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# Achduart

[NC 046 044]–[NC 055 034]

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## Introduction

The Achduart GCR site, which lies about 5 km south-east of Achiltibuie (Figure 4.1), contains the type sections of the two upward-fining sandstone units that here form the lowermost part of the Applecross Formation — the Rubha Dubh Ard Member (40 m thick) and the Achduart Member (100 m thick). The bedding dips consistently at around 9° to the east and south-east, and the contact with the underlying Diabaig Formation is exposed. The Rubha Dubh Ard Member has been mapped across country from Loch Broom in the south, through Achduart, north to Loch Veyatie in Assynt, a distance of 25 km. The depositional history of these members is readily interpreted, but it gives a valuable insight into the processes responsible for the deposition of the Applecross Formation. Nicholson (1993) has studied the detailed sedimentology of the Rubha Dubh Ard Member.

## Description

The GCR site consists of a c. 2 km-long section, mostly of low, easily accessible coastal cliffs (2–20 m high), on the S- and W-facing sides of Rubha Dubh Ard (Figure 4.27). A cairn near the cliff top at [NC 0427 0380] is a useful landmark. Just south of the cairn, slightly above high-water mark, the basal erosion surface of the Applecross Formation rests on reddened grey siltstones of the Diabaig Formation that crop out on the W-facing cliffs north of the Rubha Dubh Ard.

The sandstones of the Applecross Formation at this locality belong to the Rubha Dubh Ard Member, the type section of which is seen in the cliffs between [NC 0426 0374] and [NC 0449 0355]. The lowest 20 m of this member consist of trough-cross-bedded, contorted coarse-grained reddish-brown sandstone with scattered durable pebbles, including red porphyry, up to 1.5 cm in size. The upper half of the member is much finer-grained, consisting of medium- to fine-grained brownish-grey tabular sandstone (Figure 4.28). Small-scale trough-cross-bedding, ripple-lamination, flat bedding with current lineations and shallow scours are common, and durable pebbles are present but generally less than 0.5 cm across. Palaeocurrents changed direction during deposition of the Rubha Dubh Ard Member, flowing towards the SSE in the lower part, south-east through most of the upper part, and north-east in the very top part (Nicholson, 1993; Stewart, 2002).

The base of the Achduart Member is seen immediately to the east at [NC 0449 0355]. The top of the Achduart Member is exposed on the coast south-east of Achduart at [NC 0526 0347], and the coast section between these two points constitutes the stratotype for this unit. The Achduart Member, which is about 100 m thick, is formed of very coarse-grained red sandstone with durable pebbles up to 2 cm in diameter. Grain size diminishes upwards, so that at the top the sandstone is medium-grained and only sparsely pebbly. Trough cross-bedding shows that palaeocurrents flowed towards the southeast, significantly different to the current directions in the Rubha Dubh Ard Member beneath, and in the undifferentiated Applecross Formation above, where the palaeocurrents flowed to the north-east. Nicholson (1993) has shown that cross-beds in the lowest 9 m of the Achduart Member are arranged in cosets 1–2 m thick, dipping to the SSE. The Applecross Formation above the Achduart Member is a uniformly coarse-grained sandstone with durable pebbles up to 3 cm in diameter, normally arranged in seams. Fining-upward units like the Rubha Dubh Ard and Achduart members have not been found at higher levels in the Applecross Formation.

## Interpretation

The Rubha Dubh Ard and Achduart members were originally interpreted as the deposits of alluvial fans with their apices on or near the Minch Fault, c. 85 km north-west of Achduart (Stewart, 1982). The lowest sediments in each member are

thought to have been channel sands, formed following uplift of Lewisian gneisses west of the fault. Subsequent tectonic quiescence led to progressive retreat of the fan heads westwards, with a consequent reduction in discharge, channel cross-section and grain size at any point on the fans. Fan-head retreat is also the probable cause of the progressive upward changes in palaeocurrent directions noted above, as Williams (1969a, 2001) showed in the Applecross Formation at Cape Wrath. Repeated reactivation of the fault scarp led to the re-establishment of fans and thus the repeat of fining-upward sequences (Stewart, 1982). Stewart (2002) and Stewart and Donnellan (1992) noted that the tentative correlation of the Rubha Dubh Ard Member and the Cape Wrath Member, as suggested by Williams (1969a), was untenable on geochemical grounds. Williams (2001) noted that the Cape Wrath Member only extends southwards as far as the Coigach area, and that the southern parts of the Applecross Formation correlate with the higher parts of the sequence farther north. He argued that Torridon Group deposition commenced first in the northern area with formation of a rift basin corresponding roughly to the present-day Minch.

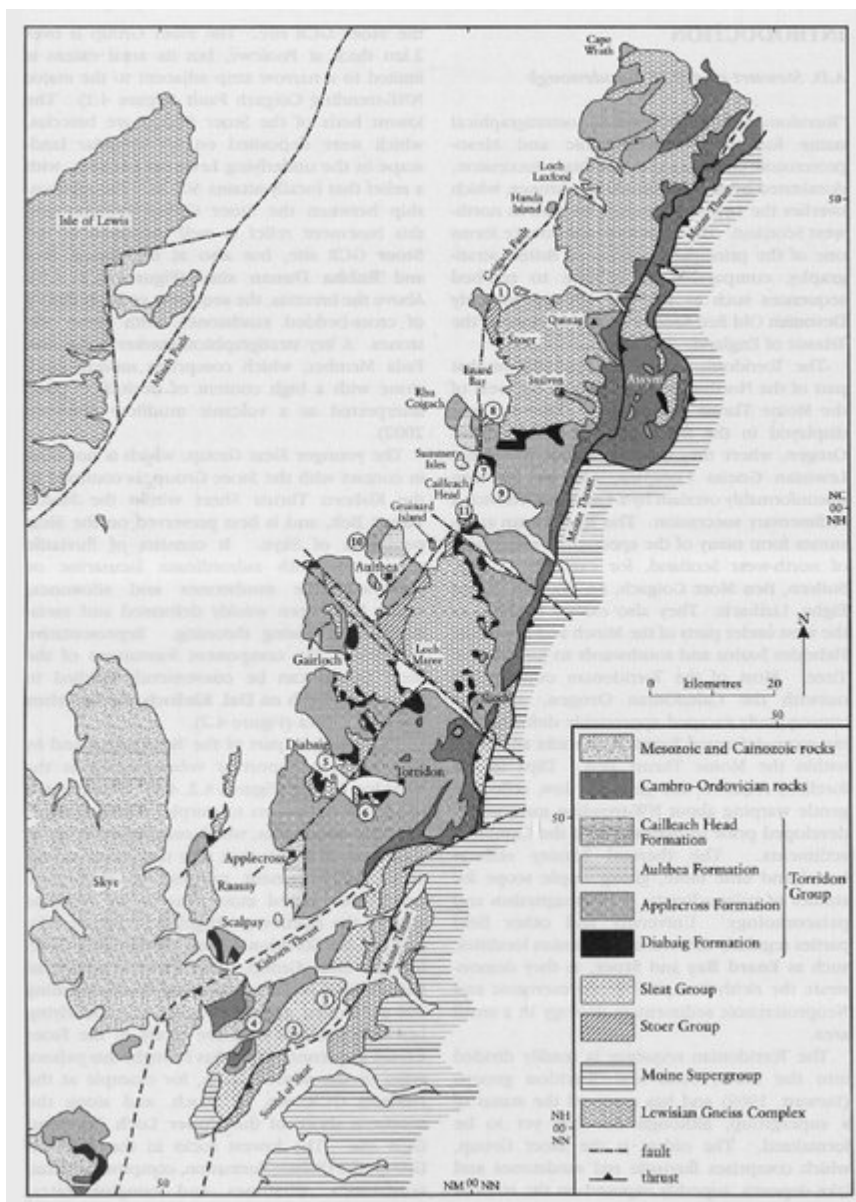
Nicholson (1993) has put forward a different hypothesis, interpreting the cosets of cross-bedded sandstone at the base of each member as having formed in large transverse bars in channels 3–9m deep. The tabular sandstones forming the upper part of the Rubha Dubh Ard Member were interpreted as deposits of sheet floods and waning-phase flows on a floodplain. Nicholson noted that the tabular sandstones and the cross-bedded sandstones interdigitate over a 2 m stratigraphical interval at one point, indicating the lateral equivalence of the two environments during sedimentation. These features were interpreted to suggest that the Applecross Formation sandstones were deposited on a large-scale braided alluvial plain. However, this hypothesis does not explain the wide regional extent of the two members, nor the fining-upward structure of the Rubha Dubh Ard Member that is present through most of its outcrop. The environment of formation of the lower units of the Applecross Formation is thus still a matter for debate.

Stratigraphically higher beds of the Applecross Formation can be seen east of Achduart, and Stewart (2002) has estimated that the total thickness of the formation is c. 1350 m between Rubha Dubh Ard and Strath Kanaid, where it is unconformably overlain by the Cambrian quartzites.

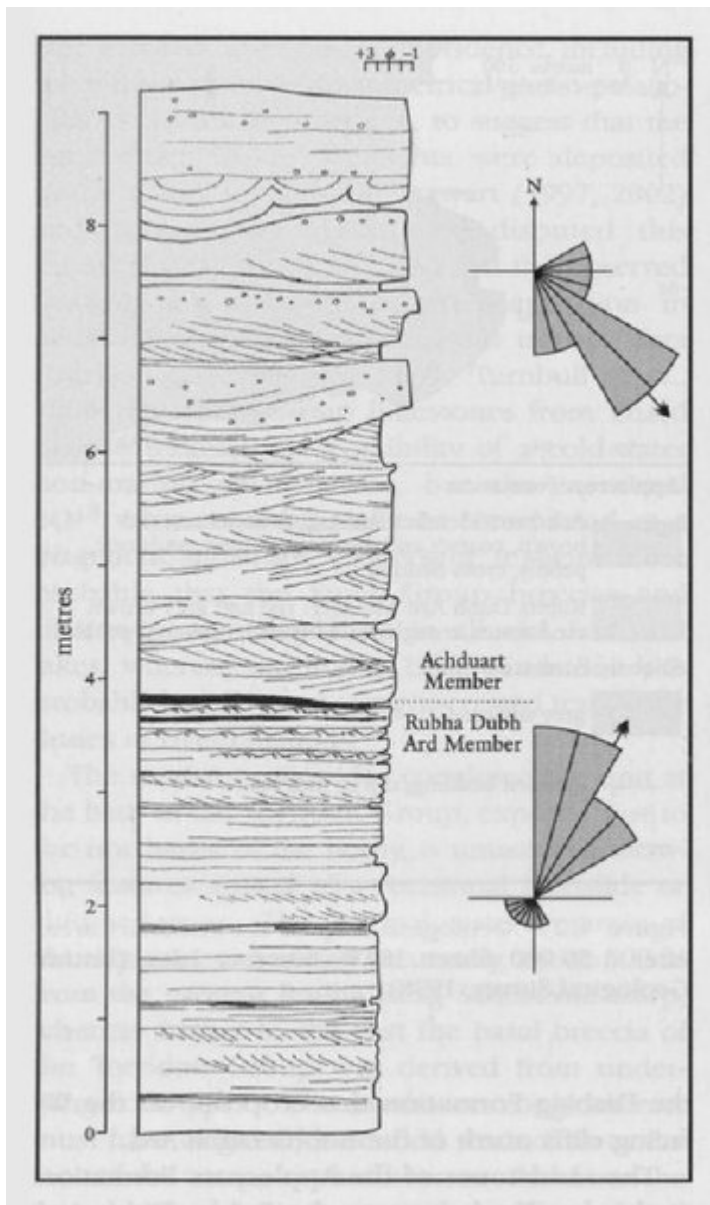
## **Conclusions**

The Achduart GCR site contains the type sections for the lower units of the Applecross Formation, termed the Rubha Dubh Ard and Achduart members. It is the best site for examination of two extensive, fining-upward Torridon Group sandstone units. The units have been variably interpreted as sections through large alluvial-fans (Stewart, 1982), or as deposits from a large-scale braided river system (Nicholson, 1993). The site is thus likely to be of continued national importance as it furnishes excellent sections in which the environments of deposition of the Torridon Group rocks can be studied.

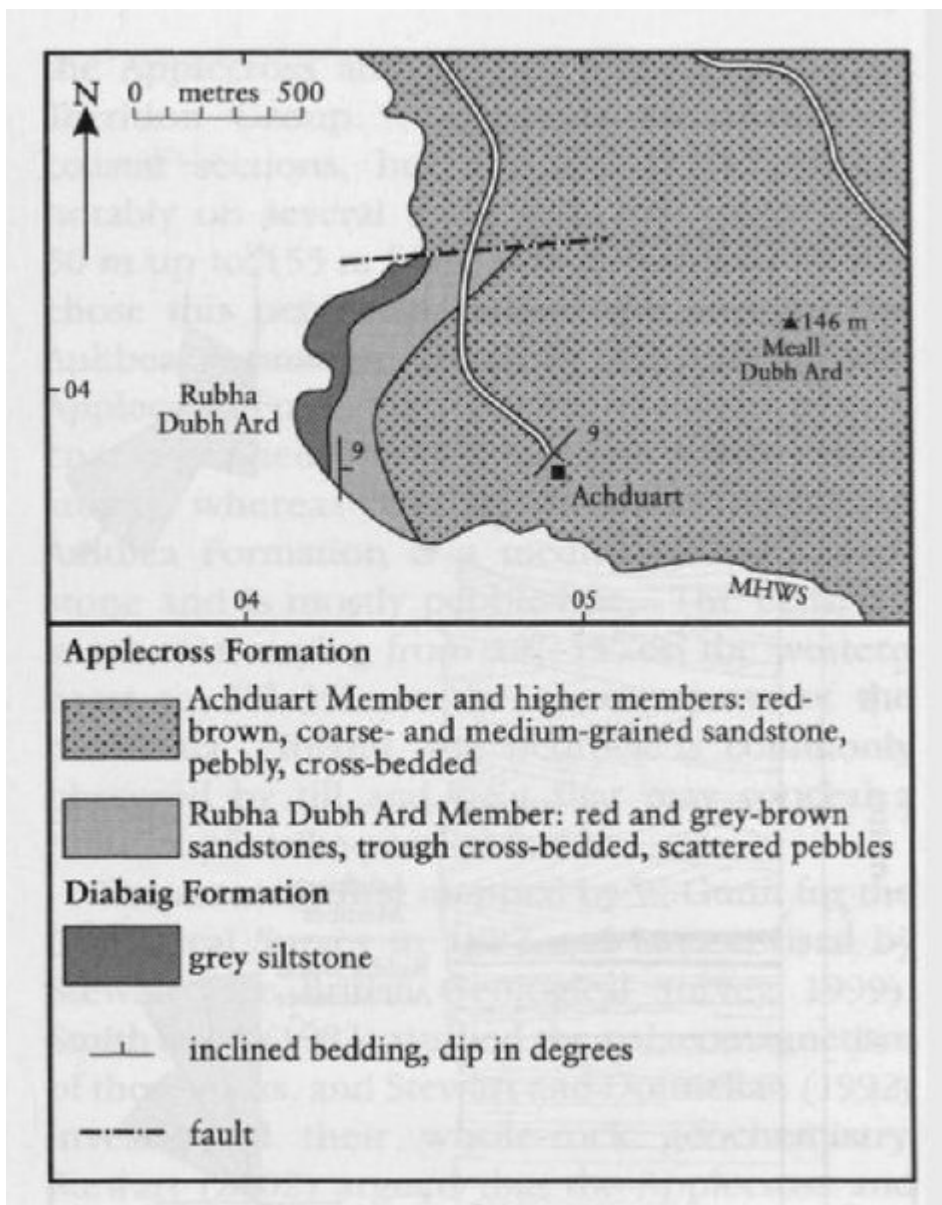
## **[References](#)**



(Figure 4.1) Geological map showing the distribution of the main stratigraphical divisions of the Torridonian in north-west Scotland and the location of GCR sites: 1—Stoer; 2—Loch na Dal; 3—Kylrhea Glen; 4—Loch Eishort; 5—Diabaig; 6—Upper Loch Torridon; 7—Rubha Dunan; 8—Enard Bay; 9—Achduart; 10—Aultbea; 11—Cailleach Head.



(Figure 4.27) Geological map of the Achduart area. After 1:50 000 Sheet 101W, Summer Isles (British Geological Survey, 1998).



(Figure 4.28) Graphic log of the contact between the Rubha Dubh Ard Member and the Achduart Member in the type section about 500 m west of Achduart [NC 0449 0355]. The grain-size scale at the top of the log spans +3 0 to —10 units (0.12–2mm). Fissile red siltstone is black on the log, and red sandstone is white. Sedimentary structures are illustrated schematically, but drawn as seen in the section. Pebbles over 1 cm across are shown. Rose diagrams, each based on 13 measurements of foresets, show palaeocurrent directions in the two members.