Treiorwerth and Ty-hên

[SH 3552 7872]–[SH 3625 7952] and [SH 3570 7992]

Introduction

This site is important because it is the type section for the Treiorwerth Formation, a major fossiliferous representative of the Arenig transgression in North Wales, and because it includes the type localities for a large number of the brachiopod taxa described by Bates (1968b).

Inshore, transgressive facies of late Arenig (Fennian) age are well developed in the Anglesey succession, and this site, together with Ogor Gynfor to the north (Figure 9.13) affords good examples. The outcrops and their faunas were reported by Greenly (1919) and were described in detail by Bates (1972) and by Neuman and Bates (1978). Although the Fennian age is not proved, Beckly (1987) has presented evidence to demonstrate that such an age is likely, especially in terms of local palaeogeography and because the local species of the trilobite *Neseuretus* is different from those characterizing earlier Arenig horizons in other parts of the Welsh Basin.

The brachiopod faunas in particular formed part of the basis of the 'Celtic Province' of Williams (1973), and were believed by Neuman and Bates (1978) to represent 'island faunas' (see below).

Description

There are three areas of outcrop to the south and south-east of Treiorwerth House in which the Carmel and Treiorwerth Formations are exposed. By the roadside 200 m north-west of Ty-hên [SH 3552 7872], sandstones of the Carmel Formation, some cross-bedded and with conglomerate bands and shelly lenses, have yielded brachiopods including *Paralenorthis proava* (Salter) and *Hesperonomiella carmelensis* Bates, together with scarce trilobites (*Neseuretus monensis* (Shirley), *Annamitella perplexa* (Bates) and *Ogyginus?* sp.). The Monian Supergroup crops out a short distance to the south, but the unconformable junction is not exposed here; it can be seen just north of Prys-Owain-bach cottage, 6 km to the north-east [SH 3986 8282].

The junction between the Carmel Formation and the overlying Treiorwerth is not exposed, although Bates (1968b, p. 134) regarded the lowest horizons of the latter, seen in a number of small natural exposures and quarries 350 m south-east of Ffynnon-y-mâb centred on [SH 3625 7952], to be not far above the base. Here the beds dip at 50–65° to the north-west; the lowest are grey-green siltstones with coarse micaceous shale partings, which pass upwards through 106 m of siltstones and sandstones into the coarse grits and conglomerates that are typical of much of the formation. The sandstones have yielded fragments of the graptolite *Tetragraptus headi* (Hall)?, and water-sorted shelly lenticles have yielded a rich brachiopod-dominated fauna, including *Thitoechia pyramidalis* (Bates), '*Orthambonites*' sp., *Monorthis typis* Bates, *Productorthis* sp., *Ffynnonia costata* (Bates), *Rhynchorthis rotunda* Bates, *Rectotrophia globularis* Bates, *Reinversella monensis* Bates and *Treioria chaulioda* Neuman and Bates. This is the type locality for all these species. Bryozoans are the next commonest group of fossils after the brachiopods, and smaller numbers of other fossils occur: trilobite fragments including an agnostid, pelmatozoan plates including the parablastoid *Blastoidocrinus antecedens* Paul and Cope, and a gastropod *Matherella? acuticostata* Bates (1963), for which this is the type locality.

Sediments that are regarded as being more typical of the Treiorwerth Formation are exposed in an old quarry on the south side of the road 350 m south-east of Treiorwerth [SH 3570 7992], just west of Pont Rhyd-lorwerth. Thick-bedded conglomerates exposed here dip at about 70° to the north-west and contain a variety of subangular pebbles and cobbles of green and purple schists and jasper derived from the Monian Supergroup that can be seen *in situ* around Presaddfed [SH 351 809], not far to the north of Treiorwerth. The conglomeratic units are matrix-supported in graded beds that are 0.2–1.0 m thick.

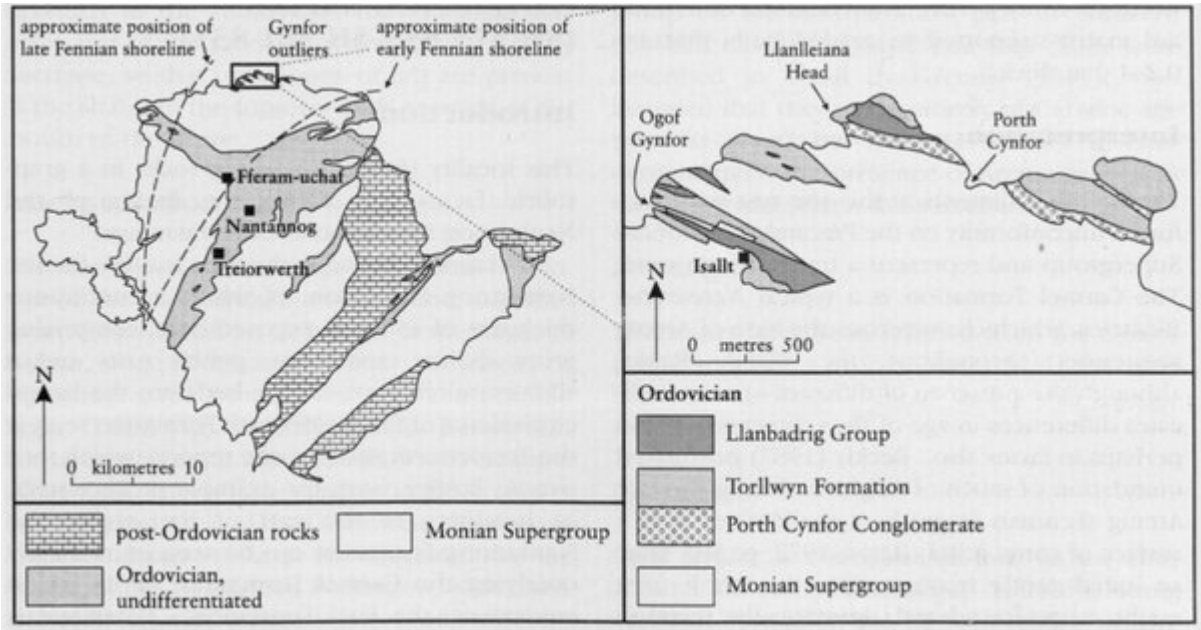
Interpretation

The Arenig sediments at this site rest with profound unconformity on the Precambrian Monian Supergroup and represent a transgressive suite. The Cannel Formation is a typical *Neseuretus* Biofacies, which characterizes the base of Arenig sequences throughout the Welsh Basin, although the presence of different species indicates differences in age of the transgression and perhaps in facies also. Beckly (1987) postulated inundation of much of Anglesey during the late Arenig (Fennian Stage) by a shallow sea over a surface of some relief (Bates, 1972, p. 56); after an initial gentle transgression, the whole area might have foundered dramatically through fault-controlled subsidence, and the conglomeratic facies that typifies much of the Treiorwerth Formation comprises up to 650 m of rudaceous mass debris-flow deposits that were banked up against an east dipping fault scarp (Beckly, 1987, p. 28) and probably derived from the west (Bates, 1972, p. 56). The abundant brachiopod fauna at Ffynnon-y-mâb comprises disarticulated valves of robust, thick-shelled coarsely ribbed species that accumulated in lenses and clearly were transported from their original habitat. Neuman and Bates (1978, p. 577) noted a generic similarity between this fauna and those from the Tagoat Beds in south-east Ireland and from broadly contemporaneous horizons in eastern North America. They proposed (p. 578) that these 'Celtic Province' brachiopods may have occupied a group of islands, with Anglesey and the Irish Sea Horst in late Arenig times separated from the Welsh Basin by a wide expanse of ocean. However, this interpretation was challenged by Beckly (1987) and others (e.g. Fortey and Rushton, in Cope *et al.,* 1992), and most authorities maintain Anglesey as an integral part of the Welsh Basin.

Conclusions

This site is critically important in affording evidence for both the palaeogeography of Anglesey and shallow-water fossil assemblages in the late Arenig and has yielded one of the most diverse brachiopod faunas of this age in Britain.

References



(Figure 9.13) Distribution of Ordovician rocks on Anglesey, from British Geological Survey (1994b), with details of the Gynfor inliers from Bates (1972).