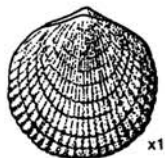


BRACHIOPODS



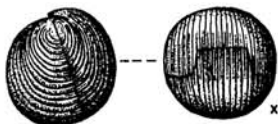
Atrypa reticularis



Daya navicula
(natural mould of inside of shell)



Isorthis orbicularis
(natural mould of inside of shell)

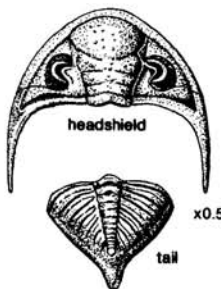


Sphaerirhynchia wilsoni
(side and end views)



Microsphaeriodorhynchus nucula

TRILOBITE



Dalmanites myops

CEPHALOPOD



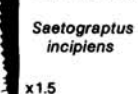
Orthoconic nautilus shell

BIVALVE



Pterinea tenuistriata

GRAPTOLITE



Saetograptus incipiens

PLANTS



Cooksonia (left)
Hostinella (right)

(s = spore bearing capsules)

OSTRACODE



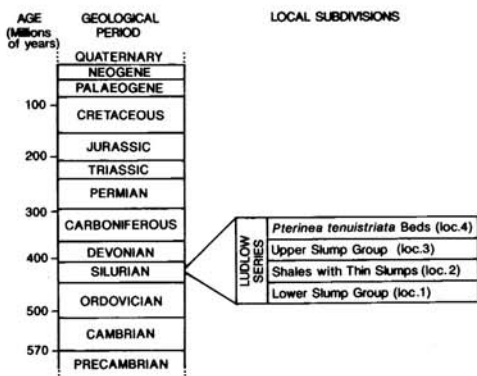
Hemiella 'maccoyana'

OUTLINE OF THE GEOLOGY

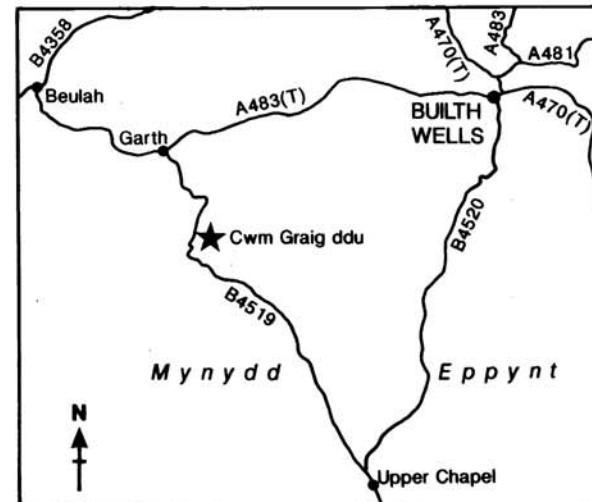
Cwm Graig Ddu is a prominent, deep valley that cuts the escarpment of Mynydd Eppynt. With its steep, rocky sides, prominent at the southern end – it is a typical glaciated valley. The small stream (Nant y Cwm) that runs along it is far too small alone to have created such a large valley, and it is a combination of the erosive action of ice during the last Ice Age and of the stream that has generated it. There are good views of the valley from many points along the section described below, and also from the road to the south of it.

There is a more-or-less continuous roadside exposure of rocks on the west side of the road, running uphill for 500m south from the cattle grid. The rocks were deposited during the latter part of the SILURIAN Period, approximately 415 million years ago, and belong to a division of rocks of that age called the Ludlow Series. They were deposited as sediments in a sea whose shoreline lay many miles to the south and east. Originally soft muds and silts, these sediments have been compacted into shales and siltstones, which can be seen to be layered, forming individual beds. The beds originally were deposited horizontally on the sea floor, but movements in the Earth's crust (that created the present Welsh mountains, between about 405 and 390 million years ago) have tilted them, so that they are now all inclined (dip) at about 45° in a southerly direction. Thus, walking southwards, successively younger beds are encountered. The marine nature of the rocks here is demonstrated by the presence in them of fossils of sea creatures (e.g. bivalves, cephalopods and brachiopods). They occur commonly at several points along the section.

Four subdivisions are recognised in this section, distinguished by the kinds of sediments present, and how they are bedded. All contain regularly laminated shales and siltstones interbedded with layers that are enrolled and contorted. The latter are slumps, produced when semi-consolidated sheets of mud and silt slid down a gentle submarine slope. The sliding was probably triggered by earthquakes along the Church Stretton Lineament, an old fault zone that passes some 20km to the southeast, and which was active during the Silurian Period. The subdivisions are discriminated by the thickness and amount of slumped layers present. Thus the 'Main Slump Group' and 'Upper Slump Group' include thick slumps, whilst they are markedly thinner in the intervening 'Shales with Thin Slumps'. The 'Pterinea tenuistriata Beds' contain few, rather thin slumps.



GEOLOGICAL WALKS IN WALES
CWM GRAIG DDU ROAD SECTION, GARTH, POWYS



LOCATION Alongside B4519, 1.5km to 3km south of Garth, Powys.

MAPS O.S. 1:50,000 Landranger Sheet 147 (Elan Valley and Builth Wells area)
O.S. 1:25,000 Pathfinder Sheet SN 84/94 (Llanwrtyd Wells)

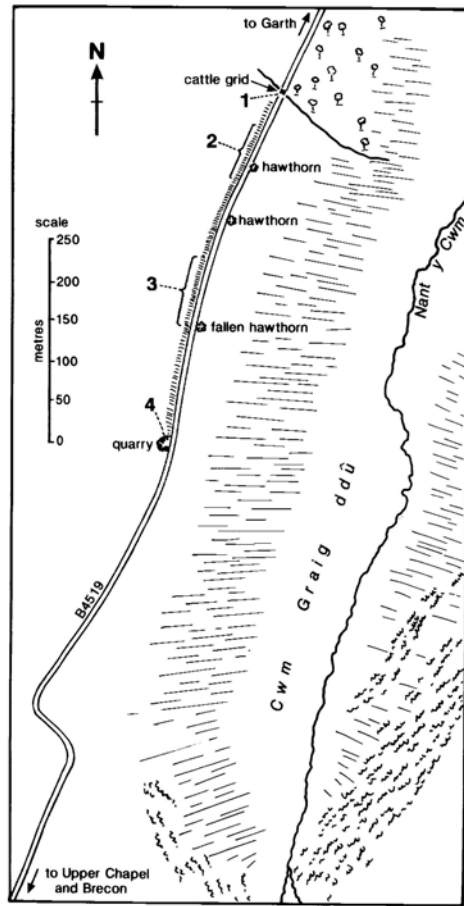
START AND PARKING Alongside cattle grid at SN 9634 4790.

WALKING DISTANCE One kilometre round trip.

WARNING Keep a lookout for traffic. Remember to follow the Geological Code of Conduct.

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Department of Geology
Information Series No. 5



ITINERARY

Locality 1. Immediately south of the cattle grid. Siltstones belonging to the 'Lower Slump Group' in places show large, spherical structures. Superficially resembling slumps, these are a product of ellipsoidal weathering. Careful examination reveals that individual beds pass continuously through them, indicating that they are unrelated to the slumping. At this exposure common fossils include **brachiopods** (e.g. *Atrypa reticularis*, *Isorthis orbicularis*, *Dayia navicula* and *Microsphaeridiorhynchus nucula*), and tiny **ostracode** (water flea) carapaces, and headshields and tails of **trilobites** are also present.

Locality 2. Between 40 and 130m south of cattle grid. The siltstones and shales of this locality belong to the 'Shales with Thin Slumps' division. Notice how some of the beds here are bent and contorted: these are **slumps**. A good example (photograph A) is present 32m south of the first hawthorn bush. The slumped beds contain fossils different from those of the undisturbed ones. This is because the moving masses of mud and silt carried along in them remains of animals (e.g. brachiopod shells,

ostracode carapaces, trilobite fragments and corals) that inhabited shallower waters some distance away. The undisturbed siltstone layers contain fossils of animals that inhabited the local, somewhat deeper water environment. Less common than those of the slumped layers, these fossils include straight, conical **cephalopod** (orthoconic nautiloid) shells, **graptolites**, and **bivalves**. These animals swam (cephalopods) or drifted (graptolites) through the water, or lived on or within the sea bed (bivalves).

Exposure between localities 2 and 3 is not very good, although there are a lot of loose rock fragments on the slope.

Locality 3. Begins some 50m south of the second hawthorn bush, and extends for about 100m to just beyond a fallen hawthorn bush. The sediments here belong to the 'Upper Slump Group' and slumped beds are well exposed for a few metres to either side of the fallen hawthorn (photograph B). As at locality 2, the slumped layers contain transported fossils of animals that inhabited shallower waters to the east - e.g. brachiopods (*Isorthis orbicularis*, *Sphaerirhynchia wilsoni*, *Microsphaeridiorhynchus nucula*) and ostracodes (*Hemsiella maccoyana*), whereas the intervening undisturbed layers contain fossils of indigenous animals, like those at locality 2.

Walk for 130m to the next locality, and notice that the rocks exposed in this stretch (photograph C) are in thin, regular beds. These are flagstones belonging to the 'Pterinea tenuistriata Beds'; they contain few slumps.

Locality 4. Roadside quarry 450m south of cattle grid. This affords an easily accessible exposure of the 'Pterinea tenuistriata Beds'. The tops of some of the beds, or **bedding planes** are in some cases strewn with cephalopod shells and bivalves, some of which are all oriented one way. This suggests that the water currents near the sea-bed were quite strong and remained consistently in one direction over a period of time. Other fossils to be looked out for here are graptolites, generally darker coloured than the rock itself, and also the remains of plants. The latter are represented by tiny, black-coloured pieces of stem. Some are Y-shaped, and occasionally preserved on their tips are pinhead-like spore-bearing capsules, or sporangia. The plants with sporangia are called *Cooksonia*; Y-shaped stems without sporangia, *Hostinella*. Microscopic structures in closely comparable specimens from elsewhere suggest strongly that they were land plants, and although preservation of specimens from this locality is not good enough to reveal such detail, it is highly likely that these were also. As such they are among the earliest known land plants in the geological record. Probably they grew on river banks or on shores of land that lay to the south, their remains being washed out to sea.

From this locality, either walk farther up the road for views of the valley, or return directly to the cattle grid at the north end of the section.

Prepared by Dr R.M. Owens.

Production of this leaflet was sponsored by A.F. Budge (Mining) Ltd., Retford, Notts.

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