

RADIOCARBON DATING THE MIDDLE TO LATE WOODLAND TRANSITION AND EARLIEST MAIZE IN SOUTHERN ONTARIO

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Recently generated AMS radiocarbon assays and recalibration of previous radiocarbon determinations from southern Ontario provide evidence that the chronology of the Middle to Late Woodland transition is more complex, and that maize appeared earlier, than previously thought. This paper presents a series of 218 radiocarbon dates from Middle Woodland and initial Late Woodland contexts with calibrations based on current tables. The series shows that Middle and Late Woodland occupations in this region may have overlapped for up to 300 years between A.D. 500 and 800. AMS dates on maize from Princess Point sites indicate that this cultigen was present in south-central Ontario as early as A.D. 500.

Des nouvelles datations au radiocarbone par AMS obtenues récemment ainsi que la recalibration de précédents résultats radiométriques provenant du sud de l'Ontario laissent entrevoir une transition complexe du Sylvicole moyen au Sylvicole supérieur et suggèrent que l'apparition du maïs y est plus ancienne que l'on ne l'avait cru. Cet article présente une série de 212 dates provenant de contextes du Sylvicole moyen et du début du Sylvicole supérieur calibrées à partir des plus récentes courbes. Cette série montre un chevauchement des occupations du Sylvicole moyen et du Sylvicole supérieur entre 500 et 800 ap. J.-C. Les datations par AMS sur le maïs provenant de sites de la tradition Princess Point indiquent que ce cultigène était présent dans la partie méridionale de l'Ontario dès 500 ap. J.-C.

INTRODUCTION

The Middle to Late Woodland transition and the advent of maize cultivation in northeastern North America are the subjects of recently renewed interest, but remain controversial and poorly understood. Both the timing and the nature of these changes are major points of contention; for example, there is currently disagreement over whether the cultural changes were the result of indigenous development or migration, and whether the introduction of maize was the result of migration or diffusion. Until the early 1990s, the prevailing model argued that Late Woodland cultures developed directly from their Middle Woodland predecessors sometime between A.D. 500 and 1000 (Murphy and Ferris 1990; Spence and Pihl 1984; Wright 1984) and that maize cultivation was adopted through diffusion sometime during this

period. This viewpoint is challenged by Snow, who argues that the Northern Iroquoian ethnic group did not develop indigenously but migrated into the Northeast from regions to the south, bringing with it maize cultivation, at some point during this same period (Snow 1992, 1994, 1995a, 1995b).

In Ontario, the debate has centered on the Princess Point Complex, first defined by David Stothers in the late 1960s. Stothers' initial model for the origins of this society proposed that it migrated from the Western Basin region at the west end of Lake Erie into southwestern and south-central Ontario at about A.D. 650, replacing resident Middle Woodland populations and introducing incipient maize horticulture (Stothers 1977). He later changed his position to argue that Princess Point most likely developed indigenously from Middle Woodland antecedents (Stothers and Graves 1983); in this he was supported by Fox (1990). Snow's reassessment directly contradicts this view with a return to a migration model. He argues that horticultural, ranked, and matrilineal Iroquoian societies pushed into Ontario from south of the lower Great Lakes to displace band-level Princess Point hunter-gatherers. Snow based this interpretation on new evidence indicating that Princess Point was a late Middle Woodland manifestation with no maize cultivation, and that maize was introduced to Ontario no earlier than A.D. 900. He originally proposed that this incursion occurred between ca. A.D. 800-900. An alternative migration model, proposed by Bursey, argues that a migration of northern Iroquoians occurred some 400 years earlier at ca. A.D. 500 (Bursey 1995). Recent research on Princess Point by the author and colleagues demonstrates that Princess Point shows clear continuity with later Late Woodland cultures in Ontario, and that maize was present in Ontario by ca. A.D. 540 (Crawford and Smith 1996; Crawford et al. 1997a). In light of this, Snow modified his model so that the timing of the proposed migration is in agreement with Bursey (Snow 1996).

This debate remains, at present, unresolved, and the cultural-historical position of Princess Point and contemporary manifestations in southern Ontario continues to be ambiguous. A primary limiting factor in this discussion is an incomplete understanding of chronology. Although over 200 radiocarbon dates are available for Middle Woodland and the earliest phases and/or stages of the Late Woodland in southern Ontario, they have not been assembled with current calibrations. As a result, interpretation of these dates generally has been piece-meal. In addition, few of these dates are AMS assays and, until very recently, few were from the crucial time period between A.D. 500 and 900. This paper seeks to redress this situation by compiling available radiocarbon dates for Middle to Late Woodland sites in southern Ontario and presenting them with the most recent calibrations. The series of dates will be examined to see what light it sheds on the timing of the transition from Middle to Late Woodland and earliest cultivation in northeastern North America.

MIDDLE AND INITIAL LATE WOODLAND RADIOCARBON DATES FROM SOUTHERN ONTARIO

It should be stressed at the outset that this is not a statistical study of radiocarbon dating or radiocarbon dates per se. In addition, the primary concern is not with the chronology of individual sites. For an applied commentary on the interpretation of radiocarbon dating in the northeast, the reader is strongly advised to consult Dragoo (1974), Rippeteau (1974), and Timmins (1985). The objective of this paper is to review and comment upon the general nature and chronological trends evident in the series of dates under review here. That being said, it is necessary to consider some particular aspects of radiocarbon dates and their use in a series.

Radiocarbon dates are statistical approximations that are subject, on an individual basis, to error caused by a number of factors (Timmins 1985). Radiocarbon assays are also subject to various interpretations of probability. They are generally presented as modal values accompanied by standard deviations. Calibration adjusts the modal values to one or more calendar years and translates the standard deviations to 1-sigma (68% confidence) and 2-sigma (95% confidence). In practical terms, while it may be tempting to use modal values to indicate specific dates, it is necessary to treat a calibrated radiocarbon date as a statistical statement that the date most likely falls somewhere within the sigma ranges, with 68% probability for 1-

sigma and 95% for 2-sigma. Thus, a calibrated radiocarbon date presented with a 2-sigma range as A.D. 260 (540) 660 simply means that there is a 95% statistical probability that the calendrical date falls somewhere within the 400 year range between A.D. 260 and 660. In this study, attention will be paid to both the modal values and the standard deviations.

The southern Ontario sites from which the radiocarbon dates were garnered for use in the present study are listed in Table 1 (*editor's note: Table 1 follows bibliography*), with the published or unpublished source of each date. Although every attempt was made to make this a comprehensive survey of all radiocarbon dates from southern Ontario relevant to the time periods under consideration here, some unpublished dates were not available. For convenience, the most recent published reference to a date is cited where possible, and unpublished references are kept to a minimum. The primary references for data are Timmins' re-evaluation of dates from Ontario Iroquoian sites, current to the early 1980s (Timmins 1985), and Ellis' and Ferris' more recent compendium on the archaeology of southern Ontario (Ellis and Ferris 1990). Timmins' work does not include Middle Woodland, however, and the Ellis and Ferris volume is not entirely comprehensive in its reporting of radiocarbon dates. In addition, both of these works include calibrations using the Klein tables (Klein et al. 1982), which are now superseded (Stuiver and Pearson 1993). Dates from other published and unpublished sources are also cited in the present study.

The master list for the series of radiocarbon assays compiled for this paper is presented in Table 2 (*editor's note: Table 2 follows bibliography*). Included here are site name, cultural affiliation, laboratory number where available, the uncalibrated date in radiocarbon years B.P. and standard deviations, and the calibrated calendrical date(s) expressed as the 2-sigma range with 100% modal values in parentheses. The material from which the dates are generated is not included because this information was unavailable for many of the assays. The order in this table is based on the modal values; these were averaged for multiple dates from a single assay. Multiple dates from a single site are not averaged. All of the dates in Table 2 are illustrated graphically with 1- and 2-sigmals, and modal values in Figures 1 and 2.

The data listed in Table 2 were selected and compiled according to a number of criteria. Not all dates from a single site are included, and some dates previously rejected by other researchers are re-evaluated. The series of radiocarbon dates from Grand Banks and Varden, both multi-component sites with Princess Point occupations, serve as useful examples. For Grand Banks, one assay was generated by Stothers (Stothers 1975) and eight by the Princess Point Project (Crawford and Smith 1996, Crawford et al. 1997a). Of these, two relate to a now well-documented late Archaic occupation of the site dating to ca. 1000 B.C. (Smith and Crawford 1995), and are excluded from this study. Two other dates from Grand Banks most likely relate to a late sixteenth/early seventeenth Cayuga Iroquois settlement at the site (Smith and Crawford 1995). This leaves us with five dates from Grand Banks corresponding to the Princess Point occupation at the site. For the Varden site, a series of six assays were generated by MacDonald (1986). Of these, MacDonald rejected a fifth century B.C. date and an A.D. seventeenth century date because they are significantly outside the apparent occupation dates of the site indicated by the pottery; these dates are also excluded from the present study. In addition, MacDonald rejected as too early an A.D. sixth century date that, in light of current research, must now be reconsidered.

The cultural affiliation noted for each site in Table 2 is, with few exceptions, that provided in the compendium edited by Ellis and Ferris (1990) or as interpreted by those researchers most closely associated with the site. A detailed evaluation of the context of each radiocarbon assay is beyond the parameters of this paper; it should be noted, however, that great care should be exercised in assigning cultural affiliation to a radiocarbon date, especially in the case of multi-component and long-term occupation sites. The classification system and chronology employed in Ellis and Ferris is summarized in Figure 3. Evaluation of this framework is a major objective of this study and will be discussed in the next section. The calibrated dates listed in Table 2 were all generated specifically for this study using the Stuiver and Pearson (1993) calibration tables and were calculated using CALIB v.3.0.3c for Macintosh.

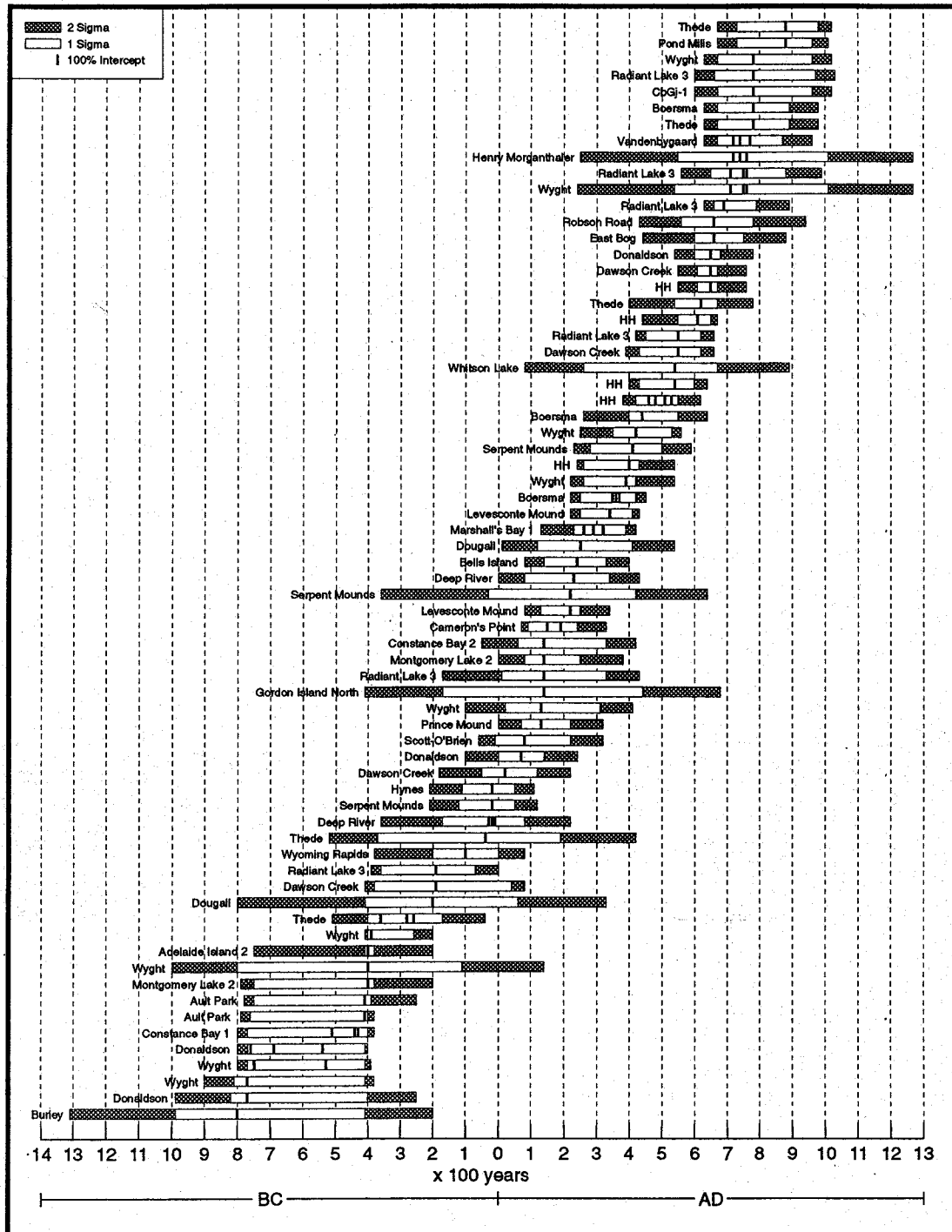


Figure 1. Middle Woodland Radiocarbon Dates from Southern Ontario.

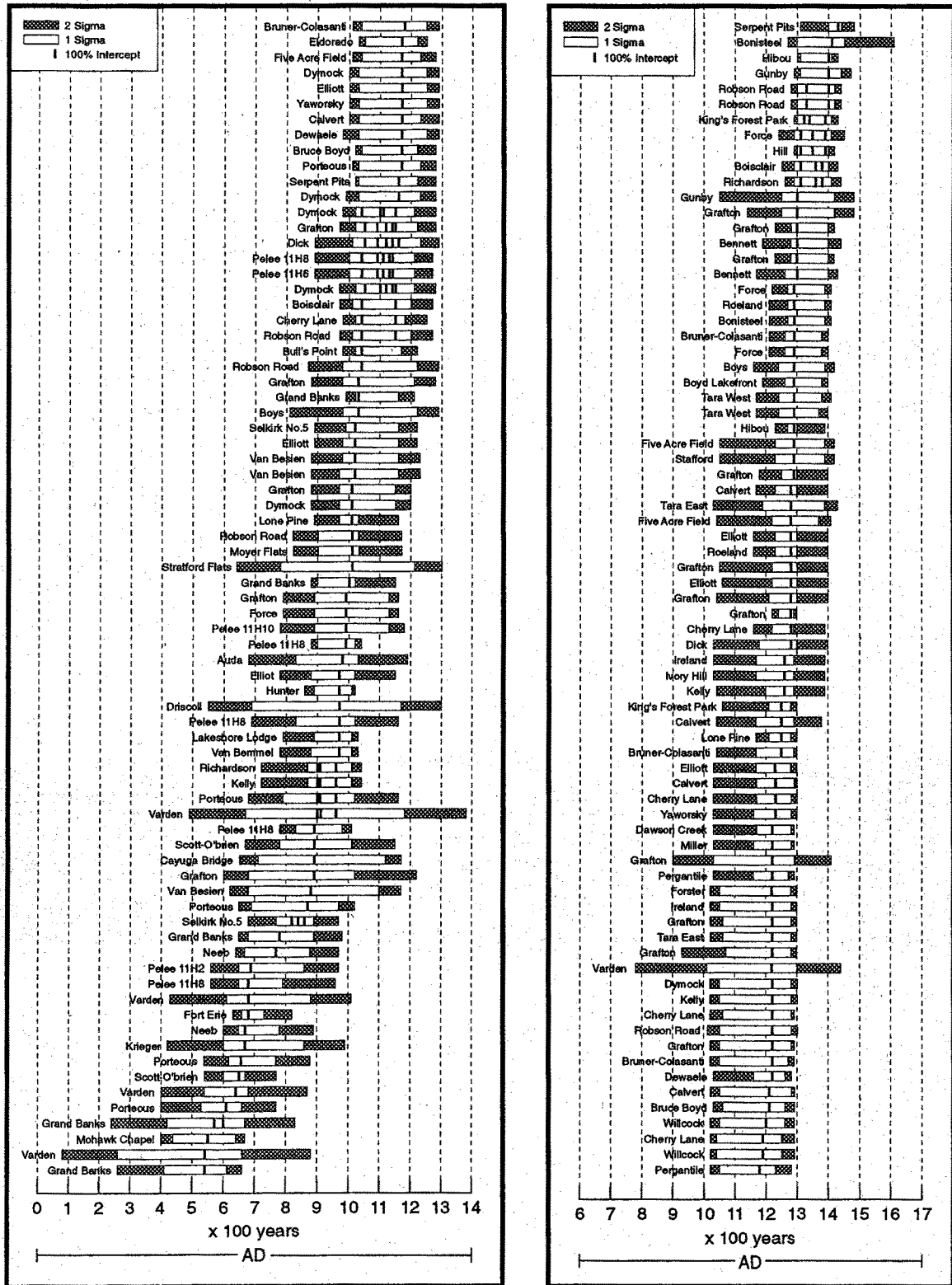


Figure 2. Late Woodland Radiocarbon Dates from Southern Ontario. Right column is a continuation of left column.

For the sake of consistency, all calibrations are rounded to the nearest 10 years; if rounding produced two identical peaks, they were merged.

The stated purpose of this study is to examine the chronology of the transition from Middle to Late Woodland and, accordingly, one of the primary objectives is to see if there is any pattern in the series of dates that would allow us to identify and define a particular period in time when this transition occurred. A key to this examination is the distinction between Middle and Late Woodland and assignment of a particular radiocarbon date to one of these two periods. To begin, the cultural affiliations listed in Table 2 will be accepted, and grouped according to the periodization used in Ellis and Ferris (1990) and displayed in Figure 3. According to this scheme Couture, Saugeen and Point Peninsula are classed as Middle Woodland. Although subject to debate (discussed below) Riviere au Vase is classified as Late Woodland (Murphy and Ferris 1990), as is Princess Point (Smith and Crawford 1995). Sandbanks is, in fact, too nebulous a concept to classify with confidence, but has most often been classified with Princess Point as Late Woodland (Fox 1990). Young and Early Ontario Iroquoian are also classed as Late Woodland.

Next, the chronologies of the two general periods will be examined in turn, followed by a critical discussion of their relation to one another. Although our main concern in this study is with the end of the Middle Woodland and the transition to Late Woodland, the whole of the Middle Woodland period as well as all of the Early Ontario Iroquoian stage and the Young phase of the Western Basin Late Woodland are included to provide a broader context. Some commentary on individual sites, especially multi-component ones, is provided to clarify cultural affiliation and possible length of occupation.

Middle Woodland

The 68 dates from 32 Middle Woodland components assembled for this study are listed in Table 2 and illustrated in Figure 1. Each of the Couture, Saugeen and Point Peninsula complexes will be analyzed separately, followed by a discussion of the chronological implications of this series for Middle Woodland as a whole.

The recently-defined Couture complex is restricted to extreme southwestern Ontario (Figure 4) and is the least well understood of the three Middle Woodland complexes (see Spence et al. 1990:144-148). Unfortunately, there is only one radiocarbon date available for Couture, which comes from a pit that yielded Couture pottery on the multi-component Robson Road site. This date (BGS-1243: 1380±120) is worth commenting upon because of the way it is reported and interpreted by Spence et al. (1990:127, 146). They provide a calibrated standard deviation of A.D. 450-860 (2-sigma), but use the uncalibrated calendrical date (A.D. 570) to date the Middle Woodland pit at Robson Road. The calibration used in the present study provides a date of cal. A.D. 430 (660) 940. Yet Spence et al. propose a time span of 300 B.C. to A.D. 500 for Couture (1990:144). It is suggested here that, in light of the recalibrated Robson Road date and developments further east in southern Ontario (discussed below), there is no cogent reason to arbitrarily end Couture at A.D. 500. In any case, the paucity of dates leaves the chronology of Middle Woodland in this region largely in doubt.

The chronology for Saugeen and Point Peninsula is clearer, if only because we have many more dates than for Couture. Several sites of these two complexes have yielded a number of radiocarbon dates widely separated in time (notably Donaldson, Thede, Wyght and Radiant Lake 3). In all cases this appears to be the result of lengthy occupation.

The geographical distribution of Saugeen is illustrated in Figure 4. For Saugeen radiocarbon dates (Figure 5), the 2-sigmas extend from 1310 B.C. (Burley site) to A.D. 1270 (Henry Morgenthaler site). These dates have wide sigma ranges and it is highly unlikely that their lower boundaries represent the beginning of Saugeen chronology or their upper boundaries represent the end. Although not directly germane to our main concern in this paper, it is worth commenting on the early end of the sequence. The Burley date (1310 (800) 200 B.C.) is suspect because of its wide sigma range; in any case the late end of both 1- and 2-sigma extend to at least 400 B.C. The two oldest dates from Donaldson are interpreted by

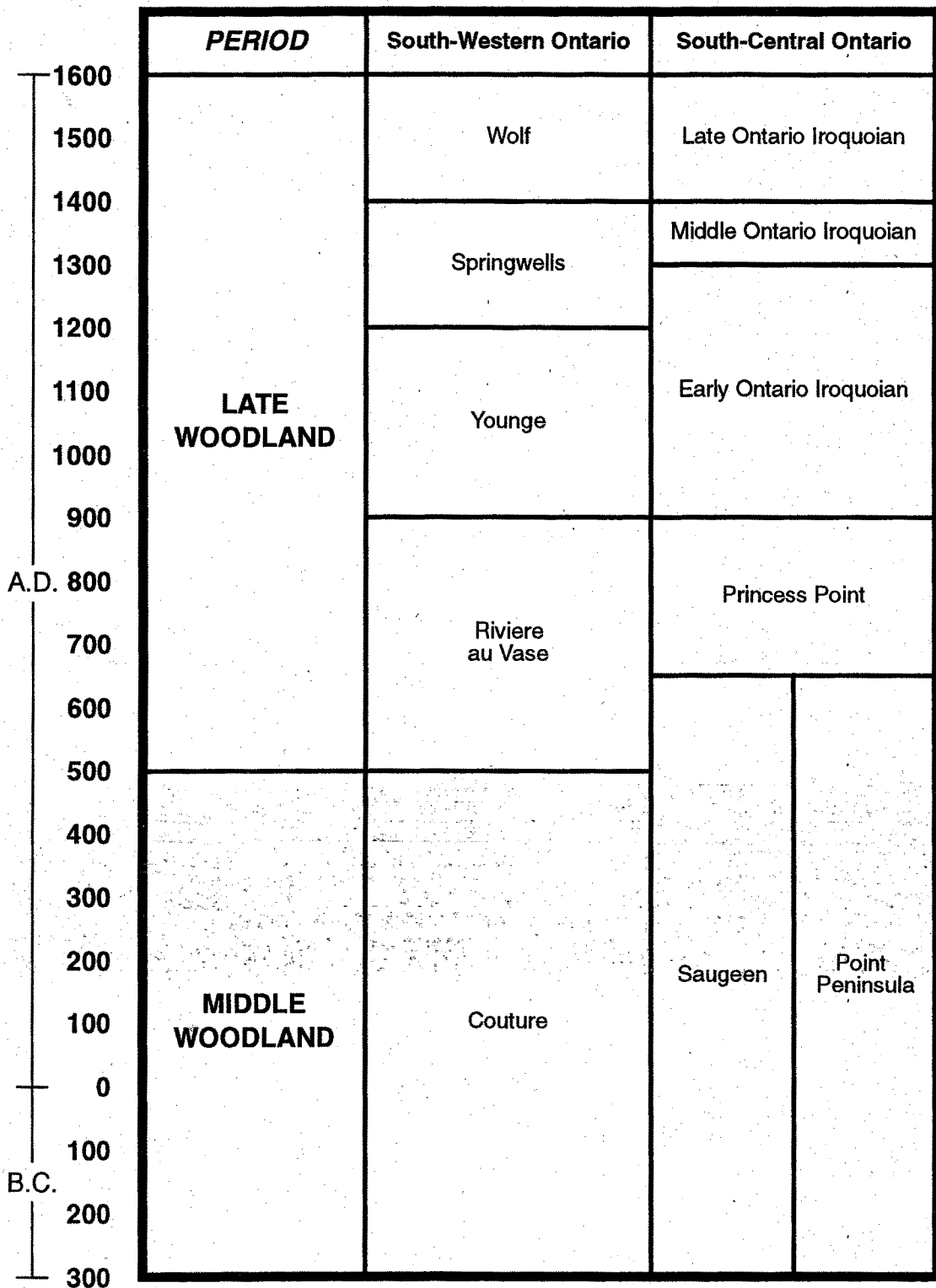


Figure 3. Middle to Late Woodland Chronology (to A.D. 1600) in Southern Ontario (abstracted from Ellis & Ferris 1990).

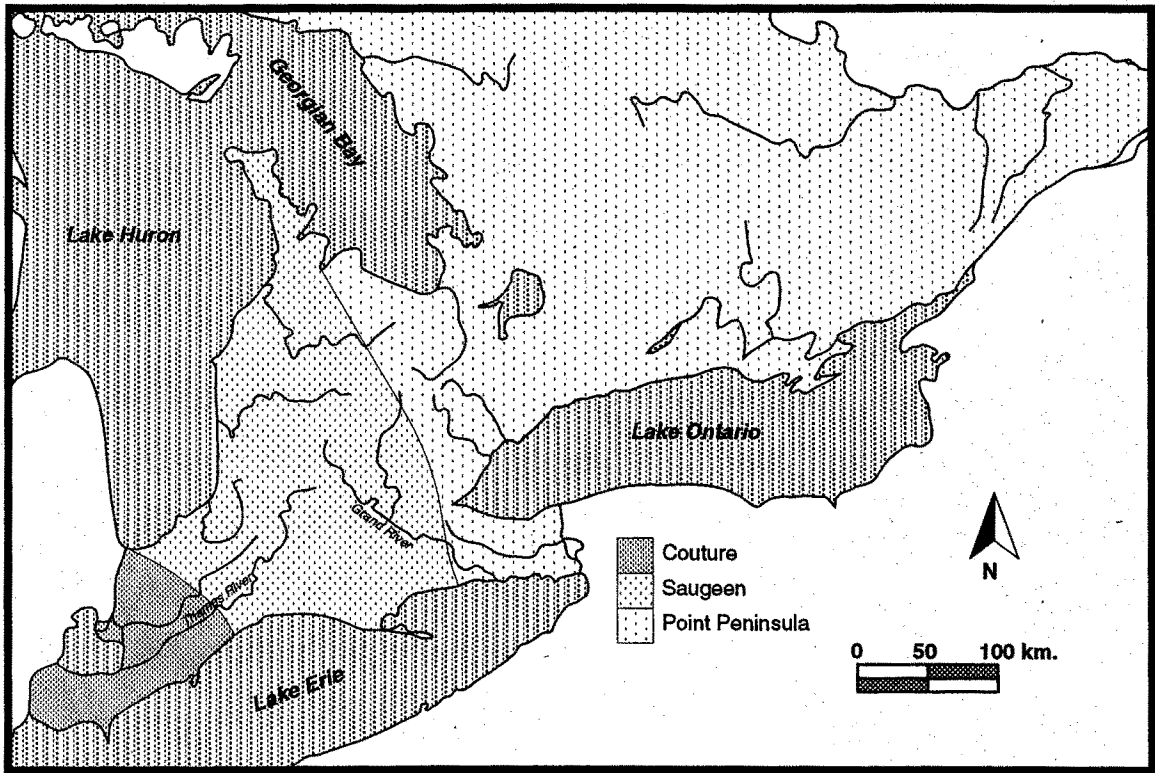


Figure 4. Distribution of Middle Woodland Sites in Southern Ontario.

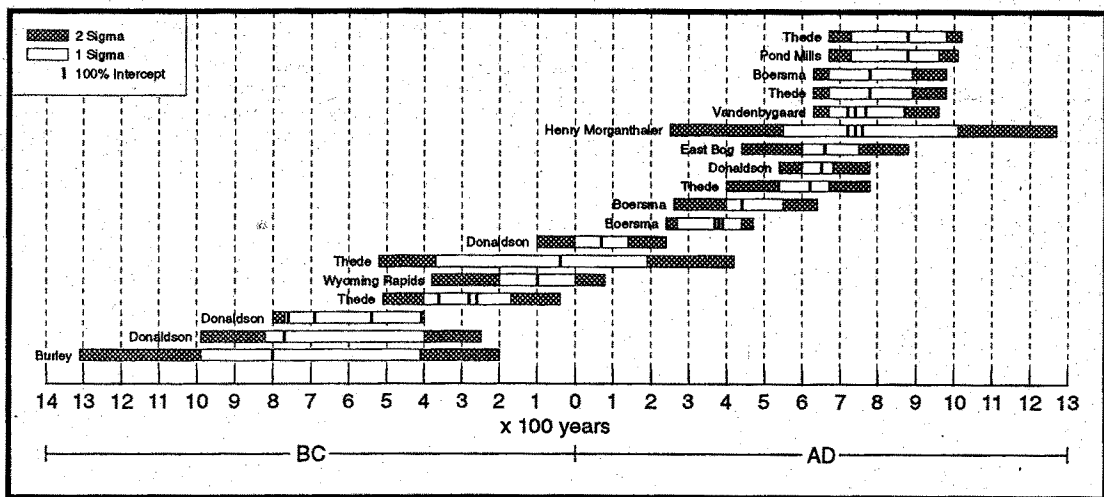


Figure 5. Saugeen (Middle Woodland) Radiocarbon Dates from Southern Ontario.

Spence et al. (1979) as Saugeen, but are attributed to an Early Woodland component at the site by Spence et al. (1990:126). If the Burley and two early Donaldson dates are discounted, the next earliest date is 510 (360, 280, 260) 40 B.C. from the Thede site and the rest of the Saugeen dates fall after 400 B.C. This suggests that ca. 400 B.C. is the most likely inception date for the Saugeen complex. At the late end of the sequence, the pattern suggests that Saugeen persisted until at least A.D. 800. Two dates (Pond Mills and Thede) have modal values that fall between A.D. 800 and 900, but they both have 1- and 2-sigmas that extend before A.D. 800. Four other later Saugeen dates (Henry Morganthaler, Vandenbygaard, Thede, and Boersma) have modal values approaching A.D. 800, suggesting that this is most likely the terminal date of Saugeen.

Point Peninsula spatial distribution in southern Ontario is illustrated in Figure 4. For Point Peninsula, an extensive series of 49 dates is available (Figure 6). The 2-sigma boundaries of this series are 900 B.C. to A.D. 1270 (both from the Wyght site), but these extremes fall well outside the chronology suggested by the other dates. All told, a pattern very similar to that for Saugeen emerges. At the early end of the sequence, all of the oldest dates have 1- and 2-sigmas that extend up to or later than 400 B.C., and seven dates (one each from Constance Bay 1, Montgomery Lake 2, and Adelaide Island 2; two each from Ault Park and Wyght) have modal values close to this date. This allows us to argue that, like Saugeen, the inception date for Point Peninsula is most likely ca. 400 B.C. At the late end, the pattern is even clearer. The five youngest dates (one from CbGj-1 and two each from Wyght and Radiant Lake 3) have modal values between A.D. 700 and 800, and there are no Point Peninsula dates with modal values later than A.D. 800. Thus, as is the case for Saugeen, A.D. 800 is the most likely end date for the Point Peninsula complex.

When examined as a whole and in light of the above discussion, the Middle Woodland series (Figure 1) shows a relatively clear pattern. At the beginning of the sequence, all of the Middle Woodland 1- and 2-sigmas extend to at least ca. 400 B.C., although the ten earliest dates have 1- and 2-sigma boundaries that occur well before this date. At the late end of the sequence, our concern is to make a probabilistic statement about the most likely terminal date for Middle Woodland. The pattern shows that no Middle Woodland site yields a date with the older 2-sigma boundary later than A.D. 700, no older 1-sigma boundary later than A.D. 800, and no intercept later than A.D. 900. The 11 latest dates in the series have modal values between A.D. 700 and 900, and 9 of these are between A.D. 700 and 800. From this, it can be argued Middle Woodland occupations in southern Ontario lasted until at least A.D. 700, more likely until A.D. 800, and perhaps until between A.D. 900 and 1000. Overall, a general Middle Woodland chronology of 400 B.C. to A.D. 800 is indicated.

Late Woodland

The 144 dates from 57 sites with initial Late Woodland (Riviere au Vase, Princess Point, Sandbanks, Younge, and Early Ontario Iroquoian) components are listed in Table 2 and illustrated in Figure 2 (right column is a continuation of left column). Each of the five manifestations included in this series will be analyzed in turn, followed by a discussion of the chronology for all of them together.

To begin with, we can consider Sandbanks, Princess Point, and Riviere au Vase the earliest of the Late Woodland categories (see Figure 7 for geographical distribution). There are only two dates for Sandbanks, from Lakeshore Lodge (cal. A.D. 790 (970) 1030) and Driscoll (cal. A.D. 550 (970) 1300). Very little can be said about these dates on their own or about Sandbanks chronology as a whole, considering how little published data there are for this poorly understood concept. Sandbanks is characterized as similar to Princess Point (Fox 1990; Smith 1987), and both Sandbanks dates fall within the Princess Point chronology (see below). In addition, it is worth noting that the date for the Lakeshore Lodge site is associated with maize.

There are 16 dates now available for Princess Point (Figure 8). Over half of these are from two sites, four from Varden (MacDonald 1986) and five recently generated AMS dates on maize from the Grand

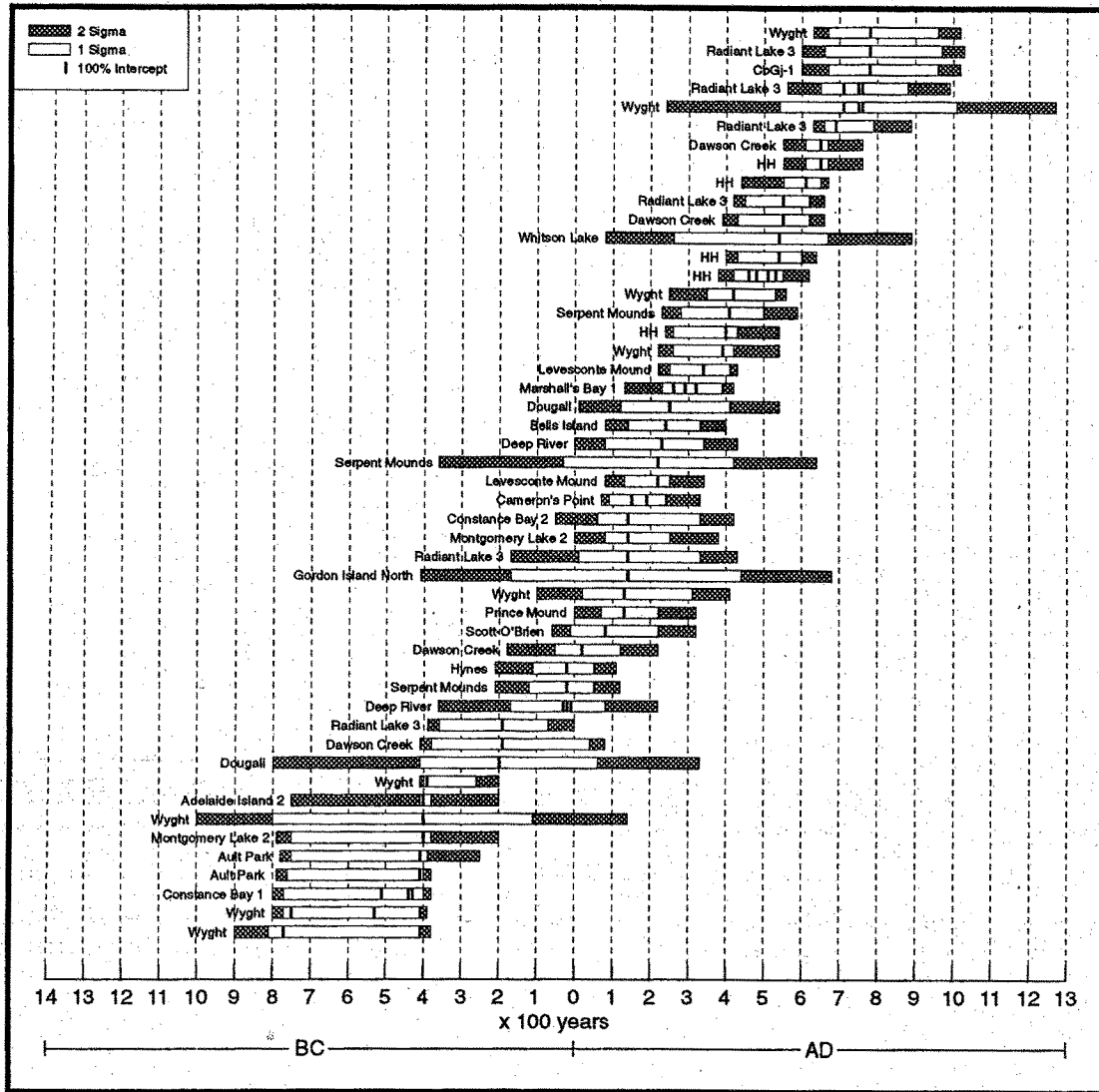


Figure 6. Point Peninsula (Middle Woodland) Radiocarbon Dates from Southern Ontario.

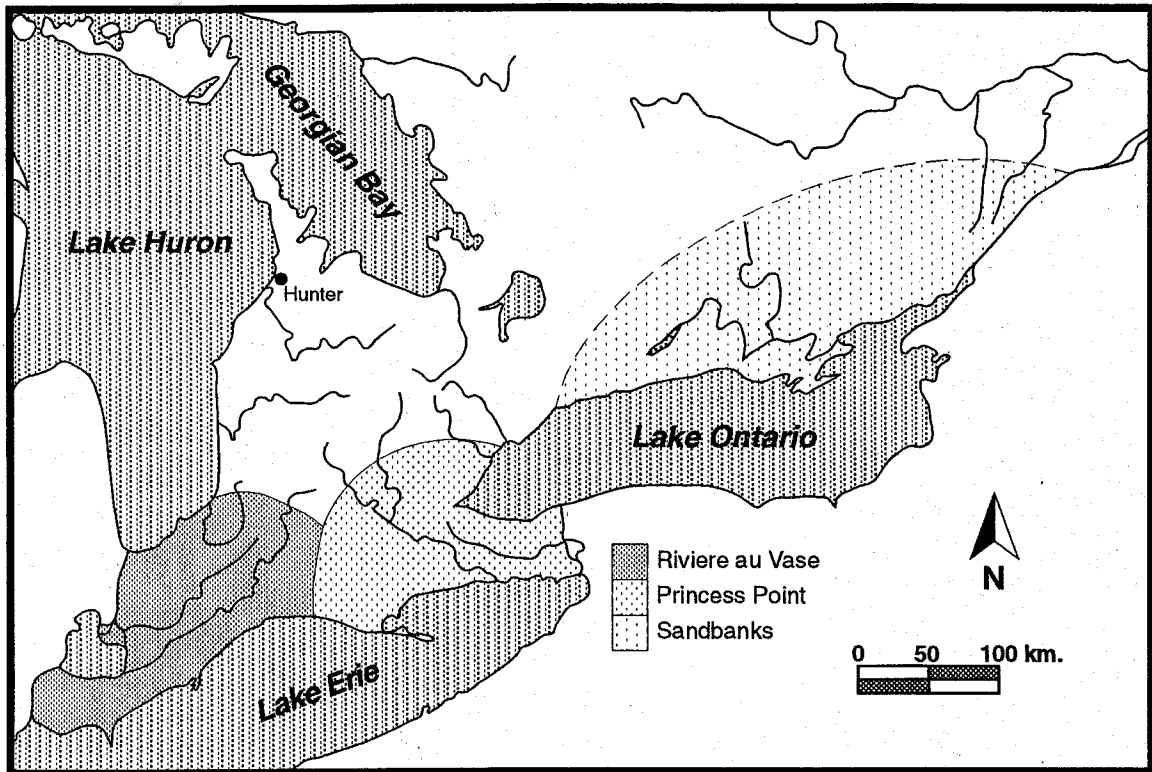


Figure 7. Distribution of Riviere au Vase, Princess Point, and Sandbanks Sites in Southern Ontario.

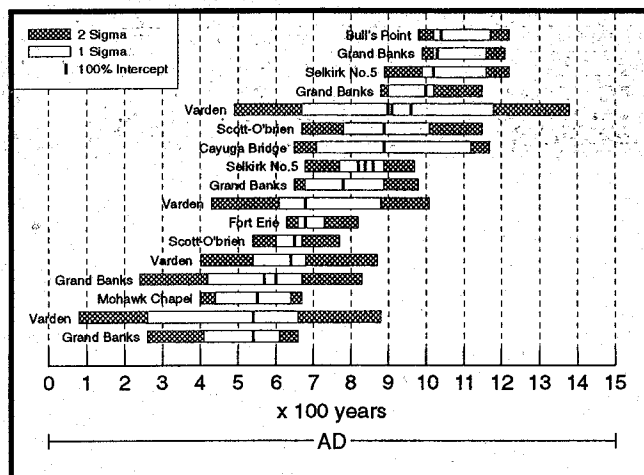


Figure 8. Princess Point (Late Woodland) Radiocarbon Dates from Southern Ontario.

Banks site (Crawford et al. 1997a). The context of the samples from the stratified Varden site used for radiocarbon assays is described in detail by MacDonald (1986). The earliest of these (RIDDLE-118) is an interesting case where the date returned (1560 ± 190) was originally calibrated to A.D. 50 (418) 785 using the Klein et al. (1982) tables. MacDonald questioned this date because it seemed at variance with other Princess Point dates available at the time. Using the Stuiver and Pearson (1993) tables this date is recalibrated to AD 80 (540) 880. Compared to the earliest AMS dates from Grand Banks, the Varden date no longer appears anomalous. The relatively early Mohawk Chapel date, previously rejected as too early by Fox (1990:181), is reinstated in this study for the same reasons.

The 1- and 2-sigma extremes for Princess Point are illustrated by two dates from the Varden site, and extend from A.D. 260 to 1180 and A.D. 80 to 1380 respectively. These two dates have very wide standard deviations, and it is highly unlikely that Princess Point chronology is represented by these extremes. The modal values from all the sites extend from A.D. 540 to A.D. 1030, with some clustering at both the early and late ends of this time span. Perhaps the best guide to Princess Point chronology is supplied by the five AMS dates from the Grand Banks site. This site is situated on the banks of the Lower Grand River, and the site formation and stratigraphy has been studied in some detail (Crawford et al. 1997b). The stratigraphy documents that Grand Banks was a stable riverine bar locality for several hundred years, and the radiocarbon dates indicate that the site was occupied relatively continuously by Princess Point communities from ca. A.D. 500 to 1050. This date range likely represents the temporal span for Princess Point (Smith and Crawford 1997).

There is a short series of 13 dates available for the Riviere au Vase of the Western Basin Late Woodland (Figure 9). The 2-sigmas extend from A.D. 560 to 1290, 1-sigma from A.D. 650 to 1250 and modal values from A.D. 670 to 1150. At the beginning of the series we have three dates (Neeb, Pelee 11H8, and Pelee 11H2) that show consistent 2-sigma ranges falling after A.D. 550, 1-sigma ranges falling at A.D. 650 and modal values that fall between A.D. 650 and 700. The dates at the end of the series show a more complex situation, because three of these fall into a section of the calibration curve that gives multiple modal values (two of them with 5 modal values). On the other hand, none of the assays with multiple modal values show 2-sigma boundaries that predate A.D. 850, nor 1-sigma boundaries that predate A.D. 1000. In addition, eight of the Riviere au Vase dates have modal values that cluster around A.D. 1000. From this pattern, it is suggested here that a temporal range of A.D. 650 to 1050 for Riviere au Vase is most likely. This chronology is somewhat at variance with the A.D. 500 to 900 chronology proposed by Murphy and Ferris (1990:225) but, as they note explicitly, the limited number of dates as well as the transitional nature of much of the Western Basin Late Woodland make assignment of temporal boundaries rather arbitrary. Temporal trends in the Western Basin Late Woodland as a whole will be discussed in more detail in the following section.

A brief comment is necessary here on the date from the Krieger site (cal. A.D. 420 (670) 990). While this date clearly falls within the Riviere au Vase date span, Murphy and Ferris (1990) reject it and affiliate the site with the later Younge phase, using pottery styles. Unfortunately, there is limited contextual information for this site and, while there may have been a Riviere au Vase occupation at Krieger, it cannot be documented at present. The date is excluded from further analysis in this study.

The Hunter site, which is located at the base of the Bruce Peninsula well outside the geographical range of Riviere au Vase, Princess Point, or Sandbanks (see Figure 7), should also be mentioned at this point. Its radiocarbon date (cal. A.D. 870 (970) 1020) and ceramics suggest that it is an initial Late Woodland manifestation, but it is situated in an area for which few other data are available. In this study it will be treated as a regional expression of initial Late Woodland but not subsumed under any formal category.

We can now turn to the two later categories of the Late Woodland in southern Ontario, the Early Ontario Iroquoian (EOI) stage and the Younge phase of the Western Basin Late Woodland (Figure 10). EOI has an extensive series of 90 radiocarbon dates available as illustrated in Figure 11 (column 11b is a continuation of column 11a), by far the largest sample examined in this study. The dates at the beginning

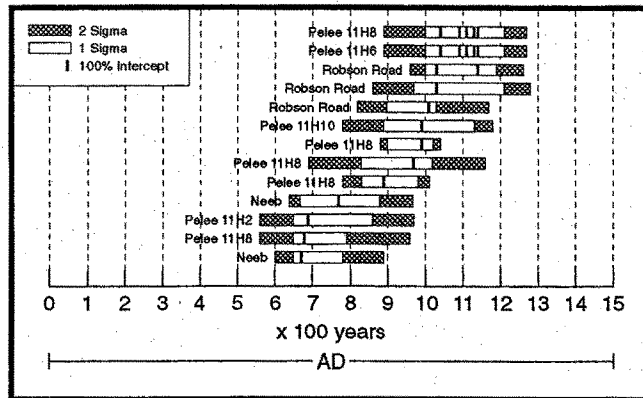


Figure 9. Riviere au Vase (Late Woodland) Radiocarbon Dates from Southern Ontario.

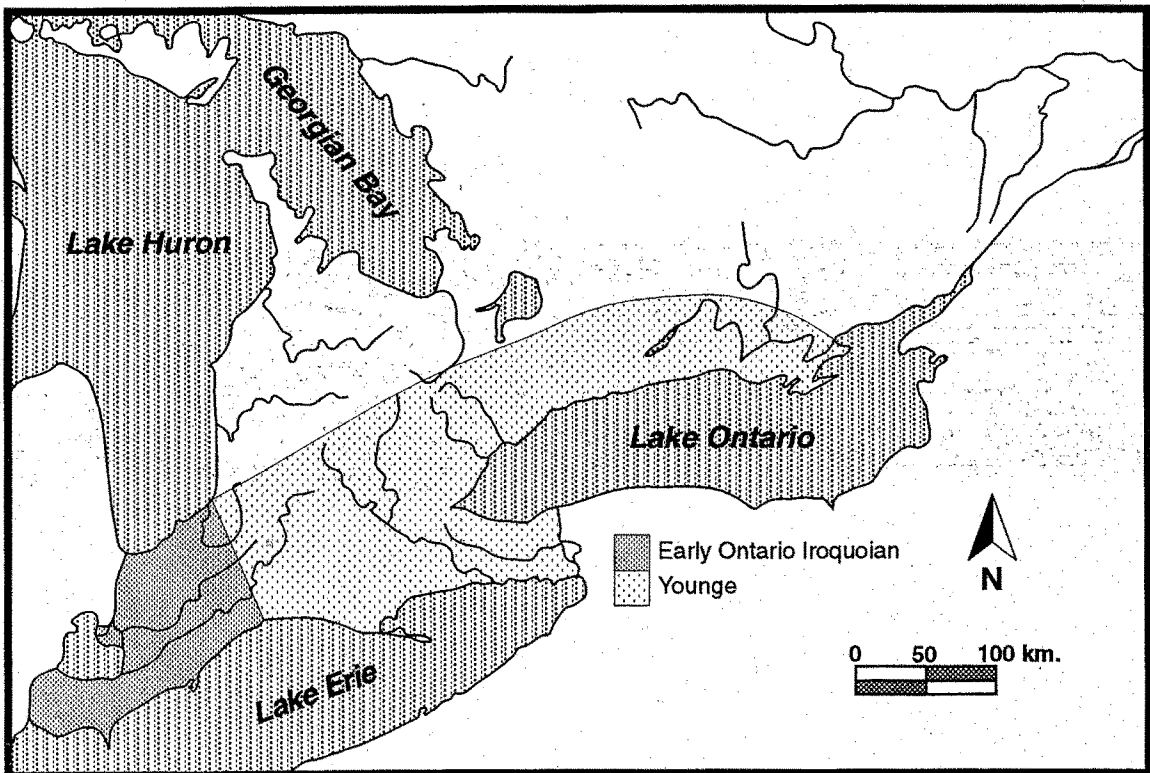


Figure 10. Distribution of Early Ontario Iroquoian and Younge Sites in Southern Ontario.

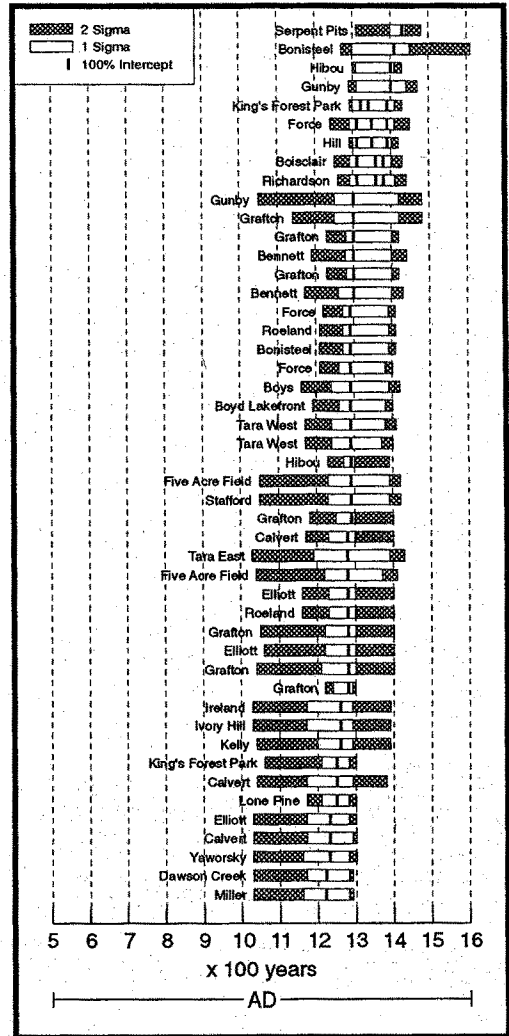
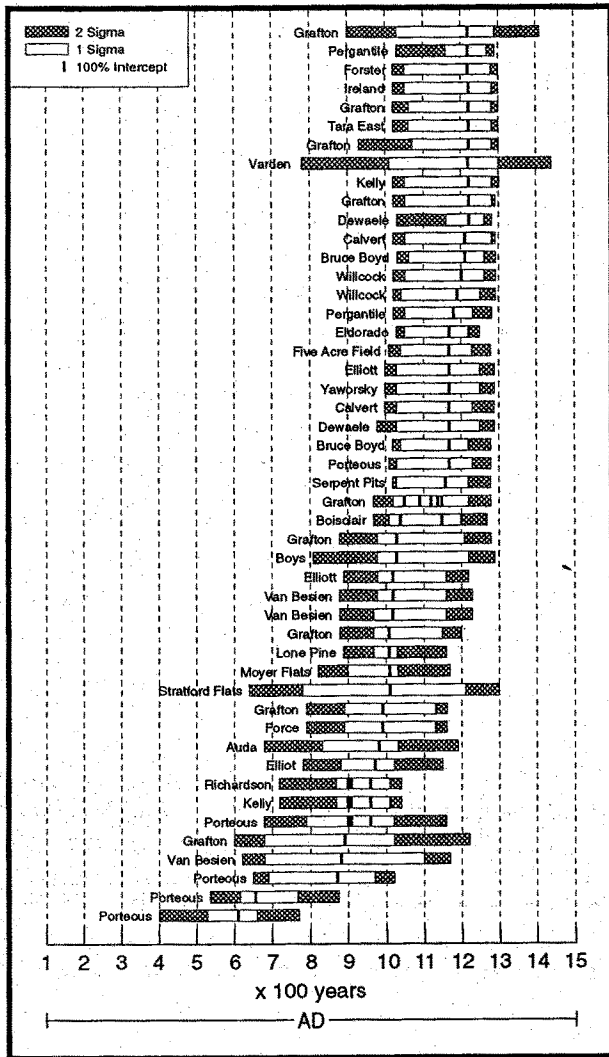


Figure 11. Early Ontario Iroquoian (Late Woodland) Radiocarbon Dates from Southern Ontario. Right column is a continuation of left column.

of this series are remarkably consistent, except for the first two dates from the Porteous site. It is worth commenting briefly on Porteous at this point because interpretation of the nature and dating of this site has been controversial since it was first reported in the early 1970s (Noble and Kenyon 1972). Stothers classified Porteous as late Princess Point in his original definition of the complex, but more recently Porteous has been considered the earliest expression of the Glen Meyer branch of EOI because it is clearly a village site (Fox 1990; Williamson 1990). The five radiocarbon dates from Porteous have clouded the issue because of their inconsistency; the calibrated 2-sigmas listed in Table 2 extend from A.D. 400 to 1280 and the modal values from A.D. 610 to 1170. In his study of Ontario Iroquoian radiocarbon dates, Timmins proposed an averaged date of A.D. 830, based on exclusion of the earliest and latest dates, and using the Klein et al. (1982) calibration tables (Timmins 1985:70). More recently, Fox (1995:147) argued for a compromise date of A.D. 900 for Porteous. Much of the concern expressed about dating Porteous is based on the assumption that it is a single component site. Without engaging in a lengthy review of the evidence, suffice it to say here that this assumption may not be justified, and Porteous could have been occupied for much of the time span indicated by the radiocarbon dates. Indeed, the earliest dates listed in Table 2 from this site (cal. A.D. 400 (610) 770 and A.D. 540 (660) 880) fall well within the range for Princess Point presented above. The relevance of this argument for this study is that, if the two earliest dates from Porteous are rejected or reassigned to a Princess Point occupation, the initial dating of EOI chronology becomes clearer. Although there are early 1- and 2-sigma boundaries that extend to between A.D. 600 and 700, the six oldest dates show modal values clustering around A.D. 900. The late end of the EOI series is complicated by the fact that the dates fall into another section of the calibration curve that gives multiple modal values. There is, however, a remarkable consistency of modal values clustering around A.D. 1300 (28 modal values) and the early 2-sigma boundaries of the last eight dates extend to A.D. 1310 at the latest (see Figure 11). It is suggested here that the EOI chronology of A.D. 900 to 1300 proposed by Williamson (1990:308) is supported by the pattern of radiocarbon dates presented in this study.

The Younger phase of the Western Basin Late Woodland has a series of 21 radiocarbon dates associated with it (Figure 12), excluding the Krieger site radiocarbon date for reasons mentioned previously. The extremes of the 2-sigma boundaries range from A.D. 780 to 1440, but the majority of the 2-sigmas fall between A.D. 950 and 1300. The earliest modal values cluster around A.D. 1000, while all but the modal values from the last two dates from Robson Road fall before A.D. 1300. As noted by Murphy and Ferris (1990:227), the latest Robson Road dates may apply to the subsequent Springwells component at the site. On the basis of the general pattern of Younger phase dates, a chronology of A.D. 1000 to 1300 is proposed here, a shift for both the inception and termination of 100 years later than the A.D. 900 to 1200 chronology proposed by Murphy and Ferris (1990:228). This appears to be largely a result of changes in the calibration tables from Klein et al. (1982) to Stuiver and Pearson (1993).

The overall pattern for Late Woodland, taking into account all of the radiocarbon dates illustrated in Figure 2, can now be examined. The most relevant aspect of this series in this study is its early end. The 1- and 2-sigmas as well as the modal values of the earliest dates suggest that Late Woodland in southern Ontario began between A.D. 500 and 600. This claim cannot be made without qualification because the earliest dates have standard deviations that fall well before and after these dates. Because there are few dates in the Late Woodland series with modal values that fall before A.D. 600, the two early determinations from the Grand Banks site (cal. A.D. 260 (540) 660 and A.D. 240 (570,600) 830) are of considerable importance. It should be emphasized that they are both recent AMS determinations on maize (Crawford, et al. 1997a) and, while they cannot be considered infallible, arguments concerning old wood or obsolete method do not apply. Suffice it to say that, taking the early AMS dates into account, an inception date for Late Woodland before A.D. 700 is likely, before A.D. 600 probable, and by A.D. 500 quite possible.

The late end of the segment of Late Woodland under consideration here is less relevant to our study, but is worthy of comment. Although there are numerous 1- and 2-sigmas with late boundaries that fall

after A.D. 1300, only the Hibou and Serpent Pits dates have early 1-sigma boundaries that fall after this date, and only the very last date in the series from Serpent Pits has an early 2-sigma boundary later than A.D. 1300. In terms of modal values, there is a remarkable clustering of all but the latest dates around A.D. 1300, although this pattern is complicated by a number of determinations with multiple modal values.

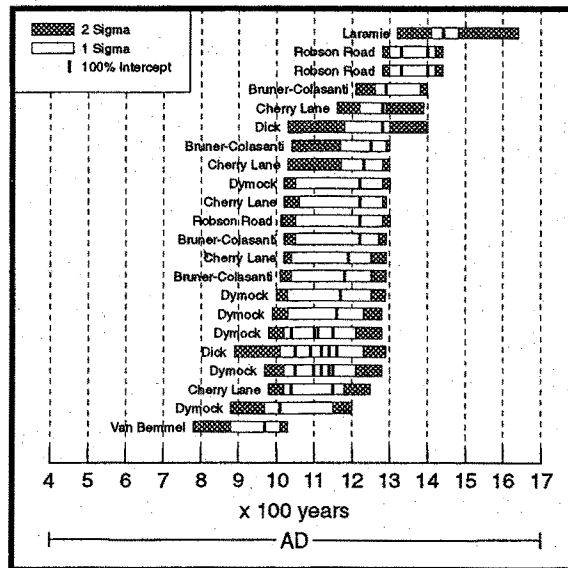


Figure 12. Younge (Late Woodland) Radiocarbon Dates from Southern Ontario.

Chronological Overlap

The chronologies suggested by the above examination of radiocarbon dates are summarized in Table 3. It is immediately clear that there is significant overlap among dates from components identified as Middle Woodland (Couture, Saugeen, and Point Peninsula) and dates from sites labeled Riviere au Vase, Princess Point, Sandbanks, Early Ontario Iroquoian, or Younge. Based on modal values the overlap begins with one of the recently generated AMS dates from Grand Banks (1570±90 cal. A.D. 260 (540) 660) and extends to a date from Thede (1180±90 cal. A.D. 670 (880) 1020). The sole way in which this overlap could be disregarded is if we accept only the youngest possible estimation for each of the Middle Woodland dates (indicated by the earliest 2-sigma boundary) and the oldest possible estimation for each of the other dates (indicated by the latest 2-sigma boundary). This course of action could be justified, of course, if we were dealing with just a few assays, but the weight of evidence in this extensive series of estimations is too strong to ignore. In other words, the pattern in Table 3 does not support the chronology for the interface between Middle and Late Woodland displayed in Figure 3, if we accept the cultural affiliations most commonly associated with these dates. In fact, in the revised chronology for the Middle to Late Woodland transition proposed here, there is an overlap between Middle and Late Woodland occupations from A.D. 500 to 800. This anomaly is examined in detail in the next section of the paper.

Table 3. Summary of Middle and Late Woodland Chronology in Southern Ontario Based on Calibrated Radiocarbon Dates.

Middle Woodland	400 B.C. - A.D. 800
Couture	-----
Saugeen	400 B.C. - A.D. 800
Point Peninsula	400 B.C. - A.D. 800
Initial Late Woodland	A.D. 500 - A.D. 1300
Riviere au Vase	A.D. 650 - A.D. 1050
Princess Point	A.D. 500 - A.D. 1050
Sandbanks	-----
Early Ontario Iroquoian	A.D. 900 - A.D. 1300
Younge	A.D. 1000 - A.D. 1300

DISCUSSION

The anomaly identified above is examined in this section through an investigation of the cultural affiliations and the classes they represent. The key to this analysis is to identify archaeologically recognizable characteristics of each class that have been used to distinguish one from the other in more than a trivial manner, but also to identify internal similarities that justify considering each as a unit. Otherwise, when dealing with radiocarbon chronology, we will evaluate a meaningless set of dates assigned arbitrarily to a particular class. It is argued here that variety or similarity in a single trait, such as an artifact category, or even in one cultural sector does not suffice to either define or separate archaeological classes.

Culture-Historical Classification

To begin with, let us examine the chronology interpreted from the Ellis and Ferris (1990) synthesis volume and presented in Figure 3. In doing this, we need to evaluate both the structure and the content of this culture-historical scheme. First, let us look at the structure. It must be noted that the framework of Figure 3 is not presented as such in Ellis and Ferris, but is abstracted for purposes of this study. At first blush, it appears that it has the structure of a simple taxonomy, with inclusive categories (Middle Woodland and Late Woodland) divided into exclusive categories (Saugeen, Princess Point, Younge, etc.). Closer examination reveals, however, that the taxonomy is imposed on a set of categories that do not lend themselves to such an arrangement. This classification is comprised of a mix of approaches and types of taxa, many of which have long been in use, while some are of more recent origin. Middle and Late Woodland are the most inclusive categories, and are employed as regional expressions of a system applied to the whole of the northeastern Woodlands. One source of meaning for these terms comes from Ritchie, who defined Middle and Late Woodland as *Stages* (after Willey and Phillips 1958) in the sense of "... cultural developments within broad and somewhat arbitrarily delimited economic and technological boundaries, with their material artifactual associations" (Ritchie 1965:xvii). Whereas Ritchie deliberately eschewed temporal attributions in his concept of *Stage*, Middle and Late Woodland in Ontario are more often referred to as subperiods of the Woodland *Period*. This raises the important issue of the distinction between *Period* and *Stage*, a recurring problem and source of confusion. If we follow Willey and Phillips' (1958: 64-72), *Period* refers to a strictly chronological class, whereas *Stage* refers to a developmental class defined on the basis of economic and/or social characteristics.

The Middle Woodland subdivisions (Couture, Saugeen, and Point Peninsula) are each referred to as a *Complex*. This use of *Complex* appears to be an implicit elevation to formal taxonomic status of a concept used in the past as a general, informal reference to consistently recurring sets of archaeological traits. McKern defines the term in the following way: "... all the traits characteristic for a given culture manifestation comprise the culture complex for that manifestation" (McKern 1939:305). Both Ritchie (e.g. 1965) and Wright (e.g. 1966) use the term *Complex* in this general fashion. A quotation from Wright illustrating this usage is especially germane in the present context: "It may be possible that, with the effective adaptation of agriculture to the area (northern varieties of corn), culture change from a nomadic to a sedentary or semi-sedentary way of life altered the archaeological complexes so rapidly and to such a degree that a non-existent archaeological hiatus between Middle Woodland ... and Late Woodland (earliest recognizable Iroquois) appears to be present" (Wright 1966:12). The term *Complex* used in this manner is akin to the very general terms *expression* and *manifestation*.

The Late Woodland subdivisions involve an unsystematic combination of various types of taxa and applications of the *Tradition-Horizon* approach (Willey and Phillips 1958). Princess Point is labeled a *Complex* in the same vein as the Middle Woodland subdivisions, but it is not formally connected to any of the other taxa presented in Figure 3; indeed, there is debate over whether it should be considered Middle or Late Woodland, as is discussed in more detail below. Riviere au Vase, Younge, Springwells, and Wolf are considered *Phases* of the Western Basin *Tradition* (Murphy and Ferris 1990). *Phase* and *Tradition* are adapted from Willey and Phillips (1958) and Ritchie (1965). According to Willey and Phillips, *Phase* has the following meaning: "[A phase is] an archaeological unit possessing traits sufficiently characteristic to distinguish it from all other units similarly conceived, whether of the same or other cultures or civilizations, spatially limited to the order of magnitude of a locality or region and chronologically limited to a relatively brief interval of time" (Willey and Phillips 1958:22). Ritchie's definition is very similar: "The phase may be defined as a recurring complex of distinctive archaeological traits, sufficiently different from any other complex to suggest that it represents the product of a single cultural group, pertaining to a limited territory and to relatively brief period of time" (Ritchie 1965:xvi). Ritchie, however, introduces a social-cultural aspect to phase, whereas Willey and Phillips' definition is more limited. A tradition, on the other hand, is defined by Willey and Phillips as: "... a (primarily) temporal continuity represented by persistent configurations in single technologies or other systems of related forms" (Willey and Phillips 1958:37). Again, Ritchie's definition is similar: "A cultural tradition is most simply defined as a custom, concept or trait, or combination of such units, with persistence in time" (Ritchie 1965:xvi). The concept of *Tradition* was also applied by Wright (1966) to the developmental sequence of the Ontario Iroquois Tradition. In this case, the *Tradition* is divided into Early, Middle and Late *Stages*, although use of the term *Stage* in Wright's scheme departs significantly from the more inclusive definition provided by Ritchie (quoted above) and as used by Willey and Phillips (1958). In fact, Wright's use of the term *Stage* most closely approximates that of *Phase*, especially as it is used by Ritchie, although Wright explicitly rejects the use of *Phase* (1966:15). The Early Ontario Iroquoian Stage is further divided into Glen Meyer and Pickering *Branches*, roughly approximating a west to east distinction, although this division is debated. Although not directly relevant to this study, the later Stages of the Ontario Iroquois Tradition are divided into the Uren and Middleport *Substages* of the Middle Ontario Iroquoian *Stage*, and the Neutral-Erie and Huron-Petun *Branches* of the Late Ontario Iroquoian Stage. Finally, Sandbanks has also been termed a *Tradition*, although it is, in fact, too poorly understood to label uncategorically; calling it a *Tradition* at this point is inappropriate considering use of the concept discussed above.

The upshot of this discussion is that the classification expressed in Figure 3 is an unsystematic mixture of Periods, Stages, Complexes, Traditions, Phases, and Branches, few of which can be related to each other on a taxonomic basis. This experiment with a synthesis is beset with the problems inherent in attempts to combine separate, internally consistent but mutually exclusive taxonomies. The welter of different kinds of schemes and terms reflects both our current lack of understanding of the archaeological record and significant differences of opinion over approaches to classification. This confusion has rarely been

addressed explicitly, and the most common reaction to it is to drop the taxonomic designation (e.g. referring to the Princess Point Complex simply as 'Princess Point' or the Glen Meyer Branch simply as 'Glen Meyer'). Another reaction that has been broached recently is to eschew the most exclusive categories (such as Princess Point) altogether, and to refer to them as regional expressions or manifestations of more inclusive taxa such as 'Transitional Woodland' (Williamson and Robertson 1994). There is, of course, the possibility that the archaeological referents of these taxonomic designations are either so vague or so different that the use of different kinds of taxonomic systems and categories is, indeed, appropriate. The evidence for this will be explored in more detail in the following discussion.

Middle Woodland

Upon close examination, it is clear that current use of Middle Woodland in southern Ontario refers to both a temporal period and a cultural class or stage. As a cultural taxon Middle Woodland is distinguished primarily on the basis of ceramics, settlement-subsistence systems, and mortuary patterns. The ceramics are characterized by coil-manufactured pottery with cord-impressed (CI), dentate stamped (DS) and pseudo-scallop-shell (PSS) exterior decoration applied in linear patterns. The three regional cultural 'complexes,' Couture, Saugeen, and Point Peninsula (Figure 4), are identified on the basis of variation in pottery styles (Spence et al. 1990). Couture is characterized by coil-manufactured pottery with decoration dominated by CI, but also includes some DS and PSS. Saugeen and Point Peninsula are generally identified by coil-manufactured pottery assemblages with decoration dominated by DS and PSS. Point Peninsula pottery is distinguished from Saugeen "... in the more frequent occurrence of interior channeling, thinner vessel walls, finer paste, higher proportion of pointed lips, use of red ochre washes, and finer dentate ..." (Spence et al. 1990:158). The Middle Woodland settlement, subsistence and social system is described as a seasonally scheduled pattern of macro-band encampments on major bodies of water in the late spring to early summer, and dispersed micro-band stations in the late summer, fall, winter and early spring (Spence et al. 1990). Mortuary patterns are characterized by construction of burial mounds and relatively elaborate grave inclusions for at least some interments (Spence et al. 1990). Thus, there appears to be some legitimacy in treating Middle Woodland in southern Ontario in the sense of a *Stage* (as discussed above), distinguished largely by particular forms and styles of pottery, sites indicative of a seasonal settlement system, relatively elaborate mortuary ritual, and absence of maize.

Middle Woodland chronology is another matter. Spence et al. (1990) date Couture from 300 B.C. to A.D. 500, Saugeen from 300 B.C. to A.D. 650 and Point Peninsula from 300 B.C. to A.D. 650. The temporal span of Couture cannot be determined with any confidence, but the revised evidence provided in this study suggests that Spence et al.'s terminal date is too early. The intercept for the single date for Couture from Robson Road (cal. A.D. 430 (660) 940) falls later than the hypothesized terminal boundary of A.D. 500. Although we cannot depend on a single radiocarbon assay, especially one with a 2-sigma range over 500 years long, this date, coupled with the revised inception date of A.D. 650 for Riviere au Vase, suggests that Couture extends to A.D. 650. This brings Couture chronology more into line with Spence et al.'s dates for Saugeen and Point Peninsula but, considering the ambiguities involved in distinguishing Couture from Riviere au Vase (discussed in more detail below), this date is probably arbitrary. In any case, Saugeen and Point Peninsula chronologies are revised in this study so that the latest date for both is extended to A.D. 800. In other words, there are significant problems in interpretation of Middle Woodland as a chronological *Period*, with hard and fast inception and termination dates, extending across southern Ontario.

Late Woodland

Characterizing Late Woodland in southern Ontario as either a *Period* or a *Stage* is even more problematic than Middle Woodland. In regions outside of extreme southwestern Ontario, Late Woodland has been equated with a distinctly Iroquoian pattern often equated with village habitation supported by maize horticulture. There has been some agreement in recent years that such a pattern begins at ca. A.D. 900 with the appearance of village habitation represented by the Porteous site (Fox 1990:173). There is considerable debate, however, over the position of Princess Point in relation to this pattern (Smith and Crawford 1995). In addition, Murphy and Ferris (1990) begin Western Basin Late Woodland in extreme southwestern Ontario with the appearance of Riviere au Vase at A.D. 500. The debate has been complicated by attempts to attribute specific ethnicity to the classes identified in Figure 3 (Bursey 1995; Murphy and Ferris 1990; Snow 1995b; Stothers et al. 1994).

As a point of departure, we can refer to Fox's (1990) useful review of approaches to definition of Late Woodland and, in light of more recent research and the radiocarbon dates presented in this study, reconsider the chronological implications of each of these approaches. Fox begins with an examination of artifact classes, concentrating largely on pottery (1990:172). He notes a change from coil-constructed, conical-based pots decorated with DS, PSS and CI, characteristic of Middle Woodland, to paddle-constructed, globular pots decorated with cord-wrapped stick impressions (CWS). Fox dates these changes in southern Ontario at sometime in the seventh century A.D. (i.e. to about A.D. 650). In this case, we need to separate technological from stylistic traits because their correlation is not well established. Although Fox's observations concerning the changes in vessel form and construction appear to be valid, these trends remain to be investigated in enough detail to state where or when they begin or end, and whether they occur gradually or abruptly. The occurrence of CWS decoration is somewhat better documented. Its initial appearance seems relatively rapid in southern Ontario, beginning at ca A.D. 500 (Smith 1995). Princess Point pottery decoration is distinguished by CWS as opposed to DS or PSS; in fact, CWS appears to be the preferred decoration in the earliest Princess Point assemblages (Bekerman 1995). Although we are unable to isolate any pottery assemblage from the Grand Banks site for the early part of its apparent 500 year history of occupation, CWS or plain dominates throughout and there is no PSS nor DS. For Riviere au Vase, the initial appearance of CWS occurs somewhat later. Murphy and Ferris state that: "The most common decorative tool types are dentate and suture stamps, while cord-wrapped objects increase in frequency towards the end of this [Riviere au Vase] phase (1990:195-207). A recent quantitative analysis of decorative attributes in Riviere au Vase pottery assemblages, however, documents significant amounts of CWS throughout the phase (Watts 1997). A radiocarbon date of 1320±95 cal. AD 560 (680) 960 from the Pelee 11H8 site is associated with a pottery assemblage with nearly 50% CWS exterior decoration.

Changes in other artifact classes are more difficult to quantify. Ceramic pipes appear in small quantities on Princess Point sites from earliest time onward (Smith 1996a), but are also present in Middle Woodland contexts (Spence et al. 1990: 151). Fox notes "... a switch to the use of small triangular projectile points ..." (1990:172) as a change in chipped lithic assemblages. A detailed comparison of samples of lithic artifacts from the Middle Woodland HH site and the Princess Point Grand Banks in a recent study by Shen results in the following observations:

... the temporal trends in lithic production, from late Middle Woodland to early Late Woodland in the study region, can be summarized as follows: (a) decrease in use of bifacial tools and a corresponding increase in use of flake tools; (b) increase in variations in use-tasks; (c) decrease in proportion of butchering/meat-preparation activities and possible plant-working; and (d) increase in use of hafted tools. (Shen 1997:273)

The radiocarbon dates cited for HH and Grand Banks in this study, however, show that they were likely both long-term occupations and contemporary for the period A.D. 500 to 650. The dating of the two sites is reinforced by the fact that all of the radiocarbon dates are recently generated AMS assays. In other words, they appear to represent a *Stage* difference as opposed to a temporal transition. These sites, which are situated only about 30 km apart, are key to an understanding of the anomaly identified in this study, and will be discussed further below.

Fox also discusses changes in patterns of mortuary treatment as a means of defining Late Woodland. He states that "... if the beginning of the Late Woodland is defined on the basis of a mortuary tradition virtually devoid of elaborate and, at times, exotic grave goods (Mason 1981), then the Middle Woodland cannot be seen to end in southern Ontario and adjacent areas until the eighth century A.D., at the earliest" (Fox 1990:172). It should be noted that burial patterns for Riviere au Vase, Princess Point and Sandbanks are very poorly understood at present, but Fox's observation that mortuary practices for these manifestations appear to be much simpler than those of the Middle Woodland complexes holds true.

Finally, Fox briefly refers to settlement definitions of Late Woodland, citing Ritchie and Funk's argument that it begins in New York State at ca A.D. 1000 with the "... appearance of large settlements, concomitant with accelerated population growth" (Ritchie and Funk 1973:165). Using these criteria, the inception of Late Woodland is marked by the Porteous site, the earliest village settlement (ca. A.D. 900) in southern Ontario. Snow's passing reference to the Grand Banks settlement as a village (Snow 1996:792) requires some comment. Although the concept of village involves more than simply a sedentary community, degree of sedentism is certainly a key aspect. Middle Woodland settlement is 'dispersed' in the sense that it is not focused on any particular place or environmental feature, although particular locales may have been returned to seasonally over a number of years. Current interpretations of Princess Point involves a transition to a 'centered' settlement system (Smith and Crawford 1995, Smith and Crawford 1997), which involves a reorientation to a major landscape feature (a body of water) as the focus. In the case of the Grand River, this produced a linear distribution of sites focused on the river (or the riverine bars) and oriented along the river bank. These may have been a series of 'hamlets' (semi-sedentary settlements of 15 - 100 people) spread out on the bars along the river. Our excavations at Grand Banks have concentrated to date on what is possibly a single locale for one of these hamlets (Crawford et al. 1997b; Smith and Crawford 1997). Thus, although site locales such as Grand Banks may be relatively large, they are not formal villages in the economic, social, or symbolic meanings of this term.

Settlement data for Sandbanks is too limited to make any generalizations. Western Basin settlement, as characterized by Murphy and Ferris (1990), lacks village settlements until A.D. 1200. Riviere au Vase settlement is described as a continuation of the seasonal pattern ascribed to the Middle Woodland (Couture). For Younge phase settlement, they state: "... it is clear that no formal village, in the sense defined by Noble (1975), has yet been identified for the Younge Phase. Moreover, we doubt that such a site exists. The large, central villages identified for the contemporaneous Early Ontario Iroquoian peoples to the east (Williamson 1985, [1990]) do not appear to be a part of the settlement pattern documented for the southwestern Ontario Younge Phase" (Murphy and Ferris 1990:244).

Fox (1990) did not address definition of Late Woodland specifically from the perspective of subsistence, perhaps because maize had not been definitively associated with contexts dating before A.D. 1000 at the time of his article. Due to the recent AMS dating of maize to the period from A.D. 500 to 1000, we must now add changes in subsistence regime to the discussion. Middle Woodland subsistence in Ontario is interpreted almost solely in terms of resource extraction (hunting, gathering, fishing); no domesticated species, either indigenous or exotic, has been recovered from an unequivocally Middle Woodland context. Late Woodland in southern Ontario is associated with a 'mixed economy' that includes cultivation of maize, beans, squash, sunflower and tobacco, wild plant gathering, hunting and fishing. Maize has now been recovered from unquestionable Princess Point occupations at the Grand Banks site dating to as early as A.D. 540, although we do not yet have enough data to claim that it was cultivated at the outset, not simply traded. In any case, it is highly unlikely that Princess Point communities were dependent on full-scale maize-based horticulture from earliest times; in fact, current evidence suggests that the transition to a fully horticultural subsistence economy did not occur until late in the Princess Point chronology, after A.D. 900. Cultivation needs to be viewed in terms of scale. At ca A.D. 500, maize was likely either traded in small quantities or cultivated at a very low scale and constituted a minor component of the subsistence regime. The level of maize in the diet, as well as the commitment to sedentism and organization of labor required by cultivation may well have increased over the period from A.D. 500 to

900, but intensification of maize cultivation does not appear to have occurred until between ca. A.D. 900 to 1100. In addition, there is no solid evidence for beans, squash, sunflower or tobacco in southern Ontario until about A.D. 1000.

Outside of the Princess Point region, there is little evidence for maize before A.D. 1000. To the east, maize was recovered from the Lakeshore Lodge site with an associated radiocarbon date on charcoal of 1110 ± 60 cal. AD 790 (970) 1030. To the west, a few maize kernels are reported from the Pelee 11H10 site and the uppermost level at the Pelee 11H8 site, dated on charcoal to 1070 ± 95 cal. AD 780 (990) 1180 and 940 ± 90 cal. AD 900 (1050, 1100, 1120, 1140, 1150) 1280 respectively (Keenlyside 1978). It may be that research in these areas has simply not been intensive enough to recover maize; after all, maize has been definitively associated with Princess Point only within the past four years. On the other hand, Murphy and Ferris (1990) employ the absence of maize in southwestern Ontario to support their argument that an essentially Middle Woodland subsistence regime of resource extraction continued throughout the Riviere au Phase, even though they class Riviere au Vase as Late Woodland. In fact, they argue that a primary dependence on resource extraction persisted well into the subsequent Young phase, and that maize cultivation remained secondary.

The warm weather subsistence strategy outlined for [the Young phase in] south Essex County implies that the growing of maize likely occurred adjacent to some of these warm weather sites, on patches of well-drained sand. Such fields would have been little more than garden plots used to augment a diversified resource diet. Only Bruner-Colasanti produced anything more than a smattering of maize fragments. While such a secondary role for maize agriculture would appear to be inconsistent with the Young Phase seasonal round proposed elsewhere, it is not inconsistent with what might be expected of a hunter-gatherer-fishing people with access to such a rich and varied resource base. (Murphy and Ferris 1990:240)

To summarize this section, Middle Woodland appears to end and Late Woodland appears to begin at different times in different regions, depending on how they are defined. This echoes Ferris and Spence's assertion that "... identifying a start date for the Late Woodland can be more a task in defining one's own methodological and conceptual framework, than recognizing a point in time of substantial change to the archaeological record" (Ferris and Spence 1995:103). The definitions have not been used consistently, however, and need to be rethought. The following section discusses one recent attempt to resolve the dilemma.

'Transitional Woodland'

An alternative to the simple distinction between Middle and Late Woodland treated either as periods or stages, currently in vogue amongst some researchers in Ontario who are investigating sites from the period between A.D. 500 and 1000, is to impose three autonomous taxa: Middle Woodland, Transitional Woodland, and Late Woodland. As illustrated graphically in Figure 13, this framework represents these three Woodland subdivisions as chronological *Periods*, although they also have *Stage* connotations. Transitional Woodland is dated from A.D. 500 (taking into account the earliest AMS dates on maize from the Grand Banks site) to A.D. 900, and subsumes Riviere au Vase, Princess Point and Sandbanks. In this scheme, Transitional Woodland takes on the same generality as Middle and Late Woodland, and essentially becomes a regional expression of Mason's Late Woodland I (Mason 1981:300 ff.). The concept of a transitional period is relatively new. Since this stance carries implications well beyond simple analytical convenience, the reasons for taking it need to be critically analyzed.

Transitional Woodland was introduced as a bridge between Middle and Late Woodland in response to confusion surrounding classification of Princess Point (Spence and Pihl 1984). The confusion arose for a number of reasons. When Stothers first defined the Princess Point Complex, he encompassed within it all archaeological manifestations throughout south-central and southwestern Ontario that dated between ca. A.D. 650 and 950 and that yielded cord-wrapped stick (CWS) decorated pottery. Similar manifestations in southeastern Ontario were initially classed as Princess Point (Smith 1987). Although Stothers characterized Princess Point as transitional between Middle and Late Woodland (Stothers 1977), he did not define a Transitional Woodland period per se. In essence, however, Princess Point in its original broad

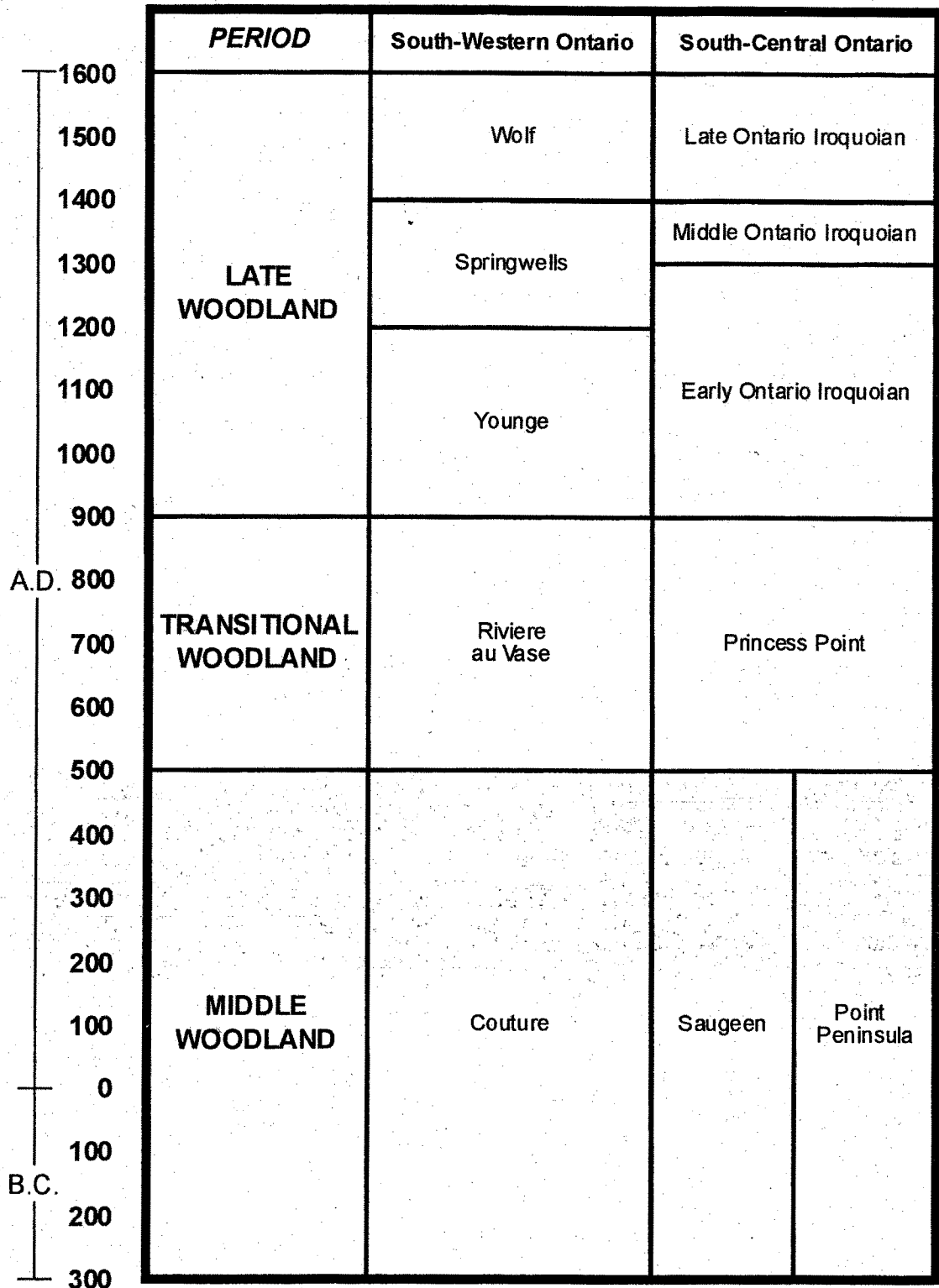


Figure 13. Interim Middle, 'Transitional', and Late Woodland Chronology in Southern Ontario.

formulation was the equivalent of Transitional Woodland in southern Ontario that recognized general similarities, at least in pottery, across southern Ontario.

Stothers' initial definition of Princess Point subdivided it into three foci: the Point Pelee focus, the Ausable focus, and the Grand River focus. In the 1980s, Fox redefined Princess Point, primarily by excluding the Ausable and Point Pelee foci and narrowing its geographic scope to the region encompassed by the Grand River focus, as illustrated in Figure 7 (Fox 1982, 1984, 1990). The Point Pelee and Ausable foci were subsumed under Riviere au Vase (Fox 1990:182). This revision has important implications, not the least of which is an argument for a more than trivial distinction between Princess Point and Riviere au Vase. This framework posits parallel but somehow dissimilar developments in southwestern and south-central Ontario. The nature of these developments has not been pursued in detail, and has been complicated by a debate over ethnicity. Murphy and Ferris (1990) claim that the Western Basin tradition represents a central Algonkian occupation of southwestern Ontario, whereas Stothers et al. (1994) claim that Western Basin represents an Iroquoian manifestation separate from, but similar to, the Ontario Iroquoian tradition.

In a recent review article, Ferris and Spence (1995) argue that a transitional period between Middle and Late Woodland in southern Ontario is necessary because of the confusion over definition of Late Woodland. They state: "Given that most researchers would be comfortable, when looking at material dating prior to A.D. 500 or 600, to classify it as Middle Woodland, and would view material dating after A.D. 900 as Late Woodland, we have chosen to simply identify the intervening period as transitional" (Ferris and Spence 1995:103). They use the notion of 'transitional Woodland' in an informal sense that avoids the pitfalls of attempting to set the beginning of Late Woodland at a particular date.

Crawford and Smith adapted the concept of Transitional Woodland to include the regional cultures stretching across southern Ontario between A.D. 500 and 900 (Riviere au Vase, Princess Point and Sandbanks [see Figure 7]), as well as similar manifestations from roughly the same time period in other regions of the Lower Great Lakes (Crawford and Smith 1996; Crawford et al. 1997a; Smith 1996b; Smith and Crawford 1995, 1997). Such a characterization recognizes the general similarities among these manifestations (primarily CWS pottery decoration), but it suffers from some important limitations that, unfortunately, outweigh such benefits. These limitations are discussed elsewhere (Fox 1990, Smith and Crawford 1997), but it is worth reconsidering some of the relevant points here. To begin with, placement of a formal taxon between Middle and Late Woodland does not accord with the nature of the Woodland as a cultural class, whether it is treated as a *Stage* or a *Period*. The Woodland taxon with its Early, Middle, and Late subdivisions is applied to the whole of eastern North America, not simply in southern Ontario and insertion of another stage or period is unlikely to be accepted elsewhere. It may be argued that a transitional class could be recognized informally at a regional level for local purposes. Justification of such a stance is difficult, however, because 'Transitional Woodland' as it is now perceived incorporates archaeological manifestations that do not share enough common characteristics to be included under one rubric. This problem is particularly pronounced in southern Ontario when we compare Riviere au Vase and Princess Point as they are currently understood.

Riviere au Vase is defined by Murphy and Ferris as the initial phase of the Western Basin Late Woodland with a chronology of A.D. 500-900 (Murphy and Ferris 1990:225). They state, however, that "... the Riviere au Vase Phase is best defined as a continuum between the earlier Middle Woodland and the Younger Phase of the Late Woodland" (Murphy and Ferris 1990:225). Further, "In most respects, Middle Woodland subsistence strategies appear to continue little-changed in the early Late Woodland. The established hunting and gathering way of life directed towards harvesting seasonally abundant resources continued, and the majority of the known sites representing the Couture complex were also occupied by Riviere au Vase groups" (Murphy and Ferris 1990:231). With all due respect to Fitting (1970) and to Murphy and Ferris, the existing evidence suggests that Riviere au Vase would be better classed in the Middle Woodland *Stage* as opposed to the Late Woodland *Period*.

Fox's redefinition focused Princess Point on a specific region but, until recently it was basically recognized as a localized collection of sites yielding CWS decorated pottery. In this limited sense, the labeling of Princess Point as simply a regional expression of 'Transitional Woodland' is suitable. We can now broaden this formal characterization to include the subsistence and settlement variables discussed above. Although the Princess Point subsistence pattern was most likely based primarily on hunting, gathering and fishing, the cultigen maize was added as early as A.D. 500, and probably gained in importance through time. The settlement system changed from a diffuse distribution to a focus on lacustrine, riverine and wetland locations at a relatively early date. These factors distinguish Princess Point from other contemporary manifestations such as Riviere au Vase.

Thus, the only characteristic that all of the archaeological manifestations that have been labeled 'Transitional Woodland' share in common is CWS decorated pottery. Based on the argument that a cultural period or stage should not be defined on the basis of one criterion, this scheme must be rejected. Finally, the term 'Transitional Woodland' carries with it the implication of a homologous change from Middle Woodland to Late Woodland, and thus tends to reify an in situ transition. Since neither an in situ nor a migration hypothesis has been adequately tested, it seems best to avoid use of 'Transitional Woodland' formally for the time being, or even informally in the sense that Ferris and Spence (1995) employ it.

Summary

The nature of the chronological anomaly identified in the previous section can now be addressed more specifically. The above discussion demonstrates that the current framework of cultural classification employed for Middle and Late Woodland in southern Ontario is confusing and inconsistent, but the apparent temporal overlap between sites classed as Middle Woodland and sites classed as Late Woodland cannot be explained away as simple terminological ambiguity. It can, however, be narrowed down to particular patterns in individual regions.

An alternative view to the traditional approach, offered here for consideration as an hypothesis, is presented graphically in Figure 14. In this framework, the ambiguous terms Middle, Transitional, and Late Woodland are deliberately eschewed as either *Stage* or *Period* concepts. There is, in fact, no overlap in southwestern Ontario. Instead of treating Riviere au Vase as a Middle Woodland 'complex' given a Late Woodland chronology, it can be seen as a phase in the Western Basin continuum. Removal of Riviere au Vase from Late Woodland does not resolve the anomaly of overlapping Middle and Late Woodland, because we are left with Princess Point. But the nature of the anomaly is focused considerably by this revision. It becomes a relatively specific manifestation of the appearance of maize associated with CWS decorated pottery on Princess Point sites at or before AD 500 in the Lower Grand River Valley.

CONCLUSIONS

In conclusion, it is hoped that this paper has accomplished two objectives. First, it has updated existing radiocarbon dates with current calibrations. This must be an ongoing task; as Rippeteau stated: "... we can note that new TR [tree ring] or other corrections will appear in future. ... TRCs [tree ring corrections] are fundamentally simple to accomplish and there will be no excuse for not increasing our calendrical accuracy each time we are provided with the means to do so" (Rippeteau 1974:31). It is certain that more precise calibration tables will be introduced in the future and, at that time, the exercise performed in this paper will have to be done all over again. We cannot predict what effect this would have on our understanding of Woodland chronology in southern Ontario and, until it changes, we must assume that we are working with the most precise dates that can be accomplished with current methods.

Second, the radiocarbon dates are presented and examined as a series instead of individually. Now that we have significant numbers of dates for many regions and periods, they should be examined in the

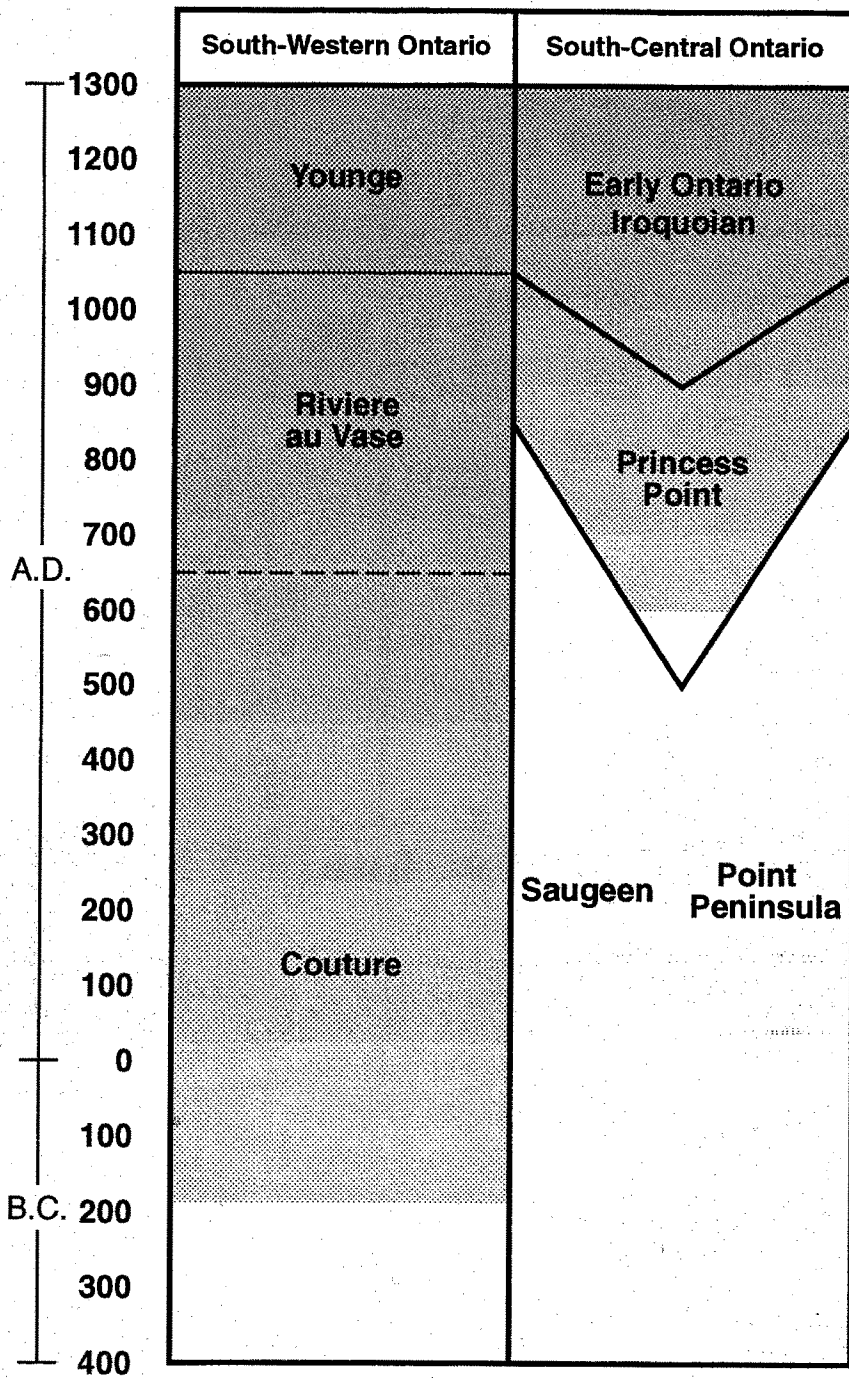


Figure 14. Revised Chronological Framework for Southwestern and Southcentral Ontario.

context of a whole series. This should allow greater precision in establishing overall date ranges and make isolation of anomalous dates more straightforward.

There remain some glaring gaps in the radiocarbon sequence, but also some that are not so obvious. The single date from a Couture site signals an conspicuous need for a concerted effort to investigate more thoroughly the chronology of Middle Woodland presence in extreme southwestern Ontario. There is also a general lack of dates for the period from A.D. 400 to 600 that would confirm and expand upon our understanding of the earliest appearance of maize, and also for the later intensification of maize cultivation. The dating of the latter is especially troubling for the critical time between ca. A.D. 900 and 1100, which is complicated by vagaries of the calibration curve (producing multiple modal values) for this period.

The radiocarbon series reported here demonstrates that the Middle to Late Woodland chronology in Ontario cannot be forced into rigid periods with sharp temporal boundaries. Whether these are hold-overs from the Midwestern Taxonomic System (McKern 1939) or applications of the Willey and Philips tradition-horizon approach, the tendency is to create classes with relatively inflexible spatial and temporal boundaries within which archaeological assemblages and sites are forced, in much the same way that MacNeish's types did for pottery analysis (Wright 1967, 1980). We are faced, then, with the general problem of how to frame classification systems, be they primarily regional, temporal, or cultural. The data presented in this paper suggests that it may be more useful to think in terms of regional continua with broad-based extra-regional interaction. There is something to be said for correlating individual trends through time and space, without lumping them into cultural pigeon-holes regardless of their individual trajectories. This is not an argument for a return to the outdated 'age-area' approach of the early hyper-diffusionists. There are a number of ways that cultural change can occur, including evolution, diffusion and migration. It would appear most likely that a combination of such factors was in operation during the transition from the Middle to the Late Woodland in the Northeast, as well as at other time periods. We should now be developing the tools to examine such factors in a more systematic fashion.

There are a number of scenarios that can be constructed to describe, if not explain, the overlap between the radiocarbon chronologies for Middle and Transitional Woodland in the northeast. A basic evolutionary perspective in which Middle Woodland groups simply transformed into Late Woodland societies in relative isolation from the rest of North America seems extremely unlikely. The appearance of maize at different times in adjacent regions underscores the variable nature of the Middle to Late Woodland transition (at least economically). This was, however, the implicit assumption of many traditional classificatory schemes used to structure prehistoric cultural groups in the northeast. If we are to account for the widespread appearance and spread of CWS throughout this region, we must consider both short and long-range communication between societies, regardless of ethnicity, and the possibility of fairly significant movement of peoples. In southern Ontario, there is a significant chronological overlap of sites yielding Middle Woodland pottery but no maize (e.g. HH) with sites producing CWS and maize (e.g. Grand Banks) in roughly the same geographical area. This strongly indicates contemporaneous occupation of southern Ontario by two distinct societies. How this came about is a major problem that is the subject of on-going research.

Both migratory and diffusionary processes can be called upon. According to Bursey (1995) and Snow (1996), a migration of 'proto' horticulturalists entered into Ontario from Pennsylvania via New York at about A.D. 500. This migration was not necessarily overtly aggressive but, according to Snow, the invaders were organized matrilineally and tended toward increased sedentism. These characteristics served as an advantage in competing economies, and the earliest Princess Point people slowly replaced the resident Middle Woodland hunter-gatherer-fishers who were pushed into regions to the north and east.

An alternative to the migration scenario outlined above calls upon diffusionary processes. It is possible that CWS decorated pottery and maize entered southern Ontario through channels of inter-society communication and were differentially accepted by various groups. Whereas CWS appears to have been accepted on a broad front that took in the whole of the northeast, maize had a much different and, at least

initially, a much narrower vector of transmission focused on south-central Ontario. Correlated with this transmission was the emergence of Princess Point, but whether maize diffusion by itself is cause or consequence is unresolvable at present. It also remains to be pursued why certain groups in a relatively circumscribed area would accept maize and CWS, while others residing in the same area did not.

Associated with the relatively early introduction of maize to south-central Ontario are a series of questions having to do with secondary origins of agriculture. Among these are problems of crop diffusion history, including chronology, the variety of maize and routes of diffusion, as well as the economic and social conditions into which cultivation was accepted. We need to address issues of increasing sedentism, often associated with the transition to horticulture, changes in social organization, and the role of women in plant exploitation and manufacture of pottery. Similarities and differences between Princess Point and Riviere au Vase will need to be explored, including an examination of the degree to which they are part of the same pattern or independent, and if the same or different processes were involved.

It is hoped that this paper focuses the debate onto some key issues. In addition, it is clear that we need to refine our understanding of Princess Point as well as the origins and nature of the earliest maize cultivation. In addition, it is necessary that the nature of Riviere au Vase be systematically pursued. A significant question is whether Riviere au Vase is really a Middle Woodland *Stage* manifestation classed as Late Woodland; a crucial issue here is documentation of the earliest appearance of maize in southwestern Ontario. The same questions need to be pursued in southeastern Ontario, where our understanding of Sandbanks is extremely spotty and vague. Finally, a full statistical analysis of the series of radiocarbon presented in this paper, with an on-going addition of new assays, should be undertaken.

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REFERENCES CITED

- Bekerman, A.
1995 *Relative Chronology of Princess Point Sites*. M.Sc. Research Paper, Department of Anthropology, University of Toronto.
- Bursey, J.A.
1995 The Transition from the Middle to Late Woodland Periods: A Re-Evaluation. In *Origins of the People of the Longhouse: Proceedings of the 21st Annual Symposium of the Ontario Archaeological Society*, edited by A. Bekerman and G.A. Warrick, pp. 43-54. Ontario Archaeological Society, Toronto.
1997 Lessons from Burlington: A Re-Consideration of the Pickering vs. Glen Meyer Debate. *Northeast Anthropology* 53:23-46.
- Crawford, G.W., and D.G. Smith
1996 Migration in Prehistory: Princess Point and the Northern Iroquoian Case. *American Antiquity* 61:782-790.
- Crawford, G.W., D.G. Smith, and V.E. Bowyer
1997a Dating the Entry of Corn (*Zea mays*) into the Lower Great Lakes Region. *American Antiquity* 62:112-119.
- Crawford, G.W., D.G. Smith, J.R. Desloges, and A.M. Davis
1997b Floodplains and Agricultural Origins: A Case Study in South-Central Ontario. *Journal of Field Archaeology* 28(2). In press.
- Dodd, C.F., D.R. Poulton, P.A. Lennox, D.G. Smith, and G.A. Warrick
1990 The Middle Ontario Iroquoian Stage. In *The Archaeology of Southern Ontario to A.D. 1650*, edited by C.J. Ellis and N. Ferris, pp. 321-359. Publication Number 5, Occasional Publications of the London Chapter. Ontario Archaeological Society, London, Ontario.
- Dragoo, D.W.
1974 Radiocarbon-14 Dates and the Archaeologist. *Archaeology of Eastern North America* 2:21-29.
- Ellis, C.J., and N. Ferris (editors)
1990 *The Archaeology of Southern Ontario to A.D. 1650*. Publication Number 5, Occasional Publications of the London Chapter. Ontario Archaeological Society, London, Ontario.
- Ferris, N., and M.W. Spence
1995 The Woodland Traditions in Southern Ontario. *Journal of American Archaeology* 9:83-138.
- Fitting, J.E.
1970 The Archaeology of Michigan: A Guide to the Prehistory of the Great Lakes Region. Natural History Press, New York.
- Fox, W.A.
1982 The Princess Point Concept. *Arch Notes* 82-2:17-26.

- 1984 The Princess Point Complex: An Addendum. *Kewa: Newsletter of the London Chapter, Ontario Archaeological Society* 84:5:2-9.
- 1990 The Middle Woodland to Late Woodland Transition. In *The Archaeology of Southern Ontario to A.D. 1650*, edited by C.J. Ellis and N. Ferris, pp. 171-188. Publication Number 5, Occasional Publications of the London Chapter. Ontario Archaeological Society, London, Ontario.
- 1995 Concluding Remarks. In *Origins of the People of the Longhouse: Proceedings of the 21st Annual Symposium of the Ontario Archaeological Society*, edited by A. Bekerman and G.A. Warrick, pp.145-151.
- Kapches, M.
1994 The Hill Site: A Possible Late Early Iroquoian Ceramic Firing Site in South-Central Ontario. *Northeast Anthropology* 48:91-102.
- Keenlyside, D.L.
1978 *Late Prehistory of Point Pelee, Ontario and Environs*. Mercury Series 80. National Museum of Man, Archaeological Survey of Canada, Ottawa.
- Klein, J., J.C. Lerman, P.E. Damon, and E.K. Ralph
1982 Calibration of Radiocarbon Dates. *Radiocarbon* 24:103-150.
- MacDonald, J.D.A.
1986 New Dates for Old Chronologies: Radiocarbon Dates from the Varden Site. *Kewa: Newsletter of the London Chapter, Ontario Archaeological Society* 86-9:8-22.
- MacDonald, R.I., and R.F. Williamson
1993 Summary of 1992 Research by Archaeological Services Inc. *Fourth Annual Archaeological Report, Ontario*:29-36.
- Mason, R.J.
1981 *Great Lakes Archaeology*. Academic Press, New York.
- McKern, W.C.
1939 The Midwestern Taxonomic Method as an Aid to Archaeological Study. *American Antiquity* 4:301-313.
- Murphy, C., and N. Ferris
1990 The Late Woodland Western Basin Tradition of Southwestern Ontario. In *The Archaeology of Southern Ontario to A.D. 1650*, edited by C. J. Ellis and N. Ferris, pp. 189-278. Publication Number 5, Occasional Publications of the London Chapter. Ontario Archaeological Society, London, Ontario.
- Noble, W.C.
1975 Corn, and the Development of Village Life in Southern Ontario. *Ontario Archaeology* 25:37-46.
- Noble, W.C., and I.T. Kenyon
1972 Porteous (AgHb-1): A Probable Early Glen Meyer Village in Brant County, Ontario. *Ontario Archaeology* 19:11-38.
- Pengelly, J., and S. Pengelly
1987 The Bonisteel Site: An Ontario Iroquoian Settlement on Lake Erie. *Kewa: Newsletter of the London Chapter, Ontario Archaeological Society* 87(6):4-20.
- Rippeteau, B.
1974 Using C-14 Calendrical Corrections and Conventions. *Archaeology of Eastern North America* 2:29-39.
- Ritchie, W.A.
1965 *The Archaeology of New York State*. Natural History Press, Garden City, NY.
- Ritchie, W.A., and R.E. Funk
1973 *Aboriginal Settlement Patterns in the Northeast*. Memoir 20. New York State Museum and Science Service, Albany.
- Shen, C.
1997 *Towards a Comprehensive Understanding of the Lithic Production System of the Princess Point Complex, Southwestern Ontario*. Ph.D. thesis, Department of Anthropology, University of Toronto.
- Smith, D.G.
1995 Cord-Marked Pottery and the Early Late Woodland in the Northeast. Paper presented at the 60th Annual Meeting of the Society for American Archaeology, Minneapolis, Minnesota.
1996a The Early Development of Iroquoian Smoking Pipes in Ontario, Canada. Paper presented at the 61st Annual Meeting of the Society for American Archaeology, New Orleans.
1996b Recent Investigations of Transitional and Late Woodland Occupations at Cootes Paradise, Ontario. MS in the author's possession.
- Smith, D.G., and G.W. Crawford
1995 The Princess Point Complex and the Origins of Iroquoian Societies in Ontario. In *Origins of the People of the Longhouse: Proceedings of the 21st Annual Symposium of the Ontario Archaeological Society*, edited by A. Bekerman and G.A. Warrick, pp. 55-70. Ontario Archaeological Society, Toronto.
1997 Recent Developments in the Archaeology of the Princess Point Complex in Southern Ontario. *Canadian Journal of Archaeology* 21:9-32.
- Smith, S.A.
1987 Princess Point in Eastern Ontario, or, What to Do When your Concepts Break Down. Paper presented at the 14th Annual Symposium of the Ontario Archaeological Society, Ottawa.
- Snow, D.R.
1992 L'augmentation de la population chez les groupes iroquoiens et ses consequences sur l'etude de leurs origines. *Recherches amerindiennes au Quebec* 22:5-12.
1994 Paleoecology and the Prehistoric Incursion of Northern Iroquoians into the Lower Great Lakes Region. In *Great Lakes Archaeology and Paleoecology: Exploring Interdisciplinary Initiatives for the Nineties*, edited by R.I. MacDonald, pp. 283-293. Quaternary Sciences Institute, University of Waterloo, Waterloo, Ontario.

- 1995a The Creation of Continuity: The Hunter's Home Phase in Iroquoian Archaeology. Paper presented at the 60th Annual Meeting of the Society for American Archaeology, Minneapolis, Minnesota.
- 1995b Migration in Prehistory: The Northern Iroquoian Case. *American Antiquity* 60:59-79.
- 1996 More on Migration in Prehistory: Accommodating New Evidence in the Northern Iroquoian Case. *American Antiquity* 61:791-796.
- Spence, M.W., W.D. Finlayson, and R.H. Pihl
 1979 Hopewellian Influences on Middle Woodland Cultures in Southern Ontario. In *Hopewell Archaeology: The Chillicothe Conference*, edited by D. S. Brose and N. Greber, pp. 115-121. Kent State University Press, Kent, Ohio.
- Spence, M.W., and R.H. Pihl
 1984 The Early and Middle Woodland Occupations of Southern Ontario: Past, Present and Future Research. *Arch Notes* 84-2:32-48.
- Spence, M.W., R.H. Pihl, and C.R. Murphy
 1990 Cultural Complexes of the Early and Middle Woodland Periods. In *The Archaeology of Southern Ontario to A.D. 1650*, edited by C.J. Ellis and N. Ferris, pp. 125-169. Publication Number 5, Occasional Publications of the London Chapter. Ontario Archaeological Society, London, Ontario.
- Stothers, D.M.
 1975 Radiocarbon Dating the Culture Chronology of Southwestern Ontario. *Man in the Northeast* 10:29-42.
 1977 *The Princess Point Complex*. Mercury Series 58. National Museum of Man, Archaeological Survey of Canada, Ottawa.
- Stothers, D.M., and J.R. Graves
 1983 Cultural Continuity and Change: The Western Basin, Ontario Iroquois, and Sandusky Traditions - A 1982 Perspective. *Archaeology of Eastern North America* 11:109-142.
- Stothers, D.M., B.S. Robinson, D.F. Belknap, J. Stark, and L.K. Kaplan
 1994 Current Perspectives on the Late Prehistory of the Western Lake Erie Region: An Alternative to Murphy and Ferris. *Archaeology of Eastern North America* 22:135-196.
- Stuiver, M., and G.W. Pearson
 1993 Extended ¹⁴C Data Base and Revised Calib 3.0 ¹⁴C Calibration Program. *Radiocarbon* 35:215-230.
- Timmings, P.A.
 1995 *The Analysis and Interpretation of Radiocarbon Dates in Iroquoian Prehistory*. Research Report 19. Museum of Indian Archaeology, London, Ontario.
- Watts, C.
 1997 *A Quantitative Analysis and Relative Chronological Seriation of Riviere au Vase Phase Ceramics from Southwestern Ontario*. M.Sc. Research Paper, Department of Anthropology, University of Toronto.
- Willey, G.R., and P. Phillips
 1958 *Method and Theory in American Archaeology*. University of Chicago Press, Chicago.
- Williamson, R.F.
 1990 The Early Iroquoian Period of Southern Ontario. In *The Archaeology of Southern Ontario to A.D. 1650*, edited by C.J. Ellis and N. Ferris, pp. 291-320. Publication Number 5, Occasional Publications of the London Chapter. Ontario Archaeological Society, London, Ontario.
- Williamson, R.F., and D.A. Robertson
 1994 Peer Politics Beyond the Periphery: Early and Middle Iroquoian Regional Interaction. *Ontario Archaeology* 58:27-48.
- Woodley, P.J.
 1996 The HH Site (AhGw-81), QEW Highway and Redhill Creek Expressway, Regional Municipality of Hamilton-Wentworth. MS on file, Ontario Ministry of Transportation.
- Wright, J. V.
 1966 *The Ontario Iroquois Tradition*. Bulletin 210. National Museum of Canada, Ottawa.
 1967 Type and Attribute Analysis: Their Application to Iroquois Culture History. In *Iroquois Culture, History, and Prehistory: Proceedings of the 1965 Conference on Iroquois Research*, edited by E. Tooker, pp. 99-100. New York State Museum and Science Service, Albany.
 1980 The Role of Attribute Analysis in the Study of Iroquoian Prehistory. In *Proceedings of the 1979 Iroquois Pottery Conference*, edited by C.F. Hayes III, pp. 21-26. Research Record 13. Rochester Museum and Science Center, Rochester.
 1984 The Cultural Continuity of Northern Iroquoian-Speaking Peoples. In *Extending the Rafters: Interdisciplinary Approaches to Iroquoian Studies*, edited by M.K. Foster, J. Campisi, and M. Mithren, pp. 283-299. State University of New York Press, Albany, New York.

Table 1. Site List and Radiocarbon Date Sources.

Site Name	Radiocarbon Date Source
Adelaide Island 2	Spence et al. 1990:127
Auda	Williamson 1990:309
Ault Park	Spence et al. 1990:127
Bells Island	Spence et al. 1990:127
Bennett	Williamson 1990:309
Boisclair	Williamson 1990:309
Bonisteel	Pengelly & Pengelly 1987
Boresma	Spence et al. 1990:126
Boyd Lakefront	Williamson 1990:309
Boys	Williamson 1990:309
Bruce Boyd	Williamson 1990:309
Bruner-Colasanti	Murphy & Ferris 1990:227
Bull's Point	Smith 1996b
Burley	Spence et al. 1979:115
Calvert	Williamson 1990:309
Cameron's Point	Spence et al. 1990:127
Cayuga Bridge	Timmins 1985:65-66
CbGj-1	Spence et al. 1990:127
Cherry Lane	Murphy & Ferris 1990:227
Constance Bay 1	Spence et al. 1990:127
Constance Bay 2	Spence et al. 1990:127
Dawson Creek	Spence et al. 1990:127
Deep River	Spence et al. 1990:127
Dewaele	Williamson 1990:309
Dick	Murphy & Ferris 1990:227
Donaldson	Spence et al. 1979:115; Spence et al. 1990:126
Dougall	Spence et al. 1990:127
Driscoll	Fox 1990:180
Dymock	Murphy & Ferris 1990:226
East Bog	Spence et al. 1990:126
Eldorado	Kapches 1994:98
Elliott	Williamson 1990:309
Five Acre Field	Dodd et al. 326
Force	Williamson 1990:309
Forster	(this paper)
Fort Erie	Williamson 1997 pers. comm.
Gordon Island North	Spence et al. 1990:127
Grafton	Gordon Dibb 1996 pers. comm.
Grand Banks	Crawford et al. 1997
Gunby	Williamson 1990:309
Henry Morganthaler	Spence et al. 1990:126
Hibou	MacDonald & Williamson 1993:31
Hill	Kapches 1994:97
HH	Woodley 1996
Hunter	Fox 1990:180
Hynes	Spence et al. 1990:127

Table 1 (continued). Site List and Radiocarbon Date Sources.

Site Name	Radiocarbon Date Source
Ireland	Bursey 1997
Ivory Hill	Timmins 1985:68
Kelly	Timmins 1985:74
King's Forest Park	Williamson 1990:296
Krieger	Murphy & Ferris 1990:226
Lakeshore Lodge	Timmins 1985:85
Levesconte Mound	Spence et al. 1990:127
Lone Pine	Crawford et al. 1997
Marshall's Bay 1	Spence et al. 1990:127
Miller	Williamson 1990:310
Mohawk Chapel	Timmins 1985:65-66
Montgomery Lake 2	Spence et al. 1990:127
Moyer Flats	Timmins 1985:67
Neeb	Fox 1990:180
Pelee 11H10	Murphy & Ferris 1990:226
Pelee 11H2	Murphy & Ferris 1990:226
Pelee 11H6	Murphy & Ferris 1990:226
Pelee 11H8	Murphy & Ferris 1990:226
Pergantile	Williamson 1990:297
Pond Mills	Spence et al. 1990:156
Porteous	Timmins 1985:70
Prince Mound	Spence et al. 1990:127
Radiant Lake 3	Spence et al. 1990:127
Richardson	Timmins 1985:85
Robson Road	Spence et al. 1990:146; Murphy & Ferris 1990:227
Roeland	Timmins 1985:77
Scott-O'Brien	Williamson 1996 pers.comm.
Selkirk No. 5	Timmins 1985:66
Serpent Mounds	Spence et al. 1990:127
Serpent Pits	Timmins 1985:84
Stafford	Timmins 1985:68
Stratford Flats	Timmins 1985:67
Tara East	Bursey 1996
Tara West	Bursey 1996
Thede	Spence et al. 1990:126
Van Bommel	Murphy & Ferris 1990:226
Van Besien	Timmins 1985:72
Vandenbygaard	Spence et al. 1990:126
Varden	MacDonald 1986
Whitson Lake	Spence et al. 1990:127
Willcock	Dodd et al. 1990:326
Wyght	Spence et al. 1990:128
Wyoming Rapids	Spence et al. 1990:126
Yaworski	Timmins 1985:75

Table 2. Radiocarbon Dates from Ontario Middle, Transitional, and Late Woodland Sites.

Site	Cult. ^a Affil.	Lab No.	C14 Date BP	Calibrated Calendrical Date ^b
Burley	SA	C-608	2619±220	1310 (800) 200 BC
Donaldson	SA	S-490	2535±150	990 (770) 250 BC
Wyght	PO	S-1843	2525±120	900 (770) 380 BC
Wyght	PO	S-1680	2460±65	800 (750,530) 390 BC
Donaldson	SA	S-119	2480±60	800 (760, 690, 540) 400 BC
Constance Bay 1	PO	S-578	2440±75	800 (510,430) 380 BC
Ault Park	PO	S-1938	2420±70	790 (410) 380 BC
Ault Park	PO	S-1939	2395±80	780 (410) 250 BC
Montgomery Lake 2	PO	GaK-1891	2380±90	790 (400) 200 BC
Wyght	PO	S-1846	2355±250	1000 BC (400) AD 140
Adelaide Island 2	PO	S-1600	2340±60	750 (400) 210 BC
Wyght	PO	S-1677	2300±55	410 (390) 200 BC
Thede	SA	GaK-2801	2240±100	510 (360,280,260) 40 BC
Dougall	PO	S-508	2185±220	800 BC (200 BC) AD 330
Dawson Creek	PO	S-2238	2170±15	410 BC (190 BC) AD 80
Radiant Lake 3	PO	S-1044	2165±75	390 (190 BC) 0 BC
Wyoming Rapids	SA	I-13,163	2100±80	370 BC (100 BC) AD 80
Thede	SA	GaK-2954	2050±200	520 BC (40 BC) AD 420
Deep River	PO	I-2084	2030±100	360 BC (30,20,10 BC) AD 220
Serpent Mounds	PO	M-1104	2020±75	190 BC (0 BC) AD 140
Hynes	PO	S-895	2020±70	190 BC (0 BC) AD 130
Dawson Creek	PO	S-2243	1990±80	180 BC (AD 20) AD 220
Donaldson	SA	S-776	1945±75	100 BC (AD 70) AD 240
Scott-O'brien	PO	WAT-2876	1920±80	60 BC (AD 80) AD 320
Prince Mound	PO	CWRU-56	1890±60	0 BC (AD 130) AD 320
Wyght	PO	S-1755	1880±110	100 BC (AD 130) AD 410
Gordon Island N.	PO	S-1821	1870±270	410 BC (AD 140) AD 680
Radiant Lake 3	PO	GSC-1662	1870±130	170 BC (AD 140) AD 430
Montgomery Lake 2	PO	GaK-1892	1860±80	0 BC (AD 140) AD 380
Constance Bay 2	PO	S-798	1855±110	50 BC (AD 140) AD 420
Cameron's Point	PO	DIC-1072	1850±55	AD 70 (150,190) 330
Levesconte Mound	PO	DIC-1071	1830±50	AD 80 (220) 340
Serpent Mounds	PO	M-850	1830±200	360 BC (AD 220) AD 640
Deep River	PO	I-2083	1820±100	0 BC (AD 230) AD 430
Bells Island	PO	TO-1468	1800±60	AD 80 (240) 400
Dougall	PO	S-507	1780±110	AD 10 (250) 540
Marshall's Bay 1	PO	GSC-2061	1750±60	AD 130 (260,290,320) 420
Levesconte Mound	PO	DIC-732	1720±55	AD 220 (340) 430
Boresma	SA	Beta-34,702	1710±60	AD 220 (350,360,370) 450
Wyght	PO	S-1679	1695±65	AD 220 (390) 540
HH	PO	TO-4268 ^c	1680±60	AD 240 (400) 540
Serpent Mounds	PO	M-1105	1660±75	AD 230 (410) 590
Wyght	PO	S-1675	1645±65	AD 250 (420) 560
Boresma	SA	Beta-34,701	1600±80	AD 260 (440) 640
HH	PO	TO-4271 ^c	1580±60	AD 380 (460,480,510,530) 620

Table 2 (continued). Radiocarbon Dates from Ontario Middle, Transitional, and Late Woodland Sites.

Site	Cult. ^a Affil.	Lab No.	C14 Date BP	Calibrated Calendrical Date ^b
Grand Banks	PP	TO-5307 ^c	1570±90	AD 260 (540) 660
Varden	PP	RIDDL-118	1560±190	AD 80 (540) 880
HH	PO	TO-4272 ^c	1550±60	AD 400 (540) 640
Whitson Lake	PO	GSC-1660	1550±190	AD 80 (540) 890
Dawson Creek	PO	S-2244	1535±75	AD 390 (550) 660
Mohawk Chapel	PP	I-13,534	1520±80	AD 400 (550) 670
Radiant Lake 3	PO	S-1045	1520±60	AD 420 (550) 660
Grand Banks	PP	TO-5308 ^c	1500±150	AD 240 (570,600) 830
HH	PO	TO-4269 ^c	1470±60	AD 440 (610) 670
Porteous	EOI	CWRU-123	1470±100	AD 400 (610) 770
Thede	SA	S-622	1455±110	AD 400 (620) 780
Varden	PP	RIDDL-115	1440±120	AD 400 (640) 870
Scott-O'brien	PP	WAT-2873	1410±70	AD 540 (650) 770
HH	PO	TO-4270 ^c	1410±60	AD 550 (650) 760
Dawson Creek	PO	S-2207	1405±60	AD 550 (650) 760
Donaldson	SA	GaK-3800	1400±80	AD 540 (650) 780
East Bog	SA	S-2961	1395±100	AD 440 (660) 880
Robson Road	CO	BGS-1243	1380±120	AD 430 (660) 940
Porteous	EOI	I-5820	1370±90	AD 540 (660) 880
Krieger	YO	S-620	1350±140	AD 420 (670) 990
Neeb	RV	I-11,369	1335±80	AD 600 (670) 890
Fort Erie	PP	TO-5243 ^c	1330±60	AD 630 (680) 820
Varden	PP	RIDDL-311	1330±140	AD 430 (680) 1010
Pelee 11H8	RV	I-4761	1320±95	AD 560 (680) 960
Pelee 11H2	RV	I-4021	1310±100	AD 560 (690) 970
Radiant Lake 3	PO	S-1289	1300±70	AD 630 (690) 890
Radiant Lake 3	PO	S-1299	1290±110	AD 560 (710,750,760) 990
Wyght	PO	S-1852	1290±250	AD 240 (710,740,760) 1270
Henry Morganthaler	SA	BGS-1363	1285±250	AD 250 (720,740,760) 1270
Vandenbygaard	SA	DIC-425	1280±80	AD 630 (720,740,770) 960
Neeb	RV	I-11,368	1265±80	AD 640 (770) 970
Thede	SA	GaK-2955	1260±90	AD 630 (780) 980
Boresma	SA	Beta-34,700	1260±90	AD 630 (780) 980
Grand Banks	PP	TO-4585 ^c	1250±80	AD 650 (780) 980
CbGj-1	PO	S-1268	1240±120	AD 600 (780) 1020
Wyght	PO	S-1756	1235±105	AD 630 (780) 1020
Radiant Lake 3	PO	-----	1240±130	AD 600 (780) 1030
Selkirk No. 5	PP	-----	1210±55	AD 680 (820,840,860) 970
Porteous	EOI	CWRU-126	1200±100	AD 650 (870) 1020
Pond Mills	SA	NMM-1333	1195±75	AD 670 (880) 1010
Thede	SA	GaK-2953	1180±90	AD 670 (880) 1020
Van Besien	EOI	-----	1175±140	AD 620 (880) 1170
Grafton	EOI	BGS-1916	1160±160	AD 600 (890) 1220
Cayuga Bridge	PP	S-714	1155±132	AD 650 (890) 1170
Scott-O'brien	PP	WAT-2875	1150±100	AD 670 (890) 1150

Table 2 (continued). Radiocarbon Dates from Ontario Middle, Transitional, and Late Woodland Sites.

Site	Cult. ^a Affil.	Lab No.	C14 Date BP	Calibrated Calendrical Date ^b
Pelee 11H8	RV	BGS-81	1146±57	AD 780 (890) 1010
Varden	PP	RIDDL-116	1120±240	AD 440 (900,910,960) 1380
Porteous	EOI	I-4972	1125±100	AD 680 (900,910,960) 1160
Kelly	EOI	I-11,475	1120±80	AD 720 (900,910,960) 1040
Richardson	EOI	I-9651	1120±80	AD 720 (900,910,960) 1040
Van Bemmell	YO	BGS-1265	1110±70	AD 780 (970) 1030
Lakeshore Lodge	SB	S-2194	1110±60	AD 790 (970) 1030
Pelee 11H8	RV	I-4,762	1110±95	AD 690 (970) 1160
Driscoll	SB	-----	1100±210	AD 550 (970) 1300
Hunter	TW	TO-1020	1100±50	AD 870 (970) 1020
Elliott	EOI	I-13,098	1100±80	AD 780 (970) 1150
Auda	EOI	S-1948	1095±110	AD 680 (980) 1190
Pelee 11H8	RV	BGS-82	1072±55	AD 880 (990) 1040
Pelee 11H10	RV	I-4009	1070±95	AD 780 (990) 1180
Force	EOI	I-10,630	1070±80	AD 790 (990) 1160
Grafton	EOI	BGS-1846	1065±80	AD 790 (990) 1160
Grand Banks	PP	TO-4584 ^C	1060±60	AD 880 (1000) 1150
Stratford Flats	EOI	I-13,081	1050±190	AD 640 (1010) 1300
Moyer Flats	EOI	I-13,078	1050±80	AD 820 (1010) 1170
Robson Road	RV	I-12,269	1050±80	AD 820 (1010) 1170
Lone Pine	EOI	TO-4586 ^C	1040±60	AD 890 (1010) 1160
Dymock	YO	I-12,479	1030±80	AD 880 (1010) 1200
Grafton	EOI	BGS-1844	1030±80	AD 880 (1010) 1200
Van Besien	EOI	I-6847	1010±90	AD 880 (1020) 1230
Van Besien	EOI	I-6167	1005±90	AD 880 (1020) 1230
Elliott	EOI	-----	1000±80	AD 890 (1020) 1220
Selkirk No. 5	PP	DIC-175	1000±70	AD 890 (1020) 1220
Boys	EOI	I-7322	975±120	AD 810 (1030) 1290
Grand Banks	PP	TO-5875	970±50	AD 990 (1030) 1210
Grafton	EOI	BGS-1845	970±110	AD 880 (1030) 1280
Robson Road	RV	BGS-1244	960±120	AD 870 (1040) 1290
Bull's Point	PP	TO-6341 ^C	960±60	AD 980 (1040) 1220
Robson Road	RV	I-12,268	950±80	AD 970 (1040,1150) 1270
Cherry Lane	YO	BGS-1267	950±70	AD 980 (1040,1150) 1250
Boisclair	EOI	I-13,094	950±80	AD 970 (1040,1150) 1270
Dymock	YO	I-12,149	945±80	AD 970 (1040,1100,1110,1150) 1280
Pelee 11H6	RV	I-4,010	940±90	AD 900 (1050,1100,1120,1140,1150) 1280
Pelee 11H8	RV	I-4,760	940±90	AD 900 (1050,1100,1120,1140,1150) 1280
Dick	YO	I-13,242	930±110	AD 890 (1050,1090,1120,1140,1160) 1290
Grafton	EOI	BGS-1843	935±85	AD 970 (1050,1090,1120,1140,1150) 1280
Dymock	YO	I-12,478	940±80	AD 980 (1050,1100,1120,1140,1150) 1280
Dymock	YO	I-12,150	910±80	AD 990 (1160) 1280
Serpent Pits	EOI	UGa-2488	905±60	AD 1020 (1160) 1280
Porteous	EOI	GSC-1917	900±70	AD 1010 (1170) 1280
Bruce Boyd	EOI	S-1840	900±60	AD 1020 (1170) 1280

Table 2 (continued). Radiocarbon Dates from Ontario Middle, Transitional, and Late Woodland Sites.

Site	Cult. ^a Affil.	Lab No.	C14 Date BP	Calibrated Calendrical Date ^b
Dewaele	EOI	-----	900±90	AD 980 (1170) 1290
Calvert	EOI	I-12,176	900±80	AD 1000 (1170) 1290
Yaworski	EOI	I-12,059	890±80	AD 1000 (1170) 1290
Elliott	EOI	I-13,095	890±80	AD 1000 (1170) 1290
Dymock	YO	I-12,152	890±80	AD 1000 (1170) 1290
Five Acre Field	EOI	Beta-87,951	890±70	AD 1010 (1170) 1280
Eldorado	EOI	TO-1078	890±40	AD 1030 (1170) 1250
Bruner-Colasanti	YO	I-11,830	880±75	AD 1010 (1180) 1290
Pergantile	EOI	TO-4320	880±60	AD 1020 (1180) 1280
Willcock	EOI	NMC-1335	875±70	AD 1020 (1190) 1290
Cherry Lane	YO	BGS-1268	875±70	AD 1020 (1190) 1290
Willcock	EOI	NMC-1331	870±70	AD 1020 (1200) 1290
Bruce Boyd	EOI	NMC-905	860±65	AD 1030 (1210) 1290
Calvert	EOI	I-12,174	860±80	AD 1020 (1210) 1290
Dewaele	EOI	-----	855±55	AD 1030 (1220) 1280
Bruner-Colasanti	YO	I-11,829	855±75	AD 1020 (1220) 1290
Grafton	EOI	BGS-1849	855±75	AD 1020 (1210) 1290
Robson Road	YO	BGS-1245	850±90	AD 1010 (1220) 1300
Cherry Lane	YO	I-11,902	850±75	AD 1020 (1220) 1290
Kelly	EOI	I-12,061	850±80	AD 1020 (1220) 1300
Dymock	YO	I-12,151	850±80	AD 1020 (1220) 1300
Varden	EOI	RIDDL-117	850±190	AD 790 (1220) 1440
Grafton	EOI	BGS-1915	840±75	AD 930 (1220) 1300
Tara East	EOI	BGS-1526	840±80	AD 1020 (1220) 1300
Grafton	EOI	BGS-1542	840±80	AD 1020 (1220) 1300
Ireland	EOI	BGS-1528	840±90	AD 1020 (1220) 1300
Forster	EOI	TO-6343 ^c	840±90	AD 1020 (1220) 1300
Pergantile	EOI	TO-4319	840±70	AD 1030 (1220) 1290
Grafton	EOI	BGS-1556	840±145	AD 900 (1220) 1410
Miller	EOI	S-108	835±70	AD 1030 (1220) 1290
Dawson Creek	EOI	-----	835±65	AD 1030 (1220) 1290
Yaworski	EOI	I-12,060	830±80	AD 1030 (1230) 1300
Cherry Lane	YO	BGS-1269	830±70	AD 1030 (1230) 1300
Calvert	EOI	I-12,173	820±80	AD 1030 (1230) 1300
Elliott	EOI	I-13,096	820±80	AD 1030 (1230) 1300
Bruner-Colasanti	YO	I-11,828	810±75	AD 1040 (1250) 1300
Lone Pine	EOI	TO-4083 ^c	800±50	AD 1170 (1250) 1300
Calvert	EOI	I-12,175	800±80	AD 1040 (1250) 1380
King's Forest Park	EOI	TO-4322	800±60	AD 1060 (1250) 1300
Kelly	EOI	I-11,474	790±80	AD 1040 (1260) 1390
Ivory Hill	EOI	I-13,164	790±80	AD 1040 (1260) 1390
Ireland	EOI	BGS-1527	790±90	AD 1030 (1260) 1390
Dick	YO	I-13,243	780±100	AD 1030 (1280) 1400
Cherry Lane	YO	BGS-1266	770±70	AD 1160 (1280) 1390
Grafton	EOI	Beta-97,371	770±40	AD 1220 (1280) 1300

Table 2 (continued). Radiocarbon Dates from Ontario Middle, Transitional, and Late Woodland Sites.

Site	Cult. ^a Affil.	Lab No.	C14 Date BP	Calibrated Calendrical Date ^b
Grafton	EOI	BGS-1858	765±95	AD 1040 (1280) 1400
Elliott	EOI	I-13,097	760±80	AD 1060 (1280) 1400
Grafton	EOI	BGS-1914	760±90	AD 1050 (1280) 1400
Roeland	EOI	I-12,774	750±80	AD 1160 (1280) 1400
Elliott	EOI	-----	750±80	AD 1160 (1280) 1400
Five Acre Field	EOI	Beta-75,657	750±100	AD 1040 (1280) 1410
Tara East	EOI	BGS-1525	750±120	AD 1030 (1220) 1430
Calvert	EOI	I-12,476	740±75	AD 1170 (1280) 1400
Grafton	EOI	BGS-1847	735±70	AD 1180 (1290) 1400
Stafford	EOI	M-1553	730±100	AD 1050 (1290) 1420
Five Acre Field	EOI	WAT-11	730±100	AD 1050 (1290) 1420
Hibou	EOI	TO-3844	730±50	AD 1230 (1290) 1390
Tara West	EOI	BGS-1530	730±80	AD 1170 (1290) 1400
Tara West	EOI	BGS-1524	725±85	AD 1170 (1290) 1410
Boyd Lakefront	EOI	I-11,827	720±75	AD 1190 (1290) 1400
Boys	EOI	-----	715±95	AD 1160 (1290) 1420
Force	EOI	I-10,629	715±75	AD 1210 (1290) 1400
Bruner-Colasanti	YO	I-11,831	715±75	AD 1210 (1290) 1400
Bonisteel	EOI	BGS-1130	705±80	AD 1210 (1290) 1410
Roeland	EOI	I-12,773	700±80	AD 1210 (1290) 1410
Force	EOI	I-10,631	705±75	AD 1220 (1290) 1410
Bennett	EOI	GSC-143	690±100	AD 1170 (1300) 1430
Grafton	EOI	BGS-1850	675±75	AD 1230 (1300) 1420
Bennett	EOI	M-1527	670±100	AD 1190 (1300) 1440
Grafton	EOI	BGS-1848	665±75	AD 1230 (1300) 1420
Grafton	EOI	BGS-1857	665±140	AD 1040 (1300) 1480
Gunby	EOI	I-10,346	665±135	AD 1050 (1300) 1480
Richardson	EOI	-----	635±80	AD 1260 (1310,1360,1380) 1440
Boisclair	EOI	I-13,082	645±75	AD 1250 (1310,1360,1380) 1430
Hill	EOI	TO-2056	630±50	AD 1290 (1310,1350,1390) 1420
Force	EOI	I-10,628	625±90	AD 1240 (1310,1350,1390) 1450
King's Forest Park	EOI	TO-4321	610±60	AD 1290 (1330,1400) 1430
Robson Road	YO	BGS-1246	600±70	AD 1280 (1330,1400) 1440
Robson Road	YO	BGS-1247	600±70	AD 1280 (1330,1400) 1440
Gunby	EOI	I-10,345	565±80	AD 1290 (1400) 1470
Hibou	EOI	TO-3845	590±50	AD 1300 (1400) 1430
Bonisteel	EOI	BGS-987	540±120	AD 1270 (1410) 1610
Serpent Pits	EOI	UGa-2487	510±60	AD 1310 (1430) 1480

^aCult. Affil.=Cultural Affiliation: CO=Couture; SA=Saugeen; PO=Point Peninsula; TW=Transitional Woodland; RV=Riviere au Vase; PP=Princess Point; SB=Sandbanks; YO=Young; EOI=Early Ontario Iroquoian.

^bCalibrated at 2-sigma with the program CALIB 3.0 (Stuiver & Pearson 1993). Calibrations are rounded to the nearest 10 years. One or more modal values are presented between the 2-sigma ranges.

^cAMS