
Chapter 15 Scotland: Ordovician of the Southern Uplands Terrane

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Introduction

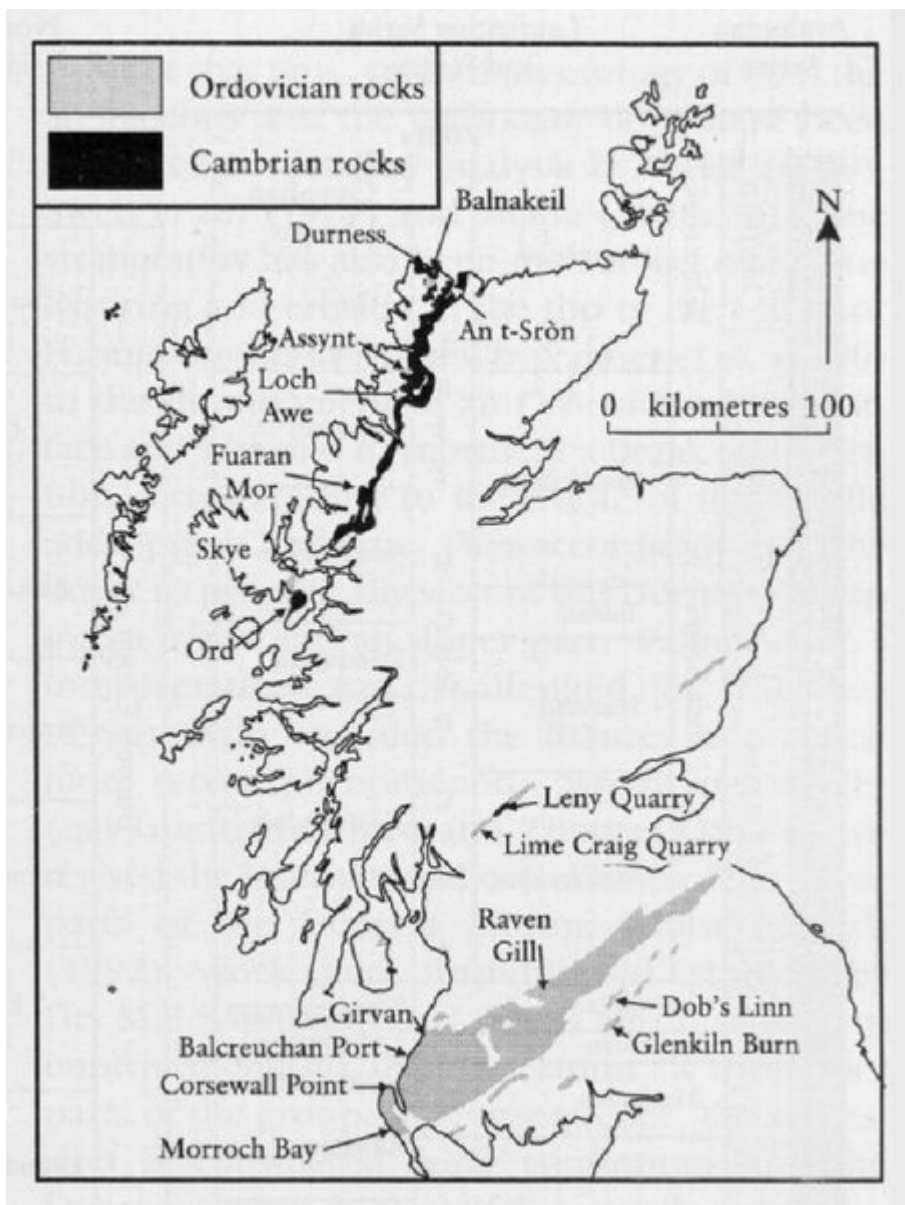
The Southern Uplands Terrane lies to the south of the Southern Upland Fault (Floyd, 1994) and overlies a probable continuation of the Midland Valley basement (Hall *et al.*, 1983). It is composed largely of greywacke and shale formations of Caradoc to Wenlock age, deposited in deep water, with slivers of basic lavas at the base that have been interpreted as indicating oceanic crust (but see Armstrong *et al.*, 1996). The area was the location of the classic work by Lapworth (1878), which demonstrated the value of graptolites in stratigraphical correlation (Fortey, 1993). The weighty Geological Survey memoir by Peach and Horne (1899) is still a valuable storehouse of detailed information, although the structural interpretations and many fossil identifications therein have long been superseded.

The Southern Uplands are commonly described in terms of an Ordovician northern belt, a central belt of Llandovery rocks with Ordovician inliers, and a southern belt of Wenlock rocks. The outcrop is divided by strike-parallel faults into structural tracts, in which the beds generally dip steeply and young to the north-west; despite this, biostratigraphy shows that the successive tracts become younger to the south-east (Rushton *et al.*, 1996a). This paradoxical structure has been interpreted in several different ways. In recent years, Leggett *et al.* (1979) proposed that the Southern Uplands was the site of a fore-arc accretionary prism formed above a NW-dipping subduction zone. Stone *et al.* (1987) suggested a back-arc setting, from which a southward-migrating thrust front developed, whilst Morris' (1987) model considered that the back-arc setting applied only to the northern belt. More recently, Armstrong *et al.* (1996) linked Ordovician deposition in the Southern Uplands to that to the north of the Southern Upland Fault and argued that deposition and volcanism took place above a continental rather than an oceanic basement and the succession was imbricated within a flower structure.

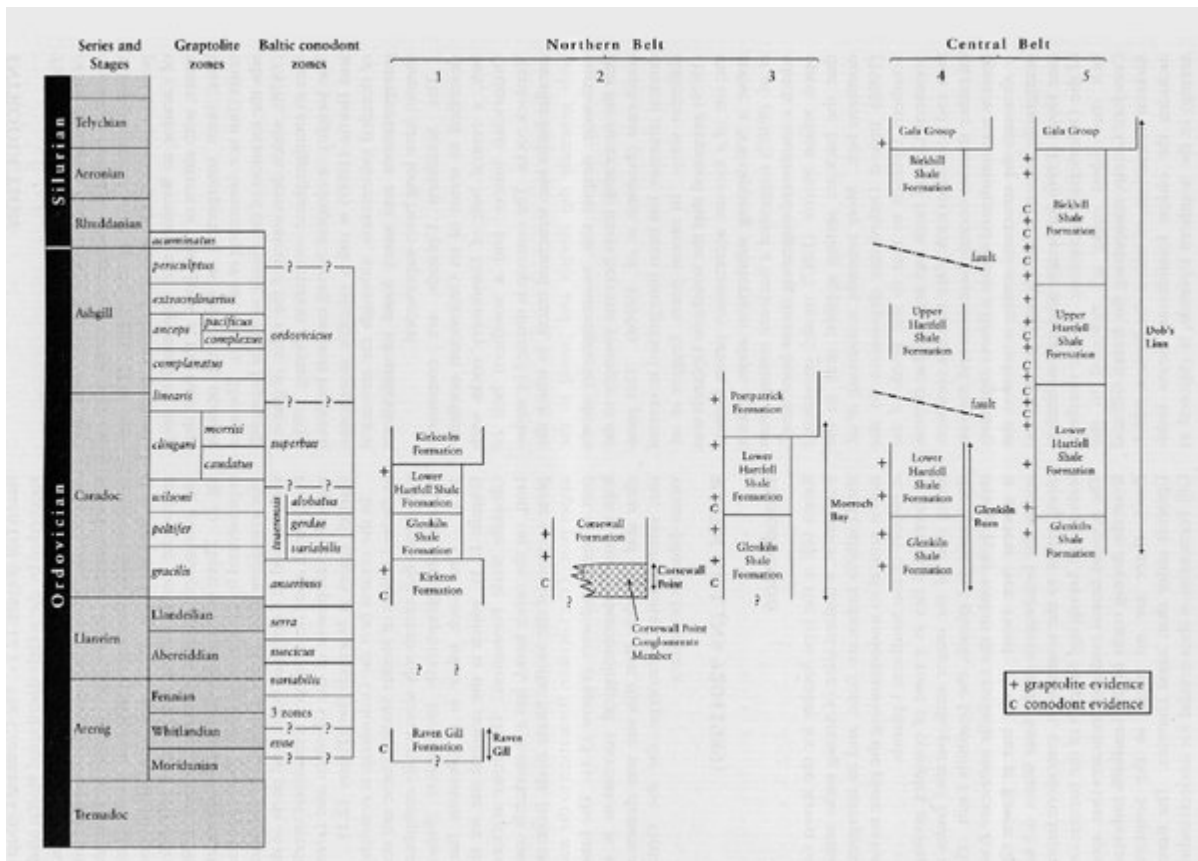
Although the structural setting is debated, the stratigraphy is now relatively well systematized (see Floyd (1996) for review and rationalization of the Ordovician succession). In the northern belt the oldest rocks are referred to the Crawford Group, comprising the Raven Gill and Kirkton formations, of which the former, which includes the oldest fossiliferous strata (mid-Arenig) in the Southern Uplands, is exposed at Raven Gill (Figure 12.1). The Crawford Group is succeeded by the widely distributed Moffat Shale Group (lowest Caradoc to Llandovery), of which only the two lower divisions, the Glenkiln and Lower Hartfell shales, are recognized in the northern belt. Resting on different levels within the Moffat Shale Beds are several distinct greywacke formations of various ages and differing petrographical characteristics (Floyd, 1996, fig. 2). Three of these greywacke formations are represented by GCR sites (Figure 15.1): spectacular conglomerates of the Corsewall Formation are exposed at Corsewall Point, and parts of the Portpatrick and Glenwhargen formations overlie a good development of the Glenkiln and Lower Hartfell shales at Morroch Bay (Figure 12.1).

In the central belt the Ordovician is restricted to faulted inliers of Moffat Shale. These are very numerous but commonly structurally complicated and stratigraphically incomplete (Figure 15.1). One such inlier is at Glenkiln Burn (Figure 12.1), which is the original site for the Glenkiln Shale Formation. The inlier at Dob's Linn, on the other hand, has a remarkably complete section of the Moffat Shale Beds, from the upper part of the Glenkiln Formation to the mid-part of the Llandovery (Figure 15.1). The lithological and palaeontological succession is so clear and complete that this site was chosen as the international stratotype for the Ordovician–Silurian boundary.

[References](#)



(Figure 12.1) Distribution of Cambrian and Ordovician rocks in Scotland, showing the general location of key sites.



(Figure 15.1) Correlation of fault-bounded stratigraphical successions in the Southern Uplands Terrane of Scotland that include GCR sites, based on Floyd (1996) and Rushton et al. (1996a, fig. 4). Columns represent the following: 1, Leadhills Imbricate Zone, Crawford district; 2, tract north of the Glen App Fault, Rhins of Galloway; 3, Morroch Bay Fault Zone, Rhins of Galloway; 4, north of Lauriston Fault, south of Moffat; 5, Moffat Valley north-east of Moffat.