

## A NEW DATING PROPOSAL: ELECTRON SPIN RESONANCE DATING WITH PLEISTOCENE BARNACLES

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Barnacles adhere to rock and other hard substrates as larvae, before constructing calcitic shells in situ. They live mainly in intertidal zones and die when exposed. The presence of barnacles thus reflects past sealevels and sealevel changes. Knowing the dates of these changes can constrain the periods of regional hominid occupation and provide a better understanding of local and global paleoenvironments. Barnacles have also been found in archaeological contexts, indicating the use of marine resources by ancient peoples (e.g. Marean *et al.* 2007). Further, barnacles adhere to some of the earliest boats (e.g., Carter, 2006). Although other aquatic carbonates have been dated by electron spin resonance (ESR), this work represents the first use of barnacles as ESR dating samples.

Six barnacle samples, *Balanus* sp., were obtained from two sites. Two were recovered from the Khyex River in British Columbia (Canada). Four smaller samples came from Quaternary glaciomarine beds in Norridgewock, Maine (USA). Using the Maine samples, the standard procedure for ESR dating was modified. In order to eliminate any contribution of  $\alpha$ -radiation, the outermost 20  $\mu\text{m}$  of the shell must be removed. For molluscs, this requires drilling off the outer shell. The complex curvature of barnacle shells made it more efficient to remove this by acid dissolution. The barnacles show a strong radiation-sensitive signal, which is easily measured in barnacles that lack Mn contamination. Four independent analyses from the Canadian samples agreed within their standard errors. Their mean age,  $15.1 \pm 1.0$  ka, correlates well with  $^{14}\text{C}$  dates on associated wood in overlying beds.

Although stability tests to establish the signal's mean lifetime and more calibrations against known ages in other sites are needed, these results shows that *Balanus* can successfully be dated by ESR. Dating barnacles by ESR thus provides another chronometer for local sealevel curves and for humanity's early use of marine resources.

### References:

Carter, Robert (2006). Boat remains and maritime trade in the Persian Gulf during the sixth and fifth millennia BC. *Antiquity* **80**:52-63.

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