



## **AMS Radiocarbon Dating Individual Taxa and Individual Specimens: Implications for Small Mammal Paleoecology.**

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Advances in AMS physics and organic geochemistry have revolutionized our ability to establish absolute chronologies on vertebrate fossils. Highly purified collagen, which provides extremely accurate  $^{14}\text{C}$  ages, can be extracted from single bones and teeth as small as 50 mg. Combined with measurement precisions of  $\pm 15$  to 25 years for ages of  $< 20,000$  yr, the direct AMS  $^{14}\text{C}$  technique enables fossil deposits to be chronologically dissected at the level of single animals.

Analysis of data from a variety of sites in the United States indicates that most excavation levels (analysis units) as small as 10 cm can be time averaged by several thousand years at a minimum, even with the greatest care in excavation and processing of sediments. Time averaging of this magnitude has important implications for fine-scale paleoecological analysis of faunas, especially when compared to high-resolution climate records like those derived from speleothems, ice cores, or marine cores. To this end, we propose saturation dating of indicative taxa and plotting dates of individual specimens against high-resolution climate records rather than analysis of complete faunas or faunules. This technique provides even higher resolution of paleoenvironments than pollen spectra.