

## THE SUB-FOSSIL ASSEMBLAGE FROM A HOLOCENE CALCAREOUS PALAEO SOL IN DAYMER BAY, NORTH CORNWALL

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The Daymer Bay submerged forest site, on the east side of the Camel Estuary, N. Cornwall, has recently been re-examined. This thin intertidal organic-rich deposit yields a well preserved sub-fossil biota consisting of terrestrial gastropods, insects and small vertebrates as well as rooted tree stumps and other plant macrofossils. The preservation of a fossil assemblage of this type is unusual in the peat-rich deposits normally associated with Holocene submerged coastal forests in Cornwall. Preliminary indications suggest that, rather than an acidic peat or histosol, the Daymer deposit represents a calcareous hydromorphic soil probably developed in an inland, predominantly well-drained scrub/woodland environment, with minor input of flora and fauna from bordering ponds and streams running into the River Camel. There are some indications that this deposit has preserved evidence of a snail death assemblage. There is no evidence of contemporaneous marine biological input or influence in the deposit which was probably buried by dune encroachment before humification and loss of calcareous elements could occur. The calcicole elements of the sub-fossil fauna and flora indicate the influence of blown calcareous sand in this early ecosystem as is seen in present day ecosystems fringing dunes along the N. Cornish coast. A sample of wood from the palaeosol has been radiocarbon dated to Cal BC 2470-2290 (2 Sigma cal. 95% probability). Later marine transgression, coupled with meteorologic run off from the shell-rich dunes, is considered to be responsible for the development of the associated beachrock and calcareous sand reefs.

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### INTRODUCTION

The remains of Holocene forests, frequently associated with peat-rich palaeosols, are a feature of the coastlines and estuaries of the South-West peninsula and the Bristol Channel (French, 1999; Bell, 2007). Major studies of coastal wetland deposits in Devon and the Severn Estuary (Balaam *et al.*, 1987; Bell, 2007) reveal organic-rich palaeosols associated with submerged forest remains as important sources of plant macrofossils, pollen and diatoms. Vertebrate remains, associated with human artefacts and activities, are relatively common in many of these deposits (Bell, 2007). In his review of the submerged forest palaeosols of Cornwall, French (1999) summarized palaeobotanical information on submerged forest and palaeosol deposits in the county, including radiocarbon dates, but noted a dearth of evidence of associated human activity.

Radiocarbon dating indicates that these submerged forest and peat deposits formed in southwest UK during the development of coastal wetlands linked to rising sea level throughout the Holocene (French, 1999; Bell, 2007). In broad terms UK relative sea level (RSL) was some 50 m lower than at present at the beginning of the Holocene (~12 ka BP) but rising rapidly after the last deglaciation (Lambeck, 1995; Shennan and Horton, 2002). The rate of RSL decreased, probably between 7 ka and 4 ka BP, when sea levels were ~10 m and ~2 m, respectively lower than today (Edwards, 2006; Gehrels *et al.*, 2011). It is mostly those forests formed and preserved during

that time interval and later that are intertidally exposed today in the far south west of the UK. The few detailed studies on coastal peats and submerged forests in Cornwall and the Isles of Scilly where radiocarbon dates are recorded generally span 8-1 ka BP (Johns *et al.*, 2008; Healy, 1995; Cole, 2001; Ratcliffe and Straker, 1996) and listed by Hazell (2008) and the Cornwall and Scilly Historic Environment Record website (CSHER, 1975-present).

Although usually observed in inter-tidal zones, peat deposits and forest beds have also been recorded by off-shore drilling in, for example, Mounts Bay (Camm, 1999) and Falmouth Bay (Ratcliffe, 1997), by on-shore drilling around Penzance (Healy, 1995), exposed by coastal erosion in North Cornwall (Clarke, 1976) and historically inland by stream tin gravel workings (Ussher, 1879a). Of the Cornish palaeosols and submerged forests the most extensive is the intertidal forest and associated peat exposed in Mount's Bay around Penzance. A number of radiocarbon dates around 4 ka BP for wood and peat from this and other localities have been recorded (Hazell, 2008) and were interpreted as evidence of mid to late Holocene transgressive submergence of Cornish coastal forests. It is now considered (French, 1999) that several factors may have played a part in submergence, including shoreline sediment barriers, and that the formation of submerged forest deposits was not the result of a single transgression event.

The Daymer Bay submerged forest bed, located on the east