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dark bluish quartz, not in the white quartz. They are frequently associated with the included fragments of the Clogau Slates; and crystals of gold, along with other minerals, may be seen adhering to the slaty surface. The occurrence of tetradymite is regarded by the miners as a favourable indication for gold.

It is certain that the wall rock has some effect on the distribution of the gold, for so far not a single pocket has been found where the lode has entered into the Gamlan Shales.

In the grits and greywackes of the Barmouth Series, immediately to the north of the lode, many fractures or cross-courses may be seen, which run straight towards the lode and intersect it. It is most probable, indeed, that these fractures are responsible, in part at any rate, for the distribution of the pockets, as they afford an easy channel for the passage of mineral solutions containing gold or some precipitant of gold. In many cases, the shoots of gold run more or less transversely across the lode; a system of cross-courses certainly favours such a distribution. In 1875 (40, p. 695) it was noticed that the lode was very rich behind one of these cross-courses. The possible importance of these cross-courses on the distribution of the pockets in the mine has not, however, been recognized, as no systematic attempt seems to have been made to follow the cross-courses in the search for the rich pockets.

(*To be continued in our next Number.*)

III.—Sedgwick Museum Notes.

New Fossils from the Dufton Shales.

By F. R. Cowper Reed, M.A., F.G.S.

Part I.

(PLATE XVI.)

A SMALL collection of fossils was made a few years ago by Mr. V. M. Turnbull from a cutting on the Alston Road, near Melmerby, and the author[1] has already described a new species of *Lichas* (*L. melmerbiensis*) which was included amongst them. Several more new species of trilobites and other groups are now described, and the complete list of the fauna is as follows[2]:—

Trilobita.

Phacops apiculatus, Salt.*
Calymene senaria (Salt., non auctt.).
C. Caractaci, Salt.
Trinucleus Nicholsoni, sp. nov.*
Acidaspis semievoluta, sp. nov.
Lichas melmerbiensis, Reed.*
Tornquistia Nicholsoni, Reed.
Homalonotus bisulcatus, Salt. (?).
Homalonotus cf. *Edgelli*, Salt.
H. ascriptus, sp. nov.
Illænus Bowmani, Salt. (?).

Ostracoda.

Beyrichia (*Tetradella*) *Turnbulli*, sp. nov.
B. (*Ctenobolbina?*) *superciliata*, sp. nov.
B. (*Ceratopsis*) *duftonensis*, sp. nov.*
Turrilepas sp.

Mollusca.

Cyrtolites aff. *ornatus*, Conr.
Bellerophon (*Sinuites*) sp.
B. (*Oxydiscus*) *acutus*, Sow. (?).
Cyclonema aff. *crebristria*, McCoy.
Holopea sp.

[1] Reed, Geol. Mag., 1907, Dec. V, Vol. IV, pp. 396–400, Pl. XVII.

[2] For other lists of fossils from the Dufton Shales, see Harkness, Q.J.G.S., 1865, vol. xxi, p. 248; Harkness & Nicholson, ibid., 1877, vol. xxxiii, pp. 462–3; Marr & Nicholson, ibid., 1891, vol. xlvii, pp. 505, 511.

Pleurotomaria (?) sp.
Trochonema sp.
Tentaculites sp.
Conularia aff. *plicata*, Slater.
Ctenodonta (?) sp.
Pterinea (?) sp.

Bryozoa.

Crisinella Wimani, sp. nov.
Monotrypa (?) sp.

Brachiopoda.

Lingula tennigranulata, McCoy.*
Lingula sp.
Orbiculoidea perrugata, McCoy.
O. oblongata, Portl.*
Acrotreta Nicholsoni, Dav. (?).
Siphonotreta scotica, Dav. (?).
Orthis unguis, Sow.*
O. testudinaria, Dalm.*
O. Actoniæ, Sow.
O. duftonensis, sp. nov.
O. melmerbiensis, sp. nov.
O. turgida, McCoy (?).
O. (*Scenidium*?) *equivocalis*, sp. nov.
Strophomena (?) sp.*
Leptæna rhomboidalis (Wilck.).

Incertæ sedis.

Pascolus sp.

Crinoidea.

Stem joints (round and pentagonal).

The species marked thus * are most abundant.

TRILOBITA.

Trinucleus Nicholsoni, sp. nov. Pl. XVI, Figs. 1–9.

Head-shield rather more than a semicircle, widest across middle, somewhat contracted at base; posterior margin inclined to lateral margin on each side at 75°–80°; fringe sloping downwards but not steeply inclined, slightly produced backwards at genal angles which are furnished with long spines. Glabella pyriform, much elevated and swollen, most so anteriorly, gradually decreasing in width and height posteriorly to occipital ring without forming neck; front end projects slightly beyond cheeks to fringe or overhangs the inner row of pits; small median tubercle present on surface of glabella, and on each side near its base are two pairs of small deep pits in axial furrows, the posterior pair in occipital furrow. Occipital ring narrow, nearly as elevated as glabella, separated off by shallow furrow, and furnished posteriorly with a short stout spine directed backwards and upwards at an angle to the general plane of head-shield and about one-third the length of the glabella. Cheeks forming spherical triangles, longer than wide, less swollen and elevated than glabella, highest along axial furrows, with posterior outer angle rounded, and minute granulation over whole surface. Fringe inclined, sloping downwards and widening to genal angles which are provided with long tapering genal spines curving first slightly inwards and then outwards. In anterior part of fringe are four rows of equal-sized pits arranged regularly in concentric and radial rows; the pits in outermost row are sometimes rather smaller. On the lower surface of the fringe the two outermost concentric rows are separated from the inner ones by a strong concentric ridge continued back to the genal angles and longitudinally along the spines. In front of and at the side of the cheeks the fringe widens slightly, and inside the four regular rows are introduced one or two shorter concentric rows of smaller pits with less distinct radial arrangement, so that 5–6 rows with a few smaller irregularly developed pits can be detected at the posterior outer angles of cheeks rounding them off. In some specimens the pits near the genal angles tend to be alternate. The true genal angle (i.e. the base of the spines where the pitted fringe ends) is level

with the second or third thoracic segment, and the posterior and lateral edges of the head-shield meet here at about 75°–80°. Neck-segment behind cheeks narrow, rounded, marked off by distinct but weak furrow. Surface of fringe coarsely granulated.

Thoracic axis about one-sixth the width of thorax, narrow, prominent, cylindrical, with pair of deep pits in furrows between the rings inside and above axial furrows. Pleuræ of usual type, narrow, horizontally extended, flat, with strong diagonal furrow running to obliquely truncate tip. Inner edge of backwardly produced genal angles of fringe overlaps ends of first three pleuræ.

Pygidium broadly triangular; axis long, narrow, conical, reaching posterior edge, less than one-fifth width of pygidium, composed of 9–10 rings, of which the first 3–5 are distinct and well separated by transverse furrows deepest at sides. Lateral lobes flat, horizontal, with traces of 4–6 radiating fine grooves on each side separating the flat pleuræ and corresponding to axial rings. Margin of pygidium bevelled, steeply inclined.

		mm.
Dimensions.	Length of head-shield (without spine) . .	10–15
	Width of head-shield	20–25

Remarks.—The characters and shape of the glabella separate this species from *T. seticornis*, for it is not divided into a swollen frontal lobe and depressed cylindrical neck, though the more or less inclined fringe and position of the concentric ridge on its lower surface and median tubercle on the glabella are features in common. *T. Bucklandi*, Barr., as represented in the Girvan district,[1] has the glabella differing in the same way, and the genal angles are much more produced backwards. The shape of the glabella and presence of nuchal spine are much like *T. Bureaui*, Oehlert,[2] but otherwise the head-shield is distinct. In *T. concentricus*, Eaton,[3] it is the glabella, not the occipital ring, which is produced backwards into a spine; only the outermost row of pits on the fringe is separated off by the concentric ridge on the lower surface, and there are no lateral slits or pits near the base of the glabella; the radial arrangement of the pits on the fringe is not as a rule so well marked in any of the American specimens which I have examined, and there is no median tubercle on the glabella, though its general shape is very similar. The British forms referred by various authors to *T. concentricus* vary so greatly that probably more than one species, or at any rate several distinct varieties, have been included. Amongst the varieties recognized by Salter, *T. favus*[4] bears some resemblance to *T. Nicholsoni* in the shape of the glabella with pits at its base and in the presence of a nuchal spine, but the fringe has different characters. *T. fimbriatus*, Murch.,[5] does not seem to be closely allied.

We may draw particular attention to the resemblance of this

[1] Reed, *Girvan Trilobites* (Palæont. Soc.), 1903, pt. i, p. 10, pl. i, figs. 10–14.

[2] Oehlert, Bull. Soc. Géol. France, 1895, vol. xxiii, p. 300, pl. i.

[3] Hall, *Palæont. N.Y.*, 1847, vol. i, pp. 249, 255, pl. lxv, figs. 4*a–c*; pl. lxvii, figs. 1*a–h*.

[4] Salter, Mem. Geol. Surv., vol. ii, pt. i, pl. ix, fig. 5; id., Dec. Geol. Surv., 1853, vol. vii, pl. vii, p. 6.

[5] McCoy, *Brit. Palæoz. Foss.*, 1851, p. 146, pl. iE, fig. 16.

species to some of the so-called varieties of *T. concentricus* from Tyrone which Portlock described as distinct species. The form ascribed by B. Smith [1] to Portlock's *T. elongatus*,[2] under the designation of *T. concentricus* var. *elongatus*, has a nuchal spine similar to *T. Nicholsoni* and more elongated cheeks and glabella than in the true *T. concentricus*; apparently there is a median tubercle present, and there is mention made of "incipient furrows" at the base of the glabella which correspond to the pits in the axial furrows described in the Dufton species. But the pits in the fringe at the genal angles are more numerous in the Tyrone examples. In the form termed *T. concentricus* var. *Portlocki* by Smith,[3] it is remarked that the three rows of pits in front of the glabella tend to become confluent in a radial direction, as rarely in *T. Nicholsoni*. The Shropshire specimens referred to *T. concentricus* have the pits of the concentric rows arranged alternately, so that the radial arrangement is lost (as in examples of this species from Cincinnati), whereas in many of the Welsh specimens there is a radial regularity observable. Barrande's *T. ornatus* (Sternb.) [4] seems closely allied to our Dufton species in the shape of the head-shield, nuchal spine, pits in axial furrows, tubercle on glabella, and radial arrangement of the pits on the fringe; but these pits are more numerous and smaller. Further investigation will, it is believed, establish the specific independence of several British forms.

EXPLANATION OF PLATE XVI.

Trinucleus Nicholsoni, sp. nov.

Fig. 1. Head-shield, with portion of thorax attached, showing impression of lower surface of fringe with concentric ridge and genal spines. × 2.
,, 2. Head-shield, showing ditto. × 2.
,, 3. Head-shield, showing upper surface of fringe, etc. × 2½.
,, 3*a*. Portion of fringe. × 10.
,, 4. Head-shield. × 3.
,, 5. Ditto. × 2½.
,, 6. Impression of upper surface of fringe and cheek. × 2½.
,, 7. Nearly complete head-shield. × 2½.
,, 7*a*. Side-view of same, showing nuchal spine. × 2½.
,, 8. Head-shield, showing impression of lower surface of fringe. × 2½.
,, 8*a*. Side-view of same, showing impression of concentric ridge. × 2½.
,, 9. Pygidium. × 2.

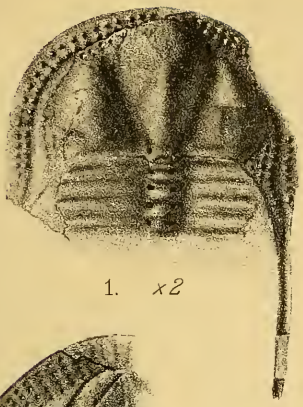
Part II.

(PLATE XVII.)

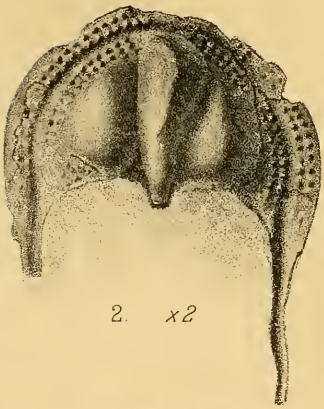
Acidaspis semievoluta, sp. nov. Pl. XVII, Figs. 1–3.

Head-shield semicircular, with middle part projecting behind base of cheeks. Glabella moderately convex, oval, widest across middle, well defined by strong continuous curved axial furrows; lateral lobes

[1] B. Smith, Proc. Roy. Irish Acad., 1907, vol. xxvi, sect. B, No. 9, p. 122, pl. viii, figs. 3, 4.
[2] Portlock, *Geol. Rep. Londond.*, p. 263, pl. i B, fig. 7.
[3] B. Smith, op. cit., p. 121, pl. viii, figs. 1, 2.
[4] Barrande, Syst. Silur. Bohême, vol. i, p. 623, pl. xxix, figs. 1–9; pl. xxx, figs. 41–60.



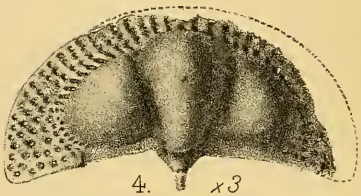
1. x2



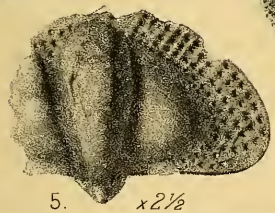
2. x2

3. x2½

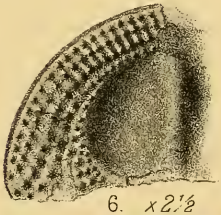
3a. x10



4. x3



5. x2½



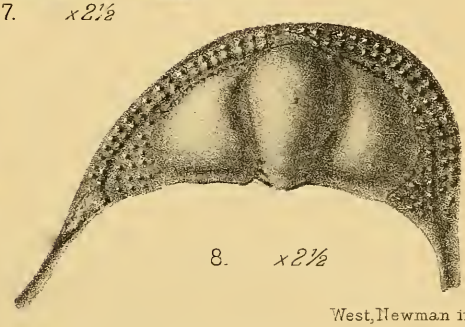
6. x2½

7. x2½

9. x2

7a. x2½

8a. x2½



8. x2½

A. H. Searle del. et lith. West, Newman imp.

Trinucleus from Dufton Shales.

completely circumscribed, except first pair. Basal lobes large, oval, swollen, half the length and one-third the width of the glabella, and placed parallel to its longitudinal axis. Middle lateral lobes sub-circular, invading sides of axial lobe of glabella. Anterior lateral lobes very small, imperfectly separated from anterior lateral angles of axial lobe. Axial lobe of glabella sub-cylindrical, rather more than one-third the width of glabella at base, expanding again between basal and middle lateral lobes and again in front, with anterior lateral angles small and overhanging anterior lateral lobes; anterior end of glabella sub-truncate.

Fixed cheek narrow, curved, convex, rounded, increasing slightly in width posteriorly, embracing side of glabella back to eye, where it has about one-fifth the basal width of the glabella; behind eye descends steeply to narrow neck-ring; posterior lateral wing of fixed cheek somewhat flattened, extending horizontally outwards to facial suture. Ocular ridge forming very narrow rounded band outside fixed cheek, running back to eye. Eyes small, situated very far back, lying behind the middle of basal lobes of glabella, and at about two-thirds their width from axial furrows. Facial sutures curving steeply backward to eyes, running almost parallel to axial furrows; behind eyes bending out very sharply (nearly at right angles to anterior branch) to follow a course nearly parallel to posterior margin of head-shield before curving back to cut this margin at a distance from the axial furrows nearly equal to width of glabella.

Occipital segment forming broad flattened band projecting behind cheeks, and having a width equal to nearly one-third the length of the glabella, narrowing laterally behind basal lobes where it rises into a pair of small oval nodules. Occipital furrow strong, straight. Neck-segment very narrow. Free-cheek triangular, convex, sloping down from eye to concave marginal part, with strong raised narrow angulated border, bearing about twelve equidistant recurved short spines, successively increasing in length towards genal angle. Whole surface of head-shield tuberculated.

Pygidium (imperfectly known), broadly semicircular, with strongly convex prominent short sub-cylindrical axis, one-third the width of pygidium and not reaching posterior margin, composed of two distinct rings (with traces of a third) of which the first is by far the most prominent, and is ornamented with a single row of tubercles. Margin of pygidium armed with five pairs of spines, of which the first two pairs are small, short, slender, sub-equal, and directed radially outwards (these are somewhat indistinct and uncertain); third pair stouter and longer than the rest, nearly as long as pygidium, slightly divergent and connected as curved ridges across lateral lobes with first axial ring; two posterior and inner pairs of spines sub-parallel, slender, sub-equal, and directed backwards.

		mm.
Dimensions.	Length of head-shield	8·0
	Width of glabella	6·0
	Length of glabella	5·5
	Length of pygidium (without spines) . .	3·0

Remarks.—Two good head-shields, one free-cheek, and a somewhat

imperfect pygidium form the material available. The head-shield much resembles that of the species termed *A. evoluta*, by Törnquist,[1] from the *Leptæna* limestone, but the pygidium of this form is unknown. A new species (undescribed) from the Starfish Bed, Girvan, also possesses many points of similarity, both in the head and pygidium. The free-cheek is somewhat like that of *A. callipareos*, Wyv. Thomson.[2]

Homalonotus ascriptus, sp. nov. Pl. XVII, Figs. 4–8.

There is an imperfectly known species of *Homalonotus* occurring in the Dufton Shales which differs in certain particulars from *H. bisulcatus*, to which it is allied, and may be separated as a new species under the name *ascriptus*. The glabella is narrower, longer, and more cylindrical, the sides are nearly straight and the anterior end is more abruptly truncated, resembling in these respects that of the small head-shield from Horderley, figured by Salter (Mon. Brit. Trilob., pl. x, fig. 10), which he considered might possibly belong to *H. Edgelli*, a species founded on a pygidium. Close to the base of the glabella the axial furrows, which are deep, straight, and not sinuous (as they are in *H. bisulcatus*), diverge a little. The cheeks are narrower, more elevated and swollen, especially in the young individuals (Figs. 6, 7), than in the last-named species, particularly near the eyes, which are placed rather further forward. The pre-glabellar portion of the head-shield is narrower, being only about one-fourth the length of the head-shield, and is flattened and bent upwards, while the anterior margin of it is straight. The occipital segment and furrow seem developed as in *H. bisulcatus*. The anterior branches of the facial sutures run back to the eyes almost parallel, and the posterior branches curve out strongly in the usual way from the eyes, bending back finally to cut the posterior margin at a distance from the axial furrows about equal to the whole basal width of the glabella. The free-cheeks are unknown. A remarkable feature is that on the larger specimens the whole surface of the head-shield is covered with closely set small tubercles, which near the anterior lateral angles of the glabella are developed on the cheeks into minute erect sharp spinules, and this character alone would seem sufficient to separate this species from *H. bisulcatus*.

In the smaller specimens referred somewhat doubtfully to this species the surface of the shell is not preserved, but the eyes and cheeks are more perfect (Figs. 6, 7).

A small hypostome (Fig. 8) about 3 mm. long, of a sub-quadrate shape, may belong to this species; it is nearly parallel-sided and as wide as long; the body is rounded, weakly convex, clearly marked off from the border, has a pair of long lateral furrows running obliquely back from the anterior corners at a small angle to the sides for about three-fourths its length; the border is rounded and somewhat swollen at the sides with small obtuse anterior wings; the posterior border is wider, marked off by a strong furrow deepened at the ends.

[1] Törnquist, Siljans. Trilobitf. (Sver. Geol. Undersokn., 1884), ser. c, No. 66, p. 28, t. i, fig. 54.

[2] Reed, *Girvan Trilobites*, 1904, vol. ii, p. 112, pl. xv, figs. 11, 13.

		I. mm.	II. mm.
Dimensions.	Length of head-shield	16·5	*c.* 8·0
	Length of glabella + occipital ring	13·5	7·5
	Width of glabella at base	9·5	5·0
	Width of glabella at front end	7·0	4·0
	Width of head-shield between eyes	14·0	8 0
	Width of head-shield at base	—	16·0

OSTRACODA.

Beyrichia (Ceratopsis) duftonensis, sp. nov. Pl. XVII, Figs. 9–11*a*.

Carapace semi-ellipitical, slightly oblique, rather elongate, widening a little posteriorly; anterior end somewhat pointed; posterior end wider and obliquely truncate above or rounded. Hinge-line straight, as long as carapace. Valves moderately convex, crossed by three swollen rounded lobes united below by sharp narrow sub-marginal ridge elevated into a thin rib on its crest running along middle of anterior lobe, then concentrically with ventral margin, then up posterior lobe, bending obliquely forward to ascend to summit of the upstanding process of this lobe. Anterior lobe with a width about one-third the length of valve, narrowing slightly below, more or less swollen and rounded; first sulcus rather obliquely inclined backwards, traversing three-fourths the width of the shell; middle lobe narrow, prominent, straight, vertical, nearly reaching marginal furrow below; second sulcus straighter and more vertical than first sulcus; accessory lobe represented by small node or tubercle almost isolated, situated about half-way down posterior lobe and separated from it by strong oblique sulcus, which is continued backwards to about middle of posterior margin, expanding somewhat and dividing the posterior lobe into two unequal parts, of which the lower forms a small elongated elliptical lobe, obliquely directed upwards and forwards with the accessory lobe at its upper end; the upper portion of the posterior lobe is strongly elevated, rising nearly at right angles to valve, and projecting a little above hinge-line as a blunt sub-conical process with flattened posterior face, and with its lower edge sharpened by the continuation of the sub-marginal crest, and beaded or fimbriated. Border flattened, set at right angles to plane of valves, with median narrow raised rim ornamented with a row of closely placed small tubercles. Surface of valves smooth.

		mm.
Dimensions.	Length	2·75–3·0
	Width	1·75–2·0

Remarks.—The relations of this species are wide. The raised process on the posterior lobe closely resembles that of *B.* (*Cer.*) *oculifera*, Hall,[1] but the border of the valves is different. The crest on the lobes recalls the sub-genus *Steusloffia*,[2] and similar crests are present in *Strepula*,[3] but they have no genetic significance. With *B.* (*Cer.*) *Chambersi*, Miller,[4] our species agrees in the reduction or

[1] Jones, Q.J.G.S., 1890, vol. xlvi, p. 21, pl. iv, figs. 19, 20; Ulrich, Proc. U.S. Nat. Mus., 1908, vol. xxxv, p. 308, pl. xxxix, figs. 19, 20.

[2] Ulrich, op. cit., p. 295, pl. xxxviii, figs. 1–5.

[3] Jones, *Ann. Mag. Nat. Hist.*, 1885, ser. v, vol. xvii, p. 403.

[4] Miller, Cincinnati Quart. Journ. Sci., 1874, vol. i, p. 234, fig. 27.

obsolescence of the accessory lobe, and in the division of the posterior lobe, but the division is not so complete in *B. Chambersi*, nor the posterior horn so long and pointed and recurved. The complete division of the posterior lobe is more like that in the *B. tuberculata* group, but the lobes are connected ventrally. The posterior lobe is divided in *B.* (*Cer.*) *quadrifida*, Jones,[1] and there is a somewhat similarly situated accessory lobe.

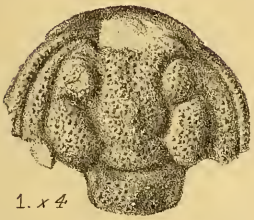
BEYRICHIA (CTENOBOLBINA ?) SUPERCILIATA, sp. nov. Pl. XVII, Figs. 14, 14*a*.

Carapace small, semi-elliptical, about twice as long as wide, with rounded sub-truncate ends, sub-rectangular cardinal angles and hinge-line somewhat shorter than maximum length of carapace; anterior and posterior ends of sub-equal size. Valves rather convex, crossed by three lobes of unequal size and development, with a fourth smaller accessory one on inner side of posterior lobe; all lobes united below and merging into rounded sub-marginal ridge. Anterior, posterior, and ventral margins thick, with narrow flange projecting above the border and bearing a row of delicate radiating short straight spines set at equal distances apart; border thickened, inclined at right angles to plane of valves and widening somewhat posteriorly. Anterior lobe on valves broad, somewhat swollen, rounded, in width equal to about one-third the length of the valve; first sulcus nearly vertical, at right angles to cardinal edge and extending about one-half to two-thirds of the distance across valve; second lobe narrower than anterior one, sub-median in position, more prominent near dorsal edge, slightly curved back ventrally; second sulcus sub-parallel to first, of sub-equal length, a little wider dorsally and slightly curved back ventrally below accessory lobe; posterior lobe as large (or nearly so) as anterior one, with small accessory tubercular lobe about half-way up its inner slope, elongated and nearly vertical and almost circumscribed by furrows; accessory furrow short, connected above with second sulcus. Surface of valves minutely granulated, and dotted with a few small scattered tubercles which are especially numerous and have a roughly concentric arrangement near ventral margin; a specially large tubercle is situated close to the cardinal edge on each of the three main lobes and usually two near the ventral margin; three smaller ones are usually present in a vertical line on the middle lobe.

		mm.
Dimensions.	Length . .	about 2·25
	Width . .	about 1·50

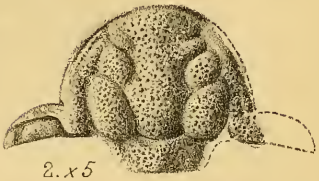
Remarks.—This species closely agrees with *B. ciliata*, Emmons,[2] but the presence of the small accessory lobe, the narrower posterior lobe, and the situation of the spines on the flange instead of along the edge of the valves sufficiently distinguish it. In the *B.* (*Ct.*) *subcrassa* section of the genus or sub-genus *Ctenobolbina* there sometimes exists, according to Ulrich,[3] a similar small accessory lobe.

[1] Jones, *Contrib. Micro. Palæont. Canada*, 1891, pt. iii, p. 66, pl. xi, figs. 19*a*, *b*.
[2] Jones, Q.J.G.S., 1890, vol. xlvi, p. 19, pl. iii, figs. 12–15; pl. iv, figs. 16–18.
[3] Ulrich, Proc. U.S. Nat. Mus., 1908, vol. xxxv, p. 309.



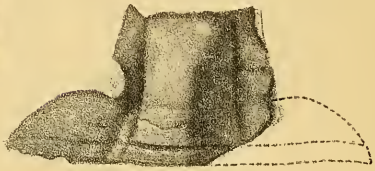
1. x 4

3. x 4

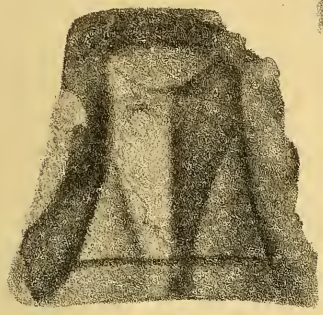


2. x 5

4a. x 12

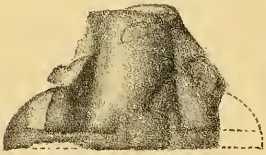


6. x 2½



4. x 2½

5. x 12



7. x 2½

8. x 8

9. x 10

10. x 10

11. x 10

11a. x 10

13. x 10

13a. x 10

12. x 10

12a. x 10

14. x 10

14a. x 10

A. H. Searle del. et lith. West, Newman imp.

New Crustacea from the Dufton Shales.

Beyrichia (Tetradella) Turnbulli, sp. nov. Pl. XVII, Figs. 12, 12*a*, 13, 13*a*.

Carapace obliquely semi-elliptical, somewhat elongated with hinge-line as long as carapace and anterior end somewhat narrower than posterior, which is broadly rounded. Valves moderately convex, divided by three unequal sulci into four lobes, all connected ventrally with rounded sub-marginal ridge. Anterior lobe largest, more or less swollen and pear-shaped, in width equal to quite one-third the length of carapace, narrowing ventrally; first sulcus longest and widest, slightly oblique or curved back below, but starting at right angles to cardinal line, extending about two-thirds to three-fourths across the valve; middle lobe almost median, narrow, rounded, about one-half the width of anterior lobe, at right angles to cardinal edge; second sulcus sub-parallel to first, slightly oblique, of same strength as first; accessory lobe smallest of all, more or less nodular, not reaching cardinal edge, situated on inner side of posterior lobe, and connected by depressed narrow neck with sub-marginal ridge; accessory furrow short, weaker than others; posterior lobe rounded, about two-thirds the width of anterior lobe or nearly as large. Border of valves with horizontally extended rounded convex flange, separated off by deep marginal furrow; flange very narrow in front, widening posteriorly, crossed by regularly placed faint radial grooves, with fine striæ on edge, making a minutely fimbriated and denticulated margin. Anterior end of valves provided with a few small marginal spines set along the edge of border below the flange. Surface of valves minutely granulated, with an irregular concentric row of small sub-equal tubercles close inside marginal furrow, becoming a double row below anterior lobe and at front end; a few larger tubercles irregularly distributed on the lobes.

		mm.
Dimensions.	Length	about 3·00
	Width (across middle) . .	about 1·25

Remarks.—We may compare this species with *B.* (*Tetr.*) *marchica*, Krause,[1] and *B. subquadrans*, Ulrich,[2] but the lobation, character of the flange, and ornamentation of our species do not completely agree with either. In *B. complicata*, Salter,[3] the valves are shorter and wider, and the lobes are not developed relatively in the same manner; the surface also is smooth (except in the variety *decorata*), and the flange and ornamentation are distinct in character.

EXPLANATION OF PLATE XVII.

Fig. 1. *Acidaspis semievoluta*, sp. nov. Head-shield without free-cheeks. × 4.
,, 2. Ditto, ditto. × 5.
,, 3. Ditto. Imperfect pygidium. × 4.
,, 4. *Homalonotus ascriptus*, sp. nov. Head-shield without free-cheeks. × 2½.
,, 4*a*. Ornamentation of ditto. × 12.
,, 5. Ditto. Ornamentation of head-shield near anterior lateral angles of glabella. × 12.
,, 6. Ditto. Head-shield of young individual (?) without free-cheeks. × 2½.

[1] Krause, *Zeits. deutsch. geol. Ges.*, 1889, xli, p. 19, t. ii, figs. 9–11.
[2] Ulrich, op. cit., p. 306, pl. xxxix, figs. 1–3.
[3] Jones, *Ann. Mag. Nat. Hist.*, 1855, ser. ii, vol. xvi, p. 163, pl. vi, figs. 1–5.

Fig. 7. *Homalonotus ascriptus*, sp. nov. Head-shield. × 2½.
,, 8. Ditto. Hypostome. × 8.
,, 9. *Beyrichia* (*Ceratopsis*) *duftonensis*, sp. nov. Left valve. × 10.
,, 10. Ditto. Right valve. × 10.
,, 11. Ditto, ditto. × 10.
,, 11*a*. Side-view of same. × 10.
,, 12. *Beyrichia* (*Tetradella*) *Turnbulli*, sp. nov. Left valve. × 10.
,, 12*a*. Ditto, ditto. Impression of surface of same. × 10.
,, 13. Ditto, ditto. × 10.
,, 13*a*. Ditto, ditto. Impression of surface of same. × 10.
,, 14. *Beyrichia* (*Ctenobolbina* ?) *superciliata*, sp. nov. Left valve. × 10.
,, 14*a*. Ditto, ditto. Impression of surface of same. × 10.

(*To be continued.*)

IV.—Petrology and Structure of the Pyritic Field of Huelva, Spain.

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(PLATE XVIII.)

Introduction.

THE great copper-mining district of Southern Spain and Portugal has been studied by several eminent geologists, and the problems presented in the geology of the field and of its ore-deposits have given rise to conflicting opinions. The three most debated points have been the origin of the ore-deposits, the relations of the igneous rocks, and the age of the sedimentary formations. The present paper, the field-work for which was carried out during the last summer season, deals in the main with the two latter points, and the writer takes this opportunity of expressing his indebtedness to Professor W. W. Watts and to Dr. C. G. Cullis for their advice and suggestions during the subsequent petrological studies at the Imperial College of Science and Technology, London.

General Relations of the District.

The copper-belt is situated at the southern end of the Iberian meseta, a fractured tableland whose essential rocks are of Palæozoic age. The meseta received its present structure with the tectonic movements and igneous eruptions of late Carboniferous and Permian times, and is one of the old Hercynian fragments, like the Armorican Mountains, the Central Plateau of France, the Vosges, and other districts of Europe. The axes of folding trend generally east and west, and the movements were accompanied by widespread intrusions of igneous rocks, and by the formation of many of the most important ore-deposits of the peninsula. The Hercynian disturbances were closed by extensive fracturing round the present edges of the tableland, notably along its south-east border. Thus the valley of the Guadalquivir follows the line of the insinking created at this period. This great fault cuts off the old mass across the strike of the folds, and is marked by a well-defined scarp along the edge of the valley between Seville and Cordoba. The fault-line appears to pass westward from the lower Guadalquivir, along the south coast by Huelva and the