MIDWESTERN DENDROCHRONOLOGY AND ARCHAEOLOGICAL DATING

PATRICK J. MUNSON
Department of Anthropology, University of Illinois, Urbana

ABSTRACT. — Although one attempt has been made to date a midwestern archaeological site by dendrochronology the dates obtained have been distrusted and the technique neglected by midwestern archaeologists. However, evidence derived from independent experimentation with dendrochronolgy and from a reevaluation of the archaeological materials from the site with the disputed dendrochronological dates suggest that the technique and the dates may well be valid.

Dendrochronology, or dating by tree-ring analysis, was first undertaken in the midwest by Florence Hawley (1941) who developed generalized master-charts for pine and oak-ash extending back to A.D. 1675 and A.D. 1536 respectively. Of greater archaeological significance however were the investigations made by Robert E. Bell (1951, 1952) who utilized red cedar (*Juniperus virginiana*), a rather slow-growing tree which was heavily utilized at the aboriginal Kincaid site in southern Illinois. A master-chart extending from A.D. 1943 to A.D. 1120 was developed for this species from specimens collected from southern Illinois, northwestern Kentucky and southeastern Missouri, and using this master-chart dendrochronological dates from about A.D. 1500 to 1600 were obtained from archaeological tree-ring specimens from Kincaid. Because radiocarbon dates, which were obtained from *supposedly* related sites, were much earlier than these tree-ring dates, midwestern dendrochronology was relegated to a position of disrepute. No attempt has been made to apply dendrochronology to a midwestern archaeological site since the publication of Bell's work.

There are data to suggest however that the midwestern archaeologist's disillusion with dendrochronology was (and is) ill-founded. In support of midwestern dendrochronology two arguments, based on (1) the independent collection and analysis of a number of tree-ring specimens from central Illinois and (2) a closer scrutiny of the archaeological data (other than dendrochronological data) from the Kincaid site (as presented in Cole et al., 1951) to determine the site's probable chronological position, are presented here.

TREE-RING ANALYSIS IN CENTRAL ILLINOIS

A total of fifty-two tree-ring specimens were obtained from the counties of Ful-

ton, Mason, Cass and Schuyler in central Illinois, forty-three of these being red cedar and the remainder being other coniferous species. Twenty-four samples were collected by the use of an increment bore on living trees and twenty-eight more or less complete cross-sections were obtained from fence-posts, logs, stumps and living trees.

The difficulties involved in working with the junipers, because of the numerous double or false rings, missing rings and distortion due to lobing, are well known, and this difficulty was multiplied by the necessity of dealing in large part with cores rather than complete cross-sections. Other difficulties arose in building the master-chart and cross-dating specimens with it because of the necessity (due to the lack of adequate measuring equipment) of using skeleton or short plots where only the narrow or "sensitive" rings (as compared to those immediately adjacent) are considered rather than histograms where actual measurements are made of all rings (cf. Bell, 1952, pp. 349-350). However, some satisfactory results were obtained.

A large percentage of the specimens collected were sensitive, particularly those from trees growing on the tops and sides of well drained loess bluffs and clay hills, and many specimens agreed well with one another (Fig. 1). By utilizing a number of red cedar specimens which were most in agreement a short master-chart was built up. In regard to this master-chart it must be remembered that a master-chart is a composite or average of many specimens and no individual specimen, nor even all radii of a single specimen, will necessarily agree perfectly, although the majority of the rings, particularly those that are consistently narrow, must be in agreement for the specimen to be cross-datable.

The ultimate test, and utility, of any dendrochronological series is whether or not specimens with unknown cutting or dying dates will cross-date with it. Specimens of this type were collected from stumps, logs and fence-posts, plotted, and compared with the master-chart. Satisfactory cross-datings were obtained in a number of cases (e.g. Fig. 1, specimens F-36 and F-42).

Despite the fact that the data collected from central Illinois have only resulted in a very short master-chart (slightly over one hundred years) the important implication is that with in-

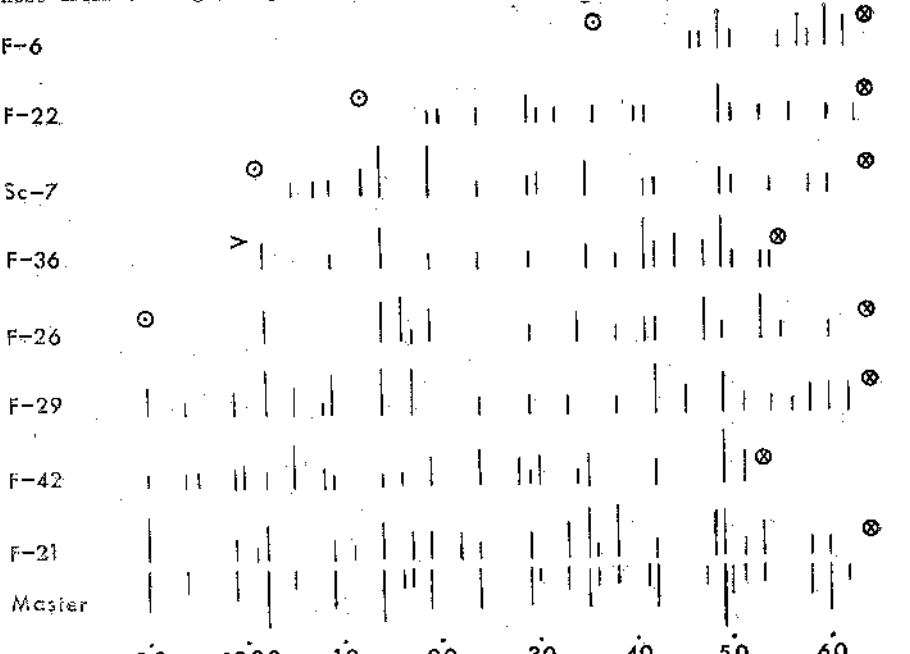

Figure 1. — Skeleton or short plots of the ring patterns of individual red cedar specimens from central Illinois compared to the central Illinois master-chart.

dependently derived data a master-chart has been constructed and it is possible to cross-date specimens with it.

Parenthetically, when the master-charts for central Illinois (FIG. 1) and southern Illinois (Bell, 1951, fig. 7) are compared it is obvious that although a number of rings agree there are far too many differences to make it possible to use the "Kincaid series" for central Illinois specimens. It is not at all surprising that this difference exists because the southern part of the state lies at the northern edge of the subtropical climatic zone whereas central Illinois is well within the temperate zone, the two areas thus having rather substantial climatic differences.

THE DATING OF THE KINCAID SITE

The difficulties that have surrounded the acceptance of the dendrochronological dates for the Kincaid site may be attributed in large part to several assumptions made in the archaeological interpretation of the site. Kenneth G. Orr (1951), working with ceramic materials from mounds Mx°4, Mx°1A-35, Mx°1A-41 and Mx°1B, divided the Mississippian occupation of the site into three periods. Using trade materials these periods were then aligned with other Mississippian complexes in the eastern United States; the Early period supposedly being temporally equivalent to Cahokia Old Village and the Hiwassee Island focus, the Middle period equaling the Dallas focus, and the Late period equating with Cahokia Trappist and the Mouse Creek focus (cf. Cole et al., 1951, fig. 48).

The dendrochronological dates, with one exception, were obtained from only one of these mounds, Mx°4, and the dates of the individual samples agreed with their relative positions in the mound; that is, the earliest dates are at the lowest levels. The lowest sample from the mound dated A.D. 1523 and the highest A.D. 1598. A date of A.D. 1613 was obtained from an additional sample from Mx°1C. Laboring under a telescoped, pre-carbon 14 concept of time-depth, the assumption was then made that this ninety year span, A.D. 1523 to 1613, encompassed more or less the entire Mississippian occupation of the site. With the "insistence" that Early Kincaid, dated A.D. 1523 by dendrochronological methods, was temporally equivalent to Old Village, the first radiocarbon dates for Cahokia (12th century A.D.) seemingly collapsed virtually all faith in midwestern dendrochronology. How, then, can these two apparently contradictory bodies of data be reconciled?

First, one very significant factor seems to have been overlooked in the scuttling of the Kincaid dates; there is a considerable amount of material from the site which almost undoubtably dates to the protohistoric or even historic period: for example, Madisonville focus and Natchez sherds. With this point in mind, and in an attempt to reconcile a date of A.D. 1523 with a component which has been equated with Cahokia Old Village, two hypotheses will be explored. 1) The site is indeed contemporary, in part, with at least a portion of what has been called Old Village, but the occupation persisted until the mid-17th century and the dendrochronological dates (and, necessarily, Mx°4 from which they were obtained) pertain only to the latter occupation. 2) There is no "Early" Mississippian occupation at the site; the materials attributed to this period have been mis-identified and actually are representative of late Middle and Late Mississippian periods.

The crux of both considerations is mound Mx°4, from which the bulk of the dates were obtained, and its chronological position in the site. Orr (1951, p. 297) refers to it as a "Domiciliary . . . (mound) . . . built up by the superposition of one house floor upon the other . . . ." (i.e. an accretion mound) and this is further implied by the statement (p. 305) that "Differences in depth of deposits suggested that the four mounds of the combined sample represented time periods of differing duration." Fay-Cooper Cole, et al (1951, p. 58), however, are explicit in stating that it is ". . . a low truncated pyramid with steeply sloping sides." Assuming that it is a truncated pyramid mound (and Cole's figure 10 illustrates rather conclusively that it is) might it be the case that its building stages *do not* correspond to all periods of the Mississippian occupation but rather that the mound was built in a relatively short period of time during the latter portion of the occupation and the "early" materials in the fill had been scraped up from the adjacent village area? Unfortunately the bulk of the materials from Mx°4 are not discussed as a unit but rather have been lumped (in presentation) with the three

other mounds involved, and it is therefore impossible (without re-examining the material) to determine the quantity of "late" materials from the lower levels, which, if they exist, should substantially strengthen this argument.

However, one good argument for a late date for mound Mx°4 is the occurrence in its middle levels of sherds with wide-line guilloche designs. In regard to these sherds James B. Griffin (quoted in Cole et al., 1951, p. 149) states, "Broad line curvilinear and rectilinear incising featuring the guilloche designs is certainly connected with the similar style in the Madisonville focus." At the Madisonville focus type-site in Ohio typical sherds and vessels of Madisonville types were found in definite association with historic trade materials (brass and iron objects, glass beads). Griffin (1943, p. 308) suggested a terminal date of A.D. 1670 to 1690 for this complex and this date was substantiated by James A. Brown (1961) when he demonstrated that at the Zimmerman site in northern Illinois the historic Danner complex, identified as Shawnee and well-dated at A.D. 1684 to 1688, had Madisonville pottery types. In addition a radiocarbon date of A.D. 1480 ± 150 (M-831) for Early Madisonville nicely brackets the Kincaid dendrochronological dates.

Turning to the hypothesis that the entire Mississippian occupation of the site is late, we find a number of relevant factors. Cordmarked bowls more or less analogous to Cahokia Cordmarked were found in the Early levels (Orr, 1951, p. 354) and Cahokia Cordmarked, although undeniably beginning at an earlier date, has been dated by radiocarbon techniques as late as A.D. 1435 ± 100 (M-1332) and A.D. 1565 ± 90 (M-1334) at Cahokia. Also in regard to Cahokia relationships, many of the Kincaid "Old Village" types don't look particularly like Cahokia Old Village types; the specimen in Orr's (1951) plate 27 *b* appears to be engraved and plate 27 *k-l* are similar to what most Cahokia archaeologists would call "Mound Place-like."

Furthermore, some Moundville-like sherds are present at the site and one incised specimen from Early Kincaid (Orr, 1951, p. 354, Plate 26B 4) is similar to the type Moundville Incised. Concerning this type Douglas H. McKenzie states, "The similarity to proto-historic and historic types may indicate that Moundville Incised occurred late in . . . (the A.D. 1250 to 1500) . . . time span." (1965, p. 62). It is also noteworthy that negative painted bottles with swastika designs (a Southern Cult motif) apparently occur in all levels (Orr, 1951, p. 334). Also, Plaquemine sherds were found in the Middle levels (Ibid., p. 354), Plaquemine having been dated by radiocarbon as late as A.D. 1600 ± 250 (M-30), and one sherd of Fatherland Incised, a historic Natchez type dating A.D. 1650 (?) to 1730, was found in a Late period context (Cole et al., 1951, p. 152).

Further confirmation of the late alignment comes from the Mississippian Tinsley Hill focus centered about thirty miles south of Kincaid in the Tennessee-Cumberland region of Kentucky. In regard to the relationship of this cultural complex and Kincaid it is stated that ". . . the Kincaid Focus . . . (is) . . . a late manifestation culturally and temporally comparable to the Tinsley Hill ceramic complexes . . . ." (Clay, 1963, p. 142), and three radiocarbon dates obtained for Tinsley Hill focus sites are A.D. 1540 ± 80 (I-479), A.D. 1600 ± 85 (I-477) and A.D. 1650 ± 80 (I-478).

However, a single radiocarbon date from Kincaid of A.D. 1275 ± 150 (M-888) has been obtained from a ". . . log tomb associated with the surface of the earliest of the three mound stages . . ." in mound Pp°2 (Crane and Griffin, 1960, p. 35). Although this date is somewhat difficult to evaluate because of the paucity of associated artifacts it does suggest that the Mississippian occupation of Kincaid *began* prior to A.D. 1500.

Summary and Conclusions

Since the use of radiocarbon dating, which appeared to negate the midwestern dates previously obtained by dendrochronology, dendrochronology has been scorned by the majority of midwestern archaeologists. However, recent independent experimentation with dendrochronology in central Illinois has resulted in a workable (although short) master-chart, and there is considerable archaeological evidence from the one midwestern site dated by dendrochronology to suggest that the site was occupied during the period indicated by the dendrochronological dates. For these reasons it is argued

that dendrochronology should be reinstated to a position of respectability as a valid and applicable method of dating in the midwest.

Unfortunately it will be difficult in many areas to develop master-charts of adequate length for archaeological dating. However, Bell's master-chart, which extends to A.D. 1120 and was constructed primarily from specimens obtained from about thirty miles south of St. Louis in Jefferson county, Missouri, should be usable for archaeological red cedar specimens from the Cahokia site near East St. Louis, as well as for specimens from sites in southern Illinois, northwestern Kentucky, the Missouri "Boot-Heel" and for an undetermined distance up the Tennessee, Cumberland and Ohio Rivers. Since dendrochronology provides absolute dating of a precision impossible to attain by radiocarbon dating, special efforts should be made to collect and preserve dendrochronology specimens from archaeological sites in these areas.

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