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# Trewern Brook

[SJ 304 116]–[SJ 310 126]

## Introduction

The Trewern Brook section is located some 10 km ENE of Welshpool on the north side of the Long Mountain area. This area is made up of Silurian strata folded into an asymmetrical syncline, with Llandovery rocks on its outer margins, then Wenlock, Ludlow and Pridoli deposits being in turn exposed towards its central, topographically highest part.

Murchison (1836, 1854) and, later in the 19th century, Watts (1891), were two early commentators on the Silurian geology of the Long Mountain. The graptolite faunas in various Long Mountain sections were subsequently studied in detail by Elles (1900) and Wood (1900) as part of their investigations into the biostratigraphy and systematics of this fossil group in Wenlock and Ludlow rocks of Wales and the Welsh Borderland. These were cardinal studies in the establishment of a biozonal scheme based on graptolites for rocks of this age, this scheme, with relatively minor amendments, remaining in current use. The most notable change has been, following the findings of Holland *et al.* (1969), the acceptance of the *ludensis* Biozone (= *vulgaris* Zone of Wood, and as used by Elles) within the Wenlock and not the Ludlow Series. The *ludensis* Biozone fauna was originally defined by Wood (1900) on the basis of the graptolite faunal sequence of the Long Mountain and Builth districts. After Elles' and Wood's studies, a geological map of the Long Mountain Syncline and description of all the Wenlock and Ludlow of the area was provided by Das Gupta (1932).

Modern revision of the Long Mountain was carried out by Palmer (1970, 1972), who presented a thesis and a stratigraphical synthesis of the Silurian of the area including a new lithostratigraphy. Rocks of Wenlock age, formerly assigned (Elles, 1900; Wood, 1900; Das Gupta, 1932) to the 'Wenlock Shales' and in part to the 'Lower Ludlow Shales', were in their entirety referred by Palmer to the Trewern Brook Mudstone Formation. A distinct horizon at the top of this formation, more calcareous and shelly in character, was distinguished by him as the Glyn Member. At the same time Cocks and Rickards (1969), in co-operation with Palmer, recognized the *centrifugus*, *murchisoni* and *riccartonensis* graptolite biozones of the lower Wenlock in the Buttington Brickworks section of the Long Mountain.

Cave and Dixon (1993) and Lydell and Cave (1993) have recorded in detail, at Buttington, the upper Llandovery to lowermost Wenlock part of the Long Mountain sequence, the latter authors establishing the thin, Butterley Mudstone Member at the base of the Trewern Brook Mudstone Formation. The bottom part of this member was considered to be of latest Llandovery age.

Trewern Brook is the type locality for the mudstone formation of the same name. It exposes, upstream, Trewern Brook Mudstone Formation (Wenlock) strata that are at least as old as *linnarssoni* Biozone age; downstream, it cuts through rocks of this formation that belong to, at least, the succeeding *ellesae*, *lundgreni* and *ludensis* biozones; thereafter, tributaries entering it from the south cross ground underlain by the Long Mountain Siltstone Formation of the Ludlow Series. The brook makes available the most complete section through Wenlock strata in the Long Mountain Syncline.

## Description

Elles (1900), Wood (1900) and Das Gupta (1932) all, variously, described the Trewern Brook Mudstone Formation and associated graptolite sequence of Trewern Brook. However there is no modern published account of the section. The description that follows thus relies on data given by these three authors, which require revision, particularly the graptolite faunal lists. Das Gupta (1932), for instance, claimed that the Wenlock sequence of the northern part of the Long Mountain area starts with rocks of *linnarssoni* Biozone age, whereas, in the Buttington area, strata belonging to earlier Wenlock biozones are now known to be present (see above). The Trewern Brook section, only 6 km to the east of Buttington on the same, northern limb of the syncline, was reported by both Elles (1900) and Das Gupta (1932) to begin with *linnarssoni* Biozone strata.

A side-stream that enters Trewern Brook from the north, 200 m south of Gate Farm [SJ 310 127], exposes beds of Llandovery age. At the confluence of brook and side-stream are hard, calcareous and flaggy mudstones with fragmentary trilobites and brachiopods but no graptolites. *Calymene*, *Dalmanites*, *Cheirurus*, *Encrinurus*, *Acidaspis*, orthid and rhynchonellid brachiopods and *Orthoceras* remains have been recorded from this locality (Das Gupta, 1932). The beds here, and throughout much of the brook section, dip fairly steeply to the SSE at about 40–45°. *C. linnarssoni* Biozone strata follow a short distance downstream; these have yielded at least six species of graptolites, most importantly the eponymous biozonal species (Elles, 1900; Das Gupta, 1932).

The *ellesae* Biozone (= *rigidus* Zone of Elles) is represented in the section by beds located 20 to 200 m north of where the railway crosses the brook. From this biozone Elles (1900) noted four graptolite species, and she recognized it on the basis of *Monograptus retroflexus*; she failed to identify from here the key biozonal index species *Cyrtograptus ellesae* Gortani (= *Cyrtograptus rigidus* Tullberg of Elles), though Das Gupta did so, together with eight other graptolite species. The fact that *M. retroflexus* occurs, according to Rickards (1976), only as a component of the *rigidus* Biozone (= *symmetricus* Zone of Elles) fauna, merely serves to emphasize the need for systematic revision of the graptolites from this section.

Graptolite-bearing horizons of the *lundgreni* Biozone have been recorded in particular from that part of the brook immediately south of the railway bridge, where the brook flows only slightly across the ENE strike of the beds and its course parallels the line of the railway. Elles (1900) listed ten graptolite species from brook exposures belonging to this biozone, and Das Gupta (1932) eight, both authors noting amongst these the occurrence of *Cyrtograptus lundgreni*. Calcareous concretions are present, being numerous in horizons low in the biozone. Shells (often fragmentary) occur, for example cardioids, and from horizons high in the biozone species of *Dalmanites*, *Atrypa*, *Leptaena*, *Meristina*, and orthids have been recorded (Das Gupta, 1932).

Strata of the *ludensis* Biozone are present in Trewern Brook southwards from about where the tributary from Glyn Common enters into it [SJ 303 116]. It is at about this point also that the shelly calcareous mudstones of the lenticular Glyn Member occur. In the northerly flowing tributary that joins the brook from Ding Wood to the south, beds of the overlying Ludlow Siltstone Formation come in. A depleted graptolite fauna composed exclusively of *Monograptus ludensis* Murchison (= *Monograptus vulgaris* Wood) and *Pristiograptus dubius* is recorded from the top Wenlock *ludensis* Biozone rocks (Wood, 1900; Das Gupta, 1932). Trilobites, *Cardiola*, *Leptaena* and *Orthoceras* have also been noted (Das Gupta, 1932).

The *nassa* Biozone (of Jaeger, 1959), which is positioned between the *lundgreni* and *ludensis* biozones, has also been recognized in the Long Mountain, by Palmer (in Hurst *et al.*, 1978), though without reference to any specific locality. Palmer (in the same publication) gave the thickness of the strata belonging to each of the graptolite biozones in the Long Mountain as follows: *centrifugus*, 10 m; *murchisoni*, 5–10 m; *riccartonensis*, ?15 m; *rigidus*, ?42 m; *linnarssoni*, ?50 m; *ellesae*, 99 m; *lundgreni*, 298 m; *nassa*, 15 m; *ludensis*, 61 m. These thicknesses, for post-rigidus biozone beds at least, can thus be taken as approximate for the Trewern Brook section also.

The Wenlock of Trewern Brook stands as the type locality for certain taxa, for example *M. vulgaris* Wood, 1900, and *Visbyella trewerna* Bassett, 1972.

## Interpretation

Throughout the Wenlock the Long Mountain district was located between shelf and basin, on the palaeoslope (Bassett, 1974a; Hurst *et al.*, 1978; Holland, 1992), with relatively deep water, soft, muddy conditions prevailing. Faunally, this palaeogeographical location is typified in the main by graptolite plankton, but a shelly benthic component is also present. The Trewern Brook Mudstone Formation of Trewern Brook is characterized by the *Visbyella trewerna* brachiopod community, which occupies the most offshore part of the Wenlock shelly benthic spectrum (Hurst *et al.*, 1978). The lime-rich and shelly Glyn Member represents on this part of the slope area a reflection of the increased carbonate build-up during late Wenlock times that gave rise to the Much Wenlock Limestone Formation on the shelf.

Trewern Brook is linked closely to the stratigraphically older, Buttington Brickworks site, the two providing nearly full coverage of Wenlock age rocks in the Long Mountain. It is also networked to the River Irfon site in the Builth Region, which has a middle Wenlock through to Ludlow sequence and a comparable fauna, lithostratigraphy and palaeoslope setting.

## **Conclusions**

Trewern Brook is a site of considerable significance for the palaeontology, stratigraphy, and palaeogeography of the Wenlock of the Long Mountain Syncline. It represents the best section of Wenlock age in the area. It gives its name to the Trewern Brook Mudstone Formation, which spans the whole of the Wenlock Series here, and it also contains the type section of the more calcareous, shelly, upper Wenlock Glyn Member of this formation. Historically it has been an important section for demonstrating the succession of many of the Wenlock graptolite biozones; in particular, the latest, *ludensis* Biozone was defined in part on the basis of the fauna from here. During Wenlock times the Long Mountain area was positioned offshore, forming part of the palaeoslope. It thus occupied an intermediate position between shelf and basin, and in consequence has a mixed graptolite–shelly fauna. Trewern Brook is the type locality for Wenlock graptolite and brachiopod species.

## **[References](#)**