
Metallic Tileries

Highlights

Metallic Tileries is the best exposure of the contact between the Newcastle and Etruria formations, where the nature of the important palaeoenvironmental change can be studied (Figure 7.13).

Introduction

This disused and partly infilled quarry [SJ 840 498] on the east side of the A34(T) road, 4.5 km north of Newcastle-under-Lyme, Staffordshire shows the unconformable contact between the Etruria and Newcastle formations in the North Staffordshire Coalfield. The site was mentioned by Gibson (1905, 1925), Williamson (1946) and Besly (1988), and non-marine bivalves were described by Myers (1954). The most detailed geological description is by Pollard and Wiseman (1971).

Description

Lithostratigraphy

The lower 30 m of the sequence belong to the Etruria Formation, and are red mudstones with a lenticular sandstone body. The sandstone is very similar to lenticular bodies found in the Etruria Formation further south in the Midlands, and known as espley sandstones (Haim and Horton, 1969).

These red beds are overlain by 10 m of grey to black strata of the Newcastle Formation (Figure 7.14). The lower 2.5 m are black laminated shales and siltstones, belonging to the Lacustrine Facies Association defined by Besly (1988). Two beds within this interval have traditionally been known as 'limestones' (e.g. Gibson, 1925), although the lower one is in fact a calcareous mudstone, and the upper one a sideritic or ankeritic siltstone (Williamson, 1946). At the contact between the Newcastle and Etruria formations, however, there are lenses of true limestone, containing calcareous algae (*Garwoodia*, *Girvanella*, *Bevocastris*, *Ortonella*).

The remainder of the succession is a coarsening upwards unit of siltstones passing into cross-bedded sandstones, representing the progressive infill of the lake by deltaic deposits.

Biostratigraphy

Non-marine bivalves

Shells have been reported by Myers (1954) from the shales between the two 'limestone' beds in the basal Newcastle Formation. Species identified include *Anthraconauta* cf. *tenuis* (Davies and Trueman), *A. aff. phillipsi* (Williamson) and *A. calcifera* (Hind). The assemblage is generally agreed to belong to the *A. tenuis* Zone, indicating upper Bolsovian to Cantabrian (see Cleal, 1984a).

Shells have not been found in the Etruria Formation exposed here. However, Besly (1988) reports the presence of *A. phillipsi* in the formation elsewhere in the North Staffordshire Coalfield.

Palynology

No palynomorphs have been reported from this locality. However, from the nearby Downing Marl Pit (now inaccessible) Smith and Butterworth (1967) reported an assemblage of the *Thymospora obscura* Zone, indicating upper Bolsovian to Cantabrian (see Cleal, 1984a).

Interpretation

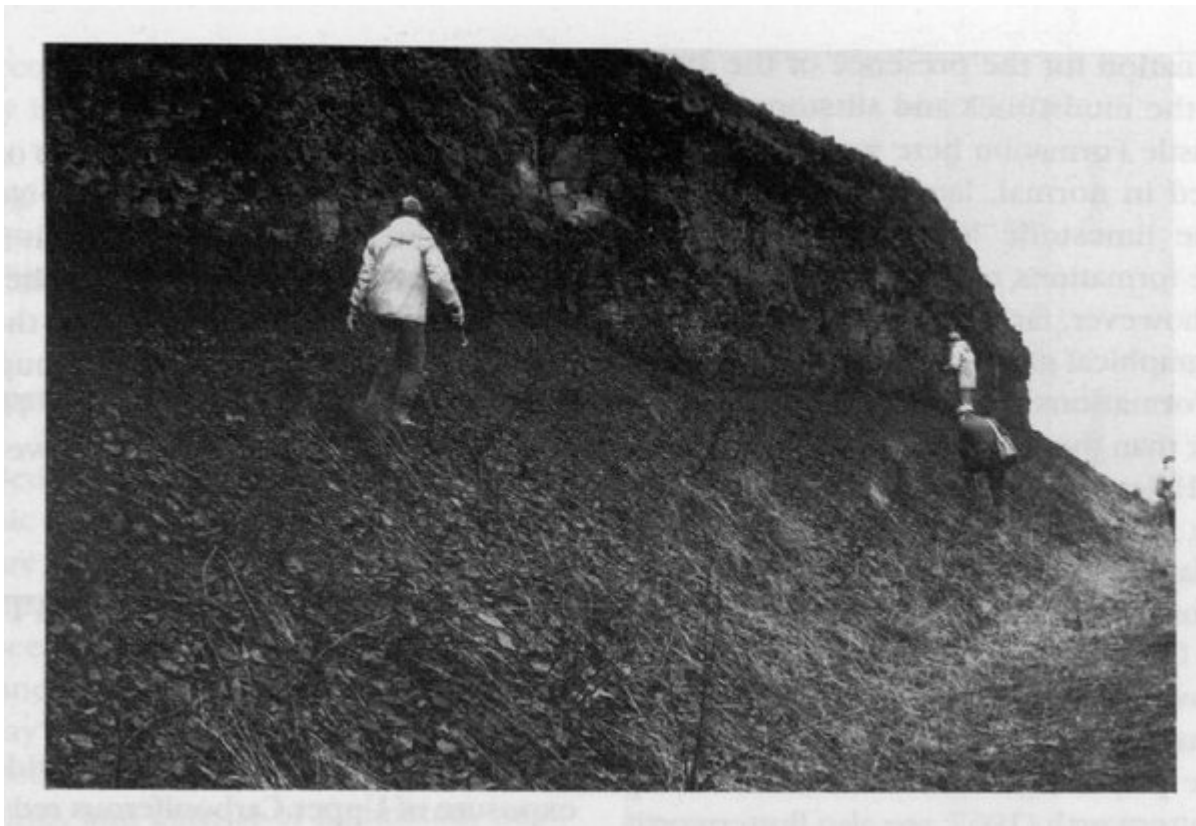
This is the only site where the contact between the Etruria and Newcastle formations in the North Staffordshire Coalfield can be examined in detail. The evidence described by Pollard and Wiseman (1971) suggests that there was at least a temporary break in sedimentation between the two units. The limestone lenses at the contact are thought to have formed in small, shallow pools on the top of what was presumably an already lithified Etruria Formation. The stromatolite-like algae found here are unique in the Upper Carboniferous of Britain, and are among the best known non-marine algae of this age from anywhere in the world. The only other well documented examples are from Nova Scotia and Newfoundland in Canada (Bell, 1940; Belt, 1968), but these represent a significantly less diverse flora to that present at Metallic Tileries. However, Pollard and Wiseman (1971) implied that the presence of such algae reflects an indirect marine influence, but this was based on the incorrect assumption that the Newcastle Formation was lagoonal (a view they later withdrew). Besly (1988) dismisses the likelihood of a marine influence as there is no supporting evidence, but gives no alternative explanation for the presence of the algae. The rest of the mudstones and siltstones in the basal Newcastle Formation here were almost certainly formed in normal, lacustrine conditions. Whether the limestone lenses at the contact between the formations represent the same environment is, however, far from certain.

The stratigraphical gap between the Etruria and Newcastle formations in North Staffordshire is much smaller than the equivalent gap (between the Etruria and Halesowen formations) in the South Staffordshire, Warwickshire and Wyre Forest coalfields. The plant fossils listed by Dix (1931b) for the Newcastle Formation suggest the middle or upper Westphalian D, and are thus of about the same age as the Halesowen Formation. Virtually no plant fossils have been reported from the Etruria Formation here, but the palynological evidence outlined by Smith and Butterworth (1967; see also Butterworth and Smith, 1976) suggests that at least the upper Etruria Formation in north Staffordshire is Westphalian D. The gap between the formations is thus extremely small, representing only a small part of the Westphalian D and probably less than one plant zone. It contrasts with the much larger break further south (e.g. middle Duckmantian to middle Westphalian D in the Wyre Forest), and reflects the strongly diachronous nature of the Etruria Formation (Besly, 1983, 1988; Besly and Turner, 1983).

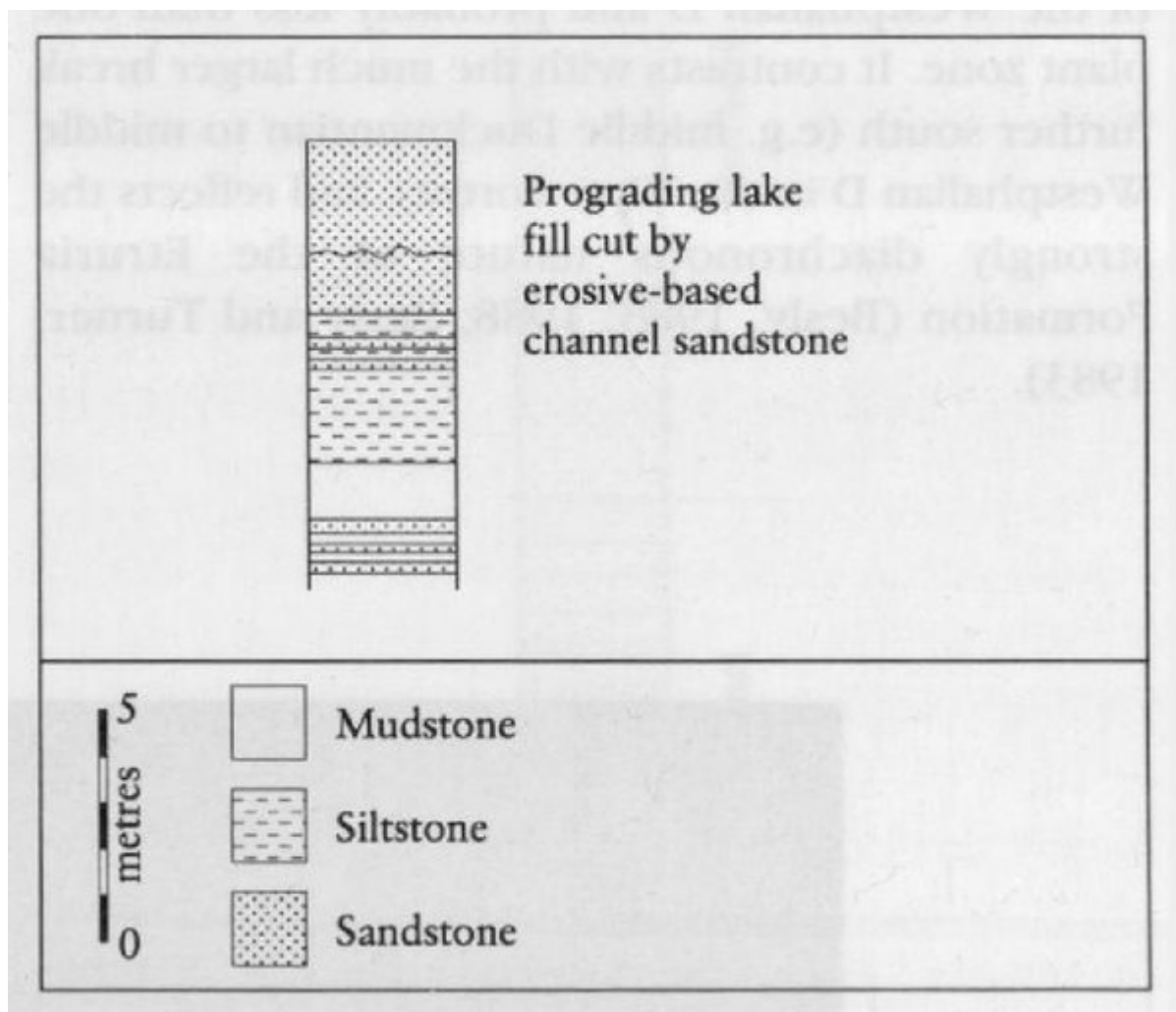
Conclusions

Metallic Tileries is the best exposure of the contact between units of rock known as the Newcastle and Etruria formations, which are about 306 and 308 million years old respectively. At the contact are lenses of limestone containing the fossilized remains of algae, which are thought to have formed in shallow pools of water. This has been given as evidence of a time gap between the deposition of the two rock units.

[References](#)



(Figure 7.13) Contact between Newcastle and Etruria formations at Metallic Tileries. (Photo: C.J. Cleal.)



(Figure 7.14) Newcastle Formation exposed at Metallic Tileries. Based on Besly (1988, fig. 15.11b).