
Chapter 23 Detail of the Carboniferous Limestone

The Principal Area

A general section through this area will be found on (Folding-Plate 12).

Lligwy, The Coast, and Pentraeth

The western part of Lligwy Bay is covered by drift and blown sand, but the Llig'wy sandstone is to be seen, though poorly, close to the fault (which cuts out its base) in Rhos Lligwy ravine, and much better near the School. At the great bend of the Lligwy river, south of the School, and thence along the low gorsy land as far as where it looks across to Plâs Bodafon woods, the Lligwy sandstone is well exposed in low escarpments. It is grey, and sometimes a conglomerate with pebbles three inches long, chiefly venous quartz. In the quarries at the river's bend are undeterminable plants.

At Careg Ddafad, Lligwy Bay, are the boulder beds and disturbances described on pp. 602, 612, 615. The section (Figure 291) is about 20 feet in height at the vertical beds. The Lligwy Bay conglomerate is seen at the western end, but is apt to be partly buried in blowing sand from time to time (Plate 35). In it the smaller pebbles, the boulders, and the lumps of dolomite [[\(E9517\)](#) [SH 498 871], [\(E9518\)](#) [SH 498 871], [\(E9519\)](#) [SH 498 871], [\(E10296\)](#) [SH 498 871], [\(E10328\)](#) [SH 499 871], [\(E10329\)](#) [SH 499 871], [\(E10330\)](#) [SH 499 871], [\(E10331\)](#) [SH 499 871], [\(E10332\)](#) [SH 499 871], this last was analysed] are tumultuously mixed together, the foreign boulders being rounded but the lumps of limestone sub-angular and irregular. One mass, at the corner of the cliff, measures 11 yards by 5. Their limestone is not all of one type, so that more than one bed has been broken up to make them. Some are fossiliferous, but have not yet yielded zonal forms. The Old Red cornstones have not been identified. Ordinary conglomerate runs on to the streamlet, where there is no fault; nor does there appear to be any at the other gap. But between the gaps is great confusion, massive passing rapidly into broken limestone, and that into a conglomerate with patches of brown dolomite, a shale below being pinched into little local anticlines. The vertical beds and their local disruptions have been described on p. 615. In the matrix of the limestone-boulder bed are a few quartz-pebbles. Towards its top the boulders are more closely packed, and it passes into a rubbly limestone. The high-dipping limestones have yielded only *Productus* sp.; but from those immediately below (the lowest visible in Lligwy) have been obtained [Af. 385(i), 385(h)]:

Athyris sp.

Cbonetes papilionacea (*Phill.*)

Rhipidomella cf. *micHELini* (*L'Eveillé*)

The relations at the southern margin of the disturbed zone are not seen; but no fault seems to run on from it inland.

Ynys Dulas, the island with a tower of shipwreck-refuge on it, rises to some 20 feet above high-water mark, and is composed of massive light crystalline limestone, with a few thin beds -of shale. The limestone, which contains also small organisms, yielded [Af. 319–22]:

Alveolites septosus (*Flem.*)

Cyathophyllum murChisoni (*Edw. & Haime*)

Syringopora reticulata? *Goldf.*

and is assigned by Dr. Vaughan to D1. More fossils might easily be obtained. The striking feature of the islet is the high dip, which rises to 80° at the Tower, and to 90° (with even a slight overturn) a little further north. It is due, not to local foundering as at Lligwy Bay, but to true earth-movement, for the shales are compressed and hardened, with slickensides in places. At no section now exposed in Anglesey do Carboniferous rocks display so much disturbance. But the zone is

narrow, for the dips on the reefs on either side are much lower.

The conglomerate near the mouth of Traeth Dulas, being thus below D1 limestones, must be at the base of the Lligwy Sandstone, and is probably the lowest Carboniferous horizon that is accessible in the Island.

Lligwy Bay to Red Wharf Bay — The limestone along the south-east side of Lligwy Bay, which contains 4 feet of sandstone, has yielded seven species [Af. 385 (j), 385 (x)], but is chiefly notable for its richness in *Alveolites septosus* (Flem.). In Porth-y-forllwyd, where *Dibunophyllum* first appears (Figure 292), is a fine section in black limestone with unusually thick shales, one being as much as eight feet, from which most of the following fossils were obtained [Af. 386–435]:

Aulopora sp.

Dibunophyllum sp.

Syringopora reticulata Goldf.

Palseechinid

Bryozoa

Chonetes cf. buchiana de Kon.

Chonetes papilionacea (Phill.)

Chonetes sp. [included by Davidson in *Ch. hardrensis* (Phill.)]

Chonetes sp. [? new]

Leptaena cf. distorta J. de C. Sow.

Productus margaritaceus? Phill.

Cf. Reticularia lineata (Mart.)

Rhipidomella michelini (L'Eveillé)

Conocardium sp.

Phillipsia eichwaldi? (Fisch. de Wald.) [may be new].

Upon these rest very massive limestones (the shales undercut below them by the sea), which may be called the 'Royal Charter Limestone', from the famous wreck of that ship against them in 1859. They are easy of access along a shelf below the drift, and have yielded [Af. 436–57]:

Careinophyllum sp. [θ of Vaughan]

Cyathophyllum murchisoni (Edw. & Hainie)

Dibunophyllum sp. [θ of Vaughan]

Lithostrotion affine Edw. & Haime

Lithostrotion cf. martini Edw. & Haime

Syringopora sp.

Productus cf. productus (Mart.)

Productus sp. ['giganteid' type]

The Royal Charter limestone forms the summit of the D1 sub-zone on the coast. Resting on it is the Helaeth sandstone (Figure 293) about 20 feet in thickness, with pebbles up to three inches in length of venous quartz, quartzite, quartz-schist, and jasper, as well as lumps of sandstone. Limestone comes on again above it, and dips towards a very sharp escarpment 60 or 70 feet in height, whose eastward prolongation forms the northern cliffs of Moelfre Point (Figure 293). At its foot, in the creek, what seems to be the Helaeth sandstone re-appears, but cannot be traced inland where the ground rises; so that the promontory is determined by an east-and-west fault with a downthrow to the north of about 90 feet. Just at the end of the beach is also a north-and-south fault with a downthrow of perhaps 40 feet to the west. The sandstone is full of fossil debris.

We now leave the D1 sub-zone, and pass into the massive crinoid limestones of Moelfre, the only considerable deposit of that type in the island, which are not rich in other fossils, but contain *Lithostrotion portlocki* (Bronn), and may be regarded as a passage-group to the second sub-zone. The small sandstone pipes, which are on the north cliff, about 270 yards from the Point's end, have no sandstone bed above them. Moelfre Island consists of massive light grey limestones, rubbly on the summit, with about four feet of hard false-bedded sandstone near the foot of the north cliff. Above the sandstone are two horizons of pipes, also with limestone above each which sags down into them a little. They are from five inches to three feet in diameter, and have weathered almost empty. The beds on the Island differ from those at the Point's end, so that the Swnt must be determined by a small fault, one of a series of six that cross the Point, the largest of which is that which breaks the Helaeth sandstone.

A definitely D2 fauna now appears, the zone 'opening with the first maximum of *Lithostrotion junceum*', in the words of Dr. Vaughan, massive *junceum*-limestones forming the cliffs from the village to the interesting section at Porth-yr-aber, where the following succession is seen:

	Feet
Massive limestone with <i>Lith. irregulare</i> , &c.	6
Calcareous sandstone	6
Fine sandstone above pipes	1
Piped limestone, massive and clean	7
Shale	2
Dark limestone with corals	

A range of five pipes is well exposed in the undercut part of the cliff, descending from the fine sandstone. They are about six feet wide at the tops and are seen to depths of about four feet, where they have narrowed to three feet (Figure 290). Thence the beds are massive, with many fossils, as far as the beautiful coral-beds of Morcyn, which contain [Af. 481–92]:

Dibunophyllum sp.

Diphyphyllum lateseptatum,McCoy

Lithostrotion irregulare (Phill.)

Lithostrotion junceum (Flem.)

Lithostrotion portlocki (Bronn)

The whole foreshore is covered with great radiating groups, and some of the Diphyphyllids are three inches across.

Massive grey limestones, rich in foraminifera, chiefly *Endothyra bowmanni* (Phill.) and *Textularia*, run on to Penrhyn-y-gell, and from them came the specimen of type 2 ([E10334](#)) [SH 517 853] that was selected for analysis. Here also are the best examples of dolomitised corals, one of which was also analysed ([E10335](#)) [SH 517 853]. The beds are

often covered with winding cylindrical bodies like the castings of annelids, but an inch or more in thickness, full of shell and coral debris.<ref>The 'Stick-bed' of Pl. 46, (Figure 2), in Prof. Garwood's paper on the Lower Carboniferous succession in the north-west of England, seems to be of the same character (*Quart. Journ. Geol. Soc.* 1912, pp. 528–9).</ref> *Lonsdaleia floriformis* beds [Af. 496–9] are seen just after the turning of the point, and the species may be said to attain a maximum.

In the pleasant little sandy bay of Traeth Bychan massive limestones still prevail. Its northern shore appears to be determined by a small fault. The old spoil-banks of the south quarry are very rich in fossils [Af. 500–38]:

Aulophyllum cf. pachyendothecum (*Thoms.*)

Diphyphyllum lateseptatum *McCoy* [narrow and broad forms]

Lithostrotion irregulare (*Phill.*)

Lithostrotion junceum (*Flem.*)

Lithostrotion portlocki (*Bronn*)

Syringopora reticulata *Goldf.*

Productus sp.

Spirifer cf. bisulcatus *J. de C. Sow.*

A massive bed which comes down from an inland escarpment forms the cliffs of Dinas, whose rocky hill is composed of a still higher massive bed. Fossils are numerous where the little dyke runs out, and the great castings are well seen.

The Dinas valley fault emerges in at least three parallel dislocations, that on the side of Dinas crag being joined by a fourth which is only 35° from the horizontal.

Penrhyn point itself is composed of thick-bedded grey limestones with *Lonsdaleia floriformis* (*Flem.*) [Af. 542–5] dipping to the south-east at 7°; but just to the south of a little shingly cove, similar beds, here extremely rich in corals (Plate 37), rise with a dip to north-east of 35° to 40°. Of this disturbance there is no trace on the other side of the headland, only 170 yards away, and any folds or faults (such as a branch of the Dinas valley fault) that might be invoked in order to explain it would be out of harmony with the escarpment features. It is to be noted, however, that an irregular sandy group lies below, and we have seen (p. 615) that foundering may occur in connexion with such beds. Moreover, on the little escarpment that faces north is a local unconformity (see p. 614), and this is just opposite the disturbance on the cliff and only 100 yards from it.

The great cliffs of Benllech, between Penrhyn Point and Huslan, are perhaps the most interesting section in the Carboniferous rocks of Anglesey, their leading features being the massive coralline limestone of the cliff-brows and the Benllech sandstone of the cliff's foot. That limestone is best studied at the Penrhyn disturbance, for when it rises from that it keeps rather persistently to the cliff-tops, where it gives rise to a noble wall of crags, and is not easy of access, though fossils have been obtained from its fallen masses. Its leading forms are [Af. 551–84, 586–99, 602–34]:

Dibunophyllum muirheadi *Nick. & Thoms.*

Diphyphyllum lateseptatum *McCoy* [narrow form] *Lithostrotion irregulare* (*Phil.*)

Diphyphyllum junceum (*Flem.*)

The beds below and above it contain fewer corals and more brachiopoda, but this coral fauna is persistent and abundant in the massive bed itself. The structure of the cliffs and of the hills above them is given in (Figure 294). As the coralline limestone rises from the beach at the Penrhyn disturbance about 6 feet of thin dark limestones with shale appear, which

thicken gradually to 20 feet. From below them rises the Benllech sandstone, alternating with them at its top. Higher beds form outliers on the hills along the coast. The Benllech succession is therefore:

	Feet
5. Massive gritty limestone of outliers	30
4. Thin-bedded limestones	20
3. Massive, coralline, 'cliff-brow' limestone. Thin-bedded limestone with shale	2
1. Benllech sandstone group (base unseen)	50

From (Figure 294) it will be seen that though the coralline limestone tends to undulate slowly down southwards on the dip, it is restored to its position on the cliff brow by the faults at Borth Wen and Pen-y-coed gaps, whose throws are of about 80 and 50 feet respectively. Just before the Huslan fault is reached it is removed from the coast, the escarpments turning inland. The Benllech sandstone is very variable. Typically it consists of a fine and flaggy sandstone, alternating rapidly with dark sandy shale, the whole resting on a rather fine conglomerate that often forms the foreshore. But sometimes the group is almost wholly sandstone, sometimes is to a great extent replaced by limestone. From the Penrhyn disturbance to Borth Wen gap all the three cliff beds are well exposed, the grey walls of the coralline limestone beetling heavily over the undercut beds below. When the sandy group reappears on the upthrow of the Borth Wen fault it is for a while replaced by limestone, in which, however, thin sandstones quickly appear; and then comes the anomalous junction described on p. 613. (Figure 288). The spot is a few yards to the south of Borth Wen, and is accessible from above by a narrow footpath down the cliff that passes over the cave's mouth. The sudden change and the erosion of the narrow creek are most suggestive of a fault, but the sandstones of the cave's roof appear to pass across and die out within the limestone on the north, and there seem to be others obscured among the weeds. The abruptness is also softened by the presence of much calcareous matter in the conglomerate which takes the limestone's place. The old succession is now resumed, and the cliff's foot from here to the great rock-fall is the most interesting portion of the section. The limestone conglomerates (Plate 36) are the best exposed in Anglesey, and are seen beneath an undercut roof a few yards to the south of the creek. Further on the rapid changes in the sandy group are well displayed, shale and sandstone, sometimes in seams only an inch in thickness, replacing each other continually. There are also horizons along which lie trains of lenticular lumps of limestone. At the great rock-fall the coralline limestone has slipped in huge masses from the cliff's brow, some of them standing on end out in the sea. The Benllech sandstone is now not so well exposed, but just to the north of Pen-y-coed gap it is seen to contain many thin beds of limestone. The Pen-y-coed fault is well seen from below. A change is now discernible in the Benllech sandstone. The limestones in it thicken rapidly, and by the time the gap is crossed, it (or what seems to be its equivalent) has become a sandy limestone, and in that condition finally passes down out of sight. On its surface, running down a broad shelf on the cliff, are many sandstone pipes, their tops about a yard wide, several often coalescing, so that the upper portions of their cores unite into a bed of sandstone, but there are no deep sections through them. Above them is about a foot of light limestone that here forms the base of the dark shaly group. They do not cut so cleanly and vertically down as usual, and little tongues of sand run out horizontally from their sides.

Such is the Benllech succession, interesting from the rapid changes that take place along the same horizons, whose identity is, however, assured by the persistence of the second and third members of the group. The section can be studied only from below, but can be traversed almost all the way along, though only at low water. An ebbing tide should be selected for the purpose, for the sea, especially in heavy weather from the east, sweeps rapidly over the low foreshores up to the feet of the overhanging cliffs.

The main fault at Huslan gap is in the south cove, and is not well exposed, that in the north cove being but a minor one. Beyond the Huslan faults, grey coralline beds appear, and then the very clean, massive, white limestone, from which, a few yards north of Benllech house and cove, came the type-specimen that was analysed ([E10336](#)) [SH 522 827]. It is rather rich in Bryozoa and Foraminifera, and has yielded [Af. 653–68]:

Endothyra bowmanni *Phill.*

Textularia sp.

Campophyllum sp.

Syringopora geniculata *Phill.*

Chonetes papilionacea? *Phill.*

Chonetes sp. [? new]

The section is less continuous beyond Benllech cove, but at the Thelwal streamlet in Benllech Sand is an excellent exposure of the black thin-bedded limestones, from which came the specimen [\(E10337\)](#) [SH 522 825] that was analysed. They contain [Af. 669–76] *Endo-thyra* (badly preserved), *Productus latissimus* J. Sow., and some corals. Beyond them, the rocks of the Old Quarry contain [Af. 677–86] the same coral-fauna as that of the "Cliff-Brow" limestone, but in less abundance. There is much nodular and tabular black chert [\(E10327\)](#) [SH 526 822], in which are spicular rods and *Endothyra*. Above them is the gently dipping outlier of Thelwal hill, massive limestones capped with a thin conglomerate, which may possibly belong to the higher sub-zone.

The gap of Dwlban (Figure 295), judging by the features, which are strongly marked, is probably determined not by one but by a pair of faults. Beyond it, at Trwyn Dwlban, is massive limestone with the pipes (see p. 613, (Figure 289), and (Plate 38), [\(E9928\)](#) [SH 532 821]. Above the sandstone from which they proceed is the coralline limestone regarded by Dr. Vaughan as in the Deb sub-zone. It has yielded [Af. 691–707]:

Lithostrotion junceum (*Flem.*)

Lonsdaleia duplicata (*Mart.*)

Lonsdaleia cf. *duplicata* (*Mart.*) [septa prolonged to outer area]

Syringopora ramulosa *Goldf.*

This is surmounted by pipe (Plate 39), outlier (Figure 295) and (Plate 40). Massive grey limestones are the foundation-beds of this, then come about eight feet of sandy beds, and then 30–40 feet of tabular tawny chert, from whose base came the specimen [\(E9881\)](#) [SH 531 815] containing *Endothyra*. This feet in height, is a conspicuous object all its sides are precipitous, but the summit is accessible from the west. The features are due to ancient quarrying.

The exposures along the Bay are poor, but at the Tower, close to the Berw fault, are fine escarpments of massive limestone, dipping at 30° to the north-west (Folding-Plate 12). Almost all the Pentraeth limestones yield [Af. 3127–31, 3135–75] *Productus latissimus* J. Sow., accompanied at Llanddyfnan Church by *Lonsdaleia* cf. *duplicata* (*Mart.*), and in the quarries of Tan-y-graig, by *Lithostrotion irregulare* (*Phill.*). The limestone that is caught between the Berw faults is well exposed by the road at Pentraeth Mill, a dark type with shale, dipping east-south-east at 50°. Its isolation cannot be directly proven, but the trend of the features and its dip leave little doubt of that. It has yielded [Af. 3146 75]:

Athyris expansa (*Phill.*)

Brachythyris planicosta *McCoy*

Martinia ovaliglabra *Vaughan*

Productus latissimus J. Sow.

Productus cf. *pugilis* *Phil?*

Productus sp. [cf. '*giganteus*' group]

Productus sp. [cf. '*semireticulatus*' form]

Pugnax pleurodon (*Phill.*)[Davidson's interpretation]

Pustula punctata? (*Hart.*)

Reticularia lineata (*Hart.*)

Rhynconellid

Spirifer bisulcatus *J. de C. Sow.*

Spirifer sp.

The brachiopod-fauna is therefore strongly marked.

The Escarpment or Western Margin

The locality that has yielded, in itself, a definitely D1 fauna (see p. 616 and (Folding-Plate 12)) is a small and short escarpment on the 200-foot contour, five-eighths of a mile due east of Plâs Bodafon, and about the same distance north-east of Cae-rhos-liligwy. It yielded [Af. 1701–18]:

Alveolites?

Cyathophyllum murchisoni (*Edw. d Haime*)

Crinoidal columnals

Stenopora?

Productus edelburgensis *Phill.*

Productus cf. *hemisphaericus* *J. Sow.*

Pustula punctata? (*Mart.*)

Cf. *Schellwienella crenistria* *Phill.*

? *Straparollus dionysi* *de Montf*

Close behind it rises the strong escarpment (Folding-Plate 12) and (Figure 277), (Figure 296)) whose foot has been taken as the limit of the D1 sub-zone. In minor escarpments which rise on the dip-slopes beyond at spots about 660 yards north-west, and 1,450 yards south-west of Parciau, were obtained [Af. 316–17, 1771–90] the definitely D2 fauna:

Lithostrotion junceum (*Flem.*)

Lonsdaleia sp.

Chonetes sp. [*C. compressa* Sibly, non Waag.]

Daviesiella sp.

Productus sp. ['giganteid' type]

Naticopsis plicistria (*Phill.*), *rar.*

These beds are approximately on the horizon of the lowest on the coast which, at Moelfre (p. 616), have also yielded a distinctly D2 fauna. At Lligwy woods kiln, immediately above the line taken as the junction of the zones, were obtained [Af. 1665–1700]:

Lithostrotion martini? *Edw. & Haime*

Chonetes *cf.* *hardrensis* (*Phill.*)

Chonetes *papilionacea* (*Phill.*)

Cf. *Martinia ovaliglabra* *Vaughan*

Productus cf. hemisphaericus *J. Sow.*

Productus sp. [*cf. 'striatus'* group]

At the farm opposite Plâs Bodafon, just above the Lligwy sandstones, [Af. 311, 1719–35]:

? *Lithostroton martini* *Edw. & Haime*

Chonetes *papilionacea* (*Phill.*)

Productus sp. [of '*hemisphaericus*' group]

Productus [of '*giganteid*' group]

Seminula ambigua (*J. de C. Sow.*)

Phillipsia? [pygidium]

From the Bonciau outlier, *inter alia* [Af. 1912–16]:

? *Amusium concentricum* (*Hind*)

Phillipsia?

Both of these are in D1.

From the great escarpment 150 to 800 yards north-east of Cae-rhos-lligwy, and therefore near the base of D2, but higher than the beds of Lligwy woods roadside kiln [Af. 1736–70].

Diphyphyllum?

Chonetes sp. [*C. compressa* Sibly, *non* Waag.]

Chonetes sp. [young]

Productus cf. corrugatus *McCoy* [with apparent affinities to *Vaughan's Pr. aff. cora, mut. C*]

Productus cf. productus (*Mart.*)

Productus sp. ['*giganteid*' type]

The conglomerate by Lligwy woods gate, about 80 feet above the Lligwy sandstone, replaces locally some -of the lower part of the D2 sub-zone. At the farm facing Phis Bodafon there are signs of contemporaneous disturbances like those of Careg Ddafad, but the exposure is not good. The dark limestone of Bonciau (Figure 296) has been treated as an outlier, from the evidence of features. The D1 limestones are then overlapped. On the south side of the road there may be a thin outlier of the Lligwy sandstone resting on the Old Red flags, but it is very obscure. North of the great alluvium the Lligwy sandstone is again well exposed, but after this the lines have had to be drawn for a long way from the evidence of debris and features. The fault at Bod Gynda is very small, but there must also be one, the same as that of the Vale of Cadarn, in the deep valley between Cefn-iwrch and the great escarpment, for the features at its head abut upon each other and the limestones do not correspond. The Lligwy sandstone remains poorly exposed all the way to Llangefni, but the limestone

escarpment (though less pronounced here) and the exposures of the Old Red conglomerate show that it rapidly thins out, and dies away, like the Old Red, close to the Llangefni fault.

Many sections about Bod Gynda have yielded the D2 fossils [Af. 1917–37, 2285–313]. Close to the base of the limestone, 160 yards south-west of the house, were obtained:

Dibunophyllum?

Diphyphyllum lateseptatum McCoy

Lithostrotion portlocki? (Bronn)

Chonetes papilionacea (Phill.)

At the old limekiln 390 yards north of the house occurred *Dibunophyllum* sp. [near ψ of Vaughan] and other forms; and close to the base of the limestone towards Ynys-goch, *Lithostrotion junceum* (Flem.) and other fossils. From the latter quarry came the mottled limestone [\(E9990\)](#) [SH 482 804]. The dark limestone of Cefn-iwrch, though sandstone is not exposed between it and the main escarpment, is evidently an outlier. It is rich in gasteropods, and at a quarry 280 yards south of the '249' level has yielded, in addition to typical D2 forms [Af. 17–25, 2270–84]:

Bellerophon sp.

Macrochilina?

Microdoma?

Naticopsis ampliata (Phill.)

Cytherella? *inflata* (Münst.)

Phillipsia eichwaldi (Fischer de Waldheim),

Murchisonia (*Hypergovia*) *copula* de Kon., var. *convexa* J. Donald, being found in the main escarpment opposite the north end of the outlier [Af. 15, 16]. It will be noted that the Crustacea seem to be characteristic of the lowest limestones, whatever their horizon. A road-section by the windmill of Llanddyfnan yielded the usual D2 forms and an apparently new *Bellerophon*, and an escarpment near Pen-y-fan, 930 yards north-west of Plâs Llanddyfnan, only a few feet up in the limestone [Af. 2088–101]:

Dibunophyllum aff. *muirheadi* Nich. & Thoms.

Dibunophyllum sp.

Lithostrotion cf. *portlocki* (Bronn)

Lonsdaleia floriformis (Flem.)

Dielasma cf. *attenuatum* (Mart.) [de Koninck's interpret.]

Productus giganteus (Mart.)

Productus cf. *productus* (Mart.)

From these lists it will be seen that the higher sub-zones are being brought by overlap quite near the Lligwy sandstone. Finally, from the quarry half a mile east-north-east of Llangefni church south of the mineral-water works, *Lithostrotion junceum* (Flem.) and other forms [Af. 3047–63]. The Pencraig sandstone, which underlies the Llanddyfnan limestone, is well exposed between the Old Windmill and the woods. That of Clegyrdy-bach is probably an outlier of it.

No Carboniferous rocks are now to be seen on the slopes west of the Old Windmill. But the quartzite of the Old Windmill must be an inlier, for the escarpment of the *junceum*-limestone is just at the 100-foot contour at Clai, and that contour passes along the foot of the quartzite crag. Moreover it is dipping, south at Clai, so that even if it return at once to its normal dip, it must pass to the west of the quartzite, and occupy the slopes between that and the river. This inlier must rise through about 100 feet of beds.

The Interior

(Folding-Plate 12).

In the country about Parciau the limestone is very strongly featured, a succession of bold though not lofty escarpments rising one after another in long lines of grey crag, usually with dense brushwood below each rocky crest. The intervening beds are seldom well exposed., but at Frigan south quarry and some other places are seen to be the fine dark ones. About Frigan their outcrop is broadened by a very gentle anticline. From the escarpment that passes 220 yards west of Parciau were obtained [Af. 180335]:

Cyathophyllum regium *Phill.*

Dibunophyllum sp.

Diphyphyllum lateseptatum *McCoy*

Lithostrotion irregulare (*Phill.*)

Lithostrotion junceum (*Flem.*)

Lonsdaleia floriformis (*Flem.*)

Productus cf. *auritus* *Phill*

Productus cf. *productus* (*Hart.*)

Productus sp. [apparently new and of '*hemisphaericus*' group]

Productus sp. [of '*semireticulatus*' group]

From the great escarpment that curves round north of the 'D' of 'Llaneugrad ' the same corals and also [Af. 318, 1836–65]:

Lithostrotion cf. *mccoyanum* *Edw. & Haime*

Cf. *Athyris planisulcata* (*Phill.*) [Davidson's interpretation]

Chonetes cf. *hardrensis* (*Phill.*)

Pustula cf. *elegans* (*McCoy*)

Pustula sp. ['giganteid' type]

Seminula ambigua (*J. de C. Sow.*)

This is the highest group obtained in Parciau.

Other D2 assemblages close by included (*inter alia*) [Af. 1866–1911, 1791–1802, 2248–50]:

Alveolites septosus (*Flem.*)

Campophyllum sp. nov.

Dibunophyllum muirheadi *Nich. & Thoms.*

Zaphrentis aff. enniskilleni *Edw. & Haime*

Chonetes sp. [*C. compressa* Sibly, *non* Waag.]

Spirifer bisulcatus *J. de C. Sow.*

Phillipsia sp.

The Rhos-fawr sandstone, which is pebbly, is about 30 or 40 feet thick. It is well exposed about the California Inn and for half a mile to the north-east, after which it is cut off against a strong feature, a straight hollow that is overlooked by -bold escarpments on its eastern side. This is evidently a fault-line of some importance, with a downthrow to the east, for from the bare plateaux that rise to the south and south-east of Gamdda-fawr (on one of which is a rock table) (Plate 58) were obtained fossils that indicate a higher horizon than D2. Combining three localities that are close together, we have [Af. 330–4, 1938–2005]:

Alveolites septosus (*Flem.*)

Aulophyllum sp.

Campophyllum?

Cyathophyllum regium *Phill.*

Dibunophyllum muirheadi? *Nich. & Thoms.*

Diphyphyllum lateseptatum *McCoy*

Lithostrotion irregulare (*Phill.*)

Lithostrotion mccoynum *Edw. d Haime*

Lonsdaleia floriformis (*Flem.*)

Lonsdaleia duplicata? (*Mart.*)

Syringopora sp.

Chonetes buchiana? *de Kon.*

Productus *cf.* productus (*Mart.*)

Productus sp. [of '*giganteus*' group]

Productus sp. [apparently new: '*hemisphaericus*' group]

Pustula punctata? (*Mart.*)

Pustula sp. [of '*elegans*' group]

Rhipidomella michelini (*L'Eveillé*)

Schizophoria resupinata (*Mart.*)

Spirifer bisulcatus? *J de C. Sow.*

These plateaux, which are composed of light massive beds resting, as usual, upon darker, are evidently an outlier of the higher sub-zones; but its limits cannot at present be determined. To the west it is bounded by the Crimach fault, and as there is a persistent south-easterly dip, it must be bounded by faults in that direction also, extending perhaps as far as the Dinas Valley fault. Probably the Borth Wen and Huslan faults, both of them upthrows to the south, come together and range as far as the Crimach fault, a combination which may explain the positions of the sub-zones. Whether the sandstone that belts the plateau north-east of Crimach be the same as that which ranges north-east to Hen-dy is not known. Indeed it is not certain that the exposures of the latter, which are connected by features and debris, be really all in the same bed.

Between Rhos-fawr and Benllech Inn a number of localities have yielded a D2 fauna [Af. 369–71, 2017–64], which includes Dibunophyllids, Diphyphyllids, and an apparently new Densiphyllid.

About a quarter of a mile east-south-east of the California Inn, on both sides of the road, and at three places, close to these, overlooking the deep straight marsh below Bryntirion, there is a bed that is rich in brachiopoda, and has yielded [At 2251–69, 2314–40, 375–85]:

Aulophyllum aff. pachyendothecum (*Thoms.*)

Campophyllum sp. nov.

Cyathophyllum murchisoni (*Edw. & Haime*)

Diphyphyllum lateseptatum *McCoy*

Lithostroton irregulare (*Phill.*)

Lithostroton portlocki (*Bronn*)

Lonsdaleia cf. duplicata (*Mart.*)

Syriugopora ramulosa *Goldf.?*

Daviesiella llangollensis (*Day.*)

Productus cf. hemisphaericus *J. Sow.*

Productus latissimus *J. Sow.*

Productus cf. productus (*Mart.*)

Productus cf. pugilis *Phill.*

Productus sp. [of '*giganteus*' group]

Productus sp. [of '*longispinus*' group]

Productus sp. [apparently new]

Pugnax pleurodon (*Phill.*)[Davidson's interpr.]

Spirifer sp.

Euomphalus sp.

the most abundant form being *Pr. cf. hemisphaericus*. Sandstones belt the conspicuous outlier east of Chwarelau Church, but one of them spreads out beyond its limits, and seems to be brought against it by a small fault. South and east of the hill the behaviour of the sandstones is also anomalous, but appears to be due to irregular deposition.

The straight marsh at the 'o' of 'Bryntirion' is clearly determined by a fault, and the Brachiopoda-bed does not reappear; but to trace the effects of the fault along the strike is not easy. To its south-east is a narrow ridge of dark limestone, and this dips at 8° beneath the extensive sandstones of the Vale of Cadarn, which appear to be connected with the still more extensive sandstones of the Vale of Caban.

To describe in words the relations of these rocks is quite impossible, and, although abundantly exposed, it is very doubtful whether they have been rightly correlated and the lines rightly laid down upon the maps. There is faulting along the deep valley north-west of Prysain High Moor, and dip faults near Bettws, for the features are marked, and the limestones fail to pass beneath each other. But no faulting is adequate to explain the extraordinary distribution of the sandstones, especially in the Vale of Caban. In that wild and boggy valley they are overlooked by curving escarpments of limestone, and it is certain (see p. 613) that they steal upwards across the horizons. At the south end of the valley, south of Pen-y-cefn, they pass eastwards into a ravine, disappear, and the limestones come together, though the result appears to be accelerated by a small fault. The Cadarn and Caban sandstones, with their intercalated limestones, have a total thickness of some 220 feet in the Cadarn country. With the rise on the Redwharf syncline, they should reappear about 220 yards from the Berw fault, indeed sooner, because they are stealing across the horizons upwards in that direction. They fail to reappear, and must therefore have thinned out south-eastwards underground.

Prysain High Moor is an outlier of massive limestones, dipping gently to the south-east. It is bounded by very bold escarpments, and its summit, the highest point in the district, about 380 feet above the sea, is a driftless moorland. At the old limekiln by Prysain house the lower beds of the outlier are rich in fossils, with large radiating groups of corals like those of Morcyn on the coast. They have yielded [Af. 356–68]:

Dibunophyllum sp.

Diphyphyllum lateseptatum McCoy [narrow form]

Dielasma sacculum (Mart.)

Productus sp. ['giganteid' type]

Dr. Vaughan regarded these beds as high in D2, and probably on the horizon of those of Traeth Bychan. Immediately above them are the two summit beds of the outlier, and these have yielded the higher fauna [Af. 305–72, 2103–53]:

Carcinophyllum?

Clisiophyllid

Cyathophyllum regium Phill.

Dibunophyllum sp. [*cf.* ψ of Vaughan]

Diphyphyllum lateseptatum McCoy [normal and narrow forms]

Lithostrotion irregulare (Phill.)

Lithostrotion junceum (Flem.)

Lithostrotion cf. portlocki (Bronn)

Lonsdaleia floriformis (Flem.)

Lophophyllum sp.

Syringopora sp.

Chonetes cf. hardrensis (Phill.)

Dielasma attenuatum (Mart.) [de Koninck's interpr.]

Productus latissimus J. Sow.

Productus cf. productus (Mart.)

Productus cf. pugilis Phill.

Productus sp. [of '*giganteus*' group]

These higher beds are restricted to the hill-top, for above the Caban sandstone, a quarter of a mile north-east of Pen-y-fan, and at Gwenfro-isaf kiln, occur [Af. 2160–9]:

Lonsdaleia cf. duplicata (Mart.)

Productus giganteus (Mart.)

Productus latissimus J. Sow.

Productus cf. productus (Mart.)

an ordinary D2 assemblage. But as the dips are still to the southeast there must be faulting, which, however, is not easy to trace.

Returning to the beds above the Cadarn sandstones, there is a long limestone escarpment just below Pen-y-cefn. In it, at two places, were obtained [Af. 341–55] *Dibunophyllum* aff. *muirheadi* Nich. & Thorns., *Diphyphyllum lateseptatum* McCoy [narrow form], *Lithostrotion irregulare* (Phill.), and other forms. Further east, in what seems the same escarpment, on a footpath 660 yards east of Castell, occurred similar forms [Af. 2170–90] with a *Clisiophyllid* and many others, including several genera of lamellibranchs and brachiopods.

The church of Llanbedr-goch stands on a little rocky platform, and a similar one is crossed by, the road close by. Both are light grey limestones with much chert, and are unusually crinoidal. They have yielded the fauna regarded as higher [Af. 2192–238] which includes, along with 16 other forms, a *Clisiophyllid*, a *Densiphyllid*, and *Aulophyllum* aff. *pachyendothecum* (Thoms.). An ordinary assemblage obtained at Trafalgar [Af. 2239–43] shows that the outlier is of small extent. Glyn hill, rising to the east of the Dinas valley fault, may be a similar outlier.

Between this and Llyn Cadarn are several sandstones, with many anomalous relations. The Cadarn and Castell sandstones coalesce to the south-west, so that a considerable thickness of limestone must be cut out by erosion. At Ty'n-y-felin a sandstone rises into a steep ridge, too high to pass below the Ty'n-y-felin limestone, yet there is no sign of a fault. The junction west-south-west of the 'C' of 'Cadarn' has been described. In front of Cae-rhedyn house a sandstone seems to cut down into a limestone. A large tract ends abruptly near the smithy. At Trafalgar and Gwenfro-isaf massive light limestones contain pebbly beds a foot in thickness. Over most of the area the limestones themselves are normal, but about Llanddyfnan Church are fine developments of the mottled type. There are no large dolomites.

In the district of Talwrn good assemblages of usual types have been obtained at a house 800 yards south-west of Plâs Llanddyfnan and at Gylched wood ([E9930](#)) [SH 480 761], ([E9931](#)) [SH 481 762], including, however [Af. 2065–77, 3194–215], a complex *Clisiophyllid* [intermediate between *Ispidophyllum* and *Rhodophyllum*] and *Daviesella llangollensis* (Dav.). There are several impersistent sandstones here, all above the Pencraig sandstone. The Talwrn sandstone, carrying on it a little outlier of limestone, lies in the important synclinal fold that is traceable all the way from Red Wharf

Bay to Hirdrefaig. South of that house the boundaries of the Millstone Grit and Coal Measures are conjectural, but it is certain that the summit of the limestone must be close by, and the sandy beds obscurely seen may be outliers of Millstone Grit. Owing, however, to the branching of the Berw faults the structure is complex, and the exposures are inadequate to elucidate it. The Talwrn (an extension of the Red Wharf) syncline is succeeded by a faulted anticline where the Mona Complex rises at Bryn-gwallen, but as the faults coalesce it may die out rapidly to the south-west. It is succeeded by another faulted syncline, beyond which is the main line of the Berw fault at Ceint. The fossils of this tract, though scanty, indicate the D2 sub-zone. But none of the localities [Af. 3035–42, 3176–93] are near enough to the Millstone Grit to exclude the presence of the higher zones.

From the Cefni to Bodoryan

A few yards of the Pencraig sandstone, with no limestone below it, is seen in the railway cutting north-east of Lledwigan (Figure 302). *Lonsdaleia floriformis* (Flem.) is found at the kiln [Af. 3103] in beds rich in minute organisms, and crystalline kaoli-nite occurs there in soft white films. The outlier south of Glan-aber, Llangefni (Figure 297) is exposed in a little valley but for whose excavation its existence would never have been suspected. No sandstone is seen, and it evidently lies in a hollow of the Mona Complex, in the form, apparently, of crescent-shaped terraces of limestone on the sides of the ravine. *Lithostrotion junceum* (Flem.) [Af. 3104] has been obtained, and it is probable that the beds are equivalents of those which, to the east of the Llangefni fault, underlie the Pencraig sandstone. From Lledwigan lodge to Llanfawr the limestone strikes obliquely at the Mona Complex as well as at a sandstone which forms a local base, so that there must be a fault nearly parallel to the Llangefni road. In the lodge quarry is a cross fissure filled with dolomitic breccia, and thence to the church kaolinite is frequent both in veins along the joints and in round aggregates about a millimetre in diameter. The higher beds are cherty. In the quarry east of the cross-roads by the church were found [Af. 338] *Leperditia inflata* (McCoy) and *Phillipsia eichwaldi*? (Fisch. de Wald.) At the west end of the church was obtained a 'D2 or higher' fauna [Af. 3066–102]:

Campophyllum sp.

Dibunophyllum?

Lithostrotion junceum (Flem.)

Fenestella sp.

Cf. Martinia ovaliglabra Vaughan

Productus sp. [cf 'corrugates' group]

Productus sp. [cf. 'undatus' group]

Some of the corals form lenticular groups a yard or two in length at which the beds are greatly thickened.<ref>J. Sowerby described *Productus coincides* [*Daviesiella* of Waagen] in 1822, *Min. Conch.*, vol. iv., pl. cccxxix. The type-specimens figured were collected by Mr. Farey in the Wayboards between the Limestone, under the Coal, at Liangaveni in Anglesea'. Recent search by Prof. Garwood, by Mr. G. J. Williams. and the writer has failed to find any specimens of this fossil in the neighbourhood of Llangefni, though it is not uncommon in the Penmon area. Llangefni may have been given as the locality, rather loosely, and meant to include the Lligwy district. It would seem that 'wayboards' are the beds of shale between the limestones.</ref>

The Llanfawr sandstone, which is not well exposed, is quickly overlapped, for at Ffrwd-onen gap no such bed is to be seen. The dark limestones of D2 are there full of great coral aggregates with radial arrangement, which contain [Af. 3107–19]:

Lithostrotion irregulare (Phill.)

Lithostrotion junceum (Flem.)

Syringopora geniculata? *Phill.*

Productus sp.

At Bryn-y-gors there is the following succession:

	Feet
Tabular sponge-cherts (E10203) [SH 448 731] with thin limestone	10
Pebbly limestone	4
Ordinary pebbly sandstone	3
Thin black grit with black shale	—
Massive light organic limestone (E10202) [SH 448 731]	15

At the farm between this and Felin-bach on the east side of the lane, close to the marsh, the cherts are seen again. These beds may therefore be correlated with those of Red Wharf, and the upper limestones can hardly be lower than D3. At Bryn-y-gors, and at the base of the limestone close to the east branch of the Felin-bach dyke, at the forking of the lane, are the black sandstones ([E10202](#)) [SH 448 731] (see p. 601). That of Bryn-y-gors is rather coarse, and contains kaolinite: the other is fine, and full of darker spots, probably due to the adjacent dyke.

From Felin-bach to the Henblâs water the relations of the sandstones are perplexing. That of Felin-bach appears to be the Millstone Grit, in which case the cherts must be thinning, for there is but little room for them between it and a limestone close to the road which is rich [Af. 3120] in *Lithostrotion irregulare* (Phil.). In the bed of the Henblâs water pebbly rocks with a red matrix are seen for about 140 yards, and the colour of the soil shows that they extend some way to the north-east. Although they dip at very low angles, limestone is seen on their strike near Carrog and also close to the steep feature west-north-west of Felin-bach and at the Cromlech, and it is therefore inferred that they are overlapped in both directions, so they may really belong to the Old Red Series. Along the four miles from Llangristiolus to the railway the boundary feature is very steep, and at Henblâs Cromlech it is a bare and vertical crag some 50 feet in height. Yet knobs of schist rise in the low ground at its foot east of Henblâs and to the north-east of Fferam, and in the Henblâs water the base retreats 210 yards to the south-east. There is also an inlier of schist at Ty-calch, and as this contains a limestone care has had to be exercised in the discrimination of Carboniferous and Mona limestones. The feature crosses, the main line of railway close to the tunnel's mouth, and on the south side of the cutting the junction is exposed (Figure 298). The schists are decomposed, but there is no disturbance, and the feature cannot be a fault.

The limestones of Trefdraeth are rather pebbly. No sub-zonal fossils have been found, but the beds must be at the summit of the series. The last exposure, a clean crinoidal limestone with a few pebbles, is seen at a quarry 340 yards west-south-west of Ty-pigyn. It has yielded [Af. 3251–66, 3271]:

Athyrid?

Dielasma sp.

Productus aculeatus? (*Mart.*)

Straparollus sp.

According to the indications of the features, the limestone now rapidly narrows and dies out by overlap three quarters of a mile further on.

The Esgeifiog Strip

At the north-east end no good features mark the wedging out of the limestone between the faults, but a good many small exposures afford evidence for the lines, and for the synclinal fold with its outlier of pebbly sandstone. At Ceint thin-bedded limestones with much chert dip under what may be a strip of the same sandstone. Marked features now

bound the tract. About Nant it is obscure, but the ravine below Rhyd-yr-arian gives a nearly continuous section all the way across, and shows that it is here almost wholly chert, especially to the south-east of the road, where the rock is full of minute organisms that would repay investigation. Chert is seen in the lanes near the church; and there is a large old quarry below the road, in which dark cherty limestone passes rapidly up into chert (Figure 302). Finally, at Holland Arms, just before the stream passes under the railway, there is a good section showing the top of a cherty limestone overlain by 8 to 10 feet of chert with partings of cherty shale. The chert is light in tint, and banded, like that of Red Wharf. No good zonal fossils have been obtained in the strip.

The Straitside Area

(Figure 299)

The nature of the base at Plâs Llanfair is uncertain. In the mill stream above Pwll-fanogle the basement sandstone is practically horizontal. Unless, therefore, there be an east-and-west fault, it must be lapping on to an old slope of the Mona Complex, and the existing surface below the column, now bared of Carboniferous rocks, must really be that slope, not much modified. There is no feature that suggests a fault, whereas there are faint terrace-features that suggest escarpments. Dr. Strahan, who examined the ground with the writer, considered that the balance of evidence was in favour of supposing the base to be unfaulted (Figure 300).

The boundary from Aber Braint house to a point west of Druid Lodge is conjectural, and the sandstone might spread out as far as Llwyn-ogan. But at Llwyn-on the limestone strikes at the Mona Complex, and a hollow feature there points direct to Aber Braint garden, and beyond the railway to a long shallow boggy hollow, so that a fault is almost certain. Further to the south-west, the straightness of the boundary, and the position of the base at the Trefwri outlier (Figure 299) are clear evidence for faulting; and if the basal conglomerate be as thick as at Pwll-fanogle, the throw must be 300–400 feet.

The Shore Section

At Pwll-fanogle are sandstones and strong conglomerates with pebbles of quartzite and jasper nearly three inches in length. But much of the sandy zone is composed of the soft purplish marls, of which there seems to be more than one bed, obscured by slipping.

These marls are better seen on the opposite shore between the bridges, where they contain pisolitic grains of ironstone. This basal group must be some 300 feet thick. East of Druid Lodge a massive limestone forms an escarpment in the wooded cliff, and the sandy series terminates. Thence to Plâs Newydd fossils are scanty, but in the park, west of the Cromlechs, is a quarry in dark limestone which has yielded the D2 fauna [Af. 3374–91]:

Diphyphyllum lateseptatum McCoy

Zaphrentis enniskilleni? Edw. cf. Haime

Martinia ovalis Phill.

Productus cf. *concinnus* J. Sow.

Productus *latissimus* J. Sow.

Productus cf. *pugilis* Phill.

The high terrace at the house conceals the emergence of the Plâs Mona cross-fault, beyond which nodular limestones alternate with lighter ones as far as the dyke, where there is an unusually flaggy shale four feet thick, just below which *Diphyphyllum lateseptatum* McCoy [narrow form] has been found [Af. 3394–7].

Above this, dark limestones pass quickly up into great coral beds, where the higher fauna comes on. The succession is:

Dark nodular limestone (coral bed).

Variable sandstones and sandy limestones, with brachiopods

and large vertical crinoids.

Nodular shale with some thin dark limestones.

Calcareous brown sandstone and conglomerate.

Nodular limestone with 'sugar-plum' conglomerate.

Yellow marls, and fine black shale with fossils.

Carnedd Sandstone

Dark nodular limestone (coral bed).

The two coral beds have yielded [Af. 3398–416, 3422–4, 3459–90, 3505]:

Alveolites septosus (Flem.)

Cyathophyllum sp.

Diphyphyllum lateseptatum McCoy [narrow form]

Lithostrotion cf. affine (Flem.)

Lithostrotion irregulare (Phill.)

Lithostrotion junceum (Flem.)

Lithostrotion cf. portlocki (Bronn)

Lonsdaleia duplicata (Mart.)

Syringopora cf. geniculata Phill.

Syringopora reticulata Goldf.

Syringopora sp. [ramulose form]

Productus latissimus J. Sow.

Productus cf. pugilis Phill.

Productus sp. [apparently new and of '*hemisphaericus*' type]

A good spine of *Archaeocidaris* was also found in one of these beds. The Edwen oolite, which succeeds, is well seen in the large quarry. It is a massive clean rock, with a few pebbles, is of a delicate pink-purple tint, and almost wholly composed of oolitic grains, whose outer shells contain the colouring matter. The Edwen red sandstone consists of:

Fine calcareous red and yellowish sandstone, with thin seams of limestone.

Rippled fine sandstone, full bright red.

Thin 'sugar-plum' conglomerate.

Red sandstone.

The colour is capricious, wandering across the bedding, and. seems to reside in a muddy matrix, not in pellicles. Above these, at a cottage, are massive limestones rich in *Lonsdaleia duplicata* (Mart.) [Af. 3425–30], and then follow the Moel-y-don sandstones of the little promontory at the ferry, which are variable in colour, and contain some grey limestones. No higher beds are seen.

The Escarpment

At Plâs Mona Park this is suddenly shifted by the cross-fault, and the width of the district is increased, after which the boundary is a very straight but not steep escarpment, at whose foot sandstones are poorly exposed here and there. Opposite Trefwri (Figure 299) a small quarry close to the line has yielded this D2 fauna from pyritous thin limestone and shale [Af. 3432–49]: *Lithostrotion junceum* (Flem.), Orthotetid [brachial valve, apparently new], and *Productus latissimus* J. Sow.

Towards Tre-Anna the feature becomes more sinuous, but its nature is not clear.

The Crest-Ridge Escarpment (Figure 299) is very pronounced for about two miles through the Gwydryn district, and is actually a sharp cliff 20 to 40 feet high, composed of medium grey limestones, with a thin pebbly sandstone for some way at the base. The following fossils were obtained along the escarpment between Gwrach-ddu and Tan-pen-cefn [Af. 3296–3329]:

Lithostrotion junceum (Flem.)

Lithostrotion cf. portlocki (Bronn)

Lonsdaleia cf. duplicata (Mart.)

Syringopora geniculata? Phill.

Productus sp. ['giganteid' type]

At Maes-y-porth east quarry *S. geniculata?* Phill. [Af. 3330–3] is abundant in large lenticular masses with ogee-curved axes, and in the Rose and Thistle quarry large crinoids are abundant. The ridge dies down beyond Tan-pen-cefn.

The Dip-Slope

This comprises the rest of the interior. The rocks of Tan-twr and Bron Menai, slightly below the horizon of the crest-ridge, are partly a sandstone traceable for some distance (with contorted lines of cavities in the quarry north-east of Rhudd-gaer), partly a red sandy oolite with bands of pebbles, and rich in brachiopods [Af. 3334–62]:

Athyrid

Dielasma hastatum (J. de C. Sow.)

Productus cf. hemisphaericus J. Sow.

Productus productus? (Mart.)

Productus sp. [of '*giganteus*' group]

Productus sp. [of '*semireticulatus*' group]

Cf. Pugnax pleurodon (Phill.)

Rhynchonellid

Seminula ambigua (J. de C. Sow.)

Mourlonia?

Straparollus?

The Carnedd sandstone, sweeping up the slopes to pass beneath escarpments near the Park-end, may be carried on with confidence to the 12 feet of red sandstone that underlie the massive limestone of the Plâs-coch escarpment and pass on to Porthamel. The rock at the Camp somewhat resembles the Edwen oolite, but contains kaolinite. At the deep gap there is probably a small fault, for the sandstone does not reappear; and in the high hall garden, facing the gap, is a yellow platy limestone, underlying a crystalline one with corals. A low escarpment about an eighth of a mile north-east of Bryn-llwyd yielded [Af. 3287–9] *Cyathophyllum regium* Phill. and *Syringopora*. The singular pseud-oolite of Maes-hir-gad ([E10244](#)) [SH 490 666], see p. 606 is the principal rock of special interest in the dip-slope.

The Strait, south-west of Moel-y-don — Exposures are scanty, and the relations of the sandstones are obscure, but there is a good outlier of limestone on them at Trefarthen boathouse. Beyond the Red Measures, across the creek that runs in south of Rhudd-gaer, is a section in red calcareous kaolinite-sandstone, almost like a cornstone, with curious wandering, anastomosing, calcareous cores. On it rests an outlier of clean purple-pink limestone, in which are [Af. 3363–72]:

Lithostrotion junceum (Flem.)

Syringopora geniculata? Phill.

Bellerophon sp.

This, and Ynys Llwm are the two last exposures.

The Small Outliers

That of the ravine at Glan-aber, Llangefni, has been described. The rest are of sandstone. Those along the margin of the Straitside area (Figure 299), though of importance as proving the persistence of the sandy basement, and giving a measure of the boundary fault, are but poorly exposed.

Most important are those on the high ridge between Berw and Llangaffo, as they connect the Principal and Straitside areas, and afford a measure of the great Berw fault. All are composed of pebbly sandstone. That near Chwipin must have been cut through by the railway but is not now seen in the Llangaffo cutting. A blackish sandstone is seen about the house.

At Tai-rhos there is a pit in a field, between bosses of mica-schist. It may lie in an old hollow or be faulted in.

At Tai-hirion, conglomerate, seen at the barns, at about 90 feet above the marsh, appears to be *in situ*.

At Twr, the old tower stands upon a little eminence of pebbly sandstone. This is the highest, being at 190 feet above the sea, and its base at 165 feet.

The level of the Tai-hirion outlier points to the western of the faults that let in the Ordovician rocks being of Pre-Carboniferous, the eastern of Post-Carboniferous age. In any case, their net effect is to let down the Carboniferous base-plane some 75 feet. But it may be that the eastern fault is much greater, being partly neutralised by the western-one.

The Penmon area

The Escarpment

Careg-onen cliff ((Figure 194), (Plate 26). B) is composed of rather dark limestone with shale, and has yielded (Af. 2341–51):

Alveolites septosus (Flem.)

Syringopora sp.

Daviesiella llangollensis (Dav.)

? *Spiriferina octoplicata* (J. de C. Sow.)

Murchisonia kendalensis McCoy

Ten feet at the base are hidden by scree. The crag ends off at Careg-onen against a fault with a downthrow to the east of about 200 feet. On the dark beds rest light massive limestones [Af. 2352–8] and on these the tabular outlier of Bwrdd Arthur (Arthur's Table), 530 feet in height, composed of similar beds, which contain [Af. 2359–83]:

Alveolites septosus (Flem.)

Cyathophyllum murchisoni? (Edw. & Haime)

Dibunophyllum sp.

Lithostroton cf. *martini* Edw. & Haime

Athyris planosulcata (Phill.) [Davidson's interpretation]

Chonetes papilionacea?

Daviesiella sp.

Productus cf. *hemisphaericus* J. Sow.

and other D1 forms. If the top of the sub-zone (now removed by erosion) be immediately above, its thickness must be about 300 feet. The base-feature is well-marked at Bwreld Arthur, and as it is a little below the 400-foot contour where it is cut by the fault, and a little below the 200-foot contour at Careg-onen, the downthrow can be measured. But it dies out with astonishing rapidity, for there is no sign of it along the southern escarpments of the hill. Here there are but 100 feet of beds below the tabular outlier, so that overlap is quite as rapid as at Lligwy, and in a southerly direction. Three small faults shift the base between this and the Smithy, and in the lower beds *Daviesiella llangollensis* (Dav.) has been obtained in four places [Af. 244–6, 249, 2385–98, 2424–9]. On the pleasant furzy brows of the Marian-dyrys, in light limestones which must be nearly on the same horizon as those of Bwrdd Arthur, have been obtained [Af. 2401–23]:

Dibunophyllum sp.

Lithostroton *martini* Edw. & Haime

Athyris expansa (Phill.)

Athyris planosulcata (Phill.), var.

Chonetes cf. *hardrensis* (Phill.)

Chonetes papilionacea (Phill.)

Dielasma cf. *canaliferum* de Kon.

Productus cf. *hemisphaericus* J. Sow.

Productus cf. *ovalis* Phill.

with *Bellerophon* sp. and some gasteropods, still indicating D1. The base now sinks with the dip until at the Smithy it is at the 200-foot contour. Here emerge two faults, which on the coast appear to be large ones, but must either be neutralising each other or dying out, as very little effect is produced on the escarpment. True, it here turns southward, but so also do

the contours; and though the base gradually sinks till at Llangoed bridge it is below the 100-foot contour, the features are not those of a boundary fault. Near the escarpment 400 yards west of Tros-y-marian [Af. 243045], *Lithostrotion* cf. *martini* Edw. & Haime, and *Chonetes* cf. *hardrensis* (Phill.), and 660 yards south of Plâs-newydd, in grey limestones, the same with [Af. 2953–7] *Lonsdaleia floriformis*? (Elem.) and *Spirifer bisulcatus* J. de C. Sow., show that the D2 sub-zone is overlapping on to the base. The whole width of the tract is here occupied by that sub-zone, for a similar assemblage, with *Dibunophyllum* sp. [cf. ψ of Vaughan] occurs 550 yards north-north-west of Plâs-newydd. The base is obscure along this reach, but black thin beds appear to run on beneath the light massive grey beds of the higher ground.

After the great bend, a pronounced escarpment is again developed, and continues to the sea.- Its fossils indicate a rise in the horizon [Af. 2887–945]:

Cyathophyllum murchisoni? (Edw. & Haime)

Cyathophyllum regium (Phill.)

Dibunophyllum cf. *matlockense* Sibly

Lithostrotion junceum (Flem.)

Lithostrotion cf. *martini* Edw. & Haime

Chonetes papilionacea (Phill.)

Productus cf. *corrugatus* McCoy

Productus cf. *hemisphaericus* J. Sow.

Productus sp. ['giganteid' type]

As those from the lower old quarry south-west of Penmon Church are 'D2 or higher', the higher sub-zones have now reached the base. Higher still is the Pentir escarpment, with similar forms and [Af. 2965–73] *Diphyphyllum lateseptatum* McCoy. All these beds are light massive limestones, with a thin red shale in the upper old quarry. At the church, a fault with a moderate downthrow to the west comes through, so that it is likely that the beds in the large quarries on its east, now in active work, are equivalents of those in the old ones on its west. They contain [Af. 2845–86] a similar fauna, with *Dielasma gillingense*? Day., *Pustula* cf. *carringtoniana* (Day.), *Martinia ovalis*? (Phill.) and gasteropods. Prof. Garwood informs Dr. Ivor Thomas that he has collected *Nentatophyllum minus* McCoy and *Dariesiella llangollemis* (Day.) in the lower part of this quarry and is therefore inclined to suspect the existence of S. But the stratigraphy does not favour this. Now, whatever the exact horizon of these beds, they underlie the Parc sandstone. This is faulted on the east, and limestones that are brought up against it on a slight anticline strike to the northern coast and there (p. 657) contain a 'D2 or higher' fauna; so that the beds of the working quarry cannot be low in the series. To their east, on the coast, is the Penmon dolomite, which appears to represent them. It is a typical dolomite (see analysis), with druses of bitter-spar. Some parts are imperfectly dolomitised, and remains of fossils are perceptible, the alteration proceeding along vertical zones.

The sea-section from here to the Lighthouse is really an escarpment, modified by marine erosion. Its structure is given in (Figure 301). The fault that bounds the Parc sandstone (in which is kaolinite) will be found on an interesting crag at the bottom of the second 'I' of 'Well', going right through the crag instead of along a hollow in the usual way. Massive grey limestone is brought abruptly against a conglomerate with limestone pebbles. Beyond the next fault flaggy limestones overlie a sandstone (E6062) [SH 639 809] which may or may not be the Parc sandstone. These limestones contain at a point 50 to 75 yards south-west of the (now disused) Lifeboat Station [Af. 2769–86], along with the usual brachiopoda, *Daviesiella comoides* (J. Sow.), which, as will presently be seen, occurs at several places not far off, all in 'D2 or higher' beds. Its presence on this horizon is remarkable (see footnote, p. 645). In more normal limestones on the eastern side of the east point of Anglesey, 160 to 340 yards south of the Lighthouse, were obtained [Af. 2738–68].

Cyathophyllum murchisoni? (*Edw. & Haime*)

Dibunophyllum sp.

Lithostrotion junceum

Lithostrotion *cf.* martini (*Edw. & Haime*)

Lithostrotion portlocki (*Brown*)

Syringopora genieulata? *Phill.*

Productus *cf.* hemisphaericus *J. Sow.*

Pustula sp.

Straparollus planorbiformis? *de Kon.*

Discetoceras?

It therefore appears that all the beds along this coast are high in, some perhaps above, the D2 sub-zone, and this is borne out by the evidence along the northern coast.

The Northern Coast

This precipitous coast is an oblique dip-section. Traversing it eastwards from Careg-onen, the D1 sub-zone is found to disappear at a considerable fault north-north-east of Pen-maen; the first of five which, from their aspect on the cliff, might be expected to produce much more effect on the escarpment than they actually do, and on the coast itself their effect on the sub-zones is a little perplexing; This one, which has three feet of breccia and a curious cornice of stalagmite that beetles out six feet over the sea, runs through to the Smithy, and bounds the Dr sub-zone. On the coast it introduces the following series:

	Feet
Massive, light, Cyathaxonia limestone	50
Flaggy limestone	20
Massive grey limestone	15
Lithostrotion bed	{20
Shale	
Massive grey and light limestone	73
Red marl	10
Massive light limestone	20

which, gradually declining with the dip, forms a cliff some 200 feet in height as far as Fargen cove. Its lower beds have yielded the D2 assemblage [Af. 241, 2467–96]:

Cyathophyllum sp.

Dibunophyllum *cf.* matlockense *Sibly*

Lithostrotion junceum (*Flem.*)

Syringopora sp.

Chonetes sp. [*C. compressa* *Sibly*, *non* *Waag.*]

Productus *cf.* hemisphaeicus *J. Sow.*

Productus sp. ['giganteid' form]

and its higher beds contained the transition fauna, 'D2, possibly D3' [Af. 2497–531] *Alveolites septosua.*, (Flem.), a Clisiophyllid, and *Dibunophyllum matlockense?* Sibly, among other species. Upon these rest the Cyathaxonia beds of the Fargen Hill outlier, whose fauna has been given on page 611 [Af. 2532–56]. It is remarkable that the only spot where definitely D3 beds have yet been found is separated by no more than 84 yards from the D1 area.

The crest of the outlier is about 250 feet above the sea.

At Fargen cove are several faults, and a breccia 25 feet wide that is probably not due to faulting. The net effect is to bring on the massive limestones that run down to Seiriol, and have yielded the 'D2 or higher' fauna [Af. 2557–94]:

Aulophyllum sp. [new?]

Campophyllum sp.

Cyathophyllum murchisoni? (Edw. & Haime)

Dibunophyllum af. *muirheadi* Nich. & Thoms.

Lithostrotion affine? (Flem.)

Lithostrotion cf. *mccoyanum* Edw. & Haime

Syringopora reticulata? Goldf.

Chonetes papilionacea (Phil.)

Cf. *Reticularia lineata* (Mart.)

Rhipidomella michelini (L'Eveillé)

Here, however, they are overlain, not by Cyathaxonia limestones, but by the Fedw sandstone and conglomerate, some 60 feet in thickness, evidently a product of contemporaneous erosion. There is therefore good reason to suspect that the Cyathaxonia beds have been removed from this tract, and that they are represented locally by the Fedw sandstone. That sandstone passes under limestones that form an escarpment ranging from Seiriol towards Ty-newydd, and these must be the highest beds of the district. Unfortunately they have yielded no zonal forms. They are cut off by a fault that runs from Seiriol east cove to near the Smithy, meeting there the Pen-maen fault and enclosing the triangular tract of the higher sub-zones.

The Fedw sandstone forms the swelling moor, called the Fedw-fawr, but is best studied at the coves, where it seems to interdigitate with the limestone on the west. The sandstone ([E9920](#)) [SH 607 818] is white, fine, and thin-bedded, calcareous, pyritous and brown-crusts, and there is a little shale. It overlies a strong conglomerate with limestone lumps.

The little promontory between the coves is composed of a brown dolomite with iron-ores. like that of Penmon, but rather less magnesian ([E6061](#)) [SH 634 805], and analysis]; pebbly in parts, and capriciously dolomitized, the edges of the dolomitic portions being sometimes abrupt. It is bounded by a curved fault. On the little triangular headland beyond the Seiriol east fault the stripping of a calcite vein curiously simulates a cross-fault. The headland contains a rather ambiguous D2 fauna [Af. 2598–621].

A long section follows along the shallow bay that extends as far as the park wall that runs out to the cliff north-north-west of Pentir, grey limestones passing under dark limestone and shale, one shale thickening locally to 15 feet. Some nodular beds with a red sandy matrix are not unlike a cornstone. Towards the east end the rocks roll gently over several times and then rise at 15° against a fault. All are ordinary D2 beds [Af. 239–40, 2622–70, 3732], with:

Alveolites septosus (Flem.)

Campophyllum sp.

Cyathophyllum regium (Phill.)

Dibunophyllum sp.

Lithostrotion irregulare (Phill.)

Lithostrotion junceum (Flem.)

Lithostrotion portlocki (Bronn)

Lonsdaleia floriformis (Flem.)

Athyris sp. [lamellose ornamentation, but without fold and sinus]

Chonetes hardrensis (Phill.)

Martinia sp. [resembles *Reticularia lineata*, but 'dental' plates apparently absent]

Productus latissimus J. Sow.

Productus pugilis? Phill.

Productus sp. of '*longispinus*' group]

Productus sp. [of *semireticulatus* ' group]

Productus sp. [of '*giganteus*'group]

Rhipidomella michelini (L'Eveillé)

Cf. Syringothyris laminosa (McCoy)

Leperditia acuta (McCoy)

Megalichthys sp. [scale]

At the end of the low-tide beach there is a cave, in which is a fault with a downthrow to the north, cut by a much larger one with a downthrow to the east. These usher in the tract of higher beds that, broken by many faults, extends to the east point. Trwyn Dinmor is composed of two massive beds with flaggy ones between, which are cut off by the fault that comes from Penmon Church. The fossils of this block (with a few from the escarpment at the rifle range) are [Af. 2671–2718, 2958–64]:

Alveolites septosus (Flem.)

Cyathophyllum regium Phill.

Dibunophyllum sp.

Lithostrotion irregulare (Phill.)

Lithostrotion mccoynum Edw. & Haime

Lonsdaleia cf. floriformis (Flem.)

Syringopora cf. geniculata *Phill.*

Syringopora ramulosa *Goldf.*

Daviesiella comoides (*J. Sow.*)

Productus latissimus *J. Sow.*

Productus sp. 'semireticulate' form]

Productus sp. ['giganteid' form]

Rhipidomella michelini (*L'Eveillé*)

a D2 or higher' assemblage, thus according with those of the other coast. The seaward-dipping limestones of Trwyn Dinmor give rise to grand overhanging cliffs like those of Caithness (Plate 41).

In the fault-riddled stretch between this and the Lighthouse detailed correlation of the beds is not easy, but fossils obtained from three places [A f. 2719–37] are of the higher D2 sub-zones. *Daviesiella comoides* (*J. Sow.*) was found 520 yards before reaching the Lighthouse. From these and the fossils of the south side (pp. 653–4) it is evident that the promontory of Penmon old park, extending about a mile from the East Point, is composed of the upper parts of the D2 sub-zone. The *Cyathaxonia* beds have not been found in it, the Parc sandstone (with the beds just east of Trwyn Dinmor) being the highest horizon present. Can it be that here, as at the Fedw-fawr, the *Cyathaxonia* beds have been removed by contemporaneous erosion and are really represented by that sandstone?

Puffin Island

Is composed of massive grey limestones, with some of the dark flaggy type at the north-east end, and at the south-west end a red rubbly bed with a pyritous shale, dolomite appearing here and there. The persistent, easterly dip of the mainland is replaced here by a northerly dip of 10°, but at the north-east end there is a little broken undulation. The island presents a bold escarpment to the south-east, 150 feet in height, and the cliffs on the other side are cut by the sea from out the back of the dip-slope. The most interesting phenomenon is the local unconformity between two limestones described on p. 614, which is very clearly exposed at a nook in the cliff north-west of the Old Telegraph Station. The, lowest horizon from which fossils have been collected is on the cliff due east of the Old Telegraph, where *Lithostrotion junceum* (*Flem.*) and *L. cf. portlocki* (*Bronn*) were obtained [Af. 2843–4]. The rest were from the north cliff, both indicating D2 or higher', though the points appear to be separated by the local unconformity. They are, from 80 yards north of the Old Telegraph Station [Af. 2787–828]:

Aulophyllum sp.

Dibunophyllum sp. [new?]

Lophophyllum sp.

Zaphrentis cf. enniskilleni *Edw. d Haime*

Fistulipora?

Athyris roissyi? (*L'Eveillé*)

Cf. Daviesiella comoides (*J. Sow.*)

Productus latissimus *J. Sow.*

Productus pugilis?

Productus sp. ['giganteid ' type]

Pustula punctata (Mart.)

Rhipidomella michelini (L'Eveill )

and from 100 yards west of the Old Telegraph Station [M. 2829–42]:

Alveolites septosus (Flem.)

Campophyllum sp. nov.

Cyathophyllum regium Phil.

Diphyphyllum sp.

Lithostrotion junceum (Flem.)

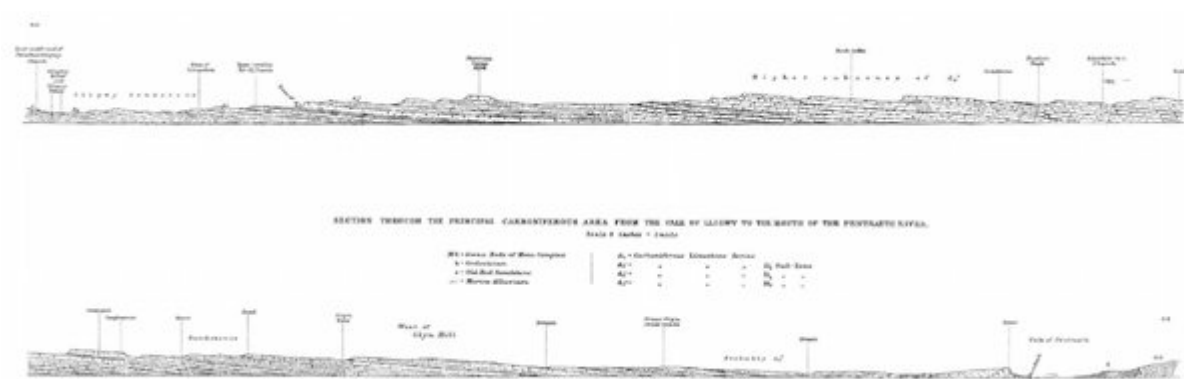
Productus cf. longispinus J. Sow.

Productus sp. ['giganteid' type]

In view of the fact that beds of this horizon lie at the base near Penmon Church, it is unlikely that any lower portion of the D2 sub-zone exists on Puffin.

Doubtless the Lighthouse channel is determined by another cross-fault, but the change of dip shows that it must be merely an incident in a general bend of the strike. The whole Penmon area, therefore, is the southern half of a synclinal basin, whose faults are accommodations to the northward subsidence. But owing to the overlap, the beds that emerge at the base are low in the D sub-zone on the west, high in the D2 sub-zone on the east.

Note to pp. 648–9. A boring has lately been made through the Fanogle Sandstone in Pl s Newydd Park, at a point 800 yards south of Llanfair Station. The Carboniferous base was reached at 133 feet, thus confirming the estimates of thickness (pp. 621–2) It further indicates that the western boundary must be faulted, and that the old slopes (p. 648) about Pl s Llanfair must be considerable.



(Folding-Plate 12) Section through the Principal Carboniferous area from the Vale of Lligwy to the mouth of the Pentraeth River. Scale 8 inches = 1 mile.



(Figure 291) Section through the contemporaneous disturbance and the Lligwy Bay conglomerate, Careg-ddafad. Scale: one inch = 75 feet.



(Plate 35) The-Lligwy Bay Conglomerate. Careg-ddafad.

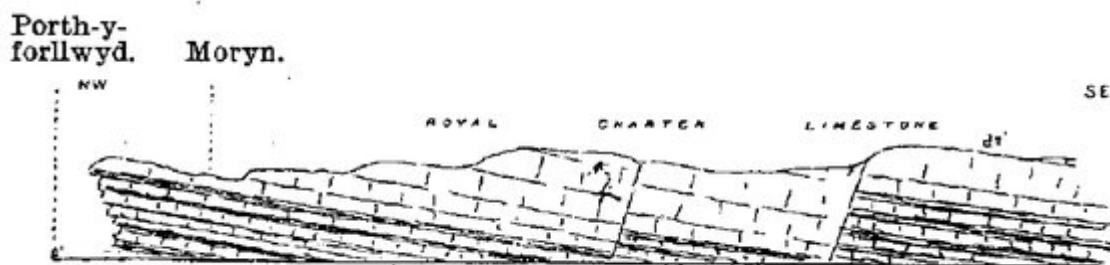


FIG. 292.—SECTION AT PORTH-Y-FORLLWYD.

(Figure 292) Section at Porth-y-forllwyd. Scale One inch = 75 feet.

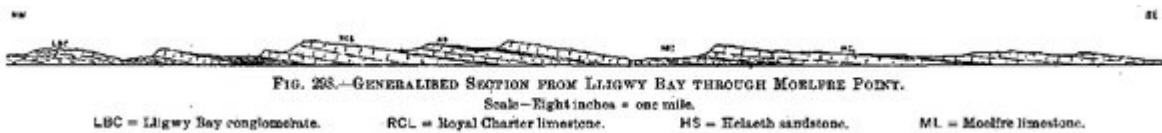


FIG. 293.—GENERALISED SECTION FROM LLIGWY BAY THROUGH MORFRE POINT.

Scale—Eight inches = one mile.

LBC = Lligwy Bay conglomerate.

RCL = Royal Charter limestone.

HS = Helaeth sandstone.

ML = Moelfre limestone.

(Figure 293) Generalised section from Lligwy Bay through Morfre Point. Scale eight inches = one mile. LBC = Lligwy Bay conglomerate. RCL = Royal Charter limestone. HS = Helaeth sandstone. ML = Moelfre limestone.



FIG. 290.

**FLOOR OF
SANDSTONE PIPE
AT
PORTH-YR-ABER.**

(Figure 290) Floor of sandstone pipe at Porth-yr-aber.

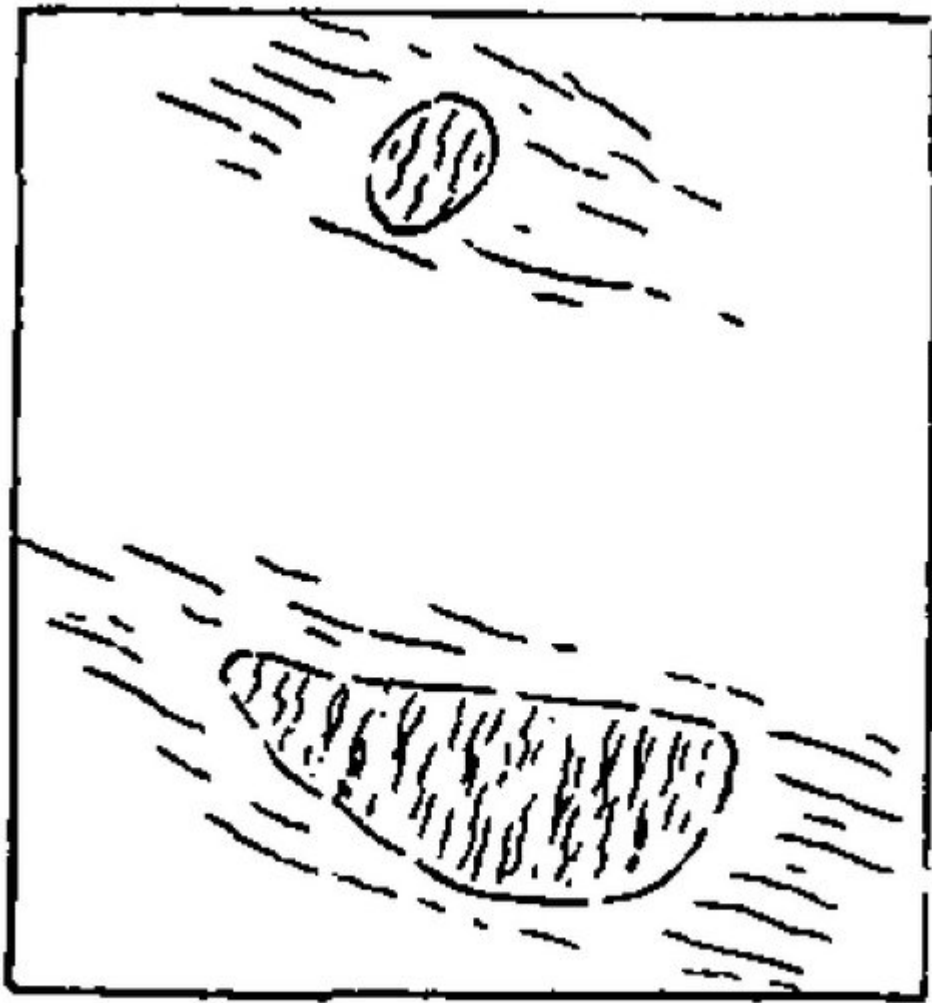


FIG. 2.

(Figure 2) Pebbles of old schist in Skerries Grits, Bwlch. Natural size



(Plate 37) Coral-beds: *Lithostrotia*, with *Dibunophyllum*. Penrhyn Cliff, Traeth-bychan.

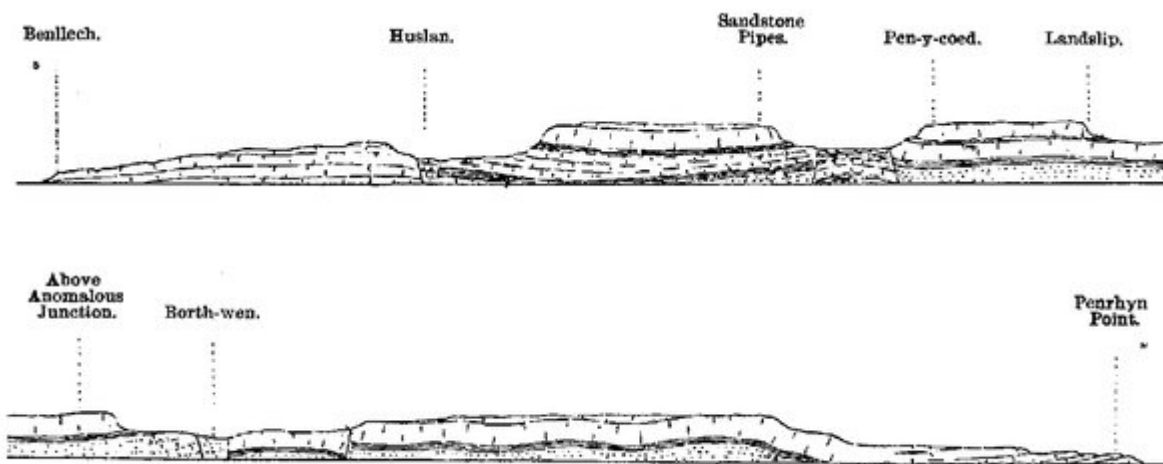


FIG. 294.—SECTION ALONG THE COAST FROM PENRHYN TO BENLLECH.

(Figure 294) Section along the coast from Penrhyn to Benllech. Scale nine inches = one mile.

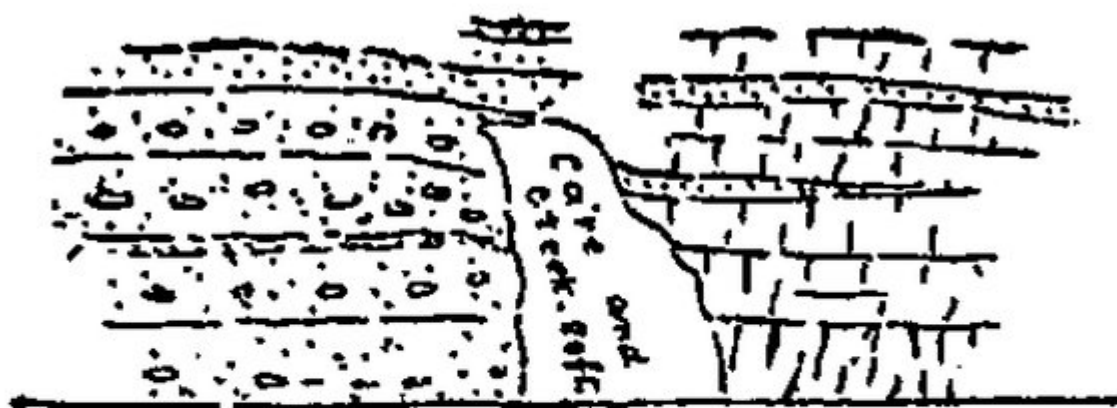
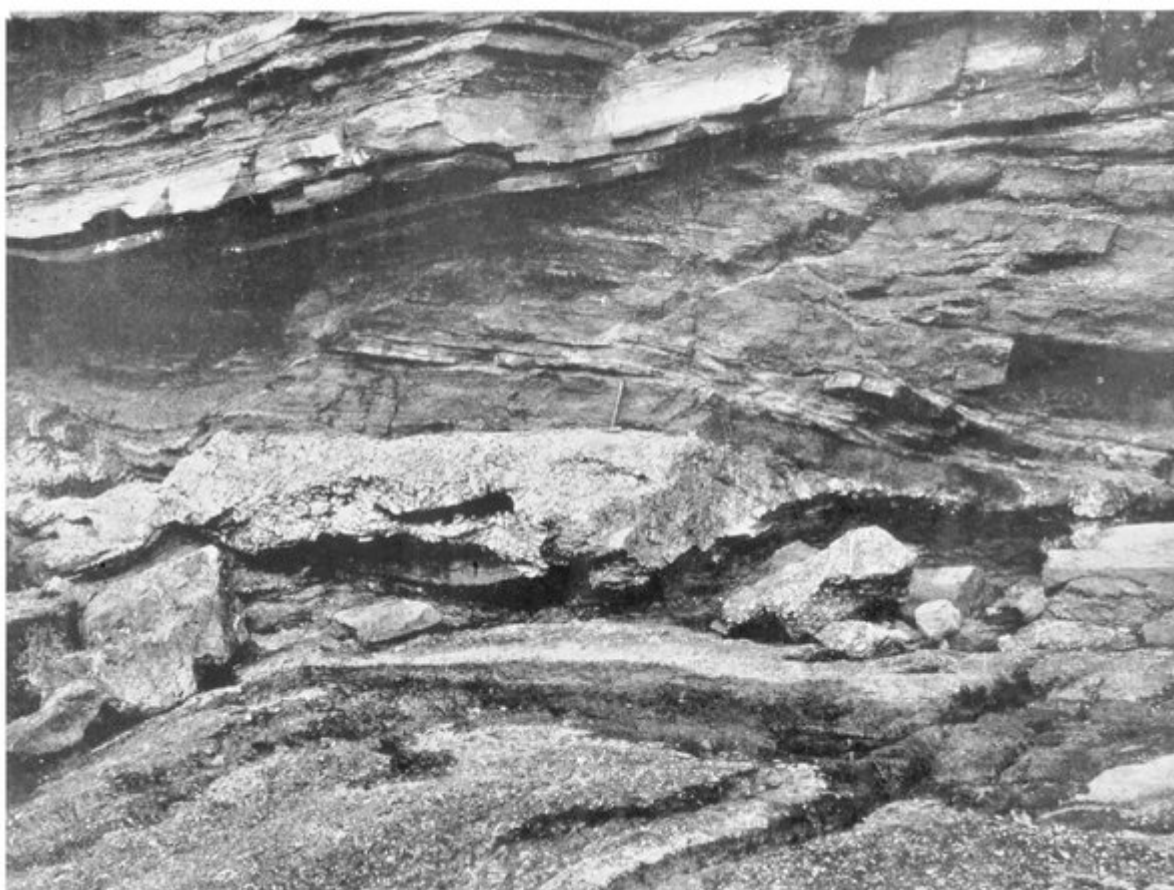


FIG. 288.

ANOMALOUS JUNCTION AT BORTH-WEN, BENLLECH.

(Figure 288) Anomalous junction at Borth-wen, Benllech.



(Plate 36) Limestone conglomerate between false-bedded Sandstones. Borth-wen, Benllech.



FIG. 295.
CASTELL-MAWR, RED WHARF BAY.

(Figure 295) Castell-mawr, Red Wharf Bay. Scale nine inches = one mile.

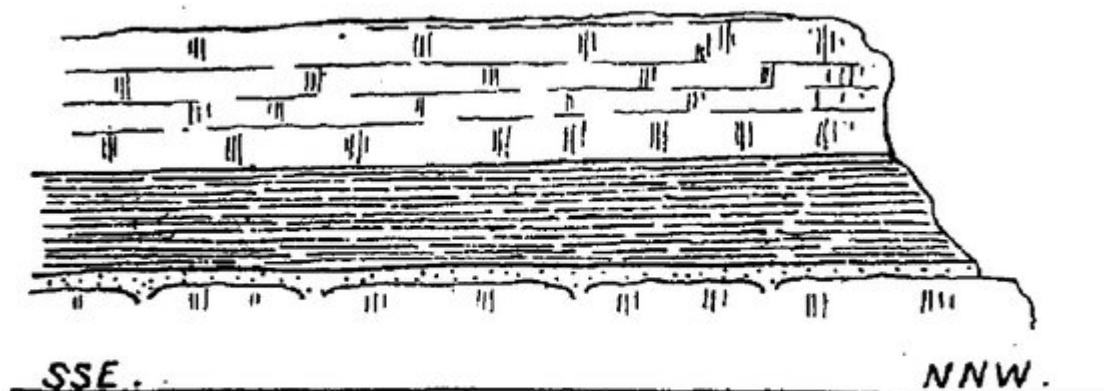


FIG. 289.—THE SUCCESSION AT TRWYN-DWLBAN.

(Figure 289) The succession at Trwyn-dwlban. (piped limestone, pipe-sandstone, shale, upper limestone.)



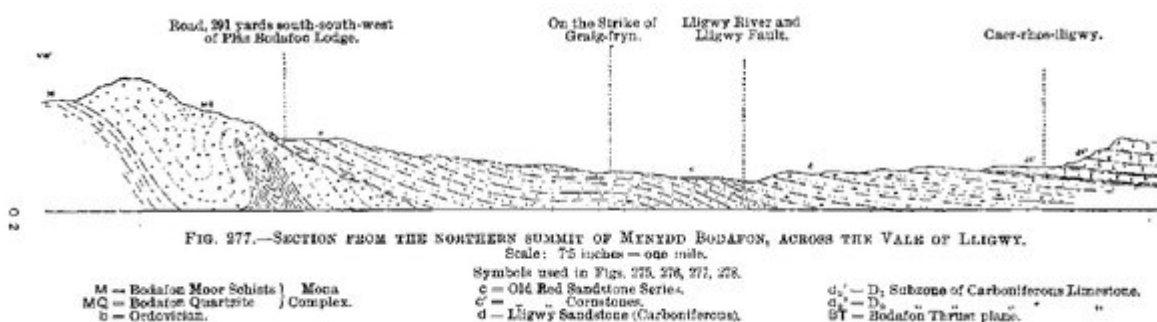
(Plate 38) Sandstone-pipe in Carboniferous Limestone. Foreshore, Trwyn-dwlban.



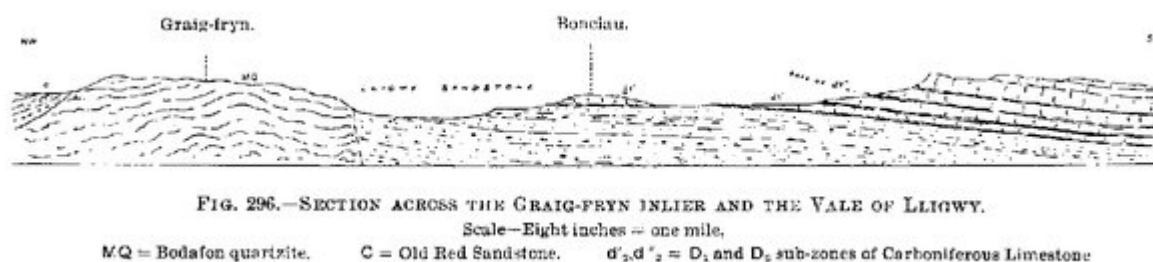
(Plate 39) Large sandstone pipe. Cliff between Castell-mawr and Trwyn-dwlban.



(Plate 40) Outlier of bedded cherts resting upon Carboniferous Limestone. Castell-mawr, Red Wharf Bay.



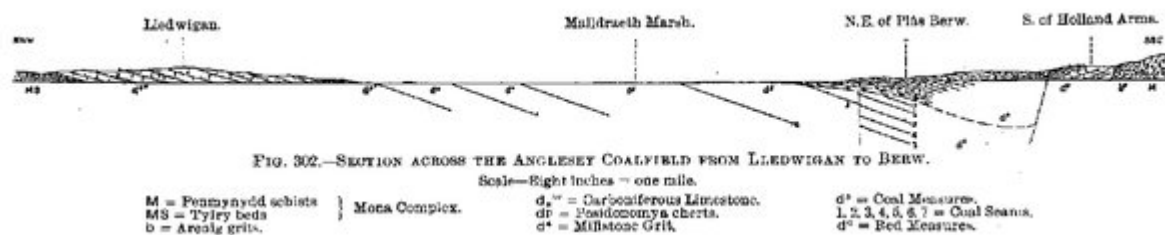
(Figure 277) Section from the northern summit of Mynydd Bodafon, across the Vale of Lligwy. Scale: 7.5 inches = one mile. Symbols used M = Bodafon Moor Schists, Mona Complex, MQ = Bodafon Quartzite, Mona Complex. b = Ordovician. c = Old Red Sandstone Series. c' = cornstones d = Lligwy Sandstone d₁ = D₁ Subzone of Carboniferous Limestone. d₂ = D₂ Subzone of Carboniferous Limestone. BT = Bodafon Thrust-plane.



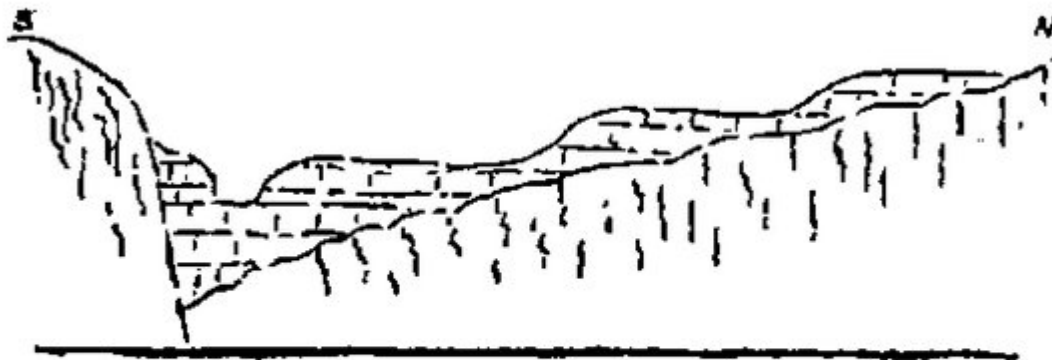
(Figure 296) Section across the Graig-fryn inlier and the vale of Lligwy. Scale eight inches = one mile. MQ = Bodafon Quartzite. C = Old Red Sandstone. d₁, d₂ = D₁ and D₂ sub-zones of Carboniferous Limestone



(Plate 58) The same. [Llangwyfan Church Islet at half-tide] From the headland.



(Figure 302) section across the Anglesey coalfield from Lledwigan to Berw. Scale eight inches = one mile. M = Penmynydd Schists, Mona Complex MS = Tyfry Beds Mona Complex d₁^{ms} = Carboniferous Limestone. dp = Posidonomya Cherts. d₄ = Millstone Grit d₅ = Coal Measures. 1, 2, 3, 4, 5, 6, 7 = Coal Seams. d₆ = Red Measures.



**FIG. 297.—CARBONIFEROUS OUTLIER
AT GLAN-ABER, LLANGEFNI.**

(Figure 297) Carboniferous outlier at Glan-aber, Llangefni.



FIG. 298.—THE CARBONIFEROUS LIMESTONE RESTING ON THE MONA COMPLEX.

(Figure 298) The Carboniferous Limestone resting on the Mona Complex. Railway cutting, Bodorgan.

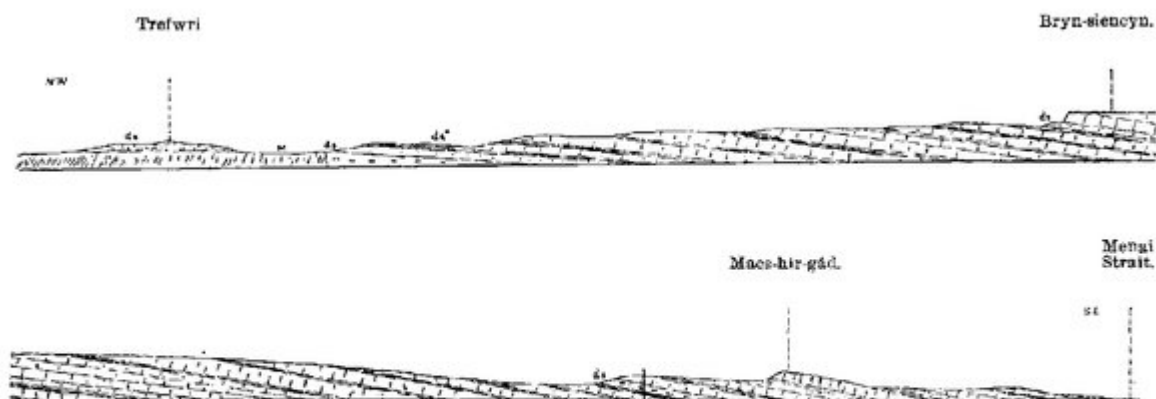


FIG. 299.—SECTION THROUGH THE STRAIT-SIDE CARBONIFEROUS AREA, FROM THE TREFWRI OUTLIER TO THE MENAI STRAIT.

Scale—Eight inches = one mile.

M = Mona Complex.

ds = Carboniferous Sandstone.

d₂ = Carboniferous Limestone.

(Figure 299) Section through the Strait-side Carboniferous area, from the Trefwri outlier to the Menai Strait. Scale eight inches = one mile. M = Mona Complex. ds = Carboniferous Sandstone. d₂ = Carboniferous Limestone.

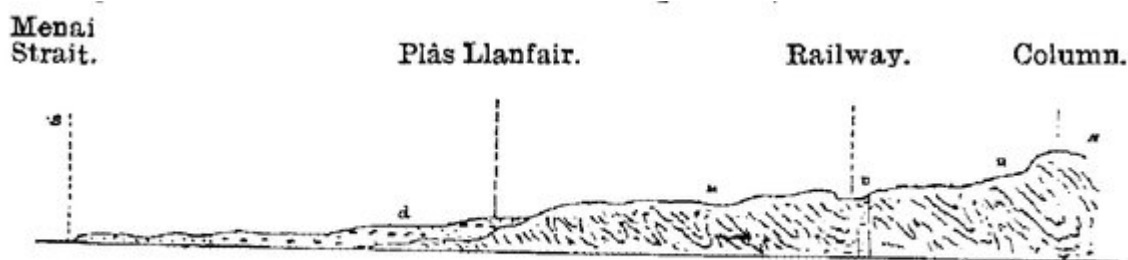


FIG. 300.—CARBONIFEROUS BASE AT PLAS LLANFAIR.

(Figure 300) Carboniferous base at Plas Llanfair. Scale eight inches = one mile.

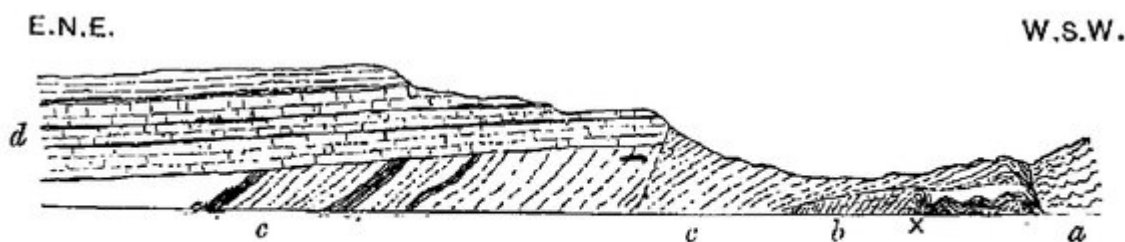


FIG. 194.—SECTION ALONG THE CLIFFS AT CAREG-ONEN.

Scale: One inch = 440 feet.

(Figure 194) Section along the cliffs at Careg-onen. Scale: one inch = 440 feet. Gwna Green-schist (a); Careg-onen Beds (b); Ordovician Shales (c); Carboniferous Limestone (d).



The Skerries. From near Carmel Head.

[Face page 265.



[Face page 265.

Careg-onen Cliffs.
Mona Complex, Careg-onen Beds, Ordovician Shales, and Carboniferous Limestone.
Height seen = about 330 feet.

(Plate 26) The Skerries. From near Carmel Head. 26a Careg-onen Cliffs. Mona Complex, Careg-onen Beds, Ordovician Shales, and Carboniferous Limestone [Note.—The crags in the foreground are composed of the Careg-onen Beds, ex where to $1\frac{1}{4}$ to 2 and one eighth inches from right hand edge of view) the sharp anticline of G Green-schist (Figure 194), (Figure 195) rises from under them.].



FIG. 301.—SECTION ALONG THE COAST FROM THE PENMON QUARRIES TO THE EAST POINT OF ANGLESEY.
Scale—16 inches = one mile.
 d_1, d_2, d_3 = D_1, D_2, D_3 sub-zones of Carboniferous Limestone.

(Figure 301) Section along the coast from the Penmon Quarries to the east point of Anglesey. Scale-16 inches = one mile. d_2, d_3 = D_2, D_3 , sub-zones of Carboniferous Limestone.



(Plate 41) Undercut cliff of Carboniferous Limestone. Trwyn-dinmor, Penmon.