Letters

Ice Age Art Analysis

In his Research News article "Ice Age art idea toppled" (17 Mar., p. 1435), Roger Lewin states that I am "an independent scholar in New York," when in fact I am a full-time Associate in Paleolithic Archaeology at the Peabody Museum, Harvard University, and have been a corporation appointee and associated faculty member on staff for more than two decades.

Lewin states that I have claimed that sets of marks made in the Upper Paleolithic represent, for instance, "a lunar calendar or a kill tally." Hunting tallies may have existed; but I have not found them, nor have I claimed them.

Lewin cites Randall White to the effect that the wear and breakage that occurs to a point during use changes an engraved cross section, with the presumption that changes in tools cannot therefore be determined from cross-sectional differences and cannot be used to determine notational accumulations. In my response to Francesco d'Errico (*1*), I indicate that it is precisely this process that helps verify the notational hypothesis. The light engraving of notational sets of tiny unit marks does not show evidence of a change in the cross section of the marks, particularly in the last stroke of a set. The next set, however, begins and continues with dramatically different cross sections. Such data represent a small portion of the complex evidence used in notational analysis.

I also state in my reply (*1*) to d'Errico that more than a dozen years ago I examined by microscope precisely the same Azilian pebbles he has examined. I determined at that time that they were not notational and the markings on them did not correspond in any way to the notations of the Upper Paleolithic.

Lewin quotes White as stating that fresh bone is easy to incise but old bone and ivory are difficult. On the contrary, tests with 1-year-old bone and with Aurignacian ivory and bone at least 25,000 years old have shown that the engraving of a set of short and light, tiny notational marks, often to the scale of the marking on a centimeter rule, is not difficult and seldom causes change to a point. Tests conducted in England more than a dozen years ago (*2*) determined that bone from freshly killed animals is difficult to incise because of the fat in fresh bone but that slightly cooked or weathered bone, such as would be found in a homesite scrap heap, is easy to incise.

Notational analysis is one of the most complex and specialized inquiries in the study of Upper Paleolithic image and symbol. A single microscopic study (and of pebbles rather than of the bone normally used for notation) or the presentation of isolated examples of noncontextual data and alternative hypotheses cannot methodologically or theoretically prove or disprove the presence of notation, or "topple" any hypothesis whatsoever.

ALEXANDER MARSHACK
Peabody Museum, Harvard University, Cambridge, MA 02138

REFERENCES

1. A. Marshack, *Curr. Anthropol.*, in press.
2. C. J. Hawkes and E. Powers, *Proc. Univ. Br. Speleol. Soc.* **12**, 137 (1970).

Agricultural Research Initiative

Mark Crawford (News & Comment, 14 Apr., p. 140) highlights the important National Initiative for Agricultural Research developed by the Board of Agriculture of the National Research Council (NRC) under the leadership of Ted Hullar. However, the article does not describe the present precarious state of the current Competitive Research Grant Program (CRGO) of the U.S. Department of Agriculture. In its twelfth year, CRGO has been underfunded since its inception. For instance, in fiscal year 1985, Congress appropriated $46 million for CRGO, but by FY 1989 this had dropped to $39.7 million. In its plant science program, $15.5 million was appropriated in FY 1985, but by 1989 this had dropped to $8 million, from which $1 million was earmarked for research proposals dealing with soybeans and alcohol fuels. The human nutrition program has fared even worse: in 1978, $5 million was appropriated for this program, and in recent years this has been reduced to approximately $3 million. In FY 1989, funding for this program was further reduced to $1 million, making it essentially nonviable. The biotechnology program, brought into CRGO in 1985 with much fanfare at a level of $20 million, is funded in FY 1989 at a $19.06-million level. When one considers the administrative and small business research innovation taxes of 5.25% deducted from the total appropriation and the various indirect costs each organization imposes on each successful grant, investigators are in actual fact left with only minimal funds to carry out their research. Moreover, of the less than 20% of the submitted proposals that are successfully awarded grants, all are underfunded for an average length of 2.2 years. The average per year award size is $48,000 for CRGO, as compared with $70,000 for the National Science Foundation and $164,000 for the National Institutes of Health.

The Office of Management and Budget (OMB) has recommended to Congress for FY 1990 a budget for CRGO of $63.54 million with a restoration of funds in the different categories to the level of a few years ago. This proposed budget would go a long way toward improving the funding capability of the CRGO program. However, because of the severe budget stringencies facing the Bush Administration for FY 1990, one cannot be very optimistic about the prospects for CRGO's budget.

For these reasons, the Board of Agriculture–NRC Initiative is a critical step in the right direction, and all scientists interested in basic agriculture research should follow it as it begins its tortuous path through the bureaucratic maze in Washington.

PAUL K. STUMPF
Department of Biochemistry and Biophysics, University of California, Davis, CA 95616

Retraction

I wish to report that our finding (*1*) of epitaxial growth of mass-selected C^+ ion-beam–deposited diamond films on single crystal silicon is incorrect. As we shall describe in more detail in a forthcoming paper (*2*), we were led astray by an extraordinary (to us) set of circumstances noted below. It should also be noted that our original data (*1*) agreed almost perfectly with the epitaxial diamond assignment.

The villain in our x-ray measurement was a harmonic of the main Cu-K_α wavelength off the monochromating graphite crystal. This $\lambda/2$ component is diffracted in second order at the graphite first order setting ($\lambda/2 = 2\, d_{001}/2 \sin \theta_{001}$). Of course, one electronically discriminates against this well-known component, but in this case it was particularly troublesome in that, at a very low residual intensity, it could nonetheless be diffracted by the (333) and (660) planes of silicon to angles that are 0.6° and 1.2°, respectively, from the expected diamond reflections. The $\lambda/2$ peaks will also be broad reflections, as they have no sharp (K_α) spectral structures. Finally, the $\lambda/2$ contaminants can accidentally come *not* at $\lambda(K_\alpha)/2$, as predicted, but rather at a slightly longer wavelength due to peculiarities of alignment and mosaic distribution of the graphite monochromator.

We have verified this unhappy constellation of effects and have proved that all of our diamond reflections in (*1*) are, in fact, $\lambda/2$ contaminants insufficiently removed and