A SUB-FOSSIL INSECT ASSEMBLAGE FROM THE 'FOURTH PEAT', REDWICK, GWENT *c.* 4910-2930 BP

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INTRODUCTION

The exceptional value of beetles and other insects as a method of site-specific palaeoenvironmental reconstruction within the inter-tidal zone of the Gwent Levels has already been demonstrated by Smith *et al* (1997, 2000). This Ph.D research aims to build upon previous work at Goldcliff, with a series of localised studies at sites on both the English and Welsh shores of the Severn Estuary and Bristol Channel. The ultimate aims are:

- To produce an estuary-wide reconstruction of the changing biomes within the Severn Estuary.
- Provide an examination of the possible factors which forced these changes.
- Examine the degree of synchroneity between sites.
- Assess the potential scope of human manipulation and exploitation within the intertidal zone.

Currently, the most chronologically and sequentially extensive results have been obtained from a pit, approximately 1.4 m deep associated with Building 4 at Redwick (Bell 2002). This structure is located on the surface of the main peat shelf or 'Fourth Peat' at Redwick (ST 422430) and provided an opportunity for high-resolution sampling and subsequent palaeoenvironmental reconstruction. This peat represents approximately 2500 years of uninterrupted vegetative development and succession and is the most extensive band of peat currently recorded on the Gwent Levels. Radiocarbon dates from the peat base suggest formation began *c.* 4910 ±70 BP (Beta-113004, Allen and Bell 2000) and continued until the time of the Redwick middle Bronze Age settlement where wooden posts associated with Building 4 produced a date of 2930 ±70 BP (Swan-225, Bell and Neumann 2000). Sampling was undertaken at Redwick during 2001 as part of a three year project exploring Mesolithic to Neolithic Coastal Environmental Change (Bell *et al* 2002) and occurred simultaneously with the final season of excavation of the Bronze Age site at Redwick (Bell 2002).

Samples for palaeoentomological analysis were obtained at intervals of between 5 cm and 10 cm (Table 1, overleaf) and have produced a comprehensive picture of successional vegetation changes at Redwick during the mid- to late Holocene.

VEGETATIONAL DEVELOPMENT AT REDWICK

The insect assemblage suggests that these vegetational changes may be divided into three phases:

During the first phase of development (Figure 1, 135-90 cm), conditions are those of damp fenland comprising a heterogeneous mosaic of vegetation types. This includes a tall reed swamp composed of *Phragmites* spp. (common reed), *Typha latifolia* (bulrush), *Scirpus* spp. (club rush) and *Glyceria maxima* (reed sweet grass) all suggested by the Chrysomelidae or leaf beetles *Donacia vulgaris* and *Plateumaris braccata* (Menzies and Cox 1996) and the Carabidae *Agonum thoreyi* (Lindroth 1974, 1985, 1986). These species are all exclusive to tall reed swamp environments.

Several species of ground beetle such as *Bembidion semipunctatum* (Lindroth 1974, 1985)

Depth (cm)	Description
0-10	Dense, dry peat, heavily compacted. No evidence of woody fragments or *Phragmites* spp. Evidence of bioturbation. Charcoal.
10-20	Compact dry peat containing twigs and woody fragments. Evidence of some bioturbation.
20-30	Moist compact peat, some small woody fragments. Evidence of bioturbation.
30-40	Moist compact peat, larger twigs and woody fragments. No evidence of bioturbation.
40-50	Moist compact peat with some twigs and woody fragments. No evidence of bioturbation. Abundant charcoal
50-60	Moist compact peat, some small woody fragments. No evidence of bioturbation. Significant charcoal
60-70	Moist, less compact. Fragments of non-oak, some *Phragmites*. No bioturbation.
70-75	Moist, less compact. Abundant, large fragments of non-oak possibly alder. No bioturbation.
85-75	Moist, friable peat contained possible leaf litter + large, well preserved fragments of non-oak possibly *Alnus*.
85-90	Moist peat, some *Phragmites* possibly a sedge peat.
90-95	Moist homogeneous *Phragmites* peat. Large, well preserved fragments of *Phragmites*.
95-100	Moist homogeneous *Phragmites* peat. Large, well preserved fragments of *Phragmites*.
100-105	Moist homogeneous *Phragmites* peat.
105-115	Highly compressed, homogeneous *Phragmites* peat. Large amounts of exceptionally well preserved *Phragmites*.
115-125	Compressed clayey *Phragmites* peat. Charcoal.
125-135	Blue/grey clay with some unidentified organic component.

Table 1: Stratigraphy of the Building 4 Pit, Redwick.

indicate an under-storey composed of grasses and carices. Also found in abundance is a third Chrysomelid *Plateumaris discolor* which lives amongst *Eriophorum* spp. (cotton grasses) and suggests areas of more acid bog (Menzies and Cox 1996). The aquatic component, particularly the Whirlygig beetle *Gyrinius suffriani* suggests that this dense vegetation surrounded pools of deep, acidic standing water (Hyman 1992). Also found in standing or slow moving waters is the tiny weevil *Tanysphyrus lemnae* which feeds upon duckweed (Koch 1992). Species associated with the coast are limited to the Carabid *Bembidion minimum* a species found within the spray zone and sand dunes (Lindroth 1974, 1985).

Subsequently, conditions become increasingly damp (Figure 1, 90-50 cm) with a marked increase in the aquatic and waterside component found within each sample. There is also an apparent transition to damp woodland, potentially alder carr, with a carpet of *Sphagnum* spp. and leafy pools surrounded by *Phragmites* spp. This is indicated by several Dytiscidae, *Hydroporus scalesianus*, *Hydroporus neglectus* (Nilsson and Holmen 1995) and the Hydreanidae *Hydrochus brevis* (Hansen 1987) all of which live around woodland pools and amongst *Sphagnum*.

This hypothesized transition to alder carr or some form of deciduous woodland is suggested by several species notably *Pterostichus minor*, *Symbiotes latus* and *Agathidum marginatum* (Lindroth 1974, 1986; Koch 1989), though they are not entirely exclusive to these woodland environments.

A further complication is the limited number of species that feed upon alder, a topic that has been discussed by Girling (1985) and Smith *et al* (2000); the former suggests that fossil insect assemblages cannot be relied upon to prove

vegetation succession vary from those at Redwick. At Goldcliff East the development of reed swamp was followed by a short lived phase of fen carr and then a regression to reed swamp conditions, this was rapidly replaced by *Sphagnum* and *Calluna* peats with no intervening phase of alder carr (Smith and Morgan 1989). At Goldcliff, radiocarbon dates from the base of Pit 15 indicate peat formation began 5920 ±80 BP (CAR-1501, Bell *et al* 2000), the insect assemblage from this feature provides a direct analogue with the Redwick assemblage and is strongly comparable. Tall reed swamp gives way to damp woodland, strong evidence of this woodland component was found, followed by a final transition to moorland or raised bog (Smith *et al* 2000).

Comparison highlights the spatial and temporal variability between these sites, situated in close proximity. During the 2002 field season, sampling of a similar 'Pit' was undertaken at Goldcliff East Site J (Bell *et al* 2003, this volume), where no previous palaeoentomological analysis has occurred: this will allow a direct comparison of these three sites providing a major contribution to the continuing process of palaeoenvironmental reconstruction of the Gwent Levels.

Notes

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