
Pitch Coppice

[SO 4723 7298]

Introduction

This disused quarry in Mortimer Forest is 35 m south of the Wigmore Road and about 4 km WSW of Ludlow, Shropshire (Figure 5.3), (Figure 5.6). It is one of several key localities defining the stratigraphy of the type Ludlow Series in an anticline south-west of Ludlow itself (Holland *et al.*, 1959, 1963 and references therein; see also Cocks *et al.*, 1971, 1992). Pitch Coppice is also one of 13 managed sites which, collectively, closely parallel the axial trace of the Ludlow Anticline and provide an educational trail summarizing the local upper Wenlock to lower Pridoli geology (Lawson, 1977b, locality 3; see also Siveter *et al.*, 1989, locality 3.3c, Jenkinson, 1991, locality 3).

The locality exposes the top of the Much Wenlock Limestone Formation (Homerian Stage) and the lower part of the overlying Lower Elton Formation (Gorstian Stage) and has international stratigraphical significance (Figure 5.4), (Figure 5.5). In 1963 it was designated by Holland *et al.* as the standard section for the base of the Ludlow Series, the (then) Eltonian Stage and the Lower Elton Beds. This decision was endorsed when the Subcommittee on Silurian Stratigraphy of the International Commission on Stratigraphy (IUGS) selected the locality as the global boundary stratotype section for the base of the Ludlow Series and the coincident base of the Gorstian Stage (Bassett *et al.*, 1979; Holland, 1980a, b; Holland *et al.*, 1980; Martinsson *et al.*, 1981; see Lawson and White and other papers in Holland and Bassett, 1989). At Pitch Coppice this level is drawn at the base of lithological unit F of Holland *et al.* (1963), a horizon there coincident with the base of the Lower Elton Formation (Elton Group). Pitch Coppice is also the nominated standard basal boundary reference section for the latter lithostratigraphical unit (Holland *et al.*, 1963; Lawson and White, 1989).

Description

As seen, the Much Wenlock Limestone Formation consists of 3.35 m of grey, sparsely fossiliferous, predominantly nodular limestones with occasional thin shale partings. About 1 m above the base of the section a prominent, soft, calcareous shale (0.20 m) forms a marked erosional recess in the limestone. The Lower Elton Formation (1.76 m seen), in which shells and corals are more obviously present, consists of shaly siltstones with thin, impersistent limestone lenses and nodules; 0.25 m above the formational boundary is a thin clay (bentonite) band. All strata are gently dipping (5–10°) in a generally easterly direction.

The lithological change from the Wenlock limestones to the fine elastics of the Elton beds is mirrored by a more gradual macrofaunal change from a coral–large brachiopod dominated assemblage to a characteristically small brachiopod dominated fauna in the early Ludlow (Holland *et al.*, 1963; Lawson and White, 1989). The Wenlock has yielded a diverse fauna of solitary and compound corals (*Favosites*, *Heliolites*, *Thecia*), bryozoans, brachiopods (e.g. *Atrypa reticularis*, *Gypidula galeata*, *Leptaena depressa*, *Resserella elegantula*, *Sphaerirhynchia wilsoni*, *Strophonella euglypha*), gastropods (*Poleumita*), trilobites (*Dalmanites myops*) and crinoid columnals. Much of the Lower Elton Formation fauna is fragmented and includes many relict Wenlock forms such as *Atrypa*, *Leptaena*, *Resserella* and *Calymene*.

Both formations at Pitch Coppice have a sparse conodont fauna (Aldridge and Smith, 1985), consisting mostly of the long ranging *Ozarkodina excavata* and *Panderodus equicostatus*. As with the conodonts, neither ostracods (Siveter, 1978, 1989; see also Lawson and White, 1989) nor chitinozoans (Sutherland, 1994) are precise indicators of the base of the Ludlow Series in the type Wenlock and Ludlow areas and miospores are extremely rare (see Lawson and White, 1989). Sutherland's (1994) informal chitinozoan Biozone 1 extends from within the Much Wenlock Limestone Formation to almost 15 m into the Lower Elton Formation. Several chitinozoan taxa, especially species of *Conochitina*, and sparse beyrichiacean ostracods range across the series boundary at Pitch Coppice itself. Scolecodonts also occur, most abundantly in the recessive calcareous shale horizon in the Much Wenlock Limestone Formation. Acritarchs are common at the Wenlock–Ludlow boundary stratotype: the junction between acritarch biozones W3 and L1 of Dorning is drawn at 0.6 m above the base of the Ludlow (Dorning, 1981b and pers. comm. in Lawson and White, 1989; see also Lister,

1970), but high resolution sampling has demonstrated an overlap of these two biozones (Mullins, 1996). Brachiopods and trilobites have also been documented from the quarry (Bassett, 1970a; Thomas, 1978).

The only graptolites documented from Pitch Coppice are fragments of *?Saetograptus varians* and *?Neodiversograptus nilssoni* from 0.03 m and 0.23 m, respectively, above the base of the Ludlow (White, 1981). However, scarce finds of graptolites in the type Wenlock and Ludlow rocks are consistent with the conventional notion (Holland *et al.*, 1969) that the base of the Ludlow Series lies close to the base of the *N. nilssoni* Biozone (evidence summarized in Lawson and White, 1989, pp. 81–2), and that graptolites hold the best potential of any group of fossils for the international correlation of the global stratigraphical section point.

Interpretation

The lithological sequence exposed at Pitch Coppice is typical of the uppermost Wenlock–lowest Ludlow of the Ludlow area. It represents carbonate and mud deposition on the mid- to outer part of a relatively shallow water, mid Silurian shelf of the Midland Platform, a stable microcraton that occupied much of the present day Welsh Borderland and contiguous areas, in central England (e.g. Bassett, 1974a; Siveter *et al.*, 1989, fig. 8; Bassett *et al.*, 1992, figs Sib, S4a). The presence of corals and other colonial organisms in the Wenlock rocks attest to prevailing modest water depths, but the absence of Wenlock age reefs in the vicinity of Ludlow suggests that that area was sited closer to shelf edge than the reef-rich deposits of Wenlock Edge (Bassett, 1974a, 1989a; Bassett *et al.*, 1975) some 10–30 km to the north.

The shift from carbonate to mud deposition across the Ludlow–Wenlock boundary is conventionally interpreted as a result of a change in sea level. Johnson *et al.* (1991) believed that a global rise in sea level occurred in latest Wenlock–early Ludlow times. Based on evidence from brachiopod dominated benthic communities Hurst (1975a, b) claimed that this was a rapid, eustatic event the inception of which is detected in the rock record about 3 m above the boundary itself. In contrast, Bassett (1976) argued that the transgression represented a gradual deepening because of local subsidence of the shelf. Recent opinion has such Silurian facies shifts related to episodic changes in climate and oceanic state (Jeppsson, 1990; Jeppsson *et al.*, 1995); indeed, both carbon isotope and palynofacies analysis of the stratotype section indicate a Wenlock–Ludlow series boundary event (Corfield *et al.*, 1992; Mullins, 1996).

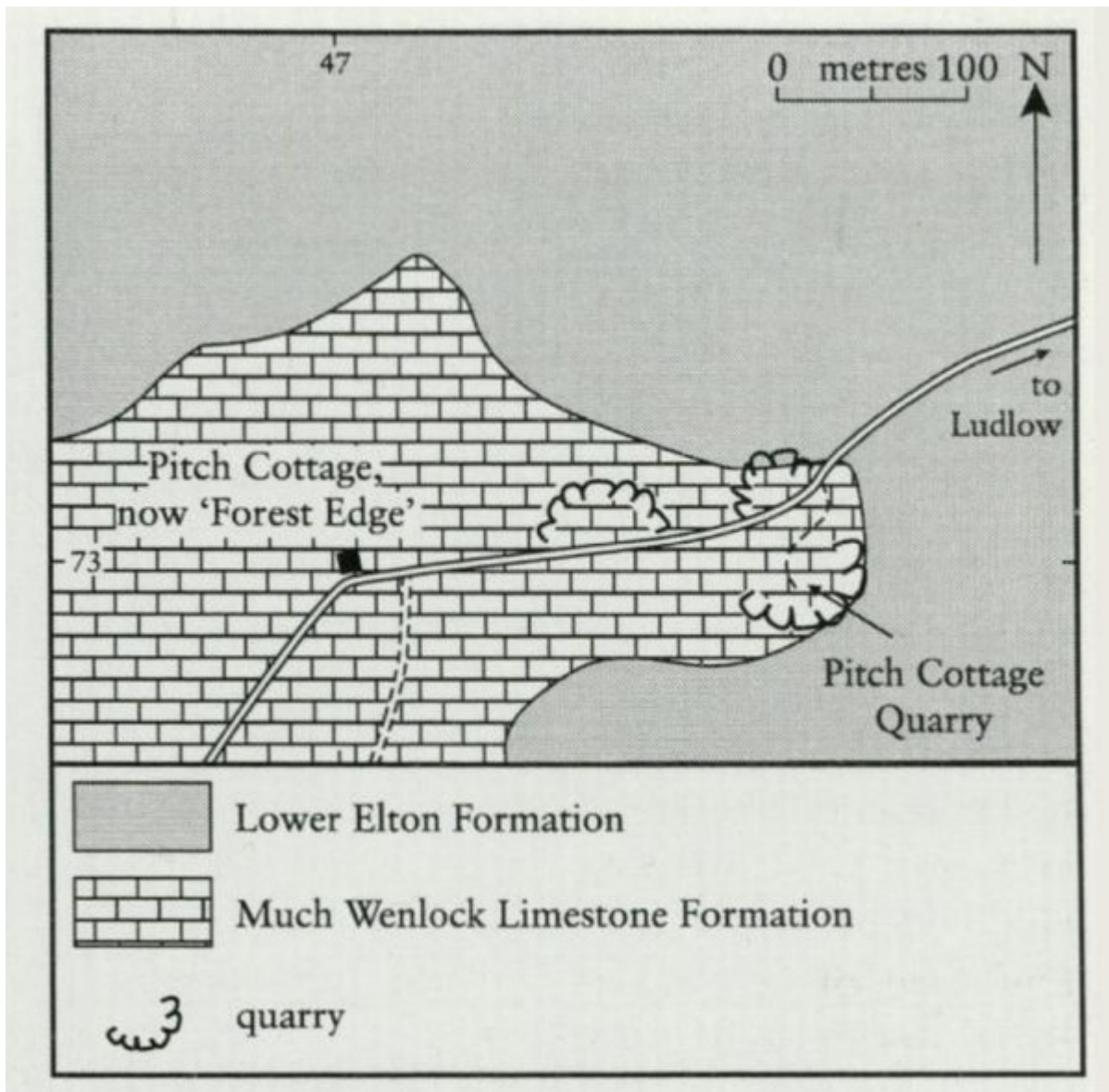
The other GCR sites that display the Wenlock–Ludlow boundary in the Welsh Basin, either in shelf, basin margin or basinal settings are Easthope–Harley Hill (Shropshire), Wren's Nest (West Midlands), Linton Quarry (Gorsley Inlier), Gurney's Quarry (Ledbury area), Cwm-Ton Farm (Usk Inlier), Rumney River (Cardiff), River Irfon (Builth), Sawdde Gorge (near Llandeilo), Marloes (Pembrokeshire), Trewern Brook (Long Mountain) and Ty Mawr (Denbigh Moors).

Conclusions

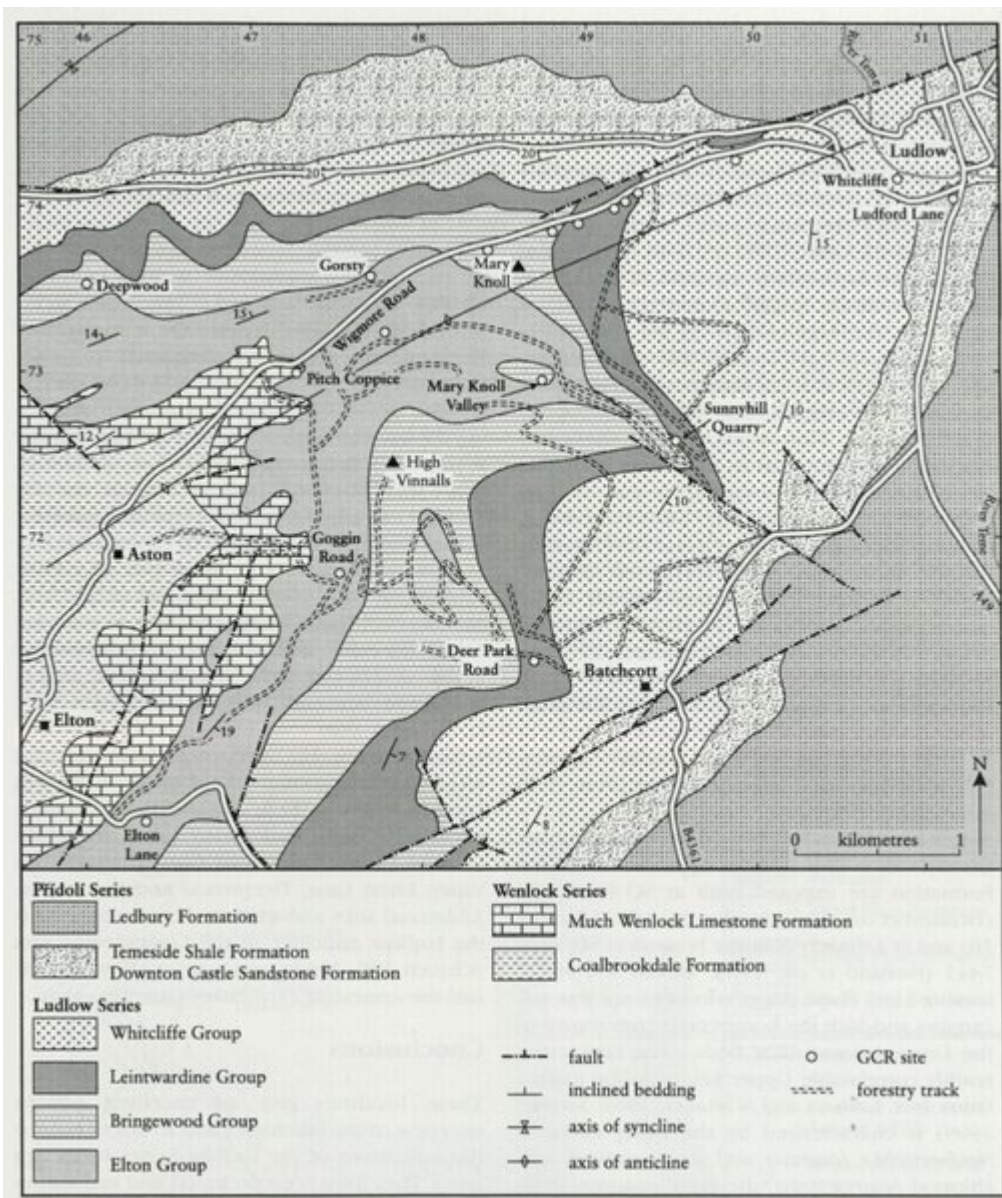
Pitch Coppice is a site of international importance in stratigraphy. It is the internationally agreed site for defining the base of the Ludlow Series, and the coincident base of the Gorstian Stage. As such it represents a globally unique locality at which a major time plane is drawn in the rock record of Earth history and is the standard succession against which all deposits of possible similar age should be correlated. The locality is also the basal boundary stratotype section for the Lower Elton Formation.

Its international scientific importance is reflected in the fact that the locality is studied by geological parties of all kinds, particularly researchers. The locality has been maintained and improved by the (then) Nature Conservancy Council, English Nature and the Marches Forestry District of the Forestry Commission and needs to be conserved rigorously.

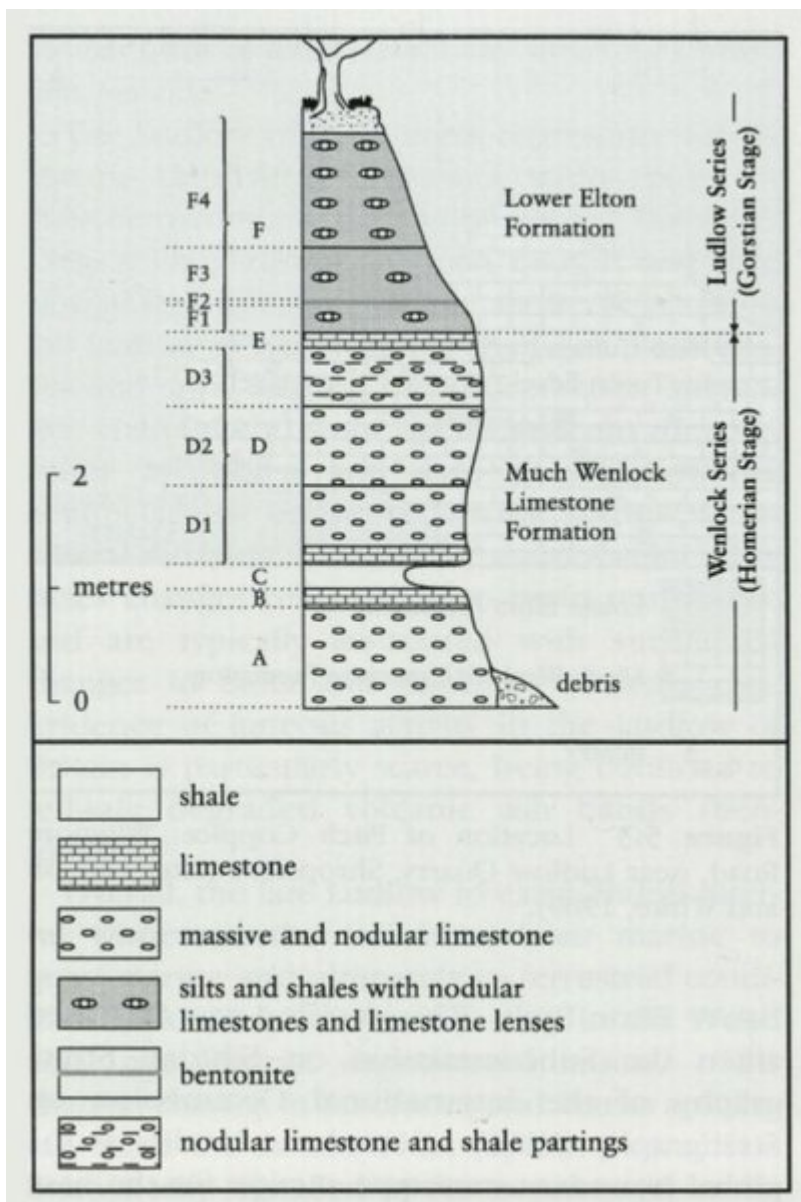
[References](#)



(Figure 5.3) Location of Pitch Coppice, Wigmore Road, near Ludlow Quarry, Shropshire (after Lawson and White, 1989).



(Figure 5.6) Map of the geology south-west of Ludlow, showing GCR sites along the Wigmore Road and elsewhere in the eastern part of the Ludlow Anticline (after Holland et al., 1963; Lawson, 1977; Lawson and White, 1989).



(Figure 5.4) The boundary stratotype section for the base of the Ludlow Series and the base of the Gorstian Stage at Pitch Coppice, Wigmore Road, near Ludlow (Holland et al., 1963; diagram after Lawson and White, 1989; both papers describe lithological divisions A-F).



(Figure 5.5) The boundary stratotype section for the base of the Ludlow Series and the base of the Gorstian Stage at Pitch Coppice, Wigmore Road, near Ludlow, Shropshire (for lithologies see (Figure 5.4)). (Photo: Jane Washington-Evans.)