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# Banwy River

[SJ 1330 1042]–[SJ 1340 1011]

Potential GCR Site

## Introduction

The Banwy river section, 3.5 km south-west of Meifod in Powys, has recently come to prominence because it yields abundant graptolites through the uppermost part of the Llandovery Series and across the Llandovery–Wenlock boundary (Loydell and Cave, 1996). Graptolites are otherwise poorly known at this level in the Silurian of Britain. The section provides a continuous exposure of strata through the Tarannon Shales Formation ( $V_3$  unit of King, 1928) and into the Nant-ysgollon Shales Formation (Salopian of King, 1928), which were deposited on the eastern slope of the Welsh Basin during an interval represented by the *turriculatus* to *riccartonensis* biozones.

The base of the Wenlock was taken by Loydell and Cave (1996) as occurring between the highest band with *Cyrtograptus insectus* and the lowest band with *C. centrifugus*, as is common practice in graptolitic sequences worldwide. This horizon occurs within the unit named the Banwy Member by Loydell and Cave (1996, p. 47), in the basal part of the Nant-ysgollon Shales Formation. The boundary level and the overlying Wenlock strata are described and discussed in the Wenlock chapter of this volume; the present description and interpretation are confined to the Llandovery part of the succession.

## Description

The lowest part of the section comprises fine-grained sandstones and silty mudstones assigned to the Blue Silty Mudstones ( $V_2$ ) by King (1928). These beds contain a benthic fauna dominated by bivalves, bryozoans and very diverse brachiopods (see Temple, 1987); they were presumed to be of Aeronian age at the top by Loydell and Cave (1996). The overlying Tarannon Shales Formation displays an abrupt contact with the Blue Silty Mudstones and comprises pale grey-green mudstone with some red/maroon beds, reaching 122 m in total thickness (Figure 3.35), (Figure 3.36). Loydell and Cave (1996) reported several thin layers of black graptolitic mudstone in the formation, with some of the bands occurring in bundles reaching up to 0.5 m in thickness. A distinctive pale-grey sandy mudstone (Bed 85 of King, 1928) occurs 7.6 m above the base of the formation (AS on (Figure 3.35), (Figure 3.36)). A second prominent sandstone (S on (Figure 3.35), (Figure 3.36)) is present about 20 m below the top of the formation. Thin bentonite bands also occur. There are no graptolites recorded from the basal part of the formation in the Banwy River section, but Loydell and Cave (1996, p. 48) reported a collection at this level from nearby Llanfyllin indicative of the highest part of the *turriculatus* Biozone. King (1928, p. 690) noted the presence of graptolites, considered by him to indicate the *turriculatus* Biozone, low in the Tarannon Shales Formation in the Banwy River (see (Figure 3.36)); however, a re-examination of these specimens by Loydell and Cave (1996, p. 48) revealed the presence of *Stimulograptus clintonensis*, which has not been positively recorded below the *crispus* Biozone. Higher in the formation, between the two red mudstone units, graptolite horizons become more common and can be found on both banks of the river, but the strata are disturbed so that individual bands cannot be matched across the stream (Loydell and Cave, 1996). The faunas include *S. clintonensis* and other graptolites of the *crispus* Biozone, with the highest band on the west side of the river also containing *Streptograptus sartorius*, suggesting assignment to the *sartorius* Sub-biozone, the highest subdivision of the *crispus* Biozone (see Zalasiewicz, 1994). Graptolites become particularly significant above the prominent sandstone (S on (Figure 3.35), (Figure 3.36)), and a range chart from this level into the lower Wenlock was provided by Loydell and Cave (1996, see (Figure 4.51)). Four bands represent the *spiralis* Biozone, with highly distinctive faunas of the *lapworthi* Biozone appearing in the uppermost few metres of the Tarannon Shales Formation.

The lowest beds of the Banwy Member also contain a *lapworthi* Biozone fauna, with the uppermost band yielding in addition *Monoclimacis basilica*, a species often taken as an indication of a Wenlock age (see Loydell and Cave, 1996). Above this about 10 m of strata are referable to the *insectus* Biozone, although a prominent slide plane disrupts the

sequence, and the original thickness may have been greater. There is a 3 m interval lacking graptolites above the highest *insectus* band, and it is within this interval that the presumed level of the Llandovery–Wenlock boundary occurs. Loydell and Cave (1996) also reported chitinozoans, diverse acritarchs and sparse brachiopods in the Banwy Member.

The *insectus* Biozone in the Banwy River section provides the type locality for the graptolites *Mediograptus flittoni* Loydell and Cave, 1996, and *Mediograptus morleyae* Loydell and Cave, 1996.

## Interpretation

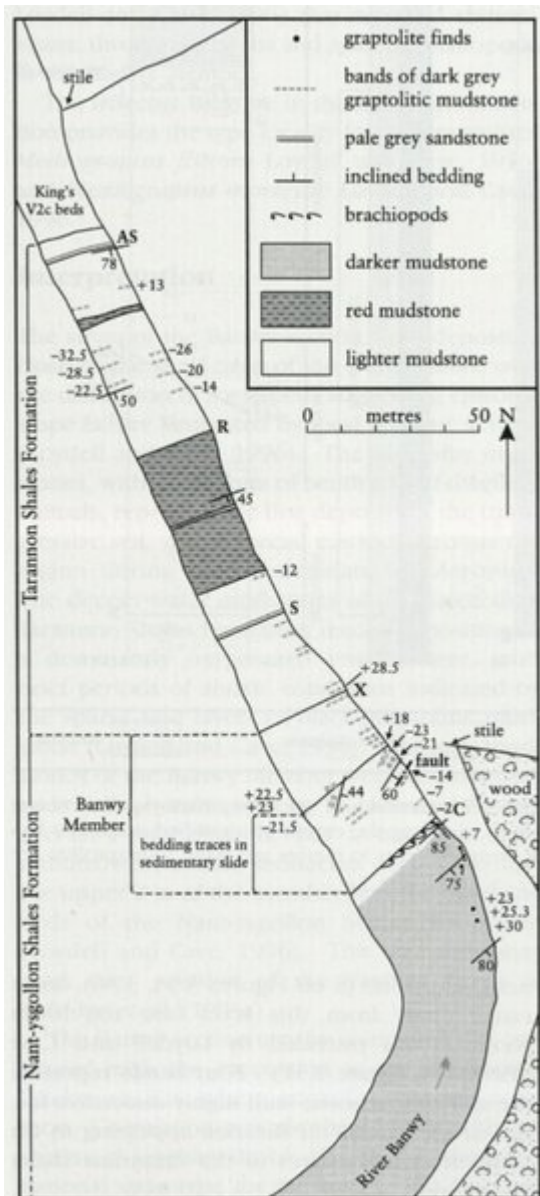
The strata of the Banwy section were deposited close to the shelf edge of the Welsh Basin, with the disruption of some beds suggesting episodic slope failure generated by local tectonic activity (Loydell and Cave, 1996). The blue silty mudstones, with their fauna of benthic shelf-dwelling animals, represent the first deposits of the transgressive sea, which spread eastwards across the region during the Rhuddanian and Aeronian. The deeper-water mudstones of the succeeding Tarannon Shales Formation record deposition in a dominantly oxygenated environment, with brief periods of anoxic conditions indicated by the sparse thin layers of black graptolitic mudstone (Loydell and Cave, 1996). The silty mudstones of the Banwy Member were also deposited in oxic bottom waters, as indicated by the pervasive bioturbation, but a transition into unburrowed, anoxic sediments occurs through the upper 2 m of the member into the overlying beds of the Nant-ysgollon Shales Formation (Loydell and Cave, 1996). This transition may mark the position of the Ireviken Event of Aldridge *et al.* (1993a).

The Banwy section may be compared and correlated with the succession at the Buffington Brickworks site, where graptolites are less common. Correlation may also be possible with the section at Hughley Brook, Shropshire, the international stratotype for the base of the Wenlock Series; although the stratotype lacks graptolites, there is potential for using chitinozoans, acritarchs and bentonites to relate the two localities (Loydell and Cave, 1996).

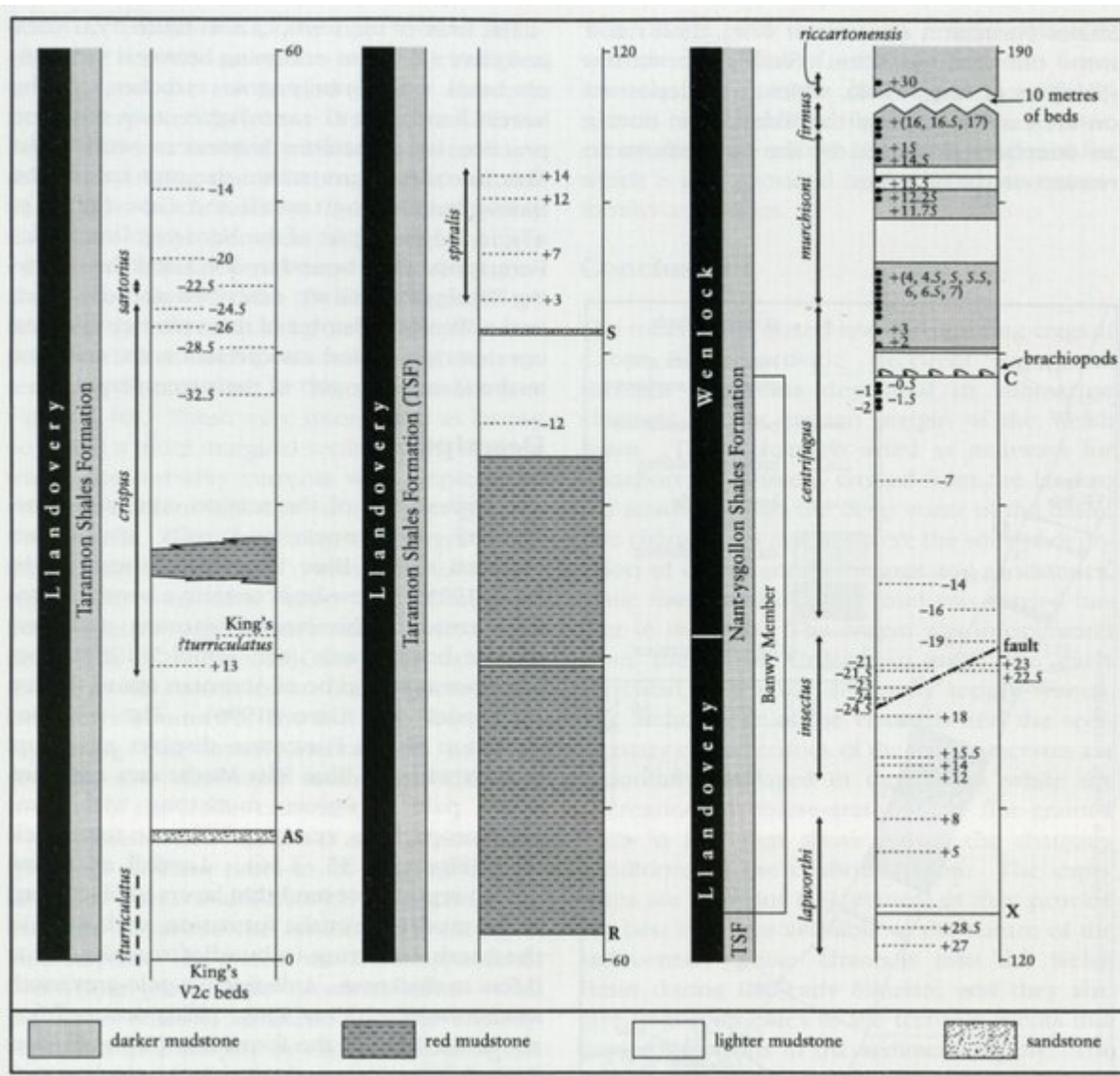
## Conclusions

The Banwy River section is of special importance as it has produced the most completely known sequence of graptolite faunas in Britain through the uppermost part of the Llandovery Series and across the Llandovery–Wenlock boundary. The presence of acritarchs, chitinozoans and bentonite bands in the section provides a potential for correlation of this graptolitic sequence with the non-graptolitic stratotype section for the base of the Wenlock Series in Hughley Brook, Shropshire. This site may well become an international reference locality for graptolite biostratigraphy across the Llandovery–Wenlock boundary.

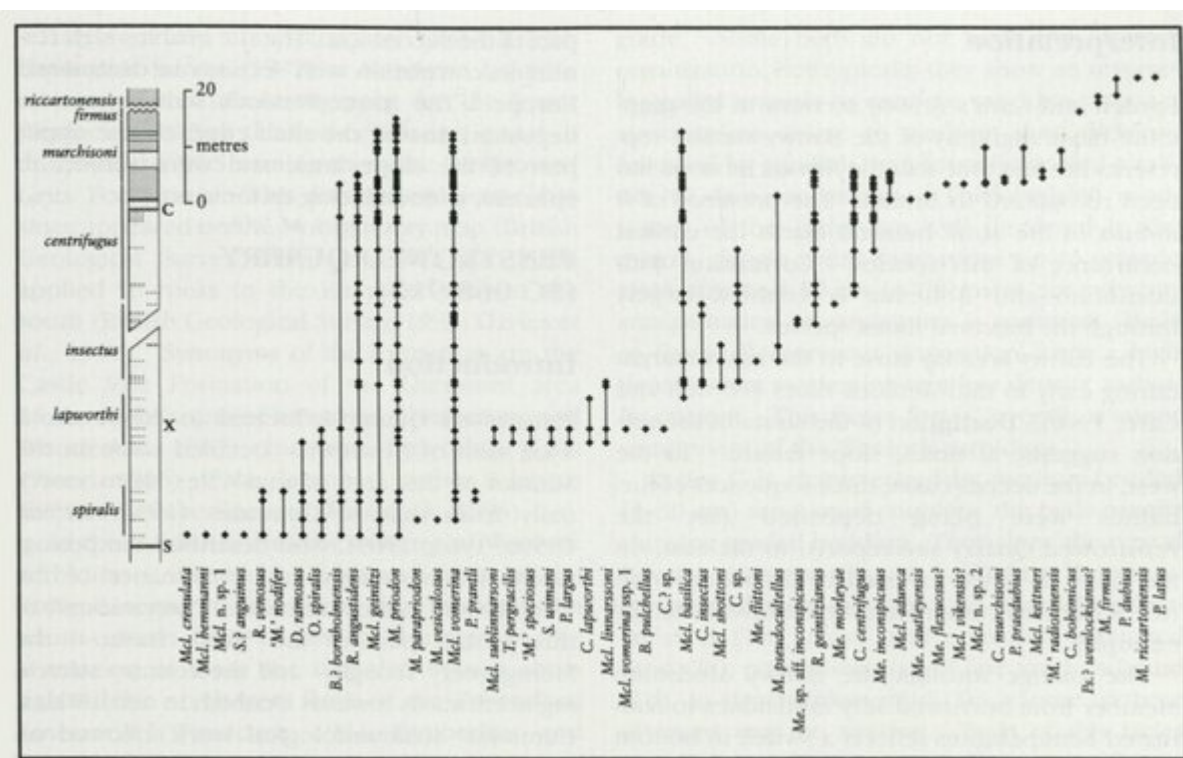
## [References](#)



(Figure 3.35) Geological sketch map of the Banwy River section (after Loydell and Cave, 1996). The letters represent marker horizons from which measurements in metres are taken to graptolitic levels.



(Figure 3.36) Measured section through the Tarannon Shales Formation and the lower Nant-ysgollon Shales Formation in the Banwy River (after Loydell and Cave, 1996), showing the extent of identified graptolite biozones. The letters represent marker horizons from which measurements in metres are taken to graptolitic levels.



(Figure 4.51) Range chart of graptolite species from the Banwy River section, Meifod area, Powys, from the *spiralis* Biozone (Telychian) to the *riccartonensis* Biozone (Sheinwoodian). The gap in the section indicates the position of a slide (within the *insectus* Biozone) (after Loydell and Cave, 1996).