# British Upper Carboniferous Stratigraphy

C.J. Cleal and B.A. Thomas

Department of Botany National Museum of Wales, Cardiff

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Chapter 5

Forest of Dean and Severn coalfields

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# Forest of Dean and Severn coalfields

These two small areas of Upper Carboniferous lie between the much larger South Wales and Bristol-Somerset coalfields (Figure 5.1). A third area is poorly exposed and is not dealt with further here (the Newent Coalfield - see Cleal, 1987 and worssam et al., 1989, for brief accounts of this coalfield). The Severn Coalfield has never been worked commercially, but the Forest of Dean was, until about 20 years ago, still commercially active. According to Bone and Himus (1936), annual output in the 1920s and 1930s varied from 1 to 1.5 million tons. There is still some very small-scale extraction in parts of the forest, purely for local consumption, done by local residents known as Free Miners who, through historical precedence, are exempt from the government's monopoly on the exploitation of coal in Britain.

The Forest of Dean is scenically one of the most attractive British coalfields. It also has considerable scientific importance, in particular as one of the few sequences in Europe to straddle the Westphalian-Stephanian boundary and to yield diverse assemblages of pollen and spores. It is also important palaeogeographically, having been an area of uplift and erosion until near the end of the Westphalian, and only becoming an area of sediment accumulation following the Leonian Phase of tectonic activity.

# History of research

Brief accounts of the geology of the Forest of Dean Coalfield were given by Buckland and Conybeare (1824) and Maclauchlan (1833, 1837), but the first attempt at a comprehensive description was by Insole and Bunning (1881). Stratigraphical analysis was further refined by Sibly (1912). The most significant account of the geology, however, is the Geological Survey memoir by Trotter (1942), which provides a full account of both the surface exposures and the underground workings. Subsequent brief reviews are provided by Moore *in* Trueman (1954), Welch and Trotter (1961), Gayer and Stead (1971) and L.P. Thomas (1974).

The finely preserved plant fossils found here have attracted numerous palaeobotanists to the area over the years, and there have been a number of biostratigraphical analyses (Arber, 1912; Crookall, 1930a; Wagner and Spinner, 1972; Cleal, 1992). There have also been several palynological investigations (Williams *in* Butterworth and Millott, 1960; Spinner, 1965; Wagner and Spinner, 1972; Butterworth and Smith, 1976). The Severn Coalfield was first discovered in the 1870s, during the construction of the railway tunnel under the Severn Estuary (Jones, 1882). Other than the small outcrops near Portishead and Kingsweston, there are virtually no surface outcrops and so details of the geology remained almost completely unknown until the 1950s, when the then National Coal Board sponsored a programme of borehole exploration. Logs of some of these boreholes are given in Welch and Trotter (1961), and the plant biostratigraphy analysed by Cleal (1986a).

# Lithostratigraphy

Both the Forest of Dean and Severn coalfields can be broadly divided into Pennant and Suprapennant formations. The junction between the formations is somewhat gradational, but is traditionally placed at the Brazilly Seam. In addition, a third unit (the Trenchard Formation) occurs at the base of the Upper Carboniferous in the northern part of the Forest of Dean. A generalized sequence of the Upper Carboniferous of the Forest of Dean is given in Figure 5.2.

Trenchard Formation

Stratotype: Puddlebrook Quarry

- Base defined: sub-Westphalian D unconformity in the northern part of the Forest of Dean.
- Characteristic facies: conglomerates and coarse grits.
- Chronostratigraphical range: upper Westphalian D.
- Comments: Trotter (1942) assigned all strata below the Coleford High Delf Coal in the Forest of Dean to this formation. However, it is here restricted to those high-energy deposits occurring at the base of the Coal Measures in the northern part of the coalfield.

Forest of Dean Pennant Formation Stratotype: Meezy Hurst

Base defined: base of lowest Pennant-type sandstone in the Forest of Dean.

- Characteristic facies: mainly thick bedded, coarse-grained sandstones of the so-called 'Pennant-type', with some intervals of coals and mudstones.
- Chronostratigraphical range: upper Westphalian D.



Figure 5.1 Map of the Forest of Dean and Severn coalfields. Based on Gayer and Stead (1971, fig. 1) and Cleal (1986a, fig. 1).

# Suprapennant Formation

- Stratotype: Oakenhill Railway Cutting Base defined: Brazilly Coal.
- Characteristic facies: mainly mudstones, siltstones and coals; strata usually grey, but sometimes showing evidence of reddening.

# Chronostratigraphical range: upper Westphalian D to lower Cantabrian.

Broadly following Trotter (1942) and Welch and Trotter (1961), it is possible to subdivide the Suprapennant Formation into three members. The lowest extends from the base of the Brazilly Seam to the base of the first sandstone above the Crow Seam, and is known as the Household Coal Member. It is mainly argillaceous deposits, and includes most of the economically exploited seams in the coalfield. This is overlain by the Serridge Sandstone Member, consisting of more arenaceous deposits. In the north of the coalfield it is almost exclusively sandstone, but to the south there is an interleaving of sandstones and shales. Coals are poorly developed in this part of the sequence. The upper part of the formation sees a return to predominantly argillaceous deposits with coals, and is referred to as the Woorgreen Member.

# Chronostratigraphy

There are significant discrepancies as to the chronostratigraphical position of the Forest of Dean sequence and these are still being repeated in the literature. In view of its importance for understanding the significance of the sequence, the evidence will be reviewed briefly.

It is still stated that the base of the sequence is upper Bolsovian or Westphalian C (e.g. Ramsbottom et al., 1978; Smith, 1987), this view can be traced back to Trotter (1942). The lowest biostratigraphical evidence of the Westphalian D is found at the Coleford High Delf, and it was considered that the underlying strata must be Bolsovian. There is no biostratigraphical evidence of any consequence from the underlying strata; the palynological data reviewed by Wagner and Spinner (1972) are equivocal. In fact, using the biostratigraphical data available to Trotter (i.e. non-marine bivalves), the Coleford High Delf could occupy any position within the Westphalian D, and it is therefore unlikely to represent the base of the stage. The point was confirmed by Wagner and Spinner (1972), who reported plant macrofossils of the Lobatopteris vestita Zone from the roof of the Coleford High Delf (incorrectly referred to as the Coalbrook High Delf in Cleal, 1992), which must therefore be upper Westphalian D (see also Cleal, 1986a, 1992). However, Wagner and Spinner's observations have been almost totally ignored in the literature.

Cleal *in* Ramsbottom *et al.* (1978) stated that the Westphalian-Cantabrian boundary in the Forest of Dean probably occurred in the upper Household Coal Member (Suprapennant Formation), probably at or about the Twenty Inch Rider Seam. This was based on Wagner and Spinner's (1972) record of



**Figure 5.2** Generalized sequence of the Upper Carboniferous of the Forest of Dean. Based on Gayer and Stead (1971, fig. 3).

*Odontopteris aequalis* Lesquereux (almost certainly *O. cantabrica* Wagner) and *Alethopteris grandinioides* Kessler var. *subzeiller* Wagner from this level. Although this needs to be finally confirmed by additional data, it would seem to be compatible with similar results obtained from South Wales (Cleal, 1978, 1984b). It would make the Forest of Dean one of the few places in Europe to provide a good palynological record through the Westphalian-Stephanian boundary, and provide evidence to show if such fossils are of value for identifying this boundary.



**Figure 5.3** Stratigraphical relationship between the Forest of Dean and South Wales coalfields. After Cleal (1991, fig. 2). *Pl, Paripteris linguaefolia* Zone; *Lb, Linopteris banburii* Zone; *Lm, Lobatopteris micromiltoni* Subzone; *Lv, Dicksonites plueckenetii* Subzone; *Oc, Odontopteris cantabrica* Zone.

# **Geological setting**

During the Namurian and much of the Westphalian, this was a positive, erosional area providing sediment to the South Wales and Bristol-Somerset basins. It is widely referred to as the Usk Axis. It has been argued that the axis briefly ceased to be an area of uplift during the early Langsettian (Sullivan, 1964; Spinner, 1984). This is based on Langsettian palynomorphs reported from a thin mudstone overlying an outcrop of Viséan Drybrook Sandstone (the samples described by Sullivan and later by Spinner were collected at the same time -E.G. Spinner, pers. comm.). However, plant macrofossils collected from the same mudstone indicate a Viséan age, which is more compatible with the conformable field relationship of the mudstone with the Drybrook Sandstone (Cleal, 1986b). There is little other evidence, either from the Forest of Dean or neighbouring coalfields, that the Usk Axis was anything other than a positive area until the end of the Westphalian.

In the mid-Westphalian D, the axis appears to

have been subject to enhanced uplift, causing a stratigraphical non-sequence in the eastern part of the South Wales Coalfield (see Introduction to previous chapter). Subsequently, however, uplift ceased and, for the first time since the Viséan, the area became one of significant sediment accumulation. The timing of these events is of interest as it not only coincides with tectonic activity recognizable elsewhere in Britain (Cleal, 1987), but also with events over large areas of Europe (see Introduction to previous chapter for relevant references). This widespread event is known as the Leonian tectonic phase.

Initially, sedimentation reflects relatively high energy conditions and probably represents a proximal position within a fluvial delta. Palaeocurrents tend on average to be to the west. However, the overall distribution of arenaceous and conglomeratic deposits indicates that the northern part of the Forest of Dean occupied the most proximal position within the delta. It is likely that the top Pennant Formation in the eastern part of the South Wales Basin (i.e. that above the infra-Pennant Formation unconformity and starting at about the No. 3 Llantwit Seam) is a lateral extension of the Forest of Dean Pennant Formation (Cleal, 1992).

Shortly before the end of the Westphalian, the style of sedimentation became quieter and reflects flood-plain conditions. The result was the formation of the Suprapennant Formation. These strata are of similar facies to the Grovesend Formation in South Wales, but detailed correlations suggest that they represent quite distinct formational units (Figure 5.3). A brief return of fluvial arenaceous deposits (the Serridge Sandstone) occurs in the middle of the formation but, on the whole, the rest of the Forest of Dean Upper Carboniferous represents relatively quiet conditions.

### GCR site coverage

Very little of the Severn Coalfield is exposed, since it mostly lies under Mesozoic cover. The only GCR site representing this area is at Portishead, and is one of only two known exposures of the Pennant Formation in the coalfield (the other is a small quarry at Kingsweston, Bristol – Matthews *et al.*, 1969).

In contrast, Upper Carboniferous exposures in the Forest of Dean are numerous, both as natural outcrop and quarries. They are mainly in the Pennant Formation, for which one is 'spoilt for choice' in selecting representative sites. In this survey, the key GCR site was Meezy Hurst, providing a more or less complete and typical sequence through the Pennant Formation of the Forest of Dean. This is supplemented by Puddlebrook Quarry, selected to show the conglomeratic base of the Trenchard Formation, that occurs in the north of the coalfield. The situation was far more difficult in the Suprapennant Formation; only one site was selected (Oakenhill Railway Cutting) and this is very overgrown.

# **MEEZY HURST**

# Highlights

Meezy Hurst is the best exposure of Forest of Dean Pennant Formation in the Forest of Dean, and clearly demonstrates its unconformable contact with the underlying Lower Carboniferous limestones (Figure 5.4).

# Introduction

A number of disused quarries and an abandoned railway-line lie on the north side of the Blakeney to



**Figure 5.4** Forest of Dean Pennant Formation lying unconformably on Carboniferous Limestone, seen at Howbeach Slade Quarry, Meezy Hurst GCR site. (Photo: C.J. Cleal.)

Parkend Road (B4431), Gloucestershire (SN 638089-SN 647091). From the resulting exposures, it is possible to reconstruct much of the Forest of Dean Pennant Formation, as it is developed in the southern part of the Forest of Dean. The most instructive accounts of the field geology are provided by Trotter (1942) and Gayer and Stead (1971).

# Description

#### Lithostratigraphy

The sequence seen here is some 300 m of the Forest of Dean Pennant Formation, and lies with angular unconformity on Viséan limestones. The unconformable contact is particularly well shown in the easternmost two exposures of this composite site.

The basal Upper Carboniferous beds here are grey and green mudstones with ironstone concre-

# Forest of Dean and Severn coalfields



Figure 5.5 Position of Coleford High Delf coal, Meezy Hurst GCR site. (Photo: C.J. Cleal).

tions, but they rapidly grade up into sub-greywacke sandstones. These basal sandstones show a mixture of trough cross-bedding and parallel bedding, and palaeocurrent evidence suggests that the sediment originated from the south-east, which contrasts with the northerly derivation of more of the rest of the Forest of Dean Pennant Formation.

About 30 m above the unconformity is a coal known as the Coleford High Delf (Figure 5.5). In the past, this coal and its associated seat earth were well exposed in the railway cutting, but the coal has been dug-out by local residents, causing the roof to collapse. Consequently, the coal is no longer visible, although its position in the sequence can still be readily identified.

The overlying strata reflect somewhat higher energy conditions, with more abundant scour-horizons and mélange. They are otherwise virtually indistinguishable from those below the Coleford High Delf, however, and the sediment appears to have had a similar provenance. Poor exposure now prevents full details of the sequence from being seen, but Gayer and Stead (1971) state that the Yorkley Seam is present, and that the succession ranges up to near the top of the Forest of Dean Pennant Formation.

#### **Biostratigraphy**

No biostratigraphical data have been specifically reported from this site. The following discussion will therefore refer to the results obtained from the same strata exposed in neighbouring collieries.

#### Non-marine bivalves and estheriids

From the roof of the Coleford High Delf near Parkend, Calver *in* Welch and Trotter (1961) reports the bivalves *Anthraconauta tenuis* (Davies and Trueman), *A. phillipsi* (Williamson) and *Anthraconaia* aff. *pruvosti* (Tchernyshev). Such an assemblage clearly belongs to the *A. tenuis* Zone, indicating a position anywhere between the upper Bolsovian and lower Cantabrian. Calver also reports the estheriid *Leaia bristolensis* Raymond. In South Wales, this occurs mainly in the Suprapennant Formation, but its distribution is probably influenced strongly by environmental parameters.

#### Plant macrofossils

The lowest stratigraphical horizon in the Forest of Dean Coalfield to yield plant macrofossils is the roof of the Coleford High Delf. The roof of this coal is usually a sandstone, unsuitable for the preservation of fossils. Occasionally, however, a thin shale occurs, yielding palaeobotanical material (Arber, 1912; Crookall, 1930a; Wagner and Spinner, 1972). Crookall claimed that it indicated what would now be called the late Bolsovian. Wagner and Spinner, however, showed that it must be Westphalian D, and the presence of *Lobatopteris vestita* (Lesquereux) Wagner points to it belonging to the *D. plueckenetii* Subzone *sensu* Cleal (1991), i.e. upper Westphalian D in age (see also Cleal, 1986a, 1992).

Arber (1912) reported a more diverse assemblage from the Yorkley Seam at Bream. This is

# Puddlebrook Quarry

clearly Westphalian D or higher, with abundant *Neuropteris ovata* Hoffmann and *Cyathocarpus arborescens* (Brongniart) Weiss. He also reports abundant '*Pecopteris miltoni*' (almost certainly *L. vestita*) and some *Polymorphopteris polymorpha* (Brongniart) Wagner, which tends to suggest a position no lower than the *D. plueckenetii* Subzone.

#### Palynology

Smith and Butterworth (1967) and Wagner and Spinner (1972) summarized the spore/pollen assemblages obtained from the Trenchard, Coleford High Delf and Yorkley seams, which all belong to the Thymospora obscura Zone. According to Smith and Butterworth, T. obscura (Kosanke) Wilson and Venkatachala is rare and Thymospora pseudothiessenii (Kosanke) Wilson and Venkatachala absent, which together suggests these coals are lower Westphalian D. This view seems to be supported by the megaspores (Spinner, 1965). However, Wagner and Spinner (1972) have subsequently reported T. pseudothiessenii from the Coleford High Delf and Yorkley seams, which tends to support the plant macrofossil evidence that these strata are upper Westphalian D.

# Interpretation

This is the best site for showing the Forest of Dean Pennant Formation. It clearly demonstrates its unconformable contact with the underlying Lower Carboniferous limestones, which attests to this having been a positive area (part of the Usk Axis) from the late Viséan to the late Westphalian D.

The strata are very similar to the South Wales Pennant Formation. Kelling (1974) pointed out that the eastern provenance of the sediment is the same as that of the Rhondda Member in the eastern part of the South Wales Coalfield, and that they probably represent similar depositional environments. However, this ignores the significant chronostratigraphical discrepancy between these two sets of strata, of about a stage (Cleal, 1992). The upper Westphalian D Forest of Dean Pennant Formation instead correlates with the upper Swansea Member (as redefined in this volume), for which there is little detailed sedimentological information.

Following Trotter (1942), it has been usual to assign any Upper Carboniferous strata in the Forest of Dean below the Coleford High Delf to the Trenchard Formation or Group. Meezy Hurst shows that, in the southern part of the coalfield, this does not reflect the real lithological relationships between the strata. The relationship is reflected better by assigning all of the strata here, from the unconformity up to the Brazilly Seam, to the Forest of Dean Pennant Formation. The Trenchard Formation should be restricted to the higher energy deposits found in the north of the coalfield, such as at Puddlebrook Quarry.

# Conclusions

Meezy Hurst is the best exposure in the Forest of Dean of sandstones known as the Pennant Formation. These rocks are about 306 million years old and are the remains of rivers that flowed southwards from an area that was being uplifted to the north (known as the Usk Axis).

# PUDDLEBROOK QUARRY

# Highlights

Puddlebrook Quarry is the only site showing the conglomeratic base of the Upper Carboniferous Trenchard Formation of the Forest of Dean (Figure 5.6).

# Introduction

This disused quarry 1 km north of Drybrook, Forest of Dean, Gloucestershire (SO 646183) is best known for the well preserved Lower Carboniferous plant fossils that it yields (see *Palaeozoic Palaeobotany of Great Britain* GCR volume 9, pp. 167-72 – Cleal and Thomas, 1995 for further description). However, overlying the Lower Carboniferous strata are Upper Carboniferous conglomerates belonging to the Trenchard Formation (Sibly and Reynolds, 1937; Trotter, 1942; Jones, 1972).

# Interpretation

This is the only site to show the conglomeratic base of the Trenchard Formation. It contrasts markedly with the lowest preserved part of the Coal Measures in the southern part of the Forest of Dean, such as at Meezy Hurst, which is in typical Forest of Dean Pennant Formation facies. It tends to suggest that the more northerly areas represent more proximal parts of the fluvio-deltaic system,



Figure 5.6 Puddlebrook Quarry GCR site. Conglomerates at the base of Trenchard Formation. (Photo: C.J. Cleal.)

although this has to be seen in the context of the prevailing westerly palaeocurrents.

# Conclusions

Puddlebrook Quarry is the only place where pebbly conglomerates can be seen at the base of the Coal Measures in the Forest of Dean. These rocks are about 306 million years old and are the remains of a river system that was flowing from an area that was being uplifted further north (known as the Usk Axis).

# OAKENHILL RAILWAY CUTTING

# Highlights

Oakenhill Railway Cutting is the best exposure of the Suprapennant Formation in the Forest of Dean, and includes some of the youngest coal seams to be commercially exploited in the Carboniferous of Britain.

# Introduction

As with the Grovesend Formation in South Wales, exposure of the Suprapennant Formation in the Forest of Dean is generally poor (see comments on Penllergaer Railway Cutting in previous chapter). The only extensive exposure, other than extractive workings, to be described in the literature is along this disused railway cutting, just south of where it passes under the Parkend to Yorkley Road, 1.5 km east of Parkend, Forest of Dean, Gloucestershire (SO 631080). The exposure has now become largely overgrown, but preliminary excavations undertaken in 1984 showed that the sequence is still visible under the vegetation and a relatively thin cover of soil. The geology of the site as originally visible, is summarized by Trotter (1942).

# Description

#### Litbostratigraphy

The sequence described by Trotter (1942) is 22.6 m thick. It is typical of the lower part of the Suprapennant Formation (known as the Household Coals Member), being dominated by grey shales and sandstones, with three coals, the Rocky, Starkey and Parkend High Delf seams. During exploratory excavations made in 1984, as part of the GCR survey, a 0.80 m thick coal underlain by 2.35 m of seat earth was uncovered near the road-bridge. By comparing the position of this seam with the British Geological Survey map for the area (Sheet 233), this may be the Twenty Inch Seam, but more comprehensive excavations would be needed to confirm this.

#### Biostratigraphy

# Palynology

Spinner (1965) described the megaspore *Lagenicula verrugosa* Spinner from the Starkey Seam at Oakenhill Cutting. Other than the Forest of Dean, Spinner stated that it had only been reported from the upper Bolsovian of Egypt (Dijkstra, 1955).

# Plant fossils

No macrofossils have been described from this site, but Trotter (1942) records them from equivalent horizons at other, nearby localities. Typical elements include *Neuropteris ovata* Hoffmann, *Macroneuropteris scheuchzeri* (Hoffmann) Cleal *et al.*, 'Alethopteris decurrens' (probably *A. robusta* var. *longipinnata* Wagner), 'Asterotheca miltoni' (probably Lobatopteris vestita (Lesquereux) Wagner), *Cyathocarpus arborescens* (Brongniart) Weiss and *Sphenophyllum emarginatum* Brongniart. This is an assemblage typical of the upper part of the *L. vestita* Zone, indicating the upper Westphalian D.

Wagner and Spinner (1972) listed plant fossils from a short distance above the Twenty Inch Seam in the north-eastern part of the coalfield that indicate the *O. cantabrica* Zone (Cleal, 1986a). The sequence at Oakenhill Railway Cutting must therefore be immediately below the Westphalian D-Cantabrian (i.e. Westphalian-Stephanian) boundary.

# Interpretation

This site shows a typical development of the Household Coals Member of the Suprapennant Formation in the Forest of Dean. The member is similar to the Grovesend Formation in South Wales, such as seen at Penllergaer Railway Cutting, except there are more and thicker coals. This part of the Forest of Dean sequence contains the youngest coals to be exploited extensively in Great Britain, and were still being worked in the early 1970s (there was an application to open up a new opencast near Oakenhill in the mid-1980s, but it was turned down on environmental grounds).

The Household Coal Member represents a time of relatively low tectonic activity in the Forest of Dean, allowing the build-up of fine-grained alluvial deposits and coal-forming peats. The lull was relatively short-lived, however; about 15 m above the Twenty Inch Seam, northerly derived sandstones (the Serridge Sandstone Member) occur again. This presumably reflects further uplift of the Wales-Brabant Barrier, as part of the late phases of the Variscan Orogeny.

# Conclusions

Oakenhill Railway Cutting is the best exposure of the Suprapennant Formation in the Forest of Dean, about 305 million years old. The exposed sequence includes some of the youngest coal seams to be commercially exploited in the Carboniferous of Britain.

### **PORTISHEAD PIER**

# Highlights

Portishead Pier shows the only good exposure of Upper Carboniferous strata in the Severn Coalfield, and provides useful sedimentological data to help understand the environment of their deposition.



Figure 5.7 Upper Carboniferous sandstones of the Severn Coalfield, exposed near Portishead Pier. (Photo: C.J. Cleal.)

# Introduction

Coastal exposures below Royal Hotel, Portishead, Avon (ST 475776) show a sequence of mainly sandstones, belonging to the Severn Coalfield (Figure 5.7). The Upper Carboniferous deposits are faulted against Lower Carboniferous limestones (Black Rock Group), and are overlain by Triassic red beds. The geology of the site is described by Stead and Williams (1973).

# Description

About 30 m of Pennant Formation are exposed here. The sequence consists mainly of coarsegrained, litharenitic sandstones. A variety of sedimentary structures can be observed, including trough cross-stratification and erosional surfaces with clay-ironstone lags, which point strongly to this being an alluvial sequence. Palaeocurrents suggest a south-east provenance for the sediments.

The only argillaceous bed is a 30 cm thick mudstone near the base of the sequence. The sandstone immediately above has prominent deformational structures, which are thought to be the result of slumping caused by penecontemporaneous earthmovements.

# Interpretation

This is the only good exposure of strata in the Severn Coalfield, which represents a southern extension of the Forest of Dean Coalfield. It is an isolated outcrop with no biostratigraphical control, and so its relationship to the rest of the coalfield is speculative. However, the sedimentological evidence would seem to indicate that it belongs to the stratigraphically lower part, known as the Pennant Formation. It may thus be broadly correlated with the lower part of the Forest of Dean Coalfield, such as exposed at Meezy Hurst.

On lithological grounds, Stead and Williams (1973) correlated the Portishead deposits with the Mangotsfield or upper Downend formations of the Bristol Coalfield. However, this is contrary to the biostratigraphical evidence found in other parts of the Severn Coalfield, which indicate that they are probably coeval with the Farrington or Radstock formations (Cleal, 1986a).

# Conclusions

Portishead Pier shows the only good exposure of rocks of the Upper Carboniferous Severn Coalfield, about 306 million years old. It has allowed details of how the rocks were formed to be established, and how they relate to the neighbouring Forest of Dean and Bristol coalfields.