A'WILDWOOD' INSECT FAUNA FROM GOLDCLIFF EAST, GWENT

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INTRODUCTION

Extensive fieldwork and systematic sampling over the past three years has produced the most complete data set of palaeoentomological information derived from any single estuary. Analysis of these samples makes it possible to infer that, over varying spatial and temporal scales, the past biomes of the Severn Estuary (Figure 1) were a complex mosaic of habitats from saltmarsh to reed swamp and raised bog, a superb illustration of haloseral and subsequent hydroseral transition. Despite a plethora of evidence indicating otherwise (several hundred root boles and fallen trunks!) entomological evidence of the widespread Mesolithic and later Neolithic woodlands within the Severn Estuary has been conspicuously absent within the entomological record at Redwick, Gwent (Paddock 2001, 2002; Tetlow in prep) and Gravel Banks, Avon (Tetlow in prep.). The basal peat generally developed later than the submerged forest which it covers, hence the lack of insect species associated with woodland. This balance has, however, been redressed by work at Goldcliff East, which has produced comprehensive and unequivocal woodland assemblages, comparable to those found west of Goldcliff Island by Smith *et al* (1997, 2000).

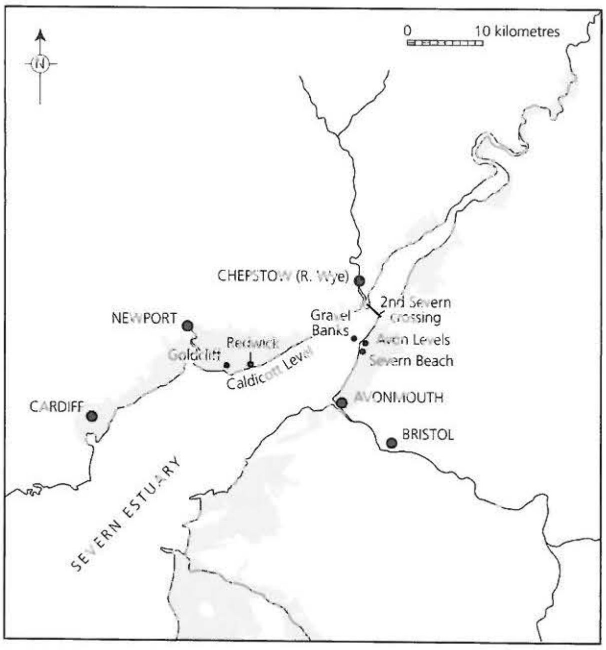

Figure 1: The Severn Estuary with sites and locations discussed in the text. Shading indicates areas of peat and alluvial clay below 10 m OD (map by H. Buglass).

STRATIGRAPHY AND SAMPLING CONTEXTS

Samples were recovered from a sampling pit at 'Site J' approximately 2 m deep, cut between 5 m and 7 m from the Mesolithic edge of the Goldcliff East 'Island' and situated at 1.49 m OD (Bell *et al* this volume: figure 1; 2002: figure 6). Depths given are from the top of the pit to the base.

Continuous palaeoentomological sampling was undertaken down to 1.24 m within the estuarine silt (context 331, Bell *et al* 2002, figure 6). Sampling of the preceding contexts of estuarine silt and interglacial beach did not occur due to the entomologically sterile nature of comparable deposits sampled and analysed from other sites within the estuary (eg Trench D, Goldcliff East; Tetlow in prep). The subsequent sample, 97–93 cm, was derived from a fragmentary band of reed peat dated 5950 ±80BP (CAR-659, 4930-4730 Cal. BC: Smith and Morgan 1989). Whilst the bulk of samples were extracted from a band of peat up to 85 cm thick and containing two, distinctly separate woody layers (context 327: Bell *et al* 2002, figure 6),

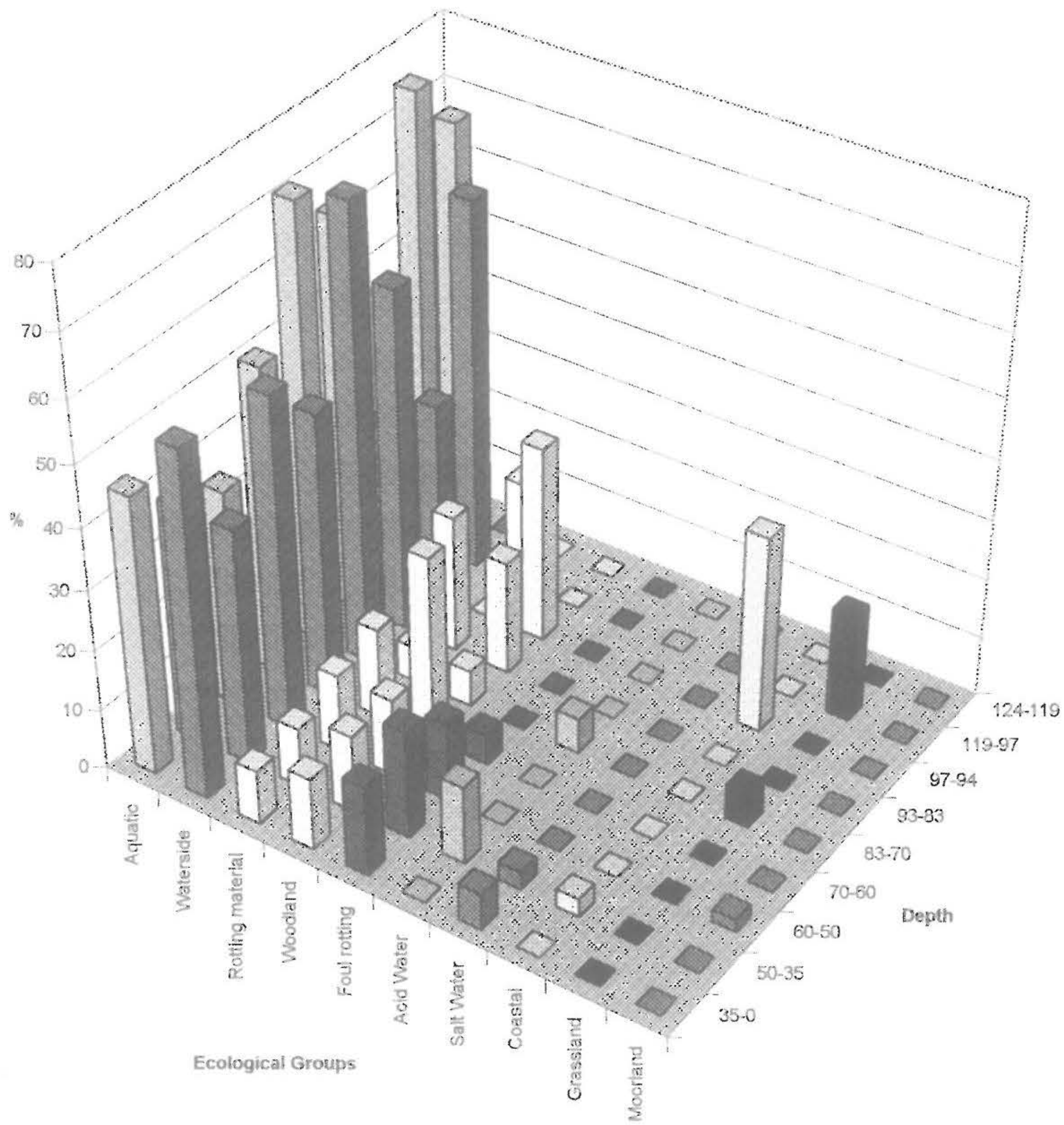

Figure 2: Goldcliff East Pit J, species ecological groups.

formation of this peat occurring between 5794 ± 23BP (OxA-12356, 4567 Cal. BC. Bell *et al* this volume: table 1) and 5061 ±21 (OxA-12355, 3914 Cal. BC. Bell *et al* this volume: table 1)

THE GOLDCLIFF EAST 'WILDWOOD' ASSEMBLAGE

The lower-most samples from this suite are indicative of a similar environment (Figure 2: 119-97 cm, 97-93 cm), both assemblages are predominantly composed of a series of aquatic and waterside species suggestive of wet, tussocky grassland interspersed with boggy, leaf filled pools.

Radiocarbon evidence (Smith and Morgan 1989), suggests this brief episode of swampy grassland, was rapidly replaced by damp, deciduous woodland (93-83 cm). As with other sites in the Severn Estuary such as Redwick (Paddock 2002), any firm entomological evidence of alder is conspicuously absent. These possible indicators of alder providing less than concrete evidence: alder and willow carr is inferred by the carabids *Agonum livens* and more ambiguously by *Pterostichus minor* (Koch 1989a; Lindroth 1985). The most notable species in this assemblage is the renowned scolytid *Scolytus scolytus* (elm bark beetle). This species is a ready flier and may have flown from elm trees inhabiting drier ground on Goldcliff Island itself. It is also possible that this species was derived from a more autochthonous source, the wych elm (*Ulmus glabra*) will withstand periods of waterlogging and flooding and generally moister conditions than the majority of deciduous trees and is commonly found amongst floodplain vegetation (Nicholson and Clapham 1975).

A decreasing aquatic component suggests conditions within the woodland are become progressively drier relatively quickly; many of the beetle species are those of decaying and rotting wood such as the Anobiidae *Grynobius planus* and the Colydiidae *Cerylon histeroides*. The exact sylvanian composition is somewhat ambivalent, as both species will live on the rotting wood of a variety of trees including alder (*Alnus*), birch (*Betula*), beech (*Fagus*), oak (*Quercus*) and maple (*Acer*) (Koch 1989b).

Sclerites recovered from the subsequent sample (70-60 cm) were poorly preserved and highly fragmentary. Plant macrofossils recovered from this depth display a similar decline and are totally absent at a depth of approximately 66 cm reappearing at 62 cm (S. Timpany pers comm). It is unlikely that this paucity is a result of taphonomic factors such as compaction or drying. Well-preserved and relatively diverse Coleopteran assemblages were obtained from the samples directly above and below this depth, plant macrofossils were also recovered. The most plausible reason for this poor preservation is that of drier conditions at the time of deposition hence the preservation of the insect remains and plant macrofossils was compromised.

With the apparent onset of wetter conditions a virtual explosion in species abundance and diversity occurs within the subsequent two samples (60-50 cm and 50-35 cm), that probably represents the climax of this area of woodland. The assemblage suggests a varied and species rich woodland (Table 1, overleaf), possibly the 'Wildwood' of Rackham (1976), composed of trees in all stages of growth and decay from saplings to the rotting remains of their ancestors with a rich under-storey of shrubs, fruit and nut trees, interwoven with honeysuckle and ivy surrounding forest glades and clearings containing pools and boggy areas.

The first of these samples suggests a heterogeneous canopy of larger trees possibly of oak and beech as suggested by the Colyiidae *Cerylon fagi* (Bullock 1993) and curculionid *Curculio venosus* (Koch 1992). There is evidence for birch, lime (*Tilia*), ash (*Fraxinus*) and willow (*Salix*). A varied layer of shrub species was present, this included hawthorn (*Crataegus*), hazel (*Corylus*) and fruit trees: The scolytid *Scolytus mali*, as the name suggests is found upon apple (*Malus*), pear (*Pyrus*), blackthorn (*Prunus spinosa*) and hawthorn (*Crateagus*) (Hyman 1992), as is the larvae of the scarabid *Gnormius nobilis*. The adult of the latter is also commonly found amongst the flowers of dog rose (*Rosa canina*) and hogweed (*Heracleum* spp.) and also willow (Hyman 1992).

Finally, the aquatic component demonstrates an overall, dramatic increase. The Hydraendiae *Octhebius* spp. found in damp, muddy conditions are abundant, as are the aquatic *Cercyon* spp. associated with rotting leaves and muddy, vegetation rich pools (Hansen 1987). This trend continues amongst the larger Hydrophilidae such as *Cymbiodyta marginella* and *Hydrobius fuscipes* both of which are often found in vegetation rich, standing waters (Hansen 1987).

The final sample (35-0 cm) shows that the woodland is becoming increasingly wet. Woodland indicators persist, however, confirming that oak and possibly beech were present. However the composition of the woodland appears to be changing subtly, perhaps suggesting the opening of the canopy. Two species, the Rhizophagidae *Rhizophagus ferrungieus* (Koch 1989b) and the curculionid *Rhyncolus chloropus* (Bullock 1993) are both exclusively associated with pine (*Pinus* spp.) and other conifers. Pine is particularly light demanding and would be unable to successfully establish itself in a densely canopied woodland (Nicholson and Clapham 1975). Indicators of this retrogressive succession and woodland demise are the growing presence of reed swamp and riparian species such as the Chrysomelidae *Plateumaris* and *Donacia* spp. (Cox and Menzies 1996). Aquatic species increase significantly in diversity and abundance with species such as the hydrophilid *Hydrobius fuscipes* and the *Cercyon* spp. suggesting muddy, slow moving leaf-filled waters (Hansen 1987).

Species	**Associated Habitat**
Agonum livens	Swampy deciduous woodland esp. alder (*Alnus*) & willow (*Salix*).
Agathidum marginatum	Light deciduous woodland
Paromalus flavicornis	Ash (*Fraxinus*) and oak (*Quercus*) spp., bracket fungi
Scaphisoma agaricinum	Rotting wood and fungi
Epuraea limbata	Fungi in deciduous woodland
Rhizophagus ferrugineus	Under bark & in fungal hyphae in a variety of deciduous trees
R. perforatus	Deciduous woodlands, esp. beech (*Fagus*).
Ditoma crenata	Oak and beech.
Cerylon fagi	Oak and beech.
Cerylon histeroides	common beech (*Fagus sylvatica*) and also oak, pine (*Pinus*) and elm (*Ulmus*)
Cerylon impressum	Maple (*Acer*), birch (*Betula*), beech and oak.
Aspidiphorus orbiculatus	Bracket fungi in deciduous woodland
Cis spp.	Saproxylic fungi
Grynobius planus	Dead wood in deciduous woodland
Anobium punctatum	Dead wood in deciduous woodland
Hypophloeus unicolor	Bark of beech but also oak and birch.
Gnorimus nobilis	Light deciduous woodland esp. *Fagus* & *Salix* spp. & fruit trees
Scolytus mali	Fruit trees and elm.
Scolytus scolytus	Elm.
Lepersinius varius	Dead ash trees.
Pteleobius vittatus	Elm.
Rhynchites spp.	Dead wood in deciduous woodland
Rhyncolus chloropus	Pine.
Phloeophagus lignaris	Rotting wood in deciduous woodland esp. beech and oak.
Dorytomus spp.	Deciduous woodlands, esp. poplar (*Populus*) and willow.
Curculio venosus	Oak.
Curculio glandium	Oak.
Acalles ptinoides	Dry, dead wood and heathland
Acalles spp.	Deciduous woodland

Table 1: Woodland species recovered and habitat preferences.

The final regression to reed swamp and the subsequent formation of a raised bog both found by Smith and Morgan (1989) have been lost through truncation and erosion of the upper sections of this sequence.

COMPARISON WITH THE GOLDCLIFF 'WILDWOOD' FAUNA

The Goldcliff East fauna is closely comparable to that found by Smith *et al* (2000) at Goldcliff to the west of the Island. Here a similar area of well developed woodland composed of oak and possibly beech with species such as the scolytids *Scolytus ratzbergi* and *Hylurgops paliatus* indicating birch and pine respectively (Hyman 1992; Bullock 1993), surrounding pools with rich emergent and riparian vegetation.

Both pollen and plant macrofossil evidence at Goldcliff suggest the primary components of this woodland were alder and willow (Caseldine *et al* 2000), Smith *et al* (2000) also found no direct indicators of either species from Pit 15. Once again, this is replicated by the pollen, plant macrofossils and wood results from Trench J: which indicate dominance of *Alnus* and *Salix* spp. throughout the profile (S. Timpany pers comm). Both studies highlight a significant contrast between the differing forms of proxy evidence.

FAUNAL IMPLICATIONS AND VEGETATIVE SUCCESSION AT GOLDCLIFF EAST

At the base of the section, several phases of succession are notably absent, particularly tall reed swamp, evidence of which has been virtually ubiquitous throughout the estuary. This may be explained by the swift colonisation of the 'sedge tussock' community by saplings of alder and willow. Species poor, wet 'sedge tussock', often forms a band between reed swamp and 'swamp carr', composed of alder and willow (Walker 1970) and is liable to rapid colonisation by seedlings of these species (Rodwell 1995). Succession then follows a typical hydroseral pattern (Walker 1970):

- "Sedge tussock" developed *c.* 5950 ±80BP (Car-659; 5050-4610 Cal BC; Smith and Morgan 1989).

- Carr woodland rapidly succeeded *c.* 5794 ±23BP (OxA-12356; 4690-4500 Cal BC) and signifies the beginning of the main phase of peat development.

- A very dry phase suggested by a poorly preserved assemblage.

- The assemblage suggests damper conditions and improved preservation with woodland possibly dominated by oak and beech with a dense layer of shrubs and rotting wood, likely to represent the climax to mixed deciduous woodland.

- Tall reed swamp begins to encroach as conditions become increasingly wet.

Finally, comparison with the assemblages recovered from Pit 15 at Goldcliff, west of the island (Smith *et al* 1997, 2000), suggest mixed, broad-leaved deciduous woodland covered a considerable area of Goldcliff 'Island' and its environs. The definition of alder carr in the archaeological record using entomological sources is problematic, this disparity between the varying proxy methods of reconstruction produces an enigma discussed by Girling (1985), Robinson (1993), Smith *et al* (2000), Paddock (2002) and Smith and Whitehouse (in press), and is compounded by a lack of modern knowledge of entomological interactions within this ecotone.

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