Excursion 4 Baldernock and Blairskaith

Key details

Authors	Judith Lawson and James D. Lawson
Theme	Sediments and fossils of the Lower Limestone Group (Carboniferous) and the environments of the time.
Features	Dolerite sills, waterfalls, coal seams, various limestones, stoop and room mining, desiccation cracks, flake breccias, ironstone nodules, black mudstones, nearshore shallow-water features, fossils and their ecology, Blackhall Limestone, Neilson Shell Bed.
Maps	O.S. 1: 50 000 Sheet 64 Glasgow; O.S. 1: 25 000 Sheet NS 47/57 Milngavie; B.G.S. 1: 63 360 Sheet 30 Glasgow
Terrain	Hummocky grass with muddy paths and potentially slippery rock at Baldernock; very muddy at Blairskaith after rain.
Distance	A few hundred metres at Baldernock and up to half a kilometre in the quarry at Blairskaith–providing transport is available.
Time	An hour is enough at Baldernock but at least two hours is needed at Blairskaith.
Access	At Baldernock cars can be parked on the adjacent road and access is open. There is also no restriction on access to Blairskaith Quarry at the moment, but there is a barrier across the road which leads past the quarry. If a large number of cars are being used the present residents at the house are very co-operative about unlocking the gate. One or two cars can be safely parked at the roadside near the farm and there is room for one coach (preferably not too large), which should approach via Bardowie to avoid tight bends. Public transport is not convenient for this excursion and would add considerably to the walking distance, but there are occasional buses to Bardowie and Balmore to the south of these localities.

Locality 1. Linn of Baldernock [NS 591 758]

In the stream section at the Linn of Baldernock is a good section through the lowest part of the Lower Limestone Group. Dolerite sills belonging to the Milngavie group have intruded into the sediments and generally form the series of waterfalls, or lhms. The benches are formed by the baked sediments, (Figure 4.1), which include coals and a thin limestone. Underneath the lowest sill which forms the largest waterfall is a limestone about 1–1.5 m thick. Limestone was a valued commodity in Central Scotland (which is generally poor in limestones) and was often mined. The old stoops, or pillars, which supported the roof as the limestones were excavated in the rooms, or stalls, can still be seen. The mine extends some distance underneath the sill. It is wet and muddy and, as with all old mine workings, should not be entered or explored. This limestone is known as the Baldernock Limestone and occurs just below the Hurlet Limestone and Coal sequence of which it really forms part. The limestone is not obviously fossiliferous but is made up of ostracode shells from which it was formerly called the Entomostracan Limestone, after the old name for ostracodes. A small seam of coal can be seen about half way up the sill above the mine. The floor of the mine is formed of a hard sandstone, a 'kingle' and below that are a limestone, another sandstone and shales of the top of the Calciferous Sandstone Measures.

Locality 2. Blairskaith Quarry (parking place south of quarry at [NS 595 752]

This abandoned brick pit exposes the Blackhall Limestone and black mudstones of the Lower Limestone Group. The strata are of approximately the same age as the limestones and shales of Trearne Quarry (Excursion 20) and are also exposed at Corrie Burn (Excursion 6). They display a striking contrast in facies and conditions of deposition to the rocks at Trearne.

A sketch of the quarry is provided in (Figure 4.2). There is a small cliff (a) in the Blackhall Limestone but it is not very stable or easy to work. The casual visitor is advised to study the rock types in the fallen blocks both here and elsewhere in the quarry (e.g. b). The lower part of the formation includes dolomitic limestone and a pseudo-oolitic limestone which is probably an algal pellet rock, suggesting non-marine or restricted marine conditions. Blocks of a striking flake-breccia ('clay galls' of the Survey Memoir) can be found in the debris, representing partly lithified pale mud which has suffered penecontemporaneous erosion in shallow water so that the flakes have been incorporated in a later mud deposit. Some large blocks can still be found (e.g. at b) displaying moulds (i.e. ridges which infilled the grooves) of desiccation cracks ('mud-cracks') indicating emergence and drying out of the sediment. The shalier layers often contain fish remains, particularly scales (Figure 4.3). Other layers contain tiny, smooth, oval ostracodes; their population structure (high density and low diversity) suggests a non-marine environment, probably brackish water. Coprolites also occur commonly: these are fossilised faecal pellets–in this case, probably of large predators (e.g. sharks) since the coprolites contain shiny 'ganoid' scales from smaller fish.

Spreads of similar feeding remains have been interpreted as shark vomit, which is common in modern seas–although diarrhoea would presumably give the same result! The top of the limestone, however, is a fully marine limestone composed mainly of small crinoid colunmals. It is best examined on the extensive top bedding surface at c (and also at e). Other fossils are also small e.g. solitary corals of zaphrentid type and the brachiopods *Crurithyris*, *Chonetes* and productids (Figure 4.3): this size-reduction may be related to a limited food-supply in less than ideal marine conditions.

The black mudstones ('blaes') below the Blackhall Limestone are fine-grained organic-rich sediments with very few fossils and are considered to be dominantly non-marine deposits, perhaps from a large sluggish river system.

Ironstone nodules of various sizes are common; these are mostly of iron carbonate composition. Some of them show septarian structures i.e. internal shrinkage cracks infilled with walls (i.e. septa) of mineral precipitate, usually calcite. The nodules often show evidence of having been exhumed, eroded and resedimented indicating early formation and subsequent modification in nearshore conditions.

The black mudstones above the limestone are lithologically similar and also contain courses of ironstone nodules; some are tiny enough to be mistaken for goniatites and others are septarian nodules. However these upper mudstones contain a large and interesting marine fauna occurring in bands at various levels, mainly in the lower parts. They can be conveniently studied at a small exposure at d near the road but if enough time is available there are large exposures at f, e and b. This fossiliferous division is called the Neilson Shell Bed and has been fully described by Wilson (1966) and traced by him over most of the Midland Valley at this level. Most of the shells are complete and not compressed but they are mostly small and the same dark colour as the containing sediment, making them difficult to find until one gets the eye accustomed. Once a good layer is found it is wise to collect large blocks for processing at home.

Bivalves are common, particularly nuculids (e.g. *Nucula*, *Polidevcia* in (Figure 4.3)) which today are superficial burrowers in silt or mud, feeding on organic detritus. Large thin-shelled pectinids and the concentrically furrowed *Posidonia* may have been able to swim, at least for short distances, above the mud. Gastropods are also common including high-spired forms (e.g. *Glabrocingulum*, (Figure 4.3)), a very low-spired euomphalid (*Straparollus*, (Figure 4.3)) and symmetrical bellerophontid genera (e.g. *Euphemites* (Figure 4.3)). These gastropods probably crawled over the sea bottom, browsing on algal debris. A third group of molluscs, the cephalopods, is well represented by straight orthoconic nautiloids often of large size (*Orthoceras*, (Figure 4.3)) and the occasional but stratigraphically important occurrence of goniatites (Figure 4.3). A coiled nautiloid, *Catastroboceras*, also occurs and should not be confused with the smooth goniatites. These cephalopods would have been predatory carnivores and would have spent some time swimming above the bottom in search of food.

Brachiopods are less common. The tolerant *Lingula* (Figure 4.3) presumably lived as a filter feeder in a burrow as at the present day. The other fairly common inarticulate, *Orbiculoidea*, however, had a strong pedicle and must have attached to something—most probably algal fronds. The occasional small productids and chonetids (Figure 4.3) possessed spines for anchorage and to avoid sinking into the mud. The tiny, smooth spiriferid *Crurithyris* (Figure 4.3) would have been very light and probably lived umbo-down in the mud like a productid.

Layers composed of spherical foraminifera are not uncommon. Fish scales and other remains have been found at all levels: *Watsonichthys* was recently recovered from the nodular mud-stones above the Neilson Shell Bed.

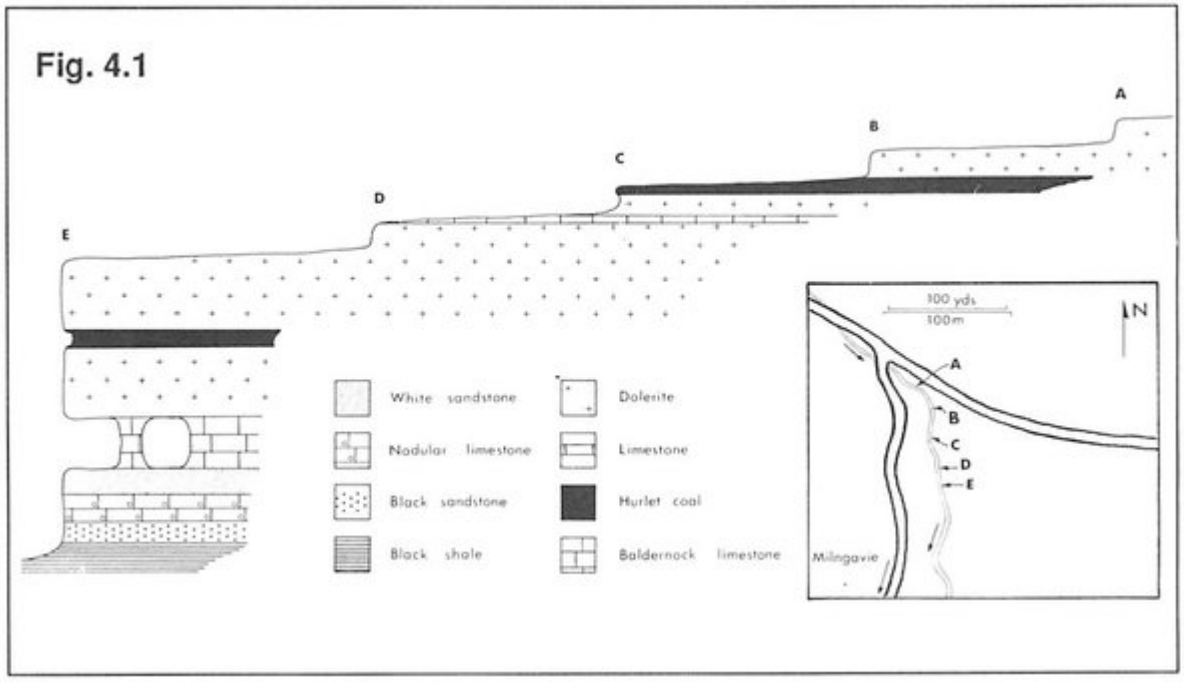
The combined evidence from the sediments and fossils in the Neilson Shell Bed suggests a shallow, quiet sea bottom rich in organic mud but with sufficient oxygen to support a fairly varied fauna of mainly small organisms including shallow burrowers, browsers, epifaunal filter feeders and swimming predators.

Dr C.J. Burton considers that the preponderance of gastropods and bivalves, together with the limited diversity of the fauna in general, suggests that 1) conditions were less than fully marine (marine marginal and river influenced) and 2) the faunas were in part opportunistic. They resemble modem delta-edge faunas occupying rich mud layers after the river activity has switched elsewhere.

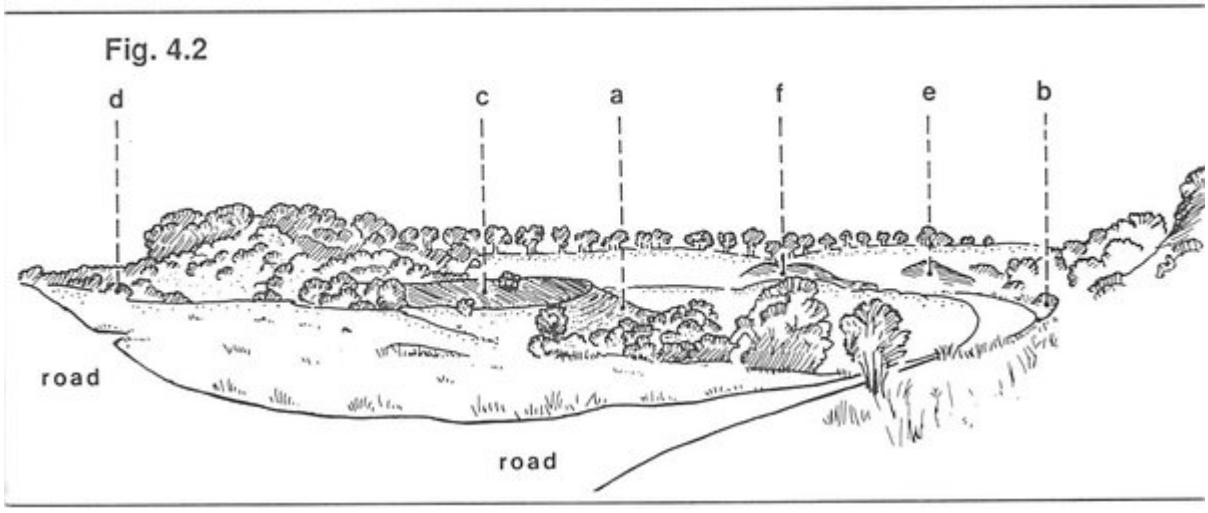
References

CLOUGH, C.T. et al. 1925. The geology of the Glasgow District. Mem. Geol. Surv. U.K.

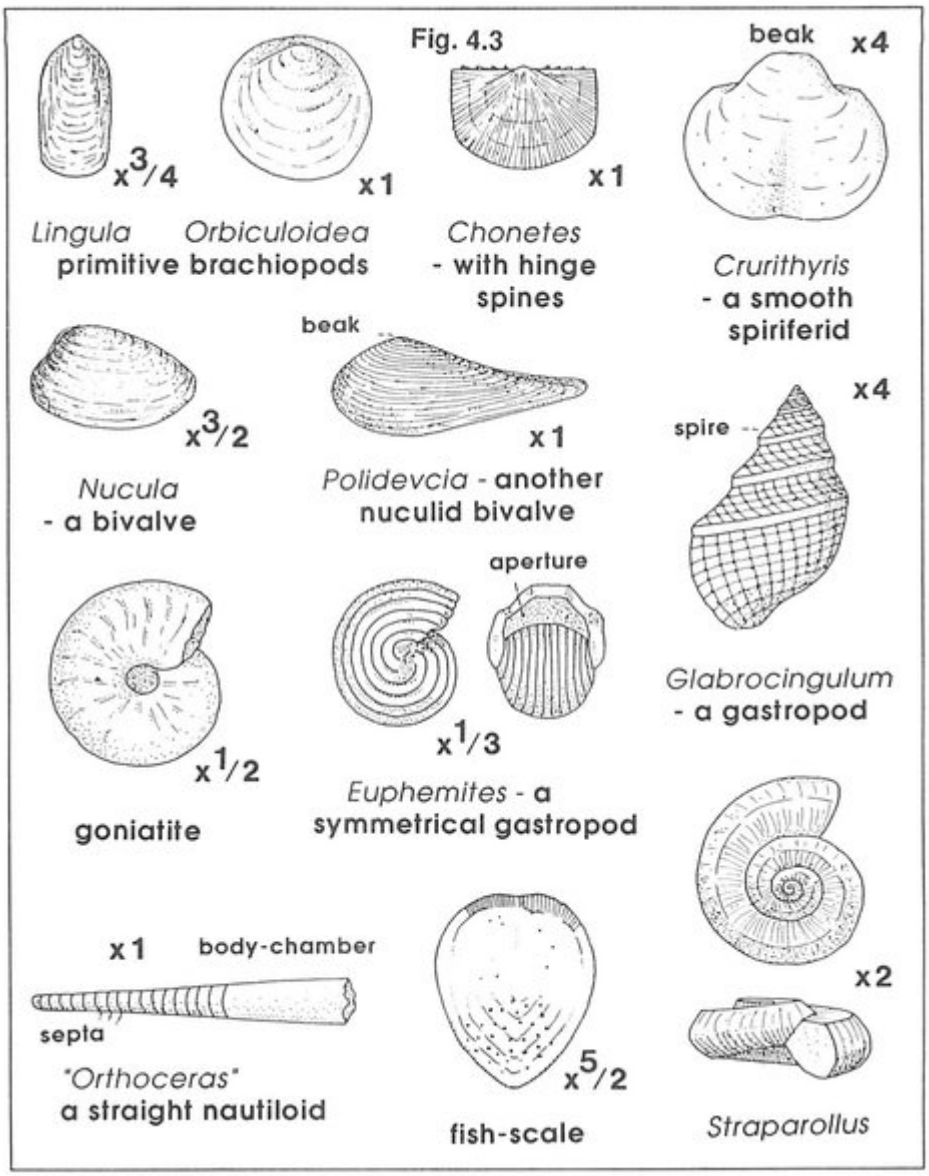
WILSON, R.B. 1966. A study of the Neilson Shell Bed, a Scottish Lower Carboniferous marine shale. Bull. Geol. Surv. G.B. 24, 105–128.



(Figure 4.1) Sketch of geology in stream section at the Linn of Baldernock.



(Figure 4.2) Sketch of Blairskaith Quarry.



(Figure 4.3) Some fossils from Blairskaith Quarry.