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## Chapter 8 North Wales

Both Namurian and Westphalian deposits are found in North Wales (Figure 8.1). The best known occur in a belt up to 11 km wide, that extends between the Dee Estuary and Oswestry. This includes the Flint–Derbyshire Coalfield which, until relatively recently, was still being actively mined. The Westphalian also outcrops in the Vale of Clwyd (between Dyserth and Ruthin), near Caernarvon, and on Anglesey.

The Westphalian deposits here do not differ significantly from the homotaxial sequences in the English Midlands (see Chapter 7). Since there are rather better exposures in the latter area, no GCR sites have been selected for these strata in North Wales. However, the North Wales Millstone Grit is of greater interest, and justifies the selection of GCR sites to represent it. The rest of this chapter is thus limited to a discussion on the Millstone Grit of this area (for further details on the Westphalian of this area, see Wood *in* Trueman, 1954 and Calver and Smith, 1974).

### History of research

The first mention of the Millstone Grit of North Wales appears to be by Conybeare and Phillips (1822), who concluded that the Holywell Shales were probably correlatives of what is now called the Edale Shales in Derbyshire. Many later workers disagreed with this; Green (1867) regarded them as Lower Carboniferous, while Walker (1878), Morton (1878) and Strahan (1890) included them in the Coal Measures. Their position in the Millstone Grit was eventually confirmed by King (1914), based on ammonoids found therein.

Work on the more arenaceous sequences further south, near Llangollen, was pioneered by Morton (1876). He established the main features of the stratigraphy there, using sites such as Dee Bridge, and his classification is the basis of that still used today.

As elsewhere in the Central Province, real progress in the study of the North Wales Millstone Grit came with the use of ammonoid biostratigraphy. King's (1914) pioneering efforts, were soon followed by Jackson (1925a), Sargent (1927), Wood (1936) and Jones and Lloyd (1942). From their work, it was possible to establish detailed correlations between the rather different sequences in the north and south of the area, as summarized by Ramsbottom (1974) and Ramsbottom *et al.* (1978).

### Lithostratigraphy

The Millstone Grit of North Wales is generally divided into different units in the north and the south of the area.

(a) The northern area, near the Dee Estuary.

#### Holywell Shales Formation

Base defined: base of shales immediately above the Carboniferous Limestone.

Characteristic facies: shales, with numerous marine bands, some of which become thin, shelly limestones.

Chronostratigraphical range: Pendleian to basal Yeadonian.

#### Lower Gwespvr Sandstone Formation

Stratotype: Abbey Mills Boreholes, near Holywell

Base defined: lowest feldspathic sandstone above the Holywell Shales.

Characteristic facies: medium-grained feldspathic sandstones with some cross-bedding, alternating with siltstones.  
Chronostratigraphical range: Yeadonian.

(b) The southern area, near Llangollen and Ruabon

### **Cefn-y-fedw Sandstone Formation**

Base defined: base of quartzitic sandstones immediately above the Carboniferous Limestone.

Characteristic facies: coarse, quartzitic sandstones with some conglomeratic beds.

Chronostratigraphical range: ?Arnsbergian to Alportian.

Comments: This name originally referred to all of the strata between the Carboniferous Limestone and the Coal Measures (Morton, 1876), and this particular unit was referred to as the Middle Cefn-y-fedw Sandstone. However, Morton's original 'Lower Cefn-y-fedw Sandstone' refers to an arenaceous unit in the Carboniferous Limestone and is a name not used today, and the 'Upper Cefn-y-fedw Sandstone' are now generally given different names (see below). Consequently, the 'Middle' has been dropped for this particular unit.

### **Lower Shale Formation**

Stratotype: Dee Bridge

Base defined: base of shale overlying the Cefn-y-fedw Sandstone.

Characteristic facies: shales, including a marine band.

Chronostratigraphical range: topmost Alportian to basal Kinderscoutian.

### **Dee Bridge Sandstone Formation**

Stratotype: Dee Bridge

Base defined: base of sandstone overlying Lower Shale Formation.

Characteristic facies: medium to fine-grained, yellow quartzitic sandstone. Chronostratigraphical range: lower Kinderscoutian to upper Marsdenian.

### **Upper Shale Formation**

Stratotype: Dee Bridge

Base defined: base of shale overlying Dee Bridge Sandstone.

Characteristic facies: shales, including a marine band.

Chronostratigraphical range: topmost Marsdenian to lower Yeadonian.

### **Aqueduct Grit Formation**

Stratotype: Dee Bridge

Base defined: base of sandstone overlying Upper Shale.

Characteristic facies: coarse-grained, feldspathic sandstone, with some pebbly horizons. Chronostratigraphical range: Yeadonian.

## Geological setting

Whereas the English Midlands provides exposures of the southern marginal facies of the Westphalian of the Central Province, North Wales is the area which typifies the southern marginal development of Millstone Grit. In fact, the North Wales sequences clearly demonstrate the rapid southwards attenuation of the Millstone Grit; near the Dee Estuary, boreholes have yielded some 275 m of Millstone Grit (including the Pendleian and Arnsbergian parts — Wood, 1936; Jones and Lloyd, 1942), whereas near Oswestry it has thinned to a mere 30 m (Smith and George, 1961).

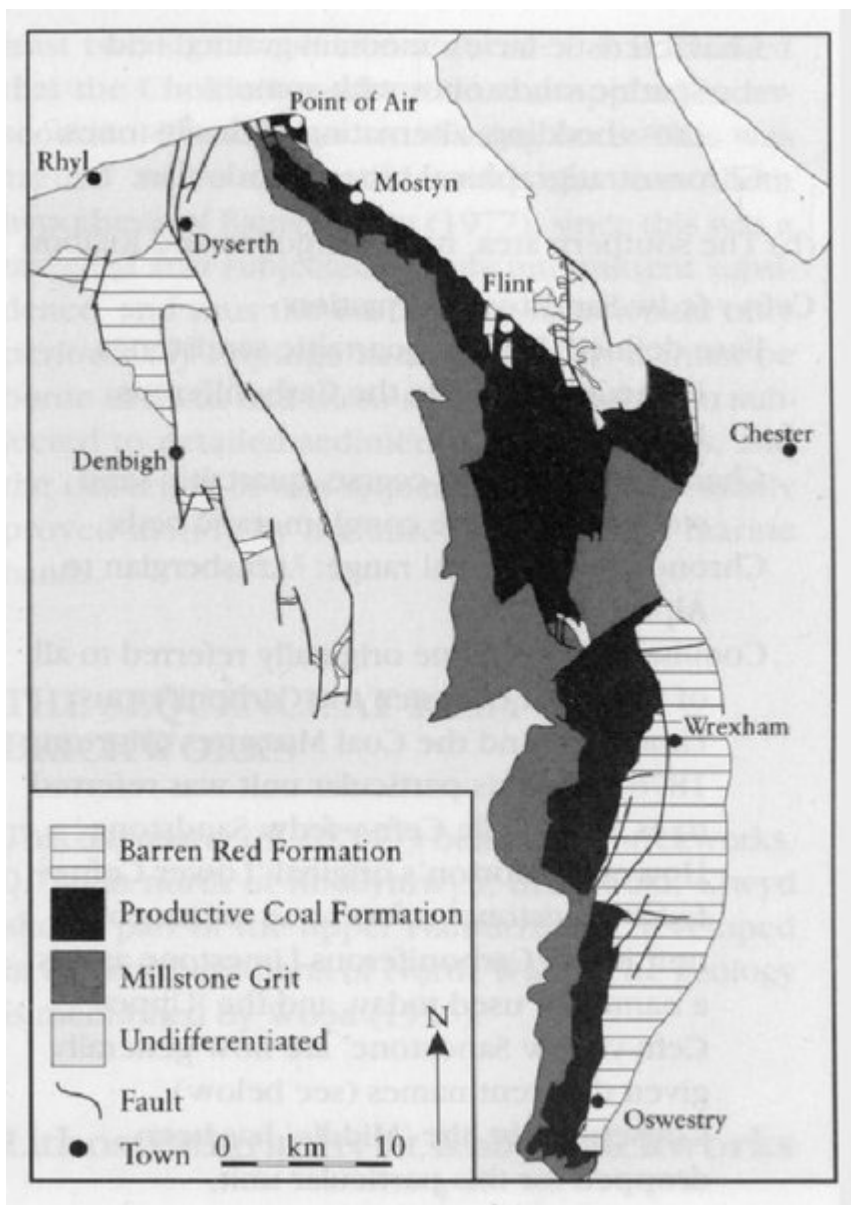
In the northern part of the area, deposition was almost exclusively of fine-grained basinal deposits (Holywell Shales). The large-scale deltas that extended over most of the rest of the Central Province (e.g. the Kinderscout delta) never reached this area until the Yeadonian, when northerly derived sandstones, possibly related to the Rough Rock, make their first appearance (Lower Gwespyr Sandstone).

Further south, the sequences are characterized by deltaic, mainly quartzitic deposits derived from the Wales–Brabant Barrier (Cefn-y-fedw and Dee Bridge sandstones), with only occasional intercalations of marine deposits. The southerly derived deltas eventually disappeared in the Yeadonian, when the Wales–Brabant Barrier appears to have ceased to be a significant area of erosion, to be replaced by northerly derived, feldspathic deposits (Aqueduct Grit).

## GCR site coverage

Exposure of the Upper Carboniferous sequence is very limited, much of the area being covered by thick drift deposits, which partially limits the potential GCR coverage. Although no GCR sites have yet been identified for the stratigraphy in this area, two potential sites are described here, one epitomizing the more condensed sequences in the south of the area (Dee Bridge), and one showing the more typical Millstone Grit further north (Ruby Brickworks).

## [References](#)



(Figure 8.1) Upper Carboniferous outcrops in North Wales. Based on Ramsbottom (1974, fig. 38), and Calver and Smith (1974, fig. 41).