
17 Kilchrenan Burn and Shore

[NN 035 215], [NN 034 227]

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17.1 Introduction

This GCR site, on the north-west side of Loch Awe, provides the best exposures of the Kilchrenan Conglomerate Member (formerly the Kilchrenan Boulder Bed), an important unit, which occurs near the top of the Argyll Group. More precisely, it is found near or at the top of the Tayvallich Slate and Limestone Formation and below the Tayvallich Volcanic Formation and Loch na Cille 'Boulder Bed' (see the *West Tayvallich Peninsula* GCR site report). The member is important for the light that it throws on the sedimentary environment of the Tayvallich Subgroup, but it is particularly important for information that it yields on the strain experienced by these rocks in the first phase of deformation. Its characteristics have been described briefly by Borradaile (1973, 1977).

The Kilchrenan Conglomerate Member is a thin, but locally continuous unit, confined to some 4 km outcrop length in the hinge-zone of the F1 Loch Awe Syncline. The metaconglomerate has only undergone weak deformation after D1, and comprises clasts of one dominant lithological type in a homogeneous matrix of another; these facts are important in its use for strain measurements. The exposures are around the village of Kilchrenan, to its south on the shore of Loch Awe and to its west in the Kilchrenan Burn. The only other outcrops of a metaconglomerate occupying a similar stratigraphical position are found east of Loch Awe, but those have not been described formally.

17.2 Description

This GCR site incorporates two localities for the Kilchrenan Conglomerate Member, a single bed, at most 30 m thick, which is otherwise poorly exposed. The Kilchrenan Burn exposes the member intermittently from [NN 0335 2289] to [NN 0342 2276], but the best exposures are seen in weathered rocks on the west bank near the former grid reference (Figure 2.39), locality A. The member here consists of a matrix of unbedded slaty metamudstone (once a carbonaceous silty mud) supporting elliptical clasts of gritty quartzite. In some beds the clasts are tightly-packed oblate spheroids (Figure 2.40), which typically have maximum lengths of some 20 cm and minimum lengths of some 5 cm, the latter being perpendicular to the slaty cleavage. The cleavage, which dips at low angles to the north-west (e.g. 030°/16°), dominates the matrix. Bedding is rarely evident, but appears to be slightly less steeply dipping to the west, than the cleavage.

The second locality consists of exposures on the shore of Loch Awe ((Figure 2.39), locality B), which are best seen from [NN 0351 2157] to [NN 0340 2148], south-west of Struan, particularly in the low, moss-covered, crags away from the shoreline. The description of the member given above generally applies, but here angular black mudstone and rounded limestone clasts have also been incorporated into the conglomerate, and there is a range in clast sizes (long axes), from 20 cm down to 0.5 cm. There are rare clasts of granite, first noted by Kynaston and Hill (1908). Another feature here is the presence of a crenulation cleavage that post-dates the slaty cleavage and slightly deforms the clasts. Although the deformation has resulted in generally oblate-shaped clasts, they do show a direction of stretching, down-dip within the NW-dipping (e.g. 030°/27°) cleavage.

17.3 Interpretation

Very little comment has been made in the literature regarding the sedimentary character of the Kilchrenan Conglomerate or of its significance in terms of the depositional environment of the Tayvallich Subgroup. Kilburn *et al.* (1965) interpreted it as a slump conglomerate, and its position between slump breccias and conglomerates in the Tayvallich Slate and Limestone Formation below, and the breccias of the Loch na Cille 'Boulder Bed' in the Tayvallich Volcanic Formation above (see the *West Tayvallich Peninsula* GCR site report), would support the interpretation of the deposition of the subgroup on an unstable shelf. The strong sorting of the clasts seen in the Kilchrenan Burn locality and their assumed high original sphericity, suggest a shallow water deposit, which has been transported to, and preserved in, deeper waters. Subsequent volcanicity and faulting supports the concept of increasing instability of the shelf (Anderton, 1985). The presence of rare granite clasts has important implications for the palaeogeography of the region and warrants further research.

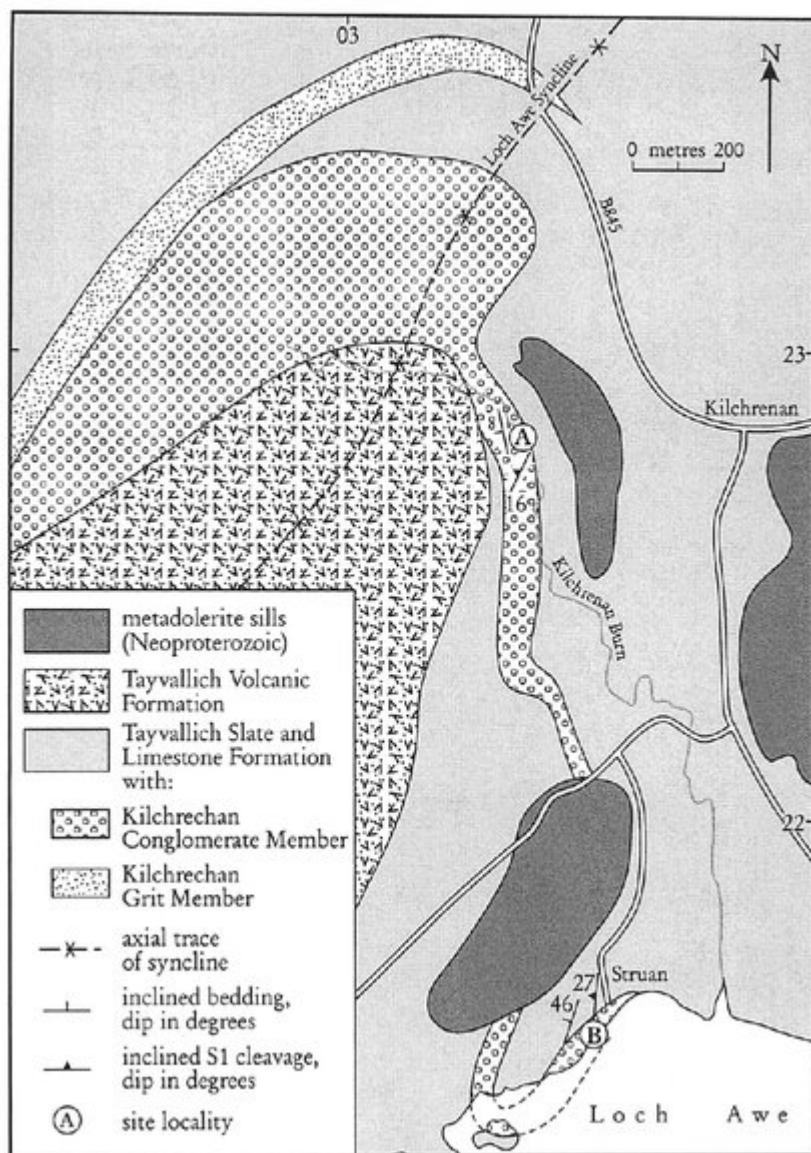
Structurally, both localities are situated on the gentle west- to NW-dipping, south-eastern limb of the Loch Awe Syncline. Although bedding is not easily distinguished in these rocks, this structural context is supported by the observation of cleavage dipping more steeply than bedding, as is seen in the Kilchrenan Burn locality. However, according to the mapping of Borradaile (1973), the exposures on the shore of Loch Awe lie on the short limb of a parasitic fold, with cleavage dipping shallower than the overturned bedding (Figure 2.39). The cleavage in which the clasts are deformed is clearly the first slaty cleavage. Measurement of the clast shape should therefore give an indication of the strain experienced during D1, with the usual assumptions that the clasts were originally subspherical and that they will give a minimum value of the strain for the whole rock. Provisional strain ratios for the clasts give X:Y:Z average ratios of 1.5:1.23:0.54 for the quartzite clasts of the Loch Awe locality and up to 1.8:1.8:0.3 for the oblate shapes in the Kilchrenan Burn (Figure 2.40).

17.4 Conclusions

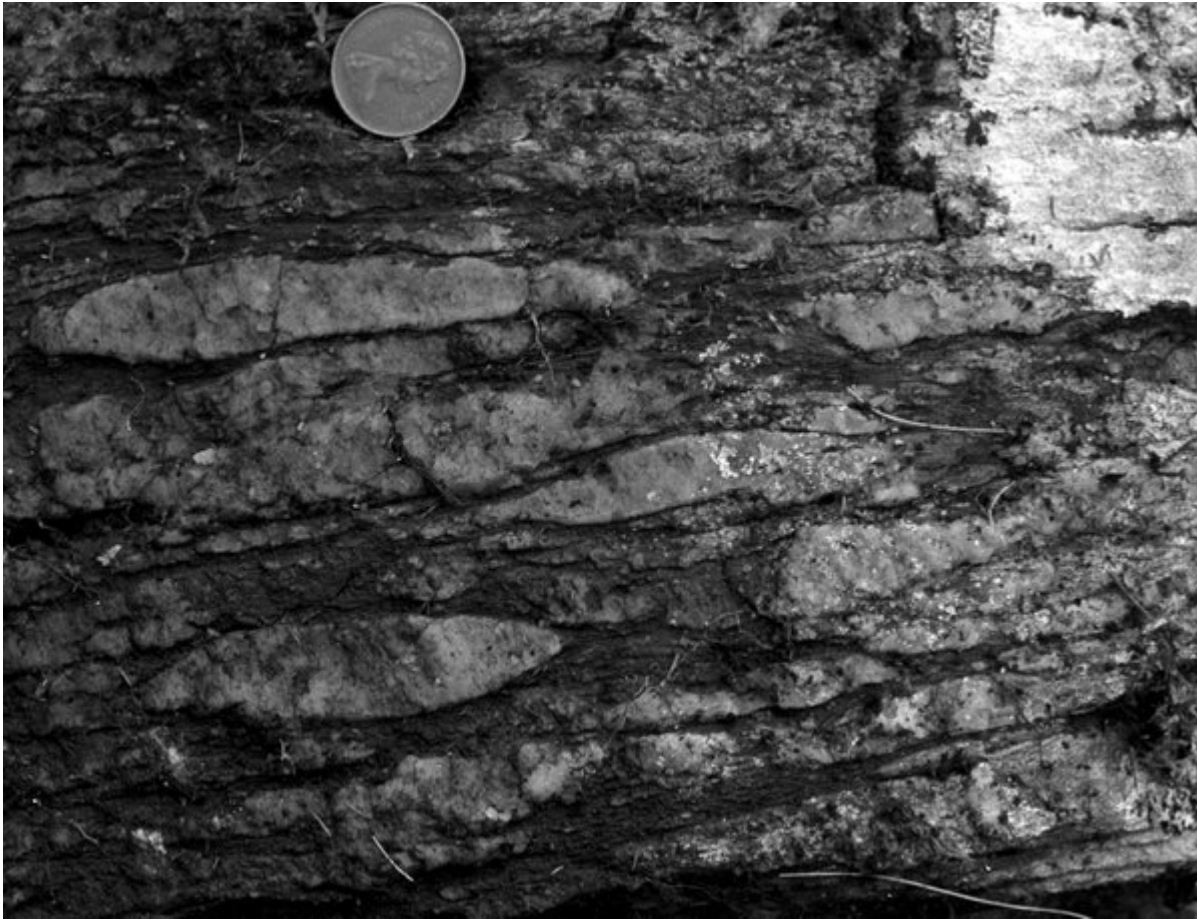
The Kilchrenan Burn and Shore GCR site is primarily of national importance for the study of pebbles in the Kilchrenan Conglomerate Member of the Tayvallich Slate and Limestone Formation. Conglomerates in which original rounded pebbles of one rock-type are not in contact with one another and sit in a uniform matrix, are extremely unusual and are of great importance to structural studies. The pebbles were deformed in the earliest deformation experienced by the Dalradian rocks of the South-west Grampian Highlands (D1) and the dimensions and orientation of the pebbles indicate the direction and strength of the forces that formed the mountain belt.

Of almost equal importance is the light that this unique sedimentary deposit can throw on the nature of the sedimentary basin in late Argyll Group time, particularly its depth, slope and stability. From the initial roundness of the pebbles and the very localized nature of the deposit, it has been suggested that the basin was on a shallow shelf, which became increasingly unstable with time, eventually resulting in the volcanicity and contemporaneous faulting seen in the overlying rocks.

[References](#)



(Figure 2.39) Map of the hinge-zone of the F1 Loch Awe Syncline at Kilchrenan, showing the principal exposures of the Kilchrechan Conglomerate Member of the Tayvallich Slate and Limestone Formation (after Borradaile 1973, 1977).



(Figure 2.40) The Kilchrenan Conglomerate in exposures on the bank of the Kilchrenan Burn. The clasts are of quartzite in a gritty, muddy matrix. Coin is 2 cm diameter. (Photo: J.E. Treagus.)