
IGCP Project 469

Atlas of animals from the Late Westphalian of Writhlington, United Kingdom

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Abstract. Representative animals from the Writhlington assemblages are collectively illustrated for the first time with notes on palaeoecology, association and distribution. They are from a comparatively well sampled, terrestrial-fresh water fauna of nematodes, bivalves, arthropods and vertebrates from the Upper Westphalian D of the UK. The Writhlington fauna provides a baseline for comparative faunal work in the Variscan Foreland.


Key words: Radstock, Carboniferous, Faunas.

Introduction

Writhlington Geological Nature Reserve (W.G.N.R.) lies in the Radstock Syncline of the Foreland Basin at Lower Writhlington in the Somerset Coalfield, UK (National Grid Reference ST 703 553; Latitude 51° 17.8' North, Longitude 2° 55.6' West). W.G.N.R. is the former colliery tip of a closed deep mine and now a Site of Special Scientific Interest (S.S.S.I.) and Regionally Important Geological Site (R.I.G.S.).

Systematic collecting since 1984 has yielded a well-preserved compression flora and fauna including over 1,200 insects and other animals (Austen, 2001). The unburnt tip is composed mainly of Roof Shales (grey silt- and mudstones, occasionally sideritic) from the Farrington Formation dating from the upper part of the Westphalian D Stage (Dicksonites plueckenetti Sub-zone). The ‘shales’ are mostly from above the No. 10 Coal Seam although a small amount associated with the No. 1 seam is also found. The No. 10 seam was worked jointly with the former Kilmersdon Colliery nearby (Jarzembowski, 1989; Thomas and Cleal, 1994).

Body fossils (terrestrial fauna)

The terrestrial fauna is dominated by arthropods, in particular insects (Pl. I, figs 4-6, 9, 11), arachnids (Fig. 1; Pl. 1, figs 1-2) and arthropleurids (Fig. 2). These occur mainly in the No. 4 assemblage of Proctor (1994), which is characterised by lycophyte debris. Arthropods are found less often in assemblages 5 and 6, which are dominated by sphenopsid and fern/pteridosperm remains respectively. Nos 4 and 6 are the most common
PLATE I

Fig. 1. *Phalangiotarbus* sp. (extinct arachnid) body alongside *Cyperites bicornatus* leaf, BMB 014846 [W 79a] coll. B. Jarzembowski. Scale line in mm.

Fig. 2. *Pleophrynus verrucosa* (armoured spider), opisthosoma showing upper and lower surfaces (after Jarzembowski, 1989). Scale line in mm. Species also known from Cantabrian/Westphalian D of Mazon Creek, South Wales Coalfield and possibly the Central Bohemian Region (Dunlop, 1994b).

Fig. 3. *Phagophytichnus* sp. (trace attributable to a mandibulate insect) on left side of *Macroneuropteris scheuchzeri* leaf; conchoidal fracture on right side (after Jarzembowski, 1992). Scale line in mm.

Fig. 4. Cockroach larva (nymph) distal portion of exuvium missing. BMB 014876 [W 105] coll. P. Austen. Scale line in mm. Species widespread including Mazon Creek.

Fig. 5. *Bechlya ericrobinsoni* (damselfly-like dragonfly), piece of *C. bicarinatus* below (after Jarzembowski and Nel, 2002). Scale in mm.

Fig. 6. Blattodean insect (mylacid cockroach). Upper view- head shield (pronotum) with folded forewings: note fern-like wing venation (after Jarzembowski & Ross, 1993). Length 17 mm.

Fig. 7. *Euproops danae* (horseshoe crab). BMB 014850 coll. J. Latham. 45 x 25 mm. Species also known from Mazon Creek and the South Wales Coalfield (Anderson, 1994).

Fig. 8. *Adelophthalmus imhoffi* (water scorpion) body after Proctor (1999). Note cuticular sculpture. Scale line in mm. Species widespread including Mazon Creek.

Fig. 9. Protorthopteran (gerarid) insect, apical portion of forewing: note crossveins present. NHM In. 64605. Preserved wing length 32 mm. *C. bicarinatus* leaf below.

Fig. 10. *Palaeoxyris* cf. *carbonaria* (shark egg case). BMB 014848 [W 467b], counterpart of Jarzembowski (1989, fig. 17). Maximum width 6 mm.

Fig. 11. *Palaeodictyopteran* insect, hindwing base: note archedictyon present (after Jarzembowski, 1988). Scale line in mm.

Fig. 12. *Anthraconauta tenuis* (fresh water bivalve) after Jarzembowski (1989). Scale line in mm. Species also present in the Sydney Coalfield and associated with *Anthraconaia* at Writhlington (Eagar, 1994).

PLATE II

Fig. 1. *Diplichnites* cf. *cuithensis* (giant millipede trackway). W 901, Manchester Museum, coll. E. Jarzembowski. Width of trackway (external) 88 mm.

Fig. 2. *Kouphichnium* aff. *variabilis* (walking trackways of horseshoe crabs). BMB 014878 [W 75a], counterpart of Jarzem­bowski (1989, fig. 6). Scale line in mm.

Fig. 3. cf. *Pseudobradypus* sp. (pelycosaur (mammal-like) reptile trace) associated with unnamed ostracod ichnofossils (PL. II, fig. 4). Footprint 63 x 29 mm (after Milner, 1994).

Fig. 4. Ostracod (seed shrimp) trails and resting traces after Jarzembowski (1989). Illustrated area is a 17 x 30 mm area of the bedding plane.

Fig. 5. Arthropod coprolites. BMB 014872 [W 186c] coll. P. Hardy. Scale in mm.

Fig. 6. *Cochlichnus* sp. (nematode (roundworm) burrow after Jarzembowski, 1989). Scale in mm. Rare, larger forms are cf. *Lunicnium* (Pollard & Hardy, 1991).

plant assemblages. No. 4 represents minimally transported material from low-lying forest (domi­nated by *Lepidodendron aculeatum*) and growing in a back-basin mire. In contrast, No. 6 is more travelled material from drier, higher diversity levee forest. Animals are absent from the coal seams.

Body fossils (aquatic fauna)

Remains of aquatic animals include horseshoe crabs (Pl. I, fig. 7), water scorpions (Pl. I, fig. 8), conchostracans (Fig. 3), shark egg capsules (Pl. I, fig. 10) and non-marine bivalves (Pl. I, fig. 12). Animals are rare in river channel sandstones. The shelly lacustrine mudstone associated with the No. 1 seam is a distinctive facies.

Trace fossils

In addition to body fossils in the above plant-rich crevasse splay depositional environments, there are animal trace fossils from the margins of a floodplain lake (Pl. II). Diverse ethological as well as morphological data are thus available (see below).

Interpretation

A numerical breakdown of the fauna is shown graphically (Fig. 4) to give a visual impression of relative abundances. More animals have been found since the last published census but the overall asymptotic ‘curve’ is unchanged for the
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lower 'shale' (i.e. excluding shell counts for the upper 'shale'). The main change is an increase in accessory taxa suggesting that W.G.N.R. has been well sampled. Thus we now know that the 'indet.' (indeterminate) category includes unique examples of a protozoopteran odonate, an amblypygid, and a eurypterid (Fig. 1; Pl. I, fig. 5; 8). *Phagophytichnus* seems confirmed and an unnamed seed-piercing ichnofossil (possibly the work of palaeodictyopteroids) has been added (Fig. 5; Pl. I, 3). There have been some inevitable taxonomic changes and *Eophrynus* is now known as *Pleophrynus* (Pl. I, fig. 2).

The general palaeoenvironment at W.G.N.R. is a forested 'upper delta plain' with fresh water wetland and waterways as summarised above. The fauna is divided here into land and aquatic elements. Representative taxa are illustrated in ascending systematic order. More information and reconstructions are available in primary sources, and work is continuing on a number of groups, e.g. the Araneida (true spiders) are being investigated separately at the University of Manchester. Some of the photographed specimens have been enhanced with ammonium chloride (e.g. Pl. I, fig. 5) or polarised light (e.g. Pl. I, fig. 9). The specimens illustrated are from the lower 'shales' at Writhlington except PL. I, fig. 12 from the upper 'shales' and PL. I, fig. 11 from Kimmersdon colliery tip. Specimen registration numbers for newly figured material have their depository prefixed as follows: BMB, Booth Museum Brighton; BR, Bristol City Museum; LL, Manchester University Museum; NHM, Natural History Museum, London.

It is hoped that this atlas will aid Carboniferous geologists and palaeobotanists undertaking comparative studies and, moreover, encourage the recognition and recovery of faunas which must exist on the numerous colliery tips across Euramerica. Chance finds may be the first indicator of untapped potential.

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Fig. 4. Numbers (y-axis) of animals (x-axis) at W.G.N.R. to show relative abundances (from Jarzembowski, 1989).

Fig. 5. Seed hole (attributable to a palaeodictyopteroid insect) in *Trigonocarpus* sp. Left, after Jarzembowski (2001). Scale line in mm.

References


