Corrie Burn, East Dunbartonshire

[NS 681 775]–[NS 685 794]

Introduction

The Corrie Burn GCR site, lying 3 km north-east of Kilsyth [NS 681 775]–[NS 685 794], consists of exposures In four small streams, which drain south of the southern flank of the Campsie Fells. Here, faulted against the lavas of the Clyde Plateau Volcanic Formation by the Campsie Fault, are outcrops of the Kirkwood Formation and Lawmuir Formation (Strathclyde Group) and of the Lower Limestone Formation and basal Limestone Coal Formation (Clackmannan Group), which range from late Brigantian to earliest Namurian age (Figure 2.2). This is the finest section of upper Dinantian–lower Namurian strata on the northern side of the Central Coalfield Basin.

The site attracted the attention of many early workers, including Young (1860), Macnair and Conacher (1914), Macnair (1917) and McCallien (1938). Excursion guides have been provided by Bassett (1958) and by Bowes (in Bluck, 1973; in Lawson and Weeden, 1992). Macgregor *et al.* (1925) and Robertson and Haldane (1937) give detailed descriptions of the sequence and these have been brought up to date by Forsyth *et al.* (1996).

Description

Summary details of the site geology are presented in (Figure 2.28). The lowest exposed beds here are the uppermost beds of the Kirkwood Formation, which is estimated to be over 55 in thick locally (Macgregor *et al.,* 1925; Robertson and Haldane, 1937). These comprise red and green beds of volcanic detritus derived from the weathering of lavas from the Clyde Plateau Volcanic Formation that are capped by a thin (0.15 m) fireclay. The basal beds of the overlying Lawmuir Formation are not well exposed but are fossiliferous shales (3.4 m) with ironstone nodule bands. The macrofauna and microfauna of these shales formed the basis of an intensive palaeoecological study by McDonald (1966). At the top of this succession, where they contain an abundant fauna of brachiopods (mainly productoids) and bryozoans, the shales become paler and more calcareous as they pass up into the Coral Limestone. This bed is exposed in small outcrops on the valley side of the Corrie Burn and is an irregular (0.6–1.5 in) limestone band with *Siphonodendron* colonies and greenish clay partings. It passes up into the White Nodular Limestone (0.6 m), which has brachiopods and crinoids at the base and abundant rootlets at the top.

The beds between this and the Corrieburn Limestone (= Hurlet Limestone), whose base is the lower boundary of the Lower Limestone Formation, are not now well exposed but include a fireclay (0.4 m) at the base, a thin coal (0.15 in) and fissile shales (4.5 m). The shales contain a layer rich in fish fragments at the base and, higher up, brachiopods, bellerophontids and abundant bivalves including *Actinopteria persulcata* and *Aviculopecten.* The Corrieburn Limestone (6.4 in) is exposed in old quarries to the east of the Corrie Burn. Its lower parts arecrinoidal and its upper parts, which are argillaceous, contain an abundant fauna including brachiopods, corals, bryozoans, bivalves and crinoid fragments.

Overlying the Corrieburn limestone, in the next burn to the east, are shales and ripple-marked sandstones (2.5 m) capped by a decalcified sandy limestone (1.8 m) with crinoid fragments and moulds of shells. Above this are further shales, with a maroon-coloured ironstone, and sandstones (4.0 m) capped by the Blackhall Limestone. The Blackhall Limestone is in two beds separated by a few centimetres of shale. The lower post (0.6 m) is an oolitic dolomite with ostracodes, some intraclasts and stigmarian roots. The crinoidal upper post (0.6 in) also contains small zaphrentid corals. Overlying this, a thick shale sequence (20 m) containing ironstone nodules forms an impressive cliff on the east bank of the middle stream. At its base this shale sequence contains an abundant marine fauna including *Tornquistia youngi, Glabrocingulum atomarium, Euchondria neilsoni, Phestia attenuata* and other forms typical of the Neilson Shell Bed Fauna (Wilson, 1966).

The shale cliff is capped by a sandstone but the beds between them and the Second Hosie Limestone and Top Hosie Limestone are poorly exposed. This poorly exposed section comprises about 25 m of sandstones, slltstone and shale and includes the Main Hosie Limestone and Mid Hosie Limestone and a fireday. The Main Hosie Limestone and the fossiliferous top of the underlying sandstone are exposed in the eastern stream close to its junction with the middle stream. The Second Hosie Limestone and Top Hosie Limestone are also exposed in the eastern stream. The former is more fossiliferous than the overlying Top Hosie Limestone and the two limestones are separated by fossiliferous shales containing *Posidonia corrugata, Tornquistia polita,* and *Sanguinolites costellatus. P. corrugata* also occurs in the basal shales of the Limestone Coal Formation immediately above the Top Hosie Limestone. The shales and the Top Hosie Limestone are also exposed in the Wham Glen, which lies west and south of the Cairnbog Fault. It was from these latter exposures in the shale below the Top Hosie Limestone that Craig (1954) made his pioneering palaeoecological studies. Snook (1999) included Corrie Burn in his regional study of faunal associations and facies in the Hosie Limestones.

Interpretation

The volcanic detritus of the Kirkwood Formation is derived from weathering of the lavas of the Clyde Plateau Volcanic Formation, and the section at Corrie Burn provides excellent evidence of the markedly diachronous nature of the boundary between this and the overlying Lawmuir Formation. The marine shales and the Coral Limestone and White Nodular Limestone, which form the base of the Lawmuir Formation, have been correlated with the Blackbyre Limestone of the Paisley and Hurlet districts (Macgregor *et al.,* 1925; Forsyth *et al.,* 1996), though within the Hurlet area the Blackbyre Limestone lies over 100 in above the base of the Lawmuir Formation. Thus deposition of volcanic detritus must have persisted at Corrie Burn long after it had been replaced by more normal (volcanic detritus free) sediments elsewhere. Forsyth *et al.* (1996) have recorded a fossiliferous band within the Kirkwood Formation near Corrie Burn that may correlate with the lower Hollybush Limestone of the Paisley area, and this reinforces the conclusion that the Kirkwood Formation at Come Burn may be laterally equivalent to parts of the Lawmuir Formation in other areas.

The marine unit at the base of the Lawmuir Formation differs from the typical developments of the Blackbyre Limestone in the presence of corals. The white nodular character of the limestones is a secondary bleaching and pedogenic effect linked to the palaeosol and coal, which immediately overlie it and from which rootlets extend down into the limestone. Similar bleaching and nodular developments are know at this horizon at other localities in the Paisley district and at Todholes (see GCR site report, this chapter), near Stirling (Macgregor *et al.,* 1925; Wilson, 1989; Forsyth *et al.,* 1996), and indicate a disconformity within the sequence.

The remainder of the very attenuated development of the Lawmuir Formation are the basal shales of the Corrieburn Limestone. The fauna of these is important as it is one of the best developments of the Abden (or Macnair) Fauna in Scotland (Macnair, 1917; Wilson, 1989). This fauna provides a useful guide to the position of the Hurlet Limestone and supports the correlation of the Corrieburn Limestone with the Hurlet Limestone though it is considerably thicker and more fossiliferous than that limestone in its type area.

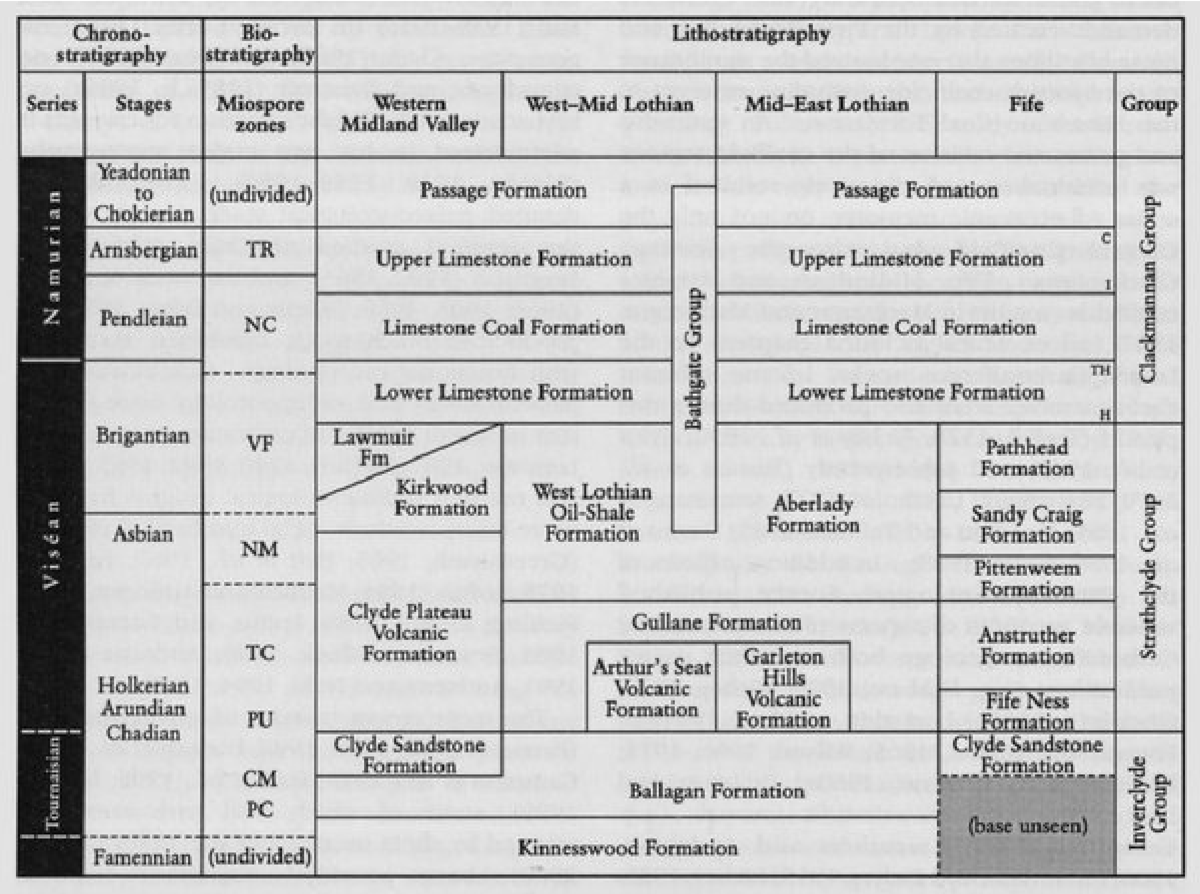
The remainder of the Lower Limestone Formation consists of a number of Yoredale cycles with marine shales and limestones passing up into shales, siltstones and sandstones of deltaic origin. The thin decalcified limestone between the Corrieburn Limestone and the Blackhall Limestone is the equivalent of the Shields Bed of the Campsie district. The occurrence of this horizon at Conic Burn is of palaeogeographical significance as this marine band is impersistent and is not found to the west of Glasgow. The Blackhall Limestone shows well its bipartite character, with a basal lagoonal facies, which is typical of its development within the Central Coalfield Basin. The shales above the limestone contain a good development of the Neilson Shell Bed Fauna, which is a guide to this horizon (Macgregor *et al.,* 1925; Wilson, 1966, 1989). These shales also contain specimens of goniatites, including *Beyrichoceratoides truncatum, Sudeticeras* spp. and *Dimorphoceras marioni,* which indicate a high P_2 age (Currie, 1954). The occurrence of *Posidonia corrugata* in the shales associated with the Top Hosie Limestone is a useful guide to this important horizon, whose top forms the boundary between the Lower Limestone Formation and the Limestone Coal Formation.

The popularity of this site with successive generations of geologists has meant that fossils from it are well represented in collections. The palaeontological lists of Murdoch (1904) include numerous records of species found at Corrie Burn, and Davidson (1851–1886, 1860) described or recorded several brachiopod species from this locality. Other taxa, including the bivalve *Limipecten dissimilis,* the brachiopods *Tornquistia scotica* (paratype material) and *Leptagonia caledonica* and bryozoan material, are also known from the site (Hind, 1896–1905; Brand, 1970, 1972; Bancroft, 1985a,b, 1986a).

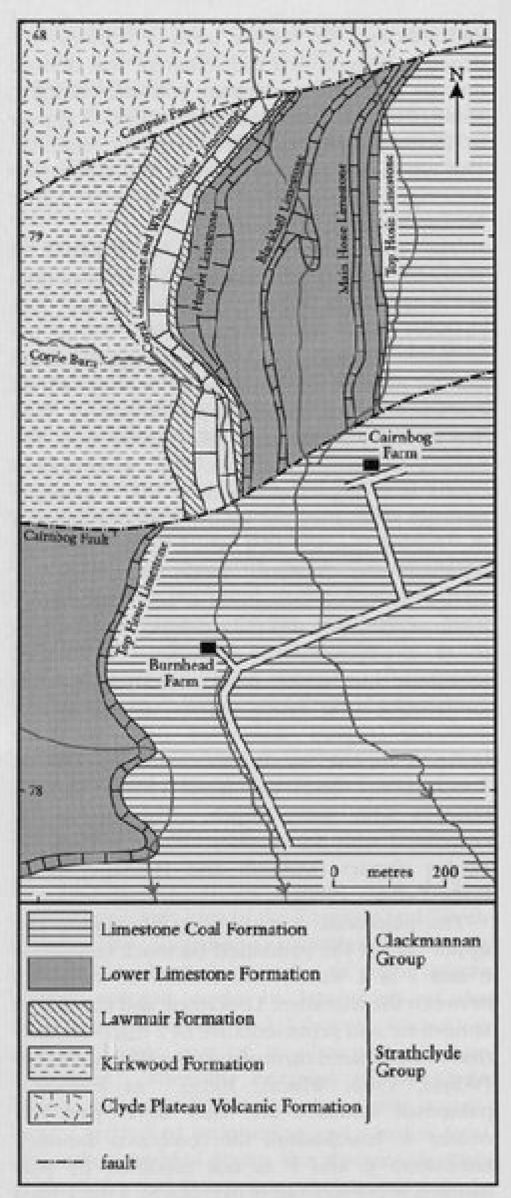
Conclusions

Stream and quarry exposures at the Corrie Burn GCR site provide a nearly complete and extremely valuable succession, from the volcanic detritus of the Kirkwood Formation to the base of the Limestone Coal Formation (Brigantian–Pendleian). Situated on the northern side of the Central Coalfield Basin, the character of the marine horizons is important in correlation and in palaeogeographical reconstruction. The limestone beds of the White Limestone, Corriebum Limestone, Blackhall Limestone and Hosie Limestone yield marine faunas of special and continuing taxonomic, stratigraphical and palaeoecological interest.

References



(Figure 2.2) Simplified Lower Carboniferous stratigraphical chart for the Midland Valley of Scotland. Note that below the Brigantian Stage, the position of stage boundaries is uncertain and that below the NM miospore zone only recorded zones are indicated. (H — Hurlet Limestone; TH — Top Hosie Limestone; I — Index Limestone; C — Castlecary Limestone.) The Bathgate Group comprises the Salsburgh Volcanic Formation, the Bathgate Hills Volcanic Formation and the Kinghorn Volcanic Formation. Based on various sources and including information from Whyte (1981), Chisholm et al. (1989) and Browne et al. (1996, 1999).



(Figure 2.28) Simplified geological map illustrating the distribution of Lower Carboniferous rocks at the Corrie Burn GCR site. Based on various sources and including information from Bassett (1958), Bowes (in Lawson and Weedon, 1992) and British Geological Survey (1992).