5 Bryn-llin-fawr

The Cwmhesgen Formation is richer in fossils than any of the other Cambrian formations and the main purpose of this excursion is to examine some good fossil localities within it. The route (Figure 19) traverses a section through the formation from the top of the Ffestiniog Flags Formation to the base of the Aran Volcanic Group. The return trip is a little over 8 km of easy walking, mostly along forest roads. The main part of the trail is protected by mature pines, and it may be enjoyed even in the rain. Half a day can easily be spent on it. Some parking space is available near Pont Aber-Geirw on the Afon Mawddach [SH 768 291], which is approached by single-track roads either from Ganllwyd or Bronaber. From the bridge walk uphill to the north and turn right through the gate on the first bend on to a metalled track that leads towards Bryn-llin-fawr farm.

Looking south from the track the valley is floored by boulder clay locally moulded into drumlins, as at Bryn Geirw. Beyond there, leading to the farm, the volcanic rocks of Rhobell Fawr can be seen. Looking eastwards, along the Mawddach valley, the Ordovician Aran Volcanic Group caps the steep scarp of Allt L■yd. The track cuts along the base of the scree and several exposures of the Ffestiniog Flags Formation can be seen. About 200 m before the farm, the track leads down to a ford. A section in the boulder clay can be seen adjacent to the ford [SH 7729 2974]. This contains blocks, mainly of shale, and is dark bluish grey, typical of the till derived from the Dolgellau Member. Cross the river and make for the gate [SH 7734 2959] into the forest.

Localities 1 to 4 These localities are in the Ffestiniog Flags Formation and can be located most easily by reference to the fire breaks, shown in (Figure 19). At Locality 1 [SH 77314 29569], close to the gate, the sedimentary structures typical of the formation are well displayed. The dip is to the east and the lowest beds are fairly uniform grey siltstone which split easily along the bedding planes. These pass up into more thickly bedded units, up to about 15 cm, and locally lenses of pale grey quartzose siltstone, with thin beds and laminae of dark siltstone. Cross-stratification is common in the quartzose siltstone; some units show truncated tops, others have well developed ripple marks. Relatively large scale cross-stratification, though difficult to determine in restricted exposures, seems to be present in the eastern part of this cutting. Whole and fragmented specimens of the brachipod *Lingulella davisii* can be found at this exposure. The fossil bands represent accumulations of shells washed and broken by currents.

Similar lithologies occur in a small exposure at Locality 2 [SH 77465 29770], but, higher in the succession, at Locality 3 [SH 77656 30102], thin beds of dark grey siltstone appear. In the nearly vertical beds at Locality4 [SH 77749 30199] some bedding planes are covered in micro-ripples. Black *Lingulella* shells are abundant.

Locality 5 [SH 77848 30195] A fault, not exposed, crosses the track between Localities 4 and 5. The quarry at Locality 5 is cut into the Dolgellau Member of the Cwmhesgen Formation. The beds are very dark grey to black silty mudstone and have yielded a few specimens of the trilobite *Parabolina spinulosa* (Figure 20).

A small fault, with a breccia zone 7 to 8 cm thick, occurs about 6 m from the east end of the quarry. The fault trends at 161° and hades to the west.

Locality 6 [SH 77957 30162] and [SH 78071 30145] The drain by the side of the forestry track is floored by dark grey mudstone of the Dolgellau Member, which contains an abundance of the small brachipod *Orusia lenticularis* (Figure 20). Unless the drain has recently been cleared the exposure is likely to be covered by fallen debris. *Orusia lenticularis* is generally less than 5 mm across, but it occurs in such numbers here as to cover successive bedding planes through a small thickness of strata.

Locality 7 [SH 78613 30333] From the previous locality the track crosses the axis of a shallow anticline. In the quarry *at Locality* 7 the uppermost part of the Ffestiniog Flags Formation is exposed on the eastern limb of this anticline. The siltstone is much darker than at *Locality 1* although the same bedding characteristics persist. Exceptionally, for this formation, a single thick bed of silty sandstone shows graded bedding. The beds again yield *Lingulella davisii* and rare examples of the trilobite *Parabolinoides bucephalus* which characterises the top Ffestiniog and basal Dolgellau beds. Some of the bedding surfaces show slickensides produced by flexural slip of adjacent beds during folding.

Locality 8 [SH 78874 30505] A quarry near the boundary of mature and younger trees exposes a fresh section of the Dolgellau Member. The beds consist of very dark silty mudstone showing grey colour banding, and include scattered phosphatic nodules. The pyritous laminae typical of this member are also present.

Locality 9 [SH 79115 30786] The section along the track has been cleared by the Nature Conservancy Council, with the permission of the Forestry Commission, as a Site of Special Scientific Interest. The section is cut in the Cwmhesgen Formation through the top of the Dolgellau Member into the lower part of the Dol-cyn-afon Member which, in this area, marks the chronostratigraphical boundary between the Merioneth Series and the Tremadoc Series. A full account of this section is given by Rushton (1982).

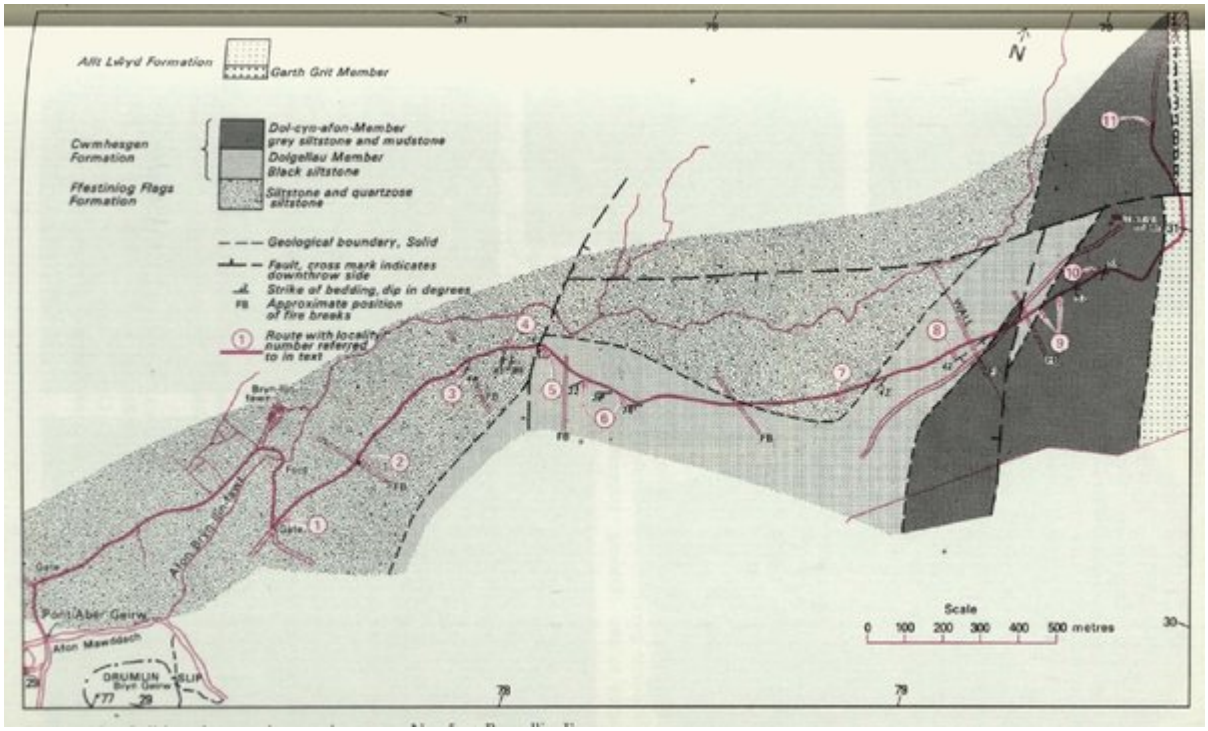
Moving up the sequence, from south-west to north-east, there is a gradual change in colour from the very dark grey beds of the Dolgellau Member to the rather pale grey siltstone and mudstone of the Dol-cyn-afon Member. This section is not particularly fossiliferous but, with patience and care, it is possible to find fossils of the top biozone of the Merioneth Series, namely the *Acerocare* Zone, and the basal zone of the overlying Tremadoc Series, that of *Dictyonema flabelliforrne.* The *Acerocare* Zone yields several trilobites, most commonly *Niobella homfrayi, Parabolina hexes* and a *Shumardia,* together with hyolithid molluscs and the brachiopod *Broeggeria* (Figure 20). The Tremadoc yields small varieties of *Dictyonema flabelliforme,* the brachiopod *Eurytreta sabrinae* and a few trilobites. The zones are separated by about a metre of grey mudstone, apparently without fossils. Two 10 cm-thick tuffite beds separated by about 30 cm of grey mudstone occur just below the unfossiliferous beds and serve, in this section, as a lithological marker for the base of the Dol-cynafon Member. They contain crystals, mainly feldspar with some bipyramidal quartz, and indicate contemporaneous volcanic activity in the area. The lower bed is cross-stratified, indicating that the volcanic material, which probably settled from an ash cloud, was reworked by currents. Abundant pyrite is concentrated in thin 'veins' at right angles' to the bedding, suggesting that the veins mark dewatering channels in the sediment.

Locality 10 [SH 79206 30873] The beds are typical of the Dol-cynafon Member. They are paler grey than the Dolgellau Member with some dark grey bands. Scattered black phosphatic nodules, up to about 1 cm long, and interbedded sandy bands and laminae occur in places. These sandy bands are characteristic of the Dol-cyn-afon Member in this area and consist of pellets of recrystallised chlorite. The beds yield *Dictyonerna flabelliforme* in slightly more abundance and in a better state of preservation than the previous locality.

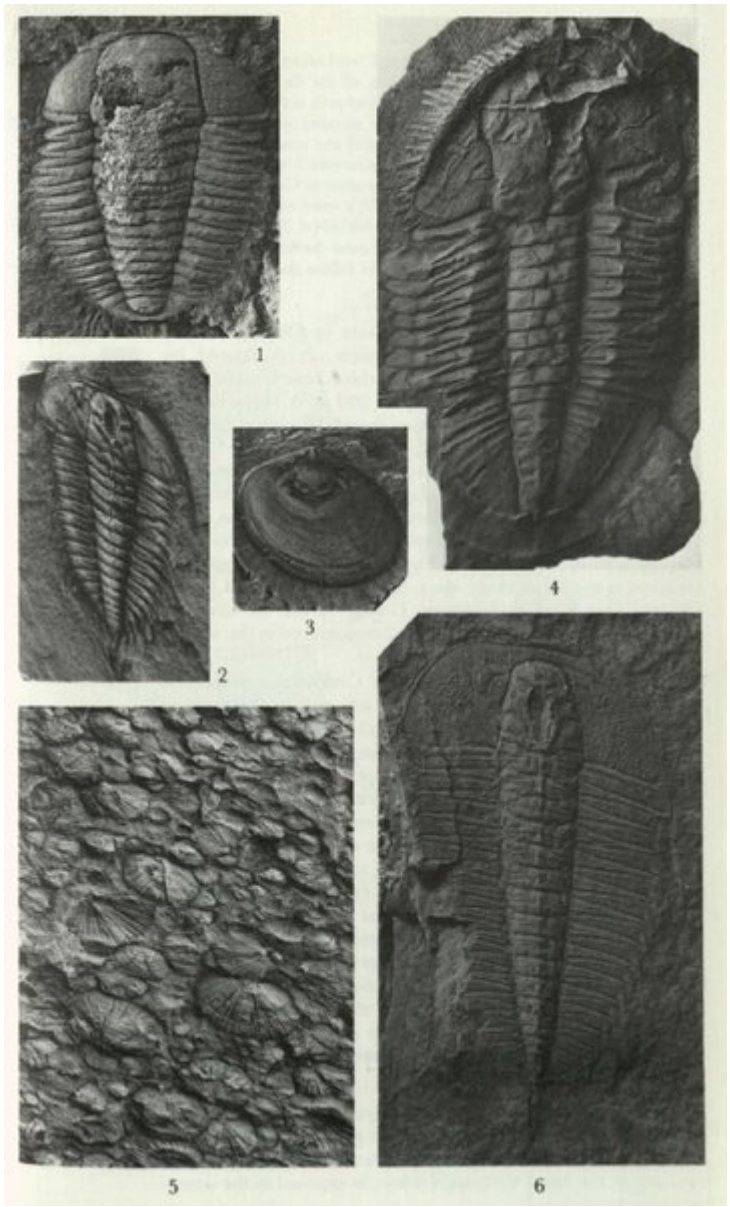
Locality 11 [SH 79189 31274] The large quarry is excavated in the Dol-cyn-afon Member in a lithology similar to that seen at the previous locality. A careful search, particularly among the weathered slabs may yield some trilobites: several varieties have been found and *Niobella homfrayi smithi, Micragnostus* cf. *bavaricus* and *Proteuloma* cf. *geinitzi are the* commonest, together with large hyolithids; they represent a low Tremadoc horizon.

Exposure continues along the track and, near where a small stream crosses it, [SH 7917 3048] the coarse-grained quartzose sandstone of the Garth Grit Member, which marks the base of the Ordovician Aran Volcanic Group, is exposed on the east side of the track.

References



(Figure 19) Solid geology and excursion route No. 5 at Bryn-llin-Fawr.



(Figure 20) Fossils from the Dolgellau Member 1. Peltura scaraboides (Wahlenberg), x3, from the P. scarabaeoides Zone. 2. Parabolina spinulosa, (Wahlenberg), x3 from the P. spinulosa, Zone. 3. Broeggeria salteri (Hull), ventral valve, x3, from the Acerocare Zone. 4 Niobella homfrayi (Salter), x2, from the Acerocare Zone. 5 Orusia lenticularis (Wahlenberg), x3, from the P. spinulosa Zone. 6 Parabolina heres Brögger, x3, from the Acerocare Zone.