

rivers, ice, springs, damp, and frost are powerless to wear away rocks and to cut out escarpments valleys and rock-basins; and secondly, that the sea can do and does such work. This, no light task truly, must be done, if it can be done, not by mere assertions of individual opinion, or mere statements based on hasty and prejudiced observations, but by hard work and sound reasoning. Not with us, but with our opponents, lies the *onus probandi*.

ERRORS IN THE FIRST PART OF THIS PAPER.

Page 451, line 16 from bottom, for “action” read “actions.”

Page 451, line 11 from bottom, for “Portland Stone in part of the Isle of Purbeck” read “Purbeck and Portland Beds in Dorsetshire.”

Page 453, line 15 from bottom, after “follow” insert “us.”

III.—ON THE “LINGULA FLAGS,” OR “FESTINIÖG GROUP”
OF THE DOLGELLY DISTRICT.

By THOMAS BELT, F.G.S.

[PART I.]

THE strata lying above and below the *Lingula Flags* have already been well described and illustrated: the Menevian Group below, by Messrs. Salter and Hicks, and the Tremadoc Group above, by Messrs. Homfray, Ash, and Salter. The great mass of strata lying between has not fared so well, though several notices of it, to which I shall refer, have appeared. In the present paper I propose to describe these strata in detail; and the remarks I have to offer embody the results of three years' researches, during part of which I have had the advantage of the company and able co-operation of Messrs. Ezekiel Williamson and J. C. Barlow, whose discoveries I shall have to mention in my description of the rocks and their fossil contents. To facilitate the study of the district around Dolgelly, which is exceedingly faulted and complicated, I have carefully mapped out nearly the whole of the rock exposures. This may seem to have been unnecessary, seeing that we have already the Geological Survey maps of the district. But since the officers of the Survey examined and mapped out the rocks of Merionethshire, from fifteen to eighteen years have elapsed, and the maps which then added so much to our knowledge are now far behind our requirements. The whole of the strata lying between the Tarannon shale and the Cambrian grits are there coloured alike. Neither the Arenig nor the Tremadoc rocks are recognised; and we now know that the strata there named “*Lingula Flags*” include at least three distinct and diverse groups.

In 1847 Professor Sedgwick separated the Tremadoc rocks from the “*Lingula Flags*,” calling the latter the Festiniög Group. Since then Mr. Salter has been the pioneer in their investigation. His discovery in 1863 of *Paradoxides Davidis* in the slates of St. David's gave an impulse to the study of these old rocks, that has resulted in a rich harvest of Primordial trilobites, chiefly through the indefatigable

labours of Mr. Hicks. The strata containing these trilobites have been separated from the *Lingula Flags* by Mr. Salter, under the name of the Menevian Group. The recent discovery by Mr. Hicks of new forms of *Paradoxides* in the purple slates, inter-stratified with the Harlech grits, will probably lead to the classification of the *Paradoxides* beds as Lower Cambrian. The Menevian Group will then form the top beds of the lower instead of the bottom beds of the upper formation and the Lower Cambrian will have a well-defined palæontological limit upwards. Whilst linked to the upper series by such general and far ranging forms as *Conocoryphe* and *Agnostus*, it will be distinctly marked off by *Paradoxides* and other genera that do not transgress the upper boundary of the Menevian beds.

The *Lingula Flags* above the Menevian Group have been divided by Mr. Salter into the Lower, Middle, and Upper *Lingula*. In a paper by Mr. Plant, an abstract of which appears in the Quarterly Journal of the Geological Society for November, 1866, the same classification is adopted. Messrs. Salter and Hicks, in the Report of the British Association for 1866, include the *Lingula Flags* in the Festiniog Group, and characterises them as “hard siliceous sandstone with grey flaky slate, containing *Lingulella Davisii*.” This description only applies to the *Lingula Flags* of South Wales. In North Wales the arenaceous flags and shales containing *Lingulella Davisii* only form a subordinate part of a series of dark-blue and black, fine grained slates, containing trilobites of several genera.

Even when we have divided the group into Upper, Middle, and Lower, we have still to speak of the Upper division of the Upper, and the Lower division of the Lower Festiniog, as each sub-division contains two distinct sets of strata. Recent discoveries have shown that the group includes at least six zones of animal life, each distinct and separate. I believe that I only meet the strict requirements of the case when I propose to form three groups of the strata now included in one. My proposal is, to restrict the name of the Festiniog Group to the flags containing *Lingulella Davisii* and *Hymenocaris vermicauda*, to which it was originally applied by Sedgwick, and to form the slates and flags lying below them, characterised by typical forms of *Olenus*, into a new group, which might well be called the Maentwrog Group, as the strata included in it are exhibited in great perfection at and around the village of Maentwrog, two and a half miles west-south-west from Festiniog. For the blue and black slates lying above the Festiniog Group, as above limited, I propose the name of the Dolgelly Group, as it is only in the neighbourhood of Dolgelly that both the members of which it is composed have as yet been found. It is well characterised by several aberrant forms of *Olenus*, constituting the genera, or sub-genera *Parabolina*, *Peltura*, *Sphærophthalmus*, and *Dikelocephalus* of various authors.

The Maentwrog, Festiniog, and Dolgelly Groups are both lithologically and palæontologically distinct. None of the Crustaceans pass from one group to another, and peculiar genera are found in

each. Lithologically, the Dolgelly Group is characterised by soft black slates, with a black streak; the Festiniog Group by hard micaceous flags, and the Maentwrog Group by dark-blue, jointed, ferruginous slates.

Before passing on to a detailed account of these rocks and their fossil contents, and in order to exhibit clearly their position in the Cambrian system, I give below a table of the whole of the Cambrian rocks, showing the proposed classification, and the range of the genera. I have not included *Calymene*, *Homalonotus*, and *Nucula*, recorded by Messrs. Salter and Hicks from rocks at St. David’s—believed by them to be of Tremadoc age¹—as no Tremadoc species have been found, and all the trilobites belong to Silurian genera. They will probably form a Lower Arenig Group.

TABLE OF THE CAMBRIAN ROCKS SHOWING THE RANGE OF THE GENERA.

GENERA.	LOWER CAMBRIAN.			UPPER CAMBRIAN.			
	Bangor Slates.	Harlech Grits.	Menevian Group.	Maentwrog Group.	Festiniog Group.	Dolgelly Group.	Tremadoc Group.
Paradoxides		—	—				
Anopolenus			—				
Microdiscus			—				
Erinnys			—				
Holocephalina			—				
Conocoryphe		—	—	—	—	—	—
Agnostus		—	—	—	—	—	—*
Olenus			—	—			
Parabolina						—	
Peltura						—	
Sphærophthalmus...						—	
Dikelocephalus						—	—
Niobe							—
Angelina							—
Cheirurus							—*
Ampyx							—*
Asaphus							—*
Ogygia							—*
Hymenocaris					—		
Lingulocaris							—
Leperditia			—				
Protocystites			—				
Bellerophon					—	—	—*
Lingulella		—	—	—	—	—	—*
Obolella			—	—	—	—	—*
Discina			—	—	—	—	—*
Orthis			—	—	—	—	—*
Theca		—	—	—	—	—	—*
Cyrtotheca		—	—	—	—	—	—*
Conularia							—*
Orthoceras							—*
Dictyonema							—
Protospongia			—	—	—	—	—
Buthotrephis				—	—	—	—

The Genera marked thus * pass upwards.

¹ Report Brit. Assoc., 1866, p. 184.

(To be continued.)

the surface, and thus more exposed to atmospheric influences. I examined as closely as possible the mussel-beds in the sand which caps the Boulder-clay that appears on the coast higher up Conway Bay, thinking they might perhaps turn out to be artificial accumulations; but I could discover no admixture of bones, or even of other shells with them, with the exception of one or two specimens of *Patella* and *Littorina*. These mussel-shell beds occur in the loose sand, with no rock for their attachment, and are about 20 feet above the beach in some places. I could find nothing in the pocket of *Mytilus* near the great Midden save those shells, and they mostly had their valves in approximation and undisturbed; they are apparently unconnected with the Midden. A general, though somewhat hasty search round the greater part of the Orme failed to reveal any further traces of Middens, although remains of raised beaches here and there, containing a few shells, such as *Patella*, *Littorina*, etc., may be seen in many places, and at very considerable heights above the present sea-level. Some fissures also in the Limestone rocks can be traced in the face of some of the quarries, which have been filled up with rolled pebbles; these are now cemented into a firm conglomerate by the infiltration of carbonate of lime. I could find no shells or other organic remains in the contents of these fissures, though *Patella* and *Littorina* are to be found in the *talus* close by.

[NOTE.—All the bones sent me by the Rev. J. M. Mello, from the Kitchen Midden in the Great Orme's Head, were very much broken (old fractures); but I was enabled to identify *Bos longifrons*; jaws, etc., of a small-horned sheep; Leg-bones of *Canis lupus*, or *Canis familiaris*; tooth and vertebræ of pig; and fragments of bones of bird.—H. W.]

IV.—ON THE “LINGULA FLAGS,” OR “FESTINIÖG GROUP” OF THE DOLGELLY DISTRICT.

By THOMAS BELT, F.G.S.

[PART II.]

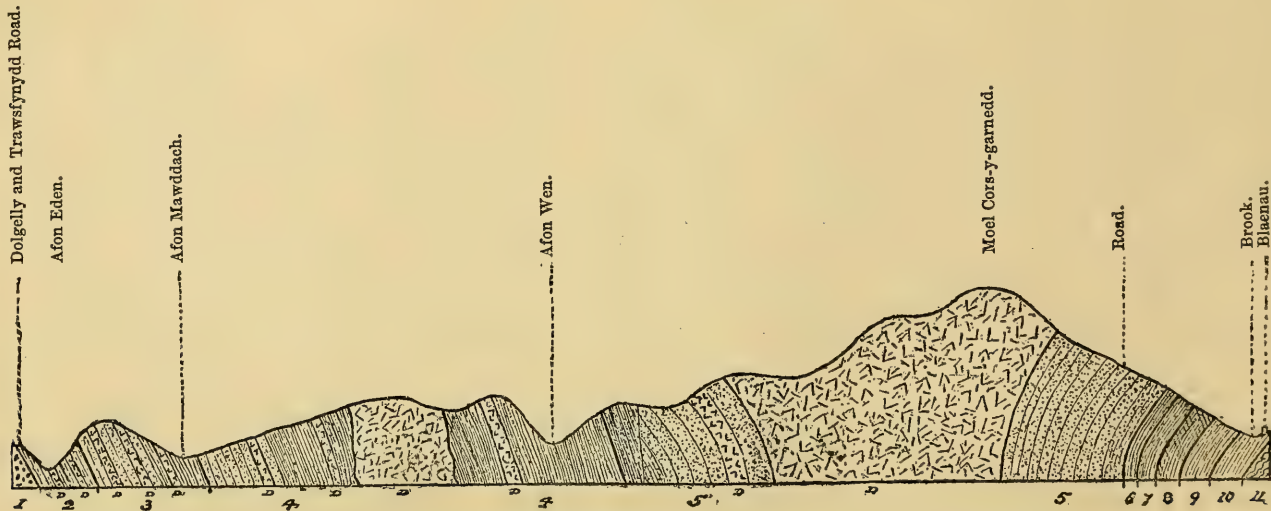
THE accompanying section shows the succession of beds from the Harlech grits, near the sixth milestone on the road from Dolgelly to Trawsfynydd, across their strike in a south-easterly direction, to the lower ash-bed of the Arenig group at the farm of Blaenau, five miles north-east from Dolgelly. In this section all the beds occur in regular sequence, although they are invaded by many intrusive masses and dykes of diabase;¹ only the larger of which are shown in my section, as it would be impossible, on so small a scale to depict the innumerable protrusions of this rock that occur in the district. The section crosses, at Moel-Cors-y-garnedd, the southern flank of the mountain Rhobell-fawr, which is the largest mass of diabase in Wales. All along the eastern side of Rhobell-fawr the strata are completely inverted, as shown in diagram, so that the Festiniög beds (5 and 6) lie above the more recent Dolgelly beds (7 and 8), from underneath which the Tremadoc beds (9) come up, overlying the beds of slates and ashes belonging to the Arenig Group (10 and 11).

¹ I follow Mr. David Forbes in calling these rocks diabase; they are the “Greenstones” of the Geological Survey.

SECTION FROM AFON EDEN TO BLAENAU, FIVE MILES N.E. FROM DOLGELLY.

N.W.

S.E.



- 1. Harlech Grits.
- 2. Menevian Beds.
- 3. Lower Maentwrog Beds.
- 4. Upper Maentwrog Beds.

- 5. Lower Festiniog Beds.
- 6. Upper Festiniog Beds.
- 7. Lower Dolgelly Beds.
- 8. Upper Dolgelly Beds.

- 9. Tremadoc Beds.
- 10. Arenig Beds.
- 11. Ash Beds.
- D. Intrusive Diabase.

I shall now describe the strata lying between the Menevian and Tremadoc beds in ascending order.

MAENTWROG GROUP.

Lower Maentwrog Beds (No. 3 in Section).—The blue black slates of the Menevian group, which everywhere around the Merionethshire anti-clinal overlie conformably the Harlech grits, are followed by a series of sandy and slaty beds. The lowest of these are grey and yellowish grey, fine-grained, pyritic flags, with hard felspathic bands and rusty partings. Alternations of more arenaceous and gritty beds are not unfrequent, and beds of yellow grey shale also occur. Some of the beds are ripple-marked and traversed by worm-tracks, but neither Trilobites nor shells have been found.

These arenaceous and shaly flags are about 400 feet thick, and are succeeded by bluish grey, blue, and blue-black, jointed, fossiliferous slates, alternating with bands of slightly arenaceous, grey and yellow grey flags. The slates contain *Olenus gibbosus*, Wahl; *Agnostus nodosus*, Belt; and *A. pisiformis*, Lin., var. *obesus*, Belt. Fragments of these fossils were first found by Mr. Williamson, near Cefn-deuddwr in 1864; but it was not until Mr. Barlow found them in great abundance near Dolmelynlyn in 1866 that I was able to determine their specific distinctness, and to separate the beds containing them from those above, with which they had been until then confounded.

The fossiliferous beds, and also the underlying arenaceous and shaly flags, may be well studied on the range between the Eden and the Mawddach, a little above the junction of these rivers, but the best locality for the fossils is that discovered by Mr. Barlow, near Dolmelynlyn, in the Mawddach, opposite the fifth milestone on the Trawsfynydd road.

The fossiliferous beds are about 300 feet thick, making the total thickness of the Lower Maentwrog beds about 700 feet.

Upper Maentwrog Beds (No. 4 in Section).—The last beds are overlaid by yellow and bluish grey fine grained flags, sometimes a little arenaceous, but never so coarse as some of the gritty beds lying below. They are often finely laminated and flaky, especially towards their upper limit, where *Agnostus pisiformis*, Lin., is not uncommon. The top beds are very fine grained and flaky, and of a bluish or brownish grey colour. There are about 600 feet of these fine grained flags.

From the bluish grey beds there is a gradual passage upwards into dark, dull blue slates, much jointed and weathering to a rusty colour. There are occasional intercalations of bluish and yellowish grey beds; and where sections of the rocks are exposed in the beds of streams, thin alternations of blue, yellow, and grey layers give them a banded appearance. This part of the series is at least 1200 feet thick, and may be more. The rocks are so much faulted that it is impossible to obtain more than an approximation towards correct measurements.

Throughout the blue beds *Agnostus pisiformis*, Lin. is found, but

most abundantly at the base and in the upper beds. Above Dolgoed, in thin shaly slates, it occurs in thousands, all drawn out and distorted by slaty cleavage; but the best specimens have been found on the left bank of the Mawddach below Hafod-fraith. In the Lower beds, at Cae-gwernog above Llanelltyd, where it was first found by Mr. Salter in 1864, and near Dolgoed, *Olenus truncatus*, Ang. accompanies the *Agnostus*, but it does not follow it into the higher beds, where it is replaced by a closely-allied species, *O. cataractes*, Salter, of which I have obtained fragments from the rocks by the roadside, a little north of Llanelltyd, and in the blue slates below Hafod-fraith.

The total thickness of the Upper Maentwrog beds in the Dolgelly and Maentwrog districts is about 1800 feet.

The *Maentwrog Group*, comprising the Upper and Lower Maentwrog beds, contains altogether, in the district under consideration, about 2500 feet of strata, and is, as has been already mentioned, well defined, both lithologically and palæontologically. The beds are everywhere much jointed and weather to a rusty colour, and form hills covered with angular ferruginous débris, so that even at a distance the experienced eye can distinguish them from the hard, shelving flags of the Festiniog Group, or the low rounded hills formed from the much softer slates of the Dolgelly Group.

In the Dolgelly district the slates and shaly flags of the Maentwrog Group occupy all the ground between the Menevian beds and the river Mawddach, from a little above Barmouth up to Llanelltyd, where they cross the river and occupy both its banks as far as Tyddyngwladis Mine. A little below the Tyddyngwladis lode they are thrown entirely to the eastern side of the river, partly by intrusions of diabase and partly by faults. Between Cwmhesian Mine and Hafod-fraith they again cross the river and range northward, towards Trawsfynydd.

In the Maentwrog district these beds are finely developed, and splendid sections of them are shown in the Waterfall Valley, and in the valley running from Tafarn-helig to Caen-y-coed. In the Caen-y-coed quarries (now abandoned) the topmost beds are well exhibited, and from this locality the finest specimens of *O. cataractes*, Salter, have been obtained by Mr. Homfray, who has also found with it, fragments of a crustacean allied to *Hymenocaris*.

The rocks of the Maentwrog Group are of little economic importance. Some rough slates and slabs have been worked in them at Caen-y-coed and above Llanelltyd, but the fine-grained beds are too much jointed, and the coarse-grained too rough for profitable working. The gold-mines of Hafod-y-morfa, Cefn-deuddwr, and others of less importance have been opened in these beds. The auriferous quartz veins also contain ores of copper, lead, and zinc, but only in small quantities.

FESTINIOG GROUP.

Lower Festiniog Beds (No. 5 in Section).—Lying conformably upon the Upper Maentwrog beds are a thick series of micaceous, grey

flags. The Lower beds are bluish grey and only slightly arenaceous and micaceous, and contain *Lingulella Davisii*, McCoy, in abundance, and also numerous worm tracks. Thin, hard felspathic layers alternate with thicker and more shaly ones. These are succeeded by thick beds of yellow and yellowish grey arenaceous flags, containing also hard felspathic layers. The arenaceous beds are often coarsely and strongly cleaved, and the cleavage planes filled with iron rust, so that, but for the uncleaved interbedded felspathic layers, it would be most difficult to determine the planes of bedding, and those of cleavage might easily be mistaken for them. *Lingulella Davisii* occurs only sparingly in this part of the series. The thick-bedded arenaceous flags are followed by thinner-bedded grey and yellowish grey flags, much finer grained than those lying below them, and crowded with the shells of *Lingulella Davisii*. In these beds in 1865 I found, near Penmaen-pool, the only specimen of a true fucus recorded from British Lower Silurian or Cambrian rocks. It branched dichotomously over the face of a slab about four feet long and three feet broad. It belongs to the genus *Buthotrephis*, but the species has not yet been described.

The highest of the Lower Festiniog beds are bluish and brownish grey fine-grained flags. They too are crowded with *Lingulella Davisii*, and contain also *Hymenocaris vermicauda*, Salter, which has been found near Penmaen-pool, on Mynydd-gader and on Moel Hafod-Owen, but only sparingly. The Lower Festiniog beds are about 2000 feet thick.

Upper Festiniog Beds (No. 6 in Section).—Lying on the last-named beds is a band of tough blue grey flags, not more than fifty feet thick, but containing an assemblage of fossil remains, nearly distinct from those in the beds below, and quite so from those above. A species of *Lingulella*, probably a variety of *L. Davisii*, but only one-third the size of that species, still occurs, and is accompanied by *Hymenocaris vermicauda*. Along with these occur, for the first time, *Conocoryphe micruva*, Salter, and *Bellerophon Cambriensis*, Sp. n. I have found this band, with its characteristic fossils, at Gwern-y-barced; in the Mawddach near Craig-y-dinas, and on Mynydd-gader.

The *Festiniog Group*, as above defined, comprises the Upper and Lower Festiniog beds, and is a little more than 2000 feet thick. The river Mawddach cuts through the whole of the beds between Rhiufelyn and Hafod-fraith. From thence they range across the east-end of Moel Hafod-Owen and by Pen-y-bryn, skirting the igneous rocks of Rhobell-fawr, where, however, only the lower beds are seen, as the upper ones have been thrust a mile and a half over to the eastward, by the intrusion of the diabase, and are seen on the east flank of Moel Cors-y-garnedd completely inverted, so that they overlie the newer Dolgelly and Tremadoc beds, as shown in Section, page 537. From Pen-y-bryn the lower beds, much disturbed by intrusive rocks, run south-westerly past Glasdir-isaf and Llyn Cynwch to Tyddyn-bach, but are not well seen, excepting on the west bank of the lake, where good specimens of *Lingulella Davisii* abound. The whole of the beds, having escaped from the disturb-

ing influence of the Rhobell-fawr igneous rocks, cross the Wnion near Glyn Maldon, and then by Gwern-y-barud and Tyn-y-craig, range to Coed-y-garth, and into the estuary of the Mawddach. To the south of Dolgelly, at Pandy and Bryn-rhug, they are brought in by a branch of the great Bala fault, and are there much disturbed and altered by intrusive igneous rocks.

Very durable building stones and some good rough flags are obtained from these strata. In the neighbourhood of the intrusive diabases the lower beds are often largely impregnated with iron and copper pyrites, and have been mined for the latter with some success at Glasdir. The numerous quartz veins intersecting the same beds in the neighbourhood of Dol-y-frwynog all contain a little gold, but have nowhere on this horizon been worked with profit.

DOLGELLY GROUP.

Lower Dolgelly Beds (No. 7 in Section).—The next beds in ascending order are hard, blue slates, characterized by containing, in great abundance, a small species of *Orthis*, and *Parabolina* (*Olenus*) *spinulosa*, Wahl. *P. spinulosa* was first found in the Dolgelly district by Mr. Williamson, in loose boulders, in the valley of the Mawddach, below Rhiw-felyn. In consequence of this discovery we searched the rocks in the neighbourhood together, and soon found, not only the above fossils *in situ*, but, above the strata containing them, the Upper Dolgelly beds crowded in some parts with Trilobites of various genera. Shortly after, I found the lower beds with *Orthis* and *P. spinulosa* at Gwern-y-barud, and more lately, have detected them on Mynydd Gader, at both places lying conformably upon the Upper Festiniog beds. I have also recognised them on the eastern flank of Moel Cors-y-Garnedd; but there, through the inversion of the strata, they lie below instead of above the Upper Festiniog beds. Since their discovery, the lower beds have been well searched for fossils; but the only species found in addition to the two mentioned above, have been some specimens of a *Lingulella*, and a single fragment of a species of *Agnostus*. In a loose stone, which probably came from these beds, Mr. Hicks, of St. David's, found a species of *Protospongia*. It adds to the probability that the specimen came from the Lower Dolgelly beds—that I have found two species of the same genus in Lower Tremadoc beds—so that it must have existed from the Menevian epoch, where it first appears, up to the time of the deposition of the Tremadoc strata.

I think that the Lower Dolgelly beds are about three hundred feet thick; but they are so much jointed and faulted that I have nowhere been able to get a trustworthy measurement of them, and my estimate of their thickness is little more than a guess.

Upper Dolgelly Beds (No. 8 in Section).—To these beds I have already alluded, when mentioning the discovery of the last. They are soft, black slates, much jointed and often intensely cleaved. They generally contain numerous fine grains of pisolitic iron. Near

the junction with the lower blue beds some bands of blue slate occur, interstratified with the black, but higher up they are entirely black. With the exception of a thin layer of black slate in the Festiniog Group, and which has been noticed but at one spot, the Upper Dolgelly beds are the only black slates in the district, although the term has been applied to the dark blue rocks of the Menevian and Maentwrog Groups. These, however, are never black, and when scratched show a white streak. The Upper Dolgelly beds are not only black, but their streak also is black. A careful examination of all the rocks of the Dolgelly district enables me to state that, with the trivial exception mentioned above, there are no other beds with a black streak. It is only since I established this fact that I have been able to map out the beds in the highly disturbed district to the east of Rhobell-fawr, and on Mynydd Gader. Geologists who have attempted to unravel the intricacies of such a disturbed country as that around Dolgelly, where the strata are faulted and contorted, altered by intrusive igneous rocks, and often so shattered and cleaved that it is useless to search for fossils, will appreciate the value of the discovery of a test which enables us to identify a well-defined set of strata however it may be fractured and cleaved.

The Upper Dolgelly beds are characterized by a great many Trilobites, none of which are found in the strata above or below. The species found in the Dolgelly district are *Conocoryphe (solenopleura?) abdita*, Sal., *C. Williamsonii*, sp. n., *C. longispina*, sp. n., *Peltura scarabæoides*, Wahl., *Sphærophthalmus bisulcatus*, Phil., *S. humilis*, Phil., *Agnostus princeps*, Sal., *A. trisectus*, Sal., and *A. obtusus*, sp. n. Besides the trilobites, a few shells belonging to the genera *Orthis*, *Lingulella*, and *Obolella*, are found. The *Orthis* is *O. lenticularis*, Dalm., according to Salter; but the others have not been described. The *Lingulella* is, however, very like *L. Davisii*, McCoy, from the Festiniog beds.

Near Tremadoc the following additional Trilobites have been found in strata at or about the same horizon as the above:—*Conocoryphe invita*, Sal., *Dikelocephalus (?) celticus*, Sal., and *D. (?) discoidalis*, Sal. The Upper Dolgelly beds are about three hundred feet thick.

The *Dolgelly Group*, comprising the Upper and Lower Dolgelly beds, is altogether about six hundred feet thick. A very fine section of the beds is exposed along a brook falling into the Mawddach at Rhiw-felyn. From thence, with many dislocations, they curve round the eastern side of Rhobell-fawr to Blaenau. Half a mile south-west from Dolgelly the black beds are well developed up the ravine through the grounds of Bryn-y-gwin to Bran-y-gader. where they are overlaid by Lower Tremador beds, with *Dictyonema fenestrata*, Sal. On Mynydd Gader they overlie the Upper Festiniog beds, and are followed conformably by Tremadoc strata containing *Asaphus innotatus*, Sal., *Niobe Homfrayi*, Sal., *Conocoryphe depressa*, Sal., and two species of *Protospongia*.

The Lower beds are not known to exist except in the Dolgelly district. They will, however, probably be discovered around Tremadoc, as in the Jermyn Street Museum there is a tail of *Parabolina*

spinulosa, Wahl. (labelled *Olenus serratus*, Sal.), from Carreg-wen, near Tremadoc.

The Upper beds have long been known as the Malvern shales, and I should have preferred to call the group the Malvern Group, if the lower beds had been found in that locality. It is, however, appropriate that the Dolgelly district, where alone the whole of the Cambrian rocks known in Great Britain are represented, should give a name to one of the groups.

(To be continued).

V.—NOTES ON THE GEOLOGY OF SOUTH BEDS.

(No. II.)

By J. SAUNDERS, Esq.

SINCE my former communication on this subject, which appeared in the GEOLOGICAL MAGAZINE for April last, (p. 154) I have had several opportunities of re-visiting some of the cuttings, on the Midland Railway, therein referred to, respecting which some doubts were expressed in reference to the age of the deposits exposed to view, and, as they are now completed, more precise observations can be made than when they were only just commenced. The cutting, south-east from Westoning, (which, in an Editorial note, was suggested might be of Tertiary age) exposes a dark heavy clay, which, upon the most rigid examination, furnished not the least trace of rolled fragments of Chalk or flints, or any other substance so frequent in the Tertiary clays of this neighbourhood, which would lead to the inference that it had been deposited subsequently to the Cretaceous era. It, however, contains what would strongly indicate that it is coæval with the Greensand, namely, a continuous band of coprolitic nodules, averaging about a foot in thickness. This layer passes through about one-third of the cutting, and may be traced from its commencement on the north-west side of the hill, passing along the face of the cutting with a gentle dip, until it reaches the level of the line, when it passes out of sight, nor does it re-appear on the south-east side of the excavation. The fossils associated with the nodules are *Lamna*, *Belemnites*, *Parasmilia*, and *Terebratulæ*, all of which are abundant in the coprolite beds at Hexton and other places in the immediate vicinity. Both above and below the coprolites the clay is identical in character, and must have been deposited contemporaneously with its associated nodules, and, as far as I can judge, it is the equivalent of the bed *h* of the section given by Mr. W. Whitaker, in the Quart. Journ. Geol. Soc., vol. xxi., 1865, pp. 399, "On the Chalk of Bucks." About the middle of the cutting is a considerable accumulation of light-brown coloured drift-sands, that lie in a basin-like hollow, that has been eroded from the summit of the hill.

The cutting at Harlington, at the north-west side of the hill, facing the Kimmeridge Clay and Greensand strata, exposes a thick bed of heavy dark clay, containing a profusion of selenite crystals, with

Every systematic naturalist feels it incumbent on him to refer the form he is describing to its proper position in the family and class to which it belongs, but the palæontologist knows well how difficult it is, from a portion only of an animal structure—whether vertebrate or invertebrate—to predicate with certainty its true affinities. In the present case the genus *Prosopon* has been referred to the *Corystidæ*, a group which nearly approaches to the *Anomoura* of Milne-Edwards. Even upon the imperfect knowledge which the present form gives us, we are led to perceive its affinities with the *Anomoura*, and probably when we are in possession of fuller information, we shall be able to refer it with confidence to the *Homoladæ*, a true Anomourous family. In the meantime we must ask our readers to be contented with this brief description, in the hope that more perfect materials may shortly be discovered.

EXPLANATION OF PLATE I., Fig. 2.

Fig. 2. *Prosopon mammillatum*, H. Woodw. Great Oolite, Stonesfield, twice the natural size.

Fig. 2a. Side view of same.

From the cabinet of G. Griffith, Esq., M.A., Harrow.

III.—ON THE “LINGULA FLAGS,” OR “FESTINIÖG GROUP” OF THE DOLGELLY DISTRICT. PART III.

By THOMAS BELT, F.G.S.

[PLATE II.]

HAVING described in some detail, the rocks of the Maentwrog, Festiniog, and Dolgelly groups, and given a list of the fossils found in each,¹ I shall now make some general remarks upon the fauna. In Part I. I have mentioned that out of all the numerous Trilobites from the Lower Cambrian² rocks, only two genera, *Agnostus* and *Conocoryphe*, have been found in higher strata. Strictly speaking, this is only true of *Agnostus*, which passes unchanged in type from the Menevian to the Caradoc strata. On the contrary, the species of *Conocoryphe* from the Lower Cambrian rocks are of essentially different type from those that have been placed in that genus from higher beds. The latter have, I believe, been referred to the genus *Conocoryphe* rather from superficial resemblances than from true affinity.

The possession of faceted or unfaceted pleuræ has been considered of sufficient importance to separate closely allied species into distinct families, and McCoy, in his Classification of the *Trilobita*, has even founded his two main divisions upon that feature. The facetting of the pleuræ may be of generic, but it is not of higher value. The absence of facets to the pleuræ of *Paradoxides* and *Olenus* does not prove, as some palæontologists have supposed, that they were incapable of rolling up. Trilobites with flat pleuræ required no facets to facilitate that operation. It is only when the pleuræ, are bent down near the middle that the facets are of use in allowing the ends of the pleuræ to pack in underneath each other.

It is through exaggerating the importance of this feature that some

¹ See GEOLOGICAL MAGAZINE, 1867, Vol. IV., pp. 493 and 536.

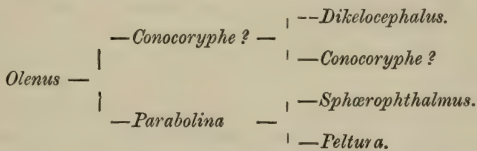
² The Lower Cambrian period, according to the classification adopted in this paper is only part of the “Primordial Zone” of Barrande, as that illustrious palæontologist has included in it *Olenus* and *Peltura*, which in reality belong to a second fauna.

species of Trilobites from the Dolgelly and Tremadoc strata have been separated from the *Olenidæ* to which they naturally belong, and placed with the *Conocephalidæ* with which they have no affinity. These *pseudo-Conocoryphe* have a thin and smooth crust and are flat or but little convex. The pleuræ are falcate and pointed, and only slightly bent down at the fulcrum; the axial furrows are shallow; the facial suture ends below, some distance within the posterior angle. In all these points the *pseudo-Conocoryphe* approach the genus *Olenus*. The typical species of *Conocoryphe* from the Lower Cambrian rocks, on the contrary, are very convex and have a thick, granulated, or even sub-spinous crust. The pleuræ are strongly bent down, so as often to be nearly vertical from the fulcrum; the axial furrows are deep; the facial suture ends below, close to the posterior angle, so that if the marginal furrow of the free cheek were produced downwards it would cut the suture. In all these points the typical *Conocoryphe* are distinct from *Olenus* and approach *Calymene*. All the species of *Conocoryphe* from the Lower Cambrian rocks belong to the typical group, and all the species that have been referred by various authors to that genus from the Upper Cambrian rocks belong to what I have called the *pseudo-Conocoryphe*; I have only retained them provisionally in *Conocoryphe*, because it is impossible without specimens of Angelin's species, or better figures of them than he has given us, to determine whether they belong to his genera *Solenopleura*, *Centropleura*, etc., or not. The whole of these *pseudo-Conocoryphe* show so many points of affinity with *Olenus* that in drawing up the following table of the *Trilobita* from the Maentwrog, Festiniog, and Dolgelly strata, I have had no hesitation in including them amongst the *Olenidæ*.

TRILOBITES OF THE MAENTWROG, FESTINIOG, AND DOLGELLY GROUPS.

Families.	SPECIES.	MAENTWROG BEDS.		FESTINIOG BEDS.		DOLGELLY BEDS.	
		Lower.	Upper.	Lower.	Upper.	Lower.	Upper.
Olenidæ.	<i>Dikelocephalus</i> ? <i>Celticus</i> , Sal. ...						—
	" ? <i>discoidalis</i> , Sal.						—
	<i>Conocoryphe</i> ? <i>abdita</i> , Sal.						—
	" ? <i>invita</i> , Sal.						—
	" ? <i>Williamsonii</i> , n. sp.						—
	" ? <i>longispina</i> , n. sp.						—
	" ? <i>bucephala</i> , n. sp.				—		—
	<i>Olenus gibbosus</i> , Wahl.	—					
	" <i>truncatus</i> , Ang.		—				
	" <i>cataractes</i> , Sal.			—			
<i>Parabolina spinulosa</i> , Wahl.					—		
<i>Peltura scarabæoides</i> , Wahl.						—	
<i>Sphærophthalmus humilis</i> , Phil.						—	
" <i>bisulcatus</i> , Phil.						—	
Agnostidæ.	<i>Agnostus nodosus</i> , Belt.	—					
	" <i>pisiformis</i> , Lin.		—				
	" " var. <i>obesus</i> , Belt.	—	—				
	" <i>sp.</i>					—	
	" <i>obtusus</i> , n. sp.						—
	" <i>princeps</i> , Sal.						—
" <i>trisectus</i> , Sal.						—	

The Lower Cambrian rocks, with their most abundant fauna,¹ are followed by strata, containing but two genera of trilobites—*Agnostus* and *Olenus*. Of these, *Agnostus* comes from below and passes on upwards unchanged in type. *Olenus*, on the contrary, only remains true to its typical form through the Maentwrog beds, in which it has three British representatives. In the Upper Festiniog and Lower Dolgelly beds it branches off in two directions. In one, through *Conocoryphe?* *bucephala* towards the *pseudo-Conocoryphe* and *Dikelocephali* of the Upper Dolgelly beds; in the other, through *Parabolina spinulosa* towards the *Pelturæ* and *Sphærophthalmi* of the same strata. This relation is shown in the following diagram :—



Many links in the chain are wanting, but this much is certain, that the typical *Oleni* of the lower strata are followed by two genera; one of which—*Conocoryphe?*, with entire pygidium and falcate faceted pleuræ, is intermediate between the *Oleni* below and the *Conocoryphe?* and *Dikelocephali* above; the other, *Parabolina* with serrated pygidium and spinous, unfaceted pleuræ, intermediate between the *Oleni* below and the *Sphærophthalmi* and *Pelturæ* above. This result is obtained, not by picking out from a number of species those that could be brought within such a generalization, but by using all the species, and placing them in the order, as to time, in which they occur in the strata.

Some interesting relations between the fauna of the Maentwrog, Festiniog and Dolgelly beds, and that of the underlying Lower Cambrian rocks on the one hand, and of the overlying Tremadoc and Lower Silurian strata on the other, still remain to be pointed out. Between the deposition of the Upper Menevian and the Lower Maentwrog beds, the abundant fauna of the Lower Cambrian period disappears, and our next horizon shows only a few species of *Agnostus* and *Olenus*; the latter, pigmy representatives of the giant *Paradoxides* of the preceding age. All on through the Maentwrog, Festiniog, and Dolgelly epochs, the various Trilobites that successively appear either belong to or are closely allied to these two genera. The fauna is a compact and homogeneous one. We have no intrusions of new types of structure, but the more recent forms are, if I may use the phrase, the natural evolution of the older. When we pass on upwards into the Tremadoc and Arenig epochs, a great and apparently sudden change takes place.

Large Trilobites belonging to the *Asaphidæ* now first appear, and then the *Cheiruridæ*, *Trinucleidæ*, and *Calymenidæ* come upon the stage. Of these there has been no development in the area under

¹ See *ante*, Part I., "Table of the Cambrian Rocks showing the range of the Genera," Vol. IV. p. 495.

consideration. They come in like an invading host, and the few species of *Olenidæ* and *Agnostidæ* that struggle on upwards are outnumbered, and, as it were, crowded out, by the intruders. It is an interesting inquiry—from whence did the latter come? but our materials are too scanty to furnish a reply. It is, however, to be noted, that at least two of the Lower Cambrian genera which are entirely absent throughout the Maentwrog, Festiniog, and Dolgelly groups are represented in the Tremadoc and Arenig strata by two families, greatly modified it is true, but yet showing many points of structural affinity with the much more ancient genera. *Microdiscus*, so abundant in the Menevian beds, comes back to us after a long absence in the *Trinucleidæ* of the Tremadoc and Arenig groups; and the Menevian *Conocoryphe* are represented by the *Calymenidæ* of the Arenig and higher rocks, and are likewise absent from the intermediate strata.

I think that it is not improbable that in the Tremadoc epoch we behold the return of a fauna driven from our area at the close of the Lower Cambrian period, and which has, in the meantime, been greatly developed, so far as the Trilobites are concerned, in some other area. This supposition would be a hazardous one to propound on the evidence of the Trilobites alone, but it is rendered more feasible by a study of the lower forms of life that accompany them. The sea towards the close of the Lower Cambrian period must have teemed with life. Besides the various genera of Trilobites, Pteropodous *Thecæ* must have swarmed, along with species of *Lingulella*, *Obolella*, *Discina*, and *Protospongia*. When the Trilobites disappear, these lower organisms disappear also. A few specimens of *Lingulella* have, it is true, been found in the Maentwrog beds, but they belong to a different type from the Lower Cambrian species, and *Theca*, *Obolella*, *Discina*, and *Protospongia* are unknown. In the Festiniog beds, one, and perhaps two, species of *Lingulella* abound, but they are of the same type as the Maentwrog species, and the other genera are still absent. In the Dolgelly beds we have the rare occurrence of *Obolella*, and a single specimen of *Protospongia* has been found in a loose stone, believed to be from these strata. The *Lingulella* are still of a different type from the Lower Cambrian forms, and not a trace of *Theca* nor *Discina* have occurred. When, however, we pass into the Lower Tremadoc strata, all the lower types of life present in the Lower Cambrian rocks come back to our area, almost unchanged specifically. *Thecæ* resembling the Lower Cambrian forms again abound, along with species of *Obolella*, *Lingulella*, *Discina*, and *Protospongia*, so like the Lower Cambrian species that I doubt whether they can be distinguished from them. When I first found this Lower Tremadoc fauna upon the flanks of Mynydd Gader, near Dolgelly, I doubted whether I had not come upon Menevian strata, brought in by some great fault, so similar were the lower forms of life; and it was only the presence of *Niobe Homfrayi*, and *Asaphus innotatus*, that assured me that the rocks were really of Lower Tremadoc age. *Lingulella ferruginea*, *Obolella maculata*, *Discina labiosa*, *Protospongia fenestrata*, and

P. flabella, have almost their exact counterparts in the Lower Tremadoc rocks of Dolgelly, although, as I have already shown, there are 5,000 feet of strata lying between, occupied by an entirely distinct fauna.

When examining the nearly barren strata of the Maentwrog epoch, I have sometimes speculated on the cause of the poverty of its fauna. It was not on account of the nearness to the beginning of life on our globe, for in older rocks still, a varied fauna abounded. It could scarcely arise from conditions of sea bottom, for thick alternations of sand, with fine grained sediments, bespoke varied depths of water under which they had been deposited. The blue beds of the Maentwrog strata do not differ lithologically from the blue beds of the Menevian group. Might there not be in these ancient epochs great oscillations of climate, such as we have certain proofs of in more recent times? Was it the advent of a cold period that drove southwards the Lower Cambrian fauna, excepting a few modified forms fitted to thrive in a more rigorous climate? and was it the return of a warmer climate in the Tremadoc epoch that brought back the ancient types of life more or less changed?

NOTES ON THE SPECIES.

Conocoryphe? Williamsonii, spec. nov. (Pl. II. Figs. 7-11.)—Length $1\frac{1}{2}$ - $2\frac{1}{2}$ in., breadth $\frac{3}{8}$ - $1\frac{1}{8}$ in. Ovate oblong.

Head, broadly semi-circular, with short strong spines pointing downwards and outwards. Glabella, a truncated cone, with two pairs of oblique furrows. Eyes small, joined to the glabella by short prominent ocular ridges, and distant from it about one-half its width. Frontal limb moderate, with a narrow margin. Fixed cheeks, curving out below the eye. Free cheeks, broad, with a scarcely impressed margin.

Thorax of 14 rings. Axis tapering, depressed. Pleuræ, flat, first two, pointed and strongly faceted, the remainder falcate and very slightly faceted.

Pygidium of 4 axial rings, of which the last is pointed and ends in a narrow ridge, running out to the margin of the limb. Limb rounded and slightly retuse, with about four furrows. Margin depressed, broad next the pleuræ and tapering to where it meets the ridge from the last axial ring.

The head of this species somewhat resembles *C. depressa*, Salter, but is easily distinguished from it by the deep glabella furrows, falcate pleuræ and truncate, slightly retuse tail. I know of no other species with which to compare it.

I have great pleasure in dedicating this fine species to my friend Mr. Ezekiel Williamson, in whose company it was first found by myself in 1865, in the black shales of the Upper Dolgelly beds, near Rhiw-felyn.

Conocoryphe? longispina, spec. nov. (Pl. II. Figs. 12-14.)—Length $\frac{3}{4}$ in., breadth $\frac{1}{2}$ in. Ovate.

Head.—Head semi-circular, with long, slightly curved spines, reaching beyond the tail. Glabella oblong, truncate, about as broad as long, with two pairs of deep, oblique furrows, of which the lowest is most oblique, and reaches nearly to the neck furrow. Eyes large, connected to the glabella by prominent ocular ridges, and distant from it rather less than one-half its width. Frontal limb broad, with a lineated margin. Fixed cheeks, minute. Free cheeks broad, with a lineated margin.

Thorax of 14 rings. Axis regularly tapering. Axial rings, with a small tubercle at each end, and traces of a central tubercle, which are more prominent on the lower rings. Upper pleuræ pointed, strongly faceted; middle pleuræ falcate, moderately faceted, lower pleuræ truncate, slightly faceted: all bent down at less than one-half their length from the axis.

Pygidium sub-rotund, of three axial rings. Limb, with three furrows. Margin narrow, linear.

This species is easily distinguished by its long head spines; short, broad glabella; long eyes and broad frontal margin. It occurs sparingly along with the last in the Upper Dolgelly beds, near Rhiw-felyn, where I discovered it in 1865.

Conocoryphe? bucephala, spec. nov. (Pl. II. Fig. 1-6). Length $1\frac{1}{2}$ in. Breadth 1 in. Ovate.

Head broadly semi-circular with strong spines pointing downwards and a little outwards. Glabella subconical, truncated, very prominent, and without furrows when perfect, Figs. 1 and 2; but when crushed Fig. 3, or divested of outer crust Figs. 4 and 5, showing two pairs of internal ones of which the upper is short and the lower long and very oblique, reaching nearly to the neck furrow. Some specimens show a third short pair of furrows near the apex of the glabella. Eyes small and prominent, distant from the glabella about half its width and joined to it by ocular ridges that are nearly obsolete in perfect specimens of the head, but clearly shown in crushed ones. Frontal limb narrow, with a strong triangular margin marked off by a deep groove. Cheeks broad, prominently convex, with a wide margin.

Thorax of 14 (?) rings. Axis convex, tapering. Pleuræ falcate, pointed strongly, grooved, and faceted. Fulcrum of the pleuræ prominent, less than half their length distant from the axis. (See Pl. II. Fig. 6.)

Pygidium not preserved in any of the specimens, but it must have been small and of not more than one or two rings.

The specimens of this species when perfect have all their parts prominent and convex. The head is large and resembles *C. ? depressa*, Sal., and that species also when uncrushed shows no glabella furrows, in which condition it is *C. ? verisimilis*, Sal., and probably also *C. ? vexata*, of the same author. Specimens of *C. ? bucephala*, flattened by pressure, resemble *Olenus micrurus*, Salter, to which species I was at one time inclined to refer it, but an examination of the specimens of *O. micrurus*, from near Trawsfynydd, in the Museum of Practical Geology, has convinced me that it is a true *Olenus* and quite distinct from *C. ? bucephala*. *C. ? bucephala* is not uncommon at Gwern-y-barud, near Penmaen-pool; on Mynydd Gader, and near Craig-y-Dinas, along with *Hymenocaris vermicauda*, *Bellerophon Cambriensis*, and a small *Lingula* in Upper Festiniog beds.

Sphærophthalmus bisulcatus, Phil.; syn., *Olenus bisulcatus*, Phil. *Olenus* (*Sphærophthalmus*) *pecten*, Salter. *Olenus* (*Sphæroph.*) *flagellifer*, Sal. *Olenus alatus*, Sal.

I have examined the specimens in the Museum of Practical Geology, on which the above species were founded. They are fragments only, variously distorted. When they are studied in connection with the perfect specimens that we have now obtained from the Dolgelly district there can, I think, be no doubt of their being one and the same species. I think the species cannot be referred to *Olenus* (*Sphæroph.*) *alatus*, Bœck, unless we assume a large amount of error in Angelin's figure of that species, as he shows the pygidium entire and with four axial rings, whereas *Sph. bisulcatus* has a minute serrated pygidium of two rings only, and is furnished with a long terminal spine. Some fragments of *Sphæroph. alatus*, Bœck, in the Museum of the Geological Society resemble *Sphæroph. humilis*, Phil., but that species also has a minute pygidium with a long terminal spine. At the same time I think it highly probable, that when we are able to compare our Cambrian trilobites with specimens of the Scandinavian species, many of our names will have to give place to those of Angelin, though we cannot at present identify them by the figures he has given us.

Mr. E. Williamson discovered this species in the black shales at Rhiw-felyn in 1865. More recently, Mr. J. C. Barlow found it in great profusion within a few yards of the first discovery. A band of about three inches thick of the shale, is almost entirely composed of the remains of *S. bisulcatus*, along with a few specimens of *S. humilis*.

Agnostus obtusus, spec. nov. (Pl. II. Figs. 15, 16). Length $\frac{1}{2}$ in., breadth $\frac{1}{2}$ in. Oblong, obtuse.

Head, a truncated semi-circle. Glabella five-eighths length of head, ovate, obtuse, with a nearly obsolete central tubercle, and traces of a nearly obsolete furrow, separating a terminal lobe. Two minute triangular lobes at base of glabella. Limb nearly of equal width all round. Margin narrow.

Thorax, of two rings. Axis, broad.

Pygidium, shaped like head. Axis, short, pentangular, one-third the length of the pygidium, with a nearly obsolete tubercle, near the end. Limb narrow at the sides, and broad at the end of the axis. Margin marked off by a deep groove, and widened near the lower angles, where it has a short spine on each side.

This species belongs to the same group as *A. tardus*, Bar., *A. lentiformis*, Ang., and *A. trinodus*, Sal., from all of which it differs in the much shorter and unlobed axis of the pygidium. In the Upper Dolgelly beds at Rhiw-felyn, I have found this species

very sparingly, along with *A. trisectus*, *A. princeps*, and the other fossils of the black shales.

Agnostus trisectus, Salter.

This species, described from imperfect specimens of the pygidium, occurs in great abundance in the black shales at Rhiw-felyn, where I have obtained numerous perfect specimens, a complete series of which is now deposited in the British Museum. These show that, like *A. princeps*, it was furnished with marginal spines to the pygidium; and other close resemblances make it most difficult to distinguish some of the specimens from that species, with which, however, I hesitate at present to join it, especially as the able author of the Monograph on the Trilobita has announced his intention of dealing with the *Agnostidae*, in the next part of that valuable work.

Agnostus Barlowii, spec. nov. (Pl. II. Figs. 17, 18).—Length $\frac{3}{8}$ in., breadth $\frac{7}{8}$ in. Oblong, ovate.

Head rounded, ovate, plain, rising from all sides to a point near the base, Margin very narrow.

Thorax of two rings. Axis trilobate.

Pygidium, shaped like head, rising to a central point near the base, with two slight indentations, marking the commencement of an obsolete axis.

This species resembles Angelin's figures of his *A. glandiformis* and *A. bituberculatus*, but differs in the absence of tubercules, and in its trilobate thoracic axis. To *A. nudus*, Bar., it comes still nearer, but that species has neither the axial furrows of the pygidium, nor the trilobate thoracic axis of *A. Barlowii*.

It is a striking example of the persistence of type amongst the *Agnostidae*, that the nearest known ally of *A. Barlowii*, which is a Tremadoc form, should be a species from the Lower Cambrian rocks of Bohemia.

It occurs in the Lower Tremadoc beds near Rhiw-felyn, along with *Asaphus innatus*, *Niobe Homfrayi*, *Conocoryphe? depressa*, etc., where it was first found by Mr. J. C. Barlow, of Birmingham. This species comes from rocks a little beyond the limits of this paper, but I include it, as it is the first example of *Agnostus* from British Tremadoc strata, and for the purpose of commemorating the services of Mr. J. C. Barlow, in elucidating the geology of the Dolgelly district.

Bellerophon Cambriensis, spec. nov. (Pl. II. Figs. 19, 20.)

Broadly involute with three or four distant, coarse ridges of growth, crossed by faint longitudinal striæ; keel narrow.

The discovery of this species carries the range of the Heteropodous Mollusca much lower down in the Cambrian rocks than was before known. I first found it near Craig-y-dinas, but have since discovered that it is not uncommon along with *Conocoryphe? bucephala* and *Hymenocaris vermicauda*, wherever the Upper Festiniog rocks are exposed as on Mynydd-gader, and at Gwern-y-barud, near Penmaen-pool.

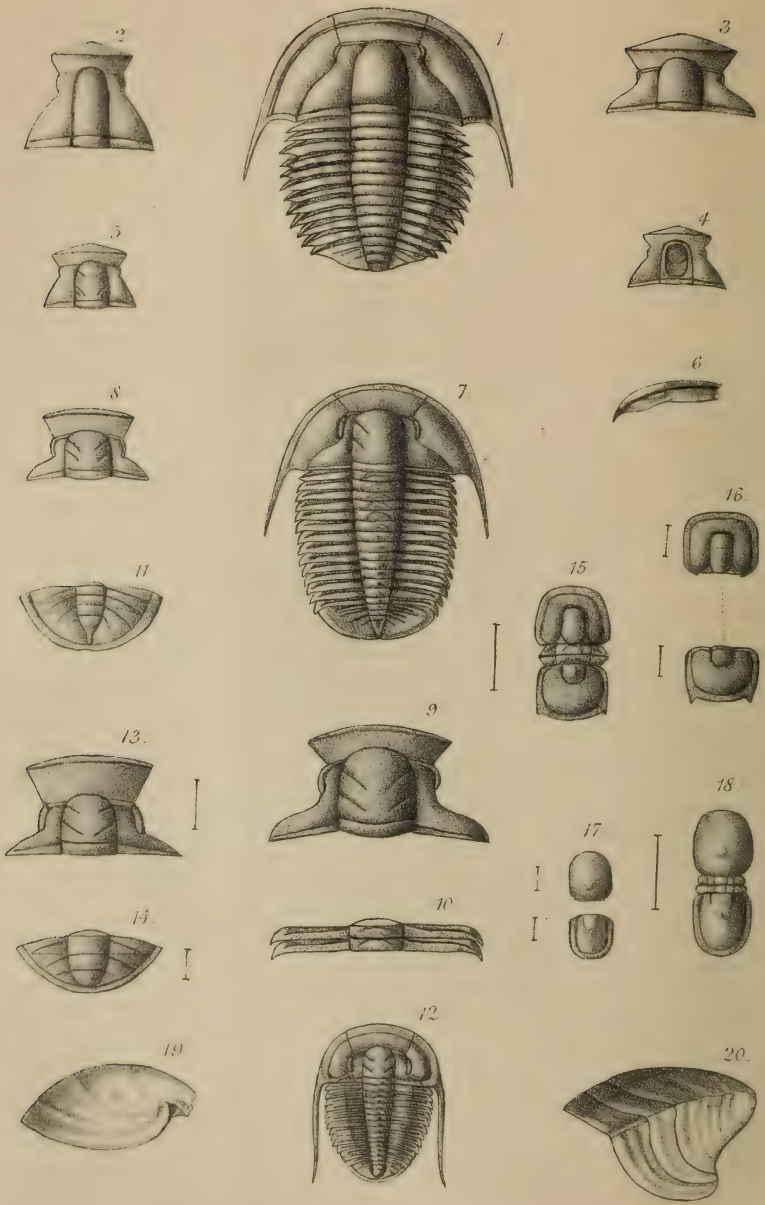
EXPLANATION OF PLATE II.

- Figs. 1-6. *Conocoryphe? bucephala*, spec. nov., from specimens in British Museum and collection of Thos. Belt.
 „ 7-11. *Conocoryphe? Williamsonii*, spec. nov., from specimens in British Museum and collection of Thos. Belt.
 „ 12-14. *Conocoryphe? longispina*, spec. nov., from specimens in British Museum and Museum Practical Geology.
 „ 15, 16. *Agnostus obtusus*, spec. nov., from specimens in British Museum.
 „ 17, 18. *Agnostus Barlowii*, spec. nov., from specimens in British Museum and collection of Mr. J. C. Barlow, of Birmingham.
 „ 19, 20. *Bellerophon Cambriensis*, spec. nov. Both specimens figured are on one slab in British Museum.

ERRATA.

In Part I., page 495. Table of the Cambrian rocks. *Obolella* should have been marked present in the upper part of the Dolgelly group and lower part of the Tremadoc group, and *Discina* in the lower part of the Tremadoc group.

In Part II., page 540, line 18 from the bottom, for *Conocoryphe micrura*, Sal., read *Conocoryphe? bucephala*, spec. nov.



A. T. Holluck del & sculp.

W. West imp.

New Trilobites, &c from the Upper Cambrian Rocks of North Wales.