
5 Blargie Craig

[NN 587 938]–[NN 608 955]

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5.1 Introduction

The Blargie Craig GCR site contains one of two recently discovered exposures, where there is evidence for the existence of an unconformity separating Grampian and Appin group Dalradian strata from an underlying crystalline basement of Moine-like affinity. The major break in sedimentation that this represents is critical to the elucidation of both the geometry of Dalradian sedimentary basins in the Northern Grampian Highlands and their subsequent deformation during the Caledonian Orogeny (Harris *et al.*, 1994; Smith *et al.*, 1999; Strachan *et al.*, 2002). Additionally, the site preserves features of the Grampian Shear-zone.

Variably gneissose rocks at Blargie Craig that have been deformed in the Grampian Shear-zone (previously termed the Blargie Slide), are cut by veins of pegmatitic granite that have yielded radiometric ages of *c.* 750 Ma. These have been interpreted as recording a Neoproterozoic deformation episode (Temperley, 1990). The recognition of Neoproterozoic deformation here and elsewhere in the Northern Grampian Highlands has been fundamental to the delineation of a series of inliers of older 'basement' to the Dalradian 'cover', previously referred to as the Central Highland Division (Piasecki, 1980), the Central Highland Migmatite Complex (Stephenson and Gould, 1995) or the Glen Banchor and Dava successions (Smith *et al.*, 1999). Those 'successions' have now been formalized as subgroups of the Badenoch Group. The Blargie Craig GCR site includes part of the Laggan Inlier, which is the largest and most southerly of these 'basement' inliers.

The basement–cover interpretation did not gain widespread acceptance; Lindsay *et al.* (1989) considered that a 'metamorphic front' separated the purported basement from its 'cover' and thereby envisaged a single continuous Dalradian succession. More recently however, Smith *et al.* (1999) and Robertson and Smith (1999) have shown that the lower part of the Dalradian, namely the Grampian Group and parts of the Appin Group were deposited unconformably on a pre-Dalradian sedimentary succession, which is now exposed in upstanding interbasin 'highs'. The Laggan Inlier exposes one of these 'highs' and is comparable to the Kincaig Inlier, which includes the *An Suidhe* GCR site.

The GCR site includes a wide range of lithologies, which are well exposed in glaciated SE-facing crags and small cliffs rising to an elevation of 750 m in the upper Spey Valley (Figure 5.13)a. A consistent sub-parallel outcrop pattern, steep to vertical strata and large-scale, upright, tight to isoclinal folds with highly attenuated limbs indicate that the site lies within the NE-trending deformation zone termed the Geal-charn–Ossian Steep Belt (see 1.4.2 in *Introduction*). The youngest strata are assigned to the Appin Group and include metalimestone and quartzite, amphibolite and semipelite. In many places across the Grampian Highlands (e.g. Kinlochleven, Bridge of Brown), these strata rest conformably on psammite and semipelite of the Grampian Group. In contrast, in the lower ground around Coull Farm, south-west of Blargie Craig, glaciated mounds and roches moutonnées preserve Appin Group strata resting unconformably on the older Glen Banchor Subgroup, with no intervening zone of shearing or high strain. In this area, the Grampian Shear-zone, including the dated pegmatitic granite veins, occurs wholly *within* the Glen Banchor Subgroup rocks.

The regional geology of the area was described briefly by Anderson (1956) and Temperley (1990) and a description of Blargie Craig is included in an excursion guide (Piasecki and Temperley, 1988b). The primary survey of the area was completed between 1996 and 1999 (BGS 1:10 000 sheets NN59NE, NN59SE, NN69NW and NN69SW) and is included in the BGS 1:50 000 Sheet 63E (Dalwhinnie, 2002) but, other than the maps, little information has been published. This site report is based upon the authors' observations and acknowledges numerous discussions with J.R. Mendum.

5.2 Description

The GCR site extends from Coul Farm north-eastwards for about 3 km to Gergask Craig and includes key sections at Blargie Craig and Coull Farm (Figure 5.13)a.

The site contains three principal lithostratigraphical units (Figure 5.13)a. The oldest comprises variably gneissose interbanded semipelites, psammites and quartzites of the Glen Banchor Subgroup. These are separated from grey flaggy non- to weakly-gneissose psammites and semipelites of the Corrieyairack Subgroup of the Grampian Group to the north-west by a narrow outcrop of semipelite, quartzite, amphibolite and metalimestone assigned to the Aonach Beag Semipelite and Coire Cheap formations of the Appin Group (Robertson and Smith, 1999). The effects of recrystallization during amphibolite-facies metamorphism have largely obliterated the original sedimentary textures in the older rocks and no way-up evidence has been found in the Glen Banchor Subgroup. In the Grampian and Appin group rocks, bedding profiles and rare sedimentary structures provide reliable younging evidence. Within the GCR site, the Appin Group strata young consistently away from the Glen Banchor Subgroup strata (Figure 5.13)b.

In its type area, farther north-east in Glen Banchor, the Glen Banchor Subgroup comprises four informal units, all of which are present in the area around Blargie Craig. These units are similar to lithologies described at the *An Suidhe* and *The Slochd* GCR sites but detailed correlations have yet to be established. The structurally lowest unit is the Creag an Loin Psammite, which is exposed south of the River Spey around Dalchully House [NN 5945 9375]. It comprises medium- to coarse-grained gneissose and migmatized interbanded psammite and semipelite. Granitic leucosomes of quartz and feldspar are sheathed with biotite-rich melanosomes imparting a stromatic texture. The semipelite is biotite, muscovite and garnet bearing. In Glen Banchor, these strata are in conformable contact with the An Stac Semipelite, e.g. on Sron Mor na h-Uamhaidh [NN 638 977]. The An Stac Semipelite, clearly displayed in cliff sections at Gergask Craig [NN 6121 9535] and north of Blargie [NN 6008 9512], consists of medium-grained gneissose muscovite-and-garnet-bearing semipelite with thin ribs of quartzite and calcsilicate rock and is intensely veined by granite and quartzofeldspathic pegmatite. Banding is defined by rare bands of dark-grey micaceous psammite. Close to contacts with adjacent units, the semipelite is finer grained, interbanded with micaceous psammite and more schistose in appearance. It contains the assemblage, garnet-muscovite-kyanite-fibrolite and, where strongly sheared, for example near Coul Farm and on Blargie Craig, it has lenticular ribbons of silvery muscovite, quartz-feldspar augen and plates and veins of quartz. This unit everywhere hosts the pegmatitic granite veins that characterize the Grampian Shear-zone.

The structurally highest unit in the Glen Banchor Subgroup is the Creag Liath Psammite, comprising K-feldspar-bearing medium-grained gneissose banded psammite and siliceous psammite. Minor lithologies include quartzite. Porphyroblasts of microcline up to 0.5 cm in diameter are common and impart a pebbly appearance to the rock and along joint faces. A minor but very distinctive unit of gneissose feldspathic quartzite, referred to as the Blargie Quartzite Member, generally occurs at the lower boundary of the Creag Liath Psammite Formation, although thin developments of this lithology are also noted within the An Stac Semipelite Formation. The quartzite is typically white to pale brown, well jointed, feldspathic and migmatitic with abundant microcline and thin interbeds of banded gneissose psammite and rare semipelite. Elongate irregular lensoid bodies of medium-grained amphibolite are developed sporadically throughout the Glen Banchor Subgroup. They are generally a few tens of metres in diameter but can reach up to 100 m in length e.g. at Blargie Farm [NN 6018 9465].

The Grampian Group strata include metasedimentary rocks assigned to the Loch Laggan Psammite, Ardair Semipelite and Creag Meagaidh Psammite formations of the Corrieyarack Subgroup, which are poorly exposed to the north-west of the site e.g. in the Allt Tarsuinn Mor [NN 5873 9622] and Allt Tarsuinn Beag [NN 5840 9530]. These strata comprise, in varying proportions, well-bedded blocky grey psammite with thin semipelite and ribs of calcsilicate rock. Grading profiles defined by weathering of muscovite-rich semipelite bands indicate a consistent regional sense of right way-up and stratigraphical younging away from the underlying Glen Banchor Subgroup. The *Rubha na Magach* GCR site report contains further descriptions of these lithologies.

The youngest strata in the Blargie area are assigned to the Aonach Beag Semipelite and Coire Cheap formations of the Appin Group on a combination of lithological and geochemical criteria (see 'Interpretation'). They are in mappable continuity with strata farther west, which include the Kinlochlaggan Boulder Bed and Quartzite and are of undoubted

Appin Group affinities (see the *Allt Mhainisteir* and *Kinloch Laggan Road* GCR site reports) (Evans and Tanner 1996; Robertson and Smith 1999). The Aonach Beag Semipelite Formation is dominated by interbanded rusty-weathering schistose semipelite and micaceous psammite but also includes blocky white quartzite and quartzose psammites, some of which are pebbly. Concordant thin sheets of garnet amphibolite are abundant, particularly close to the boundary with the Glen Banchor Subgroup. At [NN 5915 9524], a small outcrop of metacarbonate rock, calcsilicate rock and semipelite is well exposed in and around three small quarries where limestone has previously been extracted. These rocks are assigned to the Coire Cheap Formation on the basis of their whole-rock geochemistry and $^{87}\text{Sr}/^{86}\text{Sr}$ initial isotopic ratios, which are consistent with younger Appin and Argyll group metacarbonate rocks (Thomas *et al.*, 1997; Thomas *et al.*, 2004). Minor exposures of white quartzite occur in the vicinity of the contact with the Aonach Beag Semipelite Formation. The quartzite, which might be the Kinlochlaggan Quartzite Formation, is only a few metres thick compared with up to 160 m seen at the *Allt Mhainisteir* GCR site.

The contacts between the above strata are generally poorly exposed and are commonly highly attenuated by deformation. However, north of Coul Farm (at [NN 5870 9425]) the critical contact between Appin Group and Glen Banchor Subgroup strata is well exposed in a series of *roche moutonnée* exposures (Figure 5.14). A sharp and concordant boundary separates striped gneissose psammite with micaceous laminae and thin layers of quartzose psammite of the Creag Liath Psammite from schistose semipelite and micaceous psammite with abundant garnet amphibolite sheets of the Aonach Beag Semipelite Formation. Thin calcsilicate layers occur at the contact. The outcrop of this contact is repeated a number of times by upright isoclinal folds (Figure 5.13)b and is also well exposed some 5 km to the north-east at Margie na Craig in upper Glen Banchor [NN 6202 9780].

Zones of high ductile strain typical of the Grampian Shear-zone are present within the An Stac Semipelite c. 30–40 m below the unconformity at the locality described above. Similar features are also well exposed at Blargie Craig along the contact between the An Stac Semipelite and the Blargie Quartzite (Piasecki and Temperley, 1988b). As at the *An Suidhe* and *The Slochd* GCR sites, the Grampian Shear-zone is characterized by the progressive attenuation of lithologies with transposition into parallelism of all lithological and structural features. Mylonites are also present and exhibit grain-size reduction and segregation of quartz into subconcordant ‘plates’ together with the development of tabular garnets. Porphyroblasts of quartz, K-feldspar, muscovite and garnet have grown within the zones of quartz ‘plates’. Thin sheets and thicker veins of pegmatitic granite are developed within the high-strain zones and Rb-Sr dates on muscovite books within these indicate ages of c. 750 Ma (Piasecki and van Breemen, 1983).

Throughout the GCR site the lithological layering, axial surfaces of folds and associated tectonic fabrics are coplanar due to deformation within the Geal-charn–Ossian Steep Belt (Robertson and Smith, 1999). Overall the structure is one of a syncline–anticline pair with numerous parasitic folds on the limbs, many with sheared long limbs. The main gneissosity of the Glen Banchor Subgroup strata probably reflects an early compositional variation and is in places deformed by isoclinal folds, some of which are rootless. This gneissosity and the early bedding fabrics (S0) of the Grampian and Appin group strata are overprinted, transposed and re-orientated into the main S2 foliation, which is axial planar to the numerous minor tight to isoclinal folds that are commonly seen in exposures. An upright S3 crenulation records the final deformation event to have affected all strata. Mineral assemblages, particularly in the semipelitic strata, indicate that both the early gneissosity and the S2 deformation occurred under amphibolite-facies metamorphic conditions.

5.3 Interpretation

Blargie Craig, originally recognized for the preservation of high-strain lithologies and features of the Grampian Shear-zone (Piasecki and van Breemen, 1983; Piasecki and Temperley, 1988b), can now be placed in a wider lithological and structural context.

Following the completion of the primary survey, the lithologies of the Laggan Inlier and its surrounding strata can now be fitted into the regional framework. On the BGS 1:50 000 Sheet 63E (Dalwhinnie, 2002), definite Grampian Group strata are spatially separated from an older basement succession by a heterolithic sequence containing quartzites and metalimestones (Figure 5.13)b. This sequence has lithological similarities to the Kincaig Formation of the Corrieyairack Subgroup at the *An Suidhe* GCR site. Accepting such a correlation would place an emphasis and focus on the Aonach

Beag Slide as an important discontinuity or thrust structure juxtaposing basement rocks against a thin cover of upward-facing and locally overturned basal Grampian Group strata (Figure 5.13)b. However, the quartzites are distinctively thicker and whiter in colour and the semipelites are rusty weathered and less segregated than those in the Kincaig Formation and, most significantly, the metalimestones have chemical signatures consistent with those in the Appin Group (Thomas *et al.*, 1997). The sequence was therefore assigned to the Appin Group by Robertson and Smith (1999).

If the above correlation is accepted, then there is good evidence along the north-western margin of the Laggan Inlier for major stratigraphical omission across an unconformity between the Appin Group strata and an older 'basement'. Although less clearly evidenced than at the *An Suidhe* GCR site, due to the intensity of the regional deformation, the basement Glen Banchor Subgroup strata are affected by a gneiss-forming event prior to deposition of the Grampian and Appin groups and thus the contact is an orogenic unconformity. The actual plane of the unconformity, as exposed north of Coul Farm, is unremarkable. There is no evidence for an angular discordance, or for conglomerates at the base of the younger succession. But across the contact, some 5–6 km of Grampian Group strata are absent. Structurally, there is no evidence (i.e. down-dip lineations, mylonites, veining etc) for the contact being a major thrust. High ductile strains associated with the Grampian Shear-zone are preserved only within Glen Banchor Subgroup strata.

Regionally the Blargie Craig GCR site lies within the Geal-charn–Ossian Steep Belt. On the basis of opposing facing directions, Thomas (1979) originally interpreted this major structure as a primary root-zone to the major nappes of the Central and Northern Grampian Highlands. It forms the boundary between two contrasting structural domains, with primary upright structures to the north-west and recumbent folding to the south-east and has been re-interpreted as a zone of partitioned strain, where shortening during the Caledonian Orogeny was focused along an intrabasinal high (Smith *et al.*, 1999; Robertson and Smith, 1999). The steep belt has overprinted and transposed all minor structures and fabrics within all strata. Evidence cited by Piasecki (1980) from elsewhere in the Northern Grampian Highlands, which suggests that the Glen Banchor Subgroup rocks experienced a more-complex tectonothermal history, is difficult to confirm, although the presence of an early gneissosity contrasting with the preservation of bedding in Grampian Group strata supports a tectonic break. The Grampian Shear-zone, as at other GCR sites, is represented by thin zones of enhanced ductile strain and fluid-enhanced metamorphism and mineral growth within the Glen Banchor Subgroup only. The timing of fabric-forming events, as evidenced by zircon and monazite growth, is uncertain and remains to be proven conclusively.

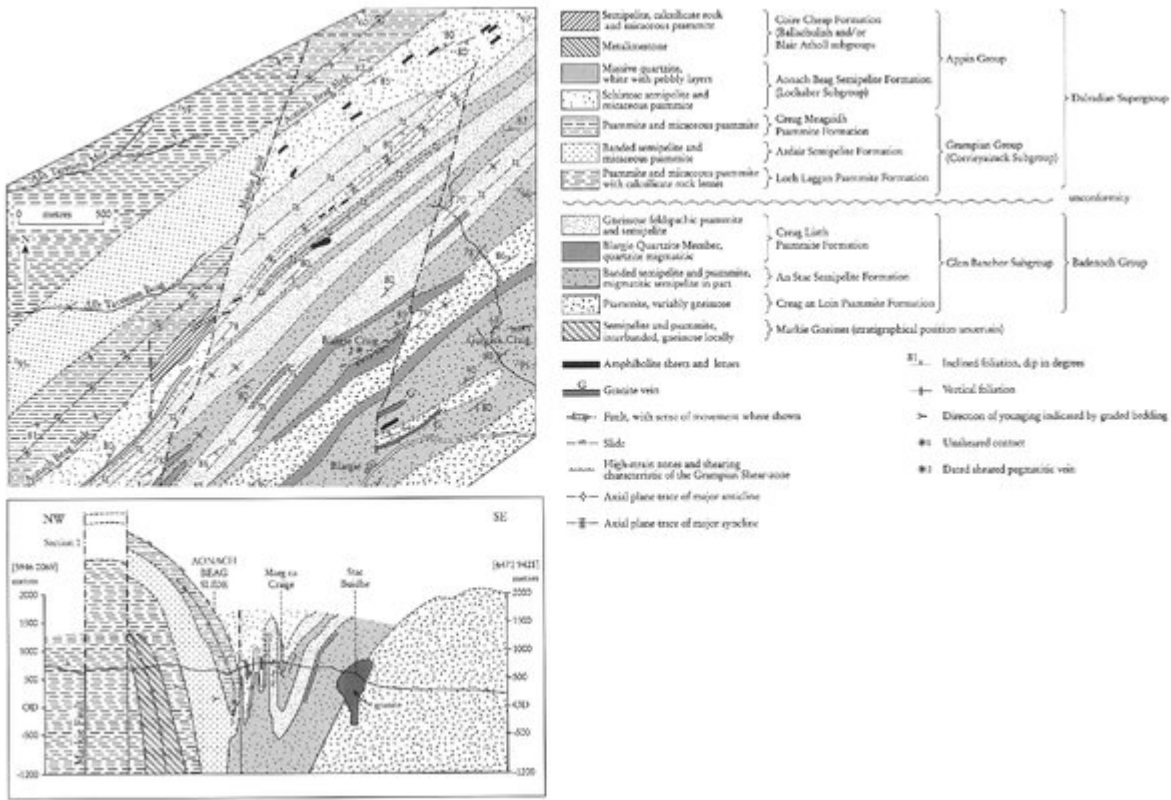
5.4 Conclusions

The Laggan Inlier, represented by the Blargie Craig GCR site, is possibly unique in the Proterozoic record of Scotland in that it preserves one of the few recorded exposures of the contact between a 'basement' of essentially Moine-like rocks and a 'cover' of Grampian and Appin group metasedimentary rocks. The stratigraphical omission of more than 5 km of Grampian Group strata is interpreted as resulting from non-deposition on an intrabasinal high during Neoproterozoic rifting events (post 800–750 Ma). Subsequent deformation during the Grampian Event of the Caledonian Orogeny (470–450 Ma) partitioned strain between the basin and its margin. The site therefore highlights the challenges involved in identifying primary lithological, orogenic and structural relations in a zone of intense strain in which all fabrics have been transposed into a common upright orientation.

This GCR site is representative of the basement Glen Banchor Subgroup of the Badenoch Group and preserves excellent examples of the key lithologies of both this and its Dalradian cover. Sheets of pegmatitic granite within the Grampian Shear-zone have yielded key radiometric dates, which were crucial in the initial identification of the older basement.

If the Badenoch Group successions described in *The Slochd*, *An Suidhe*, and *Blargie Craig* GCR site reports are to be correlated with the Moine Supergroup of the Northern Highlands Terrane, then the present understanding of their contact with Dalradian strata could question the validity of identifying separate Northern Highlands and Grampian terranes.

[References](#)



(Figure 5.13) (a) Map of the area around the Blargie Craig GCR site, incorporating part of the Laggan Inlier after BGS 1:10 000 sheets NN59NE NN59SE, NN69NW and NN69SW (1997). (b) Generalized cross-section across the Laggan Inlier showing general distribution of lithologies and structure, drawn 4 km north-east of Blargie Craig, from BGS 1:50 000 Sheet 63E (Dalwhinnie, 2002).



(Figure 5.14) Glacially smoothed exposure in the Blargie Craig GCR site, showing contact between the Aonach Beag Semipelite Formation of the Appin Group (left) and the Craic Liath Psammite of the Glen Banchor Subgroup (right). The hammer shaft (35 cm long) lies along the inferred unconformity. Locality 250 m north-west of Coul Farm at [NN 5870 9425]. (Photo: BGS No. P 611930, reproduced with the permission of the Director, British Geological Survey, © NERC.)