Goggin Road

[SO 4720 7189]–[SO 4765 7170]

Introduction

These uppermost Wenlock and lower Ludlow outcrops are on the south and east sides of a forestry track on the SSW slopes of High Vinnalls, Mortimer Forest, about 3 km southwest of Ludlow, Shropshire (Figure 5.6), (Figure 5.7). Cut in the 1960s by the Forestry Commission, the section was not available for study at the time of the seminal research on the Ludlow rocks of the Ludlow Anticline (Holland *et al.,* 1963). The stratigraphy of Goggin Road was noted by Lawson (1973a) and detailed by White and Lawson (1978). The sequence also features in an account of the global standard for the Silurian System (Lawson and White, 1989) and in field guides (Bassett *et al.,* 1979; Siveter *et al.,* 1989, locality 3.4).

Goggin Road was chosen for many of the reference horizons of the standard Ludlow Series. It contains the designated basal boundary stratotype for the Upper Elton Formation [SO 471 711]; basal boundary reference sections for the Lower Elton [SO 4727 7184] and Lower Bringewood [SO 4765 7183] formations; and body stratotypes for the Lower [SO 4732 7178], Middle [SO 4746 7170] and [SO 4747 7160] and Upper [SO 4764 7184] Elton formations (Lawson and White, 1989). With the loss of the original basal boundary stratotype section (near Owney Wood) for the Upper Elton Formation and the degradation of the basal boundary stratotype section (on a forestry path in Mary Knoll Valley) for the Lower Bringewood Formation, in the Ludlow Anticline (Holland *et* al., 1963), the equivalent stratigraphical sequences on Goggin Road assume particular importance. The basal boundary stratotype for the Upper Elton Formation is a specially excavated (1981) exposure on a branch track of Goggin Road.

Description

The sequence is about 200 m thick and extends over almost 2 km (White and Lawson, 1978; (Figure 5.7)). Outcrops consist of intermittent, low profile track banks and other excavations; beds dip gently 10°16° ESE.

The top of the Much Wenlock Limestone Formation occurs in the topographically and stratigraphically lowest part of the section, where its predominantly nodular limestones are succeeded by Lower Elton strata. White and Lawson (1978) placed the formational boundary at the eastern end of their excavation 'locality A1–5' [SO 4727 7184], a basal boundary reference section for the Lower Elton Formation (Lawson and White, 1989). However, new faunal and lithological evidence has permitted more accurate correlation with the nearby basal boundary stratotype at Pitch Coppice, and the Wenlock–Ludlow junction at Goggin Road is now drawn at an horizon some 11 m stratigraphically lower in the section ([SO 4724 7187]: Sutherland, 1994; Mullins, 1996).

The Elton Group consists of soft, easily weathered, pale olive-grey mudstones and siltstones with some more calcareous and flaggy horizons. Bentonites are common throughout the Middle and Upper Elton formations, but their provenance is not readily identifiable (Figure 5.8). Graptolites are particularly common: *Saetograptus varians varians, Saetograptus chimaera chimaera, Saetograptus chimaera semispinosus, Spinograptus spinosus* and *Pristiograptus dubius* occur in the Middle Elton and, *inter alia, Pristiograptus tumescens* is fairly common in the Upper Elton (e.g. [SO 4760 7190]).

There is a scattered and diverse shelly macrofauna. The Lower Elton (e.g. [SO 4732 7178]), some 45 m thick, yields the brachiopods *Amphistrophia funiculata, Atrypa reticularis, Craniops implicatus, Dicoelosia biloba* and *Gypidula galeata,* together with *Dalmanites myops* and tabulate and rugose corals. Orthoconic nautiloids, brachiopods such as *Aegiria grayi, Shagamella ludloviensis* and *Lingula lata* and trilobites such as *Dalmanites, Raphiophorus, Acidaspsis* and *Leonaspis* occur in beds of the Middle Elton (*c.* 85 m thick) and/or Upper Elton (partly faulted out; 19 m recorded). The deep cutting in the middle part of the Middle Elton (locality Al2–14 of White and Lawson, 1978; [SO 4746 7170]) is richly fossiliferous and shows several bentonites. Watkins' (1979, p. 259, fig. 23) log of the cutting records a small brachiopod/trilobite dominated *Glassia obovata* association, which includes bivalve, gastropod and ostracod associates.

The faunal change signifying the Elton–Bringewood boundary involves a marked reduction in the abundance of *Pristiograptus tumescens* and the introduction of several brachiopods, especially strophomenids such as *Leptostrophia filosa* and *Leptaena depressa* (see Siveter *et al.,* 1989, fig. 44). Lithologically there is a 2 m transitional sequence, passing into 17 m of hard, irregularly bedded calcareous siltstones of the Lower Bringewood Formation. At the top of the section faulting cuts out part of the Lower Bringewood strata and re-introduces Upper Elton beds.

The section also contains abundant microfauna and microflora, of which both the chitinozoans and acritarchs (Figure 5.9) feature prominently in the high resolution biostratigraphical and biofacies studies of Sutherland (1994) and Mullins (1996). Ostracods occur through the sequence but are not yet documented.

Interpretation

The rocks at Goggin Road represent marine sedimentation on predominantly the relatively sheltered shelf area of the eastern, Midland Platform margin of the Welsh Basin (see Siveter *et al.,* 1989, figs 8–10; Bassett *et al.,* 1992, figs S3b-S4b; Watkins and Aithie, 1980). The lithofacies changes from the late Wenlock through to the late Gorstian, from carbonate to fine clastic to carbonate-rich clastic regimes, may represent shifts in sea level (e.g. see Hurst, 1975a, b; Bassett, 1976; Dorning, 1981a; Siveter *et al.,* 1989; Johnson *et al.,* 1991). A relatively sharp transgressive event (Much Wenlock Limestone Formation-Elton Group) may have preceded a more gradual and much weaker regressive episode (Upper Elton–Lower Bringewood formations). Alternatively, these lithofacies may be associated with changing climatic and oceanic conditions (Jeppson, 1990; Jeppson *et al.,* 1995). Such changes clearly influenced the palynofacies of the Lower and Middle Elton formations at Goggin Road (Mullins, 1996).

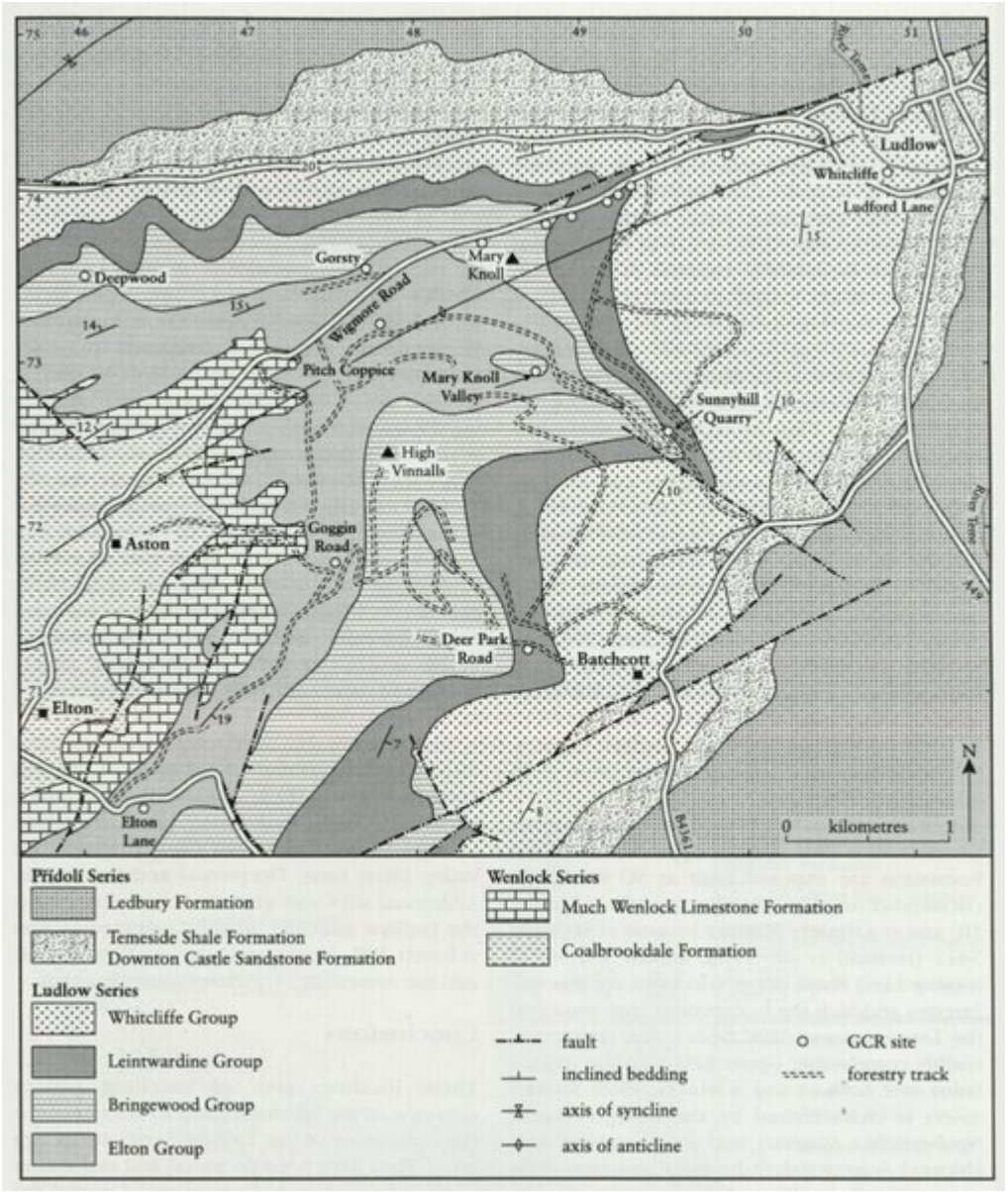
Other Welsh Basin GCR sites that contain a Wenlock to early Ludlow sequence occur locally at Pitch Coppice and in the southern Welsh Borderland and east central and southern Wales. These embrace sites that have either platform facies (Pitch Coppice; Linton Quarry, Gorsley Inlier; Gurney's Quarry, Ledbury area; Cwm-Ton Farm, Usk Inlier; Rumney River, Cardiff) or more offshore, basin-basin margin settings (River Irfon, Builth; Sawdde Gorge, near Llandeilo; Trewern Brook, Long Mountain; Ty Mawr, Denbigh area).

Conclusions

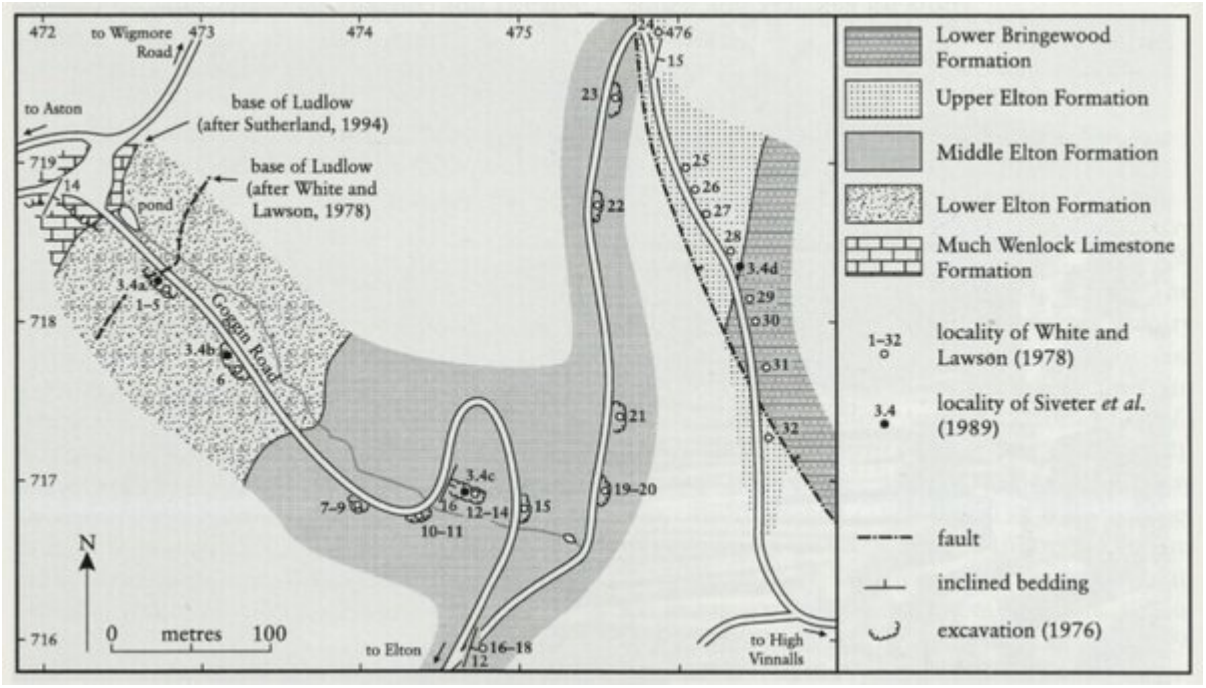
Goggin Road has international status in stratigraphy and offers excellent potential for research. Its fossil-rich exposures collectively display perhaps the most complete sequence available through the latest Wenlock and Gorstian in the type area of the Ludlow Series. The section includes a basal boundary stratotype, basal boundary reference sections and body stratotypes for formations in the Elton Group and the Bringewood Group.

The site affords good accessibility and the opportunity to collect through a long sequence embracing most of Gorstian time, but outcrops tend to deteriorate rapidly. In keeping with its importance, the exposures should be maintained and available for study.

References

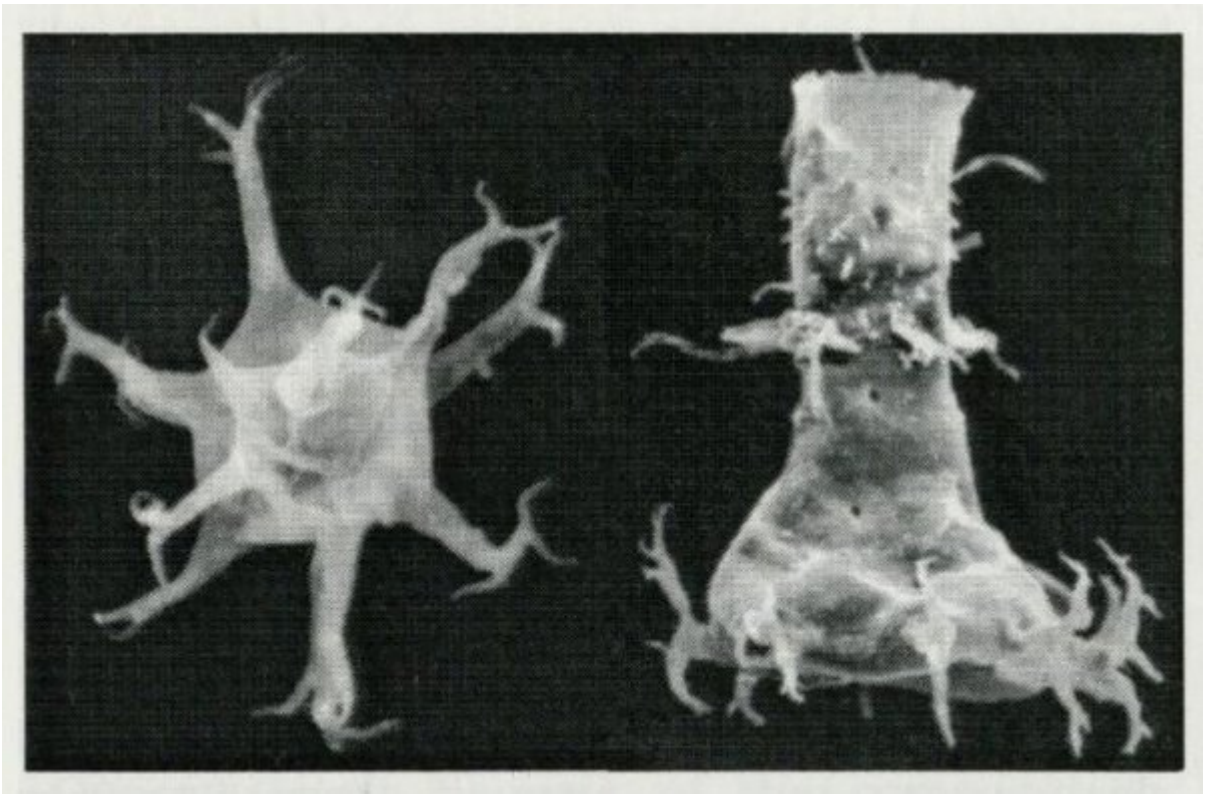


(Figure 5.6) Map of the geology south-west of Ludlow, showing GCR sites along the Wigmore Road and elsewhere in the eastern part of the Ludlow Anticline (after Holland et al., 1963; Lawson, 1977; Lawson and White, 1989).



(Figure 5.7) Geology of the section along the Goggin Road, Mortimer Forest, near Ludlow, Shropshire (after White and Lawson, 1978, with modifications from Siveter et al., 1989 and Sutherland, 1994).

(Figure 5.8) Middle Elton Formation at White and Lawson's (1978) locality 16–18 along the Goggin Road, Mortimer Forest, near Ludlow, Shropshire: mudstones containing bentonites (whitish horizons). (Photo: Derek J. Siveter.)



(Figure 5.9) The acritarch Multiplicisphaeridium variable (Lister, 1970) Dorning, 1981 (left, x 1050) and the chitinozoan Ancyrochitina gogginensis Sutherland, 1994 (right, x 320), from the Lower Elton Formation, Goggin Road, Mortimer Forest, near Ludlow (Photos: G. Mullins.)