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# Sally Beck and River Rawthey

[SD 707 978]–[SD 715 992] and [SD 708 978]–[SD 724 994]

## Introduction

This is an internationally important site for the definition and correlation of the Ashgill Series, and includes the basal stratotype. It is the type locality for the Cautleyan Stage and includes outcrops of the uppermost Caradoc and all the Ashgill zones. The type localities of a large number of shelly fossil species, especially trilobites (Ingham, 1970–1977), are also here.

The site comprises most of the Ordovician rocks in the Murthwaite Inlier, the most northeasterly of the Cautley inliers. Ingham (1966, pl. 25; 1970, fig. 3) published a geological map of the Murthwaite Inlier, and Fortey *et al.* (1991, fig. 6) included a detailed map of the basal Ashgill stratotype locality, in Foggy Gill [SD 7185 9845].

## Description

The main exposures within the Murthwaite Inlier are along the River Rawthey in the south and its two major tributaries, which flow south through the inlier: Sally Beck in the east and Wandale Beck in the west (Figure 11.16). The structure of the Ordovician rocks is essentially an anticline that plunges steeply westwards, but this is complicated by faulting, including a belt of NE–SW sinistral wrench faults. The inlier abuts Carboniferous strata in the east along the Dent Fault.

The oldest parts of the Cautley Mudstones are latest Caradoc (Onnian) in age and crop out close to the Dent Fault, to the immediate west and north of Foggygill Farm. Natural outcrops allow the base of the overlying Pusgillian Stage to be mapped fairly closely, and excavations by Drs J.K. Ingham and A.W. Owen in 1988 in the bank above Foggy Gill, a tributary of Sally Beck, enabled the base of the stage, and therefore the base of the Ashgill Series, to be defined formally on the basis of changes in the shelly faunas (Fortey *et al.*, 1991, p. 18).

Pusgillian strata are well exposed in and around Foggy Gill and in Sally Beck itself, both west of Foggygill Farm and at the northern end of the inlier (Figure 11.16). The upper part of the stage is well exposed in the stream south of Sally Brow [SD 717 986], where there is a continuous section extending up into Cautleyan Zone 2. This was chosen as the type locality of the Cautleyan Stage by Ingham and Wright (1970, p. 237), with the base of the stage situated between Ingham's (1966) localities S58 and S59 in the eastern part of the section. In this inlier the stage comprises at least 250 m of beds.

The overlying Zone 3 is well seen in the stream sections near High Sprintgill Farm, 500 m NNE of Sally Brow, and Zone 4 is well developed in Sally Beck near the footbridge to Murthwaite Farm [SD 716 982]. The lowest part of the Rawtheyan Stage (Zone 5) is seen in direct succession to beds of Zone 4 in the stream 70 m south of High Sprintgill (Figure 11.16), but the best exposures of Zones 5 and 6 are in the River Rawthey [SD 714 977]–[SD 709 979]. The base of the stage is not seen here, but Zone 6 is complete; its base lies some 120 m WNW of Rawthey Bridge. A further 350 m downstream, at the western end of the section, flaggy mudstones and thin nodular limestones of Zone 6 are succeeded by buff-coloured tuffs of the Cautley Volcanic Member at the base of Zone 7. Fossiliferous mudstones of Zone 6 crop out along much of Wandale Beck (cf. (Figure 11.17)a) and are succeeded by the Cautley Volcanic Member and the overlying units at both the northern and southern ends of the stream and along the western slopes of Wandale. There are felsite sheets below the volcanic member and in the overlying mudstones of Zone 7. The lower part of the Ashgill Formation is well developed in Odd Gill, a northern tributary of Wandale Beck, and 120 m north of the confluence of Wandale Beck with the River Rawthey. The whole formation is exposed intermittently in an unnamed stream on the western slopes of Wandale, where its upper part [SD 7080 9855] includes sandy mudstones equivalent to the coarser units seen in the other Cautley inliers (see the Ecker Seeker Beck and Backside Beck site reports).

## Interpretation

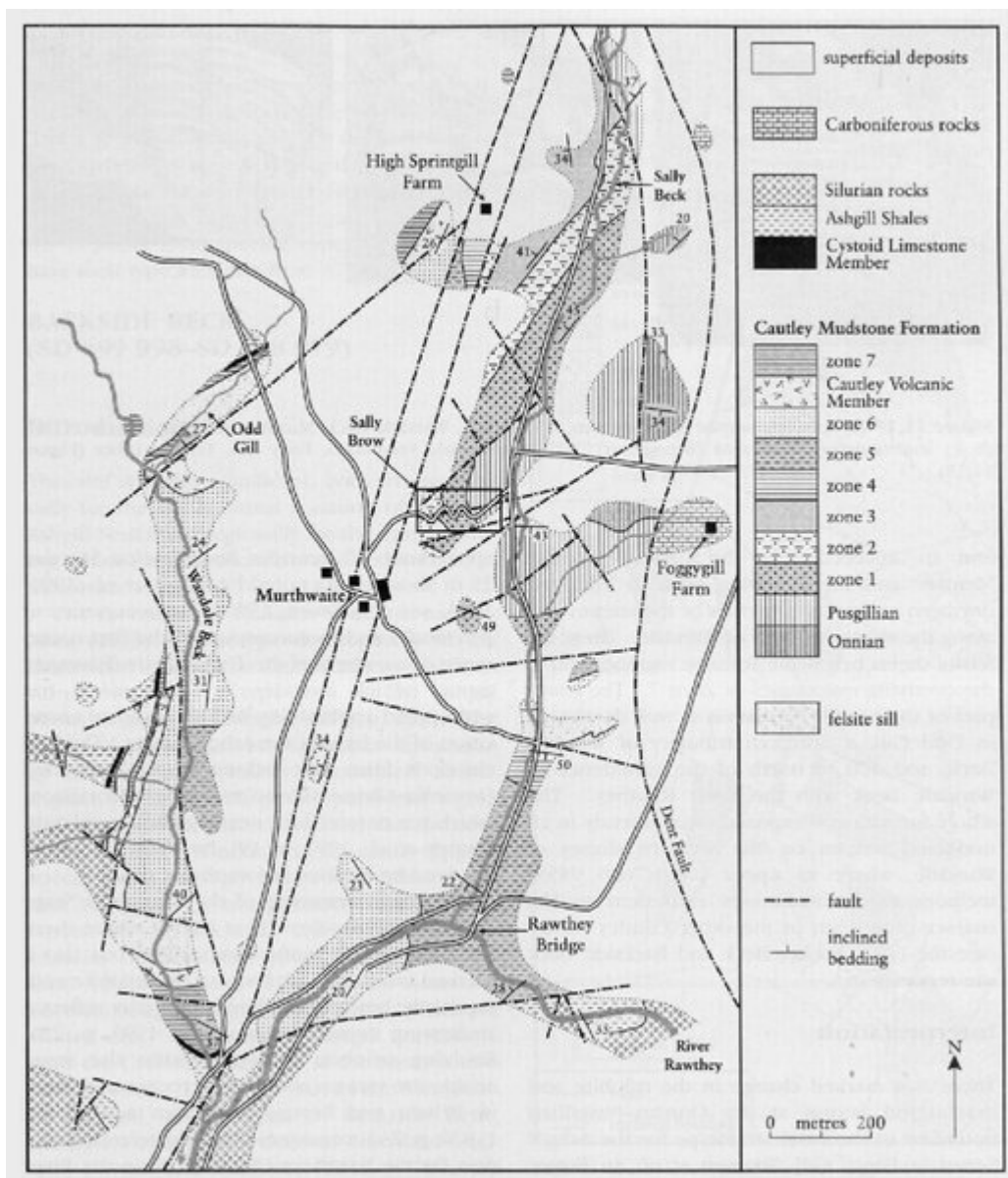
There is a marked change in the trilobite and brachiopod faunas at the Onnian–Pusgillian boundary in the basal stratotype for the Ashgill Series in Foggy Gill (Ingham *et al.*, in Fortey *et al.*, 1991, fig. 7; Fortey *et al.*, 1995, p. 23). The trilobites *Onnia pusgillensis* Dean and *Flexicalymene onniensis lata* Ingham disappear immediately below the boundary and *Brongniartella bulbosa* Ingham and *Gravicalymene jugifera* Dean make their first appearance at the boundary. Slightly less closely constrained but of wider international significance are the disappearance of *Tretaspis ceriodes* (Angelin) just below the boundary and the appearance of *Tretaspis badelandica* Stormer 25 m above it. As noted by Fortey *et al.* (1991, 1995; see also Owen, 1987), the occurrence of *T. ceriodes* and its succession by the first occurrence of members of the *T. seticornis* (Hisinger) group (which includes *T. hadelandica*) has widespread applicability for international correlation of the base of the Ashgill Series. The brachiopods from here belong to the deep-shelf *Onniella–Chonetoides/Sericoidea* association, which has potential for nearly global correlation (Fortey *et al.*, 1991, p. 19), but their taxonomy needs to be clarified before this is possible.

The basal stratotype of the Cautleyan Stage defined on Sally Brow is at a level where there are changes in specific composition but also a marked increase in diversity of the trilobite and, especially, brachiopod faunas that may reflect a shallowing event (Fortey *et al.*, 1995, p. 25). Evolving trilobite lineages within the stage enable the various zones to be recognized, both in Britain and beyond. Ingham and Wright (1970, p. 238) considered the best reference section for the Rawtheyan Stage to be in the River Rawthey section, although the basal stratotype is better defined elsewhere (see the Ecker Seeker Beck and Swindale Beck site reports). Ingham (1966, p. 474) estimated that the Cautley Volcanic Member, at the base of Zone 7, is about 12 m thick in the Murthwaite Inlier — much less than its thickness in the Westerdale Inlier, which he considered to have been more proximal to the volcanic source (see the Backside Beck site report).

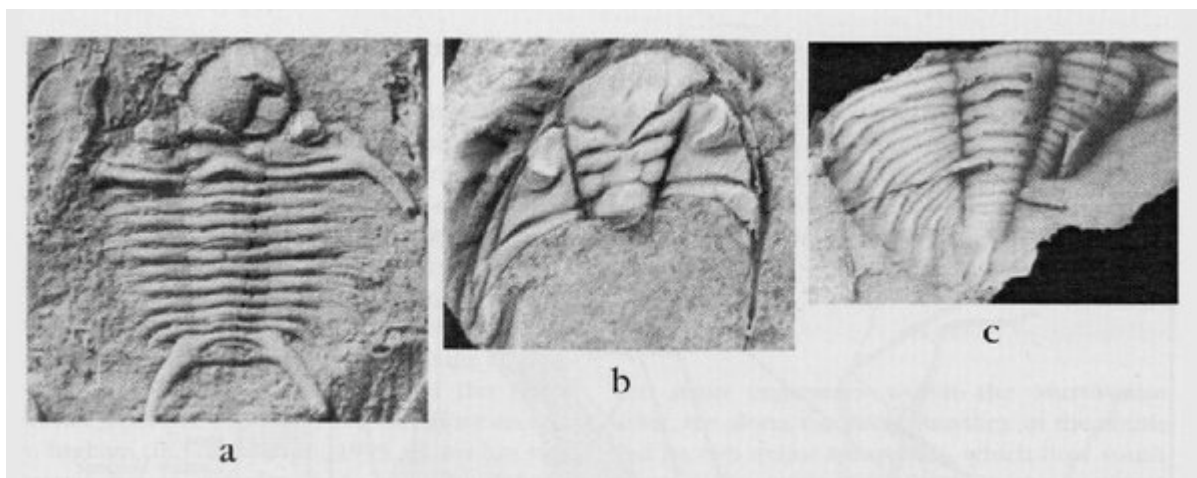
## Conclusions

This site is internationally important as it contains the formally defined base of the Ashgill Series. It also contains the type development of the Cautleyan stage, including its basal boundary, and the best reference section for the Rawtheyan Stage in its type area. A large number of shelly fossil species, especially trilobites, have their type localities here.

## [References](#)



(Figure 11.16) Geological map of the area around Sally Beck, the River Rawthey and Wandale Beck, in the Murthwaite Inlier of the Cautley district, based on Ingham (1966, pl. 25) and Ingham (1970–1977, fig. 3).



(Figure 11.17) (a) *Sphaerocoryphe kingi* Ingham, x 5, Zone 6, Wandale Beck, Murthwaite Inlier (Figure 11.16). (b, c) *Mucronaspis mucronata* (Brongniart), x2, Ashgill Shale Formation, Fairy Gill, Taythes Inlier (Figure 11.19).