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# Roughneck Quarry

[NS 2703 0398]

## Introduction

The Craighead Inlier (Figure 3.74) lies to the north of the Girvan Valley in the Kyle and Carrick region of south-west Scotland. The stratigraphy was first elucidated by Lapworth (1882) in his classic paper on the Girvan area, and this work was extended by Peach and Horne (1899). Further studies were published by Lamont (1935) and Freshney (1959), the latter showing that the inlier extended farther to the north-east than had been previously appreciated. More recently, Cocks and Toghill (1973) revised the lithostratigraphy and summarized the biostratigraphy of the succession. They recognized the following formations in the Craighead Inlier, in ascending stratigraphical order: the Lady Burn Conglomerate, the Mulloch Hill Formation, the Glenwells Shale, the Glenwells Conglomerate, the Newlands Formation, the Glenshalloch Shale, the Upper Saugh Hill Grits, the Pencleuch Shale and the Lower Camregan Grits.

The quarry at Roughneck (also sometimes termed 'Rough Neuk Quarry' or 'Mulloch Hill Quarry'), in Ladywell Wood, exposes strata in the upper part of the Mulloch Hill Formation, which has a total local thickness of 240 m (Cocks and Toghill 1973). This is the most fossiliferous formation in the Craighead Inlier, and is well displayed in the quarry. The diverse fauna indicates an age in the upper part of the Rhuddanian Stage (Cocks and Toghill 1973), and allows comparisons with other early Llandovery shelly faunas elsewhere in Scotland and in the Welsh Basin. A biostratigraphical correlation of the succession in the Craighead Inlier with those of other outcrops in the Girvan area is shown in (Figure 3.78).

## Description

The quarry is situated about 125 m west of the farmhouse of Rough Neuk. The strata comprise sandy shales and thick-bedded sandstones dipping to the east at 40°. The rocks are rich in shelly fossils; a very long list of the fauna was provided by Peach and Horne (1899, p. 530), based on their own collecting and on material collected by Mrs Elizabeth Gray. The assemblage includes calcareous algae, corals (*Aulacophyllum*, *Favosites*, *Heliolites* and others), trilobites (*Calymene*, *Acaste*, *Encrinurus*, *Staurocephalus* and others), diverse gastropods, bivalves, conulariids, tentaculitids, bryozoans, asteroids, crinoids, dendroid graptolites, orthocones, and very abundant and varied brachiopods. Cocks and Toghill (1973, p. 213) reported that one sample of 255 specimens from the quarry comprised 69% brachiopods (35% *Dalmanella* sp., 15% *Mendacella mullochensis*, 14% *Cryptothyrella angustifrons*), 12% corals, plus 15 other species, and referred the collection to a high diversity *Cryptothyrella* benthic community. The quarry is the type locality for a number of fossil taxa, including the brachiopods *Philhedrella mullochensis* (Reed, 1917), *Isorthis prima* Walmsley and Boucot, 1975, *Fardenia (Fardenia) columbana* (Reed, 1917), *Eostropheodonta mullochensis* (Reed, 1917) and *Rostricellula mullochensis* (Reed, 1917).

## Interpretation

The Girvan area lies in the Midland Valley, between the Highland Boundary Fault to the north and the Southern Uplands Fault to the south; this region accumulated relatively shallow marine and non-marine sediments during the early Silurian (see Bluck, 1983, and Chapter 1 for regional setting). At Roughneck Quarry, the presence of calcareous algae and a *Cryptothyrella* benthic community indicates that the Mulloch Hill Formation was deposited in a shallow-water environment in which the shelly fossils have been concentrated by bottom currents (Cocks and Toghill, 1973). The shoreline was probably nearby to the north or north-west (Ingham, 1992b). The underlying Lady Burn Conglomerate contains a lower diversity *Cryptothyrella* Community and the overlying Glenwells Shale is graptolitic, indicating a deepening upwards sequence. The graptolites give a *cyphus* Biozone age for the Glenwells Shale, so the Mulloch Hill Formation is Rhuddanian, although Cocks and Toghill (1973) regarded it as younger than the oldest Llandovery faunas of the related sites at Haverfordwest, Meifod and in the Llandovery area. They, therefore, suggested that the most likely correlation is

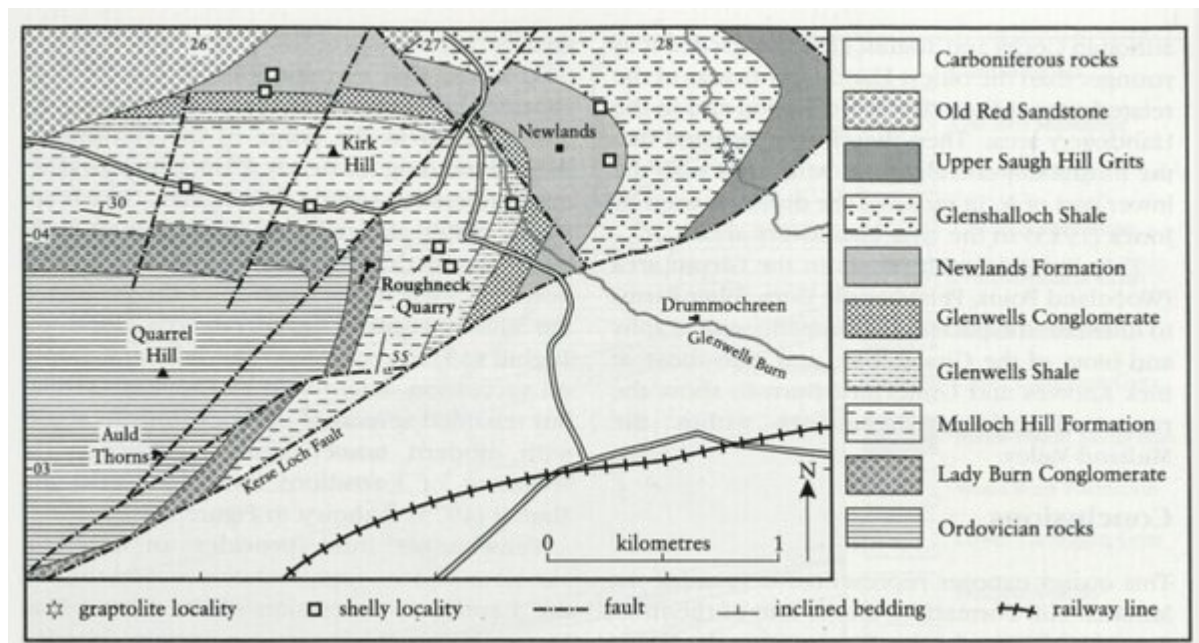
with A<sub>3</sub> or with the lower part of A4 in terms of the divisions used by Jones (1925) in the type Llandovery area.

This site links with others in the Girvan area (Woodland Point, Penwhapple Burn, Blair Farm) to illustrate the palaeoenvironment, stratigraphy and biota of the Girvan area, and with those at Birk Knowes and Gutterford Burn to show the range of palaeoenvironments within the Midland Valley.

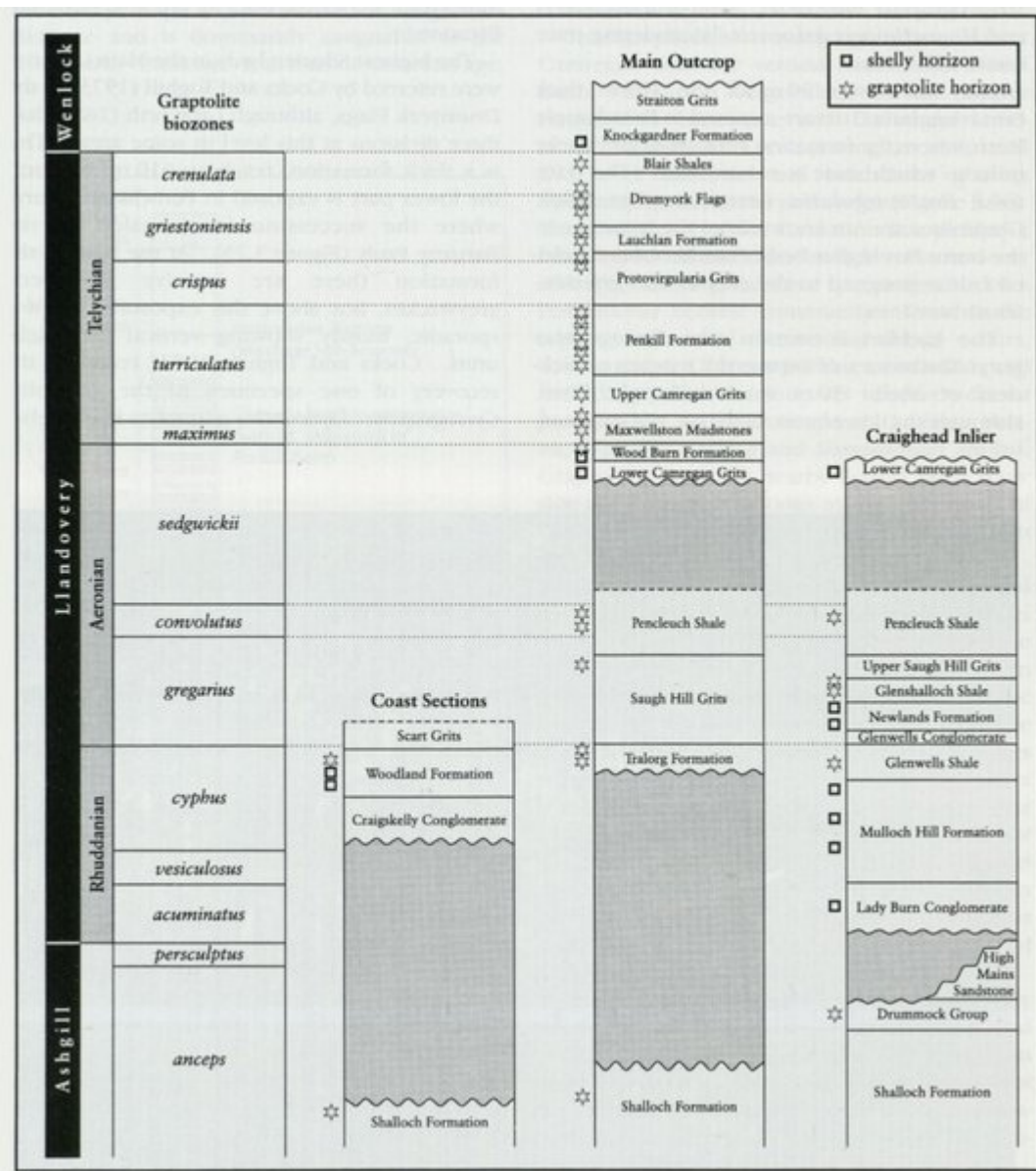
## Conclusions

This quarry exposes representative strata of the Mulloch Hill Formation, and is one of the most fossiliferous sites in the Girvan area. Its shelly macrofauna is more diverse than that of almost any other early Llandovery site in Britain, and fossils have been collected from it since the early part of the 19th century. Brachiopods are especially abundant, and the fauna has been referred to a shallow-water *Cryptothyrella* benthic community. The fossils in the formation, together with the constraints placed by the presence of latest, Rhuddanian graptolites in the overlying Glenwells Shale, suggest an age of late, but not latest, Rhuddanian. This is an important locality for regional and comparative investigations of early Silurian marine faunas and environments.

## References



(Figure 3.74) Geological map of the Craighead Inlier, showing the location of Roughneck Quarry (after Cocks and Toghill, 1973).



(Figure 3.78) Correlation of the Llandovery successions within the various outcrops in the Girvan area (modified after Cocks and Toghil, 1973).