Crawford Group, Ordovician, Southern Uplands

The oldest rocks found in the Southern Uplands belong to the Crawford Group and are of late Arenig to Llanvirn age. They comprise the dominantly volcanic and chert successions of the Raven Gill and...
Kirkton formations, which underlie the Moffat Shale Group in the Northern and Central belts (P912326 and P912327).

The Raven Gill Formation (55–70 m) consists of an interbedded succession of basaltic pillow lavas, blue-grey radiolarian cherts and fossiliferous brown mudstones, with sheet-like dolerite intrusions or lava flows. The stratigraphical limits of the formation are unclear since its southern margin (presumed base) is faulted and no overlying unit is seen, though it is possible that it may be enclosed within the Kirkton Formation (see below) as an olistostome unit. The brown mudstones at the Raven Gill type locality (NS 9204 1989) have yielded fragmentary graptolites and a conodont assemblage of late Arenig age. Only three proven outcrops are known, all within a strike length of about 2 km in the Abington area. There they form part of an extensive linear belt of black shale and chert (mostly Moffat Shale Group) inliers, up to 1.8 km wide across strike, which crop out within the imbricate Leadhills Fault Zone. These inliers are interpreted as the thrust-faulted repetition of a single, thin basal succession that may have originally been in conformable contact with the (overlying) Kirkcolm Formation.

Pillow lavas and chert are exposed at several other localities within the Leadhills Fault Zone, as well as in association with the analogous Fardingmullach Fault farther south, and have previously been assumed to correlate with those at Raven Gill. However, recent studies have shown that there is considerable variation in the geochemical characteristics of the lavas. For example, samples from the Leadhills Fault Zone at Abington (NS 9295 2141) exhibit the characteristics of mid-ocean-ridge basalts (MORB), whereas those from the Fardingmullach Fault Zone at Gabsnout Burn (NX 2020 6116) near Glenluce are chemically more like island-arc basalts. It seems likely that the lavas underlying the Moffat Shale Group were erupted during several distinct and unrelated volcanic episodes.

The Kirkton Formation (>120 m) is a sequence of red and grey cherts and red and green siliceous mudstones with chert nodules that appears to lie between the Raven Gill Formation and the Glenkiln Shale (Moffat Shale Group) within the Leadhills Fault Zone. Similar cherts crop out at other localities throughout the Northern Belt along the tract-bounding faults including, for example, at Normangill Burn (NS 971 241) north-east of Abington, at numerous localities in the Leadhills area, and at Morroch Bay (NX 017 524) south of Portpatrick on the Rhins of Galloway. North of Portpatrick, adjacent to the Glaik Fault (NW 976 588) the chert is associated with hyaloclastite containing broken lava pillows. At many of these localities the cherts yield conodont faunas of late Llanvirn and early Caradoc age. Farther south, the Kirkton Formation is represented by volcanioclastic rocks and chert, underlying apiculatus-ziczac Subzone mudstone, that crop out adjacent to the Laurieston Fault in a linear zone extending for about 7 km north-eastward from Crossmichael (NX 735 670).

Curiously, there is a complete absence from the Crawford Group of any evidence for the well-established conodont zones intervening between the upper Arenig and the upper Llanvirn. This absence, together with the restricted occurrence of the Raven Gill Formation and its uncertain relationship with the Kirkton Formation, suggests that the Raven Gill Formation may simply be one or more large olistostromes within the Kirkton Formation.

**Bibliography**


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