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# Nant y Graean and Nant Ganol

Nant y Graean [SH 7356 3043] and Nant Ganol [SH 7659 3285]

## Introduction

Nant y Graean displays a section in the Maentwrog Formation from which the biostratigraphy of three subzones of the *Olenus* Zone can be inferred more readily than from anywhere else around the Harlech Dome. The area of Nant Ganol shows the upper of these subzones, including both *Olenus micrurus* and the more widely distributed *O. cataractes*. The sites are of importance in the regional correlation of the Maentwrog Formation.

The Maentwrog Formation, mainly of early Upper Cambrian (Merioneth) age, is present around the Harlech Dome and the outcrop extends to the core of the Ynyscynhaiarn Anticline (Tremadog) and to St Tudwal's Peninsula. The base is disconformable on the Clogau Formation and, according to Crimes (1970a), marks the onset of a new cycle of sedimentation in the North Wales area. The formation consists of alternations of quartzitic sandstone beds, some of turbiditic origin, and dark-coloured mudstone. Allen *et al.* (1981) defined the basal stratotype and described the formation in detail. In places the Maentwrog Formation can be divided into a lower, dominantly arenaceous, Vigra Member, and an upper, argillaceous, Penrhos Member (e.g. Pratt *et al.*, 1995), but it is evident that the lithological succession varies locally (Allen *et al.*, 1981, p. 304). Crimes (1970a) suggested that the deposition of the Maentwrog Formation was in general below wave base, but Bose's (1983) study of correlative strata at Porth Ceiriad (see site description) showed that shallower-water conditions obtained there.

The base of the Maentwrog Formation is considered to be of late Middle Cambrian age (see site reports for Afon Llafar and Porth Ceiriad), but the bulk of the formation is known to be of late Cambrian age by the occurrence of diagnostic trilobites: Belt (1867a) described *Olenus gibbosus* (Wahlenberg), *Homagnostus obesus* (Belt) and *Glyptagnostus reticulatus* (Angelin) (as '*Agnostus nodosus*') from near Dolmelynlyn [SH 7295 2373], and Salter (1866b, p. 246) gave the distribution of some other species. However, although the Maentwrog Formation is well exposed along the Mawddach Estuary, the biostratigraphy is poorly known there because there are few fossil localities. Around Maentwrog fossils are locally abundant, but preservation is generally very poor (Salter, 1864a, pl. 1, fig. 2), on account of the strong cleavage. The best area for biostratigraphical interpretation of the Maentwrog Formation is east of Trawsfynydd, where there are several fossil localities and the cleavage is not so intense.

## Description

### Nant y Graean

Nant y Graean is a minor tributary of Afon Gain, 6 km SSE of Trawsfynydd. Between about 400 m and 1000 m upstream from the confluence with Afon Gain the stream reveals extensive exposures of sandstone and mudstone typical of the Maentwrog Formation, generally dipping gently upstream but locally showing folding. The area was mapped by Matley and Wilson (1946), whose results were incorporated in the British Geological Survey (1982) map of the Harlech district. At the downstream end of the exposure [SH 7356 3043], *Olenus gibbosus* (Wahlenberg) is associated with *Glyptagnostus reticulatus* (Angelin); these indicate the *gibbosus* Subzone of the *Olenus* Zone (Allen *et al.*, 1981, p. 307). Near the upper end of the exposure *Homagnostus obesus* is associated with poorly preserved *Olenus truncatus* (Brünnich), indicating the *truncatus* Subzone. Directly down dip, a roadside exposure [SH 745 301] yielded *Olenus micrurus* Salter which is taken to indicate the overlying *cataractes* Subzone.

### Nant Ganol

About 6 km south-east of Trawsfynydd this stream crosses the axes of a syncline—anticline pair, creating large exposures of gently dipping Maentwrog Formation [SH 7659 3285]. *Homagnostus obesus* and *Olenus micrurus* (Figure 3.8)c are relatively common locally, both here and along strike by the road [SH 7648 3298]; the latter locality also yielded

a specimen of *Olentella? rara* (Orłowski), figured by Allen and Jackson (1985, pl. 4, fig. 2). Farther east [SH 7727 3326], but at a similar stratigraphical level, *Olenus cataractes* Salter and *H. obesus* were collected, whilst a specimen of *H. obesus* collected still far ther east [SH 7786 3336] represents the only trilobite yet known from the base of the Ffestiniog Flags Formation.

## Interpretation

Many collections of *Olenus* from the Maentwrog Formation are from isolated exposures or are not well localized. In the absence of a consistent lithostratigraphy one cannot place such collections into a reliable stratigraphical succession. Nant y Graean is therefore important in providing a section in which superposition of the subzones of the *Olenus* Zone can be assessed. A similar superposition of *Olenus truncatus* above the *gibbosus* Subzone is seen in Nant Braich-y-Ceunant [SH 7572 3627], but the fossils thence are poorly preserved and the *cataractes* Subzone is not proved there.

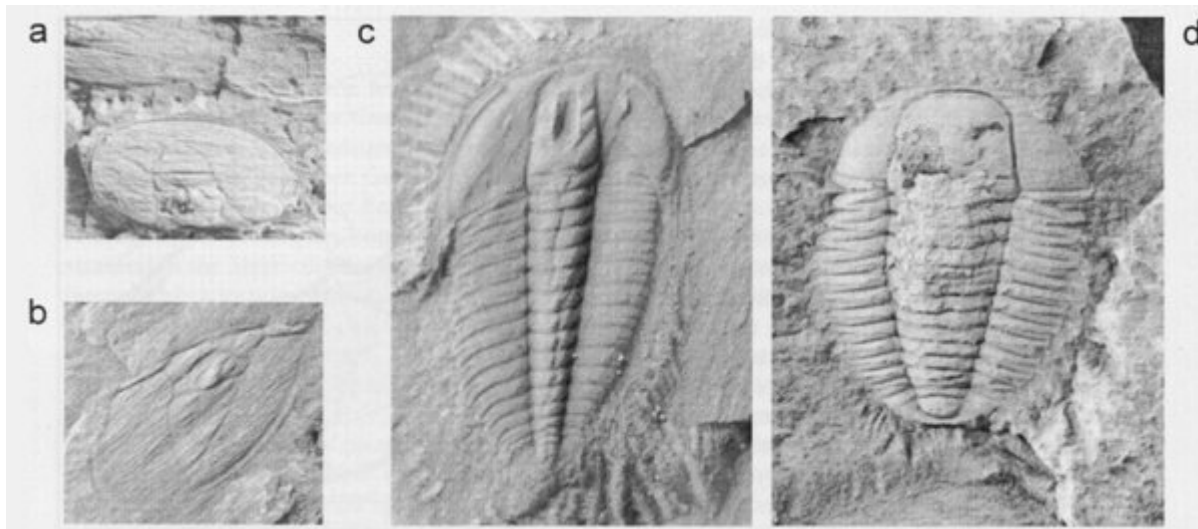
In the Nant y Graean evidence for the *truncatus* Subzone is estimated to appear 100–140 m above the *gibbosus* Subzone, the corresponding figure in Nant Braich-y-Ceunant being about 50 m (Allen *et al.*, 1981, p. 308). At Nant y Graean the specimen indicative of the *cataractes* Subzone occurred about 150 m above the locality with *O. truncatus*.

Although the *cataractes* Subzone is well shown in the area of Nant Ganol, folding makes it difficult to estimate its thickness. It is the area from which the type and other good specimens of *O. micrurus* were collected (Allen and Jackson, 1985, pl. 4, fig. 1).

## Conclusions

Nant y Graean is the best place in North Wales to observe the succession of trilobite faunas during the earlier Late Cambrian. The three successive faunas allow correlation of the Maentwrog Formation and comparison of events in other parts of Britain and elsewhere. The upper fauna is, however, better seen at Nant Ganol than at Nant y Graean.

## References



(Figure 3.8) Cambrian trilobites from North Wales. (a, b) *Ptychagnostus punctuosus*, cephalon and pygidium, x4, from the Clogau Formation (St David's Series) in Afon Llafar. (c) *Olenus micrurus* Salter, x4, from Maentwrog Formation (Merioneth) of Nant Ganol. (d) *Peltura scarabaeoides* (Wahlenberg), x 3, from Dolgellau Formation of Rhobell-y-big.