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# Randel Crag

[NY 253 295]

Potential GCR Site

## Introduction

Randel Crag is the most prolific locality for fossils of the upper part of the *gibberulus* Zone. It is the type locality for the stratigraphically and nomenclatorially important graptolite species *Isograptus gibberulus*.

The Kirk Stile Formation consists of dark-coloured, laminated mudstones and siltstones with relatively little sandstone. At about 2 km thick, it is the thickest division of the Skiddaw Group and occupies much the largest part of the outcrop (Cooper *et al.*, 1995). The stratigraphy is difficult to elucidate because of folding, faulting and the paucity of mappable subdivisions. However, graptolite faunas and acritarch floras, where available, offer some means of relating individual fault-blocks. Following Cooper *et al.* (1995, p. 191), the faunas of the Kirk Stile Formation are, in upward succession, referred to the *gibberulus* Zone and the *hirundo* Zone, with the *artus* Zone present locally (see Outside). Randel Crag exposes part of the Kirk Stile Formation estimated to be 1–1.2 km above the base of the formation and now assigned to the upper part of the *gibberulus* Zone.

## Description

Randel Crag is a shoulder of the north-west flank of Skiddaw, about 900 m from the summit ('4' in (Figure 11.1)). It exposes a considerable thickness of dark-coloured laminated mudstones and siltstones; these are distal muddy turbidites typical of the Kirk Stile Formation. They strike ENE–WSW but with variable dip, although commonly steeply southwards. In places the cleavage is nearly parallel to the bedding and the rock splits into large plates. Thermal alteration by the Skiddaw granite, strong near Skiddaw itself to the south-east, is here evinced by multitudes of minute pale crystals of andalusite. The rock is somewhat hardened and there are old slate trials nearby. Masses of scree litter the north and west sides of Randel Crag, and were no doubt the source of many of the graptolites in museums labelled 'Randel Crag'.

The graptolite fauna is dominated by extensiform didymograptids, referred here (with doubt) to *Expansograptus*: *E. extensus linearis* (Monsen), *E. nitidus* (Hall), *E. hirundo* (Salter), *E. cf. goldschmidti* (Monsen, of Kraft), *E. ? cf. uniformis* (of Elles and Wood). Numerous specimens of *Pseudophyllograptus angustifolius* (Hall), *Tetragraptus* species, *Pseudotriconograptus ensiformis* (Hall) and various multiramous dichograptids have been collected. Isograptids occur rarely, but, following Jenkins (1982), Randel Crag is the type locality for *Isograptus caduceus gibberulus* (Nicholson), which is the type species of the stratigraphically valuable genus *Isograptus*. Other fossils found here include numerous *Caryocaris wrightii* (Salter) and a few trilobites, namely the type of *Iliaenopsis harrisoni* (Postlethwaite and Goodchild) and species of the cyclopygids *Cyclopyge*, *Microparia* and *Psilacella* (Fortey *et al.*, 1989).

## Interpretation

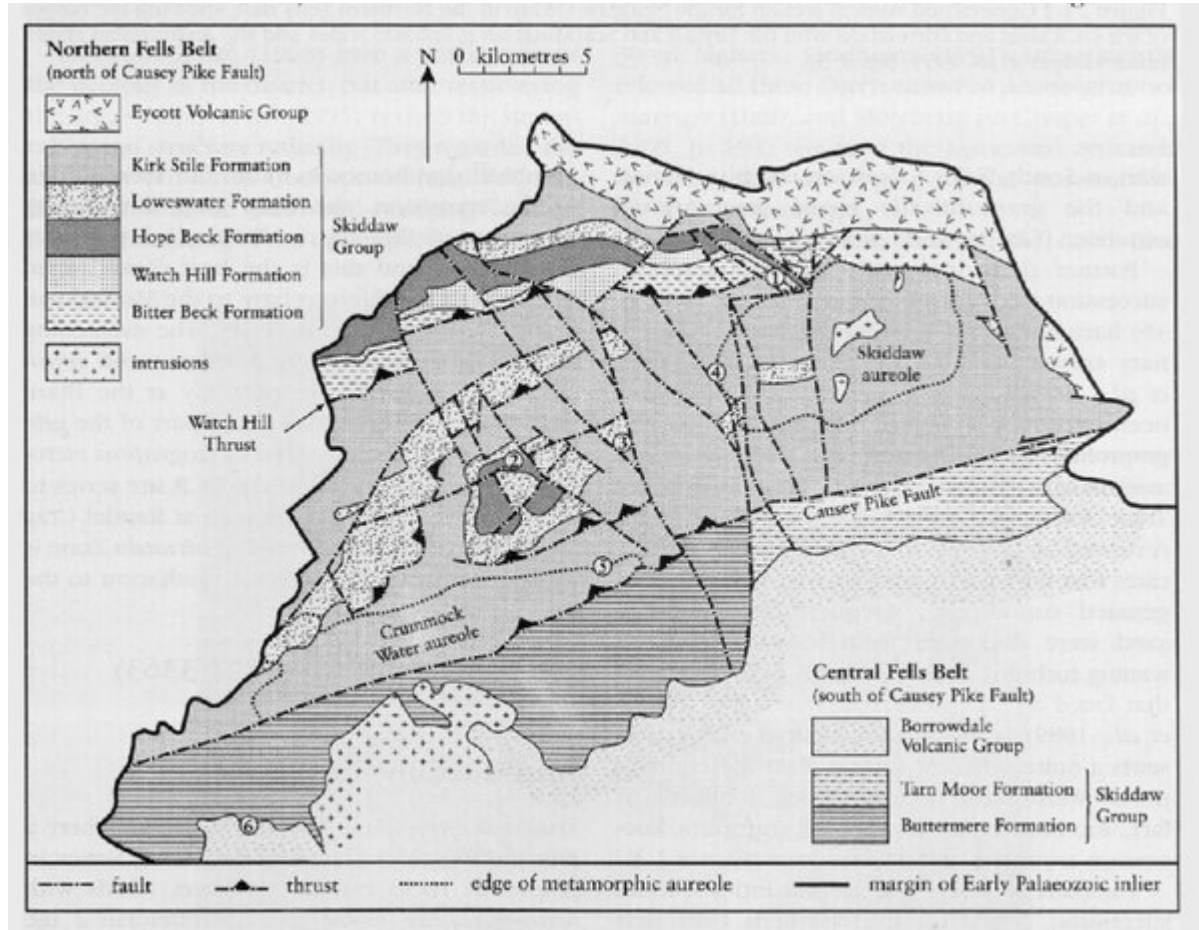
Elles (1933) thought three or more zonal divisions were present at Randel Crag, and Jackson (1962) considered that the graptolites included representatives of the *gibberulus* Subzone of the *extensus* Zone and the overlying *hirundo* Zone. Jenkins, however, found *Isograptus caduceus gibberulus* and *Expansograptus hirundo* 'closely associated' at this locality and assigned the whole fauna to the *hirundo* Zone. Fortey *et al.* (1990) and Cooper *et al.* (1995), however, used the local range of *I. caduceus gibberulus* to determine the extent of the *gibberulus* Zone and confined the *hirundo* Zone to higher levels. In this restricted usage, the *gibberulus* Zone is the only zone positively identified at Randel Crag. It is correlated with part of the Fennian Stage of South Wales (see the Pontyfenni site report), with the upper Castlemainian and possibly part of the Yapeenian of Australasia, and with part of the *hirundo* Zone of Scandinavia (Cooper and Lindholm, 1990).

The trilobites are entirely of Gondwanan affinity and contribute to the palaeogeographical interpretation that places the Lake District in an ocean-facing setting on the margin of Gondwana during the Arenig (Fortey *et al.*, 1989).

## Conclusions

Randel Crag has a diverse and abundant graptolite fauna that typifies the *gibberulus* Zone, a part of the graptolitic standard for Arenig rocks in Britain. Some species enable correlation with upper Arenig (Fennian) trilobite-bearing strata in Wales and with graptolitic sequences abroad.

## References



(Figure 11.1) Geological sketch-map of the Skiddaw Group in the main outcrop of the English Lake District, after Cooper *et al.* (1995, fig. 2). GCR localities: 1, Trusmadoor; 2, Blaze Bridge and Scawgill Quarry; 3, Barf; 4, Randel Crag; 5, Outside; 6, River Calder (Tremadoc, Chapter 7).