Boon's Quarry

[SP 329 947]

Introduction

Boon's Quarry (formerly known also as Man-Abell's Quarry) shows the transgressive local base of the Cambrian where it rests unconformably on the Precambrian Caldecote Volcanic Formation. It is the type and only locality for the Boon's Member, the lowest division of the Hartshill Sandstone Formation, which represents a fan-delta derived from the erosion of an irregular local topography.

Lapworth (1898) originally divided the Hartshill Quartzite into three: the Park Hill, Tuttle Hill and Camp Hill quartzites. Brasier *et al.* (1978) subdivided the Camp Hill division into three members, and when Carney (1992a) redescribed the sequence he referred the lowest 19 m of the Park Hill Member in the area of Boon's Quarry to a newly identified 'Boon's Member'. The present divisions of the Hartshill Formation are as follows.

Woodlands Member

Home Farm Member

Jee's Member

Tuttle Hill Member

Park Hill Member

Boon's Member

Away from Boon's Quarry, as at Judkins' Quarry [SP 343 932], the Boon's Member is not developed, and the Park Hill Member rests directly on the Caldecote Volcanic Formation. General accounts of the geology are given in Bridge *et al.* (1998), Carney (1992b), and Carney and Pharaoh (1993).

Description

Boon's Quarry is a western extension of the older Hartshill Quarries and shows the Caldecote Volcanic Formation and the basal parts of the Hartshill Sandstone Formation (Figure 5.5). The Caldecote Volcanic Formation consists of crystal-lapilli tuffs, vitric tuffs, tuffaceous sandstones and mudstones, showing evidence of deposition under water. The upper metre or two are reddened by subaerial weathering prior to the deposition of the Boon's Member.

The Boon's Member comprises red to dark-maroon medium- to coarse-grained sediments, divisible in ascending order into three units A—C as follows (Bridge *et al.,* 1998).

C. Pink or grey sandstones, more than 7 m thick, rarely with planar cross-bedding and with relatively few breccia layers. Some upwardly coarsening beds have undulating upper surfaces indicative of wave or current action.

B. Red, massive to planar-bedded lithic sandstones at least 9 m thick, with thin layers of matrix-rich breccia. Thin beds of mudstone drape the breccia layers, and one of these yielded sphaeromorph acritarchs. The proportion of breccia decreases in the upper layers. The sandstones include large proportions of subrounded quartz grains and Precambrian volcanic detritus.

A. More than 3 m of planar-bedded granule-stones with intercalated lenses of massive breccio–conglomerates that include boulders up to 2 m in diameter of Precambrian crystal–lithic tuffs.

The base of the succeeding Park Hill Member is exposed in the south-eastern part of Boon's Quarry [SP 3312 9442] and is taken as the lowest bed showing significant cross-bedding; it has a rippled top. This level coincides with the appearance of detrital glauconite. The only fossils recorded from the Boon's Member are acritarchs. They are of no precise stratigraphical significance but indicate a marine depositional environment (Bridge *et al.,* 1998, p. 29).

Interpretation

Boon's Quarry gives a unique view of the early Cambrian history and geography of the Midland Platform because the Hartshill Sandstone Formation illustrates the initial phase of deposition during the early Cambrian marine transgression. Although the lower parts of the Hartshill Sandstone Formation are not precisely dated, the succession of lithofacies and trace-fossil associations matches that of the Random Formation in south-east Newfoundland (Brasier, 1989), which is of Tommotian and possibly pre-Tommotian age. The Hartshill Formation is referred to the early Cambrian Comley Series, and Brasier (1986) has correlated the higher parts with the Tommotian Stage in Siberia, based on the fauna of small shelly fossils in the Home Farm Member (see site report for Woodlands Quarry, below).

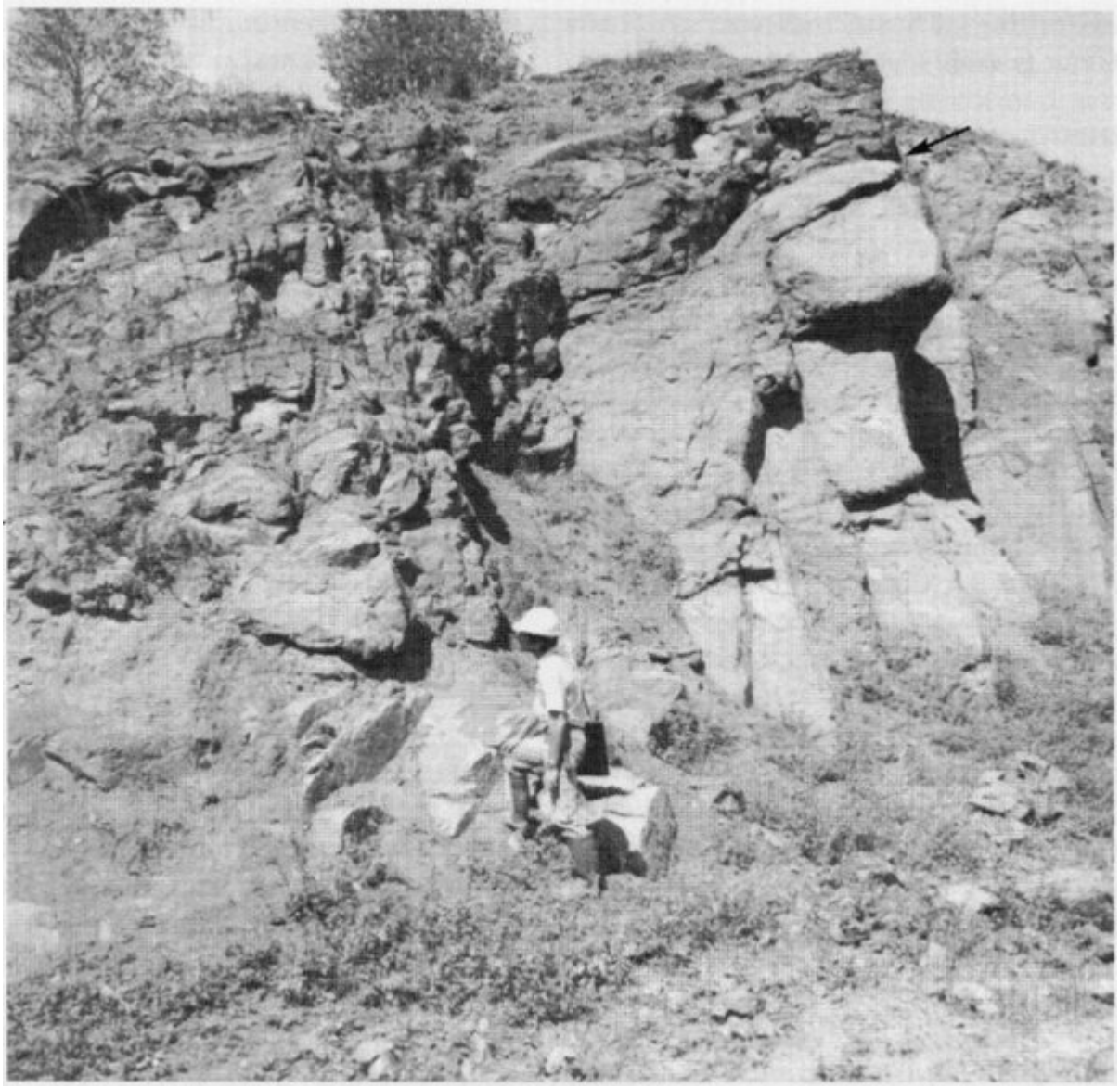
Prior to the early Cambrian transgression, the eroded Precambrian topography appears to have been subject to subaerial spheroidal weathering, resembling in part the lateritic weathering that takes place in tropical climates today. Following a late Precambrian rifting event, the coarse immature beds in the lowest part of the Boon's Member were deposited by mass-flow down south-west-facing palaeoslopes, and these are interpreted as erosional debris derived from fault scarps. Their angular clasts and mineral composition imply transport over short distances with minimal reworking. A mudstone in the overlying unit contains acritarchs that indicate that the depositional environment was marine, and the presence of turbidite beds suggests a fan-delta environment. Sediments in the uppermost unit are more mature, suggesting a more subdued source-area, with sediment being reworked tidally along a shoreline.

The succeeding Park Hill Member is interpreted as a shoreface sand deposit, representing a further cycle of deposition that covered the former rifted topography and transgressed the fan-delta of the Boon's Member.

Conclusions

Boon's Quarry is a unique site that shows the transgression of an early Cambrian sea onto the Midlands landmass: it is the type locality for the Boon's Member, the residue of a delta of coarse detritus that was eroded from the underlying Caldecote volcanic rocks and is overlain by shallow-water marine sandstones of the Park Hill Member.

References



(Figure 5.5) Boon's Quarry, north-west of Nuneaton. Spheroidally weathered Precambrian tuffs of the Caldecote Volcanic Formation overlain unconformably (at arrows) by immature conglomeratic sandstones of the Boon's Member of the Hartshill Formation (Lower Cambrian). (Photo: British Geological Survey photographic collection, A14973.)