
Ercall Quarry

[SJ 644 097]

Introduction

Ercall Quarry is of national importance, being the best and most complete exposure of the Wrekin Quartzite and showing important unconformities with the underlying Precambrian Uriconian volcanic rocks and the Ercall Granophyre. Local radiometric dates and fossils provide the best constraints for the age of the Cambrian transgression in the Welsh Borderlands.

The Wrekin (Latin *Uriconium*) is a large hill made up of Precambrian volcanic rocks (Uriconian Group); its northerly extension, the Ercall, is intruded by a granophyre. The southeast flank of both hills is covered by the Wrekin Quartzite and Comley Sandstone. Early workers regarded the Wrekin Quartzite as altered Caradoc Sandstone, but Callaway (1877, p. 653) identified it with the Hollybush Sandstone at Malvern, of known Cambrian age (see the Gullet Pass Pit site report). The geology and main rock types of the Wrekin area were described by Pocock *et al.* (1938), who also included a summary of earlier work.

The Ercall Quarry assumed particular importance when quarrying operations exposed the base of the Cambrian lying unconformably on the Ercall Granophyre. Previously their stratigraphical relationships were uncertain and the possibility that the Ercall Granophyre was intruded into the Cambrian had been entertained by some workers (see Cope and Gibbons, 1987, p. 58). Radiometric dating of the granophyre and microfloral study of part of the Wrekin Quartzite were reported by Wright *et al.* (1993). Hamblin and Coppack (1995) give a general account of the geology of the area, and Toghil and Beale (1994) give a detailed guide to the Ercall and neighbouring quarries.

Description

The rhyolitic and basaltic lavas and tuffs of the Uriconian Volcanic Group are exposed in quarries 300 m south-west of the summit of the Ercall. Intruded into these is the Ercall Granophyre, exposed in the Ercall Quarry, the north face of which reaches almost to the summit of the hill. The granophyre has given a U-Pb age of 560 ± 1 Ma (Tucker and Pharaoh, 1991), which is regarded as the date of intrusion. A Rb-Sr whole-rock date of 533 ± 12 Ma represents a resetting event that preceded the local Cambrian marine transgression (Patchett *et al.*, 1980; Wright *et al.*, 1993).

The unconformably overlying Wrekin Quartzite is 34 m thick and fully exposed (Figure 5.1). It consists of pale grey fine-grained quartz sand with a siliceous cement, occurring in thick beds, some of which have rippled upper surfaces, and is considered to have formed in a shallow coastal environment. Wright *et al.* (1993) gave a description and logged the section. Cope and Gibbons (1987) described the unconformity with the Ercall Granophyre and identified rare pebbles of the granophyre in the basal conglomerate. A bed of shale 6 m above the base of the Wrekin Quartzite contains an acritarch microflora that Downie (in Wright *et al.*, 1993) correlated with a flora that had been assigned a mid Tommotian age. In the Siberian standard succession, the Tommotian Stage underlies the trilobite-bearing rocks of the Atdabanian Stage and may correlate with or below the non-trilobite zone of the Comley Series (Figure 2.2).

The Wrekin Quartzite is succeeded abruptly but conformably at [SJ 6445 0955] by the lower Comley Sandstone, consisting of coarse to fine, commonly glauconitic, sandstone. The lowest 15 cm contains a neritic shelly fauna including *Obolella? groomi* Madey, species of *Micromitra*, and some *Mobergella* (Figure 5.2)a, b that were recorded as *M. cf. turgida* Bengtson (by Bengtson, 1977, p. 10) and as *M. cf. radiolata* Bengtson (in Hamblin and Coppack, 1995, p. 9). This fauna is correlated with the upper part of the Tommotian Stage. Elsewhere in Shropshire the lower Comley Sandstone, capped by the Comley Limestones, contains diverse faunas of the higher Comley Series, of later early Cambrian age (Cobbold and Pocock, 1934; Rushton, 1974).

Interpretation

Ercall Quarry exposes stratigraphical contacts critical for understanding the Cambrian transgression in Shropshire. The nature of the contact between the Ercall Granophyre and the Wrekin Quartzite, formerly uncertain, is here clearly exposed as unconformable. The Ercall Granophyre below the unconformity gives significant radiometric dates, and the Wrekin Quartzite and lower Comley Sandstone above the unconformity yield fossils that provide better biostratigraphical correlation with the Tommotian Stage than any other site in the Welsh Borderlands. It appears from the available evidence that the Wrekin Quartzite at the Ercall is younger than the lower parts of the Hartshill Formation at Nuneaton (see site reports for Boon's Quarry and Woodlands Quarry), suggesting that the early Cambrian marine transgression reached the Welsh Borderlands somewhat later than the English Midlands.

The base of the Cambrian is now defined internationally at Fortune Head in south-east Newfoundland (Brasier *et al.*, 1994), and the age for this base is estimated at 544 Ma (Isachsen *et al.*, 1994) or 543 Ma (Grotzinger *et al.*, 1995). An age of 531 ± 1 Ma is recorded for early Cambrian strata in New Brunswick that can be correlated with strata in Newfoundland which have been regarded as pre Tommotian (Landing, 1994), but their correlation with the Tommotian Stage of Siberia is contentious (Rozanov, 1995)

The section in Ercall Quarry shows strata of mid- to late Tommotian age overlying the Ercall Granophyre, which provides a minimum age of 533 ± 13 Ma. This falls well within the constraints offered by Isachsen *et al.* (1994) and shows that the basal part of the Cambrian in Shropshire is considerably younger than the base of the system as defined at Fortune Head and also indicates that the upper part of the Tommotian is likely to be younger than about 533 Ma. However, if the Ercall Granophyre was intruded at 560 ± 1 Ma, it pre-dates the defined base of the Cambrian, which accordingly falls within the hiatus represented by the local Precambrian—Cambrian unconformity. Even though coordination of the Tommotian with radiometric time-scales is still insecure, evidence from the Ercall Quarry section shows the magnitude of the hiatus beneath the local basal Cambrian transgression.

Conclusions

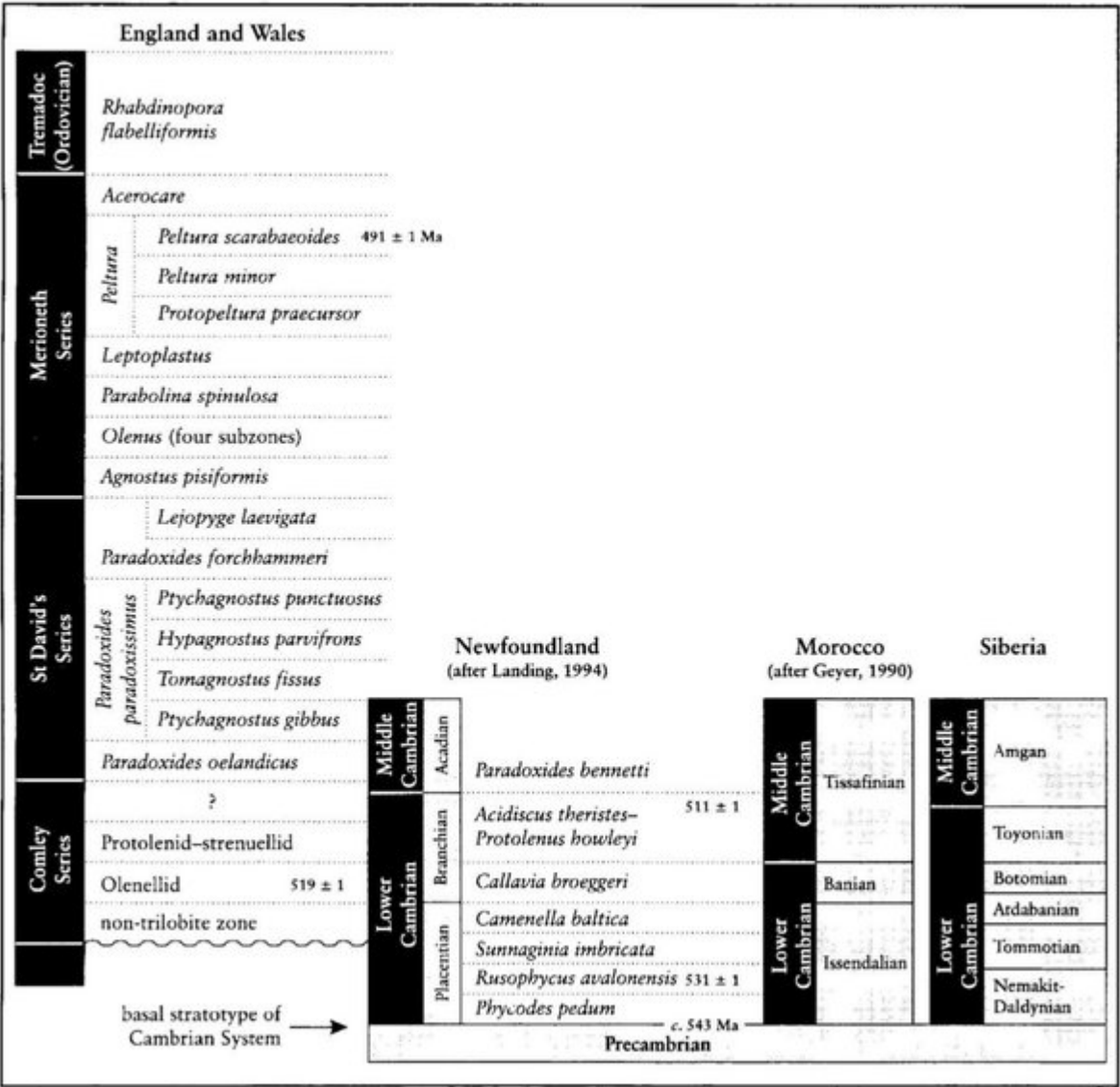
Ercall Quarry shows a unique view of Cambrian history in Shropshire. A granitic rock (the Ercall Granophyre) that solidified 560 million years ago is overlain unconformably by beach sands (Wrekin Quartzite) younger than about 533 million years old that were deposited from a deepening sea. The overlying Comley Sandstone contains small fossil shells, some of which, though known from beds of similar age in Scandinavia and Siberia, are not known elsewhere in Britain.

References

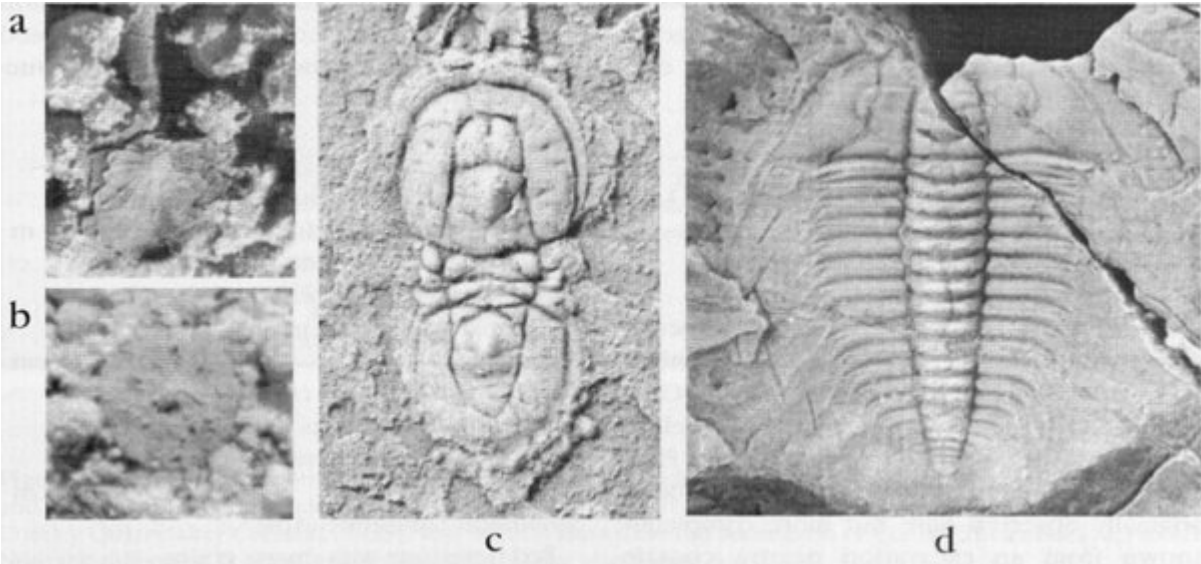


(Figure 5.1) Ercall Quarry (Quarry 3 of Toghill and Beale, 1994), looking north-east. The Ercall Granophyre (Precambrian), is the pale, non-bedded rock on the far left of the photograph. The Wrekin Quartzite, centre, is pale and

thickly bedded, and is overlain on the right by a darker cliff of Lower Comley Sandstone. (Photo: C. D. Prosser.)



(Figure 2.2) Cambrian chronostratigraphy and trilobite zones in England and Wales, with Lower Cambrian schemes for south-east Newfoundland and Morocco shown for comparison. The base of the Cambrian System is defined at the base of the *Phycodes pedum* Zone at Fortune Head, south-east Newfoundland. For sources of radiometric dates, see Davidek et al. (1998) and landing et al., 1998.



(Figure 5.2) Cambrian fossils from English sites. (a, b) *Mobergella cf. radiolata* Bengtson, x 12, from the basal Comley Sandstone (Comley Series, Tommotian) of Ercall Quarry. (c) *Tomagnostus fissus* (Linnarsson), x10, from the Abbey Shales (St David's Series), Illing's trenches, at Hartshill Hayes. (d) *Olenus gibbosus* (Wahlenberg), x6, from the Outwoods Shales (Merioneth Series), Purley Quarry.