



Fig. 13. Mammoth bone found with Clovis artifacts (from the Blackwater Draw collection). This bone is stained yellow (arrow) and is highly radioactive (3,000 ppm U) only on the upper side that was just below the black mat. Bones found above or deeper below the black mat are neither stained nor highly radioactive. INAA analysis determined a high U concentration (58 ppm) in YDB sediment at Blackwater Draw, which is ≈ 10 times the concentration above or below. High U content on fossil bones is due to well known diagenetic processes (1) as confirmed by the corresponding low Th content (<1 ppm) on the stained bone surface. During breakdown of organic material under anoxic conditions, bone beds also may precipitate phosphatic minerals (2), which in turn scavenge and concentrate U. If so, the U enrichment on the bones and in the YDB sediment may have been enhanced by the abundance of bones and other Ca sources in the extinction layer. High levels of radioactivity may, therefore, be potentially useful as an additional diagnostic marker of the YDB layer.

1. Hedges REM (2002) *Archaeometry* **44**:319-328.

2. Purnachandra Rao V, Naqvi SWA, Dileep Kumar M, Cardinal D, Michard A, Borole DV, Jacobs E, Natarajan R (2000) *Sedimentology* **47**:945-960.