LETTER

Standards of evidence and Paleoindian demographics

Buchanan *et al*. (1) correctly identify accurate Paleoindian population estimates as an important test of the Younger Dryas boundary (YDB) extraterrestrial impact hypothesis (2). They claim that cumulative probabilities of 628 ^{14}C-dated components provide evidence for population continuity across the YDB. In fact, only 80 components fall within the interval of interest (≈11,500 to 10,500 ^{14}C years). Data quality is essential with small datasets, and their conclusions are invalid for the following reasons. (*i*) Only ^{14}C dates with measurement precisions <100 years, and preferably <60 years, should be used because larger error margins blur probability distributions; many dates had precisions from 200 years to >2,000 years. (*ii*) Only bone dates processed with modern techniques [e.g., XAD (3) or ultrafiltration (4)] are valid because of the catastrophic consequences of poor chemical preparation (3). (*iii*) Stratigraphic associations between radiocarbon dates and cultural residues need to be demonstrated; e.g., much of the purported pre-11,000 ^{14}C years evidence used is now discredited. (*iv*) Single-component sites do not have the same credibility as multiple-occupation sites. (*v*) The potential for site discovery is not equal through time; destruction and preservation vary by region and are determined by burial depth, depositional environment, ground water geochemistry, and site type (e.g., kill, processing, or camp). Cumulative probabilities of outdated and inaccurate radiocarbon dates from poorly defined archaeological contexts do not provide meaningful proxies of past human demographics. Much more archaeological and chronological work is required to test the YDB extraterrestrial impact hypothesis.

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