10 South Coast, Lismore Island

[NM 798 386]–[NM 784 366]–[NM 813 383]

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10.1 Introduction

The South Coast, Lismore Island GCR site comprises the coastal exposures and much of the inland outcrop at the south-western end of the elongate island of Lismore to the north of Oban (Figure 3.22). It is important primarily for its unique exposures of the Lismore Limestone, one of the formations of the Blair Atholl Subgroup of the Appin Group. The substantial middle and upper divisions of the formation are represented; these comprise dominant metalimestone with lesser slaty pelite and transitional facies. Structurally, the site lies in the core of the F1 Appin Syncline, a major structural feature of the western side of the Grampian Fold-belt, which is also the focus of interest of the *Ardsheal Peninsula* and *Onich* GCR sites, at progressively lower structural levels. On Lismore, the D1 structure is strongly modified by D2structures.

The geology of the island was described briefly in the Geological Survey memoir by Lee and Bailey (1925) and both the stratigraphical and structural features have been described subsequently in great detail by Hickman (1975, 1978). The following descriptions are largely based upon the work of Hickman, with additional observations by the author.

10.2 Description

The Lismore Limestone Formation is estimated to be about 1 km thick and the sequence of blue-grey metalimestone and minor black slaty pelite has been divided into fifteen members by Hickman (1975). These members can be grouped into three distinct lithological ‘units’. Of these only the middle and upper units are exposed within the area of the GCR site (Figure 3.22). The middle unit (about 450 m thick) comprises three metalimestone-pelite cycles, each containing a lower metalimestone member (50–200 m thick), a transitional banded argillaceous metalimestone member (20 m thick) and an upper pelite member (10–20 m thick). The metalimestone is blue-grey, recrystallized and to varying degrees graphitic and pyritiferous, with partings at 5–20 cm intervals. The transitional beds have individual beds, typically 3–10 cm thick, which are graded. The pelite members are grey, highly carbonaceous and pyritiferous with a low carbonate content. The upper unit has a lower metalimestone member (300 m) and an upper banded argillaceous metalimestone member (50 m), which rarely preserves festoon structures and load casts. Cross-stratification is rarely preserved in the metalimestones and isoclinal folds in the pelites and argillaceous metalimestones might be slump structures.

The whole sequence across the upper unit and the upper two cycles of the middle unit may be seen within the GCR site in a traverse of the craggy inland outcrops from Bagh Clach an Dobhrain [NM 799 377] to Miller’s Port [NM 812 372]. Excellent clean exposures of metalimestone are seen all around the coast on the wave-cut platforms, those of the upper unit on the north-west side of the island (e.g. at [NM 789 364]) and those of the middle unit on the south-east side (e.g. south-west of Miller’s Port at [NM 812 372]). The banded argillaceous metalimestone of the upper unit is well seen at Bagh Clach an Dobhrain (at [NM 799 375]) and argillaceous metalimestones and pelites of the middle unit are seen inland on the ridge of Druim na Curra, near Fiart Farm (at [NM 802 369] and [NM 803 370] respectively). The continuous ‘slate belt’ that passes through the Loch Fiart area, identified on both the original (1923) and the more-recent (1992) Geological Survey maps, was originally regarded as the eroded crest of an anticline, with the pelite underlying metalimestone everywhere on the island (Lee and Bailey, 1925). However, Hickman (1978) demonstrated that the pelite is an interbedded part of the stratigraphical succession.

The structure of the metalimestones within the GCR site is dominated by upright asymmetric tight to open folds with a wavelength of 0.5–20 m (Figure 3.23). The folds typically plunge at 20–50° to the south-west and have a strongly developed, steeply dipping, axial-planar crenulation cleavage in the slightly argillaceous metalimestone beds. Stretched pyrite blebs pitch steeply north-east on the cleavage. This cleavage is axial planar to folds of a bedding-parallel phyllitic cleavage. Hickman (1978) mapped a major antiform-synform fold-pair (A and B on (Figure 3.22)) related to a change in vergence of minor folds associated with the dominant later deformation. Hickman (1978) also drew the trace of a tight syncline through the site area (fold C on (Figure 3.22)), related to the earlier deformation. The evidence for the early syncline lies in a closure of the stratigraphical units in the area to the north-east of the GCR site, where it is cross-cut by the later folds and cleavage (see below).

10.3 Interpretation

The detailed stratigraphical succession within the Lismore Limestone Formation contains variations between pure metalimestone and pelite very similar to those of the Blair Atholl Dark Limestone and Dark Schist Formation of the *Strath Fionan* GCR site, with which it can be correlated confidently (Lee and Bailey, 1925). The obvious differences between the two GCR sites are the stronger representation of transitional facies between pure metalimestone and pelite in the former and of thicker pelite members in the latter. Unsurprisingly, the Lismore GCR site, with its lower grade of metamorphism, reveals more sedimentary structures, such as festoon bedding, cross-bedding and load casts. The common graded bedding however, which might be expected to survive the higher grade metamorphism, has not been recorded in the Schiehallion area.

The main feature of structural interest on Lismore is the NE-trending syncline that crops out through the centre of the GCR site and the Loch Fiart area ((Figure 3.22), fold C). This fold was assigned to D1 by Hickman (1978) on the basis that the dominant D2 minor structures are superimposed across the stratigraphical repetition that marks the position of the D1fold. Hickman did not provide vergence data to support the position or age of the syncline within the GCR site area. However, in the area that lies on the south-east limb of this fold, the phyllitic cleavage is seen (though rarely) at a small angle to bedding and axial-planar to small, 10 cm-amplitude isoclines (e.g. at Miller's Port, 812372). The paucity of vergence information on these folds and cleavage across the trace of the syncline does not allow confirmation of the position or age of the syncline. However, the vergence of the later folds is consistently towards the north-west across the trace of the fold (see the cross-section on (Figure 3.22)) and the steeply SE-dipping rocks on its south-east limb are consistently inverted and face down on the steeper dipping later cleavage.

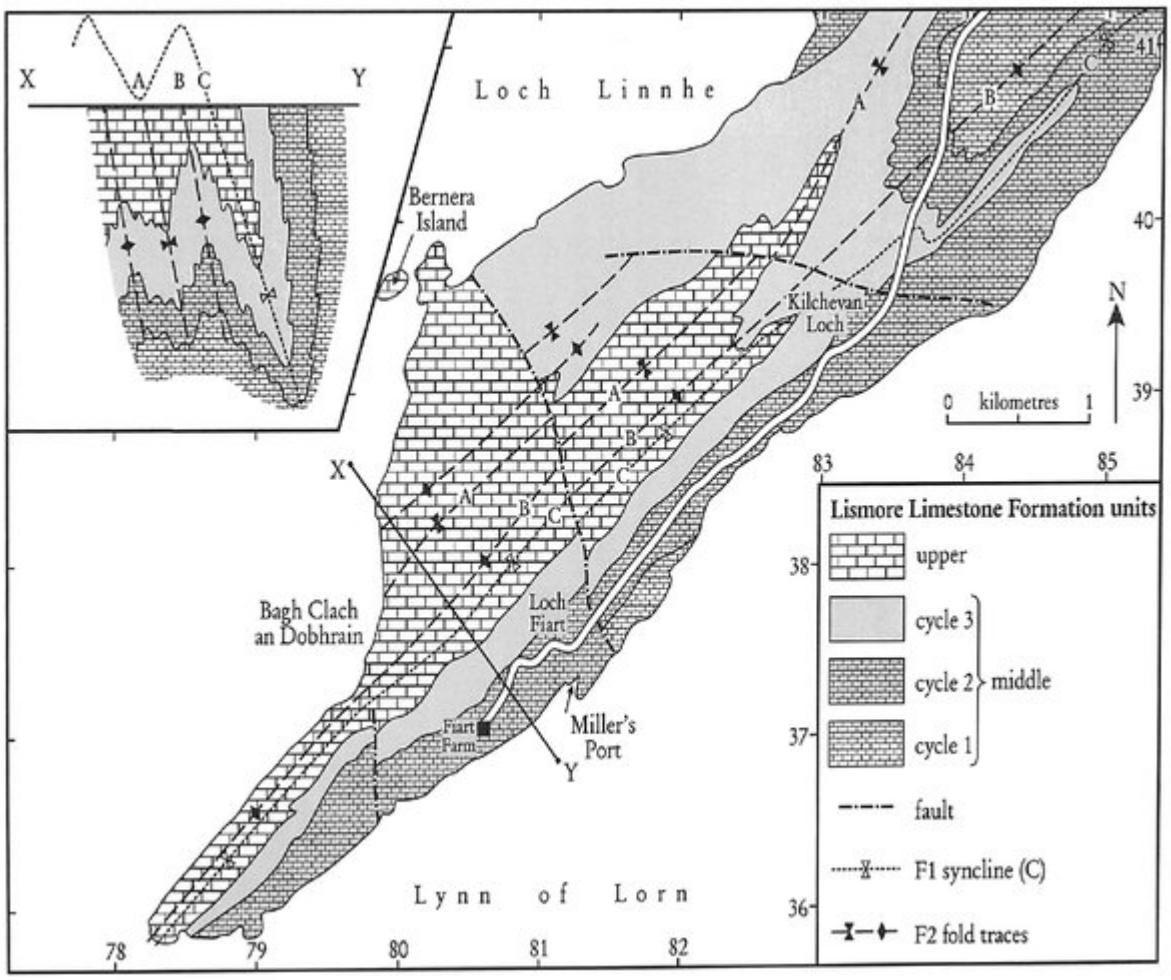
The trace of syncline C in the north of the island, as drawn by Hickman (1978), can be extrapolated to the north-east, through the Island of Shuna directly into that of the F1Appin Syncline at Cuil Bay and Onich (see the *Ardsheal Peninsula* and *Onich* GCR site reports). The vergence and plunge of the D2 structures is consistent with observations of their relations to the Appin Syncline at the above sites, and to the major F2 Stob Ban Synform to the east (see also the *Tom Meadhoin and Doire Ban* and *Rubha Cladaich* GCR site reports). Hickman (1978), however, considered that the Appin Syncline, which he regarded as a D2 structure, should be correlated with the major F2 synform A on (Figure 3.22). However, the trace of this fold, as shown by Hickman (1975) in the north of Lismore, does not extrapolate well with the projected trace of the Appin Syncline from Ardsheal through the island of Shuna.

10.4 Conclusions

The South coast, Lismore Island GCR site is the type locality for the Lismore Limestone Formation of the Blair Atholl Subgroup, which can be examined in detail in superb coastal and inland exposures. The information gained from the cycles of limy and muddy sedimentation that made up the formation is essential to the understanding of the development of the shallow shelf on which the early Dalradian sequence was deposited, particularly in comparison with other sites in the area and elsewhere in the Central Grampian Highlands. The site also provides, from its two sets of minor structures, valuable evidence for the location, identity and geometry of major F1 and F2 folds in the region, which play a fundamental role in the development of the Grampian Mountain-belt.

The Appin Syncline, the most important major F1 fold on the north-west side of the mountain-belt, can be traced through this GCR site and its geometry can be established. The later D2 folds and cleavage are particularly well displayed and demonstrate a consistent geometry down this side of the mountain-belt from the GCR sites at Onich and the Ardsheal peninsula into the Lismore Island GCR site. The site has great potential for future stratigraphical as well as structural research.

References



(Figure 3.22) Map of southern Lismore Island, showing the 'units' of the Lismore Limestone Formation and sedimentary cycles within the Middle unit as mapped by Hickman (1975, 1978). The traces of the major folds are also shown: A and B form a major F2 fold-pair, C is a major F1 syncline. The cross-section (after Hickman, 1978) illustrates the major folds and the relation of the (schematic) vergence of the F2 minor folds.

(Figure 3.23) Open F2 minor folds, verging north-west in the Lismore Limestone Formation south-west of Miller's Port [NM 812 372]; view to the south-west. Figure is 1.5 m tall. (Photo: J.E. Treagus.)