Corsewall Point

[NW 979 725]–[NX 023 730]

Introduction

Corsewall Point is the type area for the conglomeratic member of the Corsewall Formation of the Tappins Group (Floyd, 1996), the best-exposed boulder-conglomerate in the Southern Uplands of Scotland. The conglomerate contains fragments of a great variety of rock types and gives clear evidence of derivation from a varied terrane to the north-west. More controversial is the conclusion that most of the granite boulders originated from the area of north-west Newfoundland (Elders, 1987), implying extensive sinistral strike-slip (see below).

The Corsewall Formation occupies the northern extremity of the Rhins of Galloway. It is limited to the south by the south-western extension of the Glen App Fault and is well exposed around the coast, as described briefly by Peach and Horne (1899, p. 410). More detailed study by Kelling (1961) proposed that the Corsewall 'Group' be divided into a lower Flaggy Division, about 750 m thick, to the south, and a Conglomeratic Division above, to the north. He described the petrology and sedimentology in detail (Kelling, 1962), and Kelling *et al.* (1987, fig. 4) illustrated vertical and lateral facies variations by means of graphical logs of three sections. Granite boulders from the Corsewall. Conglomerates formed an important component of Elders' (1987) provenance studies, which have stimulated much further discussion. Stone (1995) gave a further account of the Corsewall Formation, including the regional geology and structural setting, and McCurry and Stone (1996, p. 127) provided a geological guide to the site.

Description

The conglomeratic member of the Corsewall Formation is exposed at the northern end of the Rhins of Galloway, from Corsewall Point to Milleur Point. The beds strike ENE to WSW and dip to the north at about 80°. The conglomeratic member overlies the flaggy greywacke member abruptly and is composed of packets, up to 25 m thick, of conglomerate beds that are commonly lenticular in form and 2–5 m thick. These are interleaved with massive coarse-grained and thinner-bedded greywacke units that resemble those of the underlying flaggy greywacke member. The conglomerates may be clast- or matrix-supported and show sedimentary structures, such as down-cutting or disruption of the underlying beds (Kelling, 1962, fig. 2), that indicate that the succession youngs to the north. The clasts in the conglomerates include a range of rock types, for example granitic and other igneous (felsitic, spilitic), sedimentary (greywacke, chert) and metamorphic rocks (Kelling, 1962, fig. 3). The clasts are generally rounded or subrounded and may be large — up to 1.5 m across (Figure 15.2).

Elders (1987) sampled the granitic clasts and grouped them into five types. The most distinctive were of foliated muscovite-biotite granite, and these gave a Rb-Sr whole-rock isochron indicating an age of 1265 ± 130 Ma. Two types of hornblende-biotite granite similarly gave ages of 603 ± 40 Ma and 600 ± 30 Ma, while Na-rich biotite granite clasts gave an age of 475 ± 20 Ma.

Interpretation

The Corsewall Formation is inferred, from along-strike correlation, to have been deposited during part of the *gracilis* graptolite zone (Stone, 1995, p. 9). Kelling *et al.* (1987) considered that the conglomerates were deposited from debris flows and high-density turbidity currents flowing directly (laterally) into the depositional trench from a north-west quarter, through a system of submarine channels that scoured the underlying greywackes. In contrast, the predominant indices of flow in the underlying flaggy greywacke member have a north-east to south-west trend and are taken to indicate flow along the axis of the trench.

The clasts in the conglomerate were derived from a varied source area with an acidic to intermediate plutonic basement, a clastic cover sequence and probable ophiolitic rocks. The larger of the boulders, though rounded, are unlikely to have been transported any great distance, so their provenance has a particular bearing on local palaeogeography and has been a matter of discussion. Elders (1987) was unable to match the older of his granite clasts (1265 Ma) with any Scottish or Irish source but compared them closely with plutons intruded into Grenville-age rocks in north-west Newfoundland. He was also able to match his younger (475 Ma) granites with a Newfoundland pluton, though not his 600 Ma clasts. In order to bring north-west Newfoundland sufficiently close to the Southern Uplands to derive the granite clasts locally, he invoked major sinistral strike-slip of about 1400 km.

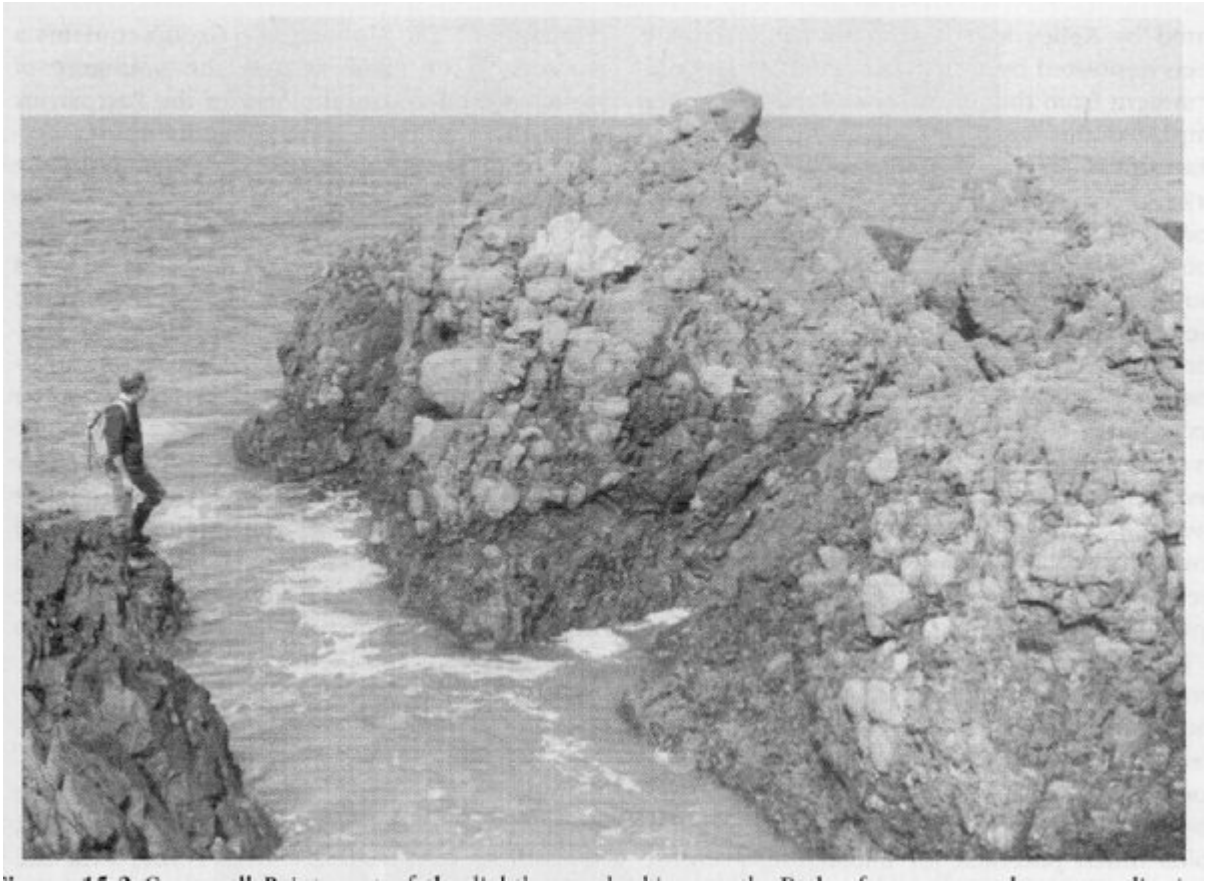
Elders' conclusions were challenged by Winchester and Max (1989), who identified a possible source for the 1230 Ma granitoid rocks in the Annagh Division, north-west County Mayo, Ireland. If, as they suggest, the Armagh Division is part of a Proterozoic basement complex that underlies a large area of north-west Britain, the source of some at least of the Corsewall conglomerate boulders may lie much closer than north-west Newfoundland. Kelley and Bluck (1989), having sampled rocks in the Rhins of Galloway (though citing only one sample from the Corsewall Formation), failed to find any detrital mica as old as the older of Elders' granite clasts; they contended that if the granite clasts were derived from north-west Newfoundland, Grenville-age micas should also have been present in the detritus. This was further discussed by Armstrong *et al.* (1996). Elders (in Elders *et al.,* 1990) considered that the mica dated by Kelley and Bluck was likely to have been deposited by a different (axial) sedimentary system from that of the lateral mass-flow that emplaced the large granite clasts. Owen and Clarkson (1992) likewise challenged Elders' strike-slip hypothesis on the grounds that transported shelly faunas in the northern part of the Southern Uplands are very similar to those found *in situ* in areas immediately north-west of the Southern Upland Fault at Girvan and Pomeroy, Ireland (see also Scrutton *et* al., 1998). They considered that this limits the possible strike-slip to a much smaller distance than that invoked by Elders. McKerrow and Elders (1989) have suggested that much of the strike-slip they envisage was taken up on the Highland Boundary Fault, to the north of Girvan, reducing the proposed movement on the Southern Upland Fault to 'around 400 km'.

There remains much uncertainty about the provenance of material that makes up the Southern Uplands Terrane, but it is clear that the varied detritus in the conglomerates of the Corsewall Formation, because it is relatively little-travelled and comes from a known direction, holds much potential for elucidating a critical problem in the understanding of the Ordovician palaeogeographical setting of the Southern Uplands.

Conclusions

The Corsewall Conglomerate is the best-exposed and most fully studied conglomerate body in the Ordovician of the Southern Uplands Terrane. Interpretation of the sedimentology indicates relatively local derivation of the coarser material, including boulders of a variety of granites, but the extent to which this can be used to infer extensive strike-slip on the Southern Upland Fault is debated. The site will continue to be vital to the resolution of these problems.

References



(Figure 15.2) Corsewall Point, east of the lighthouse, looking north. Beds of coarse conglomerate, dipping steeply and slightly overturned. Most of the large pale boulders are acid volcanic rocks and various granites. (Photo: British Geological Survey photographic collection, D4070.)