

41. NOTES on some NEW and LITTLE-KNOWN SPECIES of CARBONIFEROUS MURCHISONIA. By MISS JANE DONALD. (Communicated by J. G. GOODCHILD, Esq., F.G.S. Read June 22nd, 1892.)

[PLATES XVI. & XVII.]

EVERY student of the Carboniferous rocks must be struck by the number of keeled gasteropoda they contain, many of which are so small and also so strongly resemble one another that only the study and comparison of a large series can afford means for anything like an accurate determination of different species. As a help towards their elucidation, I am about to figure and define the characteristics of some of the more marked forms of *Murchisonia*. Several of these have been previously described, but I think it well to reproduce them with more detailed notes.

In a previous paper<sup>1</sup> the various sections into which it has been considered advisable to group different species of *Murchisonia* have been noticed. Of the species here described two alone can undoubtedly be referred to *Goniostrongya*, Ehl., as possessing the characteristics of that section: namely, the turriculated form, angular whorls, and sinual band situated on the summit of the angle. In *M. quadricarinata*, *M. quinquecarinata*, *M. elongata*, *M. Kirkbyi*, *M. plana*, and *M. conula*, var. *convexa*, the sinus is situated above the angle; in other respects these shells resemble species of *Goniostrongya*. It is therefore a question whether they should be referred to that section or whether the position of the sinual band be considered sufficiently distinctive to necessitate their being grouped together in a new section. In the latter alternative I should suggest the name *Hypergonia*, and take *M. quadricarinata* for the type.

With regard to *M. pentonensis*, it is somewhat difficult to decide whether the sinual band is actually on the summit of the angle or immediately above. I incline to the latter opinion, and should therefore group this species with *M. quadricarinata* and allied forms. *M. conula*, var. *convexa*, and *M. plana* differ from the other species of this group, and also from species of *Goniostrongya*, in having the base of the shell flattened. *M. amœna*, De Kon., agrees with these two last-named species in having the sinus above the angle and also in the base being flattened. The possession of this flattened base is hardly a characteristic of such value as to render it necessary to separate these shells from those referred to *Hypergonia*. In addition to these keeled *Murchisoniæ*, I notice a new and interesting smooth form, probably belonging to the section *Cœloculus*, Ehl. I also give a fuller description of a fossil described in 1859 by Prof. Haughton<sup>2</sup> as *Cerithioides telescopium*,

<sup>1</sup> 'Descr. of some New Species of Carb. Gasteropoda,' Quart. Journ. Geol. Soc. vol. xlv. (1889) p. 621.

<sup>2</sup> 'On some Fossil Pyramidellidæ from the Carb. Limestone of Cork and Clonmel,' Proc. Dublin University Zool. and Bot. Assoc. vol. i. pt. iii. p. 282, pl. xx. figs. 2-4.

which seems to have been overlooked, for it is not mentioned in any of the lists of fossils published since. Though he notes the existence of a band on the whorls, he does not observe its significance as indicating the possession of a sinus in the outer lip. He refers it to the *Pyramidellidae*, and considers it closely allied to the recent *Cerithium telescopium*, Brug. The sinus in the outer lip is clearly shown to have been present by the lines of growth which curve backwards to the band above and forwards again below, thus proving that the shell is closely related to the *Murchisonia*. Of the sections into which that genus has been divided, this species has most in common with *Cœlocaulus*, but it differs from it in its remarkably flattened, grooved base and in the absence of an umbilicus. The mouth is imperfect in all the individuals I have seen, but from what is preserved I think it is highly improbable that the columella was vertical or the peristome reflected as in *Cœlocaulus*. It might therefore be well to retain the name *Cerithioides* for a section of *Murchisonia* in which this species might be placed until more is known of its affinities.

Section GONIOSTROPHA, Ehlert.

MURCHISONIA (GONIOSTROPHA) HIBERNICA, sp. nov. (Pl. XVI. fig. 1.)

Shell elongated, turreted. Whorls angular, increasing very gradually, slightly concave both above and below the angle. Sinual band bounded by two strong keels situated near the middle of the body-whorl, and rather below it on the upper whorls. Ornamentation consisting of one keel a short distance below the band and another above, immediately below the suture. Sutures deep. Mouth unknown. Lines of growth not seen.

There is but one specimen of this species in the collection of the Geological Survey, Museum of Science and Art, Dublin. The apex is broken and only six whorls remain. Its surface is badly preserved, so that lines of growth indicating the possession of a sinus in the outer lip are not perceptible. Nevertheless its characteristics are sufficiently distinctive to warrant its being taken as the type of a new species of *Murchisonia*.

Length  $12\frac{1}{2}$  millim.; width of body 5 millim.; height 4 millim.

*Locality.* Hook Point, Wexford.

*Formation.* Lower part of the Mountain Limestone.

MURCHISONIA (GONIOSTROPHA) TATEI, sp. nov. (Pl. XVI. fig. 2.)

Shell elongated, turreted. Whorls angular, numerous, increasing gradually. Sinual band bounded by two strong keels, situated near the middle of the body-whorl, and rather below the middle of the upper whorls. Ornamentation above the band variable, some specimens having two slight keels on the upper part of the whorl with one or two fine threads below, between the lower keel and the band, and occasionally another thread above at the suture; while others have only two keels, the additional threads being absent. Below the band are three keels somewhat less strong than those

limiting the band; of these, only one or two are visible on the upper whorls. Lines of growth curving backwards to the band above and forwards again below. Mouth imperfectly preserved.

The shell figured is in the Tate Collection, Alnwick Museum, in which there are also fragments of other specimens referable to the same species. The surface of all is badly preserved, and the apex of the best specimen is embedded in the matrix, leaving only seven whorls visible.

It resembles *M. elongata*, Portl., more nearly than any other Carboniferous species; but may be distinguished from it by its much smaller spiral angle, by the greater strength of the keels above the band, as well as by the greater relative width of the band.

Length 23 millim.; width of body-whorl  $7\frac{1}{2}$  millim.; width of penultimate whorl 6 millim.; height 4 millim.

*Locality.* Howick.

*Formation.* Upper part of the Yoredales.

#### Section HYPERGONIA.

Shell turriculated, composed of numerous angular whorls ornamented with keels. Sinual band situated above the angle, a characteristic which distinguishes it from *Goniotropha*, Cehl. It agrees with *Stegocelia* in the position of the sinus, but differs in not having the inner lip reflected on the columella, and in not being umbilicated.

**MURCHISONIA (HYPERGONIA) QUADRICARINATA, M'Coy.** (Pl. XVI. figs. 3 to 6.)

*Murchisonia quadricarinata*, M'Coy, 1844, 'Syn. of the Char. of the Carb. Limest. Foss. of Ireland,' p. 42, pl. v. fig. 9; A. d'Orbigny, 1850, 'Prodr. de Paléont. stratigr.' t. i. p. 123.

Non *Murchisonia quadricarinata*, L. G. de Koninck, 1851, 'Descr. des Anim. foss. du terr. Carb. de la Belgique,' Supplément, p. 697, pl. lviii. fig. 15.

*Murchisonia quadricarinata*, Morris, 1854, Cat. of Brit. Foss. p. 259; F. M'Coy, 1855, 'System. Descr. of Brit. Pal. Foss.' p. 531; R. Griffith, 1860, Journ. Geol. Soc. Dublin, vol. ix. p. 90; J. Armstrong, J. Young, and D. Robertson, 1876, 'Cat. of the Western Scot. Foss.' p. 56; J. J. Bigsby, 1878, 'Thes. Devonico-Carboniferus,' p. 327.

Non *Murchisonia quadricarinata*, L. G. de Koninck, 1883, 'Faune du Calc. Carb. de la Belgique,' vol. viii. pt. 4, p. 20, pl. xxxiv. figs. 17, 18.

*Murchisonia quadricarinata*, R. Etheridge, 1888, 'Foss. of Brit. Islands,' vol. i. Pal. p. 301.

Shell elongated, turreted. Whorls angular, numerous, gradually increasing. Angle a little below the middle of the whorl, bearing a strong keel and having two slighter keels above and two below; of the latter that next below the angle is generally the stronger. The widest space is that between the keel on the angle and the lower of

the two upper keels; it is occupied by the sinual band. Lines of growth curving backwards to the band above and forwards again below, arched upon the band itself. Base somewhat produced. Mouth longer than wide.

Several different forms having been erroneously named *M. quadricarinata*, I consider it advisable to give a fuller description and enlarged figure of the type of this species. It is unfortunate that there is only one specimen from the original locality, and that it is embedded in the matrix. Thus we cannot tell what amount of variation in the strength and position of the keels there might be if a large series were available for comparison. Also the exact spiral angle is not seen. The shell is, however, well preserved, and shows traces of the lines of growth. It is quite distinct from the form called *M. quadricarinata* by De Koninck: the whorls are more angular, the sutures deeper, there is also a difference in both the number and the position of the keels, and the base of the shell is more produced. It bears a great resemblance to *M. quinquecarinata*, De Kon.; but in that species the whorls are higher in proportion to the width, the angle being in the middle or above the middle of the whorl, and three keels being frequently visible below it on the lower whorls; the spaces between the keels are more nearly equal in width, and the sutures are more oblique. *M. quinquecarinata* may, however, prove to be merely a variety having the whorls less closely coiled.

The type (Pl. XVI. figs. 3, 3 a) which is in the Museum of Science and Art, Dublin, is embedded in the matrix, and only nine whorls are visible; these have a length of 11 millim. Width of portion of body-whorl seen 3 millim.; height  $2\frac{1}{2}$  millim.

*Locality and Formation.* Upper (Carboniferous) Limestone of Blacklion, Enniskillen.

In the Woodwardian Museum there are two shells from the Carboniferous Limestone of Derbyshire referred, but with a query, to this species by McCoy himself; I also doubt their identity with the Irish specimen. They are, however, so badly preserved that it is difficult to tell what they really are.

Four small shells from the Mountain Limestone of Settle appear to belong to this species. Three are in the Woodwardian Museum, and the other is in the York Museum. This last (Pl. XVI. figs. 4, 5) is remarkably well-preserved, showing the lines of growth very distinctly, and in the middle of the band there is a fine thread on the two lower whorls. The two keels below the band are about equal in strength instead of the upper being the stronger, as is the case in the type. Eight whorls are preserved, and there would probably be two or three more if the apex were entire.

Length  $8\frac{1}{2}$  millim.; width of body-whorl  $3\frac{1}{4}$  millim.; height  $2\frac{1}{4}$  millim.

There is also, from the same locality, a fragment of a larger shell in the Woodwardian Museum which bears a great similarity to this species in the position of the angle and in ornamentation. The space above the angle is not quite so wide, and the dimensions are

greater; in these points it resembles *M. quinquecarinata*, De Kon., so that it appears to be a connecting-link between the two forms. Only four and a half whorls are preserved, of which the length is 11 millim.

A shell in the Museum of the Geological Society of London, from the Carboniferous Limestone of the shores of Lough Gill, Co. Sligo, may be this species, though the space above the angle is not quite so great as in the type.

In the collection of Mr. Young, Hunterian Museum, Glasgow, there are several specimens which, though of much smaller dimensions, appear to agree with this species in general characteristics.

One (Pl. XVI. fig. 6) from the shales of the Lower Limestone Series<sup>1</sup> at Craigenglen, Campsie, has a length of 4½ millim. Others are from the shales of the Upper Limestone Series at Glencart, Dalry, and at Robroyston.

Some external casts in my own collection from the Yoredales of Widdle Fell, Wensleydale, may also be referred to this species.

**MURCHISONIA (HYPERGONIA) QUINQUECARINATA**, De Kon., var. **FULCHELLA**. (Pl. XVI. fig. 7.)

*Murchisonia quinquecarinata*, De Koninck, 1883, 'Faune du Calc. Carb. de la Belgique,' vol. viii. pt. 4, p. 23, pl. xxxiv. figs. 14-16.

Shell very elongated, turreted. Whorls angular, numerous. Angle situated rather above the middle of the whorl. Ornamentation consisting of a strong keel on the angle with two finer keels above and three below; these latter are all visible above the sutures on the five lower whorls, but the lowest keel is hidden on the upper part of the spire. Spaces between the keels about equal in width. Lines of growth not perceptible. Sinual band probably between the keel on the angle and that next above. Sutures deep and somewhat oblique. Mouth longer than wide. Base slightly produced. Columella rather arched.

I know of only one specimen, and this was given me by Mr. Young. The apex is broken, and only eight whorls remain.

Length 8½ millim.; width of lowest whorl 2¼ millim.

From the above description it may be seen how strongly this shell resembles *M. quinquecarinata*, De Kon., in every way except in size, for De Koninck gives 20 millim. as the length of his species and 5 millim. as the width. He only speaks of two keels below the angle on the whorls of the spire, and two additional keels on the body-whorl, but some of the specimens examined in the Brussels Museum show a third keel just above the suture on several of the lower whorls similar to the specimen under discussion. The angle is, however, placed high up the whorl on all the Belgian shells.

<sup>1</sup> The higher members of the Lower Carboniferous rocks which are known to Scottish geologists as the Lower Limestone Series, the Lower Coals and Ironstones, and the Upper Limestone Series, are now known to represent the upper part of the Mountain Limestone and the Yoredale rocks of English geologists.

The body-whorl of the Scottish shell is too imperfect to show whether there was an additional keel upon it. With regard to the remarkable difference in size, it has been previously observed that many Scottish fossils are dwarfed as compared with the same species from other localities, and this appears to be especially the case with those from Dalry. In a former paper I described a variety of *M. turriculata*, De Kon., from the shales of the Upper Limestone Series<sup>1</sup> (Dalry), differing as greatly in size from the type as the present form does. In the absence of specimens of intermediate dimensions, and considering that the Scottish shell is only about half the size of the Belgian one, it seems advisable, in the meanwhile at any rate, to let it constitute a distinct variety for which I should suggest the name *pulchella*.

This species bears a great resemblance to *M. quadricarinata*, M'Coy, from which it may be distinguished by the higher position of the angle, more oblique sutures, and also in its being of much greater size than the specimens of *M. quadricarinata* from the Scottish beds. It may, however, be an elongated variety of that species, but this could only be proved by the comparison of a large series of specimens which might show intermediate forms.

*Locality and Formation.* Law Quarry, Dalry, in the shales of the Lower Limestone Series.

MURCHISONIA (HYPERGONIA) CONULA, De Kon., var. CONVEXA. (Pl. XVI. figs. 8, 9.)

*Murchisonia conula*, L. G. de Koninck, 1843, 'Précis élém. de Géologie' par J.-J. d'Omalus d'Halloy, p. 516.

*Murchisonia abbreviata*, L. G. de Koninck, 1843, 'Descr. des Anim. foss. du Terr. Carb. de la Belgique,' p. 415, pl. xxxviii. figs. 3 et 6.

*Murchisonia angulata*, L. G. de Koninck, 1843, *ibidem*, p. 412, pl. xxxviii. fig. 8 (synonymis et tab. xl. fig. 8 exclusis); H. G. Bronn, 1848, 'Index pal.' p. 747; A. d'Orbigny, 1850, 'Prodr. de Paléont. stratigr.' p. 122; J. J. Bigsby, 1878, 'Thes. Devonico-Carboniferus,' p. 325.

*Murchisonia conula*, L. G. de Koninck, 1883, 'Faune du Calc. Carb. de la Belgique,' vol. viii. pt. 4, p. 17, pl. xxxiv. figs. 9, 10.

? *Murchisonia quadricarinata*, L. G. de Koninck, *ibid.* p. 20, pl. xxxiv. figs. 17, 18.

Shell elongated, turriculated, somewhat convex in outline. Whorls from twelve to fifteen, very gradually increasing and but slightly angular. Ornamentation consisting of four keels; the keel on the angle and that next below strong and almost equally prominent, the uppermost and lowest keels much finer. The uppermost keel divides the space above the angle almost equally in two; the lowest keel appears immediately above the suture. Base flattened, having no additional keels, but having numerous fine spiral lines. Sinus situated between the keel on the angle and the upper-

<sup>1</sup> 'Descr. of some New Species of Carb. Gasteropoda,' Quart. Journ. Geol. Soc. vol. xlv. (1889) p. 622.

most keel. Lines of growth distinct and slightly irregular in strength, curving backwards to the band above and forwards below; strongly arched on the band, the greatest convexity being nearer the upper keel than the lower. Sutures prominent. Mouth imperfectly preserved, probably somewhat rounded.

This shell bears so strong a resemblance to *M. conula*, De Kon., that I consider it a variety of that species. It agrees with it in the form of the whorls, the number and position of the keels and the flatness of the base. But it differs in having a smaller spiral angle than the specimen figured and described by De Koninck. De Koninck also states that the sinus is between the two strongest keels instead of above. On the specimens, however, that I have seen both in the Brussels Museum and in the British Museum (Natural History) from Visé the lines of growth appear to indicate the sinus as being above the angle, precisely as in the British shells. Most of the Belgian specimens are imperfect and compressed, so that it is difficult to ascertain the spiral angle with accuracy. The upper part of the spire increases more rapidly than the lower, and if that portion of the shell be taken alone the spiral angle of the whole may be represented as greater than it really is. There are two unnamed shells in the Brussels Museum from Visé which are identical with the British specimens, and the clearly-preserved lines of growth show the sinus to be in the same position. The *M. quadricarinata* of De Koninck appears to me to be a small variety of this species. *M. conula*, var. *convexa*, may be distinguished from *M. quadricarinata*, M'Coy, by its more prominent sutures, less angular whorls, fewer and differently disposed keels, and by its flattened base. It is like it, however, in having the sinus above the angle.

*Locality and Formation.* The variation in size of different individuals is somewhat remarkable. The largest English shell (Pl. XVI. figs. 8, 9) is from shales at the base of the Yoredales at Abbey Foss, Askrigg, Yorkshire. It consists of eleven whorls; the apex is broken, so there would probably be four or five more if entire. It is 34 millim. in length; the width of the body-whorl is  $12\frac{1}{2}$  millim. None of the Scottish specimens equal this in dimensions. The largest that I have seen is in the collection of Mr. John Young, Hunterian Museum, Glasgow, from the shales of the Lower Limestone Series of Craigenglen, Campsie. It consists of twelve whorls; the apex is broken, but if the specimen were entire there would probably be two or three whorls more. The length is  $16\frac{1}{2}$  millim.; width of body-whorl 5 millim.; height 4 millim. The larger of the two Belgian specimens referred to is from Visé, étage v 2; it is embedded in the matrix, and only shows nine whorls, which have a length of 17 millim. De Koninck gives 45 millim. as the length of the type. Other specimens from various localities in Yorkshire, Scotland, and Belgium vary in size from these dimensions down to shells which have as many as eleven or twelve whorls in a total length of 6 millim. Small, well-preserved external casts of this species are found in an impure limestone of Yoredale age at Mosedale, on the northern slopes of Widdle Fell.

MURCHISONIA (HYPERGONIA) PENTONENSIS, sp. nov. (Pl. XVI. figs. 10-12.)

? *Turritella* ? *sulcifera*, J. E. Portlock, 1843, 'Geol. Rep. London-derry,' p. 420, pl. xxxi. fig. 11; H. G. Bronn, 1843, 'Index Pal.' p. 1338.

*Orthonema quinquecarinata*, De Kon., 'Notes on some Carb. Gasteropoda from Penton and elsewhere,' Trans. Cumberl. & Westmorl. Assoc. No. ix. (1883-1884) p. 135, fig. 6.

Non *Murchisonia quinquecarinata*, De Kon., 1883, 'Faune du Calc. Carb. de la Belgique,' vol. viii. pt. 4, p. 23, pl. xxxiv. figs. 14-16.

? *Turritella* ? *sulcifera*, J. Donald, 1887, 'Notes upon some Carb. Species of *Murchisonia* in our Public Museums,' Quart. Journ. Geol. Soc. vol. xliiii. p. 630, pl. xxiv. fig. 12; R. Etheridge, 1888, 'Foss. of Brit. Islands,' vol. i. Pal. p. 308.

Shell elongated, turreted, composed of about twelve angular whorls. Sinual band situated near the middle of the whorl, bounded by two strong keels. Ornamentation consisting above the band of one keel placed near the suture, below the band of three or four keels on the body-whorl, only two of these being visible on the upper whorls. These keels are not so strong as those limiting the band, the uppermost being generally the slightest of all, but occasionally the two next below the band are less developed. The widest space is that above the band, the spaces below being about equal. Lines of growth fine and rather irregular in strength, curving backwards to the band above and forwards again below, somewhat indistinct on the band itself. Mouth longer than wide. Columella simple. Base of the shell slightly produced.

In a previous paper I erroneously referred this shell to the genus *Orthonema*.<sup>1</sup> The examination of a large number of specimens both in my own and Mr. Young's collections, and especially the discovery of a well-preserved specimen upon which the lines of growth are very distinctly seen, have convinced me that this shell should be referred to *Murchisonia* instead of *Orthonema*. Many shells from the same beds have lines coming straight down the whorls which appear to be lines of growth, though they are not really so, but merely result from the substance and manner in which the shells are preserved. This is the case with an easily determined species of *Pleurotomaria*, some specimens of which exhibit these straight lines, while the best preserved show the true lines of growth. I also doubt the identification of the species under discussion with *M. quinquecarinata*, De Kon.; for I have lately compared some of my specimens with De Koninck's type-form at Brussels, and I consider the difference in characteristics such as to lead to their separation into two distinct species. That of De Koninck has a smaller spiral angle, there is a single strong keel on the angle of the whorl with two finer keels above and two or three below; also the angle is higher up the whorl, and the spaces between the keels are about equal in width. My specimens more nearly agree with seven unnamed shells on Tab. 933 in the Brussels Museum

<sup>1</sup> 'Notes on some Carb. Gasteropoda from Penton and elsewhere,' Trans. Cumb. & Westm. Assoc. No. ix. (1883-84) p. 135, fig. 6.



from Visé. The only difference lies in the uppermost keel bounding the band being somewhat finer on these.

Among shells belonging to the British Isles this form most nearly resembles *Turritella ? sulcifera*, Portlock, and may possibly be identical with it. The only known specimen of that species, however, is very small and imperfectly preserved, so it is impossible to identify others with it with any degree of certainty. It therefore hardly appears advisable to unite them as one species, but should the discovery of more and better specimens from Cullion prove them to be the same, the name *pentonensis* must be dropped or adopted as a variety of *sulfifera*. It also has some similarity to *M. quadricarinata*, McCoy, but the sinual band is narrower, the keels bounding it are more nearly equal in strength, and the widest space is above the band instead of being occupied by the band itself. Length of specimen (Pl. XVI. fig. 10), composed of twelve whorls, 16 millim.; width of body-whorl 5 millim.; height of body-whorl 5 millim. A larger shell, of which only eight whorls are preserved, is 23 millim. in length; the body-whorl is crushed, so its exact dimensions cannot be given.

*Locality and Formation.* Fairly abundant in the Calciferous Sandstone Series at Penton. It occurs in the shales of the Lower Limestone Series at Law Quarry, Dalry, at Craigenglen, and at Hairmyres. There are also three specimens in the Museum of Practical Geology, London, from the Carboniferous Limestone of Halkin Mountain, Holywell.

**MURCHISONIA (HYPERGONIA) KIRKBYI, sp. nov.** (Pl. XVI. fig. 13.)

Shell conical, composed of eleven or twelve somewhat rounded whorls. Whorls ornamented with five keels, which, with the exception of the uppermost, are very strong in comparison with the size of the shell. Spaces between the keels pretty equal in width. Sinual band situated between the second and third keels. Lines of growth curving backwards to the band above and forwards below. Base slightly produced. Mouth rather longer than wide. Columella simple.

This shell may be distinguished from *M. pentonensis* by its greater spiral angle, stronger keels, and less angular whorls. It bears some resemblance to *M. nana*, De Kon.,<sup>1</sup> but the keels are much stronger and the whorls are not quite so rounded. It is very like *M. nebrascensis*,<sup>2</sup> Geinitz, but has not so great a spiral angle as that species is represented to have in the figure.

I am indebted to Mr. J. W. Kirkby for specimens of this species. Length of shell consisting of eleven whorls  $8\frac{1}{2}$  millim.; width  $3\frac{1}{4}$  millim.; height of two last whorls  $3\frac{1}{2}$  millim.

*Locality and Formation.* Randerstone, Fife. Low down in the Calciferous Sandstone Series, about 3000 feet below the base of the Carboniferous Limestone Series, which there is equivalent to the Yoredales of the North of England.

<sup>1</sup> 'Faune du Calc. Carb. de la Belgique,' 1883, vol. viii. pt. 4, p. 20, pl. xxxiv. figs. 27, 28.

<sup>2</sup> 'Carbonformation und Dyas in Nebraska,' 1866, p. 12, pl. i. fig. 17.

**MURCHISONIA (HYPERGONIA) PLANA, sp. nov.** (Pl. XVI. figs. 14, 15.)

Shell elongated, turreted, composed of about thirteen very angular whorls. Angle considerably below the middle of the whorl, bearing a strong keel. Upper part of the whorl very flat, ornamented with two much finer keels, between which there is a wide space, as one keel is immediately below the suture and the other at a slight distance above the angle. Below the angle is another keel, not so strong as that on the angle, but stronger than those above it; this keel is visible just above the suture on the upper whorls. Sinus most probably situated between the strongest keel and that next above. Lines of growth not discernible. Base flattened. Columella simple.

The only shell to which this bears any resemblance is *M. amœna*, De Kon.,<sup>1</sup> from which it may be easily distinguished by its more elongated form and more angular whorls. The keels are also somewhat different, both in their form and their disposition. On this species the keels stand out clear and sharp, whilst on *M. amœna* they are so strong and rounded as to make the spaces between appear like grooves. On the base of *M. amœna* there is also an additional keel, and the uppermost one is absent.

Length of specimen figured 9 millim.; height of two lower whorls 3 millim.; width of penultimate whorl  $2\frac{3}{4}$  millim.

Another shell, which is imperfectly preserved, and of which the apex is broken so that only eight whorls remain, measures 10 millim. in length.

*Locality.* Law Quarry, Dalry; Craigenglen, Campsie.

*Formation.* Shales in the Lower Limestone Series.

**MURCHISONIA (HYPERGONIA) ELONGATA, Portl.** (Pl. XVII. figs. 2, 3.)

*Murchisonia elongata*, J. E. Portlock, 1843, 'Geol. Rep. on Londonderry,' p. 569, pl. xxxviii. fig. 10 *a, b*; F. M'Coy, 1844, 'Syn. Carb. Foss. Ireland,' p. 42; H. G. Bronn, 1848, 'Index Pal.' p. 747; J. Morris, 1854, 'Cat. Brit. Foss.' p. 259; R. Griffith, 1860, Journ. Geol. Soc. Dublin, vol. ix. p. 90; J. J. Bigsby, 1878, 'Thes. Dev.-Carb.' p. 325; R. Etheridge, 1888, 'Foss. of Brit. Islands,' vol. i. Pal. p. 301.

Shell elongated, turreted, composed of from ten to twelve whorls. Whorls angular; surface nearly flat, both above and below the angle. Sinual band situated about the middle of the body-whorl and a little below the middle of the upper whorls; it is narrow and bounded by two keels, generally about equal in strength, but sometimes the lower keel is more strongly developed on the anterior whorls. Ornamentation consisting of two fine keels above the band and two stronger ones below, with one or two finer additional keels on the body-whorl and occasionally a fine thread in the middle of the band. Sutures deep. Lines of growth fine, distinct, and slightly irregular, strongly arched on the band. Base convex. Mouth unseen.

<sup>1</sup> 'Faune du Calc. Carb. de la Belgique,' vol. viii. pt. 4, p. 22, pl. xxxiv. figs. 32-34.

This species has been erroneously identified by De Koninck with his *M. Archiaciana*,<sup>1</sup> from which it differs by its much smaller size, greater spiral angle, more angular form, the smaller number of its keels, and also their greater relative strength. He evidently confounds *M. angulata*, Portl., with *M. elongata*, Portl., shells which are not only distinct species, but which he also considers belong to different genera. On p. 67 he identifies the former with *Worthenia Waageni*. In his account of *M. Archiaciana* he refers to the figure of *M. elongata* and the description of *M. angulata*, Portl.

The largest specimen in the Museum of Practical Geology, London, is that figured by Portlock. There are only eight whorls, as the apex is imperfect. Length 19 millim.; width of body-whorl  $8\frac{1}{2}$  millim.

*Localities.* Dromard, Draperstown; Ballynasreen, Londonderry.

*Formation.* Lower Carboniferous Shales, referred by Prof. Hull to the Upper Calciferous Series.

In the Museum of Practical Geology there is a shell (Pl. XVII. fig. 6) from the Calciferous Sandstone Series of Northumberland (marked R. 106 with a red line) which strongly resembles this and is probably identical with it. It differs slightly in ornamentation, having a fine thread between the sinual band and the lower of the keels on the upper surface of the whorl. Also the upper of the two keels bounding the sinual band appears to be more prominent than on the Irish specimens. The shell is embedded in the matrix and only about eight whorls are visible, of which the length is  $21\frac{1}{2}$  millim.; width of penultimate whorl 8 millim.

*Locality.* River Tweed, a quarter of a mile below Coldstream Bridge.

*Formation.* Calciferous Sandstone Series.

#### Section CÆLOCAULUS, Ehl.

Shell elongated, whorls smooth, sinual band not prominent, sinus shallow. Distinguished from *Hormotoma* by its flattened whorls, sutures less impressed, and above all by the existence of a narrow but very deep umbilicus. Columella quite vertical, peristome reflected.

MURCHISONIA (CÆLOCAULUS ?) TUEDIA, sp. nov. (Pl. XVII. fig. 7.)

Shell elongated, conical, composed of more than ten compactly coiled whorls. Whorls smooth, somewhat flattened and separated by sutures, but slightly inclined from the horizontal. Sinual band nearer the anterior than the posterior suture, level with the surface of the whorls, and defined by a very fine thread on each side. Lines of growth strong, curving back to the band above and forwards again below, indistinct on the band, but sufficient to give evidence of a somewhat shallow sinus. Base probably flattened. Mouth unknown.

I refer this shell to the Section *Cælocaulus*, Ehl., on account of its compressed whorls and flat sinual band. As the mouth and base

<sup>1</sup> 'Faune du Calc. Carb. de la Belgique,' vol. viii. pt. 4, p. 16.

are not well preserved, it is uncertain whether it possesses the other characteristics of *Cœlocaulus*—viz., the narrow umbilicus, vertical columella, and reflected peristome. Its compact flattened whorls distinguish it from *Hormotoma*.

It is quite distinct from any other Carboniferous species in Britain that I am acquainted with. But it bears a strong resemblance to the Silurian forms *Terebra* (?) *sinuosa*, Salter,<sup>1</sup> *Turritella cingulata*, Hisinger,<sup>2</sup> and *Murchisonia Anna*,<sup>3</sup> Billings. It is evidently closely allied to the Devonian shells described by D.-P. Ehlert, of which *M. Davidsoni*<sup>4</sup> is the type.

Length  $11\frac{1}{2}$  millim.; width of penultimate whorl  $4\frac{1}{2}$  millim.; height  $2\frac{1}{2}$  millim.

*Locality.* There are only two specimens in the Tate Collection, Alnwick. That figured is from Lewis Burn, the other from Cawhope.

*Formation.* Calciferous Sandstone Series.

#### Section CERITHIOIDES, Haughton.

Shell elongated, conical, whorls slightly convex, smooth, band not raised above the surface; base flat, grooved. No umbilicus. Mouth probably subrhomboidal.

MURCHISONIA (CERITHIOIDES) TELESCOPIUM, Haughton. (Pl. XVII. figs. 1, 4, 5, 8.)

*Cerithioides telescopium*, Rev. Prof. Haughton, 1859, 'On some Fossil Pyramidellidæ from the Carb. Limestone of Cork and Clonmel,' Proc. Dublin University Zool. & Bot. Assoc. vol. i. pt. iii. p. 282, pl. xx. figs. 2, 3, 4.

? *Murchisonia maxima*, L. G. De Koninck, 1883, 'Faune du Calc. Carb. de la Belgique,' vol. viii. pt. 4, p. 26, pl. viii. fig. 7.

? *Glyptobasis conica*, ibid. p. 92, pl. viii. figs. 4-6.

Shell large, conical, composed of more than nine whorls. Whorls smooth, flattened, slightly convex, the lower whorls becoming more convex in the larger specimens. Sinual band wide, situated below the centre of the whorl, very slightly sunk below the surface, bounded on each side by a shallow groove. Lines of growth curving backwards to the band above and forwards again below, obscure on the band itself. Base very flat, ornamented by numerous spiral lines alternately strong and fine, separated by grooves which become gradually wider towards the outer margin. Mouth imperfectly known, probably subrhomboidal. No umbilicus. Shell-structure thin.

This shell is quite distinct from any British species with which I am acquainted, but it bears a strong resemblance to two Belgian shells—namely, *Murchisonia maxima* and *Glyptobasis conica*, De Koninck. I have examined the specimens of these in the Brussels

<sup>1</sup> Mem. Geol. Surv. 1848, vol. ii. pt. i. p. 357, pl. xiv. fig. 2.

<sup>2</sup> 'Leth. Suecica,' 1837, p. 39, pl. xii. fig. 6.

<sup>3</sup> 'Canad. Nat. and Geologist,' vol. iv. 1859, p. 358, fig. 8.

<sup>4</sup> Bull. Soc. d'Etudes Scientifiques d'Angers, 1887, p. 20, pl. vii. figs. 4-4 d.

Museum, and they are so much alike that I think the discovery of better-preserved individuals would most probably prove them to be the same species. There is only one of *M. maxima*, the surface of which is very imperfect, and the shell is flattened by pressure. The band is obscure, but seems to be in the same position as in *Cerithioides telescopium*, and there are traces of grooves on the base. Of *Glyptobasis conica* there are two specimens, both badly preserved and more or less contorted by pressure. It agrees with *Cerithioides telescopium* in form and in having a grooved base, but there is no evidence of the existence of a sinual band; this band, however, is so superficial that it could only be visible on well-preserved shells.

I have met with eight specimens of this species, none of which are entire. Six of these are Irish, and they are all more or less compressed. I am indebted to Mr. J. Wright for the loan of three, two of which were figured by Prof. Haughton. The largest (Pl. XVII. fig. 5) consists of about five and a half whorls, the base is embedded in the matrix, and the apex is broken. Length about 94 millim.; width of body-whorl one way 47 millim., the other 40 millim. A smaller specimen (Pl. XVII. fig. 4) has ten whorls and the apex embedded in the matrix; it is figured by Prof. Haughton, and has a length of 67 millim., width 36 millim. The other figured by Prof. Haughton has only two and a quarter whorls in a length of 48 millim.

*Locality.* Near Cork.

In the Museum of Queen's College, Cork, there is a fragment consisting of two and a half whorls from Windmill Quarry, Cork.

A specimen (Pl. XVII. fig. 1) in Trinity College Museum, Dublin, has eight whorls preserved; the apex is broken, and the shell is greatly compressed, so as to make the sutures appear much more oblique than they would be in the natural condition. Length 70 millim.; width of body-whorl about 40 millim.; height about 20 millim. *Locality.* Little Island, Cork.

There is a large specimen of about nine whorls in the collection of the Geological Survey, Dublin. Surface badly preserved. Length 87 millim. *Locality.* Kilgrogan, Limerick.

The British Museum (Natural History) possesses two specimens of this species which are not contorted by pressure, and the whorls are slightly more convex. They are both broken, but the surface of that in the Gilbertson Collection is well preserved, showing the lines of growth distinctly. Neither has the base entire, but one is so fractured across the top that the impression of some of the grooves on the base of a higher whorl is left on the upper part of the lower whorl. The shell (Pl. XVII. fig. 8) in the Gilbertson Collection has part of four whorls preserved, but only the second and third are entire. Length about 62 millim.

*Locality.* The specimen in the Gilbertson Collection is from Boland; the locality of the other is unknown.

*Formation.* Carboniferous Limestone.

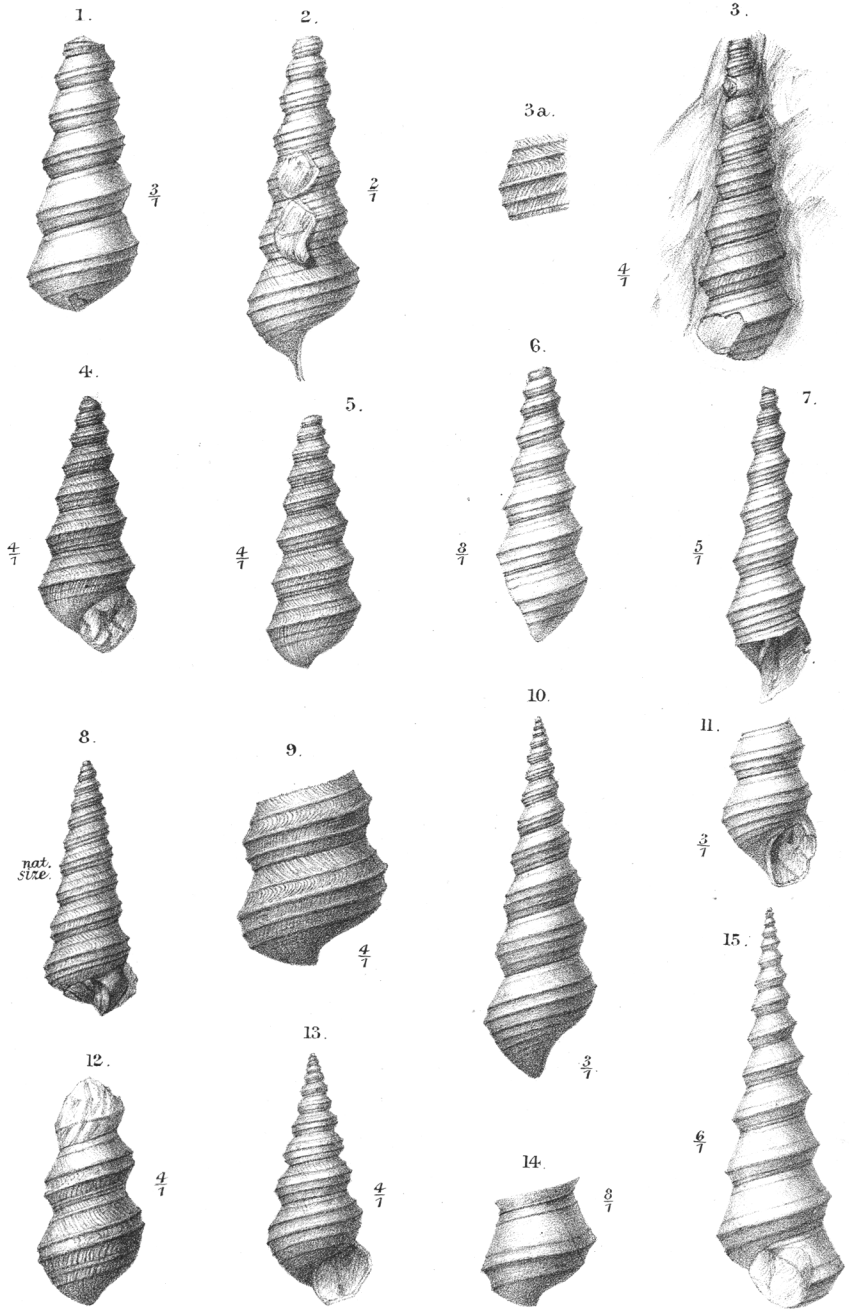
EXPLANATION OF PLATES.

PLATE XVI.

- Fig. 1. *Murchisonia (Goniostropha) hibernica*, sp. nov.,  $\times 3$ . Hook Point, Wexford. Museum of Science and Art, Dublin.
- Fig. 2. *M. (G.) Tatei*, sp. nov.,  $\times 2$ . Howick. Alnwick Museum.
- Figs. 3-6. *M. (Hypergonia) quadricarinata*, M'Coy. Fig. 3, type,  $\times 4$ . Blacklion, Fenniskillen. Museum of Science and Art, Dublin. Fig. 4, front view; fig. 5, back view,  $\times 4$ . Settle. York Museum. Fig. 6,  $\times 8$ . Craigenlen, Campsie. Collection of Mr. John Young, Glasgow.
- Fig. 7. *M. (H.) quinquecarinata*, De Kon., var. *pulchella*,  $\times 5$ . Law Quarry, Dalry. My own collection.
- Figs. 8, 9. *M. (H.) conula*, De Kon., var. *convexa*. Fig. 8, nat. size; fig. 9,  $\times 4$ . Abbey Foss, Askrigg. My own collection.
- Figs. 10-12. *M. (H.) pentonensis*, sp. nov. Fig. 10, back view,  $\times 3$ . Fig. 11, front view,  $\times 3$ . Fig. 12, fragment showing lines of growth,  $\times 4$ . Penton. My own collection.
- Fig. 13. *M. (H.) Kirkbyi*, sp. nov.,  $\times 4$ . Randerstone, Fife. My own collection.
- Figs. 14, 15. *M. (H.) plana*, sp. nov. Fig. 14, back view,  $\times 8$ ; fig. 15, front view,  $\times 6$ . Law Quarry, Dalry. Collection of Mr. John Young.

PLATE XVII.

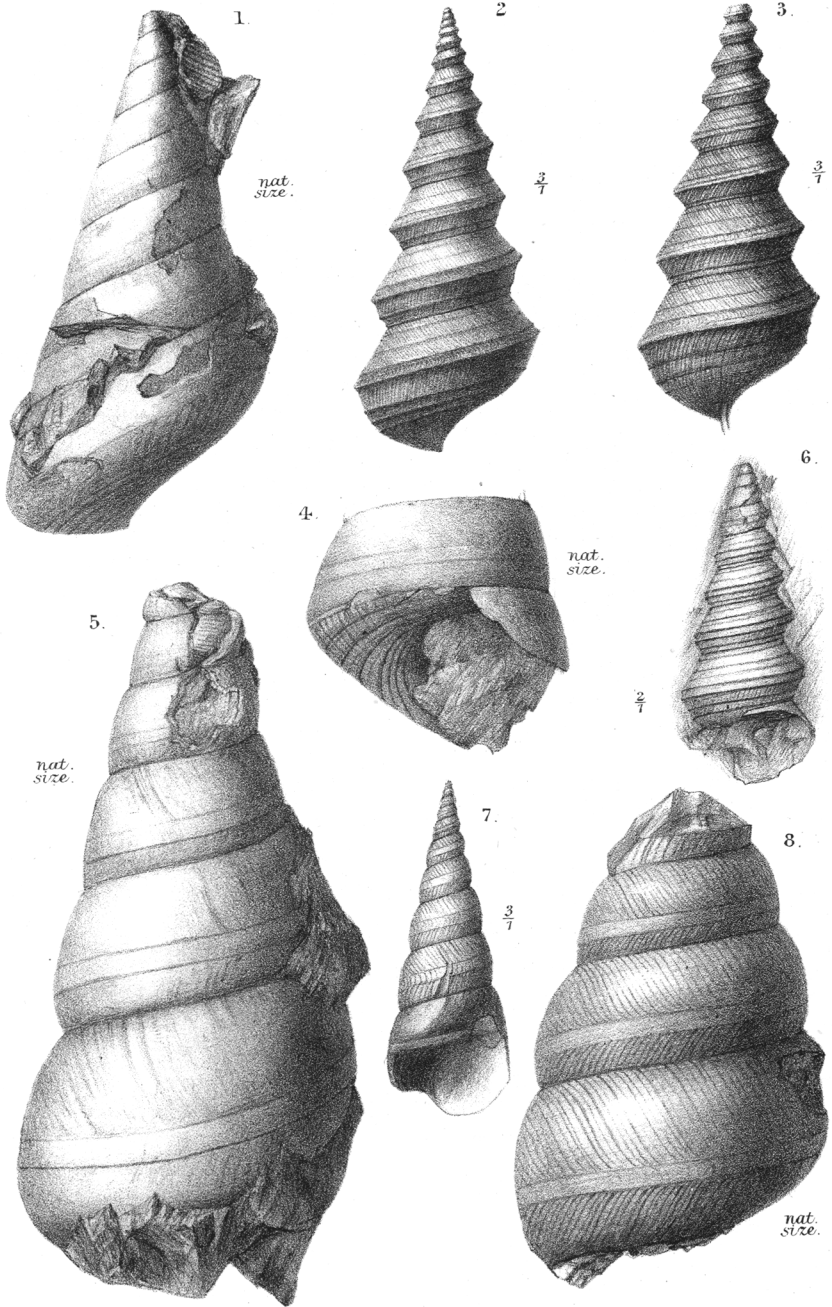
- Figs. 1, 4, 5, 8. *Murchisonia (Cerithioides) telescopium*, Haughton. Fig. 1, back view, nat. size. Little Island, Cork. Trinity College Museum, Dublin. Fig. 4, portion of a shell showing mouth, nat. size. Fig. 5, back view, nat. size. Cork. Collection of Mr. Joseph Wright. Fig. 8, back view, nat. size. Bolland. Gilbertson Collection, British Museum (Natural History).
- Figs. 2, 3. *M. (Hypergonia) elongata*, Portl. Fig. 2, back view,  $\times 3$ . Trinity College Museum, Dublin. Fig. 3, front view of type,  $\times 3$ . Dromard, Draperstown. Museum of Practical Geology, London.
- Fig. 6. *M. (H.) elongata*?, var.,  $\times 2$ . River Tweed. Museum of Practical Geology, London.
- Fig. 7. *M. (Calocaulus?) tuedia*, sp. nov.,  $\times 3$ . Lewis Burn. Alnwick Museum.



J. Donald del.  
F. H. Michael lith.

MURCHISONIA.

Mintern Bros. imp.



J. Donald del.  
F. H. Michael lith.

MURCHISONIA

Mintern Bros. imp.