PREGLACIAL RELIEF ELEMENTS IN THE GAICK FOREST

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Morphology

The area covered in this field guide includes the main watershed of the central Grampians. At its heart lies the Gaick Forest, an area of high plateau that is the headwater source for the Geldie-Dee, the Garry and major right bank tributaries of the Tay. Glacial erosion of the plateau has been largely confined to the deepening of major valleys. Significant erosion by meltwater has created deep and narrow valleys on the flanks of the Gaick plateau, for example above Gaick Lodge. The restricted extent of these features allows the main features of the preglacial relief to be reconstructed with confidence (Fig. 2).

The main valleys were all in existence before glacial modification:

- The Geldie-Dee is the least-modified by ice, with extensive valley benches representing the pre-Quaternary valley floor at ca. 600 m OD that extend into the upper Tilt and the basin at the head of the Feshie (Linton, 1949b, 1950a).
- The Tarf and its former headwaters can be traced to the heart of the Gaick Forest. This remote and hidden W-E valley formerly drained ca. 100 km² of ground before turning north to join the Geldie and Dee (Linton, 1950b).
- The Garry and its left-bank tributaries, the Edendon, Bruar and Tilt, drained the Atholl Depression (Linton, 1951), with a floor at 400-500 m backed by steep valley heads cut into the margins of the northern watershed. These valley heads are well seen in the Dalnamein Forest, where the curvature of ridge crest contours leaves no doubt about the steepness of the preglacial slopes. The configuration is especially clear in Gleann Diridh, where valley benches at 500 m in Glen Tilt can be linked to a deep basin-like valley head at ca. 700 m OD and set ca. 150 m below the surrounding ridges.
- The Spey is the most heavily modified by ice, with extensive moulding of spurs and isolation and plucking of resistant rock knobs on the floor of Strathspey. Remnants of valley benches at 500 m OD at Dalwhinnie and dropping to 300 m OD at Dalwhinnie preserve the original form of the open strath. The Pattack opens to a broad basin at ca. 520 m at the foot of Ben
Alder. The Truim extended to a col at Drumochter at a former height of ca. 600 m.

These valleys have long been recognised as fundamental and long-established elements of the drainage system of the Scottish Highlands (Bremner, 1942; Linton, 1951; Hall, 1991). The straths generally do not correspond with known structural lineaments, in contrast to local glacial breaches. The eastward flowing streams, in particular, appear discordant to regional structures, implying superimposition.

The high ground of the Gaick Forest, Beinn Dearg and the Beinn a'Ghlo hills is bounded by major breaks of slope (Fig. 2) (Sissons, 1974). To the north, the hills north and south of the Geldie rise some 300-400 m above the preglacial floor of the Geldie. The east of Drumochter is characterised by little more than bumps on a plateau which is bounded to the west by a scarp some 400 m high. The northern margin of the Atholl Depression is a slope some 200 m high that drops from 600 m OD approaching Drumochter to 400 m OD at Killiecrankie.

The high ground shows a variety of forms. The west Drumochter hills were largely isolated from each other before glaciation by valley deepening to form a number of SW-NE trending ridges. The Gaick Plateau experienced little preglacial dissection, although valley incision had extended north towards An Dùn and was threatening the capture of the Tarf headwaters. The eastern hills, including the granite of Beinn Dearg and the quartzite of Beinn a’Glo, stood above the surrounding ridges at 750-800 m.

The gross morphology of the study area is thus one of broad straths or basins, a major break of slope and an upper relief of plateau, ridges and isolated hills (Fleet, 1938). The incision of the headwaters of the Garry suggests a response to a phase of regional uplift which, coupled with the lack of incision of the adjacent Spey and Dee headwaters may imply that this event occurred not long before the onset of regional glaciation. The scale and location of the straths, extending close to the main central Grampian watershed, suggest a long period of development, perhaps including the long period of tectonic stability and warm climate in the Middle Miocene. The higher slopes must postdate the main phase of Palaeocene to early Eocene uplift of the Scottish Highlands.

Deep weathering
The Gaick Forest preserves remarkable depths of chemically weathered Moine psammites, exceeding 10 m at a number of localities (Barrow et al., 1913; Hall and Mellor, 1988). The degree of chemical alteration is modest, with retention of feldspar and biotite residues, and there is little variation with depth. Clay minerals include halloysite and the presence of extensive staining with manganese oxides implies a period of poor drainage. The weathering is found not only on the high plateau east of Gaick Lodge but also on the lower watershed of the Feshie and Truim. The age of the weathering is uncertain. It is overlain by till and glacifluvial sands and gravels and therefore must predate at least one period of glaciation. Its depth and the occurrence of halloysite imply that the weathering is much older. The evidence of water logging at sites that have been rendered free-draining by fluvial incision associated with Quaternary canyons of adjustment (Kleman and Stroeven, 1997) implies that the weathering may predate regional glaciation (Hall and Mellor, 1988).

The Gaick regolith prior to glaciation thus appears to have been 10-20 m thick in places. The south face of Sgor Dearg above Gaick Lodge shows however that regolith depth on the plateau today is variable and must have been so in the past. The regolith is 0-30 m deep, reaching maximum depths in clefts picked out by gullying. Locally, weathered rock passes down into rock that has disintegrated into blocks (Hall and Mellor, 1988). This blocky disintegration is widely exposed by streams on the margins of the plateau and may itself reach depths of several tens of metres. The disintegration is partly a response to stress release from the removal of overburden as the rock can be seen to become more competent with depth, as on the slopes of Coire Chuaich. It probably also reflects lithological controls, with feldspar-poor quartz biotite psammites showing a propensity to produce slabs and blocks (Barrow et al., 1913). The ease of removal of both the sandy weathered rock and the blocky disintegration is a key factor in accounting for the considerable depths of valley heads and of the Quaternary canyons of adjustment.