
Sawdde Gorge

[SN 715 260]–[SN 728 245]

Introduction

The Sawdde is a tributary of the River Towy, entering it near Llangadog, midway between Llandeilo and Llandovery. The strata comprising the site form part of the Towy Anticline, one of the most important Lower Palaeozoic tectonic features of the Welsh Basin.

The rocks and fossils of the Sawdde and adjoining area have figured in the geological literature from the time of Murchison (1839) and Phillips (1848). Williams (1953) provided the first detailed, modern description and map of the (lower) Silurian rocks of the Sawdde River section, in his account of the geology of the Llandeilo (Sawdde–Llanarthney) district. He divided the Wenlock strata of this region into an 'Upper' and a 'Lower' Group. Potter and Price (1965) later included the Ludlow and Pridoli parts of the section in their study of rocks of this age between Llandovery and Llandeilo. Bassett (1974a) re-assessed the Wenlock strata and fauna of the Sawdde sequence, and at the same time Calef and Hancock (1974) used Wenlock brachiopod collections from here for community ecology work. Revision of the lithostratigraphy of the Wenlock sediments and the establishment of formational terms, together with further age refinement of the various units, was carried out by Hurst *et al.* (1978). The site has also figured in the field guides of Bassett (1982b) and Siveter *et al.* (1989).

Movement on the Towy Anticline controlled lateral and vertical facies changes in this south-central area of the Welsh Basin during upper Ordovician and Silurian times. The Sawdde site is situated on the south-east flank of the anticline, the Silurian sediments here belonging essentially to those of the shelf, whereas those north-west of the fold axis are of a deeper water, basinal nature. The site provides almost continuous exposure of these shallower water sediments, which are not only of Wenlock age, but upper Llandovery, Ludlow and Pridoli too.

The deposits and fauna of the upper Silurian of the Sawdde are described in the Ludlow section of this volume.

Description

This site involves, in the main, exposures in the gorge of the River Sawdde, but in places it also takes in adjacent trackside and (in the Ludlow part of the sequence) quarry localities (Figure 4.45).

All Silurian rocks in the gorge dip steeply (up to 70°) to the south-east. The sequence begins with upper Llandovery (Telychian) strata dark blue or grey mudstones and siltstones of the Cerig Formation — which rest unconformably on the Ordovician Llandeilo Flags (Williams, 1953; Bassett, 1974a, 1982b; Cocks *et al.*, 1984; Siveter *et al.*, 1989; Cocks *et al.*, 1992). At the beginning of the section, in the vicinity of Rhydysaint, the Llandovery is probably over 270 m thick. In the lower part of the Llandovery the mudstones contain thin bands of hard, blue, impure limestone, and in the upper part concretions. The mudstones (Williams, 1953) are poorly fossiliferous, yielding mainly occasional specimens of *Plectodonta* in the upper part of the succession. The limestones and some of the concretions are more richly fossiliferous, containing for example *Costistricklandia lirata*, *Plectodonta millinensis canastonensis* and *Clorinda globosa*. Other brachiopods recorded (Hurst *et al.*, 1978) from the upper Llandovery include forms of *Eocoelia* intermediate between *E. curtisi* and *E. sulcata*, and *Pholidostrophia* (*Mesopholidostrophia*) *salopiensis*.

The Wenlock succession and faunal aspects (Williams, 1953; Calef and Hancock, 1974; Hurst *et al.*, 1978; Bassett, 1982b; (Figure 5.66)), in ascending order, are:

Sawdde Siltstone Formation

325 m thick. Mainly grey siltstones and shales with slumped horizons in the upper half of the formation. Slurried beds occupy slumps near the base, which is taken at the bottom of a shale sequence 20 m below a 6 m siltstone with irregular bedding. Shales are dominant in the lower half and a shelly, 3 m thick mudstone occurs 134 m above the base. Brachiopods of the *Dicoelosia biloba* Community occur. *Calymene* and machaeridian plates are recorded from horizons in this formation. *Pristiograptus dubius* has been found 134 m above its base.

Sawdde Sandstone Formation

295 m thick. Interbedded olive, buff and grey sandstones, siltstones and shales. Parallel bedding with internal parallel lamination characterizes the sandstones, some of which are graded and some have basal groove and scour marks. There is no evidence of wave action. The formation contains an abundant shelly fauna, including brachiopods of the *Isorthis clivosa* Community, bivalves, gastropods, pelmatozoan columnals and tentaculitids.

Ffynnant Sandstone Formation

215 m thick. Grey to greenish-grey and buff, medium to coarse-grained micaceous sandstones interbedded with siltstones and shales. Many units display flaser and herringbone cross-bedding. Brachiopods of the *Isorthis clivosa*, then *Homoeospirifer baylei* and finally *Salopina conservatrix* communities progressively occur up sequence. A fauna of bivalves and *Lingula* is found within 6 m of siltstones that occur above a 10 m sandstone and 65.5 m below the top of the formation. A 1 m thick ironstone oolite containing a *Gypidula–Atrypa* association forms the highest bed. *Monograptus flemingii* has been recorded from horizons 5 m and 105 m above the base of the formation.

Interpretation

Upper Llandovery rocks (Telychian; specifically C4–5 age using the stratigraphical scheme of Jones, 1925) were initially recorded from the Sawdde section (Williams, 1953); the immediately overlying Wenlock rocks, provisionally assigned to the *riccartonensis* Biozone, were believed to have an unconformable, overstepping relationship to them. Subsequently (Bassett, 1974a; Hurst *et al.*, 1978), strata close to the series boundary in the Sawdde were recognized as belonging to the uppermost Llandovery (C5–6 age) on the basis of species of *Eocoelia* and *Costistricklandia*, and it is now generally accepted that these strata pass conformably upwards here into Wenlock rocks.

The notion (Williams, 1953) of an unconformity within the Wenlock succession of the ground from the Sawdde to Golden Grove south-west of Llandeilo has received more limited endorsement from a subsequent study (Bassett, 1974a), which noted its presence in the country between the Sawdde and beyond Llandeilo to the south-west, but not in the Sawdde section itself. Further, a slightly later investigation of the Cennen Valley district (Squirrell and White, 1978), that is the area from around Llandeilo south-west to Llanarthney, found no evidence of an intra-Wenlock unconformity.

The early, mid- and late Wenlock ages of, respectively, the Sawdde Siltstone, Sawdde Sandstone and Ffynnant Sandstone formations (Hurst *et al.*, 1978) are based on a combination of graptolite records and species of *Resserella* and *Pholidostrophia* (*Mesopholidostrophia*). The Sawdde district was situated north of the Pretannia landmass, which formed the southern margin of the Welsh Basin, throughout Wenlock times (Bassett, 1974a; Hurst *et al.*, 1978; Cope and Bassett, 1987; Holland, 1992).

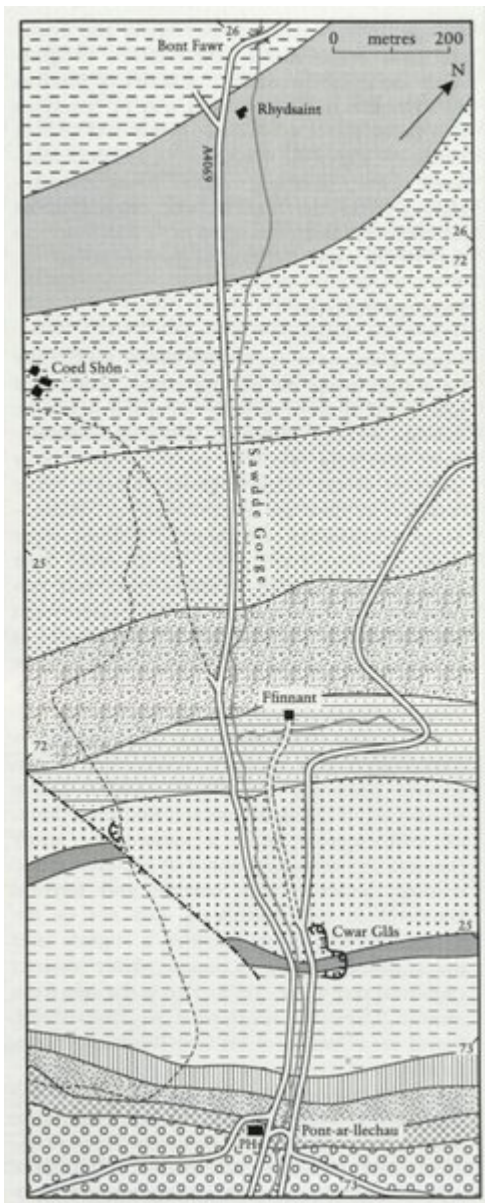
The presence of a *Costistricklandia* Community in the Llandovery sediments suggests a moderately offshore environment at this time, though the change to a *Dicoelosia biloba* Community in the overlying Sawdde Siltstone Formation has been taken as indicating a relatively more offshore situation (Calef and Hancock, 1974, Hurst *et al.*, 1978). Also, the slumped horizons in this formation indicate the presence of increased submarine gradients at this time. Higher, the *Isorthis clivosa* Community of the Sawdde Sandstone Formation suggests less deep conditions, this continuing into the Ffynnant Sandstone Formation which is a regressive, very shallow water unit showing successively shallower brachiopod (*H. baylei* then *S. conservatrix*) communities. The bivalve–*Lingula* fauna two-thirds from the bottom of the Ffynnant Sandstone has been interpreted as a restricted lagoon assemblage, and the 10 m sandstone beneath this horizon as a barrier bar. Early Gorstian times saw a return to offshore, deeper water conditions, as evidenced by the reoccurrence of the *Dicoelosia biloba* Community in the Tresglen Formation.

The Wenlock strata of the Sawdde Gorge are, with respect to other Wenlock sites in this volume, most akin to those of Wernbongam Quarry near Llanarthney, but there they are of very limited vertical extent and they lie, according to most opinions, beneath unconformable Old Red Sandstone sediments of Pridoli age.

Conclusions

The Silurian rocks of this site are shelf deposits forming part of the south-east flank of the Towy Anticline, a Lower Palaeozoic structural feature that had significant effects on the pattern of sedimentation, both vertically and laterally, in this south-central part of the Welsh Basin. The site is a very useful one, providing near continuous exposure through, and the type section for, the Sawdde Siltstone, Sawdde Sandstone and Ffynnant Sandstone formations, which taken together span the whole of the Wenlock. In addition, exposure continues both up- and down-section to include rocks of upper Llandovery, Ludlow and Pridoli age. This makes the section as a whole one of the most complete for Silurian rocks anywhere in Wales. The nature of the Wenlock sediments combined with the sequence of brachiopod communities that they contain indicates a shallowing upwards sequence.

References



(Figure 4.45) Geology of the Sawdde Gorge, Llandeilo–Llandovery area (after Bassett, 1982b and Siveter et al., 1989).

