

# REACTIONS

*Readers are invited to submit their reactions to the articles in our journal. Please address contributions to: ORIGINS, Geoscience Research Institute, 11060 Campus St., Loma Linda, California 92350 USA.*

## **Re: Brown & Webster: Interpretation of Radiocarbon and Amino Acid Age Data (ORIGINS 18:66-78)**

I read with interest Brown and Webster's article on the problematic relationship between the  $^{14}\text{C}$  chronology and amino acid racemization dating. I am unable to evaluate the technical aspects of the paper but wish to comment on two other issues.

First, it seems the authors pushed the implications of their data too far. They suggest that the disagreement between expected (on theoretical grounds) and observed (based on the  $^{14}\text{C}$  chronology) rates of racemization "compounds [sic] the uncertainty in using amino acid isomer ratios for age determination, and also brings radiocarbon ages beyond 4,000 BP. into question" (p 66). How can it do both? The uncertainty in amino acid dating is only compounded if one assumes that  $^{14}\text{C}$  time equals real time (which the authors do not assume), whereas  $^{14}\text{C}$  dating is only brought into question if one assumes that racemization rates really behave as the authors expect them to. These assumptions appear to be mutually incompatible given the available data.

Second, the authors suggest that the Ice Age (continental glaciation) occurred between 2,800 and 4,200 B.P., but this is inconsistent with their own model for converting  $^{14}\text{C}$  to "real" time. The oldest  $^{14}\text{C}$  date used in this paper (10,400 B.P.) falls at or after the end of the Ice Age (the Ice Age ended ca. 11,000 B.P. based on  $^{14}\text{C}$  dates) and is converted to a "real time" estimate of 4,765 B.P. (Table 1). Thus, according to their model, the Ice Age must have *ended* by about 4,800 B.P. and could not have extended between 4,200 and 2,800 B.P. The latter period is characterized by low racemization rates in their Fig. 6, and cooling could not have been the result of the Ice Age.

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**Brown & Webster's reply:**

The disagreement between amino acid racemization age estimates and corresponding radiocarbon age determinations reinforces uncertainty regarding the significance of an age determination by amino acid racemization ratios. Additional questions are also raised as to how reliable  $^{14}\text{C}$  age determinations may be as a standard against which amino acid age determinations may be judged. Whenever two witnesses disagree, it is necessary to make a decision whether one or both are inaccurate.

We probably should have taken greater care to explicitly state that in reference to glaciation and the ice age we were dealing only with the effect on climate in southern Palestine (p. 76, ¶ 2) and northeast Africa (p 77, ¶ 1).

Hopefully the interpretations we have suggested will aid in worldwide climate modeling that treats the 11,000 B.P. conventional  $^{14}\text{C}$  date for the end of glacial advance in northern Europe and North America.