

the microscope, when thrown down on black paper they are of a whitish grey.

PLATE XIV. fig. 13. *a.* ascus with paraphysis, magnified; *b.* sporidia more highly magnified.

1062. *P.* (Helvelloideæ) *leiocarpa*, Curr. *l. c.* p. 493, f. 6. Cupula primum connivente, subglobosa, extus (præsertim versus marginem) aspera, fusco-vinosa, tenui, semipellucida, basin versus sæpe pallida, demum expansa, fere plana; hymenio olivaceo-fusco; sporidiis globosis, lævibus.

On burnt soil. Ascot, Rev. G. H. Sawyer, where this and the preceding species were abundant in the autumn of 1863. (Rabenhorst, *l. c.* no. 622.)

Cup $1\frac{1}{2}$ – $2\frac{1}{2}$ inches broad; hymenium at first pale, then dark olive-brown; sporidia uni- or biseriate, globose, perfectly even, .0003–.0004 inch in diameter.

Resembling at first *P. pustulata*, Batsch.

PLATE XIV. fig. 14. *a.* ascus with paraphysis, magnified; *b.* sporidia more highly magnified.

[To be continued.]

XLIII.—*Notes on the Palæozoic Bivalved Entomostraca.* No. V.
Münster's Species from the Carboniferous Limestone. By
T. RUPERT JONES, F.G.S., and J. W. KIRKBY, Esq.

[Plate XX.]

[Continued from vol. i. p. 257.]

THE earliest-described species of Carboniferous Bivalved Entomostraca are those of Count Münster. In 1830 a memoir by him appeared in Leonhard und Bronn's 'Jahrbuch für Mineralogie,' &c. (pp. 60–70), "On some Fossil Species of *Cypris* (Müller, Lamarck) and *Cythere* (Müller, Latreille, Desmarest)." After noticing what was then known of fossil *Cytheridæ*, the author briefly describes (pp. 62, 64) fourteen Tertiary species of *Cythere**, and proceeds (pp. 65, 66) to give similar brief descriptions of eight species that he had collected from the Carboniferous or Mountain Limestone at Regnitzlosan, near Hof, in Bavaria. This limestone, he says, is characterized by *Producti*; and "in the midst of it occurs a marly bed, oolitic in appearance, but on close examination the oolitic bodies are found to be organic remains; few of them, however, are distinct and uninjured. Among these are the *Cytheræ* here mentioned, which for the most part are found with the valves still united. Besides these, there are in the same bed remains of small Corals, *Cida-*

* These were figured and described, together with others, by Roemer, Jahrb. f. M. u. s. w. 1838, p. 514, &c., pl. 6.

rites, *Serpulites*, *Encrinites*, *Bellerophon*, *Productus*, *Terebratula*, *Cardium*, *Nerita*, *Trochus*, *Turritella*, &c.”

The so-called *Cytheræ* (some are found to be of different genera) are thus described (p. 65):—

- “15. *Cythere Okeni*, nob. With a smooth, somewhat flat, nearly egg-shaped, large shell.
- “16. — *suborbiculata*, nob. With a smooth, nearly orbicular, somewhat flat shell.
- “17. — *inflata*, nob. With a smooth, very gibbous, nearly egg-shaped shell.
- “18. — *Hisingeri*, nob. With a somewhat kidney-shaped smooth shell, like a small *Modiola*.
- “19. — *elongata*, nob. With a much longer shell, incurved at the middle on both sides, and smooth.
- “20. — *bilobata*, nob. With a broad, strongly kidney-shaped, incurved shell, which often has both valves.
- “21. — *subcylindrica*, nob. With a smooth, nearly cylindrical shell.
- “22. — *intermedia*, nob. With a smooth, bent, somewhat kidney-shaped shell, which seems to be a passage-form between *C. Hisingeri* and *C. elongata*.”

Count Münster intended that these should have been figured in Goldfuss's great work on the Fossils of Germany; but they have remained until now without illustration. The originals are still in the Royal Museum at Munich; but, through the kind intervention of our friend Dr. A. Oppel, the Keeper of that Museum, Herr Gümbel, State-Geologist of Bavaria, has most courteously lent us a series of specimens corresponding to those in the Münster Collection, and which he has obtained from the same Carboniferous Limestone, at Tragenau, near Hof. Some of the specimens are in good condition; others, on the contrary, are much worn, either by rolling, or probably by having been partly dissolved by percolating water.

By the careful comparison of these specimens with species published since the date of Count Münster's paper, we are enabled to remove some difficulties that lie in the way of settling the nomenclature of the Upper Palæozoic Bivalve Entomostraca, among which there is much confusion—the more so since some of the Carboniferous species continue to appear in the Permian rocks, and have been described and named anew without reference to their earlier occurrence and naming; and, again, one of us, in describing some Permian forms, adopted for one* of them one of Count Münster's names, urged by too great care in the avoidance of new terms, and by some rashness in trying to re-

* *Cythere elongata*, Jones; subsequently modified, on good grounds, by Geinitz to *C. subelongata*.

cognize specific forms by the Count's very brief notice of a few features.

The series of specimens sent us by Herr Gümbel include examples of all the forms described by Count Münster, besides one which he has not described. Our opinions on the species and their generic relations, as derived from these specimens, are expressed in the following notes.

1. *Leperditia Okeni*, Münster, sp. Pl. XX. figs. 1-3;
var. *acuta*, fig. 4.

Cythere Okeni, Münster, Jahrbuch f. Min. 1830, p. 65, no. 15.

Cypris Scotoburdigalensis, Hibbert, Transact. Royal Soc. Edinb. vol. xiii. p. 179, figs. *a-c*, 1836; Portlock, Geol. Rep. Londonderry, p. 316, pl. 24. fig. 13 *c*, 1843. (Small variety.)

Cypris inflata, Murchison, Sil. Syst. p. 84, fig. A, 1839. (Probably a small variety, like the last mentioned.)

Cypris subrecta, Portlock, *ibid.* fig. 13 *b*, 1843.

Cythere arcuata (fig. 9), *cornuta* (fig. 12), *elongata* (fig. 13), *Hibbertii* (fig. 15), *inornata* (fig. 18), *scutulum* (fig. 21), *oblonga* (fig. 22), *spinigera* (fig. 23), *gibberula* (fig. 25), in pl. 23 of M'Coy's 'Synops. Carb. Foss. Ireland.' (Probably either varieties or imperfectly drawn small specimens of *L. Okeni*.)

Bairdia lævigata, var. *nigrescens*, D'Eichwald, Lethæa Rossica, p. 1342, pl. 52. fig. 5, 1860.

Length $\frac{1}{37}$ — $\frac{1}{10}$ inch, height $\frac{1}{54}$ — $\frac{1}{15}$ inch.

This is a *Leperditia*, with the hinged or dorsal border usually a little over half the entire length, and the free or ventral margin boldly rounded and somewhat oblique; valves either moderately convex or strongly gibbous, but always more or less swollen, and sometimes ridged, at the dorsal region of the left valve, as other *Leperditia* are; and either meeting along the ventral margin with a slight flange or with the right strongly overlapping the left valve; surface smooth.

None of our Bavarian specimens show either eye-spot or muscle-spot; but these are sometimes visible on other specimens. The various sizes of the individuals indicate probably differences of age, habit, and perhaps sex. Fig. 1, Pl. XX. may be regarded as the normal subovate form. Fig. 2 is smaller, more oval and obtuse, and rather more gibbous in proportion. Fig. 3 is still smaller, but is like fig. 1 in its proportions. Fig. 4 is small and very acute anteriorly: it is associated in Scotland and elsewhere, as in Bavaria, with the other varieties; we may term it var. *acuta*.

L. Okeni is found in Russia* and in Nova Scotia†, as well as in Germany, Belgium‡, and in the Upper and Lower Carboni-

* As we learn from specimens kindly sent to us by M. E. d'Eichwald.

† Dr. Dawson's collection comprises some specimens from Horton, N. S.

‡ Known to us by specimens from M. Bosquet.

ferous strata throughout the British Isles. The largest specimens we have seen were found by Mr. C. Moore, F.G.S., in the Mountain-Limestone at Weston-super-Mare, in Somerset. *L. Okeni* never seems to have quite such sharp angles at the end of the hinge-line as *L. Balthica* and other Silurian *Leperditia* have.

2. *Leperditia oblonga*, n. sp. Pl. XX. fig. 5.

Length $\frac{1}{26}$ inch, height $\frac{1}{40}$ inch.

Among the specimens of *L. Okeni* with which M. Gümbel favoured us are a few Entomostraca that do not belong to that species. One of these is a small *Leperditia*, nearly oblong, with rounded ends, nearly alike in contour, but one rather flatter than the other; the hinge-line long and straight; the ventral line gently and evenly curved; surface smooth.

Such small oblong *Leperditia* as this are rare, but are found in the Carboniferous rocks, and form a passage from *L. Okeni* (which in its small varieties imitates the small Silurian *Leperditia*: see Ann. Nat. Hist. ser. 3. vol. i. pl. 10) to *L. Koninckiana*, nob. MS., of the Carboniferous Limestone of Belgium.

3. *Leperditia parallela*, n. sp. Pl. XX. figs. 6 a, 6 b.

Length $\frac{1}{44}$ inch, height $\frac{1}{120}$ inch, thickness $\frac{1}{106}$ inch.

This is a still smaller *Leperditia*, long, gibbous, and almost cylindrical, with long straight hinge-line, coming forward almost flush with the gently rounded anterior end, and retreating from the obliquely rounded hinder end; ventral edge nearly straight, sharply curving at its posterior end, and obliquely rising in front.

4. *Leperditia suborbiculata*, Münster, sp. Pl. XX.
figs. 7 a-7 c.

Cythere suborbiculata, Münster, Jahrb. f. Min. 1830, p. 65, no. 16.

Length $\frac{1}{17}$ inch, height $\frac{1}{23}$ inch.

Excepting for convenience' sake, and from the possibility of the soft parts of the Entomostracan inhabitant of such a carapace having some difference in its inner organs from those of the ovate *Leperditia*, we could not venture to separate this shorter and rounder form from *L. Okeni*; and, after all, any differences the animal had may have been sexual only. Excepting in being nearly orbicular (the ventral margin having a very bold curve, and being only slightly oblique anteriorly), it does not appear to differ from the more common form, with which it is associated in Britain as in Bavaria. It has a moderate ventral overlap, and has the dorsal hump on the left valve. Probably it ought to be regarded as *L. Okeni*, var. *suborbiculata*, Münster.

5. *Cytherella** (?) *inflata*, Münster, sp. Pl. XX. figs. 8 a-8 c.

Cythere inflata, Münster, Jahrb. f. Min. 1830, p. 65, no. 17.

Length $\frac{1}{15}$ inch, height $\frac{1}{20}$ inch.

A swollen, nearly ovate form, with the dorsal border faintly convex and the free margin elliptical. The anterior extremity is somewhat more acute than the posterior. The valves are thick, very gibbous ventrally and rather anteriorly, sloping gradually to the dorsal border and backwards, but pinched up suddenly anteriorly; they are also margined along their free edges with a slightly lipped rim, and have a faint circular hummock in a shallow hollow in their centre.

The same form occurs in the Carboniferous Limestone of Visé, in Belgium, and in the Carboniferous (marine) shales of Craigen-glen, Campsie, Scotland. It is evidently not a *Cythere*, but approaches more nearly to *Cytherella*, in which genus we have placed it.

The foregoing are figured in Pl. XX. with the dorsal margin upwards; the following (*Bairdia* and *Cytheræ*) are figured with the anterior end upwards.

6. *Bairdia*† *Hisingeri*, Münster. Pl. XX. fig. 12 a-12 c.

Cythere Hisingeri, Münster, Jahrb. f. Min. 1830, p. 65, no. 18.

Bairdia Schaurothiana, Kirkby, Ann. Nat. Hist. ser. 3. vol. ii. p. 329, pl. 10. fig. 14, 1858; and Trans. Tyneside Nat. Field-Club, vol. iv. 1859, p. 147, pl. 9. fig. 14, and woodcut 10.

Length $\frac{1}{13}$ inch, height $\frac{1}{27}$ inch.

A good *Bairdia*, with a straight, abruptly sloping posterior extremity, an arched dorsal margin, a slightly convex inwardly sloping anterior extremity, and a nearly straight ventral margin; the valves swell most in the centre, and slope away to rather trenchant edges at each extremity.

The single example of this species among Herr Gümbel's Bavarian specimens enables us to identify it with *Bairdia Schaurothiana*, Kirkby, of the Permian strata of Durham. *Bairdia* the same as this occur also in the Carboniferous strata of Britain.

7. *Bairdia elongata*, Münster. Pl. XX. figs. 14 a-14 c.

Cythere elongata, Münster, Jahrb. f. Min. 1830, p. 65, no. 19.

Length $\frac{1}{9}$ inch, height $\frac{1}{30}$ inch.

A curious elongate subcylindrical form, more than three times

* As one of us has already indicated (Monogr. Tert. Entom. pp. 9 & 54), there is no doubt of *Cytherella* being generically distinct from *Cythere*, and probably a member of a different family—namely, of the *Cypridinidæ*.

† *Bairdia* is not yet proved to be generically distinct from *Cythere*; but it is convenient to use the term independently.

as long as high, with a flatly arched dorsal and an incurved ventral border; valves highest near anterior extremity, which is bluntly pointed; valves lowest near posterior extremity, which, though imperfect in our specimens, has been decidedly more acute than the anterior.

The worn and somewhat imperfect specimen from which we describe these characters gives evidence of having possessed the overlapping ventral flap of the left valve common to all *Bairdiæ*. The general contour of the specimen also indicates the same generic affinity, although, at the same time, it cannot but be remarked that this is not a typical species of the genus.

8. *Bairdia subcylindrica*, Münster. Pl. XX. figs. 13 *a*, 13 *b*.

Cythere subcylindrica, Münster, Jahrb. f. Min. 1830, p. 65, no. 21.

Length $\frac{1}{2}$ inch, height $\frac{1}{6}$ inch.

A pretty, slender *Bairdia*, with an evenly arched dorsal border, an obtuse anterior and a more acute posterior extremity, and a slightly concave ventral border; valves rounded, thickest in the centre, and smooth (?).

This resembles *Bairdia gracilis* of M'Coy (from the Carboniferous Limestone), with which possibly it is identical. A similar form occurs also in Permian Limestone.

9. *Cythere bilobata*, Münster. Pl. XX. figs. 10 *a*, 10 *b*.

Cythere bilobata, Münster, Jahrb. f. Min. 1830, p. 65, no. 20.

Length $\frac{1}{20}$ inch, height $\frac{1}{32}$ inch.

Dorsal border highly arched, with the anterior slope shortest; posterior extremity a little less blunt than the anterior; ventral border incurved; valves very convex and smooth (?).

The only specimen of this form in the Bavarian series scarcely gives so good an idea of the species as some which we have from British and Belgian localities. We have examples, at least, which show the ventral incurvation more decidedly than the specimen figured; and it is from this feature that Count Münster seems to have named the species. It occurs also in Russia.

10. *Cythere intermedia*, Münster. Pl. XX. figs. 9 *a*–9 *e*.

Cythere intermedia, Münster, Jahrb. f. Min. 1830, p. 65, no. 22.

Cythere subreniformis, Kirkby, Trans. Tyneside Nat. Field-Club, vol. iv. p. 154, pl. 11. f. 23.

Length $\frac{1}{17}$ inch, height $\frac{1}{38}$ inch.

The only good-sized specimen (figs. 9 *a*–9 *c*) of this species in the series is imperfect. It would appear to be the same as a Permian species described by one of us as *Cythere subreniformis*. A smaller specimen (figs. 9 *d*, 9 *e*) belongs to the same species.

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C. intermedia occurs also in Mr. Charles Moore's collection of British Carboniferous Entomostraca.

11. *Cythere Muensteriana*, n. sp. Pl. XX. figs. 11 a, 11 b.

Length $\frac{1}{14}$ inch, height $\frac{1}{36}$ inch.

The specimen from which we describe this species was sent to us as *Bairdia elongata*, from which, however, we are satisfied it is distinct.

It is nearly three times as long as high, and has a flatly convex dorsal border, abruptly sloping towards the obtusely pointed extremity; the other extremity is subtruncate; the ventral border is somewhat hollow; the valves are rather flat, thickest near the middle, and slope gently away to each extremity.

As a summary of Münster's species, we may add that—

- Münster's No. 15. *Cythere Okeni* = *Leperditia Okeni* (comprising *L. subrecta* and many others).
 „ 16. *C. suborbiculata* = *L. suborbiculata*.
 „ 17. *C. inflata* = *Cytherella inflata*.
 „ 18. *C. Hisingeri* = *Bairdia Hisingeri* (comprising *B. Schaurothiana*).
 „ 19. *C. elongata* = *B. elongata*.
 „ 20. *C. bilobata* = *Cythere bilobata*.
 „ 21. *C. subcylindrica* = *Bairdia subcylindrica* (comprising *B. gracilis*).
 „ 22. *C. intermedia* = *Cythere intermedia* (comprising *C. subreniformis*).

All of these, except *B. elongata*, we know to be more or less abundant in the Carboniferous strata of Britain and elsewhere; and some are Permian "recurrents."

XLIV.—*The Darwinian Hypothesis supported by Observations on Crustacea.* By FRITZ MÜLLER, of Desterro.

UNDER the title of 'Für Darwin,' Dr. F. Müller has published a series of careful and minute observations on certain forms of Crustacea, which, he thinks, furnish a means of testing the soundness of the Darwinian hypothesis. Whether the facts described by him have really the bearing which he attributes to them may be a question; but there can be no doubt as to the value and interest attaching to his observations. The following abstract of some of the more important portions of this work is derived from the notice in the 'Bibliothèque Universelle,' 1865, "Bulletin Scientifique," p. 154.

According to Darwin's theory, the natural classification of



Jones, T. Rupert and Kirkby, James W. 1865. "XLIII.—Notes on the Palæozoic Bivalved Entomostraca. No. V. Münster's species from the Carboniferous Limestone." *The Annals and magazine of natural history; zoology, botany, and geology* 15, 404–410.

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