
Woodland Point

[NX 169 953]

Introduction

The Girvan district is situated on the western coast of Scotland, north of the Southern Uplands Fault (Figure 3.82). The earliest major work on the area was completed by Lapworth (1882), whose results were largely confirmed by Peach and Horne (1899). The Silurian stratigraphy was revised by Cocks and Toghill (1973), who also provided new maps and an analysis of biostratigraphical data.

Coastal exposures of Silurian strata occur at Craigs Kelly [NX 1774 9605] and at the GCR site of Woodland Point, which is 1 km to the southwest of Craigs Kelly and 3 km SSW of the town of Girvan (Figure 3.73). At Woodland Point the rocks exposed on the foreshore belong to the Shalloch Formation of the Ordovician System, overlain by the Craigs Kelly Conglomerate, the Woodland Formation and the Scart Grits, all of Silurian age (Cocks and Toghill, 1973). Lapworth (1882) considered the junction between these Ordovician and Silurian rocks to be a fault, but Cocks and Toghill (1973) reported an unconformable boundary with lenses of Craigs Kelly Conglomerate occupying pockets in the top of the Shalloch Formation.

The site is the type locality for the Woodland Formation, which includes the units referred by Lapworth (1882) to the 'Woodland, or Lower *Pentamerus* Limestone', the 'Coralline Limestone' and the 'striped Shales' (Cocks and Toghill, 1973). This formation is rich in fossils, including graptolites, shelly fossils and conodonts, and the Woodland Point site is of considerable importance in studies of early Silurian biostratigraphy, environments and palaeogeography. It is the type locality for the trilobites *Stenopareia acymata* Howells, 1982, and *Acernaspis xynon* Howells, 1982.

Description

At Craigs Kelly the Craigs Kelly Conglomerate is about 40 m thick and lies unconformably on shales and greywackes of the Shalloch Formation (Cocks and Toghill, 1973). The conglomerate is clast supported and polymict, with rounded pebbles of acid and basic igneous rocks, greywacke, jasper and metamorphic rocks (Stone, 1996). At Woodland Point, however, the conglomerate occurs only intermittently, occupying lenses rarely more than a metre thick (Cocks and Toghill, 1973).

The succession at Woodland Point is overturned, with an inverted dip of around 70° to the south-east. The Woodland Formation was described by Cocks and Toghill (1973), who gave its thickness as 21.7 m. The lower 10.2 m consists of massive flags, with several of the beds strongly calcareous because of the high content of shells. Above this are 5.5 m of less massive flags with thin shell beds, which become less frequent upwards, and the upper 6 m of the formation comprises thinly bedded siltstones and shales. The lower part of the formation has yielded more than 30 species of brachiopod, with *Stricklandia lens lens* dominant; the shells are almost all transported but appear to represent a *Stricklandia* benthic community. In the middle part of the formation, brachiopods of the *Stricklandia* and *Clorinda* benthic communities have been found in life position (Ziegler *et al.*, 1966; Cocks and Toghill, 1973). A graptolitic band occurs 4 m below the top of the formation and has yielded a diverse fauna, including *Coronograptus cyphus*, indicative of the upper part of the *cyphus* Biozone, and of late Rhuddanian age. Conodonts have been recovered from a calcareous band 2 m above the base of the formation and include an early form of *Distomodus* (figured as *D. kentuckyensis* by Aldridge, 1985).

The Scart Grits comprise massive greywacke units, several with conglomeratic bases; they display normal and reverse grading. The formation reaches 45 m in thickness at Woodland Point, but the top is not exposed (Cocks and Toghill, 1973). At Craigs Kelly, the basal Scart Grits comprise a 14–24 m conglomerate, with clasts of quartz and igneous rock; this unit was separated by Cocks and Toghill (1973) as a Quartz Conglomerate Member. This member is not so well developed at Woodland Point, but may be represented by isolated knolls of conglomerate surrounded by beach shingle.

The Woodland Formation at Woodland Point provides the type locality for several brachiopod taxa, including *Lingula tenax* (Reed, 1917), *Triplesia woodlandensis* (Reed, 1917), *Katastrophomena woodlandensis* (Reed, 1917), *Leptaena? reedi* Cocks, 1968, *Leptaena valentia* Cocks, 1968, *Leptostrophomena jamesoni* (Reed, 1917) and *Fardenia (Saughina) pertinax* (Reed, 1917).

Interpretation

A marine basin occupied the Girvan area during the early Silurian, probably in a back-arc setting (Bluck, 1983). Historically, the Llandovery succession at Girvan has commonly been contrasted with that of the Moffat area (see the Dob's Linn site report), where the succession is thinner and entirely within the deep-water graptolitic facies. Cocks and Toghill (1973), however, considered that although there are shell faunas at Girvan, most of the deposition did not take place in shallow water. Apart from the basal units, including those exposed at Woodland Point, they attributed the Llandovery strata to relatively deep environments, where turbidites and graptolitic shales accumulated. Cave (in Bassett *et al.*, 1992), in contrast, suggested that the coarse elastic units might represent sub-littoral, storm-generated sand sheets rather than turbidites, and that the water may not have been deep. The presence of faunas of the *Stricklandia* and *Clorinda* benthic communities in life position in the Woodland Formation is certainly evidence of an offshore shelf environment during the Rhuddanian age. Overall, the Girvan sequence has been interpreted as part of a proximal fore-arc succession, derived from a magmatic arc that probably lay only a few kilometres to the north (Bluck and Ingham, 1992). There was probably no direct sedimentological link with the Southern Uplands Terrane during the Llandovery Epoch (Phillips *et al.*, 1998).

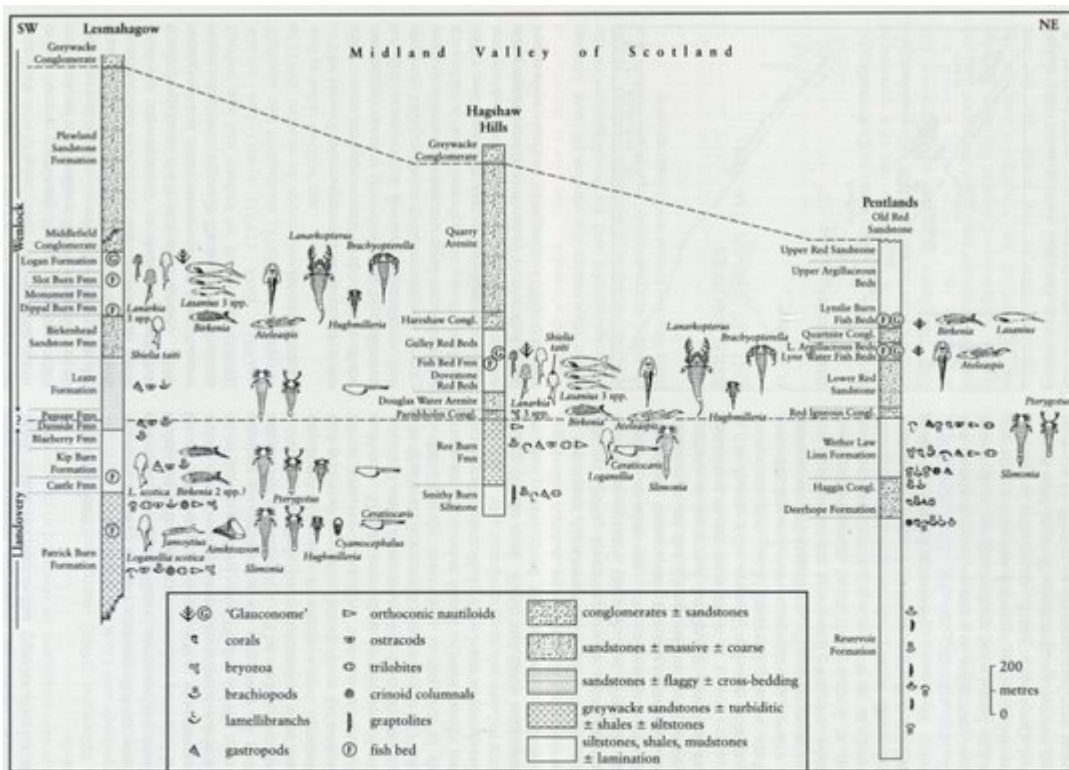
The unconformity recognized at the base of the Silurian sequence in the coastal exposures and elsewhere (Lapworth, 1882; Cocks and Toghill, 1973) may be local evidence of the widely recognized late Ordovician glacio-eustatic regression. However, the unconformity may represent the development of deep submarine channels, cutting into the Ordovician strata during the early Silurian, rather than an episode of subaerial erosion (Ingham, 1992a). The Craigs Kelly Conglomerate lies on higher levels of the Ordovician Shalloch Formation at Craigs Kelly than at Woodland Point, where the conglomerate is only patchily developed; the exposures therefore demonstrate southward overstep and overlap (Cocks and Toghill, 1973; Harper, 1988). The development of a *Stricklandia* benthic community in the lower part of the Woodland Formation, followed by a *Clorinda* community in the middle part, is evidence of sequential deepening, continuation of which is indicated by the presence of a graptolitic level in the upper beds. A major influx of detritus into the subsiding basin by mass flows is indicated by the conglomeratic proximal turbidites of the Scart Grits.

Biostratigraphical correlations of the different outcrops of Llandovery strata in the Girvan area were detailed by Cocks and Toghill (1973) and are shown in (Figure 3.78).

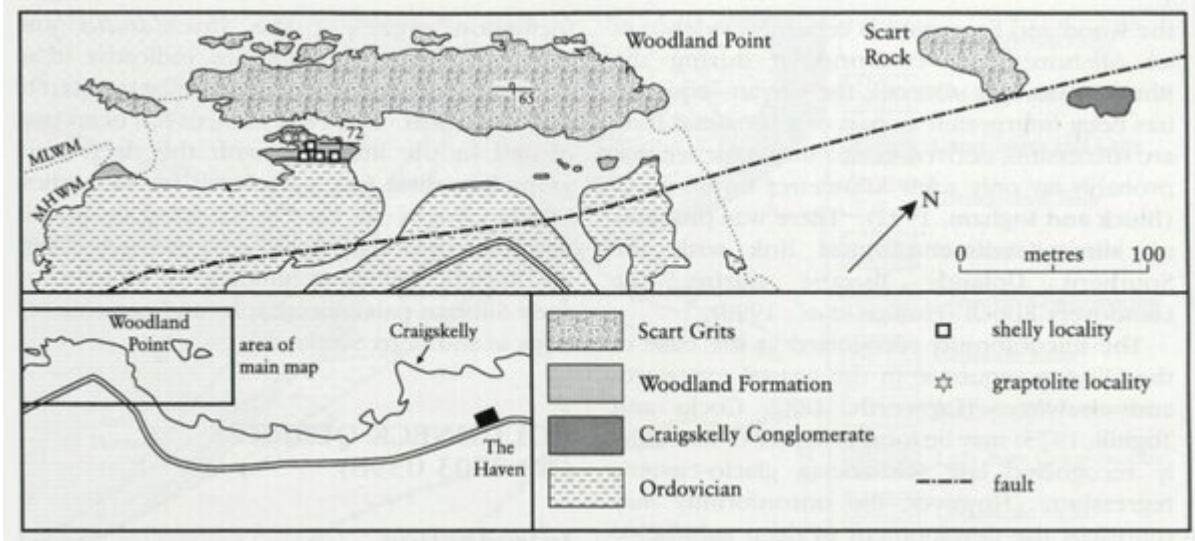
Conclusions

Woodland Point is an important locality for demonstrating the unconformable relationship between the Ordovician and Silurian strata in the classic Girvan area, and provides the best exposures of the early Llandovery (Rhuddanian) succession of the region. It is the type locality of the Woodland Formation, which has rich brachiopod faunas in the lower part and diverse graptolites towards the top. Brachiopod-dominated faunas in life position in the middle of the formation represent the *Stricklandia* and *Clorinda* benthic communities, indicative of an offshore shelf depositional setting for this part of the succession. This environment has been contrasted in the literature with the deep-water graptolitic shale facies displayed by the earliest Silurian rocks of the Moffat district in the Southern Uplands. The Girvan sites are, therefore, of importance in building up a picture of early Silurian palaeogeography and tectonic settings in southern Scotland.

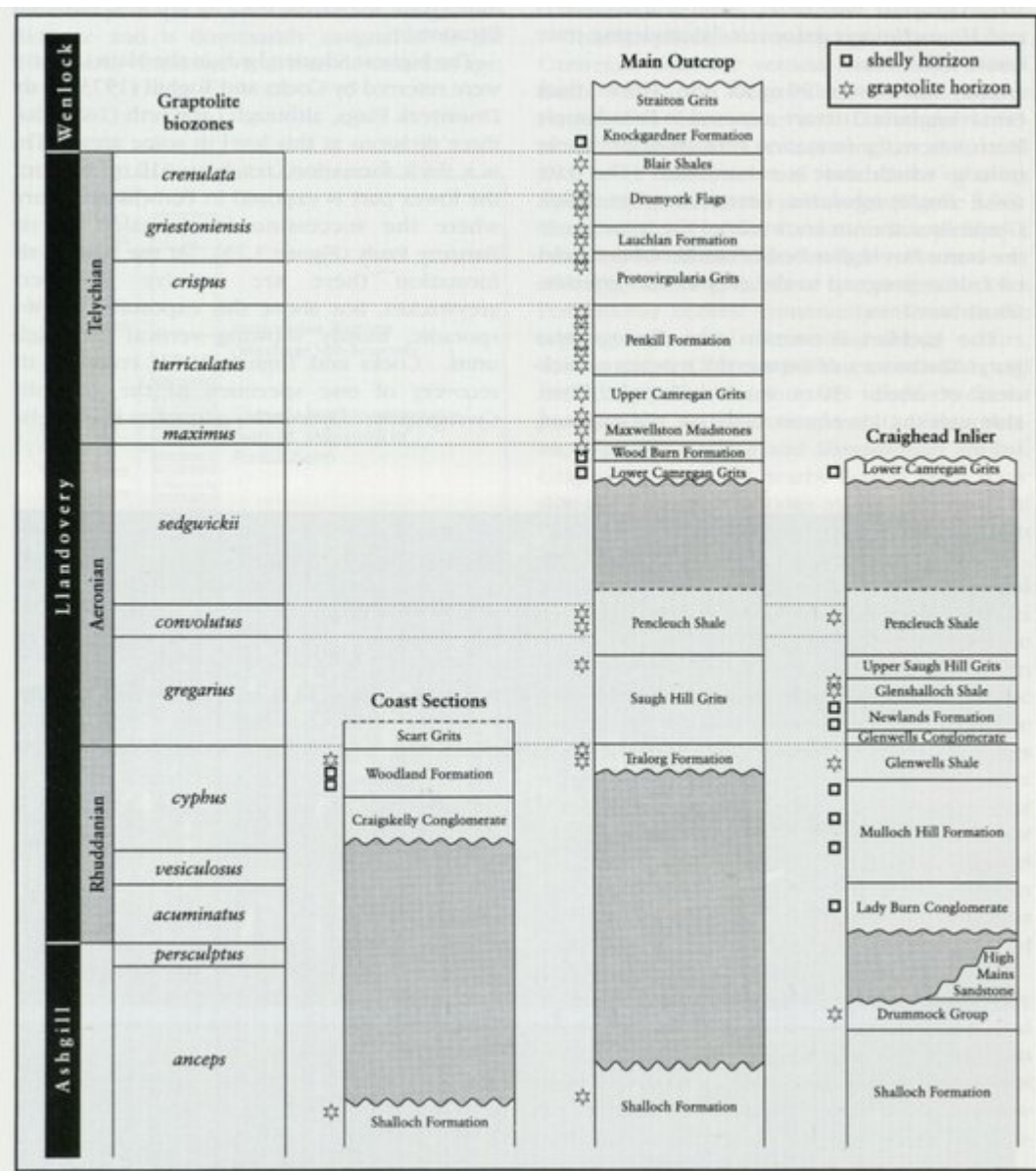
[References](#)



(Figure 3.82) Location of the main Silurian inliers of the Midland Valley of Scotland (after Wellman and Richardson, 1993).



(Figure 3.73) Sketch-map of the geology at Woodland Point (after Cocks and Toghil, 1973).



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