coast, 60 fath. (*Mr. Spence Bate's dredgings*); in shell-sand from Arran and Galway Bay (*Prof. Rowney*), and from Roundstone (*Dr. Alcock*); dredged in Poolvash Bay, Isle of Man, 12–15 fath., and in Birterbuy Bay, 10–15 fath. (*G. S. B.*).

This very interesting form was first described as a distinct species by the *Rev. A. M. Norman*, under the name of *Cythere inflata*. *Mr. Norman's* specimens were taken from shell-sand dredged in Lamlash Bay, from which locality *Prof. T. Rupert Jones* had also previously obtained the species, considering it a variety of *Bairdia subdeltoidea*. Its characters are, however, very distinct and constant; and although some forms of *B. subdeltoidea* approach it very closely, I agree with *Mr. Norman* in the opinion that it should be regarded as a distinct species. The typical form of *B. subdeltoidea*, has not, so far as I know, been met with, in a recent state, in the British seas. A few specimens of it occur in *Mr. Jeffreys's* Channel-Island dredgings, but they have the appearance of fossil shells; and as several Foraminifera dredged in the same place are evidently derived from some submarine fossiliferous bed, the most reasonable inference is that the *Bairdiæ* were likewise derived from the same source. One very fine specimen of *B. inflata* occurred in the same dredgings, and is abundantly distinct from the fossil forms with which it was associated.

*Bairdia inflata* is tolerably abundant in Galway Bay and the neighbouring seas, but appears to decrease rapidly in numbers to the east. On the eastern shores of Britain I have no record of its occurrence.

## 2. BAIRDIA ACANTHIGERA, n. sp. (Plate XXVII. figs. 18–21.)

Atlantic type. DISTRIBUTION: *Recent*—England.

Valves tumid; seen from the side subquadrilateral, nearly equal in height throughout; greatest height in the middle, equal to about half the length. Anterior margin broad, flattened, or obliquely rounded, armed with six to eight short blunt spines or tubercles, which project straight forward. Posterior extremity obliquely rounded towards the dorsum, bearing at the ventral angle about four spines, similar to those on the front of the shell. The dorsal margin forms a flattened arch, and is highest in the middle, sloping rather steeply behind. Ventral margin slightly concave in front of the middle, swelling into a rounded, flattened protuberance in front. Dorsal aspect elliptical, with flattened sides and suddenly tapering extremities; breadth equal to about half the length; line of junction of the valves waved. The left valve is the larger, and, in the centre of the ventral surface, considerably overlaps the right. End view somewhat triangular, flexuous, angles rounded. The surface of the shell is closely punctate; colour dull white. Lucid spots seven or eight, forming a rosette. Animal unknown.

Length  $\frac{1}{33}$  in., height  $\frac{1}{70}$  in. *176 x .345 mm*

*Hab.* In deep water. Channel Islands (*Mr. Jeffreys's dredgings*); Devonshire coast, 60 fathoms (*Mr. Spence Bate's dredgings*); Plymouth, from trawlers (*Mr. Barlee*).

## 3. BAIRDIA OBTUSATA, G. O. Sars. (Plate XXXIV. figs. 22–25.)

*Bairdia obtusata*, Sars, Oversigt af Norges marine Ostracoder, p. 24.

Scandinavian type. DISTRIBUTION: *Recent*—Norway, Scotland.

Carapace moderately compressed; lateral view subrhomboidal, highest near the middle; greatest height equal to half the length. Anterior extremity obliquely rounded, almost truncate; posterior obliquely rounded, almost angular below, well rounded above. Dorsal margin evenly arched; ventral gently sinuated in front, and somewhat convex behind. Seen from above, the outline is elongate oval, the extremities equally and obtusely pointed; greatest width in the middle, equal to more than one-third of the length. The left valve overlaps distinctly along the whole length of the dorsum, and forms a distinct overlapping curvature in the middle of the ventral surface. Hinge-line slightly flexuous. End view broadly oval. Surface smooth, white or fawn-coloured. Animal unknown.

Length  $\frac{1}{25}$  in., height  $\frac{1}{50}$  in. *114 x .50 mm*

*Hab.* The Minch, 45–60 fathoms (*Mr. Jeffreys*).

I have met with only two specimens of this very distinct species, both of them dredged near the Hebrides by J. G. Jeffreys, Esq.

## 4. BAIRDIA COMPLANATA, Brady. (Plate XXXIV. figs. 1–4.)

*Bairdia complanata*, Brady, Brit. Assoc. Report, 1866, p. 210.

Scandinavian type? DISTRIBUTION: *Recent*—Scotland.

Carapace much compressed; seen from the side subreniform, highest in the middle; greatest height equal to about half the length; anterior extremity evenly rounded, posterior narrowed and somewhat obliquely rounded. Dorsal margin boldly arched,

highest in the middle, and sloping steeply behind; ventral gently sinuated in front, and slightly convex behind. Seen from above, the outline is compressed, oval; extremities equally and rather obtusely pointed; greatest width in the middle, equal to about one-third of the length. Hinge-line slightly sinuous. The left valve overlaps considerably on the dorsum and in the middle of the ventral surface. Shell smooth, colour pale ochreous or white, opaque. Animal unknown.

Length  $\frac{1}{20}$  in., height  $\frac{1}{40}$  in. *1.25 x .625*

*Hab.* The Minch, 45–60 fathoms (*Mr. Jeffreys*).

This very fine and distinct species occurred in the same dredgings with *B. obtusata*, and though more abundant than the latter species, must still be considered rare.

#### Genus 8. MACROCYPRIS, Brady\*.

Carapace much elongated, attenuated at the extremities. Valves unequal, the right larger than the left, and overlapping dorsally; hinge-line flexuous. Surface smooth, polished, and destitute of hairs. Antennæ short and robust, the superior seven-jointed, joints tapering towards the apex, bearing short setæ; the inferior composed of five distinct joints, last two joints very short; armed with much-elongated claws; second joint bearing on its inner side near the base a bundle of short biarticulate setæ. Mandibles large, dilated at the inferior extremity, and divided into six or seven strong teeth; palp elongated, four-jointed, and having a distinct branchial appendage. First pair of jaws provided with an unusually small subovate branchial plate; external lobe or palp narrow, not larger than the rest. Second pair of jaws destitute of a branchial appendage; palp, in the female, large and subpediform, composed of four distinct joints, the last armed with three claws or spines; in the male very robust and subcheliform. First pair of feet much elongated, five-jointed, last joint armed with one or two long forward-curved claws; the second pair very different, and covered entirely by the shell, five-jointed, last joint armed with a very long recurved claw. Postabdominal rami rudimentary, forming two small and simple appendages attached to the posterior part of the abdomen. No eye. Male smaller than the female; copulative organs large and provided at the anterior extremity with a much-elongated mucus-gland.

The species constituting this genus are included by Sars under *Bairdia*; that author, however, had had no opportunity of examining the animals belonging to the group typified by *B. subdeltoidea*, to which the name *Bairdia* was originally given by M'Coy. I have myself so far succeeded in the investigation of the animal structure as to find ample generic characters in the formation of the postabdomen, though the other portions of its anatomy remain to be worked out. But, in addition to peculiarities of animal structure, the carapace presents well-marked differences, in its attenuated form and in the respective size of the valves, the *right* being here much the larger.

Sars observes that this marine genus seems to be analogous to the freshwater genus *Candona*, just as *Pontocypris* appears to be the marine equivalent of *Cypris*. The only British species is

\* Intellectual Observer, vol. xii. p. 119.

MACROCYPRIIS MINNA (Baird). (Plate XXVII. figs. 5-8, and Plate XXXVIII. fig. 4.)

*Bairdia minna*, Sars, Oversigt af Norges mar. Ostrac. p. 21.

*Cythere minna*, Baird, Brit. Entom. p. 171, tab. xx. figs. 4, 4a-d.

Scandinavian type. DISTRIBUTION: *Recent*—Norway, Shetland.

Carapace rather tumid; seen from the side elongated, subtriangular, rounded in front, acutely pointed behind; greatest height near the middle, equal to two-fifths of the length. Dorsal margin much arched, highest in the middle, thence sloping with a gentle curve forwards, but steeply behind, where it joins the ventral margin at an acute angle. The ventral margin is slightly sinuated in front, and runs backwards in a right line to the posterior extremity. Outline, as seen from above, ovate lanceolate, sharply pointed behind, more obtusely in front; greatest breadth in front of the middle, equal to more than one-third of the length; line of junction of the valves waved. End view subcircular; height rather greater than the breadth. Surface perfectly smooth and polished, white, the animal itself deep brown. "Antennæ short and robust, fourth joint of the upper about equal in length to the following joint; sixth joint of the lower antennæ shorter than the fifth, terminal claws very long and subequal. Marginal spines of the palp of the second pair of jaws minutely dentate. Second joint of the first pair of feet much shorter than the united lengths of the two following; last joint moderately long, armed with a short seta and two unequal claws, one twice as long as the other. Margins of the terminal claw of the last pair of feet shortly and densely pilose. Postabdominal rami forming two appendages springing from a common base, bearing on the middle of the posterior margin a small brush of hairs, and at the apex a long seta. Copulative organs of the male laminar, obtusely subtriangular."

Length  $\frac{1}{10}$  in., height  $\frac{1}{24}$  in.

*Hab.* "Dredged in from 80 to 90 fathoms of sand, twenty miles east of the Noss in the Shetland Isles, R. M<sup>c</sup>Andrew, Esq." (*Dr. Baird*).

The only British specimen of this species which I have seen is in Mr. Norman's collection, and was dredged in Shetland. *M. minna* occurs also on the Norwegian coast; and I am indebted to Hr. G. O. Sars for Norwegian specimens, from which I have been able to verify most of the details of his description of the animal above quoted. In the British seas the species is excessively rare, but on some parts of the Norwegian coast, according to Sars, is tolerably common, ranging from 20 to 300 fathoms: it is quite destitute of swimming-power.

Family 2. CYTHERIDÆ.

CYTHERIDÆ.	Mouth provided with a lip and labrum. Masticatory organs well developed. Mandibles toothed at the lower extremity.	Lower antennæ 4-jointed. Upper antennæ	5-jointed; last three joints	elongated, their united lengths more than that of the preceding joint;	destitute of spines; bearing only a few short slender setæ . . . . .	} <i>Limnocythere.</i>			
							more or less strongly spiniferous.	alike. Internal lobe of the first pair of maxillæ { well developed . . . . . } <i>Cythere.</i>	
									Feet in the male and female
							short and stout, their united length shorter than that of the preceding joint, bearing long curved spines. First two pairs of feet only 3-jointed. Right foot of last pair in the male prehensile. Eyes wanting . . . . .	dissimilar; right foot of first pair in the male prehensile, right of the second pair very weak and rudimentary . . . . .	
									6-jointed; beset with simple setæ; last four joints
		7-jointed; first two joints very large and stout, last five slender and bearing moderately long setæ . . . . .	mostly much elongated and slender, unequal . . . . .	} <i>Lozoconcha.</i>					
					Lower antennæ 5-jointed. Upper antennæ	5-jointed; beset with short scattered hairs. Postabdominal lobes broad and short, bearing three setæ. No eyes . . . . .	} <i>Bythocythere.</i>		
		6-jointed; last four joints	5-jointed; beset with short scattered hairs. Postabdominal lobes broad and short, bearing three setæ. No eyes . . . . .	} <i>Cytheropteron.</i>					
								7-jointed, bearing numerous very long setæ, last joint very long and slender; two basal joints large and stout. Postabdominal lobes subconical, directed downwards, and bearing three hairs. Eyes wanting . . . . .	much narrower than the preceding, and bearing scattered short hairs, which are in part spiniform. Postabdominal lobes rudimentary, destitute of hairs. Two separate eyes . . . . .
		(Cytherideis).	not narrower than the preceding, and beset towards the apex with numerous long setæ. Postabdominal lobes larger than ordinary, bipartite, and bearing five setæ. One eye . . . . .	} <i>Sclerochilus.</i>					
Mouth simple, tubiform; its orifice surrounded by a circular disk situated at the apex of a large subconical protuberance. Organs of mastication poorly developed and weak. Mandibles styliform; palp very narrow, destitute of a branchial appendage. First pair of jaws composed of narrow and partly imperfect lobes. Upper antennæ 6-jointed, very slender; inferior 5-jointed and shorter; flagellum large and robust. Eye single . . . . .	} <i>Pseudocythere.</i>								
		} <i>Paradoxostoma.</i>							

Shell mostly hard and compact, calcareous; surface generally more or less rough and uneven, occasionally quite smooth. Hinge-margins mostly toothed. Antennæ not adapted for swimming, the upper composed of five to seven joints and armed with various setæ or spines; the inferior 4-5-jointed, the last joint the smallest, and armed with one to three curved claws, second joint destitute of the brush of setæ which mostly occurs in the Cypridæ; first joint giving origin, at its apex, to a long biarticulate tubular seta, which extends downwards in front of the antenna about as far as the last joint, and above is connected by an efferent tube with a gland situated in the body of the animal. Mandible very similar to that of the Cypridæ. One pair of jaws, composed of four segments, with a branchial plate. Three pairs of feet, directed forwards, very much alike in shape, but increasing in length from before backwards; all of them adapted for creeping, and terminating in a single strong curved claw. The first foot corresponds with the palp of the second maxilla in the Cypridæ, the cutting segments being represented by two small setiferous appendages, arising from a common base. Postabdomen rudimentary and

almost obsolete, forming two small lobes or setæ. Eyes mostly separate, sometimes confluent, more rarely altogether wanting. Ovaries and testes not extending between the valves. Male copulative organs very large and complex in structure. Mucus-gland wanting.

This family comprises by far the larger portion of the marine Ostracoda, but is very sparingly represented in fresh water, of which, amongst the British species, only two or three are inhabitants. Almost all the numerous fossil species are likewise referable to the Cytheridæ. The most important differences between this family and the preceding are found in the structure of the lower antennæ and the mandibular palp—also in the number of feet, which in the Cypridæ are *two*, in the Cytheridæ *three* pairs, the appendage forming the second pair of jaws in the former family assuming the shape of an ambulatory foot in the latter. They are quite destitute of swimming-power. The lower antenna is armed with a curved bi- or triarticulate seta, which reaches downwards in front of the limb from the apex of the first joint, and mostly extends nearly to the apex of the terminal claws: at its base this is connected by a duct with a gland or vesicle situate in the anterior part of the body. It seems impossible to imagine any other use for this organ than that of an urticating or poison-bearing weapon. In some few species the lower antenna bears also near its apex a minute pyriform vesicle somewhat similar to that of *Pontocypris* &c., but considerably smaller. The limbs, especially the antennæ, are mostly strengthened on their anterior and posterior surfaces by bucklers or plates of strong chitinous tissue, probably to afford a firmer attachment to their powerful muscles.

#### Genus I. CYTHERE, Müller.

Valves unequal, mostly very thick and strong. Surface marked in the simpler forms with slightly elevated papillæ or tubercles, and fine punctations; in others with deep pits or fossæ, and with very prominent elevations, which take the shape of sharp ridges, spines, or tubercles. Lateral view subreniform or subquadrangular, mostly highest in front. The hinge-joint consists of two strong teeth on the right valve, which articulate with corresponding depressions of the left valve; the two teeth are often connected by a strongly developed bar, which fits into a furrow of the opposite valve-margin; the anterior tooth is much the strongest. The margin of the left valve mostly has a single small tooth behind the anterior hinge-fossa, and sometimes one also at the posterior extremity of the hinge-line; the anterior fossa occasionally forms a complete circular perforation of the marginal plate, and the central portion of the hinge-line is sometimes minutely crenulated. Antennæ robust; superior five- to six-jointed, armed on the anterior margin with three long curved spines, mostly one on the third and two on the fourth joint; lower four-jointed, the last joint short and stout. Mandibular palp three- to four-jointed, bearing, in place of a branchial appendage, a tuft of two to five setæ. Eyes one or two.

I have thought it necessary to include in this genus the forms assigned by Sars to the two genera *Cythere* and *Cythereis*. In the first place, the characters taken by that author as the ground of generic distinction seem to me inadequate; secondly, four of our British



species, *C. albomaculata*, *convexa*, *rubida*, and *pulchella*, present intermediate characters, and could not be included under either of the genera as defined by Sars. The chief distinctive characters taken by him as the ground of separation are the length of the urticating seta of the lower antenna (which, in the females of "*Cythereis*," is exceedingly short), the structure of the mandibular palp, and the abdominal rami. These characters may be tabulated as follows:—

	<i>Cythere</i> , Sars.	<i>Cythereis</i> , Sars.
Urticating seta of lower antenna	of equal length in male and female.	very short in the female.
Mandibular palp . . . . .	composed of three joints, and simply setose; two branchial filaments.	composed of four joints, and bearing three strong, curved pectinate setæ; five branchial filaments.
Postabdominal rami . . . . .	forming two obtuse lobes.	bearing two or more stout ciliated setæ.

If the characters here ascribed to *Cythereis* could have been shown to be uniformly coincident with the quadrangular and rugose forms of carapace for which the genus *Cythereis* was originally proposed, or even if they could have been applied with precision to any group, without respect to shell-structure, they might perhaps, though dubiously, have been allowed to form the basis of a distinct genus; but seeing that we have forms distinctly partaking of the characters of both genera, there seems no reasonable course but that of uniting the two under one name.

*C. albomaculata*, with the shell-characters and urticating setæ of *Cythere*, has the mandibular palp and abdominal rami of *Cythereis*.<sup>\*</sup> *C. convexa* is perhaps intermediate in form of carapace, but much more near to *Cythere* than to *Cythereis*, while the urticating seta and mandibular palp agree with those of *Cythereis*. Both species possess further characters (in the lower antennæ) which are, so far as I know, peculiar to themselves. The abnormal characters of *C. rubida* and *pulchella* will be pointed out in the descriptions of those species.

a. *Valves elongate or reniform, punctate, not prominently rugose or spinous.*

\* *Mandibular palp three-jointed, simply setose; urticating seta long, equal in the male and female.*

1. CYTHERE LUTEA, Müller. (Plate XXVIII. figs. 47–56, and Plate XXXIX. fig. 2.)

*Cythere lutea*, Müller, Entomostraca, p. 65, tab. vii. figs. 3, 4; Sars, Oversigt af Norges mar. Ostrac. p. 28; Zenker, Anat.-syst. Stud. über die Kresthiere, p. 83, Taf. v. C.

— *reniformis*, Baird, Brit. Entom. p. 169, tab. xx. figs. 5, 5 a–f.

— *setosa*, Brady, Trans. Zool. Soc. vol. v. p. 371, pl. 58. figs. 12 a–c, 13 a–d, 15 a (not 15 b–e).

Scandinavian type. DISTRIBUTION: *Recent*—Baffin's Bay, North Sea, Baltic, Great Britain, Ireland, Mediterranean. *Fossil*—Raised beaches and glacial clays, Scotland, Ireland, and Norway.

Carapace reniform, compressed. In the *female* the extremities are obliquely rounded and nearly equal; the greatest height in the middle, equal to considerably more than half the length. Dorsal margin gently and evenly arched, ventral deeply sinuate, owing to the partial disappearance of a broad flattened flange which borders the extremities and most of the inferior margin. Seen from above, the outline is compressed, oblong

oval; greatest breadth behind the middle, equal to less than half the length; the hinge-margins thickened and depressed centrally, so as to form a longitudinal sulcus, but uniting at the extremities, thus forming a broad keel. End view oval, keeled below, sulcate above. The central portion of the valves is covered with a calcareous crust, and bears numerous small puncta and a few scattered hairs. Colour yellowish or drab in specimens from beyond low-water mark, brick-red in the littoral variety. The hinge-joint consists (fig. 56), in the left valve, of a long central knurled bar, at each end of which is a fossa for the reception of a corresponding knurled protuberance of the right valve. The right valve differs from the left in being taller and more angularly truncate at the extremities. The shell of the *male* is much more elongate and angular, more deeply sinuated below, and often more rugose on the surface. Colour of the limbs deep brownish yellow. Last joint of the upper antennæ very short: terminal spine very slender, almost setose. Feet short and robust; terminal claws strong and curved, that of the last foot indistinctly setose or pectinate on the inner margin. Abdominal lobes short and thick, surrounded with short setæ. Copulative organs of the male large, the basal portion quadrangular, the apical portion produced into two tapering prolongations.

When living in the Laminarian zone, and in deeper water, this species presents somewhat different characters: the shell is considerably larger, the dorsal margin generally more flattened, the surface marked with distant deep punctations, between which are scattered numerous smaller puncta; the marginal portions tend also to become elevated into irregularly radiating ribs. This latter character is more conspicuous in the male (fig. 47), which is also more distinctly punctate and more angular in outline, the ventral margin especially forming a remarkable angular projection posteriorly. This form is, indeed, so distinct that until recently I supposed it to belong to a distinct species, *C. setosa*, Baird; but having now had the opportunity of examining a large series of dredged specimens, as well as a still greater number of carapaces from the glacial clays of Scotland, I cannot avoid the conclusion that it represents merely a deep-water form of the present species, which had previously been known to me only from littoral specimens.

Length (littoral var.)  $\frac{1}{40}$  in., height  $\frac{1}{80}$  in.; (deep water var.) length  $\frac{1}{34}$  in., height  $\frac{1}{55}$  in.

*Hab.* Abundant in tide-pools on the coasts of Northumberland and Durham, and in oyster-ooze from Stranraer (*G. S. B.*); "coast of Berwickshire, at Cockburnspath, Berwick, &c.; North Foreland" (*Dr. Baird*); dredged at Oban and Cumbræ, Macduff and Peterhead (*Mr. D. Robertson*); the Minch, 45-60 fathoms (*Mr. J. G. Jeffreys*); Guernsey, Shetland, and amongst roots of Laminaria at Tobermory (*Rev. A. M. Norman*); Long Hope, Orkney (*Mr. C. W. Peach*).

This species is found by Sars abundantly on the Norwegian coast, by Zenker in the Cattegat, and is common also on the northern shores of Britain and in the Arctic seas; I have seen but few specimens from the southern and western coasts of England and Ireland. It occurs abundantly in a fossil state in the glacial clays of Scotland.

2. *CYTHERE VIRIDIS*, Müller. (Plate XXVIII. figs. 40, 41, & 57-59; and Plate XXXVIII. fig. 8.)

*Cythere viridis*, Müller, Entomostraca, p. 64, tab. vii. figs. 1, 2; Sars, Oversigt af Norges marine Ostrac. p. 30.

British type. DISTRIBUTION: *Recent*—Norway, Great Britain, and Ireland. *Fossil*—Raised beaches and glacial clays, Norway, Scotland, and Ireland.

Very similar to the foregoing, but much smaller. Shell of the *female*, as seen from the side, subreniform, slightly higher in front than behind, greatest height equal to two-thirds of the length. Anterior extremity obliquely rounded; posterior rather narrower, rounded. Dorsal margin nearly straight, sloping gently backwards from the front, where it is slightly angular; inferior distinctly sinuated in front of the middle. Seen from above, the outline is ovate, more sharply pointed in front than behind, about twice as long as broad. Surface marked with numerous fine puncta, which are interspersed with small tubercles. Colour olive or yellowish-brown. The shell of the *male* is much narrower and more elongated. The animal itself is almost colourless. Last joint of the upper antenna much elongated, almost equal in length to the two preceding. Feet very short. "Copulative organs of the male subtriangular, the apical portion obtusely rounded."

Length  $\frac{1}{55}$  in., height  $\frac{1}{90}$  in.

*Hab.* The Minch, 45-60 fath. (*Mr. J. G. Jeffreys*); Shetland, Peterhead, Isle of Man, and Cumbrae (*Mr. D. Robertson*); Galway Bay, Birterbuy Bay, Baltimore, Roundstone Bay, Stranraer, and in tide-pools near Sunderland (*G. S. B.*); in tide-pools, Arran and Channel Islands (*Rev. A. M. Norman*); Girdler sand, Thames, and Scarpa Flow, Orkney (*Mr. E. C. Davison*).

*C. viridis* might very easily be passed over as the young of *C. lutea*; but, besides that the shell-characters are very constant, those of the animal itself are quite sufficiently distinct. It is not by any means so common a species on the northern British shores; but it may often have escaped notice on account of its small size.

3. *CYTHERE PELLUCIDA*, Baird. (Plate XXVIII. figs. 22-26, 28.)

*Cythere pellucida*, Baird, Brit. Entom. p. 173, t. xxi. fig. 7; Sars, Oversigt af Norges marine Ostrac. p. 31.

British type. DISTRIBUTION: *Recent*—Norway, Great Britain and Ireland, Mediterranean. *Fossil*—Raised beaches and glacial clays, Norway, England, Scotland, and Ireland.

Valves of the *female* compressed, oblong; as seen from the side, subquadrangular, equal in height throughout, rounded in front, angulated behind on the dorsal margin, height equal to less than half the length. Anterior margin obliquely rounded, posterior sub-truncated rounded off below, almost rectangular above. Dorsal margin very slightly arched, ventral distinctly sinuated in front of the middle. Outline, as seen from above, compressed ovate, greatest width near the posterior extremity and equal to one-third of the length. End view broadly ovate. The *male* is much more elongated than the female, and has the supero-posteal angle more produced. The centre of each valve is marked with a distinct transverse sulcus, and sometimes also with two shallower ones near the extremities. The substance of the shell is rather thin and horny; its surface covered with thickly set, circular or often oblong puncta, which vary much in size in

different specimens. Specimens from deep water are often much incrustated and porcellaneous, the surface-sculpture almost obliterated (see fig. 28). Colour brown, or dull white. Colour of the animal deep brown. Antennæ short and stout, the fourth joint very short, the last much elongated and slender, nearly twice the length of the preceding. Second joint of the mandibular palp broad at the apex, the last joint armed with three short spines. Last pair of feet fully twice as long as the first, the second joint very long, the last joint bearing at the apex four short and sharp spines. Copulative organs of the male dilated at the extremity, and produced into long tapering processes, one of which is much more slender than the other. Abdominal lobes feebly developed and bearing a short seta.

Length  $\frac{1}{38}$  in., height  $\frac{1}{99}$  in.

*Hab.* From littoral situations up to 60 fathoms. Shetland, Stornoway, Skye, Lamlash Bay, Tenby, Swansea, Plymouth, Youghall; in tide-pools, Arran and Channel Islands (*Rev. A. M. Norman*); Orkney (*Mr. C. W. Peach*); Aberdeenshire coast (*Mr. Dawson*); Oban, Cumbrae, Campbeltown, Macduff, Peterhead, and Ormeshead, dredged (*Mr. D. Robertson*); dredged amongst the Hebrides and Channel Islands (*Mr. J. G. Jeffreys*); Devonshire coast, 60 fathoms (*Mr. Spence Bate*); Norfolk coast (*Mr. D. O. Drewett*); in shell-sand from the Mumbles (South Wales), the Ribble, Preston Pans, Stranraer, Margate, Baltimore, Donegal Bay, and Roundstone; Northumberland and Durham coasts, 25-46 fathoms, and Birterbuy Bay, 15 fathoms (*G. S. B.*).

*Cythere pellucida*, though exceedingly variable in habitat, surface-sculpture, and in the proportions of the carapace, is easily distinguished by the peculiar dorsal angulation of the posterior border and by its one or more deep transverse sulci. Old specimens, however, are not always recognizable with facility, the surface-markings becoming very vague, and the contours of the shell less characteristic. The following species approaches very closely to *C. pellucida*, but is never met with except in brackish or subbrackish situations; and, in addition to this peculiarity of habitat, its shell-structure affords characters which, on close examination, will not fail to distinguish it.

#### 4. CYTHERE CASTANEA, G. O. Sars. (Plate XXVIII. fig. 27, and Plate XXXVIII. fig. 6.)

*Cythere castanea*, G. O. Sars, Oversigt af Norges marine Ostracoder, p. 32.

British type. DISTRIBUTION: *Recent*—Great Britain, Norway. *Fossil*—Glacial, Scotland.

Carapace of the *female*, as seen from the side, subreniform, rather higher in front than behind, greatest height in front of the middle, equal to half the length. Anterior extremity well rounded, posterior rounded off below, angular above at its junction with the dorsal margin; superior margin slightly arcuate and sloping backwards from the anterior third, where it is highest; inferior distinctly sinuated in the middle, curving upwards behind. Seen from above, the outline is ovate, widest in the middle, in front of which it is distinctly constricted, pointed in front, rounded behind, greatest width considerably less than the height. The shell of the *male*, seen laterally, is much more tapered behind; the supero-posteal angle much pronounced, the infero-posteal thoroughly rounded off; dorsal margin quite straight and rather steeply sloping backwards. Surface of the valves thickly covered with small rounded depressed puncta, and marked with

two curved transverse furrows; colour reddish brown. Animal precisely like that of *C. pellucida*.

Length  $\frac{1}{4\frac{1}{2}}$  in.

*Hab.* Chiefly in the brackish water of estuaries and salt marshes. Girdler sand, Thames, and at Tweedmouth (*Mr. E. C. Davison*); in salt marshes at Hylton on the Wear, Jarrow on the Tyne, Seaton Sluice, and at the mouths of the Wansbeck and Alne, Northumberland (*G. S. B.*).

The great similarity between this and the foregoing species caused me, until very recently, to regard the one as a merely littoral or brackish-water variety of the other. I have been induced to alter that opinion, chiefly by finding, in a gathering from the Girdler sand in the estuary of the Thames, the two forms living together abundantly, and retaining very perfectly their distinctive characters. The points which may be chiefly relied on as characterizing *C. castanea* are, the more arcuate dorsal margin and greater comparative height of the female, the median position of the greatest width of the carapace, and, in the male, the perfectly straight dorsal margin, and much-narrowed hinder extremity—lastly, the sculpture of the shell-surface, which consists of closely set rounded (not oblong) impressions. The list of habitats here given is doubtless very imperfect; the species must often have been passed by without special notice as a form of *C. pellucida*.

#### 5. *CYTHERE TENERA*, n. sp. (Plate XXVIII. figs. 29–32.)

British type. DISTRIBUTION: *Recent*—Great Britain, Bay of Biscay. *Fossil*—Glacial, Norway.

Carapace of *female* almost exactly similar in form to *C. pellucida*, but much smaller, the superior margin somewhat more arched; the surface smooth and having no trace of any transverse sulcus. The shell is very closely and delicately punctate, and bears a few distant and minute elevated papillæ. The length is rather more than twice the height. The outline as seen from above is regularly ovate. Animal unknown. Colour white. Shell of the *male* narrower, and tapered posteriorly.

Length  $\frac{1}{5\frac{1}{5}}$  in.

*Hab.* Off Seaham Harbour, Durham, 15 fathoms (*G. S. B.*); Race's bank and Girdler sand, Thames (*Mr. E. C. Davison*); the Minch (*Rev. A. M. Norman*); Shetland (*Mr. D. Robertson*).

This species is easily distinguished from *C. pellucida* by its much smaller size, very fine punctation, and absence of furrowing. There can, I think, be no doubt of its specific rank: all the specimens I have seen are uniform in size, and I have observed no forms intermediate in character between it and either of the two preceding species. The young of *C. pellucida*, even in their very early stages, are quite coarsely punctate, and those of *C. castanea* are mostly also of dark colour.

#### 6. *CYTHERE BADIA*, Norman. (Plate XXIX. figs. 56–59.)

*Cythere badia*, Norman, Ann. & Mag. Nat. Hist. vol. ix. (1862) p. 48, pl. iii. figs. 13–15.

— *cicatricosa*, Sars, *loc. cit.* p. 33.

? — *canaliculata*, Brady, Trans. Zool. Soc. vol. v. p. 373, pl. 59. fig. 4 a–f.

British type. DISTRIBUTION: *Recent*—Norway, Great Britain and Ireland, Mediterranean, Australia?

*Fossil*—Raised beaches and glacial clays, Norway, Scotland, and Ireland.

Carapace oblong, reniform. Seen from the side, the valves are rather higher in front than behind, the height a little more than equal to half the length. Anterior margin broadly rounded, posterior slightly rounded, subtruncate; dorsal margin very slightly arched, sloping gently backwards, ventral conspicuously incurved in front of the middle. Outline, as seen from above, compressed, ovate, breadth equal to more than one-third of the length; anterior extremity obtusely pointed, posterior more rounded. End view oval. Surface of the shell uneven, marked with irregular furrows and elevations. Hinge-joint well developed. Colour deep yellowish brown. One eye. Antennæ short and thick, last joint of the upper equal in length to the preceding. Second joint of the last pair of feet scarcely longer than the united length of the two following; terminal claw short and thick.

Length  $\frac{1}{50}$  in., height  $\frac{1}{100}$  in. .5 x .25 mm

*Hab.* In rock-pools at Mount's Bay, Cornwall, Herm, Guernsey, Arran, and Loch Carron, N. B. (*Rev. A. M. Norman*); in shell-sand, Roundstone (*Dr. Alcock*), Birterbuy Bay, 15 fathoms, and amongst oyster-ooze from Stranraer (*G. S. B.*); dredged in the Minch, 45-60 fathoms (*Mr. J. G. Jeffreys*); Cumbrae (*Mr. D. Robertson*); Scarpa Flow, Orkney (*Mr. E. C. Davison*).

*C. badia* is one of the less-common British species; in outline it is not very unlike *C. pellucida*, but much smaller.

#### 7. CYTHERE OBLONGA, Brady. (Plate XXXI. figs. 14-17.)

*Cythere oblonga*, Brady, Trans. Zool. Soc. vol. v. p. 373, pl. 59. figs. 5 a-d.

Mediterranean type. DISTRIBUTION: *Recent*—England, Bay of Biscay, Mediterranean.

Carapace, as seen from the side, oblong, subquadrangular, equal in height throughout, height equal to nearly half the length. Anterior margin obliquely rounded, minutely and numerously dentate, posterior truncate and angular; superior margin straight or very slightly curved, inferior nearly straight in front, behind irregularly emarginate or obsolete toothed. Seen from above, the outline is ovate, greatest breadth equal to much more than one-third of the length; extremities obtusely rounded; hinge-margins depressed behind the middle. Surface irregularly marked with deep angular pittings of very variable size; a well-marked tubercle over the anterior hinge. Within the anterior margin is usually a raised crenulated ridge, which is marked with radiating transverse hair-like lines. Colour yellowish brown. Animal unknown.

Length  $\frac{1}{29}$  in., height  $\frac{1}{62}$  in. .867 mm

*Hab.* In shell-sand, Mumbles (South Wales).

\*\* *Mandibular palp* four-jointed, bearing on its inner margin three strong, curved, plumose setæ; last joint linear, slender.

α. Urticating seta long in male, short in female.

#### 8. CYTHERE RUBIDA, n. sp. (Plate XXXII. figs. 71-74.)

Carapace of the *female*, as seen from the side, subreniform, highest in front of the middle, greatest height equal to more than half the length. Extremities rounded, the anterior much the broader; superior margin highest above the eye, whence it slopes

backwards almost in a right line; inferior deeply sinuated in the middle. Outline, as seen from above, subhexagonal, widest in the middle, sides nearly parallel and tapering equally to each extremity, greatest width equal to half the length. End view subtriangular, height much greater than the width, prominently keeled. The central portion of the valves is covered with a thick reddish incrustation, and closely and irregularly pitted; this central elevated portion is surrounded by a broad flattened margin, which is devoid of pittings, but is marked, especially in front, by radiating lines. The two eyes are plainly visible through the shell, forming brilliant black spots. Upper antennæ strongly spinous, last joint shorter than the preceding. Flagellum of lower antenna very short, scarcely reaching the middle of the penultimate joint. Mandibular palp four-jointed, armed with three stout curved plumose setæ as in *C. albomaculata* &c., terminal joint slender. Legs short, and nearly equal, terminal claws long and curved; second joint of last pair not so long as the two following joints, claw not ciliated. Post-abdominal lobes terminating in two ciliated setæ. Male unknown.

Length  $\frac{1}{4\frac{1}{2}}$  in. 1595

*Hab.* In rock-pools, Clackland Point, Arran, N.B. (*Rev. A. M. Norman*).

This is a very interesting species, as combining the outward form of a typical *Cythere* with the anatomical characters of the group usually classed under *Cythereis*. The other two intermediate species, *C. albomaculata* and *C. convexa*, are somewhat abnormal both in external and internal structure, and might, with some show of reason, have been erected into independent genera between *Cythere* and *Cythereis*; but *C. rubida* being outwardly a true *Cythere*, and anatomically a true *Cythereis*, seems conclusively to prove the expediency of amalgamating the two genera.

#### 9. CYTHERE CONVEXA, Baird. (Plate XXIX. figs. 19–27, and Plate XXXIX. fig. 4.)

*Cythere convexa*, Baird, Brit. Entom. p. 174, tab. xxi. fig. 3.

— *arborescens*, Brady, Ann. & Mag. Nat. Hist. 1865, vol. xvi. pl. ix. figs. 5–8.

?*Cypridina cicatricosa*, Reuss, Haidinger's Abhandl. Band iii. (1850) fol. 67, tab. ix. fig. 21.

?*Cythere cicatricosa*, Bosquet, Entom. fossil. des terr. tertiair. de la France, p. 76, tab. iii. fig. 13.

*Cythere punctata*, Jones, Entom. of Tert. Form. Eng. p. 24, pl. ii. figs. 5a–5h.

British type. DISTRIBUTION: *Recent*—Great Britain, Ireland, Bay of Biscay, Levant. *Fossil*—Glacial clay and raised beaches, England, Scotland, and Ireland; crag, England; and tertiary, Germany and Sicily.

Shell rounded, convex, beaked behind, slightly keeled in front and below; greatest height in the middle, equal to about two-thirds of the length; the left valve much larger than the right, and overlapping considerably on the dorsum. Seen from the side, the anterior margin is rounded, posterior beaked, and expanded below the beak into three or four squamous spines (figs. 19, 25, 27). Ventral margin slightly convex, sinuated at the anterior third, and curved upwards behind, where it also frequently bears one or two spines, which project downwards. Dorsal margin boldly arched, highest in the middle. End view oval, tumid, widest in the middle, pointed above and below. Outline, as seen from above, oblong oval, widest in the middle, and tapering equally to each extremity, width equal to half the length. The hinge-processes, with the intermediate bar and

furrow, are strongly developed (figs. 23, 24). The surface of the shell varies much in character; well-marked adult specimens are mostly marked with deep pittings, which are concentrically arranged, and are deepest and closest round the margins of the valves, especially on the ventral surface, where they are liable to form longitudinal furrows. But some varieties exhibit only slightly impressed punctures, and in very old specimens the excavations are more or less obliterated by calcareous deposit. The right valve, besides being much smaller than the left, is likewise very different in shape, being prominently beaked behind, somewhat truncate above, and deeply sinuated on the ventral margin. The terminal claws of the lower antennæ are very short, slender; and there is an armature of three setæ on the middle of the inner margin, similar to that of the following species, but without the pectination of the long filament. The urticating seta is very short in the female (see Plate XXXIX. fig. 4).

Length  $\frac{1}{30}$  in., height  $\frac{1}{50}$  in.

*Hab.* In deep water and occasionally between tide-marks. Scarpa Flow, Orkney (*Mr. E. C. Davison*); the Minch (*Mr. J. G. Jeffreys*); Isle of Skye, Lamlash Bay, Channel Islands, Falmouth, Burrow Island, Swansea, Youghall (*Rev. A. M. Norman*); in tidal pools in the Isle of Man, dredged off Shetland, Lerwick, Cumbrae, and Oban (*Mr. D. Robertson*), off Devonshire coast, 60 fathoms (*Mr. C. S. Bate*); in shell-sand from South Wales and Stranraer, Aran, and Roundstone, and dredged in Birterbuy Bay (*G. S. B.*); "Torquay, in sand, *W. C. Williamson, Esq.*; Tenby, in sand, *T. R. Jones, Esq.*" (*Dr. Baird*).

*β.* Urticating setæ long and slender in both sexes.

10. CYTHERE ALBOMACULATA, Baird. (Plate XXVIII. figs. 33–39, and Plate XXXIX. fig. 3.)

*Cythere albomaculata*, Baird, Brit. Entom. p. 169, tab. xx. fig. 7.

— *alba* (young), Baird, *loc. cit.* p. 170, tab. xx. fig. 6.

British type. DISTRIBUTION: *Recent*—Great Britain, Ireland, Norway, Bay of Biscay, Levant, Cape Verd. *Fossil*—Glacial clays and raised beaches, Scotland, Ireland, Norway.

Valves, as seen from the side, oblong, subreniform, nearly equal in diameter throughout; height equal to rather more than half the length. Anterior margin well rounded; posterior obliquely rounded, and somewhat angular at its junction with the ventral border. Dorsal margin forming a flattened arch; ventral margin deeply incurved at its anterior third, and curving upwards behind. Outline, as seen from, above compressed, oblong, widest in the middle, and gradually tapering to the extremities, which are pointed, width equal to more than one-third of the length. End view oval, rounded above and keeled below. The valves are bordered in front and below by a broad, flattened flange or belt, which is marked with thickly set, transverse, hair-like lines (fig. 38). The striated keel thus formed by the junction of the two valves is very conspicuous on the ventral and anterior aspects of the shell (figs. 35, 36). Surface smooth and polished, clothed with short scattered hairs; pellucid and marked with patches of black or olive-green; old specimens and those from shell-sand and deep water are mostly opaque white. The hinge-joint is exceedingly well developed, the left valve bearing a strong bar which is received into a groove between the terminal processes of the opposite valve (fig. 39).



Lucid spots about eight in number, subquadrangular, and arranged in two irregular transverse rows. Two small shining eye-tubercles. Superior antennæ robust, five-jointed, second joint short, not much more than equal in length to the two succeeding; last joint short; terminal spines strong, curved. Inferior antennæ robust, last joint short and truncate, terminal claws rather short and slender; urticating seta reaching to about the apex of the limb, equal in the male and female; penultimate joint, in the male, deeply emarginate about the middle of the posterior margin and bearing three setæ, one of which is short and slender, the central one longer and strongly pectinate, the other very short and club-shaped (see Plate XXXIX. fig. 3*b*). This arrangement is similar in the female, but all the parts are feebly developed. Second joint of the last foot not much longer than either of the two succeeding joints. Terminal claw long and strong. Abdominal lobes truncate, each bearing two ciliated terminal setæ. Eyes two. Basal portion of the male copulative organs very large, quadrate; apex acute and tapering.

Length  $\frac{1}{27}$  in., height  $\frac{1}{50}$  in. *.925 x .5 mm.*

*Hab.* Littoral and in moderate depths up to 15 fathoms. In shell-sand from Walton and Whitstable (*Prof. T. Rupert Jones*); Orkney, Girdler sand (Thames), Margate, and Cork (*Mr. E. C. Davison*); Shetland, Loch Carron, Arran (N.B.), Tobermory, Youghall, Exmouth, Burrow Island, Guernsey, dredged and living in tide-pools (*Rev. A. M. Norman*); Isle of Man, at roots of *Laminariæ*, and Cumbrae, Macduff, and Peterhead (*Mr. D. Robertson*); Aberdeenshire coast (*Mr. Dawson*); Galway, Roundstone, and Birterbuy Bay (dredged), and abundantly in rock-pools at Arranmore, and on the Durham coast, and in shell-sand from the Mumbles and Stranraer (*G. S. B.*); Norfolk coast, dredged (*Mr. D. O. Drewett*).

The form described by Dr. Baird under the specific name *alba* (see fig. 38*a*) seems to be the young of *Cythere albomaculata*. *C. strigulosa*, Reuss, is very closely allied to, but (according to specimens named by M. Bosquet) not identical with the present species. *C. albomaculata* differs remarkably from most of those with which it is associated, in the form and structure of the shell, the peculiar armature of the second antennæ, and the structure of the mandibular palp, the latter being quite similar to the form observed in the following section, which includes the species usually classed under the genus *Cythereis*. These differences, though important, do not seem so much so as to warrant the formation of an independent genus for this species. It is probably the most abundant and most widely distributed of the British marine Ostracoda, being found all round our coasts from high-water mark to a depth of about 15 fathoms. Very remarkable is its apparent absence from the Scandinavian and other shores of continental Europe; for, being a large and conspicuous species, it can scarcely have escaped detection by such naturalists as have recently investigated this group\*. Should further observation show that its distribution is confined to the British Islands, it will be a most interesting, and perhaps a unique example of a purely British species having attained almost a predominant position in its own district as to range and numbers. It occurs in the glacial clays of this country, but I am not aware whether it has been found in those of Norway.

\* Since this was in the printer's hands, I have seen a few specimens dredged by Mr. D. Robertson off the coast of Norway, and others from the Mediterranean.

## 11. CYTHERE PULCHELLA, nov. sp.

Arctic type. DISTRIBUTION: *Recent*—Scotland, Baffin's Bay. *Fossil*—Scotland, glacial clay.

Carapace of female, viewed laterally, subreniform, greatest height in front of the middle and equal to considerably more than half the length; anterior extremity broadly rounded, posterior obliquely subtruncate, scarcely rounded; superior margin highest over the eyes, thence sloping backwards with a gentle curve, inferior sinuated in the middle; outline, as seen from above, ovate, widest behind the middle, greatest width equal to nearly one-half the length, extremities pointed. Surface of the shell closely punctate. Hinge-teeth of the right valve forming two projecting crests, which end abruptly at the terminal extremities, but slope gradually towards the middle of the hinge-line, and are crenulated on their edges. Upper antennæ armed at the apices of the last four joints with slender, slightly curved spines, third and fourth joints coalescent; flagellum of the lower antenna biarticulate, alike in male and female. Mandibular palp bearing three curved pectinate setæ (as in *Cythereis*, Sars). Feet short and stout, their terminal claws much dilated at the base, nearly straight in the middle, and suddenly curved (almost hooked) at the apex.

Length  $\frac{1}{46}$  inch.

This species is not very unlike *C. villosa* in general appearance, but is smaller, less compressed from side to side, with more rounded outlines and a much finer surface-ornament. The only recent British specimen I have seen is one, apparently immature, which occurred in some shell-sand gathered by Mr. D. O. Drewett in Respond Bay, Loch Erribol, N.B. It occurs more plentifully in some of the Scottish glacial formations, and will be fully figured in a forthcoming work on the Posttertiary Entomostraca. Mr. Crosskey has also found it abundantly in some recent gatherings from Davis's Straits; and from these specimens the anatomical details above given have been derived.

b. *Carapace, as seen from the side, quadrilateral, highest in front, ventricose, often prominently rugose or spinous.*

\* *Mandibular palp three-jointed, simply setose. Urticating setæ equal in the male and female.*

## 12. CYTHERE CUNEIFORMIS, Brady. (Plate XXXI. figs. 47-54.)

*Cythere ventricosa*, Sars, *loc. cit.* p. 34.

British type. DISTRIBUTION: *Recent*—Great Britain, Ireland, Norway. *Fossil*—Glacial clays and raised beaches, Scotland and Norway.

Carapace subprismoid, depressed behind, acutely angular on the dorsal and slightly convex on the ventral surface. *Female*, as seen from the side, subclavate, greatest height at the anterior third, and equal to about half the length; anterior extremity broadly and obliquely rounded, posterior obtusely pointed (in the adult). Superior margin nearly straight and gently sloping as far as the posterior fourth, thence sloping steeply to the extremity; inferior margin straight, or irregularly sinuated. Outline, as seen from above, ovate, acuminate behind, obtusely pointed in front; greatest width behind the middle, equal to nearly half the length. End view triangular, the base slightly convex. Surface

faintly pitted or papillose, transversely sulcate near the middle, longitudinally rugose on the ventral surface. Hinge-processes feebly developed; left valve minutely crenulate. Carapace of the *male* more elongate, superior margin slightly concave. Colour yellowish. "One eye. Antennæ short, last joint of the upper shorter than the preceding. Second joint of the last pair of feet about equal to the united length of the two following joints, terminal claw long and slender. Basal portion of the male copulative organs narrow above, apical portion subtriangular."

Length  $\frac{1}{40}$  in., height  $\frac{1}{95}$  in.

*Hab.* Dredged in the Minch, 45–60 fathoms, and near Guernsey in 15–30 fathoms (*Mr. J. G. Jeffreys*); Roundstone Bay, 2–3 fathoms, and Northumberland coast, 45 fathoms (*G. S. B.*); Cumbrae (*Mr. D. Robertson*); in shell-sand from Galway (*Prof. Rowney*).

The specific name *ventricosa* being preoccupied by Reuss, I have here adopted the term *cuneiformis*, which I had applied to the species in MS. before seeing the work of G. O. Sars.

### 13. CYTHERE LIMICOLA (Norman). (Plate XXXI. figs. 38–41.)

*Cythereis limicola*, Norman, Nat. Hist. Trans. Northumb. & Durh. vol. i. p. 20, pl. vi. figs. 1–4.

*Cythere nodosa*, Sars, *loc. cit.* p. 34.

? — *complexa*, Brady, Brit. Assoc. Report, 1866, p. 210.

— *areolata*, Brady, Trans. Zool. Soc. vol. v. p. 381, tab. lxii. figs. 2a–d.

Scandinavian type. DISTRIBUTION: *Recent*—Baffin's Bay, Norway, Great Britain. *Fossil*—Glacial clay and raised beaches, Scotland.

Carapace short, tumid, quadrangular; length to height as about three to two, not much higher in front than behind. Seen from the side, the anterior margin is well rounded below and slopes very steeply backwards above, terminating in an elevated angle over the anterior hinge. Posterior margin somewhat angular in the middle, slightly rounded below, and sloping nearly in a right line upwards to the dorsum, its junction with which is marked by an angular projection; the dorsal margin, between this and the anterior angle, is considerably hollowed. Ventral margin rather sinuous. The outline as seen from above is hexagonally cuneate or boat-shaped, very broad behind, and tapering abruptly at each extremity; greatest breadth near the posterior extremity, equal to more than half the length. End view triangular, with an excessively convex base; outline irregularly sinuous. Surface of the shell rugose, tuberculated, and marked with fine closely set puncta; the general direction of the rugæ is in curved transverse lines; but the most conspicuous elevation runs longitudinally at a little distance within the ventral margin: there are two very large tubercles or nodules on the dorsal aspect of each valve near the posterior angle, and one in the situation of the anterior hinge-joint. Colour brownish yellow. "No eyes. Antennæ elongated, last joint of the upper elongated, linear, and somewhat shorter than the preceding; third joint of the lower antennæ more slender than usual. Feet slender and elongated; second joint in the last pair a little shorter than the united length of the two following, terminal claw long and almost straight. Basal portion of the male copulative organs small and rounded, apical portion

subtriangular; anterior extremity lengthened into a slender and obtusely pointed process."

Length  $\frac{1}{4\frac{1}{2}}$  in., height  $\frac{1}{7\frac{1}{5}}$  in.

*Hab.* In deep water. Isle of Skye and Northumberland and Durham coasts (*Rev. A. M. Norman*); Oban (*Mr. D. Robertson*); Aberdeenshire coast (*Mr. Dawson*).

This species appears to live altogether amongst soft mud, in which it burrows, whence probably, as Sars observes, the entire absence of eyes. Like the preceding species it is of rare occurrence in the British seas; and Sars makes the same remark respecting its Norwegian distribution. It occurs also in the Scotch glacial clays. I now believe that the form described by me as *C. complexa* is merely the young of *C. limicola* (see figs. 43-46).

#### 14. CYTHERE GLOBULIFERA, n. sp. (Plate XXXI. fig. 42.)

Valves, as seen from the side, oblong, subrhomboidal, rather higher in front than behind; greatest height equal to more than half the length. Extremities rounded, the posterior rather narrowed; superior margin straight, gibbous over the anterior hinge; inferior slightly convex, curved upwards behind. Surface marked with a fine ribbed reticulation and bearing four prominent rounded tubercles, three below the dorsal and one above the anterior extremity of the ventral margin; the shell is swollen below and behind the middle into a rounded elevated ridge or ala.

Length  $\frac{1}{5\frac{1}{8}}$  in.

*Hab.* Roundstone, in shell-sand.

Of this species I have seen only one specimen, and that a single valve; but its characters are so very different from those of any described form, that I have thought it best to describe it here under a specific name; it is nevertheless possible that it may prove to be an immature form of some other species\*.

\*\* *Mandibular palp four-jointed, last joint slender; inner margin bearing three strong, curved, plumose setæ. Urticating setæ much shortened in the female.*

#### 15. CYTHERE TUBERCULATA (Sars). (Plate XXX. figs. 25-41.)

*Cythereis tuberculata*, G. O. Sars, *loc. cit.* p. 37.

*Cythere mutabilis*, Brady, *Trans. Zool. Soc.* vol. v. p. 377, pl. lix. figs. 12-14.

British type. DISTRIBUTION: *Recent*—Baffin's Bay, Great Britain, Ireland, Norway, Bay of Biscay, West Indies. *Fossil*—Glacial clays and raised beaches, England, Scotland, Ireland, and Norway.

Shell of the *female*, as seen from the side, elongate quadrangular, highest in front; greatest height equal to more than half the length; a large rounded tubercle in front of the centre, and two elongated tubercles or ridges, one ventral and one dorsal, near the hinder extremity; these last are very conspicuous in young specimens, but become

\* Since writing this, I have had the opportunity of examining several specimens, apparently referable to this species, which have been found by Messrs. Crosskey and Robertson in the course of their researches amongst the Scottish glacial clays.

almost obsolete in the adult, forming a mere transverse tumid elevation of the valve. The anterior margin is broad, well rounded below, and more gradually curved above, where it terminates in a rounded elevation over the anterior hinge. The posterior margin is narrowed, and rather abruptly angular in the middle. Ventral margin nearly straight, or gently incurved in the middle: dorsal elevated over the anterior hinge, thence sloping in an undulating line to the posterior extremity. Seen from above, the carapace is ovate, broadest behind, width somewhat less than the height; extremities obtuse, outline very irregularly undulated; no eye-tubercle. End view irregularly quadrate, somewhat tapering above. Hinge-processes of the right valve strongly developed; of the left obsolete (fig. 29). Surface marked with large and deep pittings, often interspersed with much smaller ones, and, in the intervals, bearing elevated papillæ. Anterior border mostly fringed with a series of from five to twenty, and the posterior extremity with about six teeth; but these are often entirely absent. Colour yellowish brown. Limbs deep yellow. Shell of the *male* much elongated, length more than twice the height, upper margin slightly concave behind the anterior hinge (fig. 30). Upper antennæ six-jointed, last joint a little longer than the preceding. Urticating seta very slender. Claw of first foot pectinate on its inner margin. Second joint of last foot rather longer than the united length of the two following joints, terminal claw very long and slender. Male copulative organs produced into a much elongated and slender process in front, the apical portion forming two prolongations, the anterior obtusely hooked, the posterior acuminate.

Length  $\frac{1}{25}$  in.

*Hab.* 1–60 fathoms, Hebrides and the Minch, Shetland and Channel Islands (*Mr. J. G. Jeffreys*); Oban, Bute, Campbeltown, and Cumbræ (*Mr. D. Robertson*); Dogger bank, Exmouth, Plymouth, Isle of Skye, and Tobermory (*Rev. A. M. Norman*); Orkney (*Mr. C. W. Peach*); Northumberland and Durham coasts, 20–46 fathoms, and in oyster-ooze from Stranraer and South Wales (*G. S. B.*); Aberdeenshire coast (*Mr. Dawson*); Roundstone (*Dr. Alcock*); Devonshire coast (*Mr. C. S. Bate*); in shell-sand from Baltimore, Frith of Forth, and Margate (*Mr. E. C. Davison*).

The characters upon which I rely to distinguish this fine species are the *central tubercle*, which is never, so far as I know, entirely wanting; the *two posterior tubercles*, or, in old specimens, the transverse elevation resulting from their coalescence, which gives to the dorsal view a somewhat cuneate outline; and the absence mostly of any conspicuous tubercle over the anterior hinge, and of any well-defined longitudinal sulcus on the dorsal aspect. But, even thus restricted, there is great variety in the different forms of carapace, as will be sufficiently seen by reference to the figures in Plate XXX. The smooth but prominently tuberculated character of young specimens is shown in figs. 38–39, while the gradual disappearance of the tubercles and consentaneous development of the minor surface-markings may be traced upwards in figs. 37, 36, 30, 24, and 25; finally, fig. 32 shows a still older form, in which the surface-markings have become partially obliterated by calcareous deposit, as has been previously described in the case of other species.

## 16. CYTHERE CONCINNA, Jones. (Plate XXVI. figs. 28-33, and Plate XXXVIII. fig. 7.)

*Cythere concinna*, Jones, Tert. Entom. p. 29, pl. iv. figs. 7a-7f.

*Cythereis clavata*, Sars, loc. cit. p. 39.

Scandinavian type. DISTRIBUTION: *Recent*—Great Britain, Norway. *Fossil*—Crag, England; glacial clays and raised beaches, Scotland, Ireland, and Norway.

Valves, as seen from the side, oblong, quadrangular, higher in front than behind; length equal to twice the height. Anterior extremity rounded, posterior rectangularly or obliquely truncate, and slightly sinuated. Ventral margin nearly straight; dorsal sloping in a right line, or gently arched, highest over the anterior hinge. Outline, as seen from above, oblong quadrangular, twice and a half as long as broad, with nearly parallel, sinuous sides, and broadly rounded extremities; the hinge-margins rather depressed behind the middle. Anterior and inferior surfaces longitudinally furrowed. The surface of the shell is marked (in highly sculptured specimens) with thickly set small punctations, and on the posterior half with a network of fine ribs; but very commonly the surface is only slightly and irregularly undulated, bearing a few short scattered setæ—or sometimes roughened and studded with a few small tubercles, as shown in fig. 32. Within, and parallel to, the anterior and ventral margins runs an elevated ridge; and there are also, in most cases, two shorter oblique ridges on the posterior portion of the valve, a well-marked rounded tubercle in front of the middle, and another over the anterior hinge. The hinge-processes are well-developed, the posterior being placed very far back at the extreme dorsal angle. Colour yellowish. Last joint of the upper antennæ elongated, much longer than the preceding. Second joint of the last pair of feet about equal in length to the united lengths of the third and fourth joints; terminal claw exceedingly slender, almost setiform. Terminal claw of first foot pectinate.

Length  $\frac{1}{28}$  in., height  $\frac{1}{55}$  in.

*Hab.* The Minch and Hebrides, 45-60 fathoms (*Mr. J. G. Jeffreys*); Orkney (*Mr. C. W. Peach*); dredged in 6-10 fathoms, Campbeltown Bay, Argyleshire, and Ormeshead (*Mr. D. Robertson*); off Scarborough (*Mr. Leckenby*); off Lewis, N.B., 59½ fathoms (*Admiralty Soundings*); Roundstone (*Dr. Alcock*).

The sculpturing of the valves in this species is variable. The specimen from which figs. 28-31 were drawn represents the best developed condition of surface-marking; the ribs and tubercles are often much less conspicuous. Fossil specimens described by Prof. T. Rupert Jones are very slightly sculptured, a condition shown in fig. 32; those found in the Scottish glacial clay by Messrs. Robertson and Crosskey are often strongly marked in the coarser surface-characters, but, in most cases, have comparatively little of the delicate ribbing and punctation seen in some recent specimens. This, however, is one of the most abundant of the Scotch Glacial Entomostraca, and shows a great range of variation. Recent specimens dredged by Mr. Jeffreys in the Minch and the Sound of Skye, at a depth of about 60 fathoms, also vary considerably, and are identical in appearance with the majority of the fossil specimens. Those dredged further south by Mr. Robertson, in shallower water, are usually more highly ornamented (figs. 28-31), and are less frequently met with in a fossil state. For more copious illustrations of the

varieties of this fine species, I must refer the reader to a Monograph of the Posttertiary Entomostraca which is in preparation for the Palæontographical Society.

17. *CYTHERE ANGULATA* (Sars). (Plate XXVI. figs. 39–42.)

*Cythereis angulata*, Sars, *loc. cit.* p. 40.

Scandinavian type. DISTRIBUTION: *Recent*—Baffin's Bay, Norway, Great Britain. *Fossil*—Glacial and raised beaches, Scotland and Norway.

Carapace, as seen from the side, oblong, quadrilateral, greatest height near the front, and equal to more than half the length. Anterior margin rounded below and sloping steeply backwards above; posterior narrower, rectangularly truncate, and somewhat protuberant below the middle; ventral margin nearly straight, dorsal sloping backwards in a straight or gently curved line from the anterior hinge. Outline, as seen from above, very irregular, somewhat lozenge-shaped, tapering slightly towards the front, which is very obtuse or almost truncate, the sides parallel and constricted in the middle; posterior extremity broadly and obtusely mucronate, greatest width equal to less than half the length, the hinge-margins forming at their junction a narrow, sharply cut longitudinal sulcus. End view broadly ovate; deeply constricted above the middle; broad above, sharply keeled below. Surface irregularly undulated and marked with angular excavations of variable size; a conspicuous rounded tubercle near the anterior hinge, and another large rib or elongated tubercle near the centre of the valve; a sharply defined transverse ridge terminates the sculptured portion of the shell, beyond which the posterior portion projects on a lower level. The right valve is rather smaller and more angular than the left, and the dorsal margin is more depressed. Colour brown. "Third and fourth joints of the upper antennæ confluent, the last short and armed with a strong spine. Second joint of the last foot much shorter than the two following. Copulative organs of the male small, apical portion obtuse, subhamate."

Length  $\frac{1}{37}$  in., height  $\frac{1}{75}$  in.

*Hab.* The Minch, 45–60 fathoms (*Mr. J. G. Jeffreys*); Shetland, Lerwick, Cumbrae, Macduff Harbour, and Peterhead (*Mr. D. Robertson*); Scarpa Flow, Orkney (*Mr. E. C. Davison*).

This is very distinct from any other recent British species, and is apparently one of the rarest. Sars notes that specimens from Finmark are much larger and more abundant than those found by him in Christianiafiord; he therefore infers that it is a peculiarly northern species. It occurs in the glacial clays of Scotland and Norway.

18. *CYTHERE DUBIA*, n. sp. (Plate XXXII. figs. 75, 76.)

Carapace, as seen from the side, subquadrangular, highest in front, greatest height equal to more than half the length. Anterior extremity rounded, posterior obliquely subtruncate, angulated about the middle, below which are three small teeth; superior margin slightly convex, sloping almost in a straight line to the posterior extremity, where it forms an abrupt angular projection; inferior deeply sinuated in front of the middle. Seen from above, the outline is irregularly subovate, about twice as long as broad; sides

nearly parallel, anterior extremity obtuse, the posterior broadly mucronate. Surface of the shell uneven, vaguely marked with ill-defined pits and furrows.

Length  $\frac{1}{27}$  in. *9259*

*Hab.* Shetland (*Rev. A. M. Norman*).

Mr. Norman's collection contains one specimen only of this species. It is nearly allied to *Cythereis emarginata*, Sars, but is very much larger, and has not the sharply defined reticulated sculpture of that species; the outline is also more irregular.

#### 19. CYTHERE FINMARCHICA, Sars. (Plate XXXI. figs. 9-13.)

*Cythereis Finmarchica*, Sars, *loc. cit.* p. 41.

Scandinavian type. DISTRIBUTION: *Recent*—Norway, Great Britain, Ireland, Bay of Biscay, Cape Verd. *Fossil*—Glacial, Scotland.

Valves, as seen from the side, oblong quadrangular, rather higher in front than behind; length equal to twice the height. The anterior border is obliquely rounded and angulated at its junction with the dorsum, often slightly toothed below. Posterior extremity flattened and narrow, produced below, where it is divided into about four broad, blunt teeth. Inferior margin straight or slightly incurved. Dorsal margin very slightly arched, or sloping almost in a straight line from before backwards. Seen from below, the outline is oval, with obtuse extremities and parallel sides, which are sometimes rather deeply sulcate in the middle. End view subtriangular, broad, and rounded below, tapering above. The surface is marked with numerous rather large, shallow pits, and is often transversely sulcate; in front of the median sulcus is a large rounded tubercle bearing the lucid spots, which are nine to twelve in number, and irregular in arrangement (figs. 9, 13). Animal unknown.

Length  $\frac{1}{8}$  in., height  $\frac{1}{8}$  in. *6872*

*Hab.* Dredged off Oban (*Mr. D. Robertson*); Roundstone, in shell-sand (*Dr. Alcock*); Galway Bay, in shell-sand (*Prof. Rowney*); The Minch and Channel Islands, 15-30 fathoms (*Mr. J. G. Jeffreys*); Northumberland coast, 46 fathoms (*G. S. B.*); Devonshire coast (*Mr. C. Spence Bate*); in tide-pools, Herm (*Rev. A. M. Norman*).

I at one time supposed this species to represent merely a stage of growth or a local variety of *C. tuberculata*; but this opinion I now believe to be untenable. The elongated form of the valves (without tumidity behind), the posterior crenulation, and the one central tubercle are constant characters. It will be seen, by reference to Plate XXX., that the young forms of *C. tuberculata* always exhibit one central and two posterior tubercles; and the teeth of the posterior margin, when they exist at all, are really out-growths of the shell, and not mere indentations of the bordering lamina as in the present species. Moreover the anterior border of well-grown specimens of *C. tuberculata* is almost sure to be fringed with spines, but in *C. finmarchica* is either entire or, at most, slightly crenated, as shown in fig. 9.



20. *CYTHERE VILLOSA* (Sars). (Plate XXIX. figs. 28–32).

*Cythereis villosa*, Sars, *loc. cit.* p. 42.

British type. DISTRIBUTION: *Recent*—Great Britain and Ireland, Norway, Bay of Biscay. *Fossil*—Glacial clays and raised beaches, Scotland, Ireland, Norway.

Carapace of the *female*, as seen from the side, oblong quadrangular, nearly equal in height throughout; greatest height equal to more than half the length. The anterior margin is obliquely rounded; the posterior truncate, angular, and somewhat waved. The dorsal margin forms a flattened arch; ventral margin straight or slightly sinuated, swelling near the posterior, and sometimes also near the anterior extremity into an angular protuberance. The outline, as seen from above, is compressed oblong, its sides nearly parallel and tapering suddenly at each extremity, width equal to more than one-third of the length; the contact-margins bordered by prominent ribs. End view ovate, narrowed above. Hinge-joints as in *C. albomaculata*. The surface of the shell is marked with large and deep excavations, which tend to coalesce, and form, especially towards the ventral and posterior borders, irregularly waved ribs and furrows. There is, however, much variety in the amount and character of the sculpture, as well as in colour, which ranges from white or yellow to a deep slaty blue. The form and proportions of the carapace are also very variable, though the essential characters of the species are mostly well preserved. The *male* is much elongated, about twice as long as high. Animal almost exactly similar to that of *C. angulata*. The second antenna has an armature of three setæ similar to that of *C. convexa*.

Length  $\frac{1}{4}$  in.

*Hab.* Littoral and in deep water. Shetland, Tobermory, Berwick, Isle of Skye, Plymouth, Exmouth, Youghal, alive in tidal pools at Herm, Lamash Bay, and Loch Carron (*Rev. A. M. Norman*); Orkney (*Mr. C. W. Peach*); Aberdeenshire coast (*Mr. Dawson*); Cumbrae, Macduff, Peterhead, Lerwick, and Oban (*Mr. D. Robertson*); Cowes, Margate, Girdler sand and Donegal Bay (*Mr. E. C. Davison*); the Minch and Channel Islands (*Mr. Jeffreys*); Devonshire coast (*Mr. C. S. Bate*); Norfolk coast (*Mr. D. O. Drewett*). In shell-sand from South Wales, Stranraer, Galway Bay, and Roundstone; dredged in Birterbuy Bay, 15 fathoms, and Northumberland coast, off Holy Island, 45 fathoms (*G. S. B.*).

This species, like *C. convexa*, is almost exclusively confined to the laminarian zone, the instances of its occurrence in a living state between tide-marks being comparatively rare. It appears to be a common species in our seas, except on the eastern coast, where it is rare—in this respect, also, agreeing with *C. convexa*. It occurs plentifully in the Glacial clays of Scotland and Norway.

21. *CYTHERE* ? *SEMIPUNCTATA*, n. sp. (Plate XXIX. figs. 33–37.)

DISTRIBUTION: *Recent*—Ireland, Bay of Biscay.

Carapace of the *male* (?), as seen from the side, subelliptical, rather higher in front than behind; greatest height equal to more than half the length; extremities rounded; superior margin nearly straight in front, gently curved behind; inferior slightly sinuated; margins at their outermost edge thickened and elevated, but depressed inwardly, thus forming a shallow excavated channel round the anterior and ventral portions of the

valve. Outline, as seen from above, compressed, subquadrangular, width equal to one-third of the length; sides parallel, anterior extremity narrowed, truncate; posterior broader, slightly rounded. Surface of the shell covered behind the middle with closely set circular pits. Colour yellowish. Animal unknown.

Length  $\frac{1}{4\frac{1}{5}}$  in.

*Hab.* Birterbuy Bay, dredged (*G. S. B.*); Roundstone, in shell-sand (*Dr. Alcock*).

The valves represented at figs. 36 and 37 belong apparently to the young of this species, are slightly sulcate across the middle, and exhibit the semipunctate character of the species very plainly. Several examples of single valves occurred in *Dr. Alcock's* shell-sand, but only one perfect carapace in my dredgings from the same locality.

## 22. CYTHERE JEFFREYSII, n. sp. (Plate XXIX. figs. 51–55.)

Atlantic type? DISTRIBUTION: *Recent*—Great Britain and Ireland. *Fossil*—Raised beaches, Scotland.

Carapace, as seen from the side, ovate, highest near the front; surrounded by a well-developed fillet or flange; height equal to more than half the length. The anterior margin is wide, well-rounded, and bordered by a flattened lamina which is marked with transverse hair-like lines. Posterior extremity narrowed and produced below into a spinous plate. Dorsal margin highest over the anterior hinge-joint, where it bears a conspicuous polished tubercle; ventral margin nearly straight. Seen from above, the outline is tumid, oblong, with nearly parallel sides, and tapering suddenly to the broadly keeled extremities; the anterior hinge-tubercles very conspicuous. End view tumid, broadly rounded below, narrowed above. Surface smooth and polished, marked with a reticulated moniliform pattern, which is composed of rows of numerous small tubercles (fig. 55). Animal unknown.

Length  $\frac{1}{40}$  in., height  $\frac{1}{70}$  in.

*Hab.* Deep water, very rare. Channel Islands (*Mr. Jeffreys's dredgings*); Roundstone, in shell-sand (*Dr. Alcock*).

A form described by me in the 'Transactions of the Zoological Society' (vol. v. p. 374) under the name *Cythere catenata* is closely similar to the present in its surface-markings; and I have since learnt that it is only the young of *C. echinata*, Sars, a species till recently quite unknown to me, its catenate tubercles being developed in later life into spines. It is possible that *C. Jeffreysii* may in like manner prove to be an imperfectly developed form of some strongly spinous species; but it has every appearance of mature growth, and the specimens from both the above-named localities are in every respect similar.

## 23. CYTHERE LATICARINA, n. sp. (Plate XXXI. figs. 1–4.)

British type? DISTRIBUTION: *Recent*—Great Britain. *Fossil*—Raised beaches, Scotland.

Carapace, as seen from the side, subtriangular, highest in front; length to height as five to three. Anterior margin broad, rather suddenly rounded below, more gradually above, bordered below by a row of short spines; posterior margin rather angular. Dorsum highest over the anterior hinge, whence it slopes gently and almost in a right line backwards. Ventral margin nearly straight. The outline, as seen from above, is oblong

oval, with parallel sides and abruptly tapering obtuse extremities; over the anterior hinge are two conspicuous polished tubercles, supported on divergent processes or ribs. The whole carapace is surrounded by a fillet, which, on the anterior and ventral aspects, forms a very broad and stout keel. End view ovate, tumid, very broad below. The surface of the shell is marked with rather large, vaguely defined pits, and is slightly scabrous. Animal unknown.

Length  $\frac{1}{37}$  in., height  $\frac{1}{62}$  in.

*Hab.* Channel Isles, 15–30 fathoms (*Mr. J. G. Jeffreys*); Oban (*Mr. D. Robertson*).

This is strikingly similar in general contour to *C. Jeffreysii*; but in other respects the two species are abundantly distinct. It bears also some resemblance to *C. marginata* (Norman) and to certain forms of *C. tuberculata*. From the last-mentioned it may be at once separated by the conspicuous stalked tubercles of the anterior hinge, the absence of tubercles on the lateral surfaces of the valves, and, as seen from above, by the regularly oval contour, without posterior tumidity. From *C. marginata* the hinge-tubercles, characters of surface, and want of excessive angularity of the dorsum sufficiently distinguish it.

#### 24. CYTHERE MARGINATA, Norman. (Plate XXXI. figs. 5–8.)

*Cythere marginata*, Norman, Ann. & Mag. Nat. Hist. vol. ix. (1862) p. 47, pl. iii. figs. 10–12.

Carapace subquadrangular, highest in front; height equal to more than half the length. Anterior margin rounded below, sloping steeply backwards above, and forming at its dorsal extremity a conspicuous angular elevation over the anterior hinge. Inferior margin nearly straight; dorsal margin sloping sinuously and rather steeply backwards. Posterior extremity narrowed, angular, produced below. Outline, as seen from above, oblong, widest in the middle and tapering abruptly at each extremity; width equal to half the length. End view tumid, ovate. Surface covered with large angular pittings, which are separated from each other by narrow ribs. Animal unknown.

Length  $\frac{1}{37}$  in., height  $\frac{1}{65}$  in.

*Hab.* Lamash Bay (*Rev. A. M. Norman*).

The single specimen upon which this species is founded is scarcely well enough marked in its characters to form a satisfactory species; but I am unable to refer it with certainty to any other described form.

#### 25. CYTHERE QUADRIDENTATA, Baird. (Plate XXXI. figs. 19–30.)

*Cythere quadridentata*, Baird, Brit. Entom. p. 173, t. xxi. fig. 2.

British type. DISTRIBUTION: *Recent*—Great Britain, Ireland, Bay of Biscay. *Fossil*—Glacial, Scotland.

Carapace, as seen from the side, oblong quadrangular or cuneate, highest in front; height equal to about one-half the length. Anterior border obliquely rounded, often bearing a row of from eight to twelve small teeth. Posterior margin narrowed, angular, excavated above and considerably produced below, where it is generally armed with about four sharp spines. The inferior margin is straight or slightly convex, the superior elevated over the anterior hinge, thence sloping sinuously backwards. The

outline, as seen from above, is oblong ovate or hastate, the junction of the hinge-margins marked behind the middle by a deep, sharply defined sulcus. Ventral surface sulcate along the whole length of the contact-margins, which are bordered by a broad, well-defined, smooth band. End view ovate. The surface of the shell is marked with oblong punctures, which are arranged chiefly in longitudinal rows, but in curved lines round the anterior border. The valves, in typical specimens, are swollen behind, forming an abrupt angular elevation, from which a longitudinal rib runs directly forwards, and two others in an oblique direction towards the upper and lower margins of the valve; the left valve is considerably smaller than the right. Animal unknown.

Length  $\frac{1}{3}$  in.

*Hab.* In deep water, rare. Coasts of Northumberland and Durham, 25–46 fathoms (*G. S. B.*); Ormeshead and Oban (*Mr. D. Robertson*); Shetland (*Rev. A. M. Norman*); Hebrides and the Minch (*Mr. J. G. Jeffreys*).

The specimen represented in figs. 19–22 is the form originally described by Dr. Baird under the specific name *quadridentata*; that shown in fig. 25 is a very similar form, while fig. 23 differs only in being less angular and the surface-markings fainter. The specimens from which figs. 26–30 were drawn appear to be merely a variety, or perhaps the adult or the female of the same species. The peculiar characters of the ventral and dorsal surfaces, as well as the elongated punctation, are distinctly retained. The species is a rare one, and I have had no opportunity of thoroughly examining the animal.

## 26. CYTHERE EMACIATA, Brady. (Plate XXXI. figs. 31–37.)

*Cythere emaciata*, Brady, Brit. Assoc. Report, 1866, p. 210.

Atlantic type. DISTRIBUTION: *Recent*—Great Britain and Ireland. *Fossil*—Raised beaches, Scotland.

Carapace, as seen from the side, compressed, quadrangular, higher in front than behind; length equal to more than twice the height. Anterior extremity flattened or but slightly rounded, often fringed with a row of eight or nine teeth. Posterior extremity narrowed, excavated above, produced and toothed below. Dorsal and ventral margins nearly straight. Outline, as seen from above, oblong, widest behind, nearly thrice as long as broad; the ventral keel produced behind into two broad fimbriated processes. The contact-margins on the ventral surface are bordered by two flattened ridges, forming a very broad keel, which projects considerably behind. End view oval, with rounded lateral protuberances. Surface marked with large pits arranged longitudinally; in small or young specimens the punctures are oblong, as in the preceding species; along the middle of the valve runs a conspicuous elevated rib, a less distinct ridge within the ventral margin, and another smaller one in an oblique direction behind the antero-dorsal angle. Right valve larger than the left. Animal unknown.

Length  $\frac{1}{40}$  to  $\frac{1}{30}$  in., height  $\frac{1}{90}$  to  $\frac{1}{80}$  in. 5.50 5.80 7.27 8.32 mm.

*Hab.* In deep water. Shetland (*Rev. A. M. Norman*); Peterhead and Ormeshead (*Mr. D. Robertson*); Hebrides (*Mr. J. G. Jeffreys*); Aberdeenshire coast (*Mr. Dawson*); Northumberland and Durham coasts, 35 fathoms, and Birterbuy Bay, 15 fathoms (*G. S. B.*); Devonshire coast, 60 fathoms (*Mr. Spence Bate*); in shell-sand from Roundstone (*Dr. Alcock*), Baltimore (*Mr. E. C. Davison*), and Galway Bay (*Prof. Rowney*).

This species bears considerable resemblance to Prof. T. R. Jones's figures of *C. retifastigiata*, but a reference to the type specimens, kindly placed at my disposal by that author, convinces me that the two species are quite distinct. The more elongated forms figured at 31 and 36 are very probably, as in other species, the males; but I have not been able to satisfy myself of this, all the specimens which I have examined having proved to be only empty shells.

27. *CYTHERE MIRABILIS*, nov. sp. (Plate XXIX. figs. 7, 8.)

DISTRIBUTION: *Recent*—Scotland. *Fossil*—Glacial, Scotland.

Valves, as seen from the side, subtrapezoidal, highest at the anterior third; greatest height equal to two-thirds of the length. Anterior extremity broadly and obliquely rounded, its lower half bearing a series of short blunt teeth; posterior narrow, very slightly curved, bearing four teeth at the lower angle; superior margin sloping steeply and in a convex line from before backwards, terminating abruptly in an obtuse angle at each extremity, more or less abruptly undulated or emarginate throughout, but especially behind the anterior extremity, where it is twice or thrice deeply and irregularly jagged; inferior margin evenly convex. Outline, as seen from above, ovate, twice as long as broad, obtusely toothed and mucronate behind, margins irregularly spinous and emarginate. Hinge-joint very strongly developed, consisting in the right valve of a triangular tooth in front and an obliquely truncate one behind; in the left of a strong central bar ending abruptly behind, and elevated into an angular tooth in front. Surface of the shell covered in its central and middorsal portions with large angular excavations, and surrounded on the ventral margin and the extremities by wide and sharply cut irregularly concentric furrows, across which the separating ribs anastomose sparingly.

Length  $\frac{1}{27}$  in.

*Hab.* Off Luman Head, Lewis (*Admiralty soundings*).

I have seen only one valve of this species in a recent state; some of the details above given are taken from fossil specimens obtained from the Scotch Glacial clays.

28. *CYTHERE MUCRONATA* (G. O. Sars). (Plate XXVI. figs. 34, 34 a.)

*Cythereis mucronata*, G. O. Sars, *loc. cit.* p. 48.

— *spinossissima*, Brady, *Trans. Zool. Soc.* vol. v. p. 386, pl. lx. figs. 10 a-e.

Scandinavian type. DISTRIBUTION: *Recent*—Norway, Shetland.

Valves, as seen from the side, subquadrangular, highest in front of the middle; greatest height equal to half the length. Anterior margin rounded, fringed with six very broad, strong, linguiform, obtusely rounded spines; posterior narrower, fringed also with a series of about nine much smaller and abruptly truncated spines; superior margin arched, irregularly emarginate, inferior nearly straight. The central portion of the valves is closely beset with large, clumsy, irregularly angular protuberances, which, towards the extremities, are much fewer and smaller; along the ventral margin they form a row of stout tooth-like spines, the last of which projects strongly outwards and backwards.

Outline, as seen from below, rhomboidal; greatest width behind the middle, where the last ventral spine projects, forming a strongly marked angle.

Length  $\frac{1}{2\frac{1}{3}}$  in.

*Hab.* Shetland (*Rev. A. M. Norman*).

One valve only, found amongst dredged sand.

29. CYTHERE DUNELMENSIS (Norman). (Plate XXX. figs. 1-12.)

*Cythereis dunelmensis*, Norman, Nat. Hist. Trans. Northumb. & Durh. vol. i. p. 22, pl. vii. figs. 1-4.

— *horrida*, Sars, *loc. cit.* p. 45.

Scandinavian type. DISTRIBUTION: *Recent*—Baffin's Bay, Norway, Great Britain. *Fossil*—Glacial clays and raised beaches, Scotland and Ireland.

Carapace of *female*, as seen from the side, elongate quadrangular, highest in front; greatest height equal to nearly two-thirds of the length. Anterior margin broadly rounded and irregularly fringed with short, blunt spines; posterior rectangularly truncate. Dorsal and ventral margins nearly straight. Outline, as seen from above, subovate, widest in front of the middle, sides nearly parallel; width equal to about half the length. End view subquadrangular, widest in the middle. Surface coarsely reticulated and excessively rough, with spinous and tubercular elevations; a curved spinous ridge just within the anterior margin, and a more or less conspicuous tubercle in front of the centre of the valve. The posterior portion of the ventral margin is armed with a series of irregular squamous spines, which often coalesce so as to form a rugged, dentate lamina. The shell of the *male* (figs. 5-8) is much elongated, height equal to twice the length; ventral margin distinctly sinuated, and the surface-spines much coarser and stronger. Colour yellowish. "Eyes large and located in the tubercles of the carapace. Upper antennæ distinctly six-jointed; last joint almost equal in length to the two preceding, terminating in four equal setæ. Second joint of the last foot longer than the two following, and bearing on the anterior margin a group of four hairs; terminal claw very long and slender. Basal portion of the male copulative organs subquadrangular, apical portion subtriangular, produced and obtusely acuminate in front."

Length  $\frac{1}{30}$  in., height  $\frac{1}{50}$  in.

*Hab.* Durham coast, in 40 fathoms (*Rev. A. M. Norman*); off Scarborough (*Mr. Leckenby*); Cumbrae, 10 fathoms (*Mr. D. Robertson*); Croulin Islands (*Mr. J. G. Jeffreys*); Roundstone (*Dr. Alcock*).

This species occurs with tolerable frequency in the Scotch Glacial clays; but, in the living state, appears to be somewhat rare. In the Frith of Clyde and north-western Scottish coast it is rather more common than on the eastern coast. It seems also to be moderately common on the coast of Norway.

30. CYTHERE WHITEI, (Baird). (Plate XXX. figs. 21-24.)

*Cythereis Whitei*, Baird, Brit. Entom. p. 175, t. xx. figs. 3, 3 a.

British type. DISTRIBUTION: *Recent*—Great Britain, Levant. *Fossil*—Glacial, Ireland.

Valves, as seen from the side, elongated quadrangular; length equal to twice the height. Anterior margin abruptly rounded below, and sloping steeply backwards above, where it

terminates in a conspicuous elevation over the anterior hinge; posterior margin straight, and much emarginate. The dorsal margin slopes pretty evenly backwards from the anterior hinge; the ventral margin nearly straight, but bearing a variable number of regularly set, short, blunt teeth. Outline, as seen from above, somewhat cuneate, suddenly narrowed behind, broadest at the posterior third; width equal to nearly half the length. End view subquadrangular. The surface of the shell is rugose, and bears three rows of elevated processes, or truncated spines; one row commences at the anterior hinge, running parallel to and within the anterior and ventral margins nearly as far as the posterior extremity; a second row runs directly backwards, almost in the median line of the valve; a third and much less conspicuous row runs transversely, parallel to and just within the posterior margin. Animal unknown.

Length  $\frac{1}{35}$  in., height  $\frac{1}{70}$  in. *77 x 1*

*Hab.* "In shell-sand from Tenby, *Prof. T. Rupert Jones*; and from Torquay, *W. C. Williamson, Esq.*" (*Dr. Baird*); Campbeltown, 10 fathoms (*Mr. D. Robertson*).

### 31. CYTHERE ANTIQUATA (Baird). (Plate XXX. figs. 17–20.)

*Cythereis antiquata*, Baird, Brit. Entom. p. 176, tab. xx. fig. 2.

British type. DISTRIBUTION: *Recent*—Great Britain, Ireland, Bay of Biscay, Levant. *Fossil*—Glacial clay and raised beaches, England, Scotland, and Ireland.

Valves rectangular, quadrilateral; length equal to twice the height. Anterior border rounded at the angles, and armed below with a series of blunt spines; posterior margin rectangularly truncate, and bearing below the middle several strong linguiform spines. Dorsal and ventral margins parallel, the latter quite straight, the former cleft into three or four segments with intervening sulci. The carapace, as seen from below, is oblong, with projecting lateral alæ, which taper towards the front, but terminate abruptly behind, giving to the whole a somewhat arrow-headed outline. Seen from above, the outline is more irregular. End view subtriangular, deeply emarginate below, each lateral portion with two strongly projecting ridges. The surface of the shell is tuberculate, and bears two conspicuous, sharply defined longitudinal ridges, which terminate abruptly in angular elevations near the posterior extremity of the valve. These ribs are mostly perforated at the base, the rows of apertures thus produced being very conspicuous on the ventral aspect of the shell (fig. 19). The anterior hinge-tubercle is very large and conspicuous. Left valve larger than the right. Upper antennæ five-jointed, last joint long and slender; second joint equal in length to the following two; spines straight, very long and slender. Second joint of lower antennæ very short, scarcely half the length of the third joint. Second joint of the last foot equal in length to the following two; terminal claw very long and slender. Abdominal lobes terminating in a short seta.

Length  $\frac{1}{25}$  in., height  $\frac{1}{50}$  in. *1.6 x 1*

*Hab.* In depths of 7 to 60 fathoms. Hebrides and the Minch (*Mr. J. G. Jeffreys*); Tobermory, at roots of *Laminaria*; Shetland, Isle of Skye, and Plymouth (*Rev. A. M. Norman*); Aberdeenshire coast (*Mr. Dawson*); Oban, Ormeshead, Cumbrae, and Campbeltown, dredged (*Mr. D. Robertson*); Birterbuy Bay, dredged, and in oyster-ooze from Stranraer (*G. S. B.*); in shell-sand from Tenby (*Prof. T. Rupert Jones*), Roundstone (*Dr. Alcock*), and Cowes (*Mr. E. C. Davison*); off Lewis, 18½ miles N.W., 59½ fathoms (*Admiralty soundings*).

The Frith of Clyde seems to be peculiarly rich in the spinous forms hitherto referred to the genus *Cythereis*, Mr. Robertson having there dredged all the British species in a living state: *Cythere antiquata* appears to be the commonest and most widely distributed of these, but is nowhere very abundant. It is not mentioned by Sars among the Norwegian Ostracoda.

32. *CYHERE JONESII* (Baird). (Plate XXX. figs. 13-16.)

*Cythereis Jonesii*, Baird, Brit. Entom. p. 175, tab. xx. fig. 1; Norman, Nat. Hist. Trans. Northumberland and Durham, vol. i. p. 21, pl. vii. figs. 5-8.

— *fimbriata*, Norman, Ann. & Mag. Nat. Hist. Jan. 1862, pl. iii. fig. 9.

*Cythere ceratoptera*, Bosquet, Entom. fossil. des terr. tertiair. de la France, p. 114, pl. vi. fig. 2; Jones, Tertiary Entom. p. 39, pl. iv. fig. 1.

*Cythereis spectabilis*, Sars, *loc. cit.* p. 46.

— *subcoronata*, Brady, Trans. Zool. Soc. vol. v. p. 384, pl. lx. figs. 9a-e, and (?) Speyer, Ostrac. der Casseler Tertiärbild. p. 38, tab. iv. figs. 9, 10.

? *Cythereis cornuta*, Jones (young), Entom. of Tert. Form. Eng. p. 39, pl. iv. fig. 19.

Atlantic type. DISTRIBUTION: *Recent*—Norway, Great Britain; (var. *ceratoptera*) Ireland; Bay of Biscay, Levant. *Fossil*—Glacial, Scotland; (var. *ceratoptera*) tertiary, France, Belgium, England.

Valves compressed in front, but gradually swelling towards the hinder extremity; as seen from the side, oblong, subquadrangular or ear-shaped; height equal to much more than half the length. Anterior margin rounded, spinous below, and terminating above in a well-marked angular elevation over the anterior hinge. Posterior extremity irregularly bordered with spines, the strongest of which are at the ventral angle. Ventral margin gently curved; dorsal much shorter than the ventral, straight but emarginate, and forming an elevated ridge, which bears at its posterior extremity three or four strong, linguiform processes. The outline, as seen from below, is irregularly lozenge-shaped or subrhomboidal, and bordered with strong spinous projections, which gradually increase in size from the front to the posterior third, where they terminate abruptly; width equal to two-thirds of the length. End view equilaterally triangular, the base perfectly straight. The surface of the shell is quite smooth, and rises gradually from the front to near the posterior extremity of the valve, at which point the elevation terminates abruptly in a jagged and spinous declivity. A strongly developed ridge commences at the anterior hinge-tubercle, running a little within and parallel to the anterior and ventral margins, as far as the transverse declivity just described; this ridge is, in the first portion of its course, smooth and rounded, but at the antero-ventral angle becomes spinous, and retains that character to its termination: the spines, or "linguiform processes," are about ten in number, very large and strong, with rounded extremities. Colour ochreous. Eye-tubercles very large and prominent. Antennæ elongate, almost exactly similar to those of *C. dunelmensis*. Feet slender; second joint of the last pair shorter than the united lengths of the following two. Apical portion of the male copulative organs forming an elongated acuminate process.

Length  $\frac{1}{2\frac{1}{5}}$  in., height  $\frac{1}{4\frac{1}{5}}$  in.



*Hab.* In depths of from 2 to 60 fathoms. Orkney (*Mr. C. W. Peach*); Hebrides and the Minch, 45-60 fathoms (*Mr. J. G. Jeffreys*); Tobermory at roots of *Laminaria*, Shetland, Isle of Skye and Lamlash Bay, and Dogger bank (*Rev. A. M. Norman*); Aberdeenshire coast (*Mr. Dawson*); Oban, Cumbræ, Ormeshead, Bute, and Campbeltown (*Mr. D. Robertson*); Northumberland coast (*G. S. B.*); in shell-sand from Roundstone (*Dr. Alcock*); off Lewis (N.B.), 59½ fathoms (*Admiralty dredgings*) \*.

33. CYTHERE (?) ACEROSA, n. sp. (Plate XXXI. figs. 55-58.)

Carapace, as seen from the side, reniform, highest in the middle, greatest height equal to half the length. Anterior extremity flattened, subtruncate, obtusely angular at its junction with the dorsal margin; posterior rounded. Superior margin arched, highest in the middle; inferior deeply concave, nearly parallel with the dorsal margin. The anterior, posterior, and postero-ventral portions of the margin are excessively compressed and laminar. Outline, as seen from above, oblong, hexagonal; extremities suddenly tapered, sharply acuminate, sides parallel; width equal to one-fourth of the length. Surface smooth; colour yellowish, opaque. Animal unknown.

Length  $\frac{1}{4}\frac{1}{2}$  in.

*Hab.* Plymouth (*Rev. A. M. Norman*).

This remarkable species ought very probably to form the type of a distinct genus; but as I have had no opportunity of examining the animal, it seems best *pro tempore* to place it in its present position. The only specimen extant is in the collection of the *Rev. A. M. Norman*, and was obtained by the late *Mr. Barlee* from nets of trawlers at Plymouth.

Genus 2. LIMNICYTHERE, Brady †.

Shell irregularly tuberculate or spinous, rather thin, and horny in texture. Animal like that of *Cythere*, except that the antennæ are armed with short setæ instead of spines. Upper antennæ five-jointed, slender, the last joint much elongated, the antepenultimate excessively short. Postabdomen terminating in two rather stout setæ. Inhabits fresh water.

Of this genus I have not yet seen the males; but the structure of the upper antennæ, together with the external characters of the carapace and the freshwater habitat, seems to require that it should be placed in a distinct genus. I think it very probable that a more minute examination than I have yet been able to make may reveal also other differences than those here specified.

1. LIMNICYTHERE INOPINATA (Baird). (Plate XXIX. figs. 15-18, Plate XXXVIII. fig. 9, and Plate XXXIX. fig. 1.)

*Cythere inopinata*, Baird, *Brit. Entom.* p. 172, tab. xx. figs. 1, 1 a-e.

Valves, as seen from the side, reniform, irregular, tuberculate, highest in the middle; greatest height equal to more than half the length. Anterior border rather narrower than the posterior, rounded, and produced into a flattened encircling flange. Posterior

\* See Appendix.

† *Intellectual Observer*, vol. xii. p. 121.

margin slightly rounded, and armed below with a series of from six to twelve small spines. The dorsum forms a flattened arch; ventral margin deeply incurved near the middle. Seen from above, the outline is irregularly lanceolate, sharply mucronate in front, obtusely behind, and mostly asymmetrical, on account of a want of correspondence in the tuberculation of the valves; greatest width situated at the posterior third, equal to less than half the length. End view somewhat pyramidal, strongly keeled below. The surface of the valves is punctate, and marked near the middle with a deep transverse furrow; the anterior half of each valve bears mostly one, the posterior half two tubercles; but these are subject to much variation in position and number, scarcely any two shells being precisely alike. Colour dull white or straw-coloured. Upper antennæ slender, five-jointed; last joint linear, equal in length to the preceding; the third scarcely more than half the length of either of the two following; second equal to third and fourth united. Terminal claws three, nearly equal in length, curved and setiform; the fourth joint bears at its apex four setæ, about equal in length and strength to the terminal claws, and near the middle two shorter setæ. The second and third joints bear each one seta. Terminal claws of the second antennæ slender. Feet short and stout; terminal claws of the first and second pairs stout and strongly curved; those of the third pair slender, subsetiform, and equal in length to the three preceding joints; second joint equal in length to the two following. Males unknown.

Length  $\frac{1}{40}$  in., height  $\frac{1}{80}$  in.

*Hab.* In fresh water. Hardwick Lake and Baby Park, county Durham (*Rev. A. M. Norman*); Fulwell Cemetery, Gibside, and in a mill-stream at Hedworth, county Durham; East Belsay Lake, Northumberland, and North Shaws Loch, Selkirkshire (*G. S. B.*); in a pond between Hanwell and Southall, Middlesex (*Dr. Baird*); Glasgow and Paisley Canal (*Mr. D. Robertson*).

## 2. LIMNICYTHERE MONSTRIFICA (Norman). (Plate XXIX. figs. 9–12.)

*Cypris monstrifica*, Norman, Ann. & Mag. Nat. Hist. vol. ix. 1862, p. 45, pl. iii. figs. 4, 5.

Valves, as seen from the side, oblong subquadrangular, strongly spinous and tuberculate. Extremities boldly rounded, the anterior bearing on each valve a marginal row of about twelve sharp spines. Dorsal margin straight, angulated at its anterior extremity, whence it slopes gently downwards and backwards. Ventral margin incurved centrally. Seen from above, the outline is compressed, oval, each valve bearing two very large spinous tubercles, and several smaller spines and ridges. End view subquadrate, irregularly angulated. The valves are closely punctate, furrowed across the middle; one strong spinous tubercle on the anterior half, and two on the posterior half of each valve. The posterior portion is also beset with numerous small sharp spines. Animal unknown.

Length  $\frac{1}{33}$  in.

*Hab.* Fresh water. In the canal at Fleckney, Leicestershire, August 1856 (*Rev. A. M. Norman*).

This species was described by Mr. Norman as a *Cypris*. It seems, however, to have more affinity with the genus *Limnocythere*, to which I here refer it. Mr. Norman observes that it made no attempt to swim in the few days during which he kept it alive.

The excessively rugged surface of the shell would, indeed, constitute a serious impediment to any rapid movement through the water; consequently we do not observe any such condition of carapace in the genus *Cypris*, nor even in *Candona*. The two or three specimens on which the species was originally founded are all that have as yet been observed. It may be noted that specimens of *Cypris gibba* sometimes assume a tuberculated or spinous surface; but never, so far as I know, to such an extent as in the present species.

### Genus 3. CYTHERIDEA, Bosquet.

Shell, as seen from the side, subtriangular or triangularly ovate, highest at the anterior third; thick and compact in structure. Surface more or less pitted, sometimes smooth and papillose, or concentrically rugose. Hinge-margin of the right valve bearing a series of small tubercles or crenulations, which are received into corresponding depressions of the opposite (left) valve; these tubercles are mostly disposed in two terminal groups, the intervening portion of the valve-margin being plain or marked by minute tubercles on the *left*, and corresponding fossæ on the *right* valve. Lucid spots about four, in a transverse row, near the centre of the valve, and two detached spots (which sometimes coalesce) in front of the main group. Upper antennæ very robust, mostly five-jointed, and bearing strong spines; the last joint narrow and elongated; lower antennæ four-jointed; urticating setæ long and slender, biarticulate. Mandibles large and numerously toothed; palp three-jointed, and bearing a distinct branchial appendage. The right foot of the first and second pairs in the male different from the rest, that of the first pair very strong and prehensile; of the second very feeble, the apical portion rudimentary and destitute of a terminal claw. Eyes distinct.

I am unable to find any good distinctive characters to separate the genus *Cyprideis* (Jones) from *Cytheridea*. G. O. Sars restricts the latter genus (apparently) to certain very broad and dentate forms, which, however, do not appear to me to present any well-marked generic characters: the animal is not known, but may be supposed to be, in all probability, not far different from that of the typical *Cytheridea* (*Cyprideis*, Sars). It may be noted that some of the species included by Sars under *Cyprideis* belong distinctly to the series included by Bosquet in his *Cytheridea*; and one of them (*Cyprideis Bairdii*, Sars) is, as I believe, identical with *Cytheridea papillosa*, Bosquet. If the distinctness of the two genera be maintained, the name *Cyprideis* should, I think, be reserved exclusively for *C. torosa*, which differs to some extent in its anatomy, and probably also in its mode of reproduction. Many of the fossil forms described by authors as *Bairdii* belong undoubtedly to *Cytheridea*. The genus is a small one; but some of the species, though local, occur in prodigious quantities when the conditions of existence are favourable.

#### 1. CYTHERIDEA ELONGATA, Brady. (Plate XXVIII. figs. 13–16, and Plate XL. fig. 6.)

*Cythere angustata*, Baird, Brit. Entom. p. 172, tab. xxi. fig. 6.

Atlantic type. DISTRIBUTION: *Recent*—Great Britain, Ireland, Bay of Biscay. *Fossil*—Glacial deposits and raised beaches, Scotland and Ireland.

Carapace, as seen from the side, elongate, not much higher behind than in front;

greatest height in the middle, and equal to considerably less than half the length, evenly rounded in front, obliquely rounded behind, and obsolete angular at the infero-posterior angle. Superior margin evenly and gently arched, inferior nearly straight for the anterior two-thirds, then gently convex, behind which it is slightly upturned. Outline, as seen from above, subovate, sides nearly parallel, width equal to much less than half the length; anterior extremity obtusely pointed, posterior broadly rounded and emarginate in the middle. End view nearly circular, keeled below. Shell smooth, ornamented with very small and distant circular papillæ, the ventral surface faintly grooved in a longitudinal direction, these grooves sometimes extending obscurely round the anterior margin. Colour light purplish brown; of specimens from shell-sand horny yellow. Hinge formed by a median crest of the right valve and two terminal curved flanges of the left valve; altogether weakly developed, and showing no trace of crenulation, but an obscure tooth-like projection on the anterior flange of the left valve. Penultimate joint of the upper antennæ nearly twice as long; second joint nearly four times as long as the third; last joint half as long as the preceding; basal joint very stout, and bearing on its inferior margin a row of about twelve short spinous hairs. Terminal claw of the third pair of feet long, slender, and flexuous; a single short seta at the apex of the penultimate joint, none on the antepenultimate. First pair of feet in the *male* alike on both sides, subprehensile; last joint bearing one strong, slightly curved terminal claw, and one very short spine; second joint armed with one apical claw, similar in size and shape to that of the last joint; second pair alike on both sides (?), basal joint bearing a stout apical spine; terminal claw long, setiform.

Length  $\frac{1}{8}$  in.

*Hab.* In deep water. Aberdeenshire coast (*Mr. Dawson*); the Minch and Channel Islands (*Mr. J. G. Jeffreys*); Devonshire coast (*Mr. C. Spence Bate*); Exmouth, Burrow Island, Isle of Portland, Swansea, Tenby, Tobermory, Youghal (*Rev. A. M. Norman*); Pegwell Bay and Poole Bay (*Prof. T. Rupert Jones*); in shell-sand from the Mumbles, Frith of Forth, Thames and Roundstone, and in tide-pools at Sunderland\* (*G. S. B.*); off Yarmouth (*Mr. D. O. Drewett*); "Devonshire, *W. C. Williamson, Esq.*; Tenby, *T. Rupert Jones, Esq.*" (*Dr. Baird*); off Ormeshead (*Mr. D. Robertson*).

Of *C. elongata* I have seen only one specimen containing the animal—a male. This was found at the roots of *Laminaria* at Tobermory by the Rev. A. M. Norman. In some respects this differs rather remarkably from others of the genus, as, for instance, in the conformation of the first and second feet, which are here alike on both sides. The want of crenulation in the hinge-margins of the valves is also an important distinction; and notwithstanding the general resemblance of the species to the genus *Cytheridea*, I cannot help suspecting that a fuller investigation of the structure of the animal may show valid generic differences.

Dr. Baird has doubtfully referred this species to *Cytherina angustata*, Münster; but the differences in shape and in proportions of length and breadth appear to me too serious to allow of this identification. It approaches more closely to "*Bairdia*" *lithodomoides*, Bosquet; but is not precisely similar to it, as I have satisfied myself by the examination of specimens sent to me by that author.

\* This was in all probability a washed-up specimen, as the valves were empty.

2. *CYTHERIDEA PAPILLOSA*, Bosquet. (Plate XXVIII. figs. 1–6, and Plate XL. fig. 1.)

*Cytheridea papillosa*, Bosquet, Entom. fossil. des terr. tertiair. de la France, p. 42, pl. ii. figs. 5 *a, b, c, d*.

*Cythere Bradii*, Norman, Brit. Assoc. Report, 1864, p. 192.

— *debilis*, Norman, Nat. Hist. Trans. Northumb. & Durh. vol. i. p. 15, pl. v. figs. 5–8, and note, p. 28.

*Cyprideis Bairdii*, G. O. Sars, *loc. cit.* p. 52.

Scandinavian type. DISTRIBUTION: *Recent*—Baffin's Bay, Norway, Great Britain. *Fossil*—Glacial deposits and raised beaches, Scotland and Norway; tertiary, France and Belgium.

Valves of the *female*, as seen from the side, oblong, slightly higher in front than behind, height equal to more than half the length; the postero-ventral termination somewhat angular. Anterior margin obliquely rounded; posterior sloping steeply with a gentle curve from above downwards, terminating below in an obtusely rounded angle. Superior margin very slightly arched, inferior straight or indistinctly sinuated in front of the middle. Outline, as seen from above, ovate, tumid, rounded at the extremities, the anterior of which is the narrowest; greatest width behind the middle, equal to half the length; a slight longitudinal depression along the junction of the two valves behind the middle. End view nearly circular. The shell of the *male* is much more elongated, and nearly equal in height throughout, the height much less than half the length; inferior margin more decidedly sinuated. Surface of the shell smooth and shining, cream-coloured, clouded with reddish brown on the dorsal aspect; beset with distant circular papillæ. Lucid spots arranged in a transverse row of four, with two others at a considerable distance in front. Terminal hinge-processes distinctly crenulated, the intervening portion more slightly so (Plate XXVIII. figs. 5 *a, b*). Terminal joint of the upper antenna very short, not half the length of the preceding, armed with a long spine and two setæ. Spines of the third and fourth joints very robust, ensiform. Branchial appendage of the mandibular palp bearing three setæ. First pair of feet very short, last two joints imperfectly separated; terminal claw of the third foot much longer than the second joint and finely ciliated on the margins. Right foot of the first pair in the *male* very strong, subcheliform, the last three joints coalescent, very thick and massive, and bearing on the anterior margin a very stout, bearded linguiform process; terminal claw very strong and bent almost at a right angle; "right foot of second pair very rudimentary, the terminal portion composed of one very small ovate joint, bearing a short seta on the anterior margin;" the left also different from that of the female, subprehensile, the last three joints thickened; terminal claw strong and doubly pectinate. Basal portion of the male copulative organs subovate; terminal portion bipartite, the anterior segment small and obtusely triangular, the posterior larger and produced into an acuminate process.

Length  $\frac{1}{30}$  in., height  $\frac{1}{60}$  in.

*Hab.* In deep water, 10 to 50 fathoms. Hebrides, the Minch (*Mr. J. G. Jeffreys*); Bute, Loch Fyne and Cumbrae, and Ormeshead (*Mr. D. Robertson*); Aberdeenshire (*Mr. Dawson*); Northumberland and Durham coasts (*G. S. B.*); Yorkshire coast, off Scarborough (*Mr. Leckenby*); Thames estuary (*Mr. E. C. Davison*).

*C. papillosa* seems to be a strictly northern species, and on the Scotch coasts and those of the north-east of England is one of the most abundant forms. In some few favourable localities, especially in Loch Fyne, it occurs in great profusion, and is associated with

*C. punctillata* to the exclusion of almost all other species. It is remarkable that Sars has found these two species associated in a similar manner on the Norwegian coast. From fossil specimens communicated to me by M. Bosquet, I cannot entertain much doubt that the present species is identical with the *C. papillosa* of that author, though the recent specimens are uniformly larger than the fossil ones.

3. CYTHERIDEA PUNCTILLATA, Brady. (Plate XXVI. figs. 35-38, Plate XXVIII. figs. 17-20.)

*Cytheridea punctillata*, Brady, Ann. & Mag. Nat. Hist. vol. xvi. (1865) p. 189, pl. ix. figs. 9-11.

*Cyprideis proxima*, G. O. Sars, *loc. cit.* p. 54.

Scandinavian type. DISTRIBUTION: *Recent*—Baffin's Bay, Norway, Britain. *Fossil*—Glacial and post-tertiary deposits, England, Scotland, and Norway.

Carapace of the *female*, as seen from the side, oblong, subovate or subtriangular, often marked more or less distinctly with a central transverse sulcus; greatest height equal to more than half the length, situated at the anterior third. Anterior margin broad and well rounded; posterior narrower, suddenly round or almost angular below, but not so much so as in the preceding species. Superior margin gently arched, highest a little in front of the middle; ventral nearly straight. Outline, as seen from above, oval, with rather obtuse extremities. End view ovate, narrowed above, broadly rounded below. The shell of the *male* is more elongated, and presents differences of proportion much the same as in *C. papillosa*. Surface rough and quite free from polish, marked with thickly set rounded pittings, in the intervals of which are scattered elevated papillæ. Lucid spots six or eight, four in the line of the central sulcus; the rest in one or two separate patches in advance of the main group. Substance of the shell very dense and thick. Colour dull brown. Superior antenna rather slender, last joint bearing three terminal setæ. Distal portion of the first feet more slender than in the preceding species, distinctly three-jointed. Terminal claw of the last pair of feet very long and almost straight, setiform. Distal portion of the right first foot of the male biarticulate, the first joint armed in front with a hooked spine, the last joint considerably swollen, its terminal claw short and curved; "right foot of the second pair as in *C. papillosa*, its terminal segment very small and composed of one joint, the left foot subprehensile, terminal claw bipectinate. Basal portion of the copulative organs of the male very large, subquadrangular, broader than long; terminal portion short, bearing two processes, of which the anterior is obtuse, the posterior acuminate."

Length  $\frac{1}{3}$  in., height  $\frac{1}{6}$  in.

*Hab.* In deep water, 10-60 fathoms. Suffolk coast, dredged by Mr. D. O. Drewett; Loch Fyne (*Mr. D. Robertson*); Shetland (*Rev. A. M. Norman*); Hebrides, the Minch (*Mr. J. G. Jeffreys*).

*Cytheridea punctillata* bears much resemblance in general form to *C. papillosa*. It is, however, a more robust species, higher in proportion to its length, and the postero-ventral angle much less angular. It is also further characterized by a well-marked and sometimes rather coarse surface-sculpture, and frequently by the central transverse sulcus, in these latter characters approaching closely *C. torosa*; whilst *C. papillosa* possesses, mostly, a smooth, papillose surface, without any trace of pitting, and *C. torosa*

a pitted surface, often without papillæ (both rules, however, being liable to occasional exceptions): in *C. punctillata* we see a mixture of these two characters.

*Bairdia hebertiana*, Bosquet, and *B. punctatella*, Bosquet, are both nearly allied to the present species, but not absolutely identical with it. M. Bosquet, to whom I have submitted specimens, agrees with me in this determination. Reuss's *Cytherina intermedia* comes, perhaps, still nearer; but his figures are insufficient for the purpose of identification. *Cytheridea Müllereri*, Bosquet, is also a very near relative, but is separated by the constant tendency to dentation of the anterior, and sometimes of the posterior margin; this character is *entirely* absent in *C. punctillata*.

The only British locality in which this species has been found abundantly is Loch Fyne, where, as previously stated, it occurs in great numbers in company with *C. papillosa*. It is by far the most abundant species in the Scotch glacial clays.

4. CYTHERIDEA TOROSA (Jones). (Plate XXVIII. figs. 7-12, and Plate XXXIX. fig. 5.)

*Candona torosa*, Jones, Ann. & Mag. Nat. Hist. ser. 2, 1850, vi. p. 27, pl. 3. fig. 6.

*Cyprideis torosa*, Jones (in part), Tertiary Entom. of England, 1856, p. 21; Brady, Ann. & Mag. Nat. Hist. vol. xiii. (1864) p. 62, pl. iv. figs. 11-23, and Trans. Tyneside Nat. Field Club, vol. vi. p. 108, pl. iii. figs. 11-23; G. O. Sars, *loc. cit.* p. 51.

British type. DISTRIBUTION: *Recent*—Norway, Great Britain, Ireland, Levant, Sea of Azoff. *Fossil*—Posttertiary, England and Scotland.

Shell of the *female*, as seen from the side, oblong, subovate; length scarcely equal to twice the height. Dorsal margin arched, highest in front of the middle, where it is slightly gibbous. Ventral margin straight, or slightly incurved at the anterior third, mostly furnished with a single stout spine at the posterior angle. Extremities well rounded. The outline, as seen from above, is oblong-ovate (often irregularly and obsoletely angular), sides nearly parallel, extremities obtusely pointed; the line of junction of the hinge-margins depressed behind the middle, forming a longitudinal sulcus. End view very broadly oval, nearly circular. The right valve is smaller than the left, and has the dorsal margin inclined more steeply, and almost in a right line, from before backwards. Shell of the *male* elongated, more than twice as long as high. Surface of the valves marked with closely set rounded pittings, and with a more or less conspicuous transverse sulcus somewhat in front of the centre. Young specimens are sometimes furnished also with a few short, thinly scattered hairs, and at the postero-inferior angle, near the spine before mentioned, there is often a conspicuous group of rather long hairs. Lucid spots arranged in a transverse row of about four near the sulcus, with two isolated and widely separated spots considerably in advance of the main group (fig. 11). The hinge-ment does not differ materially from that of the two preceding species (see fig. 12). Colour dull brown. Eyes distinct. The penultimate joint of the superior antenna scarcely longer than the preceding; the last joint rather longer and slender, ending in three setæ; spines long and slender. Terminal claws of the lower antennæ very long. Branchial appendage of the mandible-palp bearing five setæ (fig. 5*p*, Plate XXXIX.). Last three joints of the first foot about equal in length to the preceding one; second joint of the last foot much longer than the following two, and bearing at its apex one

long ringed seta and one shorter spine; terminal claw slender, about equal in length to the second joint. Right foot of the first pair in the *male* prehensile, four-jointed, much stronger than the left; the apex of the second joint giving origin to a long, curved, bearded seta; terminal claw moderately strong; basal joint of the right foot of the second pair bearing three plumose setæ (fig. 5*g*, Plate XXXIX.); second joint dilated at the distal extremity and bearing on the anterior margin two fasciculi of short setæ, and at the apex one very long ciliated seta; the left foot of the second pair scarcely different from that of the female. Second joint of the last pair on the right side armed on the anterior margin with a dense brush of setæ (fig. 5*h''*), on the left side with four semi-verticillate groups of shorter hairs. Abdomen of the female (fig. 5*m*) ending in a large, curved, acuminate process; postabdominal lobes bearing two very small plumose setæ. Copulative organs of the male divided at the apex into two processes, one of which is acutely lanceolate and serrated at the margin, the other obtusely rounded (fig. 5*k*); basal portion very large and subovate. The ova and undeveloped young are carried within the carapace of the female.

Length  $\frac{1}{8}$  in., height  $\frac{1}{50}$  in. - 892 x .5 mm.

*Hab.* In brackish and occasionally in fresh water. Gravesend (*Prof. T. R. Jones*); Girdler Sand, Thames (*Mr. E. C. Davison*); Sedgfield, in fresh water; Hartlepool, Weston-super-Mare, and Guernsey (*Rev. A. M. Norman*); Belsay, in fresh water; Warkworth, Alnmouth, Camboise, Seaton Sluice, Jarrow Slake, and in shell-sand from Pegwell Bay (*G. S. B.*).

*Cytheridea torosa* was first found living by Prof. T. Rupert Jones in brackish water at Gravesend, and was by him referred to the genus *Candona*; further examination, however, showed the animal to be allied to, if not identical with, *Cythere*, and revealed also peculiarities of shell-structure for which the genus *Cyprideis* was proposed. But there seems to be no difference of generic importance between this species and the older genus *Cytheridea*. The peculiar setæ and ringed hairs which I have described as existing in *C. torosa* (*Ann. & Mag. Nat. Hist. loc. cit.*) are found in some, if not all, of the *Cytheridea* and in some allied genera; and the characters of the first pair of feet in the male are analogous also to those met with in the foregoing species, though the right foot of the second pair is not rudimentary as in those species. For these reasons I have thought it desirable to class *C. torosa* as a true *Cytheridea*, though there remains one important character in which, so far as I know, this species stands alone amongst the Ostracoda, namely, the enormous number of ova borne at a single time by the female. How far this may prove to be of generic importance, future investigations must show; it is, at any rate, an interesting fact, and one which fully accounts for the immense numbers in which the species is often found.

I have had the opportunity, through the kindness of Professor T. Rupert Jones, of examining the specimens, both recent and fossil, from which the species was first described; and I find that the more strongly tuberculated forms, from which it derived its specific name, are referable to *C. lacustris*. Under these circumstances the name *lacustris* should, according to the laws of zoological nomenclature, give way to the prior term *torosa*, and the smoother species (the *torosa* of Sars, of the present monograph, and of my previous paper) be named afresh. But as the two specific designations here used



have already gained a certain currency, it seems best not to disturb the existing nomenclature for the sake of adherence to a law which, in this case, would further confuse matters.

5. *CYTHERIDEA LACUSTRIS* (G. O. Sars). (Plate XXVI. figs. 18–21, and Plate XL. fig. 2.)

*Cythere lacustris*, G. O. Sars, Zoologisk Reise i Sommeren 1862, p. 30.

*Cyprideis torosa*, Jones (in part), Tertiary Entomostraca, p. 21, pl. ii. figs. 1*a*–1*i*, and woodcut, p. 16. fig. 2.

DISTRIBUTION: *Recent*—Norway, Scotland. *Fossil*—Posttertiary, England.

Valves of the *female*, as seen from the side oblong, subtriangular, highest in front; greatest height equal to more than half the length. Anterior margin broad and well rounded; posterior narrowed, obscurely angular above, rounded off below. Superior margin much elevated and angular over the anterior hinge, thence sloping steeply backwards in a right line; inferior straight or very slightly sinuated in front of the middle. Outline, as seen from above, oblong oval, irregularly emarginate; sides nearly parallel; extremities equal and obtusely pointed; width equal to half the length; a deep longitudinal sulcus formed by the depression of the hinge-margins behind the middle. The ventral surface is marked with faint, jagged, longitudinal furrows. End view ovate, broad below, pointed above. The shell is thick and dense in structure, covered with closely set irregular pittings, and with scattered papillæ, each of which seems to be composed of four small points arranged in a rosulate manner; often these are fused so as to form one papilla with a central perforation. Valves transversely sulcate and bearing several irregularly placed rounded tubercles. Colour pale yellowish brown. Hingement that of *Cytheridea*, except that the terminal rounded protuberances are scarcely at all crenated. Limbs very robust. Upper antennæ short and stout; terminal joint linear, considerably longer than either of the two preceding joints, which are about equal in length and very short; the antepenultimate about equal to the following two; spines long and slender. Urticating seta of the lower antenna very short, reaching to the base of the terminal claws. Basal joint of the first pair of feet very stout, about equal in length to the three following joints, bearing on its posterior margin a very stout flexuous seta; second joint narrow at the base and much dilated at the distal extremity; last two joints very short, and distinctly separated; terminal claw slender, slightly curved, and equal in length to the three preceding joints. Second joint of the last pair much longer than the following two, which, like those of the other feet, are much dilated at the apex. Male unknown.

Length  $\frac{1}{30}$  in., height  $\frac{1}{50}$  in.

*Hab.* North Shaws Loch, Selkirkshire (*G. S. B.*); Glasgow and Paisley Canal (*Mr. D. Robertson*).

I took one imperfect specimen of this very interesting species in Selkirkshire in 1864, since which time Mr. Robertson has found it more abundantly in the neighbourhood of Glasgow. It occurs fossil in the fluviatile clays of Hornsea, Yorkshire; and at Grays, in Essex.

## 6. CYTHERIDEA SORBYANA, Jones. (Plate XXIX. figs. 1-6.)

*Cytheridea sorbyana*, Jones, Entom. of Tert. Form. p. 44, pl. iv. figs. 6a-6e.

— *dentata*, G. O. Sars (right valve), Oversigt af Norges marine Ostracoder, p. 56.

— *inermis*, *idem* (left valve), *ibidem*, p. 56.

Scandinavian type (?). DISTRIBUTION: *Recent*—Norway, Scotland. *Fossil*—Glacial, Scotland and Norway; crag, England.

Carapace, as seen from the side, broadly subtriangular, highest in front of the middle; greatest height equal to two-thirds of the length. Anterior margin broadly rounded, posterior obliquely rounded, narrowed, and exserted below; the right valve bears on the anterior margin six blunt teeth; and its postero-ventral angle has one much longer tooth, which is directed downwards and backwards. Superior margin boldly arched, somewhat gibbous in front of the middle, sloping with a steep curve behind; inferior margin slightly convex in front, straight behind. Outline, as seen from above, broadly oval, with equally rounded extremities, widest in the middle; greatest width equal to two-thirds of the length. Surface marked with irregular concentric rugæ, which are most pronounced towards the margins, and bearing numerous short and rigid scattered hairs, which are papillose at the base. The left valve is much larger, higher, and more rounded, and less attenuated behind than the right, besides being destitute of marginal teeth. Animal unknown.

Length  $\frac{1}{30}$  in.

*Hab.* Off Lewis (*Admiralty soundings*); Hebrides (*Mr. J. G. Jeffreys's dredgings*); off Ormeshead (*Mr. D. Robertson*).

G. O. Sars, having seen only separated valves of this species, has naturally referred them to two distinct specific forms, which is not surprising, considering the great dissimilarity between the right and left valves. I had myself adopted the same course until I saw a perfect carapace (posttertiary fossil), collected by the Rev. H. W. Crosskey in Norway; this at once showed me the mistake. I have figured the Norwegian shell for the sake of better illustration (figs. 2-4), all hitherto found *recent* specimens consisting merely of detached valves.

## 7. CYTHERIDEA ZETLANDICA, n. sp. (Plate XXVIII. figs. 42-46.)

Valves, as seen from the side, oblong subreniform; greatest height near the posterior extremity, equal to more than half the length. Anterior and posterior margins obliquely rounded; the anterior narrow; the posterior broad and subtruncate. Dorsal margin forming a flattened arch; ventral straight, with a slight median sinuation. Seen from above, the carapace is oval, widest in the middle, rather obtusely pointed in front, broader behind; greatest width equal to half the length. End view obovate, broadly rounded above, pointed below. Lucid spots about five in number; irregularly angular and rather crowded together. Surface smooth, dull yellowish white. Animal unknown.

Length  $\frac{1}{27}$  in.

The general appearance of *C. zetlandica* is very like that of *Candona candida*; it has not, however, the polish of the freshwater species. Two or three specimens taken by Mr. Barlee in rock-pools in Shetland, and now in Mr. Norman's collection, are the only

examples that I have seen. Its position in the genus *Cytheridea* must be considered merely provisional.

8. CYTHERIDEA (?) SUBFLAVESCENS, Brady. (Plate XXXIV. figs. 53-55.)

*Cythere subflavescens*, Brady, Brit. Assoc. Report, 1866, p. 210.

Carapace, as seen from the side, subtriangular, highest in the middle; greatest height equal to rather more than half the length; extremities rounded, anterior broad, posterior somewhat narrowed; superior margin well arched, highest in the middle, where it is obscurely angular, inferior slightly convex. Outline, as seen from above, ovate, pointed in front, rounded behind; greatest width in the middle, scarcely equal to half the length. Surface smooth, finely and closely punctate, very slightly pubescent; colour yellowish. Animal unknown.

Length  $\frac{1}{50}$  in.

*Hab.* The Minch, 45-60 fathoms (*Rev. A. M. Norman*).

One specimen only of this species was found, by Mr. Norman, in sand dredged amongst the Hebrides in 1866.

Genus 4. EUCYTHERE, Brady.

(*Cytheropsis*, G. O. Sars\*.)

Carapace high and compressed in front, lower and more tumid behind. Shell thin, pellucid, and marked with conspicuous round white papillæ. Hinge-joint formed on the right valve by a projecting flange or crest, which is received into a corresponding depression of the left valve. "Superior antennæ five-jointed, and in structure almost like those of *Cythere*; inferior much more robust, four-jointed; flagellum (urticating seta) long. Mandibular palp three-jointed; branchial appendage very small. Cutting portion of the first maxillæ weaker than usual; internal segment rudimentary. Second pair of maxillæ very large, dilated in an extraordinary manner at the apex, flabelliform, and beset with numerous apical setæ. Feet weak and slender, subequal; terminal claws long and almost straight, alike in the male and female. Copulative organs of the male unusually small. One eye."

Though one species of this genus, *E. declivis*, is tolerably common on the British coast, I have never yet obtained specimens in such a state of preservation as to allow of the examination of the animal. A deficient supply of specimens has also prevented Sars from making a very accurate investigation of the anatomical structure; but there would seem to be little doubt that there is quite sufficient peculiarity in the shell and internal parts to constitute a distinct genus.

\* The name *Cytheropsis*, having been already used by M'Coy in the 'Systematic Description of the British Palæozoic Fossils in the Geological Museum of the University of Cambridge,' 1855, it is necessary to substitute another name for this genus.

## 1. EUCY THERE DECLIVIS (Norman). (Plate XXVII. figs. 22-26, 52-55.)

*Cythere declivis*, Norman, Nat. Hist. Trans. Northumb. & Durh. vol. i. p. 16, pl. v. figs. 9-12, and Brit. Assoc. Report, 1864, p. 192.

? *Cytheropsis tenuitesta*, Sars, *loc. cit.* p. 59.

British type. DISTRIBUTION: *Recent*—Norway, Great Britain, and Ireland. *Fossil*—Glacial, Scotland.

Valves of the *female* as seen from the side subtriangular, broad and well rounded in front, tapering to a narrowly rounded point behind; greatest height in the middle, equal to considerably more than half the length. Superior margin boldly arched in front of the middle, thence sloping steeply to the posterior extremity; inferior margin gently sinuated in front of the middle. Outline as seen from above oblong, ovate; greatest width equal to about half the length, situated at the posterior third; extremities pointed. End view somewhat pyramidal, the base rounded. Shell pellucid, smooth, or marked with very fine puncta, and beset with distant round white papillæ. Lucid spots three or four in a transverse row, with two (usually coalescent) in front. Carapace of the *male* much more elongated, and less arched on the dorsum; height equal to less than half the length. "Upper antennæ moderately long, the second joint much shorter than the united length of the three following; last joint narrow and linear. Internal lobe of the first maxillæ forming a very small bisetose tubercle; external lobe or palp not larger than the other two, the last joint much longer than the preceding. Branchial lamina subquadrangular, the four external setæ thicker than the others, and more densely ciliated. Feet very slender, terminal claws very long and narrow. Copulative organs very small, distal portion obtusely rounded." This description of the animal, quoted from G. O. Sars, applies to the male only of *E. tenuitesta*.

Length  $\frac{1}{4}$  in.

*Hab.* In depths of 2-60 fathoms. Shetland, Channel Islands, and the Minch (*Mr. Jeffreys's dredgings*); Donegal Bay (*Mr. E. C. Davison*); Lerwick (*Mr. D. Robertson*); Aberdeenshire coast (*Mr. Dawson*); Plymouth, Falmouth, Isle of Skye (*Rev. A. M. Norman*); Northumberland and Durham coasts, 25-46 fathoms, Preston Pans (oyster-ooze), Galway Bay, Roundstone Bay, Devonshire coast, South Wales (*G. S. B.*).

The female of *E. declivis* seems to be very much more abundant than the male; indeed, except two specimens (figs. 54, 55) obtained by Mr. Norman from the Sound of Skye, I have seen no males; and these I conclude to be so simply from their close agreement with Sars's description and with a drawing which he has kindly sent me. I had been disposed (lacking the opportunity of anatomical investigation) to consider the form figured at 49 to be the male of *declivis*; but, in deference to the observations of G. O. Sars, I must for the present refer it to the following species. There is, however, a curiously contorted form which occurs pretty numerous (figs. 52, 53) in a gathering from the Devonshire coast, and which, from its general resemblance, I am inclined to refer to the present species. The bulk of the gathering consists of the ordinary female forms (fig. 22); and there are none answering to the male, unless we consider as such the curved forms here referred to. Without further opportunities of investigation it is impossible to decide the question. Possibly this curved form may be a distinct species; at the same time it may be well to bear in mind the possibility of there being two distinct

males, as has been shown to be the case in some crustacea. A curious roughly punctate and small form, which I suppose to be referable to a variety or stage of growth of this species, is represented at Plate XXV. figs. 49, 50.

2. EUCYTHERE ARGUS (G. O. Sars). (Plate XXVII. figs. 49–51.)

*Cytheropsis Argus*, Sars, *loc. cit.* p. 58.

Scandinavian type (?). DISTRIBUTION: *Recent*—Norway, Great Britain, and Ireland. *Fossil*—Glacial, Scotland and Norway.

Valves of the *female*, as seen from the side, subovate, highest in the middle; height equal to more than half the length. Anterior margin rounded, posterior rather narrower and obliquely rounded; superior margin highest in the middle, thence sloping with a gentle curve towards each extremity, but more steeply backwards; inferior slightly sinuated in front of the middle. Outline, as seen from above, ovate, widest behind the middle, greatest width equal to half the length; obtusely pointed in front, rounded behind. Shell pellucid, thickly set with rounded white papillæ, which are very much larger than those of the preceding species. "Second joint of the upper antennæ about equal to the united length of the following three, last joint short, ending in a strong spine and two or three setæ; lower antennæ short and thick, last joint larger than usual, and armed with two claws, of which the internal is the smaller, the external strong and armed on the anterior margin, towards the apex, with six teeth. Internal segment of the first maxillæ forming a simple spine. Feet very short, terminal claw scarcely longer than the united length of the two last joints."

Length  $\frac{1}{4}$  in. *Sars*

*Hab.* In shell-sand, Galway Bay (*Prof. Rowney*); Girdler Sand (*Mr. E. C. Davison*); off Holy Island (*G. S. B.*); Shetland (*Mr. D. Robertson*).

My collection contains only two or three specimens (one a female, the others males) from the three first-named localities; but Mr. Robertson obtained a fine series from his Shetland dredgings, off the Isle of Papa.

Genus 5. ILYOBATES, G. O. Sars.

Valves thin and pellucid, subovate, truncate behind; smooth and shining, and set with very small distant papillæ. Hinge-joint simple, formed by a slight projection of the left valve, which is received into a corresponding depression of the right. Upper antennæ very stout, five-jointed, the first two joints much thickened, the last three short and bearing long curved spines; lower antennæ four-jointed. Mandibles small, with unusually long slender teeth; palp three-jointed, the second joint elongated, "branchial appendage having two long ciliated setæ and one rudimentary." Maxillæ of the usual form. Feet very short; the first two pairs three-jointed, the last pair four-jointed. "Right foot of the last pair, in the male, prehensile and only three-jointed, terminal claw very large and strong. Abdomen of the female very convex above, the postabdominal lobes bearing two short hairs." Eyes wanting.

ILYOBATES BARTONENSIS (Jones). (Plate XXXIV. figs. 11-14, & Plate XL. fig. 5.)

*Cytherideis bartonensis*, Jones, Tertiary Entomostraca, p. 50, pl. v. figs. 2a, 2b, 3a, 3b.

*Ilyobates prætexta*, G. O. Sars, *loc. cit.* p. 60.

Scandinavian type. DISTRIBUTION: *Recent*—Norway, Britain, Bay of Biscay. *Fossil*—Tertiary, England.

Carapace of the *female*, seen from the side, elongate, subovate, slightly higher behind than in front; greatest height behind the middle and equal to half the length. Anterior margin evenly rounded, posterior obliquely rounded, almost truncate. Superior margin slightly arched, inferior nearly straight and forming almost a right angle with the posterior extremity. Outline, as seen from above, ovate, tapering in front to an obtuse point, posterior extremity truncate and evenly excavated; greatest width behind the middle and equal to nearly half the length. End view subcircular. Carapace of the *male* much narrower and more elongated. Shell smooth, pellucid, with opaque patches, the brown body of the animal shining through; surface set with small distant papillæ, and, more especially along the anterior and inferior margins, with rather long single hairs. Lucid spots large, quadrangular, four in a transverse row, mostly two or three more in front, and others sometimes scattered irregularly over the valves. Last three joints of the upper antennæ shorter than the preceding one; basal joint of the lower antennæ bearing on the upper margin a brush of long hairs; last joint terminating in three long, slender, nearly equal claws. Terminal claw of the second pair of feet longer than that of the rest. "Basal portion of the copulative organs of the male very large, subquadrangular, armed behind and below with a long spiniform process; distal portion short, acutely produced before and behind."

Length  $\frac{1}{35}$  in.

*Hab.* The Dogger bank off Scarborough (*Mr. Leckenby's dredgings*); the Minch, 45-60 fathoms, and Loch Alsh and Loch Fyne (*Mr. J. G. Jeffreys*); Shetland (*Mr. D. Robertson*).

This is a very peculiar species, and cannot be confounded with any other recent form; but there is one which occurs in some of the older glacial clays which, if not identical with the present, is at any rate very closely allied; it is, however, larger and less elongated, besides presenting other minor differences. It is interesting to note that this, and one or two other species occur (in Britain) only on the Dogger bank, and on the western and northern shores of Scotland.

#### Genus 6. LOXOCONCHA, G. O. Sars.

(*Normania*, Brady, Zool. Trans. vol. v.)

Valves subrhomboidal in shape, mostly regularly convex; surface usually marked with fine concentric pittings and distant circular papillæ, rarely bearing deep polygonal excavations; ventral margin forming a thin and prominent keel behind the middle; posterior dorsal angle obliquely truncate. Hinge-joint formed by four small teeth, situated at the extremities of the hinge-line, two on each valve, the intervening portion of the valve-margin often finely crenulated. Limbs of the animal slender and colourless. Upper antennæ very slender, six-jointed, the last joint very long, linear, and bearing

long simple setæ; lower antennæ four-jointed, the third joint long and narrow; flagellum long and biarticulate. Mandibular palp three-jointed, bearing a distinct branchial appendage. Lowest seta of the branchial plate of the first pair of jaws deflexed. Feet long and slender, alike in male and female. Abdomen terminated by a hairy conical process; postabdominal lobes bearing two moderately long subequal setæ.

The genus is well characterized by the oblique "peach-stone" outline of the carapace, and by the very slender, setose but non-spinous limbs of the animal. The typical form is well represented by the species described by Dr. Baird under the name *Cythere impressa*, which is common both in a recent state and in the posttertiary formations of England, Scotland, and Norway.

1. *LOXOCONCHA IMPRESSA* (Baird). (Plate XXV. figs. 35–40, and Plate XL. fig. 4.)

*Cythere impressa*, Baird, Brit. Entom. p. 173, t. xxi. fig. 9.

— *viridis*, Lilljeborg, De Crustaceis, p. 168, tab. xviii. figs. 4–6 & 8–13, and tab. xix. figs. 3–5.

— *flavida*, Zenker, Ueber die Krebsthiere, p. 86, tab. v. b.

— *carinata*, Brady, Ann. & Mag. Nat. Hist. vol. xvi. (1865) p. 190, pl. ix. figs. 1–4.

— *rhomboidea*, Fischer, Abhandl. d. bayerischen Acad. d. Wissenschaften, Bd. vii. p. 656 (*vide* G. O. Sars).

*Loxoconcha rhomboidea*, G. O. Sars, *loc. cit.* p. 62.

British type. DISTRIBUTION: *Recent*—Norway, Great Britain, Ireland, Bay of Biscay. *Fossil*—Glacial deposits and raised beaches, Norway, Scotland, England, and Ireland.

Carapace of the *female*, as seen from the side, rhomboidal; greatest height in the middle, equal to two-thirds of the length; extremities obliquely rounded, the posterior obliquely truncate above the middle; superior strongly arched, inferior sinuated in front of the middle, and prominently keeled behind\*. Outline, as seen from above, tumid, widest in the middle, and tapering evenly to the extremities, which are sharply pointed; width equal to somewhat more than half the length. The shell of the *male* is much lower in front than behind, the dorsal margin straight, and angular at the anterior and posterior extremities; outline as seen from above considerably less tumid than in the female. Surface often covered with a thick calcareous crust, and marked with closely set impressed puncta, which are arranged in more or less regular concentric rows. Young specimens bear in the intervals of the pittings distant elevated papillæ. Hinge-processes very feebly developed, intervening margin crenulated. Colour yellowish white, and, when occurring in tidal pools or amongst seaweed, marked with rather large brown spots. Upper antennæ very slender; the second joint pilose on its anterior margin, and shorter than the united lengths of the two following joints; last two joints about equal in length, each bearing at its apex three or four very long slender setæ. Third joint of the lower antennæ long and narrow, bearing two setæ above the middle of the posterior margin, and finely serrated below. Second joint of the last pair of feet about equal to the conjoined length of the two following joints; last joint finely toothed on its anterior

\* In my paper ("Fossil Entomostraca from the Brick-earth of the Nar") the anterior extremity of *C. carinata* is erroneously described as the posterior, and *vice versa*.

margin. Apical portion of the male copulative organs tuberculated behind, acuminate in front. Eyes distant and separate.

Length  $\frac{1}{40}$  in.

*Hab.* Littoral and in deep water. In shell-sand from the Girdler Sand (Thames), Cowes, Baltimore, and Donegal (*Mr. E. C. Davison*); Isle of Man, Cumbræ, Oban, Lerwick (*Mr. D. Robertson*); Guernsey, Falmouth, Swansea, Youghal, Skye, Stornoway, Tobermory (*Rev. A. M. Norman*); Arran, Roundstone, Galway, and South Wales in shell-sand; Birterbuy and Roundstone Bays; dredged, and in rock-pools, Arranmore and Sunderland (*G. S. B.*); Channel Islands and Hebrides (*Mr. Jeffreys*); Devonshire coast, 60 fathoms (*Mr. Spence Bate*); Norfolk coast (*Mr. D. O. Drewett*).

*Loxococoncha impressa* is one of the commonest of British species, occurring almost all round our shores, but much more sparingly on the eastern coast. Where it does occur, however, it is usually, as in the west of Ireland, the Isle of Man, and the Firth of Clyde, one of the most abundant species.

The surface-marking varies considerably. Young specimens are smooth, pellucid, finely punctate, and beset with large circular papillæ; but as age advances the shell becomes covered with a thick calcareous crust which obliterates the papillæ, the puncta becoming at the same time coarser and deeper. This state is represented at fig. 40, where a portion of the outer crust (*b*) has been detached, exposing the original shell-surface (*a*). This is interesting as showing one possible source of error in the discrimination of species, many of which have been founded on characters not so distinct as those shown in the two conditions of fig. 40. When I applied the name *carinata* to this species I believed that Dr. Baird's *Cythere impressa* was the species here called, after G. O. Sars, *Cythere villosa*. An examination of the type specimens and of the original description, shows, however, that the term *impressa* refers to the present species.

## 2. LOXOCOCONCHA GRANULATA, Sars. (Plate XXV. figs. 51, 52.)

*Loxococoncha granulata*, Sars, *loc. cit.* p. 64.

DISTRIBUTION: Britain, Norway.

Carapace of the *female*, seen from the side, subrhomboidal; greatest height in the middle, and equal to more than half the length. Anterior margin obliquely rounded; posterior forming an obtuse projection in the middle, obliquely truncate above; superior margin very slightly arched, inferior convex, sinuated in front of the middle. Outline, as seen from above, subovate; greatest breadth in the middle, equal to half the length; extremities equal, sharply tapering. The shell of the male is more elongated and straighter on the superior margin, which is also more angular at the extremities. Surface of the valves marked by small and closely set concentric pittings. "Second joint of the inferior antennæ shorter than the three following; last two joints equal, elongated; third joint of the lower antenna almost as in *L. tamarindus*; its anterior border bearing, above the median setæ, some equally distant very short hairs. Second joint of the last pair of feet longer than the two following. Male copulative organs large, basal portion subquadrangular, apical portion produced before and behind into a very slender subulate process. Eyes separate."

Length (male)  $\frac{1}{55}$  in.

*Hab.* In oyster-ooze from Stranraer.



Of this species I have seen only one British specimen, a male, from which the figures here given were taken. It seems to be very closely allied to *L. impressa*, as well as to *L. tamarindus*, and I should scarcely have ventured to describe it as a distinct species, had its peculiarities not been carefully studied by G. O. Sars, and by him considered to warrant its separation. The male has, as Sars observes, very much the same form as the female of *L. tamarindus*; but the shell-structure is much more like that of *impressa*, which the female also resembles in outline.

3. LOXOCONCHA ELLIPTICA, n. sp. (Plate XXVII. figs. 38, 39, 45–48, and Plate XL. fig. 3.)

Valves of the *female*, as seen from the side, subrhomboidal, rather higher in front than behind; height equal to two-thirds of the length. Extremities obliquely rounded. Superior margin arched; inferior sinuated in front of the middle and slightly keeled behind. Seen from above, the outline is oblong-ovate, extremities acuminate; greatest width behind the middle, equal to half the length. Lucid spots curved or comma-shaped; four placed transversely, with one or two at a little distance in front. Surface of the shell smooth and finely punctate, bearing small scattered papillæ, and often incrustated like the preceding species. Colour yellowish brown, with patches of rather darker shade. The *male* is larger, more elongated, and more regularly quadrilateral, the dorsal margin nearly straight and angulated at its extremities; seen from above the outline is more compressed, the sides subparallel. Superior antennæ slender; the second joint equal in length to the two following; last joint considerably longer than the preceding. Inferior antennæ scarcely different from those of the preceding species. Second joint of the third pair of feet equal in length to the two following.

Length (of the *male*)  $\frac{1}{40}$  in., (*female*)  $\frac{1}{45}$  in.

*Hab.* In brackish water. Arnold's Pool, Guernsey (*Rev. A. M. Norman*); Girdler Sand, Thames (*Mr. E. C. Davison*); in pools at the mouth of the Seaton Burn and Wansbeck, Northumberland (*G. S. B.*).

4. LOXOCONCHA TAMARINDUS (Jones.) (Plate XXV. figs. 45–48.)

*Cytherideis tamarindus*, Jones, Tertiary Entom. p. 49, pl. iii. fig. 4a, 4b.

*Cythere levata*, Norman, Nat. Hist. Trans. Northumb. and Durh. vol. i. p. 18, pl. v. figs. 13–16, and Brit. Assoc. Report, 1864, p. 192.

*Loxoconcha longipes*, G. O. Sars, *loc. cit.* p. 63.

British type. DISTRIBUTION: *Recent*—Norway, Great Britain, Ireland, Bay of Biscay. *Fossil*—Crag, England; glacial and raised beaches, England, Scotland, Ireland, and Norway.

Valves of the *female*, as seen from the side, oblong, subquadrilateral, equal in height throughout; length equal to nearly twice the height. Anterior margin evenly rounded; posterior angulated in the middle and obliquely truncate above. Inferior margin straight, terminating behind in an obtuse angle; ventral sinuated in front, slightly convex behind. Outline, as seen from above, oblong-oval, greatest width in the middle, equal to less than half the length; extremities pointed. Shell fragile, pellucid, smooth and polished; marked with a few fine scattered puncta. Colour white or yellowish. "Upper antennæ much more robust than in *L. impressa*, and beset partially with spiniform setæ; second

joint about equal in length to the three following\*, last joint very slender and much longer than the preceding; third joint of the lower antennæ shorter and thicker, two setæ attached about the middle of the anterior margin. Feet, especially the last pair, much elongated; the second joint of the last pair longer than the two following joints. Copulative organs of the male much shortened; apical portion indistinctly separate from the basal, acutely produced in front, rounded behind. Eyes distinct." Shell of the *male* slightly more elongated.

Length  $\frac{1}{8}$  in.

*Hab.* Hebrides, the Minch (*Mr. J. G. Jeffreys*); Guernsey, Falmouth, Burrow Island, Skye, Lamash Bay, and in tide-pools, Herm (*Rev. A. M. Norman*); in shell-sand, Girdler Sand, Margate, and River Ribble (*Mr. E. C. Davison*); Devonshire coast, 5–60 fathoms (*Mr. C. Spence Bate*); Ormeshead, Peterhead, Macduff, Cumbrae, and Shetland (*Mr. D. Robertson*); Aberdeenshire coast (*Mr. Dawson*); Northumberland and Durham coasts, in tide-pools and in 30–46 fathoms; Galway, Roundstone, and Birterbuy Bays, 1–15 fathoms; in shell-sand from Stranraer and South Wales, and in tide-pools, Sunderland (*G. S. B.*); Norfolk coast (*Mr. D. O. Drewett*).

From an examination of Prof. T. Rupert Jones's type specimens, I have no hesitation in referring this species to his *Cytherideis tamarindus*. I have never seen any valves containing the animal, except two or three Norwegian specimens kindly sent to me by Sars.

##### 5. LOXOCOONCHA GUTTATA (Norman). (Plate XXVII. figs. 40–44.)

*Cythere guttata*, Norman, Nat. Hist. Trans. Northumb. and Durh. vol. i. p. 19, pl. vi. figs. 9–12, and Brit. Assoc. Report, 1864, p. 192.

British type. DISTRIBUTION: *Recent*—Great Britain, Ireland, Bay of Biscay, Levant. *Fossil*—Glacial and postglacial, Scotland, Ireland.

Valves of the *female*, seen from the side, rhomboidal or peach-stone-shaped; greatest height equal to much more than half the length. Dorsal margin straight or only slightly arched, angular at each extremity. Ventral margin convex, sinuated at the anterior third. The lower half of the anterior border is rounded; the upper half flattened, and sloping backward to its junction with the dorsal border; posterior margin obliquely rounded below, produced into a rounded angular projection about the middle, obliquely truncate and emarginate above. Seen from above, the carapace is ovate, tumid, widest behind the middle; strongly keeled; extremities obtusely mucronate, greatest width equal to half the length. The end view is very broadly ovate, almost circular. The shell of the *male* is much more elongated, the dorsal margin quite straight and obtusely angular at each extremity, ventral margin only slightly convex behind. The greater portion of each valve is covered with large and sharply defined, deep, angular pittings, but these are wanting round the margins: on the ventral surface they coalesce into irregular furrows. Colour straw-coloured, brown, or slaty-blue.

Length  $\frac{1}{5}$  in.

*Hab.* Deep water: Plymouth (*Rev. A. M. Norman*); Devonshire coast, 60 fathoms (*Mr. Spence Bate's dredgings*); Girdler Sand, Thames (*Mr. E. C. Davison*); Aberdeenshire coast (*Mr. Dawson*); in shell-sand from Stranraer, Roundstone, and Galway Bay; Birterbuy Bay, dredged; Norfolk coast;

\* As this phrase occurs frequently in the course of the Monograph, it should be stated that the *united* lengths of the following joints are always meant.

Northumberland and Durham coasts, 25–46 fathoms (*G. S. B.*); Ormeshead and Shetland (*Mr. D. Robertson*); Hebrides, 45–60 fathoms (*Mr. J. G. Jeffreys*).

This is a strictly deep-water species, and, though occurring over a wide range of coast-line, is seldom found in great numbers. The only locality in which I have found it at all common is Birterbuy Bay, Ireland, where it is mostly of a deep-brown or slaty-blue colour.

#### Genus 7. XESTOLEBERIS, G. O. Sars.

Shell very smooth and polished, ornamented with small round distant papillæ, much lower in front than behind, in the female very tumid behind. Hinge-joint formed by a dentated projecting crest of the left, which is received into an excavation of the right valve. Ventral margin of both valves incurved in front of the middle. Upper antennæ six-jointed, the last four joints successively decreasing in length, and bearing very short simple setæ; lower antennæ short, four-jointed, flagellum of moderate length. Mandibular palp four-jointed; “branchial appendage small and bearing only two setæ.” Maxillæ as in the preceding genus. Feet short. Postabdominal lobes bearing two setæ. Eyes distinct. Ova and immature young borne within the shell of the female.

This genus is chiefly distinguished by the peculiar form of the carapace, which is very low and pointed in front, elevated and tumid behind, in these respects offering a direct contrast to the genus *Eucythere*, with which, however, in the character of the hinge-joint and of the surface-markings, it to a great extent agrees. Zenker and Sars agree in stating these animals to be viviparous, a character which I have not myself had an opportunity of examining.

#### 1. XESTOLEBERIS AURANTIA (Baird). (Plate XXVII. figs. 34–37, and Plate XXXIX. fig. 6.)

*Cythere aurantia*, Baird, Mag. Zool. & Bot. ii. 143, t. v. fig. 26 (1835), and Brit. Entom. p. 171, tab. xxi. fig. 8.

— *nitida*, Lilljeborg, De Crust. ex. ord. trib. p. 169, tab. xix. figs. 6–7.

— *viridis*, Zenker, Anat.-syst. Studien über die Krest. p. 86, tab. v. A.

*Xestoleberis nitida*, G. O. Sars, *loc. cit.* p. 67.

Atlantic type. DISTRIBUTION: *Recent*—Norway, Great Britain, Ireland.

Carapace of the *female*, seen from the side, subtriangular; greatest height a little behind the middle, equal to nearly two-thirds of the length. Anterior margin much narrowed, rounded; posterior very broadly rounded; superior boldly arched, sloping more steeply in front than behind; inferior slightly sinuated in front of the middle. Outline, seen from above, ovate, tapering gradually to a point in front, broadly rounded behind; greatest width behind the middle, equal to half the length. The shell of the male (see fig. 35) differs in being more elongated and scarcely so tumid behind. Shell smooth and polished, bearing very small scattered papillæ. Colour deep brownish orange, or sometimes white; a very conspicuous black or deep-crimson spot in front of the eyes. Second joint of the upper antennæ shorter than the three following; terminal claws of the lower antennæ short, scarcely more than double the length of the last joint; flagellum stout; poison-gland very large and deeply coloured. Second joint of the last pair of

feet much longer than the following two. Terminal claws very short, stout, and bent almost at a right angle. "Distal portion of the male copulative organs narrow, lingiform, and projecting downwards."

Length  $\frac{1}{55}$  in.

*Hab.* Littoral. Dunstanborough (in tide-pools), Arranmore (in tide-pools), Roundstone Bay (1 fathom in mud) (*G. S. B.*); Poole Bay (*Prof. T. Rupert Jones*); Berwick Bay (*Dr. Baird*); Arran, Loch Carron, Guernsey, Herm, and Falmouth (*Rev. A. M. Norman*); Macduff (*Mr. D. Robertson*); Girdler Sand, (*Mr. E. C. Davison*).

This seems to be a strictly littoral species, and, though closely allied to the following, is undoubtedly quite distinct. The principal points of difference are noticed under *X. depressa*.

2. *XESTOLEBERIS DEPRESSA*, G. O. Sars. (Plate XXVII. figs. 27-33.)

*Xestoleberis depressa*, G. O. Sars, *loc. cit.* p. 68.

? *Cytherina impressa*, Reuss, *Foram. u. Entom. d. Kreidemergels v. Lemberg* (Haidinger's *Abhandl.* vol. iv. 1850), p. 48, tab. vi. fig. 5.

British type. DISTRIBUTION: *Recent*—Norway, Great Britain, Ireland. *Fossil*—Glacial, Scotland and Ireland; cretaceous, Lemberg?

Carapace of the *female* very tumid, breadth much greater than the height; as seen from the side, subtriangular, greatest height somewhat behind the middle, equal to more than half the length. Anterior margin narrow, rounded; posterior obtusely rounded, subtruncate; dorsal margin arched, sloping steeply in front, more rounded behind; ventral slightly sinuated in front of the middle. Outline, as seen from above, tumid, broadly rounded behind, widest at the posterior third, thence tapering to the acuminate anterior extremity; greatest width equal to two-thirds of the length. End view subtriangular, angles well rounded, base nearly flat, height much less than the width. Shell of the *male*, as seen from the side, more elongated and triangular; seen from above, ovate, widest in the middle. Shell pellucid or opaque pearly white, often tinged at the anterior extremity with reddish orange, very smooth and polished, iridescent, studded with small, distant, setose papillæ. The contact margins on the ventral surface marked with transverse hair-like lines. "Antennæ shorter than in the preceding species, second joint of the upper pair shorter than the three following; terminal claws of the lower pair long. Second joint of the last pair of feet about equal in length to the two following, terminal claw very long and curved. Distal portion of the male copulative organs larger than in the preceding species, and broadly lanceolate."

Length  $\frac{1}{44}$  in.

*Hab.* In depths of 2-60 fathoms, and very rarely in tidal pools. Shetland, the Minch, and Channel Islands (*Mr. Jeffreys's dredgings*); Scarpa Flow, Orkney (*Mr. E. C. Davison*); Aberdeenshire coast (*Mr. Dawson*); Cumbrae, Peterhead, and Oban (*Mr. D. Robertson*); Devonshire coast, 60 fathoms (*Mr. C. Spence Bate*); Arran, Tobermorey, Loch Fyne, Stornoway (*Rev. A. M. Norman*); Northumberland and Durham coasts, 25-46 fathoms; Galway, Roundstone, and Birterbuy Bays (*G. S. B.*).

This is one of the most beautiful and most widely distributed of our marine Ostracoda. It is mainly distinguished from the preceding species by the excessively tumid and depressed form of carapace in the female, by the absence of any black spot in front of

the eyes, the uniform white colour of the shell (except where the extremities or dorsum are tinged with orange, which is not a very uncommon occurrence), lastly by the peculiarly beautiful *iridescence* of the shell, a character of constant occurrence in this species, but never, so far as I know, found in *X. aurantia*; I have often observed it even in fossil specimens of *X. depressa*. The chief distinctive character of the animal itself is found in the long terminal claws of the feet and lower antennæ. In habitat it ranges from 2 to 60 fathoms or upwards, while *X. aurantia* is purely littoral. G. O. Sars gives the following interesting account of the development of the young, which, as previously stated, are carried within the shell of the mother during the earlier stages of existence. "We may recognize four distinct stages of development, which are often found in one and the same mother. The first stage is that of the mature egg just escaped from the ovary, in which may be seen the outer membrane and an inner mass of yelk, on one side of which is visible the germinal vesicle. In the next stage the egg assumes a kidney-shape, one side of which (the ventral) is much incurved: one already sees an indistinct appearance of the eyes while there is as yet no trace of the limbs. These first appear in the third stage, and first of all the lower antennæ. The valves are already formed, and present a peculiar shape, being very much produced immediately over the eyes. In the last stage the shell assumes its adult form. The antennæ, of which the upper are still only five-jointed, the mandibles, and maxillæ are already well-developed, whilst the feet are rudimentary, and appear only as pointed inarticulate appendages."

#### Genus 8. CYTHERURA, G. O. SARS.

Valves unequal and dissimilar in form, the right more or less overlapping the left on the dorsal margin; surface reticulated, punctated, deeply excavated, or bearing irregularly disposed ribs or protuberances, mostly marked with a central areola of darker colour than the rest of the shell. Carapace oblong or subtriangular, the posterior extremity produced into a more or less prominent beak. Hinge-processes mostly obsolete. Superior antennæ shortly setose, six-jointed, gradually tapering; second joint bearing a rather long seta on the middle of the posterior margin; inferior antennæ five-jointed, terminal claws short; flagellum long, triarticulate. Mandibles robust, with very blunt teeth; "palp three-jointed, branchial appendage small, and bearing only two recurved setæ." Terminal lobes of the first pair of maxillæ long and narrow, "branchial plate bearing on its external margin two non-ciliated setæ, which are directed downwards, and arise from a separate lobe." Feet small, the terminal claws short and curved. Eyes distinct. Copulative organs of the male very complex, provided with several irregular processes and a very long spirally convoluted tube.

The type of this genus, *C. gibba*, Müller, appears to be almost absent from the British shores; but the genus is abundantly represented by other species, sixteen in all. They are the smallest of all the Ostracoda, and, except *C. nigrescens*, occur almost exclusively beyond low-water mark. My specimens (except *C. nigrescens*) have been picked from shell-sand or from dredged mud which has been subjected to a drying-process; and my sole knowledge of the anatomy of the genus has therefore been derived from the littoral species above named, which I find to correspond very accurately with

Sars's description. The three-jointed character of the urticating seta (flagellum) is not noted by Sars, and I cannot say whether it holds good throughout the genus; it is, however, very distinct in all the specimens which I have examined of *C. nigrescens*. The genus is distinctly characterized, externally, by the peculiarly beaked hinder extremity.

1. *CYTHERURA NIGRESCENS* (Baird). (Plate XXXII. figs. 50–55, and Plate XXXIX. fig. 7.)

*Cythere nigrescens*, Baird, Brit. Entom. p. 171, tab. xxi. figs. 4, 4 a.

*Cytherura nigrescens*, G. O. Sars, *loc. cit.* p. 71.

British type. DISTRIBUTION: *Recent*—Norway, Great Britain, Ireland. *Fossil*—Glacial, Norway, Scotland, Ireland.

Carapace of the *female*, as seen from the side, subovate, greatest height in the middle and equal to half the length; rounded in front, behind produced about the middle into a short obtuse beak; superior margin well arched, inferior slightly incurved. Outline, as seen from above, compressed ovate; greatest breadth behind the middle, and equal to less than half the length; extremities acuminate. The *male* similar, but rather more elongated. Valves smooth or sparingly punctate, and bearing a few small scattered hairs, marked with long, hair-like, radiating lines on the anterior and posterior margins; pellucid at the extremities; central areola convex in front, deeply concave on its hinder margin, often mottled with deep black. Last joint of the upper antennæ very short; the penultimate and antepenultimate nearly equal and much longer than the preceding. Terminal claws of the feet robust and much curved. Second joint of the last pair of feet about as long as the united lengths of the two following. "Apical portion of the male copulative organs small, subtriangular, with acute angles."

Length  $\frac{1}{65}$  in.

*Hab.* Littoral, and in depths up to 10 fathoms. In rock-pools at Sunderland and Arranmore; dredged amongst mud in Roundstone and Birterbuy Bays; in oyster-ooze from Stranraer, and in shell-sand from South Wales (*G. S. B.*); in rock-pools, Herm, Guernsey, and Arran; and in shell-sand from Berwick and Isle of Skye (*Rev. A. M. Norman*); Lerwick, Shetland, Isle of Man, and Oban (*Mr. D. Robertson*); Minch (*Mr. J. G. Jeffreys*); Loch Erribol (*Mr. D. O. Drewett*).

When living between tide-marks this species is always more or less marked with black; sometimes the central areola forms one deep-jet-black patch, but more frequently is flecked with irregular black striæ or spots. Specimens dredged from beyond low-water mark, though showing the outline of the areola, are altogether destitute of colour. The form figured (54, 55) from the Minch was dredged in a depth of about 50 fathoms, and may possibly be distinct; but it approaches *C. nigrescens* so closely that, for the present, I prefer to regard it as a variety only of that species.

2. *CYTHERURA ANGULATA*, n. sp. (Plate XXXII. figs. 22–25.)

Carapace, seen laterally, subquadrangular, greatest height in the middle, and equal to about half the length, evenly rounded in front, produced behind above the middle into a rather long, obliquely truncate beak; superior margin evenly arched, inferior slightly

sinuated; the valves are produced laterally, so as to form, at the infero-posteal angle, a sort of projecting ala. Outline, as seen from above, compressed hastate, greatest breadth in the middle, and equal to rather more than one-third of the length; anterior extremity obtusely pointed, posterior rectangular, mucronate. End view ovate. Surface coarsely punctate; areola as in the preceding species, with the same hair-like lines radiating from its borders. Colour pale or deep golden yellow.

Length  $\frac{1}{6\frac{1}{5}}$  in.

*Hab.* Birterbuy Bay, 10 fathoms, in mud, and in shell-sand from South Wales (*G. S. B.*); Lerwick, Shetland, Peterhead (*Mr. D. Robertson*); the Minch (*Mr. J. G. Jeffreys*); Plymouth, and in rock-pools, Arran, N.B. (*Rev. A. M. Norman*).

Well characterized by its excessively compressed dorsal outline, the posterior angulation, and the coarse punctation of the shell, also by the very prominent beak of the supero-posteal angle. I have had no opportunity of examining the animal of this species; nor have I seen any distinction in the carapaces, such as is usually characteristic of the sexes.

### 3. CYTHERURA STRIATA, G. O. Sars. (Plate XXXII. figs. 26–29, 62, 64, 65.)

*Cytherura striata*, G. O. Sars, *loc. cit.* p. 74.

British type. DISTRIBUTION: *Recent*—Norway, Great Britain, Ireland. *Fossil*—Glacial, Norway, Scotland, Ireland.

Carapace of the *female*, seen laterally, elongate subquadrangular, about equal in height throughout; greatest height equal to less than half the length, evenly rounded in front, produced behind into a large obtusely rounded median process; superior margin nearly straight in the middle, inferior gently sinuated, and ending behind in an obtuse angle. Outline, as seen from above, oblong, sides nearly parallel, width equal to less than half the length, pointed in front; posterior extremity almost rectangular, acuminate in the middle. End view ovate, very tumid below. The *male* very narrow and elongate, almost thrice as long as high, very tumid behind. The shell is very distinctly longitudinally striated, with circular pittings in the grooves (fig. 62); areola obsolete; colour yellowish.

Length  $\frac{1}{6\frac{1}{5}}$  in.

*Hab.* Northumberland coast, 46 fathoms, Birterbuy Bay, 10 fathoms, and in shell-sand from South Wales (*G. S. B.*); Lerwick and Cumbrae (*Mr. D. Robertson*); the Minch (*Mr. J. G. Jeffreys*); Plymouth, Portland, Isle of Skye, and Shetland (*Rev. Mr. Barlee*); Girdler Sand and River Ribble (*Mr. E. C. Davison*); Stornoway, and in rock-pools, Herm (*Rev. A. M. Norman*).

### 4. CYTHERURA LINEATA, n. sp. (Plate XXXII. figs. 30–34, 67.)

Carapace of the *female*, as seen from the side, subovate, length equal to rather more than twice the height, evenly rounded in front, produced into a short obtuse median prominence behind. Dorsal margin gently arched, ventral nearly straight, terminating behind in a minute tooth. Outline, as seen from above, ovate, widest in the middle, about twice as long as broad, obtusely pointed in front, mucronate behind. End view ovate, tumid. The *male* is rather more elongated and compressed, but in other respects

similar to the female. Shell marked with fine elevated striæ, but without any punctuation. Central areola similar to that of *C. nigrescens*, sometimes jet-black, often obsolete.

Length  $\frac{1}{70}$  in.

*Hab.* The Minch, 50–60 fathoms (*Mr. J. G. Jeffreys*); Isle of Skye (*Rev. Mr. Barlee*).

5. *CYTHERURA CUNEATA*, n. sp. (Plate XXXII. figs. 35–38, 63.)

Atlantic type. DISTRIBUTION: *Recent*—Great Britain, Ireland, Levant. *Fossil*—Glacial, Scotland.

Carapace of the *female*, as seen from the side, subquadrangular, excessively tumid behind, nearly equal in height throughout, height equal to half the length, anterior margin broadly rounded; posterior obliquely truncate, and produced above the middle into a short obtusely rounded beak; superior margin nearly straight, inferior slightly sinuated. Outline, as seen from above, cuneate, obtusely rounded in front, very broad and centrally mucronate behind; greatest width equal to half the length. End view pentagonal, widest above the middle. *Male* narrower and more elongated. Shell longitudinally striated on its ventral and anterior portions, reticulated over the posterior protuberances, which are bounded below by a more or less distinct crest or rib. Central areola obsolete.

Length  $\frac{1}{65}$  in.

*Hab.* Birterbuy Bay, 10 fathoms, in shell-sand from Preston Pans, Donegal Bay, and South Wales (*G. S. B.*); Skye (*Rev. Mr. Barlee*); the Minch, and in rock-pools, Herm (*Rev. A. M. Norman*); Lerwick, Shetland (*Mr. D. Robertson*); Loch Erribol (*Mr. D. O. Drewett*).

6. *CYTHERURA SARSII*, n. sp. (Plate XXXII. figs. 39–42.)

Carapace, as seen from the side, elongate, subrhomboidal, nearly equal in height throughout; height equal to less than half the length. Anterior border rounded; posterior obliquely truncate, rounded off above; superior margin nearly straight, inferior rather deeply sinuated. Outline, as seen from above, compressed ovate; width equal to about one-third of the length, extremities mucronate. Shell pellucid, smooth, bearing a few small scattered hairs, the anterior portion marked with radiating hair-like lines. Areola obsolete.

Length  $\frac{1}{50}$  in.

*Hab.* Amongst oyster-ooze from Stranraer.

Of this very distinct species I have seen only one specimen.

7. *CYTHERURA SIMILIS*, G. O. Sars. (Plate XXXII. figs. 56–59.)

*Cytherura similis*, G. O. Sars, *loc. cit.* p. 72.

DISTRIBUTION: *Recent*—Norway, Great Britain. *Fossil*—Glacial, Scotland, Norway.

Carapace of the *female*, as seen from the side, subquadrangular, nearly equal in height throughout, height equal to more than half the length; anterior margin rounded, posterior produced above the middle into a very short obtuse protuberance; superior margin arched, nearly straight in the middle, inferior slightly sinuated. Outline, as seen from above, oval, sides nearly parallel, breadth equal to half the length, broadly rounded in



front, mucronate behind. Shell smooth or indistinctly reticulated. Central areola obsolete ("as in *C. nigrescens*," Sars).

Length  $\frac{1}{65}$  in.

*Hab.* In shell-sand from the River Ribble (*Mr. E. C. Davison*) and amongst oyster-ooze from Stranraer (*G. S. B.*), one specimen from each locality; Shetland (*Mr. D. Robertson*).

8. *CYTHERURA UNDATA*, G. O. Sars. (Plate XXXII. figs. 43-49, 66.)

*Cytherura undata*, G. O. Sars, *loc. cit.* p. 75.

— *humilis*, Brady, Brit. Assoc. Report, 1866, p. 210.

Scandinavian type? DISTRIBUTION: *Recent*—Baffin's Bay, Norway, Great Britain, Ireland. *Fossil*—Glacial, Scotland, Ireland, Norway.

Carapace of the *female*, as seen from the side, subrhomboidal; greatest height equal to rather more than half the length. Anterior extremity obliquely rounded, posterior obliquely truncate, and forming a very short projection above; superior margin arched, inferior scarcely sinuated, and forming a distinct angle behind. Outline, as seen from above, oblong, nearly parallel-sided, almost rectangular behind; width equal to less than half the length. The *male* rather more elongated. Shell thick and strong, indistinctly reticulated, and marked with irregular crests or ribs, two or three of which usually run directly forward from a transverse ridge in front of the middle of the valve, thus producing the outline of the letter F. The surface-markings are usually more prominent in the male than in the female. Colour yellowish.

Length  $\frac{1}{65}$  in.

*Hab.* Birterbuy Bay, 10 fathoms, and in oyster-ooze from Stranraer (*G. S. B.*); Shetland, Cumbræ, Macduff, and Oban (*Mr. D. Robertson*); the Minch (*Mr. J. G. Jeffreys*); Stornoway, and in rock-pools, Arran, N.B. (*Rev. A. M. Norman*); Scarpa Flow, Orkney (*Mr. E. C. Davison*).

9. *CYTHERURA PRODUCTA*, n. sp. (Plate XXXII. figs. 60, 61.)

Valves of the *male*, as seen from the side, oblong, produced into a rounded laterally projecting ala; height equal to less than half the length. Anterior margin rounded, obliquely truncate below, posterior produced in the middle into a long tapering triangular beak; superior and inferior margins nearly straight in the middle, the latter forming nearly a right angle behind. Outline, as seen from above, broadly ovate, widest in the middle, greatest width equal to half the length; extremities strongly mucronate. Surface of the shell irregularly reticulate, polished, the ventral surface longitudinally striated. Central areola broad, somewhat crescentic. The *female* is more tumid, perfectly smooth and polished, without any sculpturing.

Length  $\frac{1}{50}$  in.

*Hab.* Birterbuy Bay, 10 fathoms (*G. S. B.*); the Minch (*Rev. A. M. Norman*); off Ormeshead (*Mr. D. Robertson*).

Apparently a scarce species, three specimens only having been met with from the first-named, and one from the second locality.

10. *CYTHERURA AFFINIS*, G. O. Sars. (Plate XXXII. figs. 19-21.)

*Cytherura affinis*, G. O. Sars, *loc. cit.* p. 77.

Carapace of the *female*, as seen from the side, subquadrangular; height equal to half the length. Anterior margin rounded, posterior produced above the middle into a wide, obliquely truncate beak; superior and inferior margins nearly parallel, the former scarcely arched, the latter slightly sinuated in front of the middle. Outline, as seen from above, boat-shaped, ventricose; greatest breadth in front of the middle, and equal to half the length, acuminate behind. Surface of the shell waved and, on the ventral surface, longitudinally striate.

Length  $\frac{1}{4\frac{2}{3}}$  in.

*Hab.* Berwick-upon-Tweed (*Rev. A. M. Norman*); Peterhead (*Mr. D. Robertson*). One specimen from each locality.

#### 11. CYTHERURA ROBERTSONI, n. sp. (Plate XXXII. figs. 16–18.)

Carapace of the *female*, as seen from the side, subovate, produced into a lateral ala behind the middle of the ventral margin; height equal to more than half the length. Anterior margin rounded, posterior forming a slight and somewhat rounded protuberance above the middle. Superior margin gently and evenly arched, inferior slightly sinuated. Seen from above, the outline is subrhomboidal, broadest behind the middle, where the width is equal to about two-thirds of the length; extremities slightly mucronate. Ventral surface quite flat. End view broadly triangular, the width greater than the height, basal angles much produced. Surface of the shell very distinctly and regularly marked with a raised reticulation, except on the ventral surface, which is longitudinally striated. The *male* is rather more elongated, more sinuated ventrally, and the alæ not so much produced.

Length  $\frac{1}{5\frac{1}{2}}$  in.

*Hab.* Lang Bank, Cumbrae (*Mr. D. Robertson*), and in rock-pools, Arran (*Rev. A. M. Norman*).

This is a very distinct and remarkable species; and I have pleasure in naming it after its discoverer, whose diligent pursuit of marine zoology, as well as his unvarying kindness in assisting me with specimens for the preparation of the present monograph, merit my most cordial acknowledgment.

#### 12. CYTHERURA GIBBA, Müller. (Plate XXXII. figs. 68–70.)

*Cythere gibba*, Müller, Entomostraca, p. 24, tab. vii. figs. 10–12.

— *gibbera*, idem, ibidem (mas); Lilljeborg, De Crustaceis, p. 167, tab. xix. figs. 1, 2.

— *gibba*, Zenker, Anat. Studien über die Krest. p. 84, tab. v. D.

Scandinavian type? DISTRIBUTION: *Recent*—Norway, Britain.

Carapace of the *female*, as seen from the side, elongated subquadrangular, of nearly equal height throughout, greatest height equal to less than half the length; rounded in front, posterior margin produced into an obtuse beak above the middle; superior margin straight, inferior slightly sinuated. Outline, as seen from above, constricted in the middle, forming a rounded lateral protuberance behind, widest behind the middle; greatest width equal to more than half the length; extremities pointed, the posterior mucronate. End view pentagonal, width greater than the height. "The *male* more elongated, subreniform, upper margin slightly, lower deeply sinuated; seen from above,

sinuated in front of the middle." The shell is closely punctate and divided (especially in the male) into large polygonal areolæ. "Colour deep blackish green towards each extremity, with an obliquely transverse white median band. Last joint of the upper antennæ elongated, equal in length to the preceding; second joint of the last pair of feet much longer than the two following joints; terminal claw curved toward the apex. Copulative organs of the male large, basal portion subquadrangular, with a very long convoluted tube, distal portion obtusely rounded below, divided behind into many irregular processes, of which the lower is large and obtusely pointed."

Length  $\frac{1}{45}$  in.

The only specimen of *C. gibba* which I have seen is a female, in the collection of the Rev. A. M. Norman. The locality in which it was taken is unknown.

### 13. CYTHERURA CORNUTA, n. sp. (Plate XXXII. figs. 12-15.)

DISTRIBUTION: *Recent*—Britain, Dardanelles.

Carapace of the *female*, as seen from the side, subquadrangular, nearly equal in height throughout; height equal to half the length. Anterior extremity broadly rounded, posterior produced above the middle into a large obtusely rounded beak; dorsal margin gently arched; ventral abruptly sinuated in front, produced behind into a sharply defined crest, which terminates in an acute triangular lamina or spine. Outline, as seen from above, somewhat hastate, broadest behind the middle, pointed in front, strongly mucronate behind; greatest width equal to more than half the length. End view triangular, nearly equilateral, base flat and produced at the angles. The shell is faintly sulcate in the middle, the anterior portion marked with almost obsolete polygonal depressions, the posterior irregularly reticulated; ventral surface longitudinally striated, waved.

Length  $\frac{1}{43}$  in.

*Hab.* Birtherbuy Bay, 10 fathoms, amongst mud (*G. S. B.*); Cumbrae and Shetland (*Mr. D. Robertson*); Loch Erribol (*Mr. D. O. Drewett*).

*C. cornuta* is evidently nearly allied to the preceding species, but is distinguished by the acutely angular ventral ala, the less rounded outline, more prominent posterior beak, weaker reticulation of the surface, and, lastly, by its larger size. From *C. acuticostata* it is separated chiefly by the character of the surface-markings.

### 14. CYTHERURA ACUTICOSTATA, G. O. Sars. (Plate XXXII. figs. 1-11.)

*Cytherura acuticostata*, G. O. Sars, *loc. cit.* p. 76.

Atlantic type. DISTRIBUTION: *Recent*—Norway, Great Britain, Ireland. *Fossil*—Norway, glacial.

Carapace of the *female* very tumid; seen from the side, subquadrangular, greatest height somewhat exceeding half the length; broadly rounded in front, posterior margin waved, obliquely truncate, and produced above the middle into a rather slender beak; superior margin gently arched, slightly depressed in front; inferior slightly sinuated, and terminating behind in an acute angular spine. Outline, as seen from above, broadly ovate, mucronate behind; width equal to more than half the length. The *male* more elongated, higher in front than behind, the superior and inferior margins more distinctly

concave. Valves marked with several (8-10, Sars) more or less longitudinal acute elevated ribs, one or more of which terminate behind in sharp spinous points. Colour variable—yellowish, brown, or slaty blue.

Length  $\frac{1}{50}$  in.

*Hab.* Off Holy Island (Northumberland), Birterbuy and Galway Bays, and in shell-sand from South Wales (*G. S. B.*); Cumbrae and Shetland (*Mr. D. Robertson*); Loch Fyne, and in rock-pools, Arran, N.B., and Herm (*Rev. A. M. Norman*); Aberdeenshire coast (*Mr. Dawson*); Isle of Skye, Plymouth, Isle of Portland (*Rev. G. Barlee*).

This appears to be the commonest and most widely distributed of the deep-water species of *Cytherura*, often occurring in considerable numbers. It exhibits much variation in the number and direction of the ribs with which the surface of the shell is marked; and I have met with one specimen, apparently referable to the same species, in which the ribs were quite obsolete except on the ventral surface. This specimen is represented (figs. 9-11), and was taken in Birterbuy Bay, Connemara.

#### 15. CYTHERURA CLATHRATA, G. O. Sars. (Plate XXIX. figs. 43-46.)

*Cytherura clathrata*, G. O. Sars, *loc. cit.* p. 77.

Scandinavian type? DISTRIBUTION: *Recent*—Norway, Great Britain, Ireland. *Fossil*—Glacial and raised beaches, Scotland and Norway.

Carapace of the *female*, as seen from the side, subtriangular, greatest height in the middle, and equal to nearly two-thirds of the length; anterior margin narrow, rounded, and bearing four or five short broad teeth; posterior margin produced into an obtuse laminar process; superior margin strongly arched in the middle, inferior convex. Outline, as seen from above, subovate, widest in the middle, extremities obtusely mucronate; greatest width about equal to half the length. The shell surrounded in the greatest part of its circumference by a laminar belt or keel. "The *male* lower and less strongly arched above" (Sars). The right valve is much larger than the left. Shell marked with irregularly reticulated ribs; mostly one conspicuous ridge running longitudinally near the middle of the valves, and one or two, which are rather less distinct, branching obliquely from it. Colour brown.

Length  $\frac{1}{52}$  in.

*Hab.* Dredged off Yarmouth (*Mr. D. O. Brown*); Ormeshead and Oban (*Mr. D. Robertson*).

#### 16. CYTHERURA CELLULOSA (Norman). (Plate XXIX. figs. 47-50, 60.)

*Cythere cellulosa*, Norman, Nat. Hist. Trans. Northumberland and Durham, vol. i. p. 22, pl. v. figs. 17-20, and pl. vi. fig. 17.

*Cytherura nana*, G. O. Sars, *loc. cit.* p. 78.

British type. DISTRIBUTION: *Recent*—Norway, Great Britain, Ireland. *Fossil*—Glacial, Norway, Scotland.

Valves, as seen from the side, nearly semicircular, except that the infero-posteal angle is broadly and obliquely truncate; greatest height in the middle, and equal to nearly two-thirds of the length; narrow and obliquely rounded in front; produced behind, above the middle, into a short obtuse process. Superior margin very boldly arched,

inferior nearly straight. Seen from above, the outline is compressed oval, the sides nearly parallel in the middle, extremities evenly tapering; width equal to less than half the length. Right valve much overlapping the left. Shell marked with a few large and deep polygonal or irregularly rounded excavations, each of which has a small elevated nodule at the bottom; colour yellowish ("in medio vero colore saturate fusco-violaceo insignis," Sars).

Length  $\frac{1}{70}$  in.

*Hab.* Birterbuy Bay and in shell-sand from Donegal and Roundstone Bays (*G. S. B.*); Lamlash, Berwick, Guernsey, Arran (Ireland), and in rock-pools, Arran, N.B. (*Rev. A. M. Norman*); Cumbrae and Shetland (*Mr. D. Robertson*).

This is the smallest of the genus, and almost the smallest of British Ostracoda. It is also a very distinct and well-marked species, having no near allies except *C. clathrata*, with which, however, it is little likely to be confounded.

#### Genus 9. CYTHEROPTERON, G. O. Sars.

Valves unequal and of dissimilar form, the right overlapping the left in the middle of the dorsal margin; surface marked with small round impressed puncta or shallow angular pits, sometimes with elevated ribs; ventral surface expanded laterally into a winged process; posterior margin produced into an obtuse beak. Hinge-joint composed of two terminal teeth on the right valve, and on the left a median crenulated ridge. Upper antennæ shortly setose and composed of five joints, penultimate joint elongated and bearing on the middle of the anterior margin two hairs; lower antennæ distinctly five-jointed, flagellum long. Mandibles of moderate size; palp three-jointed, branchial appendage bearing two very small setæ. Jaws as in the preceding genus. Feet long and slender, terminal claw slender. Abdomen ending in a long, narrow process, post-abdominal lobes bearing three short hairs. Copulative organs of the male armed behind with three spiniform processes, one of which is trifurcate. Eyes wanting.

This genus is easily distinguished by the prominent lateral alæ of the shell; the peculiar armature of the male copulative organs is a remarkable characteristic of the internal animal structure.

#### 1. CYTHEROPTERON SUBCIRCINATUM, G. O. Sars. (Plate XXXIV. figs. 39-42.)

*Cytheropteron subcircinatum*, G. O. Sars, *loc. cit.* p. 81.

Very similar to the following species, but smaller; the lateral alæ almost semicircularly curved, and not angular. Carapace, as seen from the side, subovate; highest in the middle, greatest height equal to more than half the length, obliquely rounded in front; posterior margin somewhat angularly produced; superior margin forming a flattened arch; inferior nearly straight, but encroached upon by the convex margin of the lateral ala. Outline, as seen from above, very broadly ovate, widest in the middle; greatest width equal to two-thirds of the length, extremities very slightly mucronate. End view triangular, width greater than the height, sides convex, base slightly concave; valves unequal. Surface of the shell faintly pitted, ventral surface longitudinally grooved and bearing a

few small round papillæ. Colour white. "Antennæ and limbs similar to those of *C. latissimum*."

Length  $\frac{1}{6}$  in.

*Hab.* Galway Bay, off the Isles of Arran, in 10 fathoms water (*G. S. B.*).

Like Sars, I at first took this to be the young of the following species; but a minute examination shows decided specific differences, which will be best appreciated by examination of the figures. One specimen only occurred in my dredgings.

## 2. CYTHEROPTERON LATISSIMUM (Norman). (Plate XXXIV. figs. 26–30.)

*Cythere latissima*, Norman, Nat. Hist. Trans. Northumb. & Durh. vol. i. p. 19, pl. vi. figs. 5–8; Brady, Trans. Zool. Soc. vol. v. p. 381, pl. lxii. figs. 4 *a–e*.

*Cytheropteron convexum*, G. O. Sars, *loc. cit.* p. 80.

British type. DISTRIBUTION: *Recent*—Baffin's Bay, Norway, Great Britain, Ireland. *Fossil*—Glacial, Scotland, Norway.

Lateral protuberance moderately prominent, obtusely angular behind. Carapace of the *female*, seen from the side, obliquely subovate, greatest height in the middle, and equal to considerably more than half the length; anterior extremity narrowed, rounded; posterior produced in the middle into an obtusely rounded angle. Superior margin arched; inferior convex, slightly sinuated in front of the middle. Outline, as seen from above, subovate, angular behind the middle, thence suddenly tapering to the posterior extremity, which is sharply pointed; greatest width equal to more than half the length. Ventral surface flat, often longitudinally striated. End view triangular, equilateral, base flat, sides convex. Shell of the *male* more elongated. Colour white. Surface of the valves marked more or less distinctly with oblong, slightly curved pittings, running in transverse rows across the shell. "Second joint of the upper antennæ about equal in length to the fourth, the last very short. Second joint of the last pair of feet much longer than the two following. Distal portion of the male copulative organs obtusely truncated at the apex, the trifurcate spine narrow and shorter than the rest."

Length  $\frac{1}{40}$  in.

*Hab.* In depths of from 10–80 fathoms. Shetland (*Mr. J. G. Jeffreys*); Aberdeenshire (*Mr. Dawson*); Loch Fyne (*Rev. A. M. Norman*); Oban, Bute, Cumbræ, Macduff, Peterhead, and Ormeshead (*Mr. D. Robertson*); Northumberland, Durham, and Yorkshire coasts (*G. S. B.*); Norfolk coast (*Mr. D. O. Drewett*); in shell-sand from the River Ribble and Isle of Wight (*Mr. E. C. Davison*).

A very pretty and well-marked species, distinguishable from the following (*C. nodosum*) by the less angular outline and the absence of any well-defined transverse ribs and nodes, as well as by its larger size,—from *C. punctatum* also by its much greater size, less pronounced lateral alæ, and the character of the surface-marking. It has been wrongly identified by G. O. Sars with *Cythere convexa*, Baird, a totally different species, which has not yet been noticed on the Norwegian coast.

## 3. CYTHEROPTERON NODOSUM, n. sp. (Plate XXXIV. figs. 31–34.)

Atlantic type? DISTRIBUTION: *Recent*—Britain, Ireland. *Fossil*—Glacial, Scotland, Ireland.

Similar to the preceding, but much smaller. Carapace of the female, as seen from the

side, oblong, highest in the middle, greatest height equal to less than two-thirds of the length, narrowed and rounded in front, obliquely truncate behind; superior margin strongly arched, inferior rather convex. Outline, as seen from above, broadly ovate, widest behind the middle, extremities pointed; greatest width equal to more than half the length. End view triangular, equilateral, broad at the apex; base flat, sides decidedly concave. The shell is obscurely punctate and rugose, and has two more or less strongly marked rounded ribs running from the central portion of the ala to the extremities of the hinge-margin, and forming, when viewed from above, two large rounded nodes; the ala itself is more angular than in the preceding species. Animal unknown.

Length  $\frac{1}{50}$  in.

*Hab.* Hebrides and the Minch, 50–60 fathoms (*Mr. J. G. Jeffreys*); and in shell-sand from Roundstone (*Dr. Alcock*).

#### 4. CYTHEROPTERON PUNCTATUM, n. sp. (Plate XXXIV. figs. 45–48.)

*Cytheropteron tricorne*, Brady, Brit. Assoc. Report, 1866, p. 208.

Outline, as seen from the side, very similar to the preceding; but the posterior margin is broader and more produced above, and the lateral ala much more exerted and ending suddenly, behind the middle, in an acute angle. Outline, as seen from above, rhomboidal, rectangular behind the middle, thence tapering to the acuminate posterior extremity; or it may be described as consisting of two equilateral triangles applied to each other by their bases, the larger being in front; greatest width behind the middle and equal to nearly three-fourths of the length. Surface of the shell minutely punctate.

Length  $\frac{1}{55}$  in.

*Hab.* The Minch, 60 fathoms (*Rev. A. M. Norman*), and off Ormeshead (*Mr. D. Robertson*).

I was at one time disposed to refer this species to a fossil form described by Herr Bornemann under the name *Cythere tricornis*; and in outline the two are, indeed, very similar; but the fossil species seems to have no punctation of the surface; and as it differs slightly in other respects, it seems better to keep it distinct.

#### 5. CYTHEROPTERON MULTIFORUM (Norman). (Plate XXIX. figs. 38–42.)

*Cythere multifora*, Norman, Nat. Hist. Trans. Northumb. & Durh. vol. i. p. 18, pl. vi. figs. 13–16, and Brit. Assoc. Report, 1864, p. 192.

Atlantic type? DISTRIBUTION: *Recent*—Britain, Ireland.

Carapace of the *female*, seen from the side, oblong, rhomboidal, equal in height throughout; height equal to more than half the length; ventral ala not very prominent. Extremities irregularly and obtusely rounded, the anterior oblique and forming an obtuse angle at its junction with the dorsum; superior and inferior margins parallel and nearly straight. Seen from above, the outline is subhexagonal, with suddenly tapering pointed extremities; greatest width equal to much more than half the length; hinge-margins depressed behind the middle so as to form a longitudinal sulcus. End view subtriangular, the three sides convex, apex and base centrally emarginate. Carapace of the *male* more elongated; sides, as seen from above, parallel. Shell-surface marked with closely set

angular fossæ, arranged in more or less distinct longitudinal rows, which are separated by sharp ridges. Colour yellowish brown. Animal unknown.

Length  $\frac{1}{50}$  in.

*Hab.* In depths of 10–60 fathoms, Shetland, Stornoway, Skye, Loch Fyne, Plymouth (*Rev. A. M. Norman*); Oban and Ormeshead (*Mr. D. Robertson*); Aberdeenshire (*Mr. Dawson*); Northumberland and Durham coasts, 25–46 fathoms (*G. S. B.*); Hebrides, the Minch, and Channel Islands (*Mr. J. G. Jeffreys*); Devonshire coast (*Mr. C. Spence Bate*); Roundstone (*Dr. Alcock*).

6. CYTHEROPTERON RECTUM, nov. sp. (*See Appendix.*)

Genus 10. BYTHOCY THERE, G. O. Sars.

Valves subequal, smooth or very sparingly sculptured, almost destitute of hairs; thin and fragile. Hinge-joint quite simple or composed of a slight bar and furrow; no teeth. Upper antennæ elongated, seven-jointed; the second joint large and thick and bearing a seta on its anterior and posterior margins; the other joints suddenly much narrower, forming a long slender lash, which bears several setæ; penultimate joint linear and destitute of setæ. Lower antennæ tolerably robust, four-jointed; second joint large; flagellum long, biarticulate, its last joint long and setiform. Mandibles constricted above the distal extremity, strongly toothed; palp four-jointed, bearing a well-developed branchial plate, which is set with numerous ciliated setæ. Terminal lobes of the first pair of jaws very short and thick; branchial plate large, ovate, bearing numerous marginal ciliated setæ, and at the base four long and deflexed simple setæ. Feet elongated, terminal claw very long and slender, second and third joints bearing each a short apical seta; basal joint of the first pair furnished at the base with a small lobe, which bears two very large and densely ciliated, and two smaller and simple setæ. Abdomen ending in a very large and acuminate process; postabdominal lobes narrow and bearing three hairs. Eyes mostly absent.

The species grouped under this genus present two very distinct types, so far as the characters of the shell are concerned; but according to the investigations of Herr G. O. Sars, the structure of the animal itself is the same in both types. My own observations of the animal have been made altogether on dried specimens, and are necessarily imperfect, but, so far as they go, they are quite in accordance with those of that most accurate author.

1. BYTHOCY THERE SIMPLEX (Norman). (Plate XXXIII. figs. 23–27, and Plate XL. fig. 8.)

*Cythere simplex*, Norman, Nat. Hist. Trans. Northumb. & Durh. vol. i. p. 17, pl. v. figs. 1–4.

*Jonesia simplex*, Brady, Trans. Zool. Soc. Lond. vol. v. p. 363, pl. lvii. figs. 11a–e.

*Bythocythere acuminata*, G. O. Sars, *loc. cit.* p. 86.

Scandinavian type. DISTRIBUTION: *Recent*—Baffin's Bay, Norway, Britain. *Fossil*—Glacial, Scotland.

Carapace of the *female*, as seen from the side, oblong fusiform, about twice and a half as long as broad, rounded in front, acuminate behind. Dorsal margin straight in the middle, sloping suddenly downwards at the posterior extremity, gently rounded in front;



ventral margin sinuated in front, very convex behind. The valves are bordered by a broad, flattened flange, which bulges conspicuously near the middle of the ventral margin, and is lost on the dorsum; the flange is marked by numerous closely set radiating hair-like lines. Outline, as seen from above, elongate fusiform, more than thrice as long as broad, narrowed in front, slenderly acuminate behind, the right valve overlapping the left. Shell of the *male* scarcely different from that of the female. Lucid spots five, forming an oval patch a little below and in front of the centre of the valve; spots parallel, the three central ones linear-oblong, the terminal ones oval or lenticular. Shell perfectly smooth, thin and structureless, pellucid, slightly olivaceous, with arborescent markings of a deeper tint. Hinge-margins straight, quite simple. Last pair of feet in the male subprehensile, last three joints very robust, terminal claw very strong. Distal portion of the male copulative organs large, irregularly triangular, subtruncate at the apex; anterior margin straight, posterior deeply sinuated. No eyes.

Length of female  $\frac{1}{20}$  in.

*Hab.* Off Holy Island, Northumberland, in 45 fathoms; off Scarborough, and in dredgings from Shetland (*G. S. B.*); Dogger bank (*Rev. A. M. Norman*); Aberdeenshire coast (*Mr. Dawson*); off Cumbrae, Bute, and Ormeshead, and at low water-mark in the Isle of Man (*Mr. D. Robertson*); the Minch (*Mr. J. G. Jeffreys*).

This species was first described by the Rev. A. M. Norman, from specimens taken in deep water a hundred miles off the coast of Northumberland, and shortly afterwards by G. O. Sars from Norwegian specimens. Though widely distributed, it seems to be, in point of numbers, rather a scarce species, the only British gatherings in which it has occurred at all abundantly being those from the Aberdeenshire coast and from off Scarborough. It occurs in the Arctic seas, and also in a fossil state in the Scotch glacial clays.

## 2. BYTHOCY THERE CONSTRICTA, G. O. Sars. (Plate XXXV. figs. 47-52.)

*Bythocythere constricta*, G. O. Sars, *loc. cit.* p. 85.

Carapace tumid, expanded into an obtusely angular lateral protuberance behind, slightly constricted in the middle; ventral surface nearly flat. Shell of the *female*, as seen from the side, subrhomboidal, rather higher behind than in front; greatest height equal to rather more than half the length; obliquely rounded in front, produced behind above the middle into a short, obtusely rounded (sometimes bluntly toothed) process. Dorsal margin nearly straight; ventral sinuated in front, convex behind. Outline, as seen from above, ovate, widest behind the middle, strongly acuminate behind; greatest width equal to considerably more than half the length. Shell of the *male*, as seen from the side, much more elongated, highest behind; greatest height equal to less than half the length; posterior extremity obliquely truncate, and less produced above. Surface of the shell marked with rather distant, round punctations, which are connected with each other by more or less distinct, depressed lines, thus producing a faint reticulation; ventral surface longitudinally striated, and bearing numerous flocculent white papillæ; infero-posteal angle armed (frequently) with 3-5 minute teeth. "Penultimate joint of the upper antennæ longer than the preceding. Second joint of

the last pair of feet longer than the two following;” terminal claw very long and slender. No eyes.

Length  $\frac{1}{30}$  in.

*Hab.* In depths of 10–60 fathoms. The Hebrides and the Minch, Shetland and Channel Islands (*Mr. J. G. Jeffreys*); Aberdeenshire (*Mr. Dawson*); Macduff and Ormeshead (*Mr. D. Robertson*); Northumberland coast and Arranmore, Ireland (*G. S. B.*); Devonshire coast (*Mr. C. Spence Bate*); and in shell-sand from Roundstone (*Dr. Alcock*).

Though widely distributed, this is rather a rare species, and at the same time a very beautiful one. I regret that the specimens in my collection have not enabled me to examine accurately the internal animal structure; and for this reason there may, perhaps, be some doubt as to the sexual relations of the two forms of shell here described and figured. The more elongated (? male) form is the commoner of the two, but in none of my specimens have I found the animal: in one example of the stouter form I found the animal in a rather imperfect state, and have no reason to doubt that it is the female; the greater abundance of the form supposed to belong to the other sex, however, is curious.

### 3. BYTHOCYTHERE TURGIDA, G. O. Sars. (Plate XXXIV. figs. 35–38.)

*Bythocythere turgida*, G. O. Sars, *loc. cit.* p. 84.

“Shell very tumid; lateral protuberance large and obtusely angular behind; ventral surface nearly flat; dorsal evenly arched. Shell of the *female*, seen from the side, subrhomboidal, nearly equal in height before and behind, greatest height equal to much more than half the length; anterior extremity obliquely rounded, posterior somewhat produced above the middle; superior margin a little arched, inferior slightly sinuated; lateral protuberance rather prominent in the middle; seen from above very broad, subhexagonal, greatest width somewhat exceeding the height, and situated behind the middle, tapering gradually in front, suddenly behind; posterior extremity forming an acuminate triangular process. Shell of the *male* a little more elongated, higher behind than in front; superior margin straight in the middle, arched behind. Surface ornamented with a few small rounded impressions, which are larger and more numerous on the ventral surface; posterior margin armed below with five to seven minute teeth. Colour white, with a few red spots on the dorsal aspect. Eyes separate. Penultimate joint of the upper antennæ equal in length to the preceding. Branchial appendage of the mandible-palp bearing eight setæ, gradually decreasing in length towards the front, the two anterior rudimentary, one overlapping the other. Second joint of the last pair of feet shorter than the united length of the two following joints. Apical portion of the male copulative organs produced downwards, elongated, subtriangular or lanceolate.”

The single shell figured in Plate XXXIV. was unaccountably lost or mislaid before my drawings were completed. I have no record of the locality; but it was probably taken off Holy Island on the Northumberland coast, and seems to me, from a comparison of the figures with Sars's description, quoted above, to be referable to *Bythocythere turgida*.

Length  $\frac{1}{28}$  in.

G. O. Sars gives the following curious description of the male copulative organs. "By a wonderful freak of nature these have the appearance, when seen from the side, of the head of a bald old man. The basal portion represents the skull, the terminal portion the long beard, and the intervening parts the profile with forehead, nose, and mouth. To make the resemblance more complete, some chitinous bands produce, in the proper position, an eye with pupil and highly elevated eyebrows. These organs present in various orders of Crustacea so many variations that, by the help of a little fancy, it is easy to make each species represent some particular object. But here the resemblance is so exact that it must needs strike every observer."

Genus 11. PSEUDOCY THERE, G. O. Sars.

Shell thin and pellucid, having no distinct structure, rounded in front, produced behind. Hinge-joint simple. Upper antennæ bearing long setæ, 7-jointed; second joint thick and armed with a single seta on the middle of the anterior margin; last joint very long and narrow, linear, terminating in very long setæ; lower antennæ very slender, 5-jointed; flagellum long and slender. Mandibles small, with slender, curved, unguiform teeth; palp narrow, 4-jointed; branchial appendage bearing long setæ. Terminal lobes of the first pair of jaws narrow; branchial plate large, elongate-ovate, armed towards the base with three curved and deflexed simple setæ. Feet very long and slender. Abdomen ending in a long, slender process; postabdominal lobes almost as in the preceding genus. No eye.

Though very nearly related to the foregoing, the characters given by G. O. Sars appear to be amply sufficient to constitute *Pseudocythere* a distinct genus. The form of the carapace is, indeed, so peculiar as at once to suggest its distinctness; and there are also important differences in the structure of the antennæ and mandibles. The only member of the genus is

PSEUDOCY THERE CAUDATA, G. O. Sars. (Plate XXXIV. figs. 49-52, and Plate XLI. fig. 6.)

*Pseudocythere caudata*, G. O. Sars, *loc. cit.* p. 88.

Carapace of the *male*, as seen from the side, quadrilateral, highest in front; greatest height equal to more than half the length. Anterior margin broad and well rounded; posterior obliquely truncate, produced above into an obtusely conical beak. Superior margin sloping in a somewhat sinuous line from before backwards; inferior slightly sinuated in front, terminating behind in one or two small sharp teeth. The anterior and ventral margins form a thin flattened lamina, which is marked with radiating transverse lines, and is most strongly developed behind. Shell of the female rather more tumid. Outline, as seen from above, compressed, oval, tapering to the extremities, which are slightly mucronate; greatest width in the middle and equal to one-third of the length. Shell smooth, thin, and fragile, bearing scattered short hairs; pellucid, the brown body of the animal showing through the shell. Lucid spots four, linear, parallel, situated obliquely a little in front of the middle. "Last joint of the upper antennæ much longer

than the three following; penultimate joint of the lower antennæ very slender, and twice as long as the preceding. Branchial appendage of the mandible bearing eight backward-pointing setæ. Second joint of the last pair of feet shorter than the two following."

Length  $\frac{1}{43}$  in.

*Hab.* Rare; in depths of 10–60 fathoms. Birterbuy Bay and coast of Northumberland off Holy Island (*G. S. B.*); the Minch, and one dead shell in rock-pool, Herm (*Rev. A. M. Norman*).

#### Genus 12. CYTHERIDEIS, Jones.

Carapace slender, elongate, subovate, tapering towards the front, not much compressed laterally. Hinge-margins nearly simple; shell smooth, finely punctate. The right valve overlapping the left in the centre of the ventral aspect. Animal unknown.

CYTHERIDEIS SUBULATA, Brady. (Plate XXXV. figs. 43–46.)

*Cythere flavida*, Baird, Brit. Entom. p. 168, t. xxi. figs. 12, 12 a.

British type. DISTRIBUTION: *Recent*—Britain, Ireland, Bay of Biscay, Cape Verd, Levant. *Fossil*—Glacial, Scotland.

Carapace, as seen from the side, much attenuated in front, highest behind; greatest height equal to one-third of the length; sharply rounded in front, broadly and obliquely rounded behind. Superior margin sloping with a gentle curve from the middle forwards, nearly straight behind the middle; inferior margin gently sinuated in the middle. Seen from above, the outline is compressed ovate, widest behind, tapering to an acute point at each extremity; greatest width equal to one-third of the length. Shell thin and fragile, yellowish, marked with fine closely set impressed puncta; the anterior and posterior margins with transverse radiating lines; centre of the valves obscurely sulcate transversely. End view circular. Animal unknown.

Length  $\frac{1}{46}$  in.

*Hab.* In shell-sand from the Mumbles, Donegal Bay, and Roundstone (*G. S. B.*); Macduff and Peterhead (*Mr. D. Robertson*); Channel Islands (*Mr. J. G. Jeffreys*); Devonshire coast (*Mr. C. Spence Bate*); Frith of Clyde, Falmouth, and in rock-pools, Herm (*Rev. A. M. Norman*).

All the examples of this species which I have seen are merely empty shells, and therefore I cannot refer it with certainty to its proper position. The shell, though in its lateral aspect very similar to some forms of *Paradoxostoma*, differs in some important particulars: it is not laterally compressed as all the elongated forms of the latter genus are; the shell is more horny in character, and not smooth and polished. The lucid spots are four, large, quadrangular, and irregularly grouped. Lastly, the overlapping ventral margin of the right valve almost certainly proclaims that it cannot belong to that genus, which always exhibits a longitudinal aperture between the two contact-margins in front, for the protrusion of the suctorial apparatus. Under these circumstances, I have retained for this species the generic term *Cytherideis*, under which group, as originally defined by Professor Rupert Jones, it would naturally fall. Müller's *Cythere flavida*, with which Dr. Baird identifies it, seems to me to belong to another species, probably *Paradoxostoma variable*.

## Genus 13. SCLEROCHILUS, G. O. Sars.

Valves elongated, very hard, especially towards the margins; surface smooth and shining, ornamented with very minute scattered papillæ. Hinge-joint formed by a projecting median crest of the left valve. Antennæ robust; second joint of the upper bearing a seta on the anterior and posterior margins, the last five joints quickly decreasing in size and bearing numerous long setæ; lower antennæ larger than the upper, 5-jointed; flagellum long and very slender. Poison-glands very large, and divided into many lobes. Mouth produced, conical; labrum strongly toothed. Mandibles small; teeth numerous and acuminate; palp narrow, indistinctly 3-jointed, with a distinct branchial appendage. Terminal lobes of the first pair of jaws partly wanting; branchial plate narrow, almost lanceolate, and set with numerous setæ on the outer and inner margins. Feet short and robust; second and third joints armed in front with a short seta; first pair armed with a single strong spine at the apex of the basal joint. Postabdominal lobes larger than usual, forming broad bilobed laminæ, and bearing five setæ. Eye single.

In outward appearance the one species belonging to this genus is scarcely separable from the following (*Paradoxostoma*); but the structure of the animal shows an apparent transition from the *Cythere* type to that of *Paradoxostoma*. This is more especially evident in the mandibles and mouth.

SCLEROCHILUS CONTORTUS, Norman. (Plate XXXIV. figs. 5–10, and Plate XLI. fig. 7.)

*Cythere contorta*, Norman, Ann. & Mag. Nat. Hist. vol. ix. 1862, p. 48, pl. ii. fig. 15; and Trans. Tyne-side Nat. Field Club, vol. v. p. 150, pl. iii. fig. 15.

*Sclerochilus contortus*, G. O. Sars, *loc. cit.* p. 90.

British type. DISTRIBUTION: *Recent*—Britain, Norway, Bay of Biscay. *Fossil*—Glacial and raised beaches, Scotland, Ireland, Norway.

Carapace of the *female*, seen from the side, elongated, bean-shaped, higher behind than in front; greatest height rather behind the middle, and equal to considerably less than half the length. Anterior and posterior margins rounded; superior boldly arched, sloping steeply in front, inferior deeply sinuated in front, convex behind. Outline, as seen from above, compressed oval, more than twice as long as broad; greatest width behind the middle, tapering to the extremities, the anterior of which is the more acutely pointed. Shell of the *male* more elongated, the dorsal margin less convex. Shell smooth and polished, very sparingly punctate, the margins marked with short transverse, radiating striæ. Colour yellowish, with a reddish-brown patch on the dorsum. Lucid spots five, linear-oblong, parallel. Third joint of the upper antennæ not shorter than the preceding, and about equal to the united lengths of the three following. "Branchial appendage of the mandibular palp bearing four long, subequal setæ." First pair of jaws having only two terminal lobes, one of which is very narrow, and terminated by a hooked spine. Second joint of the last pair of feet shorter than the two following. Basal portion of the male copulative organs semiovate; upper and anterior margin forming a continuous arch; distal portion smaller, subovate, narrowed to the base.

Length  $\frac{1}{3}$  in. 76.

*Hab.* This species occurs from low-water mark to the greatest depths that have yet been dredged in the British seas. Shetland, Frith of Clyde, Skye, Youghal, Plymouth (*Rev. A. M. Norman*); Aberdeenshire coast (*Mr. Dawson*); Hebrides and Channel Islands (*Mr. J. G. Jeffreys*); Devonshire (*Mr. C. Spence Bate*); Cumbrae, Macduff, Peterhead, and Ormeshead, and at low water-mark, Isle of Man (*Mr. D. Robertson*); Northumberland and Durham coasts (30–46 fathoms); Birterbuy Bay and in oyster-ooze from Stranraer (*G. S. B.*); Norfolk coast (*Mr. D. O. Drewett*); and in shell-sand from the Girdler Sand, Margate, and Donegal (*Mr. E. C. Davison*).

One of the most widely distributed, and, in most localities, one of the more abundant species. It is readily distinguished from all others by its peculiarly flexuous outline.

#### Genus 14. PARADOXOSTOMA, Fischer.

Shell thin and fragile, smooth, shining, and having no definite structure; valves subequal, mostly much higher behind than in front, usually elongate-ovate. Lucid spots as in the preceding genus. Hinge-joint simple. Ventral margins emarginate in front, so that when the valves are closed there is still an elongated orifice, through which the suctorial mouth can be protruded. Upper antennæ exceedingly slender, 6-jointed, and bearing short setæ; lower shorter and more robust, 5-jointed; flagellum large and almost as thick as the antenna itself. Poison-glands large and mostly lobulated. Mouth suctorial. Labrum and labium forming together a large and stout subconical process projecting downwards, and terminating in a disk with elevated margins, in the middle of which the orifice of the mouth is situated. Mandibles very slender, protractile, styloform, subulate at the apex; palp very slender and elongated, indistinctly jointed, and without a branchial appendage. Terminal lobes of the first pair of jaws very narrow; branchial plate elongate-ovate, and bearing at the base two deflexed setæ. Feet short and robust, last joint elongated, terminal claw very short and curved; basal joint of the first pair armed at the apex with a single strong spine. Postabdominal lobes bearing two short hairs. One eye.

The peculiar characters of the mouth in this genus were first noticed by Fischer, and by him were justly made the ground of separation from other Cytheridæ\*; these observations were made on species found in Madeira. Herr G. O. Sars, however, has described with much more minuteness and accuracy, in his 'Oversigt af Norges marine Ostracoder,' to which reference has so frequently been made in these pages, the anatomical characters of the genus. The suctorial mouth and the stylet-shaped mandible are very extraordinary, and show an interesting approximation to the structure of the mouth-organs in the parasitic Copepoda. It is not likely, however, that the members of this genus are in any sense Epizoa; they have never been taken in situations at all different from those frequented by other Ostracoda, being constantly met with on the fronds of algæ in littoral situations, or in the mud and ooze of considerable depths of water. Indeed we cannot doubt that the piercing and suctorial apparatus with which they are armed is used, not for the abstraction of the vital juices of any large animal, but simply as a means of appropriating the nourishment found in the monads and other minute animal prey on which the Crustacea appear mostly to subsist. Sars, indeed, conjectures that it

\* Abhandl. d. kgl. bayerischen Akademie d. Wissenschaften, Bd. vii.

may be employed to puncture the epidermis of algæ, and afterwards to abstract the juices of the plant; but in this case one fails to see any use for the exceptionally large poison-glands and urticating setæ with which the members of this genus are armed. Altogether it appears to me more conformable to what we know of the general habits of the Crustacea, and more fully explanatory of the peculiarities of the Paradoxostomata, if we suppose their diet to consist of microscopic animalcula, rather than the juices of algæ or of animals much higher in organization than themselves.

1. PARADOXOSTOMA VARIABILE (Baird). (Plate XXXV. figs. 1-7, 12-17, and Plate XLI. fig. 8.)

*Cythere variabilis*, Baird, Trans. Berw. Nat. Club, i. 98, tab. iii. figs. 7 *a*, *b* (1835), and ii. 153; Brit. Entom. p. 170, tab. xxi. figs. 10, 11.

*Paradoxostoma variabile*, G. O. Sars, *loc. cit.* p. 93.

? *Cythere flavida*, Müller, Entomostraca, p. 66, tab. vii. figs. 5, 6.

British type. DISTRIBUTION: *Recent*—Baffin's Bay, Britain, Norway. *Fossil*—Glacial and raised beaches, Norway, Scotland, Ireland.

Carapace of the *female*, seen from the side, elongate-ovate, much attenuated in front, highest behind the middle; greatest height equal to not more than half the length. Anterior margin narrowly, posterior very broadly and obtusely rounded, often slightly angulated above; superior margin well arched, sloping rather steeply in front; inferior straight or but slightly convex in front, much more convex behind. Outline, as seen from above, compressed ovate, tapering gradually to each extremity; greatest width behind the middle, and equal to more than one-third of the length; extremities pointed. The shell of the *male* is similar to that of the female. Valves pellucid, white, slightly olivaceous or ochreous; marked with arborescent black or violet patches, and often with two more or less distinct dark transverse bands. Second and fourth joints of the upper antennæ nearly equal in length, longer than the third, and very much longer than the united lengths of the fifth and sixth. Terminal claws of the lower antennæ very short and subequal; flagellum robust, triarticulate. First pair of jaws having only three uniarticulate lobes, two of which are nearly equal in length, the other more than twice as long. Last joint of the third pair of feet very long and narrow, densely ciliated on the anterior margin. Basal segment of the male copulative organs exceedingly large and rounded, distal segment very small and twisted, bipartite, the anterior portion narrow and obtuse, the posterior expanded and acuminate.

Length  $\frac{1}{35}$ — $\frac{1}{32}$  in.

*Hab.* Berwickshire and Dover (*Dr. Baird*); plentifully in rock-pools on the Northumberland and Durham coasts, and in shell-sand from Guernsey (*G. S. B.*); at roots of *Laminaria*, Tobermory; Isle of Skye, Arran, and Herm (*Rev. A. M. Norman*); Falmouth (*Rev. Mr. Barlee*); dredged off Cumbræ (*Mr. D. Robertson*); Girdler Sand, Thames (*Mr. E. C. Davison*).

It seems to me very probable that (as has been suggested by Sars) Müller's description of *Cythere flavida* has been taken from the ochreous variety of this species; but, considering the doubt which must attach to this supposition, and the fact that the name

*flavida* is by no means a generally appropriate one, it seems better to retain the name proposed by Dr. Baird.

2. PARADOXOSTOMA ABBREVIATUM, G. O. Sars. (Plate XXXV. figs. 22–25.)

*Paradoxostoma abbreviatum*, G. O. Sars, *loc. cit.* p. 94.

Atlantic type? DISTRIBUTION: *Recent*—Britain, Ireland, Norway. *Fossil*—Glacial, Scotland.

Carapace of the *female*, as seen from the side, much shorter and higher than the preceding, greatest height behind the middle, and equal to about two-thirds of the length; extremities rounded, anterior narrow, posterior excessively broad; superior margin boldly arched, inferior deeply sinuate in front, very convex behind. Outline, as seen from above, compressed ovate, about three times as long as broad. Colour whitish or pale yellow. "Shell of the *male* and young female lower, inferior margin less convex behind. Third joint of the upper antennæ much shorter than the preceding, fourth elongate, and about twice as long as the following two united; terminal claws of the lower antennæ unequal, the anterior about twice as long as the posterior. First pair of jaws almost as in the preceding species. Last joint of the third pair of feet very slightly ciliated. Distal portion of the male copulative organs large, subhamate, or armed behind with a spiniform curved process."

Length  $\frac{1}{45}$  in.

*Hab.* Mostly beyond low-water mark. Plymouth Sound, 5 fathoms (*Mr. C. Spence Bate*); Girdler Sand and Race's Bank (*Mr. E. C. Davison*); Lerwick and Cumbræ (*Mr. D. Robertson*); Lamlash (living in tide-pools), Skye (*Rev. A. M. Norman*).

The validity of this species seems to me open to considerable doubt; and had it not been for the slight differences of animal structure noticed by G. O. Sars, I should have certainly considered it merely a variety of the preceding. Unfortunately, all the specimens which I have seen are merely dried shells, and I have therefore had no opportunity of myself examining the recent animal. But the differences described by Sars are after all very slight, and perhaps do not amount to more than ought to be allowed as merely varietal. This can only be decided by further examination of this and such intermediate forms as those figured (figs. 1–3, 12, 13), which it is now difficult to refer with certainty either to *P. variabile* or *P. abbreviatum*. The form represented in figs. 14–16 is, I believe, referable to the young of *P. variabile*.

3. PARADOXOSTOMA NORMANI, n. sp. (Plate XXXV. figs. 39, 40.)

Carapace of the *female*, as seen from the side, subreniform, much narrowed in front, highest in the middle; greatest height equal to half the length; extremities rounded, the anterior narrow and produced, posterior broad. Superior margin arched, highest in the middle, sloping steeply in front; inferior deeply sinuated in front of the middle, convex behind. Outline, as seen from above, ovate; extremities pointed, widest in the middle; greatest width equal to one-third of the length. Shell pellucid, marked with dendritic black patches, the brown body of the animal shining through the shell. Fourth joint of the upper antennæ more than twice as long as the fifth; lower antennæ short, terminal



claws unequal, one large, the other very short and slender. Terminal claw of third foot long and slender, finely ciliated on the anterior margin; the preceding joints not ciliated.

Length  $\frac{1}{45}$  in.

*Hab.* Isle of Skye, Herm, and Plymouth (*Rev. A. M. Norman*).

4. PARADOXOSTOMA PULCHELLUM, G. O. Sars. (Plate XXXV. figs. 41, 42.)

*Paradoxostoma pulchellum*, G. O. Sars, *loc. cit.* p. 95.

Carapace of the *female* much compressed; seen from the side, nearly semicircular, rather more tapered in front than behind; greatest height in the middle, and equal to rather less than half the length. Extremities rounded, the anterior rather the narrower of the two; superior margin evenly arched, inferior very slightly sinuated in the middle. Outline, as seen from above, much compressed, nearly four times as long as broad. Shell pellucid, yellowish, with deep-black or violet dendritic markings scattered irregularly over the dorsum and centre of the valves. "Third joint of the upper antennæ scarcely shorter than the preceding, and longer than the following; last two subequal, their united lengths not shorter than the preceding one. Lower antennæ very slender, bearing one small terminal claw. Jaws and feet almost as in *P. abbreviatum*. Male unknown."

Length  $\frac{1}{50}$  in.

*Hab.* In rock-pools, Guernsey, Herm, and Stornoway (*Rev. A. M. Norman*).

A very distinct and pretty species, well worthy of the name bestowed upon it by Sars. The colouring of the specimens collected by Mr. Norman does not exactly agree with Sars's description ("in medio vero fascia lata transversali colore saturate obscure-violaceo instructæ), though in some cases there is an indication of a transverse band; but very little stress can be laid upon this point, especially in the present genus.

5. PARADOXOSTOMA OBLIQUUM, G. O. Sars. (Plate XXXV. figs. 18-21.)

*Paradoxostoma obliquum*, G. O. Sars, *loc. cit.* p. 97.

Carapace of the *female* tumid, seen from the side subrhomboidal; greatest height in the middle, equal to more than half the length. Anterior extremity rounded, much narrowed; posterior obliquely truncate, its upper angle produced; superior margin strongly arched, sloping steeply in front, where it is also slightly incurved; inferior gently convex. Outline, as seen from above, ovate, fully twice as long as broad. End view nearly circular. The right valve is of a shape different from the left, being higher and overlapping on the antero-dorsal and postero-ventral margins. *Male* unknown. Shell smooth, pellucid, fawn-coloured, without any maculæ.

Length  $\frac{1}{35}$  in.

*Hab.* Abundantly in shell-sand from Roundstone (*Dr. Alcock*); in oyster-ooze from Stranraer (*G. S. B.*); Sound of Skye, and in tide-pools at Arran, N.B., and Herm (*Rev. A. M. Norman*); Shetland (*Mr. D. Robertson*).

Of this very well-marked species I have been able to dissect only one specimen (Stranraer), and the animal was not in sufficiently good preservation to enable me to do

more than satisfy myself respecting its sex and genus. Though very abundant in the shell-sand from Dog's Bay, near Roundstone, these specimens consist only of detached valves; and I have not detected it in my own dredgings from Roundstone and Birterbuy Bays.

6. *PARADOXOSTOMA HIBERNICUM*, n. sp. (Plate XXXV. figs. 35, 36, and Plate XL. fig. 7.)

Carapace of *female*, as seen from the side, oblong subelliptical, rather higher behind than before; greatest height equal to less than half the length. Extremities nearly equally rounded; superior margin gently and evenly arched; inferior slightly sinuated in front. Outline, as seen from above, compressed oval; extremities equally acuminate; greatest width in the middle, equal to rather more than one-fourth of the length. *Male* unknown. Shell smooth and polished; colour (of spirit specimens) a uniform ashy grey. Upper antennæ very slender, one very short slender seta at the apex of the third and fourth joints; fourth joint nearly twice as long as the third, and more than twice as long as the fifth and sixth united; fifth joint twice as long as the sixth. Terminal claws of the feet short, thick, and abruptly curved; penultimate joint of the third foot much less than half the length of the preceding, bearing five strong spinous setæ on the anterior margin. Basal portion of the male copulative organs moderately large, rounded; distal portion small, elongated triangular, acuminate.

Length  $\frac{1}{38}$  in.

*Hab.* In rock-pools amongst the smaller algæ, Great Isle of Arran, Ireland (*G. S. B.*); Arran, N.B., and Loch Carron, Ross-shire (*Rev. A. M. Norman*).

7. *PARADOXOSTOMA SARNIENSE*, n. sp. (Plate XXXV. figs. 26–29, and Plate XL. fig. 9.)

Carapace of the *female*, seen from the side, oblong elliptical, rather higher behind than in front; dorsal and ventral margins nearly parallel, greatest height equal to less than half the length. Anterior extremity obtusely, posterior obliquely rounded; superior margin perfectly straight; inferior straight in front, convex behind, much compressed, and forming a prominent keel. Outline, as seen from above, excessively compressed, more than four times as long as broad, extremities equally pointed. Shell smooth, pellucid, ornamented on the dorsal and ventral portions of the valves with dendritic black or dark-brown markings. Lower antennæ very slender, scarcely thicker than the stout but slenderly pointed flagellum; one terminal claw. Penultimate joint of the third foot one-third the length of the preceding, anterior margin finely ciliated; terminal claw slender. *Male* unknown.

Length  $\frac{1}{40}$  in.

*Hab.* Guernsey and Herm, in rock-pools, and Falmouth (*Rev. A. M. Norman*); and in shell-sand from the Channel Islands (*G. S. B.*).

A very beautiful and remarkable species, differing from the preceding chiefly in its colouring, its less flexuous outline, and its greater lateral compression.

8. *PARADOXOSTOMA ENSIFORME*, n. sp. (Plate XXXV. figs. 8–11.)

Atlantic type. DISTRIBUTION: *Recent*—Britain, Ireland. *Fossil*—Glacial, Scotland, Ireland.

Carapace, as seen from the side, elongate siliquose, highest behind the middle; greatest height equal to much less than half the length. Anterior extremity much narrowed, rounded; posterior produced, and somewhat angular in the middle; superior margin well and evenly arched; inferior nearly straight in front, convex behind. Outline, as seen from above, ovate, fully thrice as long as broad, broadest in the middle; extremities equally acuminate. Colour dull yellowish white. The animal, so far as I have been able to ascertain from dried specimens, exactly resembles *P. variable*, except in the various parts being more slender and elongated.

Length  $\frac{1}{3\frac{1}{2}}$  in.

*Hab.* In shell-sand, Girdler Sand, estuary of Thames, and Donegal Bay (*Mr. E. C. Davison*); the Minch (*Mr. Jeffreys's dredgings*); Shetland and Peterhead (*Mr. D. Robertson*); Plymouth, Swansea, and Herm (*Rev. A. M. Norman*).

*P. ensiforme* appears to be perfectly distinct from any other described species, though in general outline it rather approaches the form of *P. variable*, figured at Plate XXXV. figs. 12, 13. The chief characteristics of the present species are its attenuated and flexuous form, the median angulation of the posterior, and the comparatively slight compression or keel-like projection of the ventral margin.

#### 9. PARADOXOSTOMA FLEXUOSUM, Brady. (Plate XXXV. figs. 30–34.)

*Bythocythere? flexuosa*, Brady, Brit. Assoc. Report, 1866, p. 211.

Carapace, as seen from the side, sublinear, flexuous, highest in the middle, greatest height equal to one-third of the length; obliquely rounded, and sloping steeply in front, tapering to an obtusely angular median process behind; superior margin evenly and gently arched; inferior sinuated in front, convex and compressed behind. Outline, as seen from above, compressed, ovate, four times as long as broad; extremities acuminate. Colour yellowish white. Animal unknown.

Length  $\frac{1}{4\frac{1}{2}}$  in.

*Hab.* Hebrides and the Minch, 45–60 fathoms (*Mr. J. G. Jeffreys's dredgings*); Birterbuy Bay, 10 fathoms (*G. S. B.*); Plymouth (*Rev. A. M. Norman*); Girdler Sand, Thames (*Mr. E. C. Davison*).

#### 10. PARADOXOSTOMA<sup>?</sup> ARCUATUM, n. sp. (Plate XXXV. figs. 37, 38.)

Carapace, as seen from the side, elongate, curved, highest in the middle; greatest height equal to little more than one-third of the length; attenuated and rounded in front, obliquely rounded behind; superior margin boldly and evenly arched; inferior sinuated in front of the middle, slightly convex behind; anterior and ventral margins compressed and marked by radiating transverse lines. Outline, as seen from above, compressed ovate, broadest behind the middle; greatest width equal to one-fourth of the length. Colour pearly white. Animal unknown.

Length  $\frac{1}{4\frac{1}{3}}$  in.

*Hab.* Birterbuy Bay, 10 fathoms.

One specimen only found.

## Section II. MYODOCOPA, G. O. Sars.

## Fam. I. CYPRIDINIDÆ, Baird.

Shell mostly hard and compact in structure, smooth or punctate, and sometimes beset with short hairs, notched at the antero-inferior angle, so that when the valves are closed there remains still a large aperture for the protrusion of the lower antennæ. Upper antennæ large, geniculated at the base, many-jointed, and bearing, especially towards the apex, several long ringed setæ. Basal portion of the lower antennæ broadly triangular, bearing a slender secondary branch, which is set with a few short setæ, and a large natatory branch, which is mostly nine-jointed, and bears several long ciliated setæ. Mandibles rudimentary, the palp very large, geniculated, pediform, four-jointed; first joint large and thick, bearing at the apex a slightly setose appendage, like a rudimentary branchial plate; last joint very short and strongly clawed. Three pairs of jaws, somewhat pediform. First pair of jaws having four spinous lobes, the exterior or largest biarticulate; first joint large, elongated, subquadrangular; last very short, and set with numerous spines or claws. Second pair of jaws short and stout, composed of several setose or unguiculate segments; the exterior short, three-lobed, and beset with short finely ciliated setæ, bearing at the base a very large semilunar branchial plate, which is provided with numerous marginal setæ. Third pair of jaws smaller, composed of three spinous lobes, beneath which is a membranous subovate plate, beset with many finely ciliated setæ; one pair of feet, forming a very long, flexuous, subcylindrical annulose body, which is armed towards the apex with long prickly spines. Postabdomen large, composed of two broad closely appressed laminæ which are armed posteriorly with strong marginal claws. Two compound pedunculated eyes, between which is a large simple eye, and at its base a short cylindrical tentacle. Male of less height than the female; eyes more developed; copulative organs of complex structure. Ova and embryos borne beneath the shell of the female.

The foregoing description of this family is adopted, with very slight alteration, from the definition of G. O. Sars. The Cypridinidæ are comparatively scarce in the seas of temperate latitudes, but much more abundant in the tropics, constituting, indeed, a not unimportant part of the phosphorescent agencies there so strikingly developed. Many species and genera have been described by various authors, but, except in a few cases, their anatomical structure has not been thoroughly investigated.

In the British seas the few species which have hitherto been discovered are taken mostly by the use of the towing-net at night. Some have occurred amongst dredged sand, and some have been taken by the hand-net amongst *Zostera* in tide-pools; but this seems to be an exceptional circumstance. The animals are essentially of natatory character, their powerful antennæ having free play, even when the valves are quite closed, through the large aperture which is characteristic of the family.

## Genus I. PHILOMEDES, Lilljeborg.

Valves elongated, thin; notch broad, anterior extremity obtuse. Upper antennæ six-jointed, scarcely attenuated at the apex; antepenultimate joint bearing a stout seta,

which is set with numerous long auditory cilia; last joint short, and bearing two setæ, which are much longer than the antenna itself. Lower antennæ very robust, basal portion large and thick, natatory branch very long, nine-jointed, the first three joints elongated, the rest short, subequal, and set with long plumose cilia; secondary branch larger than usual, geniculated, three-jointed, last joint turned upwards. Basal portion of the mandibular feet bearing at the apex a small tubercle, with two short hairs, "forming a rudimentary incisive portion of the mandible; penultimate joint shorter than in *Cypridina*, the anterior marginal setæ fewer and fasciculate. First pair of jaws slender, palp bearing simply a small trisetose lobe; second pair of jaws having neither a mandibuliform appendage nor clawed spines; terminal lobes small, and bearing simple hairs." Eyes large, subelliptical, far separated, and situated near the middle of the shell. Animal swimming with long jerks.

*PHILOMEDES INTERPUNCTA* (Baird). (Plate XXXIII. figs. 10–13, and Plate XLI. fig. 3.)

*Cypridina interpuncta*, Baird, Proc. Zool. Soc. Lond. part 18 (1850), p. 257, plate xvii. figs. 8–10 (Annulosa).

*Philomedes longicornis*, Lillj. De Crustaceis, p. 176, tab. xxvi. figs. 4–6, 14–16; Norman, Ann. & Mag. Nat. Hist. vol. viii. p. 280, plate xiv. fig. 11; G. O. Sars, *loc. cit.* p. 107.

Carapace, as seen from the side, oblong-oval, nearly twice as long as high; dorsal margin nearly straight, almost perpendicularly deflexed behind, gently curved downwards in front; ventral margin gently convex. Anterior extremity obtusely pointed; oral notch situated below the middle, wide, its margins densely setose; posterior extremity broad, obliquely truncate, bearing a short spine near its lower, and sometimes a similar one near its upper termination. Outline, as seen from above, narrow ovate; greatest width in front of the middle, equal to much less than half the length. End view ovate, tumid, the notch showing as a diamond-shaped opening. The shell is yellowish, horny, and translucent (except in old specimens), showing the animal clearly through it; surface marked with a fine reticulated pattern, similar to that of *Candona compressa* (see Plate XXVI. fig. 26), but the meshes larger, often finely punctate. Second joint of the upper antennæ large, longer than the two following; terminal setæ longer than the antenna itself. Natatory branch of the inferior antennæ (exclusive of the setæ) about equal in length to the basal portion; first joint longer than the two following, second about half the length of the third, which is nearly as long as the remaining six; first joint of the secondary branch short and stout; second long, slender, slightly curved, about equal in length to the first joint of the natatory branch, bearing three setæ at the middle of the external margin; last joint shorter, very slender, and much curved, unguiculate, dilated at the base, apex obtuse. Third joint of the mandibular foot scarcely half the length of the second, bearing a dense brush of plumose setæ on the anterior margin. Third pair of jaws terminating in a broadly triangular trifold lobe, densely clothed with plumose setæ. "Oviferous foot" terminated on one side by a rounded elevation, on the other by a curved claw-like process; setæ very slender, minutely and symmetrically spinous at the apices. Postabdominal laminæ armed with about eleven curved

spines, the last two very long and subequal, fourth and sixth about half the length of the second; third, fifth, seventh, and all the rest very slender and short. Eyes black.

Length  $\frac{1}{16}$  in.

*Hab.* Taken abundantly in the towing-net at Cumbrae, chiefly at night time (*Mr. D. Robertson*); Northumberland coast, Shetland, Plymouth Sound, and amongst *Zostera*, between tide-marks at Herm (*Rev. A. M. Norman*).

Though the description given above differs in some minor points from that of G. O. Sars, I have no doubt that the species referred to is the same; and, indeed, a British specimen which I forwarded to that author for examination was identified by him with *P. longicornis*. There is much variety in the spinous armature of the posterior margin; in most cases one short spine exists near its lower extremity, and rarely one likewise at the upper angle; not unfrequently they are altogether wanting. I have not been able clearly to make out the structure of the maxillary apparatus, nor have I seen any males recognizable as such.

The figure and description given by Mr. Norman (*loc. cit.*) are certainly referable to this species, though, owing to their being taken from worn specimens, they are not quite applicable to the species when seen in good condition. There can, I think, be little doubt that Dr. Baird's description and figures of "*Cypridina interpuncta*" are properly to be identified with *P. longicornis*, Lilljeborg.

#### GENUS 2. CYLINDROLEBERIS, Brady\*.

Shell elongated fusiform or subcylindrical; beak rounded, not at all produced; upper antennæ of the *male* bearing at the apex two excessively long, annulated, plumose setæ, four shorter setæ, and a short curved claw; penultimate joint bearing at its apex a stout densely ciliated seta; upper antenna of the *female* terminated by a stout curved claw, and six or seven subequal plumose setæ, which do not exceed in length that of the last four joints of the antennæ; penultimate joint bearing at the apex a short seta or pedicle, from the extremity of which spring six long simple setæ. Second joint of the natatory branch of the lower antennæ in the *male* elongated, in the *female* scarcely longer than the succeeding joints; secondary branch in the *male* robust, subchelate, terminal joint slender, curved upwards; in the *female* simple, triarticulate, last joint setiform. Antepenultimate joint of the mandibular foot shorter than the following joint, bearing three long subequal curved setæ, two of which are plumose; penultimate joint armed with five stout setæ on the anterior, and two at the apex of the posterior margin; last joint very short, armed with a curved claw and several setæ. First maxilla consisting of a broad subquadrate or crescentic lamina, densely clothed on its distal margin with long bristles; second maxilla swollen at the base, suddenly narrowed towards the apex, the apical portion bearing six plumose setæ, three of moderate length, and three short, basal portion having a series of ten simple spine-like setæ on its convex margin; third jaw narrow, elongated, set along the whole of the inner margin with short simple setæ, which increase in length towards the apex; oviferous foot terminating in two symmetrical dentate lips, and bearing about six pairs of spinous setæ.

\* Intellectual Observer, vol. xii. p. 127.

I have not succeeded in detecting the sexual organs of the two species belonging to this genus; but it seems pretty certain that the forms referred to in the generic description are really the two sexes of one and the same species. The shells of the two forms present no appreciable difference; and the several pairs of jaws, the mandibular and "oviferous" feet, and the postabdominal laminae are in both precisely alike.

1. CYLINDROLEBERIS MARLÆ (Baird). (Plate XXXIII. figs. 18-22, and Plate XLI. fig. 1.)

*Cypridina Mariae*, Baird, Proceedings Zool. Soc. Lond. part xviii. (1850) p. 257, pl. xvii. (Annulosa) figs. 5-7.

Carapace, as seen from the side, oblong-elliptical, more than twice as long as high, rather higher in front than behind. Dorsal and ventral margins nearly straight, subparallel; beak erect; notch wide, almost rectangular. Extremities obtusely rounded, the posterior rather narrowed. Outline, as seen from above, oblong, subclavate, about twice as long as broad, greatest width in front of the middle; extremities rounded, the anterior deeply cleft in the centre. Notch radiated, produced along the median lines of the dorsal and ventral aspects as well as laterally. End view nearly circular. Muscle-spots very numerous, forming a conspicuous patch near the centre of the valves. Shell pellucid, and showing through it the deep-yellowish-brown body of the animal; growing altogether opaque with age. Eyes black and plainly visible through the shell, rather behind and above the centre. Upper antennæ of the *male* altogether more slender and less densely setose than in the *female*; auditory seta short and stout, dilated and obliquely truncate at the apex; terminal claw also short and stout, scarcely half the length of the adjacent setæ. Second joint of the natatory branch of the lower antennæ in the *female* short, scarcely longer than the following joints; in the *male* nearly as long as the first joint. First pair of maxillæ subquadrate, bearing a large branchial appendage. Oviferous foot terminating in two equal numerously dentate lips; setæ robust, rather irregularly spined toward the apices. Postabdominal laminae broad, subquadrangular, obliquely truncate behind, armed with six slender marginally dentate, slightly curved claws, which decrease regularly in length from below upwards.

Length  $\frac{1}{11}$  in.

*Hab.* Isle of Skye (*Dr. Baird*); Shetland, Penzance, and with the preceding species in tide-pools at Herm (*Rev. A. M. Norman*); taken in the towing-net at Cumbræ (*Mr. D. Robertson*).

*C. Mariae*, though mostly taken in company with *Philomedes longicornis*, is a much scarcer species, the specimens taken at any one time being never very many.

2. CYLINDROLEBERIS TERES (Norman). (Plate XXXIII. figs. 6-9, and Plate XLI. fig. 2.)

*Cypridina teres*, Norman, Ann. & Mag. Nat. Hist. vol. viii. (Oct. 1861) pl. xiv. fig. 10.

Carapace of the *female*, as seen from the side, ovate, highest behind the middle; greatest height equal to more than two-thirds of the length; extremities rounded, anterior narrowed, posterior broad; superior and inferior margins evenly convex; notch very narrow, curved. Outline, as seen from above, ovate, widest in the middle, more

than twice as long as broad. Surface of the shell smooth, pellucid, and finely punctate, the brown body of the animal shining through. Terminal claw of the upper antennæ long, slender, nearly equal in length to the adjacent setæ; auditory seta slender, scarcely dilated at the extremity. First maxilla elongated, the distal extremity curved upwards, slender, and terminating in two setæ, between which and the range of marginal setæ there is a considerable interval. The basal joint of the mandibular foot bears on the anterior margin a series of eight short setæ, the last three or four of which are bifid or trifid at the extremity. Postabdominal laminæ short, subovate, bearing seven or eight long slender claws, the last two being much the longest.

Length  $\frac{1}{17}$  in.

*Hab.* Dredged in 7–20 fathoms at Oban (*Rev. A. M. Norman*); Guernsey (*Mr. J. G. Jeffreys*); taken in the towing-net at Cumbrae (*Mr. D. Robertson*).

### Genus 3. BRADYCINETUS, G. O. Sars.

Shell thicker and more compact in structure than in the preceding genera; notch deep, with setose margins. Upper antennæ six-jointed, the apical setæ nearly equal and of no great length. Natatory branch of the lower antennæ nine-jointed, its setæ short; secondary branch in the female very small and biarticulate, the last joint obtuse, and bearing at the apex a curved seta; in the male larger, three-jointed; the last joint long and membranaceous, terminating in two short setæ. Mandibular feet similar to those of the preceding genera, but armed also with a bifurcate mandibular process, in front of which are three toothed spines. First pair of jaws strongly armed with spine-like setæ; second pair having a strong mandibuliform appendage composed of two robust toothlike processes. Eyes small, of pale colour, and scarcely visible through the shell. "Animal mostly moving slowly amongst mud, not swimming nimbly like the preceding."

The chief distinguishing characters of this genus are the strong toothed armature of the second pair of jaws, and the peculiar bifurcate process and toothed spines of the mandibular palp. The lower antennæ are also more shortly ciliated, and the habits of the animal are, according to Sars, much less active than those of the allied genera. Fischer's *Asterope grænelandica* belongs to this genus, and is either identical with, or closely allied to, *B. brenda*.

#### 1. BRADYCINETUS BRENDA (Baird). (Plate XXXIII. figs. 1–5, and Plate XLI. fig. 5.)

*Cypridina brenda*, Baird, Brit. Entom. p. 181, tab. xxiii. figs. 1 a–g.

— *globosa*, Lilljeborg, De Crustaceis ex ord. trib. p. 171, tab. xvii. figs. 2–10, tab. xviii. figs. 1, 2, 3 & 7.

*Bradycinetus globosus*, G. O. Sars, *loc. cit.* p. 110.

Carapace of the *female*, as seen from the side, rotundo-ovate; greatest height in the middle, and equal to about three-fourths of the length. Upper margin slightly arched, sloping steeply in front, inferior well and evenly arched, posterior obliquely subtruncate, anterior somewhat narrowed, prominent, and obtusely angular above the notch, which is large and wide, its inferior angle produced into a short tooth. Outline, as seen from



above, subovate, widest in the middle; greatest width equal to a little more than half the length. End view ovate, width equal to three-fourths of the height. Notch, as seen from below, elliptical, seen from the front arcuate. Shell covered densely with short pubescent hairs; colour yellowish white. Second joint of the upper antennæ about as long as the following four united; secondary branch of the inferior antennæ very small, the last joint elongate-ovate, bearing two setæ on its anterior margin, and one, which is curved upwards, on the truncate extremity. Last joint of the mandibular foot armed with three claws, the anterior of which is short, the other two subequal, and nearly twice as long; second joint bearing at its apex a large subconical process, which is armed at the extremity with two moderately long plumose setæ; oviferous feet bearing about twenty-four apical setæ, each of which has 4-6 series of short teeth; extremity hooked at one side. Postabdominal plates having 8-10 dentate claws. "*Male* similar to the female, but rather smaller, the eyes larger and redder; secondary branch of the lower antennæ three-jointed, last joint elongated, membranaceous, terminating in two short setæ."

Length  $\frac{1}{2}$  in.

*Hab.* Forty or fifty miles off Tynemouth, on a muddy bottom (*Rev. A. M. Norman*); "dredged in from 80 to 90 fathoms sand, 20 miles east of the Noss, in the Shetland Isles" (*R. M. Andrew, Esq.*).

I have not had the opportunity of examining the type specimens of this species; but as I believe Dr. Baird considers them to be identical with *B. globosus*, I have here adopted that view.

The following interesting remarks on this species I translate from Sars's work on the Norwegian Ostracoda. The difference noticed by that author between the two forms (probably male and female) have an important bearing on those which I have myself found in *Cylindroleberis Mariæ*. In the latter species, however, the variation occurs principally in the *upper* antennæ. "On account of its slow movements and inconspicuous colour, this species [*B. globosus*] is somewhat difficult to detect amongst the mud in which it constantly seems to live, and with which its shell is often more or less coated. I have mostly found the setæ of the lower antennæ, as represented in Lilljeborg's figure, very short, decreasing in length towards the apex, and non-plumose; but in one individual, which in other respects agreed with the rest, I found a remarkable variation, the setæ attached to the last five joints being much elongated, and adapted for swimming. My attention was first drawn to this as follows. Among several specimens which I had in a glass of sea-water, I saw, to my surprise, one individual suddenly abandon its slow creeping movement, which, from the structure of the lower antennæ, I had alone thought possible for this genus, and, with a peculiar rolling movement, give a short bound upwards from the bottom of the glass. On examination of the animal, I found that the lower antennæ were armed with long swimming-setæ. On account of this peculiarity, I thought that the specimen might possibly be a male, but did not find this surmise borne out by anatomical examination. I have since found amongst my preserved specimens many individuals thus fitted for swimming, and have convinced myself that those with the short setæ are females. The peculiarity is not one of age merely, for I have found it in both young and old individuals; and I have noticed it also in another species

(*B. Lilljeborgii*). In this single example (which, though I could not satisfactorily detect the copulative organs, I must take for the male) the lower antennæ show another marked peculiarity, the shorter branch being much larger than in the female, and having an elongated membranous terminal joint armed with two short setæ, which is entirely wanting in the female. This is shown in Lilljeborg's figure as well as in Baird's figures of the same organs in *Bradycinetus Macandrei*. In the individuals which show this peculiarity the eye-pigment is also much deeper and of a red colour, whilst in the female it is almost entirely absent."

2. BRADYCINETUS MACANDREI (Baird). (Plate XXXIII. figs. 14-17, and Plate XLI. fig. 4.)

*Cypridina Macandrei*, Baird, Brit. Entom. p. 179, tab. xxii. figs. 1 a-g.

Carapace of the *female*, as seen from the side, subcircular, highest in the middle; greatest height equal to more than three-fourths of the length; superior margin arched, sloping steeply in front, inferior boldly rounded; anterior extremity produced into a prominent beak, in shape much like a bird's head, which projects downwards and forwards, terminating in a sharp point, and bearing also at each side a long curved laterally extended process; subjacent notch deep and rather narrow; posterior extremity subtruncate, bearing at its inferior angle a broad truncated and serrated spine. Outline, as seen from above, ovate, tapering to a point in front, broadly rounded behind, greatest width in the middle, equal to half the length; the two lateral curved processes project conspicuously like horns in front, and the posterior spine forms a broad, deeply emarginate mucro behind; hinge-line flexuous, the left valve overlapping behind. The notch appears broadly heart-shaped or subtriangular when seen from below; from the front it is hidden by the two horn-like processes. Surface of the shell finely punctate, white, with clouded patches. Animal almost exactly like that of *B. brenda*; but the filaments of the lower antennæ are profusely plumose, and the secondary branch consists of two broad joints, each of which has four setæ springing from the middle of the external margin, and one from the apex; that from the apex of the distal joint is long and flexuous.

Length  $\frac{1}{12}$  in., height  $\frac{1}{15}$  in. ;

*Hab.* Dredged in 70 fathoms, between the Islands of Lewis and Skye, *R. M'Andrew, Esq.* (*Dr. Baird*); Oban, in mud, and at Cumbræ, amongst the fibres of *Lima hians* (*Mr. D. Robertson*).

Fam. 2. CONCHÆCIADÆ.

"Shell very thin and flexible, neither horny nor calcareous, but almost membranaceous, more or less distinctly notched and emarginate in front, forming an orifice through which, as in the preceding family, the lower antennæ are protruded whilst swimming. No eyes. Upper antennæ, in the *female*, small, obscurely jointed, bearing at the apex a brush of auditory filaments, in the *male* much larger and distinctly jointed; between the antennæ is a very large tentacle directed forwards and dilated at the apex. Lower antennæ almost like those of *Cypridina*; basal joint large and stout, natatory branch

bearing long plumose setæ, secondary branch short and, in the male, prehensile. Mandibles distinct, narrow, dentate at the apex : palp large, pediform, geniculate, four-jointed ; basal joint very large, produced at the base into a dentate process which stretches beyond the apex of the mandible, last joint armed with elongated claws. Two pairs of jaws ; first pair composed of three lobes, the external lobe or palp large, biarticulate, and incurved ; second pair provided with a small branchial plate and an elongated subpediform palp. Two pairs of feet ; first pair elongated, five-jointed, bearing at the base, like the second maxillæ, a small branchial plate, dissimilar in the male and female ; second pair very small and rudimentary. Postabdomen forming two short clawed laminae."

I have had no opportunity of properly examining any of the animals belonging to this family ; and, indeed, its sole claim to admission here rests at present on a single individual taken in Shetland by the Rev. A. M. Norman. The definition given above is taken from the work of G. O. Sars, who describes three species of *Conchœcia*, which appear to be not uncommon on the Norwegian coast, where they are met with either in great depths of water (100–300 fathoms) or swimming near the surface in the open sea.

#### Genus CONCHÆCIA, Dana.

"Valves elongated, produced in front into a beaked process ; shell finely reticulated or marked with concentric striæ ; very slightly pilose. Dorsal surface of the carapace flattened in front, sometimes slightly excavated and keeled. Upper antennæ in the female small, scarcely protruding beyond the shell, immobile, obscurely articulated, bearing at the apex four large auditory cilia and a seta twice as large, curved upwards and finely denticulated ; in the male much larger, distinctly four-jointed and moveable, some of the apical setæ much elongated, and differing in structure from those of the female. Lower antennæ very powerful, basal portion elongate-triangular, and nearly equalling half the length of the shell ; natatory branch seven- to eight-jointed ; first joint longer than the rest united, secondary branch biarticulate, first joint much dilated, last very small, bearing, in the female, several subequal setæ, in the male a short hook-like claw. Labrum large, produced like a hood. Mandibles armed at the lower extremity with a strong tooth and a semicircular, flexuous, and finely toothed crest : palp robust, scarcely projecting beyond the valves ; basal joint bearing near the apex, in lieu of a branchial appendage, a densely ciliated seta ; last joint obliquely truncate, armed with two long and finely toothed claws or spines. First pair of jaws composed of two strongly spined incisive lobes and a large palp, the first joint of which is subovate, and set with long setæ on the anterior and posterior margins ; the last small, incurved, armed with several curved claws, which increase in length inwardly. Incisive part of the second pair of jaws scarcely lobed, strongly spined at the apex ; branchial lamina small, three-lobed ; palp elongated and directed forwards, three-jointed, last joint very small and armed with three unequal claws. First pair of feet five-jointed, bearing at the base a three-lobed branchial plate as in the second pair of jaws ; in the female narrow, directed forwards, and armed at the extremity with three elongated claws ; in the male much stronger and stretched backwards, terminated by three very long ciliated setæ, which are curved

upwards and backwards. Last pair of feet very small, obsolete biarticulate, terminating in two unequal setæ, one of which is very long, often exceeding the length of the limb. Abdomen large and stout, in the adult female mostly filled with ova, behind forming an obtuse process. Postabdominal laminæ short and rounded, armed with several claws and one longer annulated seta springing in front. Eyes wanting, but in the base of the upper antennæ are several lens-like bodies which seem to be imperfect organs of vision, irregularly grouped, but always placed in a distinct nervous layer, and without pigment. One male copulative organ, of simple structure, attached in front of the postabdominal plates on the left side. Animal very agile, swimming very rapidly."

? CONCHÆCIA OBTUSATA, G. O. Sars. (Plate XLI. fig. 9.)

*Conchæcia obtusata*, G. O. Sars, *loc. cit.* p. 118.

Carapace, as seen from the side, subquadrangular, height equal to more than half the length. Anterior margin produced into a sort of hood; posterior obtusely truncate, its inferior angle broadly rounded and destitute of spines; superior and inferior margins nearly straight, parallel. Shell structureless, destitute of striæ or reticulation.

Length  $\frac{1}{20}$  in.

*Hab.* Shetland (*Rev. A. M. Norman*).

The description here given does not accurately correspond with that of *C. obtusata* as given by Sars, particularly as regards the structure of the shell, which that author states to be "striis concentricis subtiliter striata;" but it is impossible to make a minute examination without the destruction of the single specimen preserved in Mr. Norman's collection; I therefore, for the present, refer it to *C. obtusata*, which it approaches, at all events, more closely than any other species.

### Section III. CLADOCOPA.

#### Fam. POLYCOPEIDÆ.

"Valves subequal, thin, not notched in front. Upper and lower antennæ both natatory, terminated by long setæ, basal portion of both large, stout, and muscular; the upper simple, not geniculate, the lower two-branched, both branches natatory. Mandibles distinct, strongly toothed below; palp short, neither pediform nor clawed. Two pairs only of posterior limbs, scarcely pediform, the first natatory, the second branchial. Abdomen terminated by two short unguiferous laminæ. Eyes wanting. No heart. Intestine forming a simple sac."

#### Genus POLYCOPE, G. O. Sars.

"Valves rounded, ventricose, thin, and fragile, corneo-calcareous. Forehead having no tentacle, but in its place two ciliated setæ. Upper antennæ three-jointed, last joint short, terminal setæ long and slender; terminal rami of the lower antennæ unequal, one many-jointed, of structure very similar to that of *Cypridina*, the other shorter and three-jointed. Lower extremity of mandibles strongly inflexed, armed with a few small acute

teeth; palp biarticulate, first joint stout, bearing externally a short, bisetose branchial appendage, last narrow, beset with long plumose setæ. Incisive portion of the first pair of jaws small, forming a simple setiferous lobe; palp very large, four-jointed, two-branched, second joint bearing externally a long, narrow, and obsoletely biarticulate branch, which is terminated by long setæ. Second pair of jaws membranaceous, three-jointed; penultimate joint bearing externally a small branch which terminates in a single seta; furnished at the base with a large branchial plate. Postabdominal plates short, posterior margin shortly digitate and armed between the segments with acuminate claws. Animal swimming actively like the Lynceidæ."

Sars thinks that there are probably several species of this genus, but he has not been able accurately to examine and determine more than one. The two species here described I myself know only from their external characters, the few British specimens hitherto found being apparently empty shells.

1. POLYCOPE ORBICULARIS, G. O. Sars. (Plate XXXV. figs. 53-57.)

*Polycope orbicularis*, G. O. Sars, *loc. cit.* p. 122.

Shell of the *female*, as seen from the side, subcircular, greatest height in the middle, slightly less than the length; anterior margin slightly narrowed and produced, posterior evenly rounded, superior and inferior margins boldly arched. Outline, as seen from above, ovate, tapering equally to each extremity; greatest width in the middle, equal to more than half the length. Valves finely punctate and divided by fine reticulated ribs into numerous polygonal areolæ. Colour pale yellow, marked with patches ("radiating stripes," Sars) of a darker red colour. "Basal joint of the upper antennæ longer than the two others combined, densely hairy on the anterior margin, and provided with a short seta, last joint ending in five long slender setæ; one branch of the lower antennæ eight-jointed, the last seven joints short and subequal; the other three-jointed, first joint longer than the two following combined, bearing eight long partly ciliated setæ. Mandibles divided at the apex into five teeth, the most external of which is much the larger; palp shorter than the mandible itself, its last joint equal in length to the basal joint and bearing seven ciliated setæ. Secondary branch of the anterior maxillæ reaching a little beyond the apex of the palp, and terminating in about eight very long and slender setæ. Branchial plate of the posterior maxillæ narrow, elliptical, bearing sixteen ciliated marginal setæ. Postabdominal plates armed with six finely ciliated claws decreasing gradually in length backwards; behind them two short setæ. Posterior margin of the abdomen bearing three brushes of short hairs. Male unknown."

Length  $\frac{1}{8\frac{1}{2}}$  in.

*Hab.* Shetland and the Minch (*Rev. A. M. Norman*); in oyster-ooze from Stranraer (*G. S. B.*); in shell-sand, Roundstone (*Dr. Alcock*).

There seems to be much difference in the amount of sculpturing of different specimens of *P. orbicularis*. In adults the shell is often almost perfectly smooth, though mostly bearing an obscure reticulated pattern; a single valve from shell-sand at Roundstone (represented at figs. 56 & 57) is more distinctly sculptured than any other specimen that I have seen. Young specimens are punctate but not reticulated.

Probably this is not an uncommon genus; but the extreme minuteness of the animal renders it very liable to be overlooked.

For the anatomical description given above I am indebted to G. O. Sars's work. The same author remarks that the motions of the animal much resemble those of some species of *Chydorus*; it is exceedingly active, having no less than ten limbs adapted for swimming.

## 2. POLYCOPE (?) DENTATA, n. sp. (Plate XXXV. figs. 58-59.)

Carapace, as seen from the side, subcircular, highest in the middle; greatest height equal to fully three-fourths of the length. Anterior margin notched above the middle, notch broad and shallow; inferior obliquely arched, more convex in front than behind; superior margin of the *left* valve simply and obliquely arched, the convexity being greatest behind, that of the *right* valve surrounded by a narrow fillet produced in front into two large, broad, and bluntly pointed teeth which are directed forwards, behind which it is at intervals obtusely angulated, so as to form four sides of a polygon, and ends suddenly in a slightly exerted angular tooth above the middle of the posterior margin. Outline, as seen from above, compressed ovate; sulcate along the hinge-line. Shell thin and fragile; surface closely, minutely, and uniformly punctate; colour yellowish. Animal unknown.

Length  $\frac{1}{5}$  in.

*Hab.* Shetland (*Rev. A. M. Norman*).

It may perhaps be doubtful whether this very remarkable and beautiful little species is rightly referred to the genus *Polycope*: it is at any rate very nearly allied to that genus; but as one specimen only has been found, the anatomical details of the animal cannot at present be investigated.

## Section IV. PLATYCOPA.

### Fam. CYTHERELLIDÆ.

“Valves unequal, very thick and calcareous, not notched in front. Antennæ very large, the upper many-jointed and geniculate at the base; lower broad and flattened, two-branched, like the feet of the Copepoda. Mandibles very small, with a large pectinato-setose palp. Three pairs of hinder limbs, scarcely pediform; the two anterior pairs branchial, the others rudimentary. Abdomen terminating in two very small, narrow, and spiniferous laminae. Ova and embryos borne beneath the shell of the female.”

### Genus CYTHERELLA, Bosquet.

“Valves elongated, flattened, thick, and hard, very unequal; the right much larger than the left, and overlapping throughout the whole circumference, presenting round the entire inner margin a distinct groove into which the valve of the opposite side is received. Upper antennæ very large, shortly setose or spiniferous, seven-jointed, the

first two joints larger than the rest, and forming between them a distinct geniculation; lower antennæ composed of a large, broad, biarticulate, and geniculate basal portion, from which arise two flattened unequal branches, one biarticulate, the other triarticulate, both beset with very numerous long setæ. Labrum large, subglobose, giving out in front a short subtriangular process. Mandibles very weak, strongly inflexed at the lower extremity, which is obliquely truncate and set in a pectinate manner with slender teeth; palp large and elongate, almost straight, bearing on the inner side very numerous long pectinately arranged setæ, which stretch backwards as in the feet of the Sididæ. First pair of jaws bearing at the base a very large branchial plate, which is beset with numerous ciliated marginal setæ; incisive portion divided into three setiferous lobes; palp very large, scarcely articulated; the posterior margin slightly lobated; the inner margin pectinately setose, like the mandibular palp, but smaller. Second pair of jaws membranaceous, bearing, like the preceding pair, a branchial plate, but smaller and narrower; distal portion subovate, beset with a few ciliated setæ, and in the male furnished with a very large and strong hatchet-shaped appendage adapted for prehension. Third pair of jaws, in the female, rudimentary, forming a simple setiferous lobe; in the male strong, distinctly jointed and subcheliform. Abdomen beset behind with several bundles of long setæ for supporting the ova. Postabdominal laminae narrow, slightly dilated at the apex, and armed before and behind with several marginal setæ or spines. Copulative organs of the male very large and narrow."

From this definition of the genus it will be seen that it differs very remarkably from all hitherto known forms, presenting, in the conformation of the lower antennæ, a remarkable approach to the Copepoda, and in the palps of the mandibles and first pair of jaws a likeness to the Sididæ. The way in which the animal uses its powerful limbs is not known, it never having been observed in the living state.

#### 1. CYTHERELLA SCOTICA, Brady. (Plate XXXIV. figs. 18-21.)

*Cytherella Scotica*, Brady, Brit. Assoc. Report, 1866, p. 211.

Valves, as seen from the side, rather obliquely subelliptical, almost equal in height throughout; greatest height equal to more than half the length; extremities broadly, the posterior obliquely rounded, superior and inferior margins slightly concave in the middle. Outline, as seen from above, subconical, subtruncate behind, obtusely pointed and slightly emarginate in front; greatest width situated near the posterior extremity and equal to rather less than half the length, lateral margins nearly straight and converging gently towards the front; hinge-line slightly flexuous near the front, and sulcate. Surface of the shell smooth, faintly punctate, more especially towards the posterior extremity. Colour whitish, opaque. Animal unknown.

Length  $\frac{1}{30}$  in.

*Hab.* The Minch (*Mr. Jeffreys's dredgings*), 60 fathoms.

Two or three specimens only of this interesting species have occurred to the Rev. A. M. Norman and myself, amongst sand dredged off the Scotch coast by Mr. Jeffreys. It is very nearly allied to *Cytherella abyssorum*, Sars; and, indeed, until I saw specimens

of the latter species, I considered the two to be identical. But a comparison with Norwegian specimens, kindly communicated by Herr G. O. Sars, leads me to believe them distinct. The characters in which *C. abyssorum* chiefly differs from the present species are as follows:—The extremities, especially the anterior, as seen from above, are more abruptly truncate, the angles somewhat produced, and the general outline more compressed; seen from the side, the outline is more evenly elliptical; the surface of the shell is much more profusely punctate and the puncta larger.

2. *CYTHERELLA LÆVIS*, Brady. (Plate XXXIV. figs. 15–17.)

*Cytherella lævis*, Brady, Brit. Assoc. Report, 1866, p. 211.

Valves, as seen from the side, subovate, highest in front, greatest height equal to about three-fourths of the length; anterior extremity broadly rounded, posterior rather narrowed; superior margin well arched, sloping steeply behind; inferior sinuated in the middle. Outline, as seen from above, ovate; sides and angles well rounded. Surface quite smooth and devoid of sculpture. Colour yellowish white.

Length  $\frac{1}{37}$  in.

*Hab.* The Minch, 60 fathoms.

One valve only was found, in the same gathering as the previous species.

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APPENDIX.

The following species were, for various reasons, not noticed in the foregoing pages:—

*BAIRDIA FULVA*, nov. sp. (Plate XXVIII. fig. 21.)

Carapace, as seen from the side, subreniform, highest in front of the middle; greatest height equal to rather more than half the length; anterior extremity rounded; posterior somewhat narrowed, rounded below; superior margin boldly arched, inferior sinuated in the middle. Seen from above, compressed ovate, widest in the middle; extremities equally acuminate; width much less than half the length. The right valve is much larger and higher than the left, and overlaps considerably, both on the dorsal and ventral margins; it is also much less angular in outline. Surface of the shell finely and closely punctate. Colour yellowish brown. Animal unknown.

Length  $\frac{1}{35}$  in.

My first acquaintance with this species was derived from a single valve of the left side found among shell-sand from Roundstone. From its shape and the characters of its surface-marking, I supposed that it might perhaps be referable to a variety of, or to some species nearly allied to, *Cytheridea punctillata*, and I therefore figured the valve in juxtaposition with that species. But having more recently seen a perfect specimen, found by Mr. Robertson at Shetland, as well as one or two fossil examples, I have no hesitation in describing it as an entirely new species of *Bairdia*. It will be fully illustrated in the 'Monograph of Posttertiary Entomostraca.'



## CYTHERE EMARGINATA (G. O. Sars).

*Cythereis emarginata*, G. O. Sars, *loc. cit.* p. 38.

Scandinavian type. DISTRIBUTION: *Recent*—Baffin's Bay, Norway, Shetland. *Fossil*—Glacial, Scotland, Norway.

Shell of the *female*, seen from the side, subreniform, highest near the middle; greatest height much more than half the length. Anterior extremity rounded, posterior produced below the middle into a prominent angular lobe; superior margin boldly arched, inferior sinuated in front of the middle and bending upwards behind. Seen from above, the shell is compressed ovate; extremities broadly mucronate. Right valve very different from the left, higher and more boldly arched, sinuated in front of the eyes; posterior extremity more deeply emarginate and more prominent below. Shell of the *male* distinctly quadrangular; greatest height scarcely exceeding half the length, and situated near the front; superior margin only slightly armed; posterior obliquely truncate. Surface irregularly sculptured with large angular excavations; the sculptured portion of the shell terminating abruptly in a transverse ridge, a little in front of the posterior extremity, and below in a sharply cut ventral rib, which is most conspicuous posteriorly. Hinge-line marked on the dorsal aspect by a deep sulcus; hinge-teeth large and strong.

Length  $\frac{1}{30}$  in. , 830000

Dredged by Mr. D. Robertson off Shetland. The only British species with which *C. emarginata* can be confounded is *C. angulata*, which, however, is considerably smaller and may mostly be distinguished also by the absence of any sharply cut transverse declivity, the prominent tuberculation of the valves, and often by a more or less radiate arrangement of the surface-sculpture. *C. costata*, Brady, an Arctic species, is a much nearer relative.

## EUCYTHERE ANGLICA, nov. sp. (Plate XXV. figs. 49, 50.)

Carapace, seen from the side, subtriangular, highest in the middle, greatest height equal to nearly two-thirds of the length; anterior extremity broadly rounded, posterior narrowed, obliquely rounded; superior margin very strongly arched, sloping steeply behind, inferior almost straight. Seen from above, the outline is compressed ovate, widest in the middle, tapering to an acute point in front, more obtuse behind, the hinge-line showing a well-defined sulcus behind the middle. Surface of the shell stony in appearance, rudely punctate, and towards the margins showing traces of concentric furrows.

Length  $\frac{1}{50}$  in.

*Hab.* Dredged off the Durham coast (*G. S. B.*), and off the Morecambe Light-ship (*Mr. D. Robertson*).

This is referred to, under my description of *E. declivis*, as a small, roughly punctate form of that species. Having only met with two specimens in a single locality, I hesitated to admit it as a distinct species; but Mr. Robertson has recently sent me three specimens, completely identical with it, from the west coast, and I think there can be no longer any doubt respecting the propriety of assigning to them a separate specific name.

## CYTHEROPTERON RECTUM, nov. sp.

Carapace, as seen from the side, oblong, subquadrangular, nearly equal in height throughout; height equal to less than half the length; extremities rounded; superior margin straight, terminating abruptly at each extremity in a small protuberance; inferior almost straight; dorsal aspect oblong subovate, widest behind the middle, suddenly constricted at the posterior third; extremities pointed, width rather more than the height. Shell-surface closely and minutely punctate; lateral ala not very prominent, rounded off in front, abruptly angular behind.

Length  $\frac{1}{50}$  in.

One specimen only was dredged, by Mr. D. Robertson, in Lerwick Bay, Shetland, in a depth of 12-14 fathoms.

## Note on CYTHERE JONESII.

In the Mediterranean, the Bay of Biscay, and on the western coast of Ireland, a form which appears to me to be properly referable to this species, but at the same time remarkably different in some minor characters, is abundantly met with. The points in which it differs are, the much greater delicacy and transparency of the shell, and the greater length and slenderness of the entire spinous armature. In the position of the spines and the general outline of the shell, it does not differ appreciably from the typical form of the species. I have no hesitation in identifying it with the *Cythereis ceratoptera* of Bosquet, and, I think, also with the *C. subcoronata* of Speyer. The figures given by the latter author seem, indeed, to be widely different, but a specimen which he kindly communicated to me is either identical, or very nearly so, with the form here noticed.

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TABLE illustrating the Distribution of the British Marine Ostracoda.

"Littoral" includes everything between tide-marks and in salt-marshes; "deep-water" everything beyond low-water mark, also shell-sand. \*\*\* indicates the prevailing forms in each district. \*\* indicates moderately common species. \* indicates rare species.

NAME OF SPECIES.	Channel Islands.		S.W. ENGLAND. (Devon, Cornwall, and South Wales.)		Galway and West Ireland.		S.W. SCOTLAND. (Clyde district, Isle of Man, North Wales.)		N.W. SCOTLAND. (Skye, Hebrides, &c.)		N. SCOTLAND. (Orkney, Sutherland, &c.)		Shetland.		E. SCOTLAND. (Aberdeenshire &c.)		N.E. ENGLAND. (North-umberland, Durham, Yorkshire, and Dogger Bank.)		S.E. ENGLAND. (Norfolk, Thames, &c.)		Norway.	Post-tertiary Fossils.	
	Littoral	Deep water	Littoral	Deep water	Littoral	Deep water	Littoral	Deep water	Littoral	Deep water	Littoral	Deep water	Littoral	Deep water	Littoral	Deep water	Littoral	Deep water	Littoral	Deep water			
PARACYPRIS																							
<i>polita, Sars</i> .....	..	**	..	..	..	..	..	..	..	**	..	..	..	**	..	..	..	..	..	..	..	**	*
PONTOCYPRIS																							
<i>mytiloides, Norman</i> .....	..	**	..	**	..	**	..	**	..	**	..	..	..	*	..	*	..	*	..	..	**	*	
<i>acupunctata, Brady</i> .....	..	..	..	..	..	*	..	..	..	*	..	..	..	..	..	..	..	..	..	..	..	**	*
<i>trigonella, Sars</i> .....	*	*	..	*	..	*	*	**	..	**	..	..	..	..	..	..	..	..	*	..	**	*	
<i>angusta, Brady</i> .....	..	..	..	..	..	*	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BAIRDIA																							
<i>inflata, Norman</i> .....	..	*	..	*	..	**	..	**	..	*	..	*	..	*	..	..	..	..	..	..	..	..	*
<i>acanthigera, Brady</i> .....	..	*	..	**	..	..	..	..	..	..	*	..	..	..	..	..	..	..	..	..	..	..	*
<i>obtusata, Sars</i> .....	..	..	..	..	..	..	..	..	..	*	..	..	..	..	..	..	..	..	..	..	..	..	*
<i>complanata, Brady</i> .....	..	..	..	..	..	..	..	..	..	*	..	..	..	..	..	..	..	..	..	..	..	..	*
<i>fulva, Brady</i> .....	..	..	..	..	..	*	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	*
MACROCYPRIS																							
<i>minna, Baird</i> .....	..	..	..	..	..	..	..	..	..	..	..	..	..	*	..	..	..	..	..	..	..	..	**
CYTHERE																							
<i>lutea, Müller</i> .....	*	..	..	..	..	*	**	**	..	**	..	**	**	..	..	..	**	..	**	..	**	..	*
<i>viridis, Müller</i> .....	**	*	..	..	..	**	*	**	..	**	..	..	..	..	..	*	..	..	*	..	**	..	*
<i>pellucida, Baird</i> .....	*	**	**	**	..	**	*	**	..	**	..	**	**	**	**	**	**	**	**	**	**	**	*
<i>castanea, Sars</i> .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**	..	**	..	**	..	*
<i>tenera, Brady</i> .....	..	..	..	..	..	..	..	..	..	*	..	..	..	*	..	..	..	*	..	**	**	..	*
<i>badia, Norman</i> .....	*	..	*	..	..	*	*	*	*	*	..	..	..	..	..	..	..	..	..	..	..	*	*
<i>oblonga, Brady</i> .....	..	..	..	*	..	*	*	*	*	*	..	..	..	..	..	..	..	..	..	..	..	*	*
<i>rubida, Brady</i> .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	*
<i>albo-maculata, Baird</i> .....	**	**	**	**	**	**	**	**	**	**	..	..	**	*	..	*	**	..	**	**	**	*	*
<i>convexa, Baird</i> .....	*	**	..	*	..	**	*	**	..	**	..	..	..	*	..	..	..	..	..	..	..	..	*
<i>cuneiformis, Brady</i> .....	..	*	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	*
<i>limicola, Norman</i> .....	..	..	..	..	..	..	..	..	..	*	..	..	..	..	..	..	..	..	..	..	..	..	*
<i>globulifera, Brady</i> .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	*
<i>tuberculata, Sars</i> .....	..	**	..	**	..	..	..	..	..	**	..	**	**	**	..	**	..	**	..	**	**	**	*
<i>concinna, Jones</i> .....	..	..	..	..	..	..	..	..	..	**	..	**	..	..	..	..	..	..	..	..	..	**	*
<i>angulata, Sars</i> .....	..	..	..	..	..	..	..	..	..	*	..	..	..	*	..	*	..	..	..	..	..	..	*
<i>emarginata, Sars</i> .....	..	..	..	..	..	..	..	..	..	*	..	..	..	*	..	*	..	..	..	..	..	..	*
<i>dubia, Brady</i> .....	..	..	..	..	..	..	..	..	..	..	..	..	..	*	..	..	..	..	..	..	..	..	*
<i>finmarchica, Sars</i> .....	*	*	..	*	..	*	..	..	..	*	..	..	..	..	..	..	..	..	..	..	..	**	*
<i>pulchella, Brady</i> .....	..	..	..	..	..	..	..	..	..	..	..	..	..	*	..	..	..	..	..	..	..	**	*
<i>villosa, Sars</i> .....	*	**	..	**	..	*	*	**	*	**	..	**	..	*	..	*	..	*	..	*	..	**	*
<i>semipunctata, Brady</i> .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	*
<i>Jeffreysii, Brady</i> .....	..	*	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	*
<i>laticarina, Brady</i> .....	..	*	..	..	..	..	..	..	*	..	..	..	..	..	..	..	..	..	..	..	..	..	*
<i>marginata, Norman</i> .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	*
<i>quadridentata, Baird</i> .....	..	..	..	..	..	..	..	..	..	..	..	..	..	*	..	..	..	..	..	..	..	..	*
<i>emaciata, Brady</i> .....	..	..	..	**	..	**	..	..	..	*	..	..	..	*	..	..	..	..	..	..	..	..	*
<i>mirabilis, Brady</i> .....	..	..	..	**	..	**	..	..	..	*	..	..	..	*	..	..	..	..	..	..	..	..	*
<i>dunelmensis, Norman</i> .....	..	..	..	..	..	..	..	..	..	*	..	..	..	..	..	..	..	..	..	..	..	**	*
<i>mucronata, Sars</i> .....	..	..	..	..	..	..	..	..	..	*	..	..	..	..	..	..	..	..	..	..	..	*	*
<i>Whiteii, Baird</i> .....	..	..	..	*	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	*
<i>antiquata, Baird</i> .....	..	..	..	..	..	**	..	**	..	*	..	..	..	*	..	*	..	..	..	..	..	..	*
<i>Jonesii, Baird</i> .....	..	..	..	..	..	*	..	*	..	*	..	..	..	*	..	*	..	..	..	..	..	..	*
<i>acerosa, Brady</i> .....	..	..	..	*	..	..	..	..	..	*	..	..	..	*	..	*	..	..	..	..	..	..	*
CYTHERIDEA																							
<i>elongata, Brady</i> .....	..	**	..	**	..	**	..	..	..	*	..	..	..	..	..	**	*	..	..	**	..	**	*
<i>papillosa, Bosquet</i> .....	..	..	..	..	..	..	..	..	..	**	..	..	..	..	..	*	..	**	..	*	..	**	*
<i>punctillata, Brady</i> .....	..	..	..	..	..	..	..	..	..	*	..	..	..	*	..	..	..	..	..	..	..	**	*
<i>zetlandica, Brady</i> .....	..	..	..	..	..	..	..	..	..	*	..	..	..	*	..	..	..	..	..	..	..	**	*
<i>subflavescens, Brady</i> .....	..	..	..	..	..	..	..	..	..	*	..	..	..	..	..	..	..	..	..	..	..	..	*
<i>torosa, Jones</i> .....	*	..	**	..	..	..	..	..	..	..	..	..	..	..	..	..	**	..	**	..	**	..	*
<i>Sorbyana, Jones</i> .....	..	..	..	..	..	..	..	..	..	*	..	..	..	..	..	..	..	..	..	..	..	*	*
EUCYTHERE																							
<i>declivis, Norman</i> .....	..	*	..	**	..	**	..	..	..	*	..	..	..	**	..	*	..	*	..	*	..	*	*
<i>Argus, Sars</i> .....	..	..	..	..	..	*	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	*	*
<i>anglica, Brady</i> .....	..	..	..	..	..	..	..	..	..	*	..	..	..	..	..	..	..	..	..	..	..	*	*
ILYOBATES																							
<i>bartonensis, Jones</i> .....	..	..	..	..	..	..	..	..	..	*	..	..	..	*	..	..	..	..	..	..	..	**	*
LOXOCONCHA																							
<i>impressa, Baird</i> .....	**	**	..	**	**	**	**	**	..	**	..	..	..	*	..	..	*	..	..	**	**	*	*

TABLE (continued).

NAME OF SPECIES.	Channel Islands.		S.W. ENG-LAND. (Devon, Cornwall, and South Wales.)		Galway and West Ireland.		S.W. SCOTLAND. (Clyde district, Isle of Man, North Wales.)		N.W. SCOTLAND. (Skye, Hebrides, &c.)		N. SCOTLAND. (Orkney, Sutherland, &c.)		Shetland.		E. SCOTLAND. (Aberdeenshire &c.)		N.E. ENG-LAND. (Northumberland, Durham, Yorkshire, and Dogger Bank.)		S.E. ENG-LAND. (Norfolk, Thames, &c.)		Norway.	Post-tertiary Fossils.	
	Lit-toral	Deep water	Lit-toral	Deep water	Lit-toral	Deep water	Lit-toral	Deep water	Lit-toral	Deep water	Lit-toral	Deep water	Lit-toral	Deep water	Lit-toral	Deep water	Lit-toral	Deep water	Lit-toral	Deep water			
<b>LOXOCOONCHA</b>																							
<i>granulata</i> , Sars	..	..	..	..	..	..	..	*	..	..	..	..	..	..	..	..	..	..	..	..	..	**	
<i>elliptica</i> , Brady	*	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	*	..	..	*	
<i>tamarindus</i> , Jones	*	***	..	***	..	***	..	**	..	**	..	..	..	**	..	**	*	**	..	**	*	*	*
<i>guttata</i> , Norman	..	..	..	*	..	**	..	*	..	**	..	..	..	..	**	..	**	..	*	..	..	*	*
<b>XESTOLEBERIS</b>																							
<i>aurantia</i> , Baird	**	..	**	..	**	**	*	..	..	..	..	..	..	..	*	*	*	..	*	..	**	*	*
<i>depressa</i> , Sars	..	**	..	**	..	***	..	**	..	**	..	..	..	**	..	**	..	**	..	..	**	*	*
<b>CYTHERA</b>																							
<i>nigrescens</i> , Baird	**	..	..	*	**	**	**	**	..	*	..	*	..	**	..	..	*	..	..	..	..	***	*
<i>angulata</i> , Brady	..	..	..	*	..	*	*	..	..	*	..	..	..	*	..	*	..	..	..	..	..	..	*
<i>striata</i> , Sars	*	..	..	**	..	**	..	*	..	**	..	..	..	*	..	..	..	*	..	*	*	*	*
<i>lineata</i> , Brady	..	..	..	..	..	..	..	..	..	*	..	..	..	*	..	..	..	*	..	*	*	*	*
<i>cuneata</i> , Brady	*	..	..	*	..	**	..	..	..	*	..	*	..	*	..	*	..	..	..	..	..	..	*
<i>Sarsii</i> , Brady	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	*
<i>similis</i> , Sars	..	..	..	..	..	..	..	*	..	..	..	..	..	*	..	..	..	..	..	..	..	*	*
<i>undata</i> , Sars	..	..	..	..	..	**	*	**	..	**	..	..	..	**	..	*	..	..	..	..	..	**	*
<i>producta</i> , Brady	..	..	..	..	..	*	..	*	..	*	..	..	..	*	..	*	..	*	..	..	..	*	*
<i>affinis</i> , Sars	..	..	..	..	..	..	..	..	..	..	..	..	..	*	..	*	..	*	..	..	..	*	*
<i>Robertsoni</i> , Brady	..	..	..	..	..	..	*	*	..	..	..	..	..	*	..	*	..	*	..	..	..	*	*
<i>gibba</i> , Müller	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	*	*
<i>cornuta</i> , Brady	..	..	..	..	..	*	..	*	..	..	..	*	..	..	..	..	..	..	..	..	..	*	*
<i>acuticostata</i> , Sars	*	..	..	**	..	***	*	**	..	*	..	..	..	*	..	*	..	*	..	..	..	*	*
<i>clathrata</i> , Sars	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	*	*	*
<i>cellulosa</i> , Norman	..	*	..	..	..	**	*	*	..	..	..	..	..	*	..	..	..	*	..	..	..	*	*
<b>CYTHEROPTERON</b>																							
<i>subcircinatum</i> , Sars	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	*	*
<i>latissimum</i> , Norman	..	..	..	*	..	..	..	**	..	..	..	..	..	**	..	**	..	**	..	**	**	*	*
<i>nodosum</i> , Brady	..	..	..	..	..	**	..	..	*	..	..	..	..	..	..	..	..	..	..	..	..	..	*
<i>punctatum</i> , Brady	..	..	..	..	..	**	..	..	*	..	..	..	..	..	..	..	..	..	..	..	..	..	*
<i>multiforum</i> , Norman	..	*	..	*	..	*	..	*	..	**	..	..	..	*	..	*	..	*	..	..	..	..	*
<i>rectum</i> , Brady	..	..	..	..	..	..	..	..	..	..	..	..	..	*	..	..	..	..	..	..	..	..	*
<b>BYTHOCYTHERE</b>																							
<i>simplex</i> , Norman	..	..	..	..	..	..	*	*	..	*	..	..	..	*	..	**	..	*	..	..	..	**	*
<i>constricta</i> , Sars	..	**	..	**	..	**	..	*	..	**	..	..	..	*	..	*	..	*	..	..	..	*	*
<i>turgida</i> , Sars	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	*	..	..	..	..	*
<b>PSEUDOCYTHERE</b>																							
<i>caudata</i> , Sars	*	..	..	..	..	*	..	..	..	*	..	..	..	..	..	..	..	*	..	..	..	*	*
<b>CYTHERIDEIS</b>																							
<i>subulata</i> , Brady	*	*	..	*	..	*	*	*	..	..	..	..	..	..	..	*	..	..	..	..	..	..	*
<b>SCLEROCHILUS</b>																							
<i>contortus</i> , Norman	..	**	..	**	..	**	*	***	..	**	..	..	..	**	..	**	..	***	..	**	*	*	*
<b>PARADOXOSTOMA</b>																							
<i>variabile</i> , Baird	***	..	**	..	..	..	*	**	..	**	..	..	..	**	..	..	***	..	**	..	***	*	*
<i>Normani</i> , Brady	*	..	..	*	..	..	..	..	..	*	..	..	..	..	..	..	..	..	..	..	..	*	*
<i>abbreviatum</i> , Sars	..	..	..	..	..	..	..	*	**	..	..	..	..	*	..	..	..	..	..	..	..	*	*
<i>pulchellum</i> , Sars	**	..	..	..	..	..	..	*	**	..	..	..	..	*	..	..	..	..	..	..	..	*	*
<i>obliquum</i> , Sars	*	..	..	..	..	**	..	*	**	..	..	..	..	*	..	..	..	..	..	..	..	*	*
<i>hibernicum</i> , Brady	..	..	..	..	*	..	*	..	*	..	..	..	..	*	..	..	..	..	..	..	..	*	*
<i>sarniense</i> , Brady	**	..	**	..	..	..	..	..	..	..	..	..	..	*	..	..	..	..	..	..	..	*	*
<i>ensiforme</i> , Brady	*	..	..	*	..	*	..	..	..	*	..	..	..	*	..	*	..	..	..	..	**	*	*
<i>flexuosum</i> , Brady	..	..	..	*	..	*	..	*	..	*	..	..	..	..	..	..	..	..	..	..	..	*	*
<i>arcuatum</i> , Brady	..	..	..	..	..	*	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	*
<b>PHILOMEDES</b>																							
<i>interpuncta</i> , Baird	*	..	..	*	..	..	..	**	..	*	..	..	..	*	..	..	..	*	..	..	..	**	*
<b>CYLINDROLEBERIS</b>																							
<i>Marieæ</i> , Baird	*	..	..	*	..	..	..	*	..	*	..	..	..	*	..	..	..	..	..	..	..	..	*
<i>teres</i> , Norman	..	*	..	..	..	..	..	*	..	..	..	..	..	*	..	..	..	..	..	..	..	..	*
<b>BRADYCINETUS</b>																							
<i>brenda</i> , Baird	..	..	..	..	..	..	..	..	..	..	..	..	..	*	..	..	..	*	..	..	..	**	*
<i>MacAndrei</i> , Baird	..	..	..	..	..	..	..	*	..	*	..	..	..	*	..	..	..	*	..	..	..	**	*
<b>CONCHÆCIA</b>																							
<i>obtusata</i> , Sars	..	..	..	..	..	..	..	..	..	..	..	..	..	*	..	..	..	..	..	..	..	*	*
<b>POLYCOPE</b>																							
<i>orbicularis</i> , Sars	..	..	..	..	..	*	..	*	..	*	..	..	..	*	..	..	..	..	..	..	..	**	*
<i>dentata</i> , Brady	..	..	..	..	..	..	..	..	..	..	..	..	..	*	..	..	..	..	..	..	..	**	*
<b>CYTHERELLA</b>																							
<i>scotica</i> , Brady	..	..	..	..	..	..	..	..	..	..	..	..	..	*	..	..	..	*	..	..	..	**	*
<i>lævis</i> , Brady	..	..	..	..	..	..	..	..	..	..	..	..	..	*	..	..	..	*	..	..	..	**	*

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## EXPLANATION OF THE PLATES.

## PLATE XXIII.

*Notodromas monachus.*

- Fig. 1. Carapace (male), seen from left side,  $\times 33$ .  
 2. do. do. above,  $\times 33$ .  
 3. do. do. below,  $\times 33$ .  
 4. do. do. front,  $\times 33$ .  
 5. Carapace (female), from left side,  $\times 33$ .  
 6. Detached valves of female carapace, seen from below,  $\times 40$ .  
 7. Left valve (female), seen from behind,  $\times 40$ .  
 8. Postabdominal ramus,  $\times 112$ .  
 9. Lucid spots,  $\times 84$ .

*Cypris fusca.*

10. Carapace of female, from right side,  $\times 25$ .  
 11. do. do. above,  $\times 25$ .  
 12. do. do. below,  $\times 25$ .  
 13. do. do. front,  $\times 25$ .  
 14. Lucid spots,  $\times 80$ .  
 15. Postabdominal ramus,  $\times 80$ .

*Cypris incongruens.*

16. Carapace of female, from left side,  $\times 20$ .  
 17. do. do. above,  $\times 20$ .  
 18. do. do. below,  $\times 20$ .  
 19. do. do. front,  $\times 20$ .  
 20. Postabdominal ramus,  $\times 84$ .  
 21. Anterior extremity of right valve, external surface,  $\times 84$ .  
 22. A portion of the anterior margin of right valve, seen from within,  $\times 84$ .

*Cypris virens.*

- Fig. 23. Carapace of female, seen from right side,  $\times 16$ .  
 24. Carapace of female, seen from above,  $\times 16$ .  
 25. do. do. below,  $\times 16$ .  
 26. do. do. front,  $\times 16$ .  
 27. Postabdominal ramus,  $\times 80$ .  
 28. Hinge-margin, right valve,  $\times 40$ .  
 29. do. left valve,  $\times 40$ .  
 30. Lucid spots,  $\times 80$ .  
 31. Contact margin, left,  $\times 40$ .  
 32. do. right,  $\times 40$ .

*Cypris obliqua.*

33. Carapace of female, seen from right side,  $\times 25$ .  
 34. Carapace of female, seen from above,  $\times 25$ .  
 35. do. do. below,  $\times 25$ .  
 36. do. do. front,  $\times 25$ .  
 37. Postabdominal ramus,  $\times 80$ .  
 38. Lucid spots,  $\times 80$ .

*Cypris tessellata.*

39. Carapace of female, seen from right side,  $\times 40$ .  
 40. Carapace of female, seen from above,  $\times 40$ .  
 41. do. do. below,  $\times 40$ .  
 42. do. do. front,  $\times 40$ .  
 43. Shell-structure,  $\times 310$ .  
 44. Postabdominal ramus, 120.  
 45. Lucid spots, 120.



## PLATE XXIV.

*Cypris compressa.*

- Fig. 1. Carapace of female, seen from left side, × 40.  
 2. Carapace of female, seen from above, × 40.  
 3. do. do. below, × 40.  
 4. do. do. front, × 40.  
 5. Postabdominal ramus, × 190.

*Cypris striolata.*

6. Carapace of female, seen from left side, × 40.  
 7. Carapace of female, seen from above, × 40.  
 8. do. do. below, × 40.  
 9. do. do. front, × 40.  
 10. Shell-sculpture, × 310.

*Cypridopsis villosa.*

11. Carapace of female, seen from left side, × 40.  
 12. Carapace of female, seen from above, × 40.  
 13. do. do. below, × 40.  
 14. do. do. front, × 40.  
 15. Lucid spots, × 80.

*Cypridopsis aculeata.*

16. Carapace of female, seen from left side, × 40.  
 17. Carapace of female, seen from above, × 40.  
 18. do. do. below, × 40.  
 19. do. do. front, × 40.  
 20. Shell-sculpture and spines, × 200.

*Cypris lævis.*

21. Carapace of female, seen from left side, × 50.  
 22. Carapace of female, seen from above, × 50.  
 23. do. do. below, × 50.  
 24. do. do. front, × 50.  
 25. Lucid spots, × 80.  
 26. Postabdominal ramus, × 210.

## Variety (Loch of the Lowes).

43. Carapace, seen from left side, × 80.  
 44. do. do. above, × 80.  
 45. do. do. below, × 80.

*Cypridopsis vidua.*

- Fig. 27. Carapace of female, seen from left side, × 40.  
 28. Carapace of female, seen from above, × 40.  
 29. do. do. below, × 40.  
 30. do. do. front, × 40.  
 46. Seta and hyaline vesicle of lower antenna, × 400.

*Cypris ovum.*

31. Carapace of female, seen from left side, × 40.  
 32. Carapace of female, seen from above, × 40.  
 33. do. do. below, × 40.  
 34. do. do. front, × 40.

*Candona detecta.*

35. Carapace, seen from right side, × 40.  
 36. do. do. above, × 40.  
 37. do. do. below, × 40.  
 38. do. do. front, × 40.

*Cypris cinerea.*

39. Carapace of female, seen from left side, × 40.  
 40. Carapace of female, seen from above, × 40.  
 41. do. do. below, × 40.  
 42. do. do. front, × 40.

*Cypris gibba.*

47. Carapace of female, seen from left side, × 40.  
 48. Carapace of female, seen from above, × 40.  
 49. do. do. below, × 40.  
 50. do. do. front, × 40.  
 51. Shell-sculpture, × 190.  
 52. Postabdominal ramus, × 190.  
 53. Separated valves, showing hinge-margins, × 40.  
 54. Outline of carapace (tuberculated variety), × 40.

*Candona lactea.*

55. Carapace of female, seen from left side, × 50.  
 56. Carapace of female, seen from above, × 50.  
 57. do. do. below, × 50.  
 58. do. do. front, × 50.

## PLATE XXV.

*Candona candida.*

- Fig. 1. Carapace of female, seen from left side, × 40.  
 2. Carapace of female, seen from above, × 40.  
 3. do. do. below, × 40.  
 4. do. do. front, × 40.  
 5. Lucid spots, × 96.  
 6. Outline, young carapace, × 40.  
 7. do. adult male (Regent's Park), × 40.  
 8. do. do. (Gravesend), × 40.  
 9. Structure of posterior extremity of shell (Gravesend), × 210.

*Cypris reptans.*

10. Carapace of female, seen from left side, × 16.  
 11. Carapace of female, seen from above, × 16.  
 12. do. do. below, × 16.  
 13. do. do. front, × 16.  
 14. Lucid spots, × 40.

*Cypris serrata.*

15. Carapace of female, seen from left side, × 25.  
 16. Carapace of female, seen from above, × 25.  
 17. do. do. below, × 25.  
 18. do. do. front, × 25.  
 19. Lucid spots, × 60.

*Candona albicans.*

20. Carapace of female, seen from left side, × 50.  
 21. Carapace of female, seen from above, × 50.  
 22. do. do. below, × 50.  
 23. do. do. front, × 50.  
 24. Lucid spots, × 210.  
 25. Shell-sculpture, × 210.

*Pontocypris serrulata.*

26. Carapace (female), seen from left side, × 40.  
 27. do. do. above, × 40.  
 28. do. do. below, × 40.  
 29. do. do. front, × 40.  
 30. Detached valves, showing hinge-margins, × 40.

*Pontocypris trigonella.*

- Fig. 31. Carapace (female), seen from left side, × 40.  
 32. do. do. above, × 40.  
 33. do. do. below, × 40.  
 34. do. do. front, × 40.

*Loxoconcha impressa.*

35. Carapace of male, seen from left side, × 40.  
 36. do. do. above, × 40.  
 37. do. do. below, × 40.  
 38. do. do. front, × 40.  
 39. Lucid spots, × 84.  
 40. Shell-surface, × 84.  
*a*, original surface, *b*, incrustation.  
 40\*. Carapace of female, seen from left side, × 40.

*Cypris trigonella.*

41. Carapace of female, seen from left side, × 40.  
 42. Carapace of female, seen from above, × 40.  
 43. do. do. below, × 40.  
 44. do. do. front, × 40.

*Loxoconcha tamarindus.*

45. Carapace of female, seen from left side, × 40.  
 46. Carapace of female, seen from above, × 40.  
 47. do. do. below, × 40.  
 48. do. do. front, × 40.

*Eucythere anglica.*

49. Carapace, seen from left side, × 40.  
 50. do. do. above, × 40.

*Loxoconcha granulata.*

51. Carapace (male), seen from left side, × 40.  
 52. do. do. below, 40.

*Pontocypris acupunctata.*

53. Carapace of female, seen from left side, × 40.  
 54. Carapace of female, seen from above, × 40.  
 55. do. do. below, × 40.  
 56. do. do. front, × 40.

## PLATE XXVI.

*Cypris punctillata.*

- Fig. 1. Carapace of female, seen from left side, × 16.  
 2. Carapace of female, seen from above, × 16.  
 3. do. do. below, × 16.  
 4. do. do. front, × 16.  
 5. Lucid spots, × 40.  
 6. Shell-sculpture, × 100.  
 7. Postabdominal ramus, × 80.

*Cypris salina.*

8. Carapace of female, seen from left side, × 40.  
 9. Carapace of female, seen from above, × 40.  
 10. do. do. below, × 40.  
 11. do. do. front, × 40.  
 12. Lucid spots, × 80.  
 13. Postabdominal ramus, × 140.

*Cypris bispinosa.*

14. Carapace of female, seen from left side, × 16.  
 15. Carapace of female, seen from above, × 16.  
 16. do. do. below, × 16.  
 17. do. do. front, × 16.

*Cytheridea lacustris.*

18. Carapace of female, seen from left side, × 40.  
 19. Carapace of female, seen from above, × 40.  
 20. do. do. below, × 40.  
 21. do. do. front, × 40.

*Candona compressa.*

22. Carapace of female, seen from left side, × 40.

- Fig. 23. Carapace of female, seen from above, × 40.  
 24. do. do. below, × 40.  
 25. do. do. front, × 40.  
 26. Reticulation of shell, × 96.  
 27. Lucid spots, × 96.

*Cythere concinna.*

28. Carapace (male), seen from left side, × 40.  
 29. do. do. above, × 40.  
 30. do. do. below, × 40.  
 31. do. do. front (Campbeltown Bay), × 40.  
 32. Carapace (female), seen from left side (the Minch), × 40.  
 33. Outline of right valve, from above, × 40.

*Cythere mucronata.*

34. Right valve, seen from side, × 40.  
 34a. do. do. below, × 40.

*Cytheridea punctillata.*

35. Carapace (male), seen from left side (the Minch), × 40.  
 36. Carapace (female), seen from left side, × 40.  
 37. Carapace (female), seen from above (Loch Fyne), × 40.  
 38. Hinge-margins of right and left valves, × 40.

*Cythere angulata.*

39. Carapace of female, seen from right side, × 40.  
 40. Carapace of female, seen from above, × 40.  
 41. do. do. below, × 40.  
 42. do. do. front, × 40.

## PLATE XXVII.

*Paracypris polita.*

- Fig. 1. Carapace, seen from left side, × 40.  
 2. do. do. above, × 40.  
 3. do. do. below, × 40.  
 4. do. do. front, × 40.

*Macrocypris minna.*

5. Carapace, seen from left side, × 16.

- Fig. 6. Carapace, seen from above, × 16.  
 7. do. do. below, × 16.  
 8. do. do. front, × 16.

*Bairdia inflata.*

9. Carapace, seen from left side, × 40.  
 10. do. do. above, × 40.  
 11. do. do. below, × 40.

Fig. 12. Carapace, seen from front (Lamlash), × 40.

13. Outline of left valve (Channel Islands), × 40.

14-17. Outline of left valve (Roundstone), × 40.

*Bairdia acanthigera.*

18. Carapace, seen from left side, × 40.

19. do. do. above, × 40.

20. do. do. below, × 40.

21. do. do. front, × 40.

*Eucythere declivis.*

22. Carapace (female), seen from left side, × 40.

23. do. do. above, × 40.

24. do. do. below, × 40.

25. do. do. front, × 40.

26. Separated valves, from above, × 40.

52, 53. Variety (?) (Devonshire), × 40.

54, 55. Carapace of male, × 40.

*Xestoleberis depressa.*

27. Carapace (of female), seen from left side, × 40.

28. Carapace (of female), seen from above, × 40.

29. do. do. below, × 40.

30. do. do. front, × 40.

31. Separated valves, showing hinge-margins, × 40.

Fig. 32. Carapace of male, seen from left side, × 40.

33. do. do. below, × 40.

*Xestoleberis aurantia.*

34. Carapace of female, seen from left side, × 40.

35. Carapace of male, seen from left side, × 40.

36. do. do. above, × 40.

37. do. do. front, × 40.

*Loxoconcha elliptica.*

38. Carapace (female), seen from left side, × 40.

39. do. do. above, × 40.

45. Carapace of male, seen from left side, × 40.

46. do. do. above, × 40.

47. do. do. below, × 40.

48. do. do. front, × 40.

*Loxoconcha guttata.*

40. Carapace (female), seen from left side, × 40.

41. do. do. above, × 40.

42. do. do. below, × 40.

43. do. do. front, × 40.

44. Separated valves, showing hinge-margins, × 40.

*Eucythere Argus.*

50. Carapace (female), seen from left side, × 40.

51. do. do. above, × 40.

49. Carapace (male?), from left side, × 40.

PLATE XXVIII.

*Cytheridea papillosa.*

Fig. 1. Carapace (female), seen from left side, × 40.

2. do. do. above, × 40.

3. do. do. below, × 40.

4. do. do. front, × 40.

5. Hinge-margins: (a) left, (b) right, × 40.

6. Lucid spots, × 84.

*Cytheridea torosa.*

7. Carapace (female), seen from left side, × 40.

8. do. do. above, × 40.

9. do. do. below, × 40.

10. do. do. front, × 40.

11. Lucid spots, × 84.

12. Hinge-margins: (a) left, (b) right, × 84.

*Cytheridea elongata.*

13. Carapace, seen from left side, × 40.

Fig. 14. Carapace, seen from above, × 40.

15. do. do. below, × 40.

16. do. do. front, × 40.

*Cytheridea punctillata.*

17. Carapace (female), seen from left side, × 40.

18. do. do. above, × 40.

19. do. do. below, × 40.

20. do. do. front, × 40.

*Bairdia fulva.*

21. Left valve, × 40.

*Cythere pellucida.*

22. Carapace, seen from left side, × 40.

23. do. do. above, × 40.

24. do. do. below, × 40.

25. do. do. front, × 40.

Fig. 26. Separated valves, showing hinge-joint, × 40.

28. Old valve, from deep water, × 40.

*Cythere castanea.*

27. Carapace of female, from left side, × 40.

*Cythere tenera.*

29. Carapace (female), from left side, × 40.

30. do. do. above, × 40.

31. do. do. below, × 40.

32. do. do. front, × 40.

*Cythere albo-maculata.*

33. Carapace, seen from left side, × 40.

34. do. do. above, × 40.

35. do. do. below, × 40.

36. do. do. front, × 40.

37. Lucid spots, × 96.

38. Portion of anterior contact-margins, from the front, × 84.

38*a*. Young carapace, from left side (*C. alba*, Baird), × 40.

39. Separated valves, showing hinge-margins, × 40.

*Cythere viridis.*

40. Carapace of female, seen from left side, × 40.

Fig. 41. Carapace of female, seen from above, × 40.  
57–59. Lateral, superior, and end views of specimens dredged in the Minch, × 40.

*Cytheridea zetlandica.*

42. Carapace, seen from left side, × 40.

43. do. do. above, × 40.

44. do. do. below, × 40.

45. do. do. front, × 40.

46. Lucid spots, × 84.

*Cythere lutea.*

(Deep-water variety.)

47. Right valve of male, × 40.

48. Carapace (female), seen from left side, × 40.

49. do. do. above, × 40.

50. do. do. front, × 40.

51. Separated valves, showing hinge-joint, × 40.

(Littoral variety.)

52. Carapace, from left side, × 40.

53. do. do. above, × 40.

54. do. do. below, × 40.

55. do. do. front, × 40.

56. Hinge-margins, from above: (a) left, (b) right, × 84.

PLATE XXIX.

*Cytheridea Sorbyana.*

Fig. 1. Right valve (recent), × 40.

2. Carapace (fossil), seen from left side, × 40.

3. do. do. above, × 40.

4. do. do. front, × 40.

5. Left valve (recent), from side, × 40.

6. do. do. above, × 40.

*Cythere mirabilis.*

7. Left valve, seen from side, × 40.

8. do. do. above, × 40.

*Limnocythere monstrifica.*

9. Carapace, seen from left side, × 40.

10. do. do. above, × 40.

11. do. do. below, × 40.

12. do. do. front, × 40.

*Limnocythere inopinata.*

Fig. 15. Carapace of female, seen from left side, × 40.

16. Carapace of female, seen from above, × 40.

17. do. do. below, × 40.

18. do. do. front, × 40.

*Cythere convexa.*

19. Carapace of female, seen from left side, × 40.

20. Carapace of female, seen from above, × 40.

21. do. do. below, × 40.

22. do. do. front, × 40.

23. Separated valves, showing hinge-margins, × 40.

24. Hinge-joint of left valve (lateral view), × 40.

- Fig. 25. Outline of carapace, from right side,  $\times 40$ .  
 26. do. right valve only,  $\times 40$ .  
 27. do. left valve only,  $\times 40$ .

*Cythere villosa.*

28. Carapace (female), seen from left side,  $\times 40$ .  
 29. do. do. above,  $\times 40$ .  
 30. do. do. below,  $\times 40$ .  
 31. do. do. front,  $\times 40$ .  
 32. Separated valves, showing hinge-margins,  
 $\times 40$ .

*Cythere semipunctata.*

- 33-35. Carapace, lateral, upper, lower, and  
 end views,  $\times 40$ .  
 36. Right valve (young), lateral view,  $\times 40$ .  
 37. do. do. from above,  $\times 40$ .

*Cytheropteron multiformum.*

38. Carapace (of male), seen from left side,  
 $\times 40$ .  
 39. Carapace (of male), seen from above,  $\times 40$ .  
 40. do. do. below,  $\times 40$ .  
 41. do. do. front,  $\times 40$ .  
 42. Left valve (young),  $\times 40$ .

*Cytherura clathrata.*

- Fig. 43. Carapace, seen from left side,  $\times 40$ .  
 44. do. do. above,  $\times 40$ .  
 45. do. do. below,  $\times 40$ .  
 46. do. do. front,  $\times 40$ .

*Cytherura cellulosa.*

47. Carapace (female), seen from left side,  $\times 40$ .  
 48. do. do. above,  $\times 40$ .  
 49. do. do. below,  $\times 40$ .  
 50. do. do. front,  $\times 40$ .  
 60. do. do. left side,  $\times 84$ .

*Cythere Jeffreysii.*

51. Carapace, seen from right side,  $\times 40$ .  
 52. do. do. above,  $\times 40$ .  
 53. do. do. below,  $\times 40$ .  
 54. do. do. front,  $\times 40$ .  
 55. Ornament of shell-surface,  $\times 140$ .

*Cythere badia.*

56. Carapace, seen from left side,  $\times 40$ .  
 57. do. do. above,  $\times 40$ .  
 58. do. do. below,  $\times 40$ .  
 59. do. do. front,  $\times 40$ .

## PLATE XXX.

*Cythere dunelmensis.*

- Fig. 1. Carapace (male) (Durham coast), seen  
 from left side,  $\times 40$ .  
 2. Carapace (male), seen from above,  $\times 40$ .  
 3. do. do. below,  $\times 40$ .  
 4. do. do. front,  $\times 40$ .  
 5-8. The same, male (Frith of Clyde),  $\times 40$ .  
 9. Carapace (female), seen from left side,  $\times 40$ .  
 10. do. do. above,  $\times 40$ .  
 11. do. do. below,  $\times 40$ .  
 12. do. do. front,  $\times 40$ .

*Cythere Jonesii.*

13. Carapace of female, seen from right side,  
 $\times 40$ .  
 14. Carapace of female, seen from above,  $\times 40$ .  
 15. do. do. below,  $\times 40$ .  
 16. do. do. front,  $\times 40$ .

*Cythere antiquata.*

- Fig. 17. Carapace of female, seen from left side,  
 $\times 40$ .  
 18. Carapace of female, seen from above,  $\times 40$ .  
 19. do. do. below,  $\times 40$ .  
 20. do. do. front,  $\times 40$ .

*Cythere Whiteii.*

21. Carapace, seen from left side,  $\times 40$ .  
 22. do. do. above,  $\times 40$ .  
 23. do. do. below,  $\times 40$ .  
 24. do. do. front,  $\times 40$ .

*Cythere tuberculata.*

25. Carapace (female), seen from left side,  $\times 40$ .  
 26. do. do. above,  $\times 40$ .  
 27. do. do. below,  $\times 40$ .  
 28. do. do. front,  $\times 40$ .

- Fig. 29. Separated valves, showing hinge-margins (Dogger bank),  $\times 40$ .  
 30. Carapace (male), seen from left side,  $\times 40$ .  
 31. do. do. above (Northumberland coast),  $\times 40$ .  
 32. Carapace (female), seen from left side,  $\times 40$ .  
 33. do. do. above (Durham coast),  $\times 40$ .

- Fig. 34. Carapace (female), seen from left side,  $\times 40$ .  
 35. do. do. above (Aberdeenshire),  $\times 40$ .  
 36-39. Carapace, in different stages of growth, seen from left side (Northumberland and Durham coasts),  $\times 40$ .  
 40, 41. Young carapace, lateral and ventral aspect,  $\times 40$ .

## PLATE XXXI.

*Cythere laticarina.*

- Fig. 1. Carapace, seen from left side,  $\times 40$ .  
 2. do. do. above,  $\times 40$ .  
 3. do. do. below,  $\times 40$ .  
 4. do. do. front,  $\times 40$ .

*Cythere marginata.*

5. Carapace, seen from left side,  $\times 40$ .  
 6. do. do. above,  $\times 40$ .  
 7. do. do. below,  $\times 40$ .  
 8. do. do. front,  $\times 40$ .

*Cythere fnmarchica.*

9. Carapace of female, seen from left side,  $\times 40$ .  
 10. Carapace of female, seen from above,  $\times 40$ .  
 11. do. do. below,  $\times 40$ .  
 12. do. do. front,  $\times 40$ .  
 13. Lucid spots,  $\times 84$ .

*Cythere oblonga.*

14. Carapace (male), seen from left side,  $\times 40$ .  
 15. Carapace of female, seen from left side,  $\times 40$ .  
 16. Carapace of female, seen from above,  $\times 40$ .  
 17. do. do. below,  $\times 40$ .

*Cythere quadridentata.*

19. Carapace (male), seen from left side,  $\times 40$ .  
 20. do. do. above,  $\times 40$ .  
 21. do. do. below,  $\times 40$ .  
 22. do. do. front (Durham coast),  $\times 40$ .  
 23. Carapace (male) seen from left side,  $\times 40$ .  
 24. do. do. above, (variety, Durham coast),  $\times 40$ .

- Fig. 25. Right valve (Oban),  $\times 40$ .  
 26. Left valve (female), old (Shetland),  $\times 40$ .  
 27. Carapace (female), seen from left side,  $\times 40$ .  
 28. Carapace (female), from above,  $\times 40$ .  
 29. do. do. below,  $\times 40$ .  
 30. do. do. front (Northumberland coast).

*Cythere emaciata.*

31. Carapace, seen from left side,  $\times 40$ .  
 32. do. do. above,  $\times 40$ .  
 33. do. do. below,  $\times 40$ .  
 34. do. do. front (Plymouth),  $\times 40$ .  
 35. Left valve, old (Galway),  $\times 40$ .  
 36. Carapace, seen from left side,  $\times 40$ .  
 37. do. do. below (Devonshire coast),  $\times 40$ .

*Cythere limicola.*

38. Carapace of female, seen from left side,  $\times 40$ .  
 39. Carapace of female, seen from above,  $\times 40$ .  
 40. do. do. below,  $\times 40$ .  
 41. do. do. front,  $\times 40$ .  
 43. Left valve (young), seen from side,  $\times 85$ .  
 44. do. do. above,  $\times 85$ .  
 45. do. do. below,  $\times 85$ .  
 46. do. do. front,  $\times 85$ .

*Cythere globulifera.*

42. Right valve,  $\times 84$ .

*Cythere cuneiformis.*

47. Left valve, lateral view,  $\times 40$ .  
 48. do. seen from above,  $\times 40$ .  
 49. do. do. below,  $\times 40$ .

*Cythere* (?) *acerosa*.

Fig. 50. Left valve, front (adult female).

51-54. Perfect carapace (adult male), lateral, dorsal, ventral, and end views,  $\times 40$ .Fig. 55. Carapace, seen from left side,  $\times 40$ .56. do. do. above,  $\times 40$ .57. do. do. below,  $\times 40$ .58. do. do. front,  $\times 40$ .

## PLATE XXXII.

*Cytherura acuticostata*.Fig. 1. Carapace (male), seen from left side,  $\times 40$ .2. do. do. above,  $\times 40$ .3. do. do. below,  $\times 40$ .4. do. do. front,  $\times 40$ .5. Carapace (female) from left side,  $\times 40$ .6. do. do. above,  $\times 40$ .7. do. do. below,  $\times 40$ .8. do. do. front,  $\times 40$ .9. Carapace (female, smooth variety), from left side,  $\times 40$ .10. Carapace (female, smooth variety), from above,  $\times 40$ .11. Carapace (female, smooth variety), from below,  $\times 40$ .*Cytherura cornuta*.12. Carapace (female?), from left side,  $\times 40$ .13. do. do. above,  $\times 40$ .14. do. do. below,  $\times 40$ .15. do. do. front,  $\times 40$ .*Cytherura Robertsoni*.16. Carapace (female), from left side,  $\times 40$ .17. do. do. below,  $\times 40$ .18. do. do. front,  $\times 40$ .*Cytherura affinis*.19. Carapace (female), from left side,  $\times 40$ .20. do. do. below,  $\times 40$ .21. do. do. front,  $\times 40$ .*Cytherura angulata*.22. Carapace, seen from left side,  $\times 40$ .23. do. do. above,  $\times 40$ .24. do. do. below,  $\times 40$ .25. do. do. front,  $\times 40$ .*Cytherura striata*.26. Carapace (female), from left side,  $\times 40$ .27. do. do. above,  $\times 40$ .28. do. do. below,  $\times 40$ .Fig. 29. Carapace (female), from front,  $\times 40$ .62. Sculpture of shell,  $\times 210$ .64. Carapace (female), from left side,  $\times 84$ .65. Interior of left valve,  $\times 84$ .*Cytherura lineata*.30. Carapace of female, from left side,  $\times 40$ .31. do. do. below,  $\times 40$ .32. Carapace of male, from left side,  $\times 40$ .33. do. do. above,  $\times 40$ .34. do. do. front,  $\times 40$ .67. do. do. left side,  $\times 84$ .*Cytherura cuneata*.35. Carapace (female), seen from left side,  $\times 40$ .36. Carapace (female), seen from above,  $\times 40$ .37. do. do. below,  $\times 40$ .38. do. do. front,  $\times 40$ .63. Sculpture of shell,  $\times 210$ .*Cytherura Sarsii*.39. Carapace, seen from left side,  $\times 40$ .40. do. do. above,  $\times 40$ .41. do. do. below,  $\times 40$ .42. do. do. front,  $\times 40$ .*Cytherura undata*.43. Carapace (male), from left side,  $\times 40$ .44. do. do. above,  $\times 40$ .45. do. do. below,  $\times 40$ .46. do. do. front,  $\times 40$ .47. Carapace (female), left side,  $\times 40$ .48. do. do. above,  $\times 40$ .49. do. do. below,  $\times 40$ .66. do. do. left side,  $\times 84$ .*Cytherura nigrescens*.50. Carapace (female), from left side,  $\times 40$ .51. do. do. above,  $\times 40$ .52. do. do. below,  $\times 40$ .53. do. do. front,  $\times 40$ .



Fig. 54. Carapace (variety, deep-water), from left side,  $\times 40$ .

55. Ditto (ditto), from above,  $\times 40$ .

*Cytherura similis*.

56. Carapace (female), from left side,  $\times 40$ .

57. do. do. above,  $\times 40$ .

58. do. do. below,  $\times 40$ .

59. do. do. front,  $\times 40$ .

*Cytherura producta*.

60. Carapace of male, seen from left side,  $\times 40$ .

61. Carapace of male, seen from below,  $\times 40$ .

*Cytherura gibba*.

Fig. 68. Carapace (female), from left side,  $\times 40$ .

69. do. do. above,  $\times 40$ .

70. do. do. front,  $\times 40$ .

*Cythere rubida*.

71. Carapace (female), from left side,  $\times 40$ .

72. do. do. above,  $\times 40$ .

73. do. do. below,  $\times 40$ .

74. do. do. front,  $\times 40$ .

*Cythere dubia*.

75. Carapace, seen from left side,  $\times 40$ .

76. do. do. above,  $\times 40$ .

PLATE XXXIII.

*Bradycinetus globosus*.

Fig. 1. Carapace seen from left side,  $\times 20$ .

2. do. do. above,  $\times 20$ .

3. do. do. below,  $\times 20$ .

4. do. do. front,  $\times 20$ .

5. Hinge-margins,  $\times 16$ .

*Cylindroleberis teres*.

6. Carapace, seen from left side,  $\times 20$ .

7. do. do. above,  $\times 20$ .

8. do. do. below,  $\times 20$ .

9. do. do. front,  $\times 20$ .

*Philomedes interpuncta*.

10. Carapace, seen from left side,  $\times 20$ .

11. do. do. above,  $\times 20$ .

12. do. do. below,  $\times 20$ .

13. do. do. front,  $\times 20$ .

*Bradycinetus Macandrei*.

Fig. 14. Carapace, seen from left side,  $\times 20$ .

15. do. do. above,  $\times 20$ .

16. do. do. below,  $\times 20$ .

17. do. do. front,  $\times 20$ .

*Cylindroleberis Mariae*.

18. Carapace, seen from left side,  $\times 20$ .

19. do. do. above,  $\times 20$ .

20. do. do. below,  $\times 20$ .

21. do. do. front,  $\times 20$ .

22. Lucid spots,  $\times 84$ .

*Bythocythere simplex*.

23. Carapace, seen from right side,  $\times 40$ .

24. do. do. above,  $\times 40$ .

25. do. do. below,  $\times 40$ .

26. do. do. front,  $\times 40$ .

27. Lucid spots,  $\times 84$ .

PLATE XXXIV.

*Bairdia complanata*.

Fig. 1. Carapace, seen from left side,  $\times 40$ .

2. do. do. above,  $\times 40$ .

3. do. do. below,  $\times 40$ .

4. do. do. front,  $\times 50$ .

*Sclerochilus contortus*.

5. Carapace of female, seen from left side,  $\times 40$ .

6. Carapace of female, seen from above,  $\times 40$ .

7. do. do. below,  $\times 40$ .

8. do. do. front,  $\times 40$ .

Fig. 9. Separated valves, showing hinge-margins,  $\times 40$ .

10. Lucid spots,  $\times 84$ .

*Ilyobates bartonensis*.

11. Carapace of female, seen from left side,  $\times 40$ .

12. do. do. above,  $\times 40$ .

13. do. do. below,  $\times 40$ .

14. do. do. front,  $\times 40$ .

*Cytherella laevis.*

- Fig. 15. Right valve, seen from side, × 40.  
 16. do. do. above, × 40.  
 17. do. do. front, × 40.

*Cytherella scotica.*

18. Carapace, seen from left side, × 40.  
 19. do. do. above, × 40.  
 20. do. do. below, × 40.  
 21. do. do. front, × 40.

*Bairdia obtusata.*

22. Carapace, seen from left side, × 40.  
 23. do. do. above, × 40.  
 24. do. do. below, × 40.  
 25. do. do. front, × 40.

*Cytheropteron latissimum.*

26. Carapace, seen from left side, × 40.  
 27. do. do. above, × 40.  
 28. do. do. below, × 40.  
 29. do. do. front, × 40.  
 30. Separated valves, showing hinge-joint, × 40.

*Cytheropteron nodosum.*

31. Carapace, seen from left side, × 40.  
 32. do. do. above, × 40.  
 33. do. do. below, × 40.  
 34. do. do. front, × 40.

*Bythocythere turgida.*

- Fig. 35. Carapace (female), seen from left side, × 40.  
 36. Carapace (female), seen from above, × 40.  
 37. do. do. below, obliquely, × 40.  
 38. Lucid spots, × 84.

*Cytheropteron subcircinatum.*

39. Carapace, seen from the left side, × 56.  
 40. do. do. above, × 56.  
 41. do. do. below, × 56.  
 42. do. do. front, × 56.

*Pontocypris (?) angusta.*

43. Carapace, seen from left side, × 56.  
 44. do. do. above, × 56.

*Cytheropteron punctatum.*

45. Carapace, seen from left side, × 40.  
 46. do. do. above, × 40.  
 47. do. do. below, × 40.  
 48. do. do. front, × 40.

*Pseudocythere caudata.*

49. Carapace, from left side, × 40.  
 50. do. above, × 40.  
 51. do. below, × 40.  
 52. do. front, × 40.

*Cytheridea (?) subflavescens.*

53. Carapace, seen from left side, × 40.  
 54. do. do. below, × 40.  
 55. do. do. front, × 40.

## PLATE XXXV.

*Paradoxostoma variable.*

- Fig. 1. Carapace of female (from deep water, 1-60 fathoms), seen from left side, × 40.  
 2. Carapace of female, seen from above, × 40.  
 3. do. do. front, × 40.  
 4. Carapace of female, seen from left side, × 40.  
 5. Carapace of female, littoral variety, seen from above, × 40.  
 6. do. do. below, × 40.  
 7. do. do. front, × 40.  
 12. Carapace of female (from roots of *Laminaria* beyond low-water mark), seen from left side, × 40.

- Fig. 13. Carapace of female, seen from above, × 40.  
 14. Young carapace (littoral variety), seen from left side, × 40.  
 15. do. do. above, × 40.  
 16. do. do. front, × 40.  
 17. Aperture between contact-margins for protrusion of suctorial apparatus, × 140.

*Paradoxostoma ensiforme.*

8. Carapace, seen from left side, × 40.  
 9. do. do. above, × 40.

Fig. 10. Carapace, as seen from below, × 40.

11. do. do. front, × 40.

*Paradoxostoma obliquum.*

18. Carapace, seen from left side, × 40.

19. do. do. above, × 40.

20. do. do. below, × 40.

21. do. do. front, × 40.

*Paradoxostoma abbreviatum.*

22. Carapace (female), seen from left side, × 40.

23. Carapace (female), seen from above, × 40.

24. do. do. below, × 40.

25. do. do. front, × 40.

*Paradoxostoma sarniense.*

26. Carapace (female), seen from left side, × 40.

27. Carapace (female), seen from above, × 40.

28. do. do. below, × 40.

29. do. do. front, × 40.

*Paradoxostoma flexuosum.*

30. Carapace, seen from left side, × 40.

31. do. do. above, × 40.

32. do. do. below, × 40.

33. do. do. front, × 40.

34. Left valve from above, showing hinge-margin, × 40.

*Paradoxostoma hibernicum.*

35. Carapace (female), seen from left side, × 40.

36. Carapace (female), seen from above, × 40.

*Paradoxostoma arcuatum.*

Fig. 37. Carapace, seen from left side, × 40.

38. do. do. above, × 40.

*Paradoxostoma Normani.*

39. Carapace, seen from left side, × 40.

40. do. do. above, × 40.

*Paradoxostoma pulchellum.*

41. Carapace, seen from left side, × 40.

42. do. do. above, × 40.

*Cytherideis subulata.*

43. Carapace, seen from left side, × 40.

44. do. do. above, × 40.

45. do. do. below, × 40.

46. do. do. front, × 40.

*Bythocythere constricta.*

47. Carapace of female, from left side, × 40.

48. Carapace of male, from left side, × 40.

49. do. do. above, × 40.

50. do. do. below, × 40.

51. do. do. front, × 40.

52. Outlines of separate valves, showing hinge-margins, × 40.

*Polycope orbicularis.*

53. Carapace, seen from right side, × 120.

54. do. do. above, × 120.

55. do. do. behind, × 120.

56. Imperfect valve (Roundstone), × 84.

57. Sculpture of shell, × 140.

*Polycope dentata.*

58. Carapace, seen from left side, × 84.

59. do. do. below, × 84.

PLATE XXXVI.

In this and the following Plates (except Plate XLI.), illustrating details of anatomical structure, the letters (*a, b, c, &c.*) uniformly refer to one and the same organ, except when otherwise stated in the explanatory text. The letters refer as follows:—

*a.* Upper antenna.

*b.* Lower antenna: *a'*, poison-gland; *b'*, flagellum or urticating seta.

*c.* Mandible: *a'*, palp; *b'*, branchial appendage.

*d.* First maxilla: *a'*, external palp; *b'*, branchial plate.

*e.* Second maxilla: *a'*, palp; *b'*, branchial appendage.

*f.* First foot.

*g.* Second foot.

*h.* Third foot.

*i.* Postabdominal ramus.

*k.* Male copulative organ.

*l.* Male "glandula mucosa."

- Fig. 1. *Cypris virens*, female,  $\times 85$  (fig. *a*  $\times 40$ ).  
*m.* Mouth,  $\times 320$ .  
*n.* Receptaculum seminis and duct,  $\times 210$ .  
 Fig. 2. *Cypris gibba*, female,  $\times 145$ .  
 Fig. 3. *Cypris serrata*, female,  $\times 120$ .  
 Fig. 4. *Cypris reptans*, female,  $\times 85$ .  
 Fig. 5. *Cypris levis*, female,  $\times 210$ .  
 Fig. 6. *Cypris compressa*, male.  
*a.* Copulative organs,  $\times 210$ .  
*m.* Extremity of "mucus-gland,"  $\times 210$ .  
*n.* do. mandibular palp,  $\times 210$ .  
 Fig. 7. *Cypris cinerea*, female,  $\times 210$ .

- Fig. 8. *Cypris ovum*, male,  $\times 210$ .  
 Fig. 9. *Cypridopsis villosa*,  $\times 400$ .  
 Fig. 10. *Cypridopsis aculeata*,  $\times 400$ .  
 Fig. 11. *Cypris punctillata*.  
 Extremity of mandible,  $\times 210$ .  
 Fig. 12. *Candona albicans*, female.  
*m.* Biarticulate seta of lower antenna,  $\times 600$ .  
*i.* Postabdominal ramus,  $\times 210$ .  
*n.* Palp of second jaw,  $\times 210$ .  
 Fig. 13. *Candona candida*, male.  
*k.* Copulative organs,  $\times 85$ .

## PLATE XXXVII.

- Fig. 1. *Candona candida*,  $\times 85$ .  
*m.* Portion of the mucus-gland highly magnified,  $\times 210$ .  
*t.* Portion of a spermatozoid,  $\times 600$ .  
 Fig. 2. *Candona detecta*, female,  $\times 210$ .  
*m.* Terminal claws of postabdomen,  $\times 400$ .  
 Fig. 3. *Notodromas monachus*.  
*e'*. Second jaw and palp, female,  $\times 210$ .  
*e''*. do. right side, male,  $\times 85$ .  
*e'''*. do. left side, male,  $\times 85$ .  
*f'*. Foot of first pair, female,  $\times 210$ .  
*f''*. do. male,  $\times 210$ .  
*g.* Extremity of second foot, male,  $\times 210$ .  
*c.* Mandible with palp and branchial appendage,  $\times 210$ .

- b.* Terminal joints of lower antenna,  $\times 96$ .  
*l.* Glandula mucosa,  $\times 96$ .  
*k.* Copulative organs, male,  $\times 120$ .  
 Fig. 4. *Pontocypris mytiloides*,  $\times 210$ .  
*g.* Extremity of second foot,  $\times 210$ .  
*e'*. Left jaw of second pair, male,  $\times 210$ .  
*e''*. Palp of second jaw, female,  $\times 210$ .  
*c.* Mandible: *a'*, palp of mandible,  $\times 210$ .  
*j.* Suprabasal seta of do.,  $\times 210$ .  
*o.* Intestinal canal with dilatations,  $\times 210$ .  
*k.* Copulative organs, male,  $\times 85$ .  
*m.* Posterior spines of right valve,  $\times 210$ .

## PLATE XXXVIII.

- Fig. 1. *Pontocypris mytiloides*.  
 Branchial plate of first jaw,  $\times 210$ .  
 Fig. 2. *Paracypris polita*,  $\times 210$ .  
 Fig. 3. *Pontocypris trigonella*,  $\times 210$ .  
 Fig. 4. *Macrocypris minna*,  $\times 85$ .  
*m.* Coil of spermatid filaments,  $\times 400$ .  
 Fig. 5. *Bairdia inflata*,  $\times 210$ .  
 Fig. 6. *Cythere castanea*,  $\times 210$ .

- Fig. 7. *Cythere concinna*,  $\times 210$ .  
*m.* Terminal claw of last foot.  
*n.* Terminal claw of first foot.  
 Fig. 8. *Cythere viridis*,  $\times 210$ .  
 Fig. 9. *Limnocythere inopinata*,  $\times 210$ .  
*i.* Abdominal lobes and setæ,  $\times 400$ .  
*m.* Appendage of do.,  $\times 400$ .

## PLATE XXXIX.

- Fig. 1. *Limnocythere inopinata*,  $\times 210$ .  
 Fig. 2. *Cythere lutea*,  $\times 210$ .  
*k.* Copulative organs, male.  
*p.* Penis.  
*i.* Postabdomen.

- Fig. 3. *Cythere albomaculata*,  $\times 210$ .  
*b.* Terminal joints of lower antennæ, male and female.  
*m.* Homologue of second maxilla,  $\times 400$ .  
 Fig. 4. *Cythere convexa*,  $\times 210$ .

Fig. 5. *Cytheridea torosa*, × 210.

- m.* Abdomen of female, × 84.
- n*<sup>''</sup>. Second joint of last right foot of the male, × 210.
- o.* Ringed seta of last foot, × 400.
- h.* Foot of last pair (left) of male, × 210.
- g.* do. second pair (right) of male, × 210.

*g*<sup>''</sup>. Foot of second pair (left) of male, × 210.

- f.* do. first pair (female), × 210.
  - f*<sup>''</sup>. do. do. (male, right), × 210.
  - k.* Copulative organs of male, × 84.
  - p.* Branchial appendage of mandible palp, × 210.
- Fig. 6. *Xestoleberis aurantia*, × 210.  
 Fig. 7. *Cytherura nigrescens*, × 210.

## PLATE XL.

Fig. 1. *Cytheridea papillosa*, × 210.

- h.* Third foot, male.
  - f.* First foot (right) of male.
  - f*<sup>''</sup>. do. female, and left of male.
- Fig. 2. *Cytheridea lacustris*, female, × 210.  
 Fig. 3. *Loxoconcha elliptica*, × 210.  
 Fig. 4. *Loxoconcha impressa*, × 210.  
*k.* Apical portion of copulative organs of male.

*m.* Abdominal lobe.

- Fig. 5. *Ilyobates bartonensis*, × 210.
- Fig. 6. *Cytheridea elongata*, male, × 210.
- Fig. 7. *Paradoxostoma hibernicum*, × 210.
- o.* Extremity of mandible.
- Fig. 8. *Bythocythere simplex*, × 84.
- Fig. 9. *Paradoxostoma sarniense*, × 210.

## PLATE XLI.

Fig. 1. *Cylindroleberis Mariae*.

- a.* Upper antenna of male, × 40.
- b.* do. female, × 84.
- c.* Lower antenna of female, × 40; *c*<sup>''</sup>, secondary branch, × 40.
- d.* Secondary branch of lower antenna of male, × 84.
- e.* Mandibular foot, × 84; *e*<sup>''</sup>, first maxilla.
- f.* Second maxilla, × 84.
- g.* Third maxilla, × 84.
- n.* Abdominal laminæ, × 84.
- i.* Extremity of "oviferous foot," × 210.

Fig. 2. *Cylindroleberis teres*, female, × 84.

- a.* Upper antenna, × 84.
- b.* Mandibular foot, × 84.
- c.* First maxilla, × 84.
- d.* Abdominal lamina, × 84.

Fig. 3. *Philomedes interpuncta*.

- a.* Secondary branch of lower antenna, × 84.
- b.* Mandibular foot, × 84.
- c.* Third maxilla, × 84.
- d.* Extremity of oviferous foot, × 210.
- e.* Abdomen, seen from side, × 84.

*f.* Abdomen, seen from below, × 84.

Fig. 4. *Bradycinetus Macandrei*.

Secondary branch of lower antenna, female, × 210.

Fig. 5. *Bradycinetus brenda*.

- a.* Upper antenna of female, × 84.
- b.* Mandibular foot of female, × 84.
- c.* First maxilla of female, × 84.
- d.* Second maxilla with portion of branchial plate, × 84; *d*<sup>''</sup>, mandibuliform processes.

Fig. 6. *Pseudocythere caudata*.

Third foot, × 210.

Fig. 7. *Sclerochilus contortus*.

- a.* Upper antenna, × 210.
- d.* First maxilla, × 210.
- f.* First foot, × 210.
- k.* Copulative organs, male, × 210.

Fig. 8. *Paradoxostoma variabile*.

- a.* Upper antenna, × 210.
- b.* Lower antenna, × 210.
- g.* Second foot, × 210.
- h.* Third foot, × 210.

Fig. 9. *Conchæcia obtusata*?, × 40.



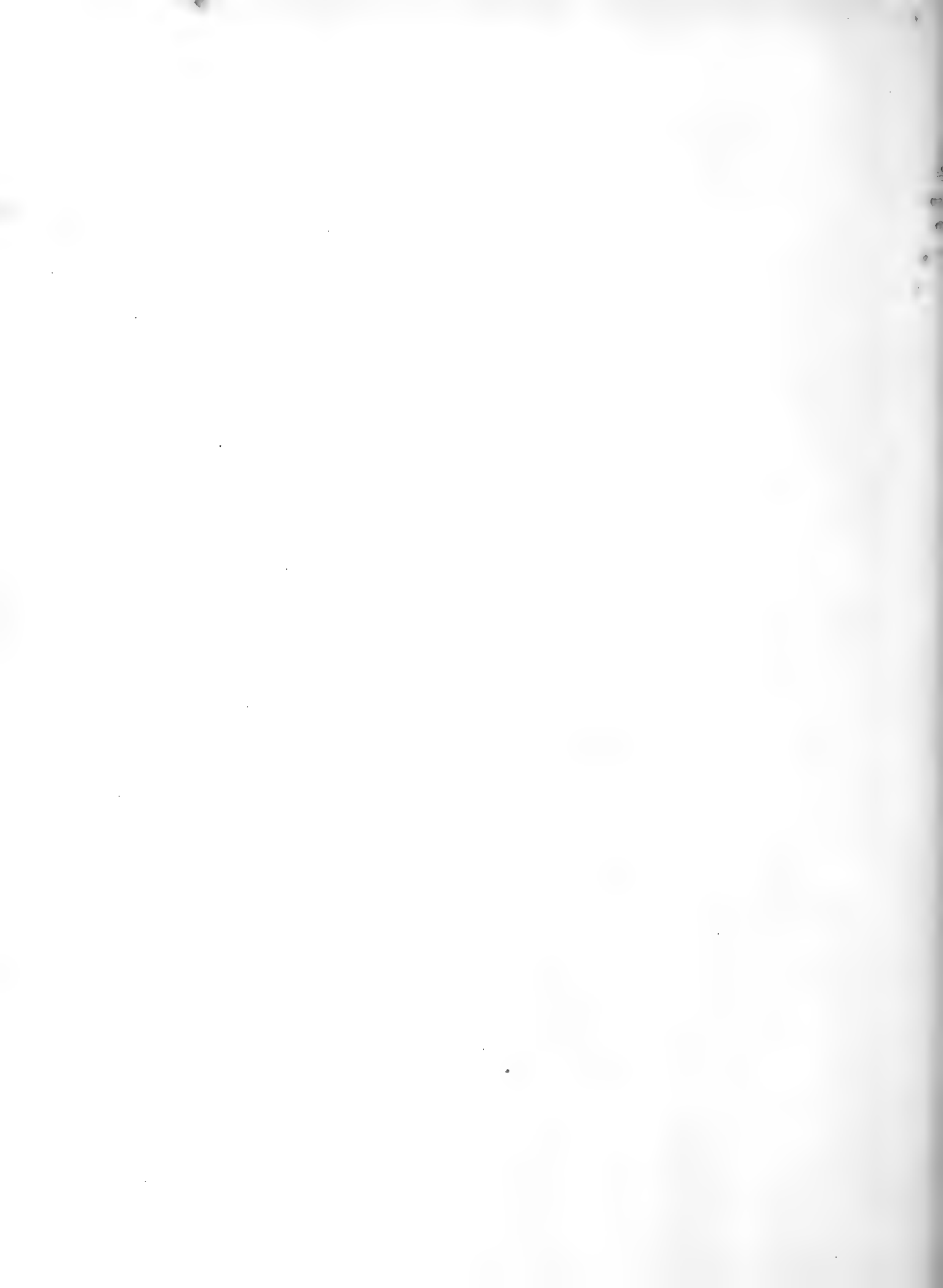


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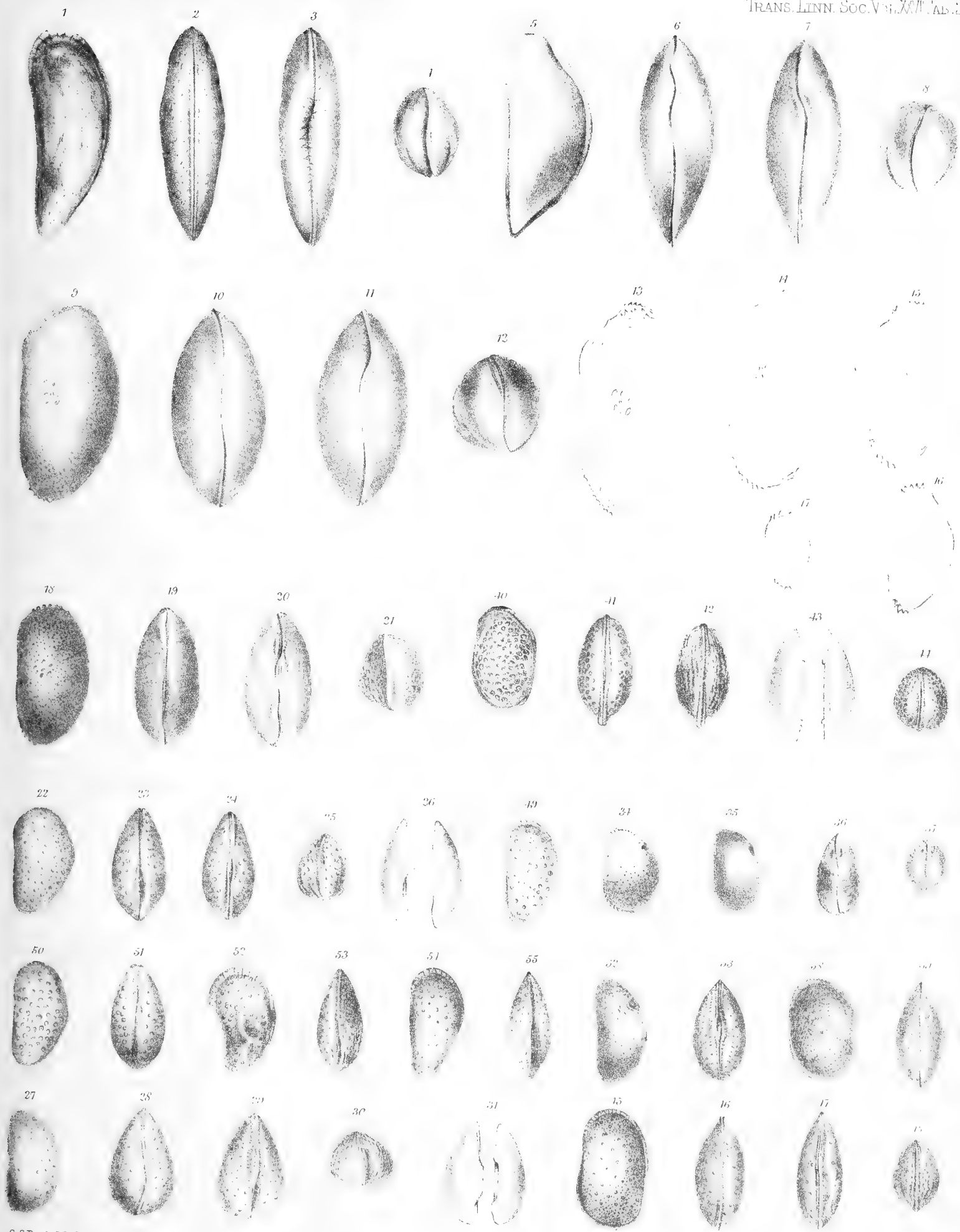










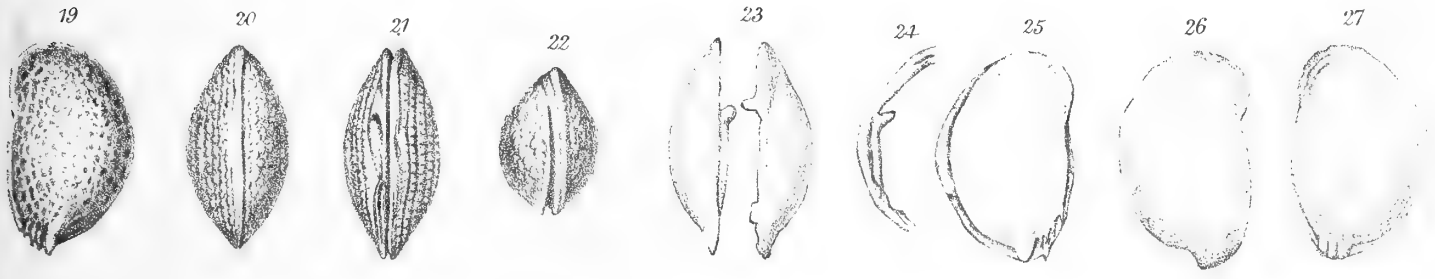
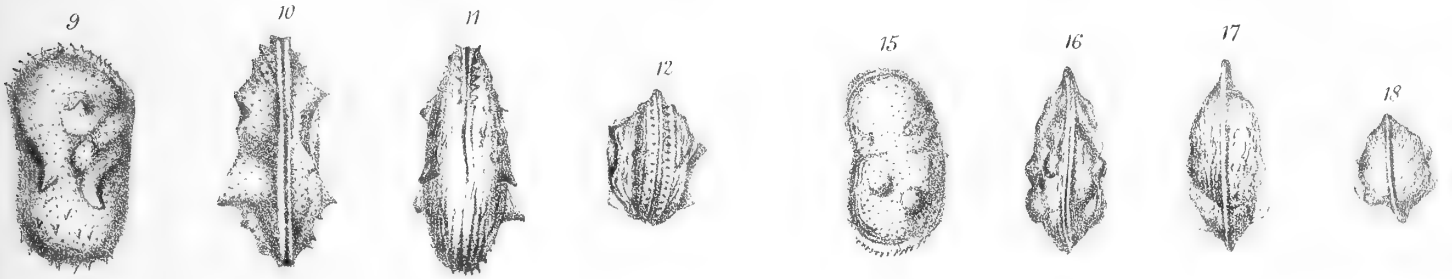




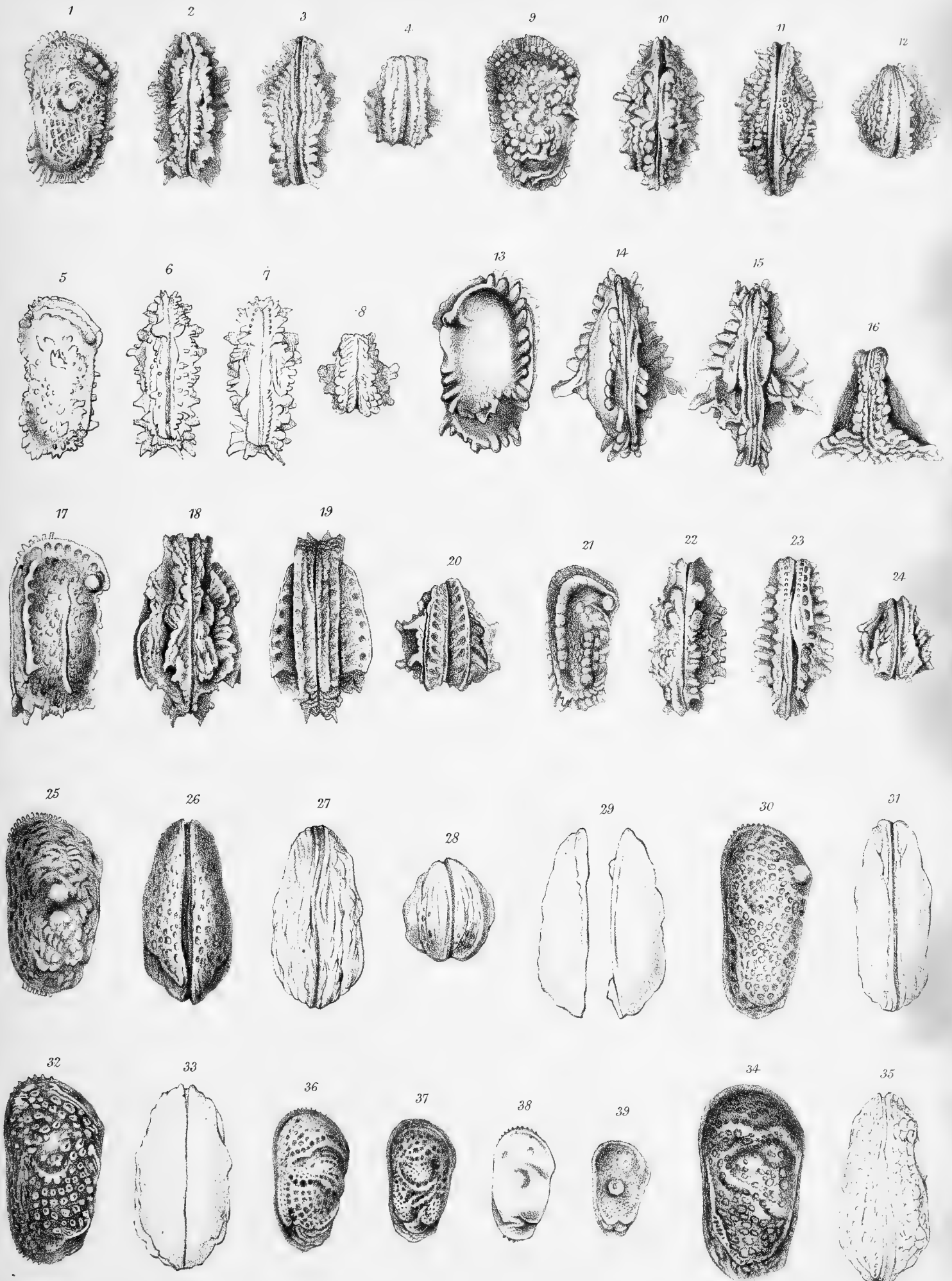










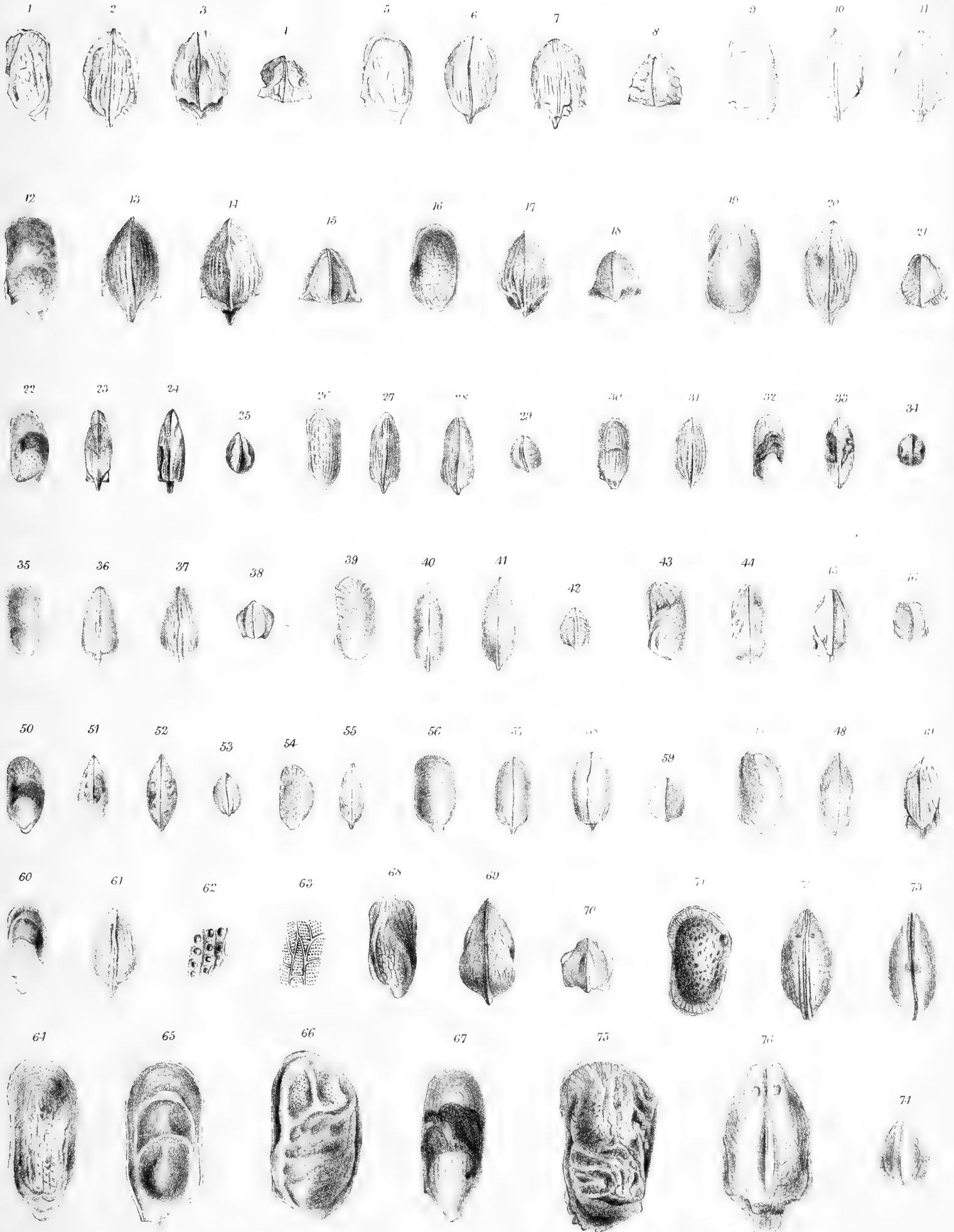










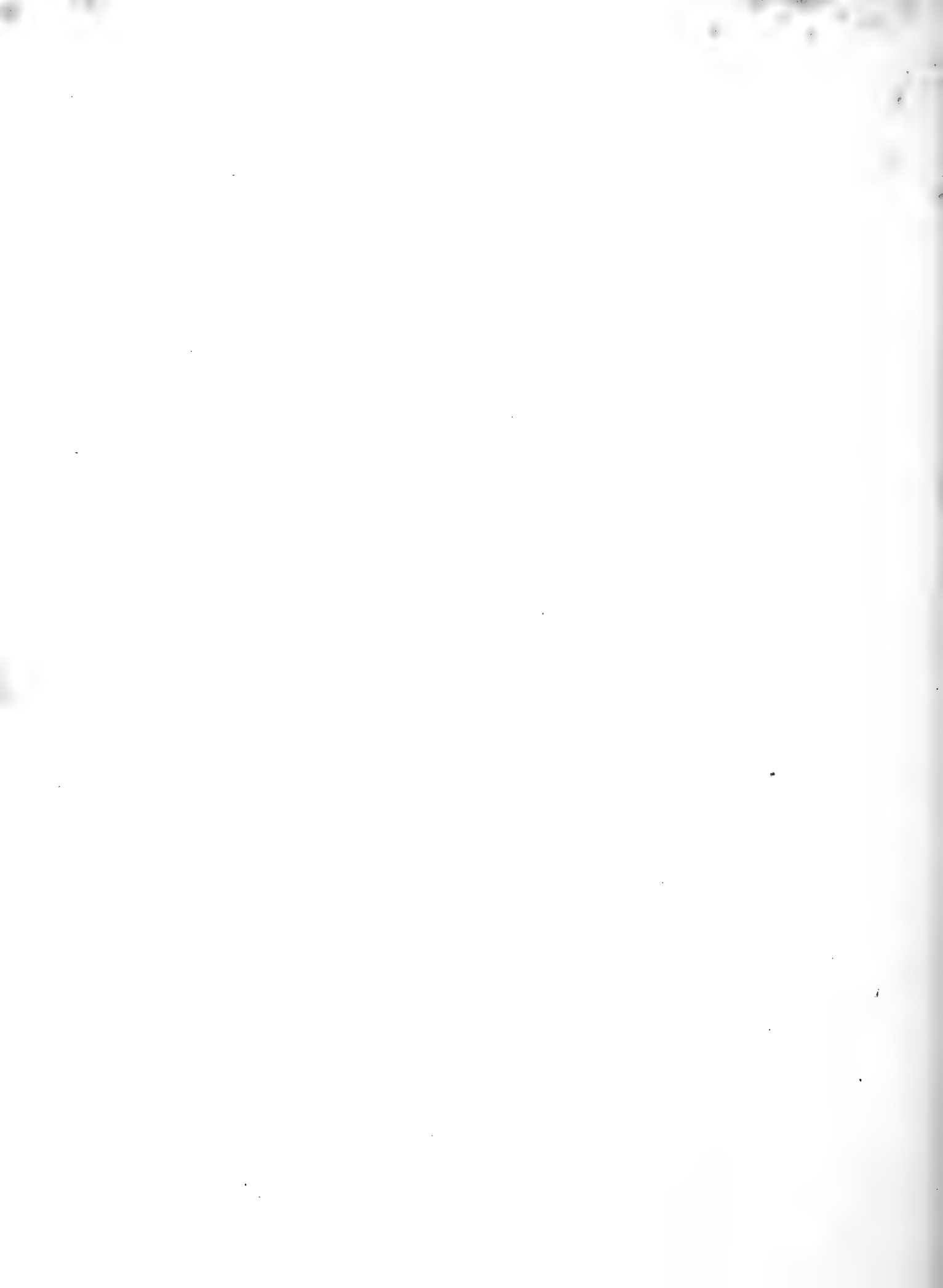










































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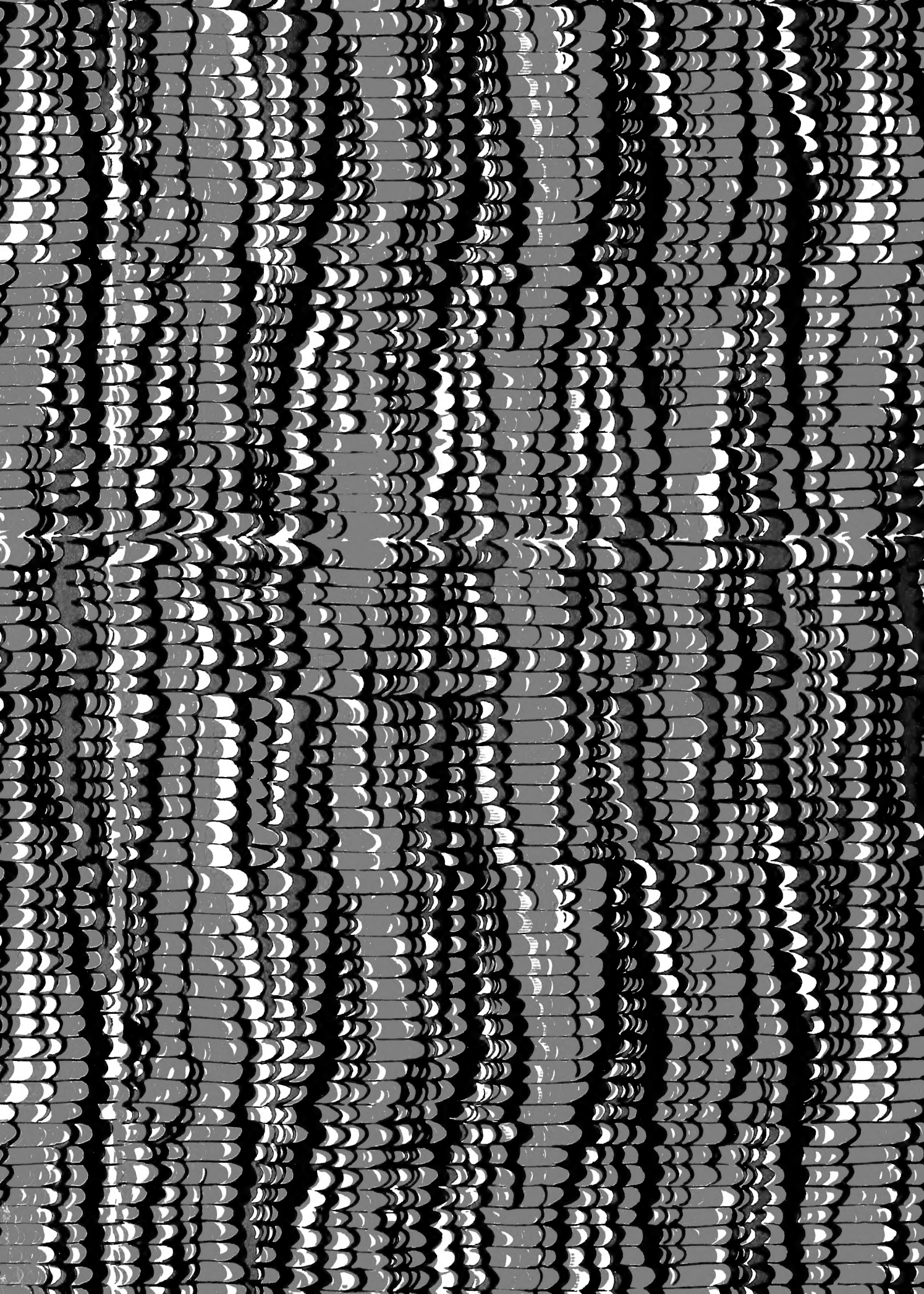


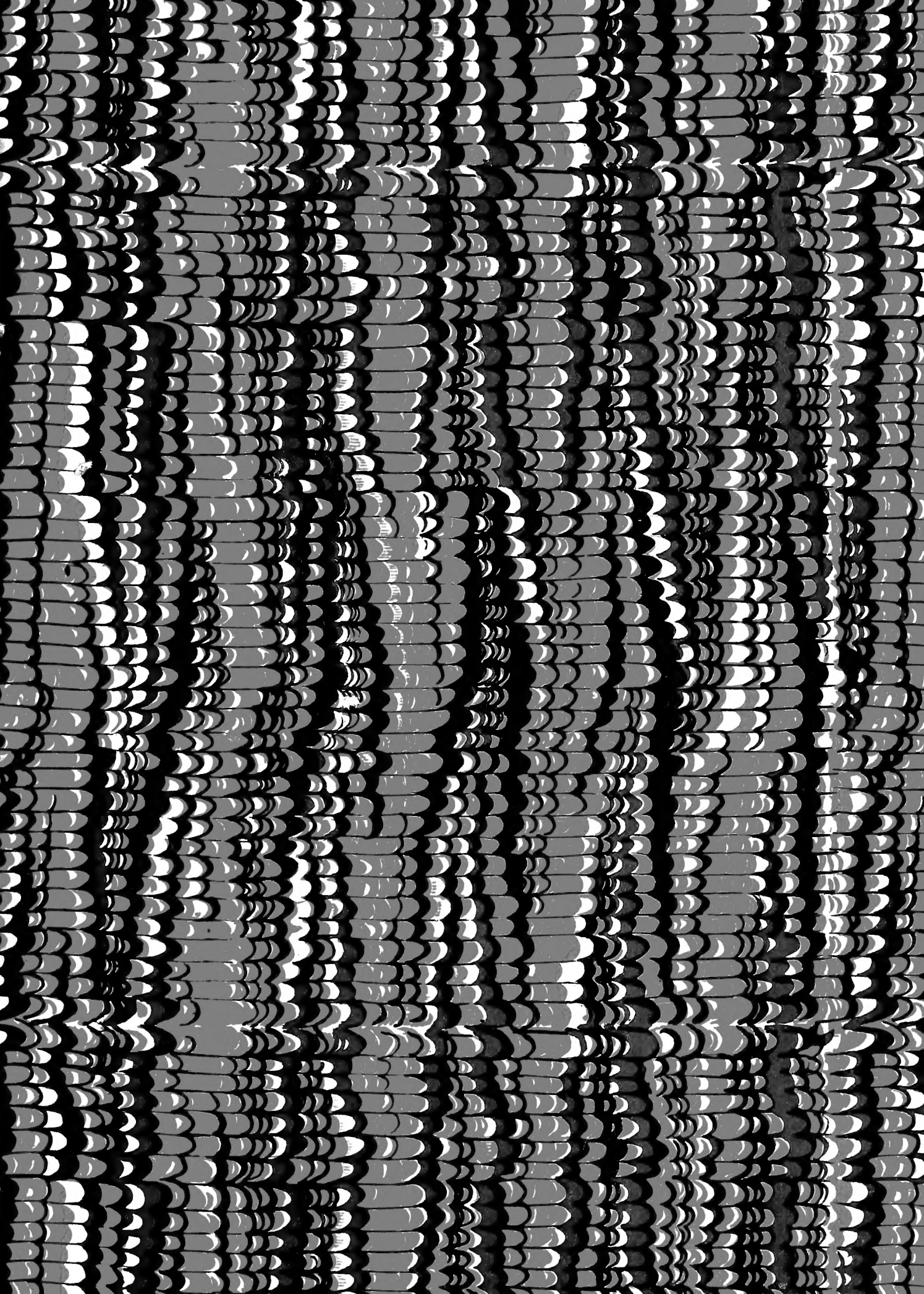












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