
Hafotty Ffilltirgerig and Amnodd-wen

[SH 8167 3844]–[SH8161 3860] and [SH 8202 3703]

Introduction

This locality is of historical importance as it exemplifies the Arenig Series in its type area. It was used by Sedgwick (1852) to establish his subgroup of Arenig slates and porphyries'.

Elles (1904) gave a brief and rather inaccurate description of a section at Hafotty Ffilltirgerig, but the first detailed account was that of Fearnside (1905), who named the basal Llyfnant Flags, overlain by the Henllan Ash and Ffilltirgerig Beds. Subsequently little attention was paid to this locality, until Whittington (1966) described the trilobites of the Henllan Ash and correlated the fauna with the lower one-third of the Mytton Flags of Shropshire and Skevington (1969) assigned the graptolites from the Llyfnant Flags to the *deflexus* Subzone. Fortey and Owens (1978) noted that the trilobite fauna has species in common with the lower Arenig Carmarthen Formation in South Wales. Zalasiewicz (1984b) gave the first modern account of the sequence and biostratigraphy and concluded that much of the later Arenig was absent; he adapted the lithostratigraphy introduced by Lynas (1973) for the Migneint area to the north. Beckly (1987) confirmed most of Zalasiewicz's conclusions but on the basis of graptolites suggested that the later Fennian was present, resting disconformably upon Moridunian strata.

Description

There are exposures in crags on the hillside (Figure 9.5), but the best section is in a stream section 400–500 m south-east of Hafotty Ffilltirgerig (Zalasiewicz, 1984b, fig. 8), which extends through the Arenig Carnedd Iago Formation of Lynas (= Allt Llyd Formation of Traynor, 1990, and Howell and Smith, 1997) into the lower part of the Serw Formation, of Llanvirn age. The basal unit of the Allt Llyd, the Garth Grit Member, is not developed here but is seen to advantage at Bryn Glas Quarry (see site report). The oldest division here is the Llyfnant Member, a sequence of predominantly flaggy, laminated siltstones and mudstones, interbedded with graded sandstones that sometimes show low-angle cross-lamination; these beds are considered to have been deposited from waning turbidity currents (Traynor, 1990). Bioturbation, including *Teichichnus* and *Chondrites* burrows, is common throughout. A level near the base of the member is exposed in small quarries south of Hafotty Ffilltirgerig [SH 8167 3844] and the middle part of the member south-east of Amnodd-wên [SH 8202 3703]; both have yielded the graptolite *Didymograptus* aff. *simulans* Elles and Wood.

Ross *et al.* (1982) gave an age of 478 ± 27 Ma for the Llyfnant Member, derived from the fission-track dating of zircons from a tuffaceous sand about 1 m thick within this unit, exposed above Hafotty Ffilltirgerig [SH 8174 3868], and Compston and Williams (1992), using the SHRIMP ion-probe technique on the same sample, refined this date to 471 ± 3 Ma.

The overlying Henllan Ash Member comprises various lithologies, ranging from massive, blocky feldspathic sandstones with little trace of bedding (the 'Henllan Ash' of Fearnside, 1905, and the 'Henllan facies' of Zalasiewicz, 1984b) to muddy, strongly bioturbated feldspathic sandstones or sandy mudstones, commonly with a shelly fauna (which Fearnside, 1905, called the 'Erwent Limestone', though it is not limestone, and the 'Erwent facies' of Zalasiewicz, 1984b). The latter is exposed in and adjacent to the stream to the south-east of Hafotty Ffilltirgerig and at [SH 8161 3860] has yielded the graptolite *Azygograptus* cf. *eivionicus* Elles (see Zalasiewicz, 1984a). Whittington (1966) described a trilobite fauna from exposures in the same general area [SH 818 387] that included *Merlinia selwynii* (Salter), *Neseuretus parvifrons* (M'Coy) and *Ampyx cetsarum* Fortey and Owens, accompanied by brachiopods (*Paralenorthis*). Displaced blocks of dark-coloured, bioturbated mudstone from trenches excavated by the then Nature Conservancy Council at [SH 816 386] yielded (on different blocks) *Expansograptus* cf. *praenuntius* Törnquist and *Amplexograptus confertus* (Lapworth); the blocks apparently originate from the top of the Carnedd Iago Formation (Zalasiewicz, 1984b, p. 119). The former species was also identified by Zalasiewicz among specimens collected by Fearnside from Hafotty Ffilltirgerig and

labelled as '*Didymograptus hirundo*'. On lithological grounds, Zalasiewicz (1984b, p. 119) believed these to originate from the Serw Formation. Farther south, to the south-east of the 'Henllan facies' crops out.

The base of the succeeding Serw Formation, a series of mudstones, crystal tuffs and minor ignimbrites of early Llanvirn age, crops out a short distance upstream from the Henllan Member south-east of Hafotty Ffilltirgerig, and loose blocks from the vicinity of [SH 8184 3850] have yielded *Didymograptus cf. artus* Elles and Wood, *Amplexograptus* sp. and *Lasiograptus* sp. Further specimens recorded by Fearnside (1905) from 'Hafotty Ffilltirgerig' were redetermined by Zalasiewicz (1984b) as *D. cf. artus* Elles and Wood, *Aulograptus cucullus* (Bulman), *Cryptograptus tricornis schaeferi* Lapworth and *Didymograptus cf. acutidens* Elles and Wood. Zircons from the Serw Formation [SH 8185 3856] yielded an age of 465.7 ± 2.1 Ma to Tucker *et al.* (1990).

Interpretation

Zalasiewicz (1984b, p. 120) argued on the basis of the sedimentology that a shallow, subtidal marine environment was most likely for the deposition of the Llyfnant Member, although Traynor (1990, p. 18) thought that deposition was predominantly below storm wave-base. Zalasiewicz proposed that the clean-washed, in places strongly cross-bedded, arenaceous feldspathic sandstones that form the 'Henllan facies' were deposited in turbulent, probably shallow, water; they were derived perhaps by rapid erosion of the Rhobell Volcanic Group (Traynor, 1990). The muddy bioturbated 'Erwent facies' represents quieter water, with well-aerated bottom conditions favourable for a benthic fauna.

There is likely to be an unconformity or disconformity at or near to the top of the Carnedd Iago Formation, for definitive post-Moridunian faunas have not been identified at the present site and the base of the overlying Serw Formation has yielded a *D. artus* Zone graptolite fauna (Zalasiewicz, 1984b, p. 121). Beckly (1987), however, placed faunas with the graptolites *Cryptograptus tricornis schaeferi* Lapworth, *Pseudotrigranograptus minor* (Mu and Lee) and *Pseudophyllograptus cor* (Strandmark) in the late Fennian, these originating from the Arenig area, though locality details and discussion were not given.

What is clear from the sections at Hafotty Ffilltirgerig and elsewhere in the Arenig district is that a large part of the Arenig Series, as represented in its fullest development in South Wales, is absent from the type area (Zalasiewicz, 1984b; Fortey and Owens, 1987; Beckly, 1987). Such graptolites as are present do not permit precise correlation with sections elsewhere (Zalasiewicz, 1984b, 1986), although the trilobites from the Henllan Member (Whittington, 1966; Fortey and Owens, 1978) include species common to the Moridunian Stage in South Wales (see site reports for Glan Pibwr and Allt Pen-y-Coed, for example) and to the lower third of the Mytton Flags (see Mytton Dingle site report).

The refined radiometric age of 471 ± 3 Ma obtained from the Moridunian part of the succession and that of 466 ± 2 Ma from the lower Llanvirn are important ties between the British standard series and the geochronological timescale.

Conclusions

This site is of historical importance as it shows the Arenig Series in the area in which it was originally conceived, and the scope there of the Series as now understood. Compared with the Arenig of South Wales and as recognized in the graptolitic sequence, the historical type area shows only the upper parts of the Moridunian and Fennian stages, and the present site is significant for identifying the gaps in the succession.

[References](#)



(Figure 9.5) Hafotty Ffilltirgerig, north-west flank of Arenig Fawr. Sandstones with mudstone laminae of the Allt bkyd Formation (Llyfnant Flags of Fearnside), dipping eastwards, away from the observer. Such sandstones are typical of the lower Arenig and are developed widely around the Harlech Dome. (Photo: A.W.A Rushton.)