COMMENTS

COMMENT ON COOK AND COMSTOCK'S "EVALUATING THE OLD WOOD PROBLEM IN A TEMPERATE CLIMATE: A FORT ANCIENT CASE STUDY"

John P. Hart and Kevin C. Nolan

In their recent report, Cook and Comstock (2014) purport to address the "old wood" problem in temperate eastern North America. Here we point out several interpretive and analytical errors in their work. We conclude that careful selection of wood charcoal for radiocarbon assay can result in accurate chronology for events of interest. However, this does not obviate the need to critically assess the extant database of wood charcoal dates in any chronology building effort.

En un reciente informe, Cook y Comstock (2014) pretenden evaluar el problema de la "madera antigua" en el templado oriente norteamericano. A través de este artículo destacamos varios errores de análisis e interpretación en su trabajo. Concluimos que una selección cuidadosa de los carbones de leña destinados al análisis de radiocarbono puede generar dataciones precisas para eventos de interés. No obstante, esto no elimina la necesidad de evaluar de forma crítica las bases de datos disponibles para dataciones de carbones en cualquier intento de elaboración de cronologías.

Cook and Comstock (2014) purport to address the "old wood" issue in temperate eastern North America (ENA), which they claim has been misconstrued in recent chronometric hygiene programs. They present analyses of radiocarbon ages from four sites in the Middle Ohio River Valley (MORV) to demonstrate that the "old wood" problem is not an issue in ENA. They assert that, unlike in the American Southwest, where Schiffer (1986) originally defined the problem, the residence of wood on landscapes in ENA is short and it is unlikely that use of wood hundreds of years old would pertain. They demonstrate that carefully selected wood charcoal can provide accurate ^{14}C ages, which may be younger than complementary ^{14}C ages on non-wood samples.[1] Unfortunately, their report suffers from interpretive and analytical errors.

Interpretive Errors

Cook and Comstock (2014) in fact do not address the issues of concern for most chronometric hygiene programs in ENA or elsewhere. They specifically critique Nolan's (2012) approach in the MORV, which eliminated many wood charcoal ^{14}C ages. While Nolan did suggest that ^{14}C ages on wood charcoal are questionable in general, he was explicit about which ages were not considered useful: (1) mixed samples of unidentified charcoal from throughout a sampling unit; (2) large chunks/logs with no sample size provided; and (3) any sample with 1σ ranges = 100 years or that were assayed before 1970 (Nolan 2012:195–196). We must note that early beta-count assays required large samples (~ 10 g) and the resulting ^{14}C ages often had very large standard deviations.

John P. Hart ■ Research and Collections Division, New York State Museum, 3140 Cultural Education Center, Albany, NY 12230 (jph_nysm@nysed.gov)
Kevin C. Nolan ■ Applied Anthropology Laboratories, Department of Anthropology, Burkhardt Building 314J, Ball State University, Muncie, IN 47306 (kcnolan@bsu.edu)

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While these ages were useful when obtained, they are not useful for most contemporary analyses.

Cook and Comstock (2014) use a criterion similar to Nolan's to select their own wood charcoal samples for assay—charcoal from exterior house posts, which represent small short-lived tree trunks or branches. Not only do they consider the resulting ^{14}C ages accurate, but they suggest that the short residence of wood on the landscape and the demonstrated use of small pieces of wood for firewood (citing Asch and Brown 1990) indicate that wood charcoal from ENA does not contribute "significant error to radiometric dates" (Cook and Comstock 2014:772). Any extrapolation from their results to all ^{14}C ages on wood in ENA radiocarbon databases, however, is a non sequitur. Each new or extant sample must be evaluated for its relevance to the question at hand.

Analytical Errors

Here we assess Cook and Comstock's analytical results. Like them, we use Ward and Wilson's (1978) technique to determine whether or not ^{14}C ages are significantly different. Our use of that technique is through the Test Sample Significance module of CALIB 7.0.

Cook and Comstock (2014:766) indicate that the means of the ^{14}C ages on wood charcoal and non-wood from the Shomaker site are significantly different from one another. While they state that the wood and non-wood ^{14}C ages are not significantly different, respectively, we find that the group of five ^{14}C ages from wood charcoal (t = 28.86, χ^2 = 9.5, $p < .05$) and the five ^{14}C ages on non-wood (t = 32.27, χ^2 = 9.5, $p < .05$) listed in their Table 1 are. Eliminating the two youngest ^{14}C ages on wood and the oldest ^{14}C age on non-wood results in the two groups, respectively, not being significantly different (wood: t = 5.99, χ^2 = 5.99, $p > .05$; non-wood: t = 4.9, χ^2 = 7.81, $p > .05$), and no significant difference for the seven ^{14}C ages as a whole (t = 28.86, χ^2 = 9.5, $p > .05$). The resulting pooled mean for non-wood is 651 ± 17 B.P. and for wood 663 ± 32 B.P.; they are not significantly different from one another (t = .11, χ^2 = 3.84, $p > .05$). In order to obtain the mean pooled dates for the two groups reported by Cook and Comstock, 651 ± 17 B.P. and 571 ± 26 B.P., respectively, it was necessary to eliminate the oldest age on non-wood but retain the two youngest on wood.

Cook and Comstock (2014:767, 769) indicate that ^{14}C ages on wood (n = 3) from the State Line site as reported by Drooker (1997) are significantly different from those on non-wood (n = 10), which they report for the first time. It is accurate that the two groups, respectively, are not significantly different and that they are significantly different from one another. However, the two youngest ^{14}C ages on wood are obvious outliers when compared to the complete suite of ^{14}C ages. The third ^{14}C age on wood is not significantly different from the non-wood ^{14}C ages (t = 10.47, χ^2 = 18.3, $p > .05$). Neither Drooker nor Cook and Comstock provide details on species or context; however, notes at the Cincinnati Museum Center suggest that the three "wood charcoal" samples were mixes of wood and annual charcoal from multiple contexts. As a result, these ^{14}C ages should not be used in any contemporary chronology-building effort.

Cook and Comstock indicate that neither the seven ^{14}C ages on wood nor the eight ^{14}C ages on non-wood from the Guard site are significantly different. However, the ^{14}C ages on wood are significantly different (t = 54.35, χ^2 = 12.6, $p < .05$), as are those on non-wood samples (t = 14.91, χ^2 = 14.1, $p < .05$). Eliminating the youngest ^{14}C age on wood results in a non-significantly different group (t = 2.37, χ^2 = 11.1, $p > .05$) and a pooled mean of 905 ± 17 B.P. Eliminating the youngest ^{14}C age on non-wood samples results in a non-significant difference (t = 10.36, χ^2 = 12.6, $p > .05$) and a pooled mean of 845 ± 14 B.P. Evidently Cook and Comstock eliminated the same ages from their calculations—the slight differences in mean pooled ages from ours resulting from rounding. There is a non-significant difference between the remaining 13 ages (t = 19.1, χ^2 = 21, p > .05), although the pooled means of the two groups are significantly different (t = 7.42, χ^2 = 3.84, $p < .05$). It is not possible to determine whether the wood ^{14}C ages are accurate because there are no dates on non-wood samples from the purportedly earlier occupation with which to compare the dates on wood.

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Conclusions

Careful sample selection is a critical element of successful chronology-building. It is clear that Cook and Comstock were careful in their selection of wood charcoal for assay at Guard. What our reanalysis of their results demonstrates is that careful selection of wood charcoal for radiocarbon dating can result in accurate ^{14}C ages statistically consistent with those on annuals and other non-wood samples. In the end, what Cook and Comstock suggest is consistent with recent programs of chronometric hygiene, which they begin their report by criticizing. That is, they suggest assessing the potential for laboratory error and carefully evaluating contexts and material dated to ensure that dates are accurate for the issue at hand. The need to revisit extant databases of ^{14}C ages and apply rigorous selection criteria for contemporary chronology-building is not obviated by the present results.

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Note

1. Accurate radiocarbon dates are those that contain the true age of the event in question within their probability distributions.

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