

## Chapter 16

# The Pleistocene–Holocene Transition in the Eastern United States

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We define the eastern United States for the purposes of this chapter as being bordered by the Laurentide Ice Sheet on the north, the ancestral Gulf of Mexico on the south, the Atlantic Ocean on the east, and the Western Plains on the west. These borders enclose most of the area between the latitudes 25–50°N and longitudes 65–90°W, a region of ecological diversity and complexity even today.

In this area, a rich heritage of human occupation extends from the late Paleolithic/late Pleistocene through the present. The indigenous development of horticulture took place by about 5,000 BP<sup>1</sup> (Smith 1995:196), and the development of complex political systems based on intensive maize agriculture began by the 9th century AD. In this chapter, however, we focus on the cultures and environments of the area during the terminal Pleistocene and Early Holocene.

### LATE GLACIAL AND POSTGLACIAL ENVIRONMENTS

In the eastern United States, the Last Glacial Maximum circa 20,000–18,000 BP coincided with a sea-level decrease of around 120 m below present (Bloom 1984:42). A cool

<sup>1</sup>All dates in this chapter are expressed in radiocarbon years before present (BP).

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temperate-boreal vegetation ecotone existed at 20,000 BP through Tennessee (Delcourt and Delcourt 1991:103; see also Delcourt and Delcourt 1987b; T. Webb 1987, 1988). During the late glacial, "boreal forest dominated by jack pine (*Pinus banksiana*) and spruce (*Picea*) was replaced progressively by temperate deciduous forest" as climate ameliorated (Delcourt and Delcourt 1991:102–103). Near Memphis, Tennessee, a large male mastodon was recovered with spruce cones, insects, and snails dated to about 17,000 BP (Brister *et al.* 1981; Delcourt *et al.* 1980). Other megafaunal mammals of this general region include ground sloth, giant beaver, horse, camel, llama, and tapir.

The terminal Pleistocene deglaciation was a time of rapidly changing landscapes, biota, and climates, the character of which appears to have profoundly shaped the colonization of the region (Figure 1). Deglaciation commenced around 14,000 BP and seas rose slowly from their full glacial minimum stands, although by circa 12,000 BP, when the first human groups may have appeared, sea level was still approximately 60 m below its modern stand. Lake strandlines and other glacial features pose special problems in the north (Ellis 1994). Vast areas of the exposed continental shelf were characterized by a rich floral and faunal record and would have been ideally suited for human habitation, particularly in the southern part of the region, from the Middle Atlantic to the Gulf coasts (Autin *et al.* 1991:563; Graham and Mead 1987; Ruddiman 1987). At this same time, the Laurentide Ice Sheet had receded sufficiently in the north to clear Niagara Falls and expose and fill the basins of the vast glacial great lakes, while to the south the deltaic plain of the Mississippi River began to form. Glacial retreat and sea-level rise appear to have arrested or even reversed during the Younger Dryas, from roughly 11,100 to 10,500 BP, and it is during this interval that unequivocal evidence for human occupation appears throughout the East. Human populations entering eastern North America from the west—if the so-called "ice-free corridor" was indeed the route of initial entry south of the ice sheets (e.g., Haynes 1964)—or, alternatively, along the continental shelf from the south, if initial colonization occurred along coastal margins (e.g., Fladmark 1979) may, accordingly, have been forced away from coastal areas by the fluctuating sea levels (Faught 1995).

The relationship between early human populations and Pleistocene fauna in the East is likewise not clear at present, with arguments advanced favoring generalist adaptations directed to an array of resources, with a fairly minimal emphasis on megafauna (e.g., Meltzer 1988; Meltzer and Smith 1986), to those arguing for an appreciable focus on large game animals (e.g., Anderson 1995; Kelly and Todd 1988). A late survival of megafauna to shortly after 11,000 BP is clearly indicated, however (Mead and Meltzer 1984). In southeast Missouri, for example, a *Paleolama* was found associated with hazel nuts that were dated to about  $10,890 \pm 130$  BP (Morse and Graham 1991 [NZA-1100]). Direct associations between humans and now-extinct Terminal Pleistocene fauna indicating that hunting was occurring have been found at Little Salt Spring (a giant land tortoise with an embedded sharpened wooden stake [Clausen *et al.* 1979]) and in the Wacissa River of Florida (a *Bison antiquus* skull with a projectile point embedded in its forehead [S. D. Webb *et al.* 1984]) (Figure 2). In addition, indisputable associations of humans and mastodon have been found at Kimmswick in southern Missouri (Graham *et al.* 1981) and Martins Creek in Ohio (Brush and Smith 1994), and other likely candidates include the Coates-Hindes site in western Tennessee (John Broster 1995 personal communication). Finally, worked mastodon and mammoth green bone and ivory, including foreshafts, have been recovered in a number of locations in Florida (Dunbar and Webb *in press*; Milanich 1994; S. D. Webb 1995). All these lines of

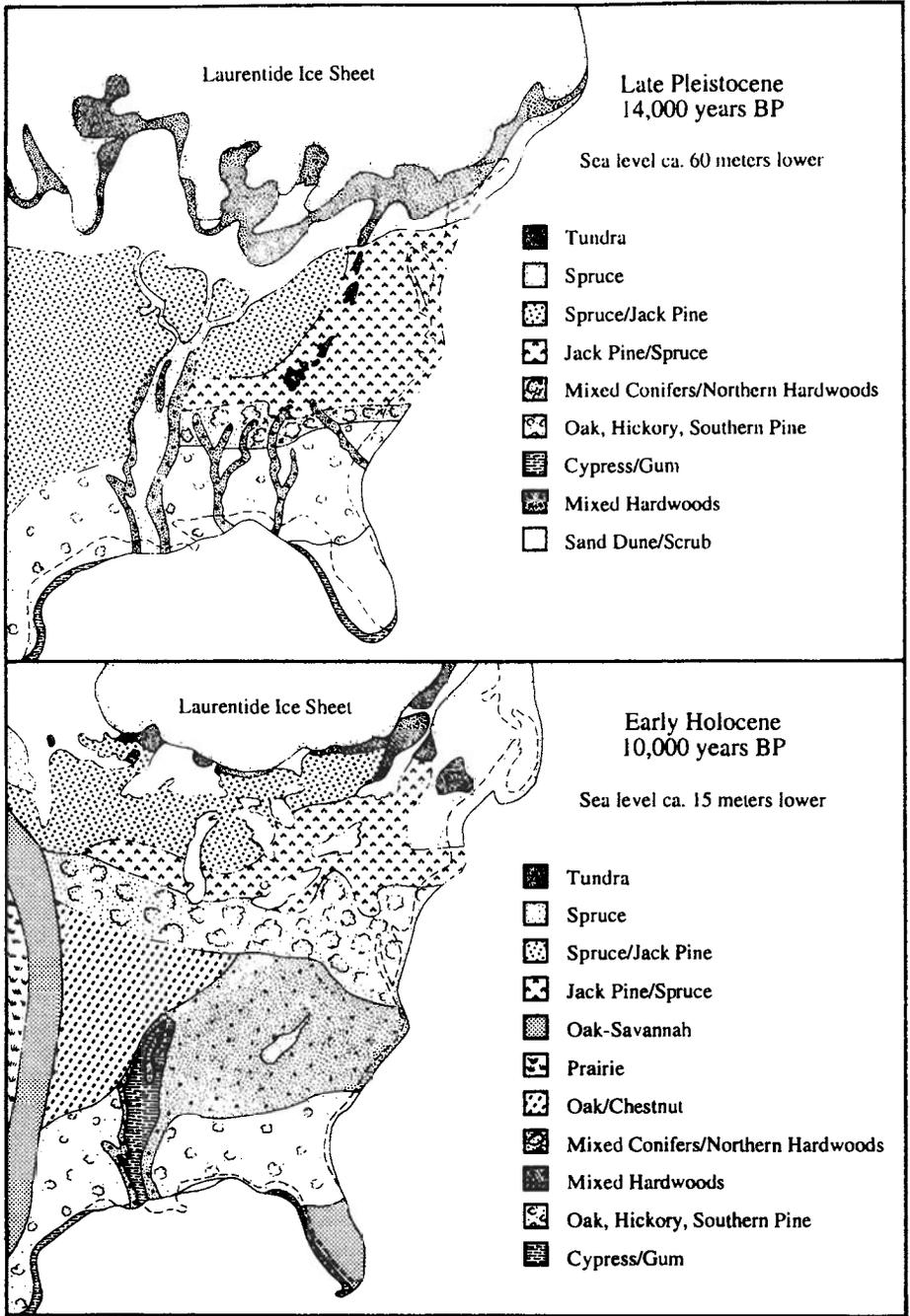


Figure 1. Vegetation zones at 14,000 BP and 10,000 BP. From Delcourt and Delcourt (1981).

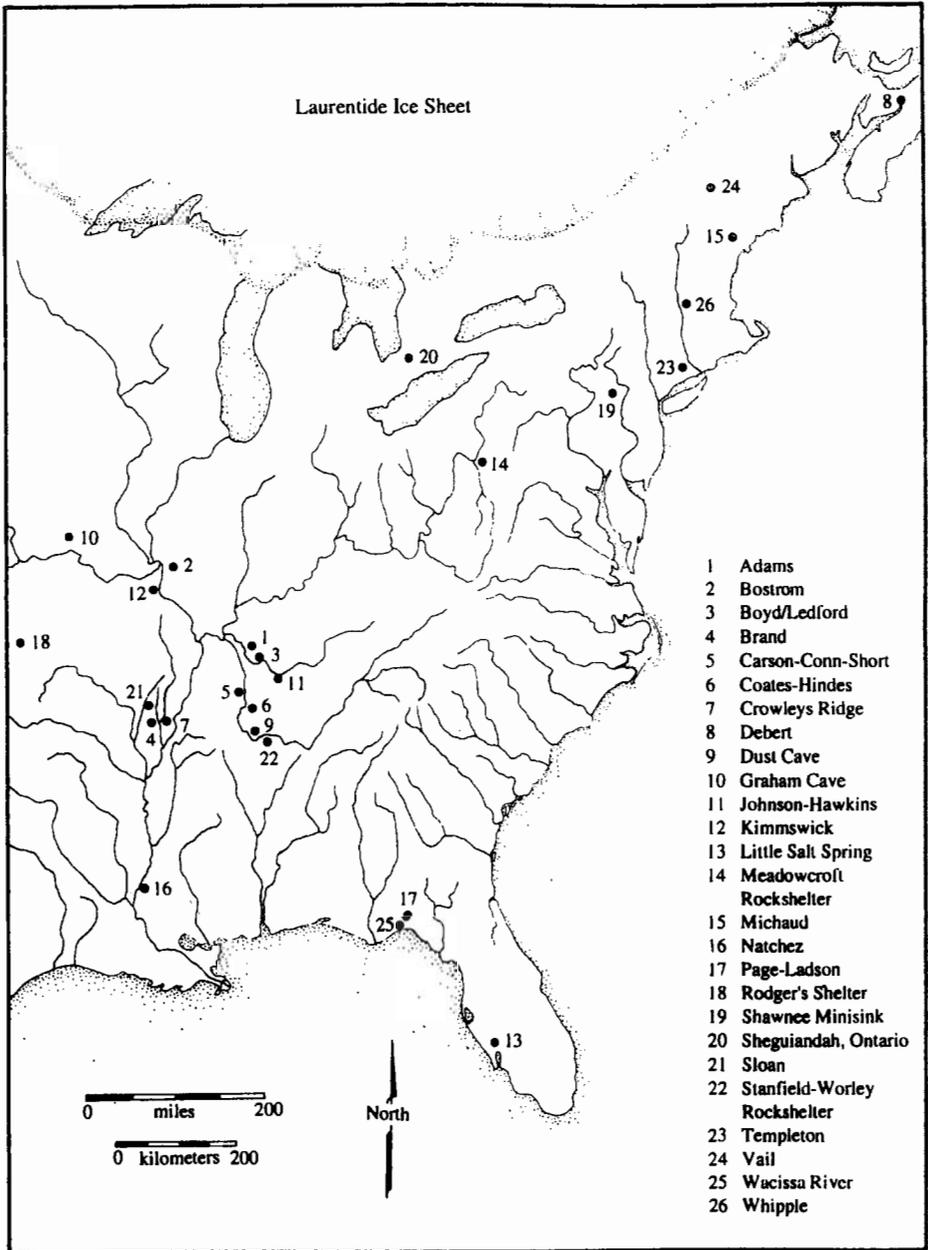


Figure 2. Locations of sites mentioned in the text.

evidence indicate that Eastern Paleoindians hunted Pleistocene fauna and megafauna at least some of the time and may have played at least some role in the extinction of some of these species.

By 10,000 BP, the glacial ice had receded north of the Great Lakes, sea level was only 15–20 m below modern tides, and much of the southern two thirds of the eastern United States was covered by deciduous or combined deciduous and pine forests. Prairie-like conditions were characteristic on the west central border (Munson 1990). To the far north, immediately south of the ice, were boreal forests. A possible dichotomy of largest surviving land mammals emerges. White-tailed deer existed throughout much of the hardwood region, but in the north there were moose, elk, and caribou. The smaller deer were most prolific in the south, particularly in hardwood ecotones, where adequate year-round browse was available.

The central Mississippi Valley was mostly a cypress–gum floodplain with surrounding uplands and a central erosional remnant known as Crowley's Ridge characterized by mixed hardwoods (Delcourt and Delcourt 1981). The floodplain itself was made up of active and ponded relict braided stream channels of the Mississippi as well as meandering streams. Forest edges probably including hardwoods lined the streams and ponds, making up a mosaic of vegetation zones probably ideal for white-tailed deer. Acorn mast provided adequate winter food for deer and the huge numbers of waterfowl in the Mississippi River flyway. Fish, small mammals, and plant foods would have been abundant. In much of the eastern United States, the following Hypsithermal Interval (8,000–4,000 BP) was a period of decreased rainfall and increasing warming.

## THE ARCHAEOLOGICAL RECORD

The archaeological record is almost entirely lithic in nature. Sites include rock shelters, eroded surface scatters, buried sites, coastal submarine locations, and submerged sinkholes. Frustrating aspects are the general lack of radiocarbon dates and the relative absence of good faunal and floral associations. The research tools either developed or adopted in eastern North America include microwear analysis, fluted point technology, identification of chert sources, and the reconstruction of stone artifact assemblages.

### Pre-Clovis Remains

No satisfactory evidence exists at the present for "Pre-Clovis" occupation(s) in the East. While Meadowcroft Rockshelter in southwestern Pennsylvania has yielded a series of Pre-Clovis dates, controversy continues to swirl around their interpretation and context (Haynes 1980, 1992; Mead 1980). The Natchez pelvis, originally found with Late Pleistocene megafaunal remains, was redated using accelerator mass spectrometry (AMS) to  $5580 \pm 80$  BP (e.g., Cotter 1991). The claimed Oldowan nature of the Alabama pebble tool complex (Lively 1965) has never been substantiated, and the "complex" instead appears to be initial stage lithic reduction debris as well as expedient tools associated with Holocene quarrying and wild-plant-gathering activity (Futato in press), a speculative construct rather than an assemblage captured in clear stratigraphic context. The alleged Pre-Clovis occupation at the Sheguiandah site in Ontario has been shown to be Post-glacial in age (Storck et al. 1994).

Outside these examples, there has been little evidence of a pre-12,000 BP occupation of the eastern United States. At Page-Ladson, five dates bracketing the interval from 12,000 to 12,500 BP have been obtained from a level containing a mastodon tusk bearing cut marks (Dunbar and Webb in press; 1995 personal communication), and at Little Salt Springs, a wooden spear associated with the giant tortoise was dated to  $12,030 \pm 200$  BP (Clausen *et al.* 1979:611). While these dates raise the possibility of early human occupations in the Southeast well before the currently accepted maximum age for western Clovis at 11,200 BP, their acceptance has been limited, because the associated artifacts are few.

Major periods of early human occupation in the eastern United States encompass initial colonization and settlement, identified by the makers of early fluted point forms ( $\approx 11,500$ – $10,750$  BP); the emergence of distinctive subregional cultural traditions, the best known of which are the Dalton horizon in the southern woodlands and the fluted-point-using hunters of the northern Great Lakes and periglacial tundra ( $\approx 10,750$ – $10,000$  BP); the adoption of Initial Holocene or Early Archaic lifeways based on the exploitation of modern flora and fauna identified by side and corner notched point forms ( $\approx 10,000$ – $9,000$  BP); and the decline and eventual disappearance of the formal and highly curated toolkit that characterized occupation in the region up to this time. A pattern of increasingly localized group movement and interaction becomes evident, identified by groups using stemmed and bifurcate-based projectile points ( $\approx 9,000$ – $8,000$  BP). Dramatic changes in population growth, interaction, and adaptation that occurred over this time are best reflected in lithic technology, which remains the primary source of information about the early occupants of the region at this time (Figure 3).

### **Initial Colonization (11,500–10,750 BP)**

Clear evidence for human occupation of the East appears after 11,500 BP, when fluted point forms resembling classic western Clovis projectile points are found in large numbers across the region. Unfortunately, radiocarbon dates from this period are restricted almost exclusively to the northeast (Levine 1990), with the result that age estimates for Clovis assemblages are largely based on cross-dating with well-documented southwestern assemblages, which range from circa 11,200 to 10,900 BP (e.g., Haynes 1987, 1992). Locational or metric data or both have been compiled for almost 5000 fluted points just from the Southeast and on over 8000 fluted points from eastern North America as a whole, almost 80% of the number of fluted points reported from the entire continent (Anderson 1990b; 168, 1991a; Brennan 1982; Dincauze 1993a; Faught *et al.* 1994). Despite this difference in numbers, the view of New World Paleoindian that has come to dominate thinking is based largely on data from the Southwest and the Great Plains because of where the earliest discoveries of fluted points in superb geological context occurred.

Large numbers of fluted points are found in the major river valleys of the interior Southeast and lower Midwest, along stretches of the Tennessee, Ohio, Cumberland, lower Missouri, Mississippi, Illinois, and Wabash rivers, with particularly dense concentrations near confluences, major chert sources, and areas likely rich in game. These areas are thought to represent areas of initial extended settlement, staging areas from which the exploration and eventual occupation of the larger region may have proceeded (e.g., Anderson 1990a,b; Dincauze 1993b). The numbers of fluted points in these areas suggest appreciable time depth, leading a number of scholars to suggest that Clovis technology itself may have arisen

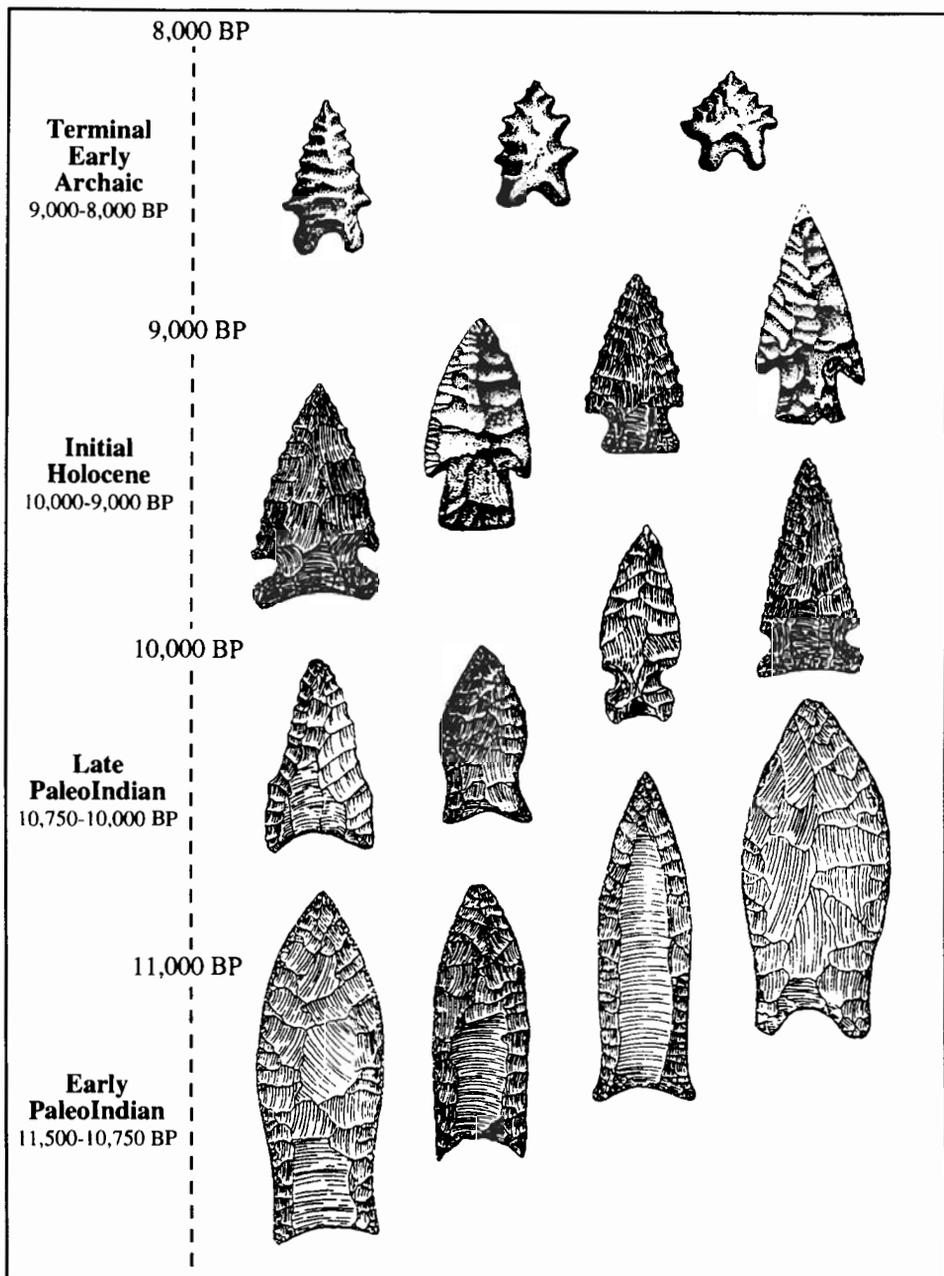


Figure 3. Major artifacts characteristic of the four periods during 11,500-8,000 BP.

in the region (e.g., Faught 1995; Mason 1962; Stanford 1991). In the East, the irregular distribution of fluted points, which occur in large numbers in some areas and are nearly absent in others, such as in portions of the Gulf Coastal Plain, suggests that colonization and subsequent settlement were uneven, proceeding in leapfrog fashion rather than as a continuous wave of advance, as suggested by Martin (1973) in his now classic overkill hypothesis paper (Anderson 1995; Faught 1995; Faught *et al.* 1994).

Radiocarbon determinations from the East associated with Clovis or Clovis-like fluted points are almost exclusively from the northeast, and even here dating indicates occupation only during the 11th millennium BP and perhaps somewhat later (Levine 1990). Six northeastern sites—Debert, Michael, Shawnee Minisink, Templeton, Vail, and Whipple, which are fairly well dated, suggest that deeply indented fluted forms occur somewhat later in time than classic Clovis-like lanceolates, to circa 10,600 BP. A number of major eastern Clovis sites remain undated, such as Kimmswick (Graham *et al.* 1981), where one fluted point appears to have been embedded in mastodon flesh, yet charcoal preservation was poor. A hearth at the Johnson-Hawkins site near Nashville with an associated fluted point preform and spruce fragments has been recently dated to  $11,700 \pm 980$  BP (Broster and Barker 1992; Broster and Norton 1992, *in press*; Broster *et al.* 1991, 1994) and, although an early date, has such a large standard deviation as to preclude its use in arguments about the antiquity of fluted points in the region. With few exceptions, then, the radiocarbon dates obtained thus far from fluted point sites in the East are in the 11th and 10th millennia BP (Haynes *et al.* 1984; Levine 1990). Well-dated sites like Debert (MacDonald 1968) and Vail (Gramley 1982) are contemporaneous with Folsom assemblages from the West and Dalton sites in the Southeast, at least at Rodgers Shelter (Goodyear 1982). The later dates for fluted points from the Northeast are contemporaneous with dates for Early Holocene notched point assemblages in the South, which, whenever found in stratigraphic position, *always* overlay fluted point deposits. Pre-11,000 BP dates from the East are thus comparatively few and equivocal at present, a situation that must be remedied if we are to work out an accurate Paleoindian chronology and occupational history for the region. While one conceptual sequence of fluted points through time sees the development of any or all of longer “waists,” narrower stems, and deeper basal concavities from a Clovis-like archetype toward a Dalton-like form (e.g., Perino 1985:100, 1991:91; see also Haynes *et al.* 1984), until larger samples are discovered in good context, this sequence must remain speculative.

A remarkable artifact assemblage consisting of large single-platform polyhedral cores and large curved blades has been recovered from Adams and Boyd/Ledford in Kentucky (Bostrom 1993; Freeman *et al.* *in press*), Carson-Conn-Short in Tennessee (Broster and Norton 1993), the Bostrom site in Illinois (Tankersley and Morrow 1993), and at sites in West Texas (M. Collins personal communication) and at Blackwater Draw in New Mexico (Green 1963). At the Tennessee site, 53 polyhedral cores and 465 true blades have been recovered to date (J. Broster 1994 personal communication).

Eastern fluted points are not expedient tools, but formal, hafted bifaces made mainly for forcible penetration of animal hide, possibly including mastodon, tapir, sloth, horse, caribou, camel, llama, elk, deer, and others. The hafted area is defined and possibly strengthened (Titmus and Woods 1991) by lateral grinding and by surface flutes that extend from the base to about one third of the length of the point. The lanceolate shape and fluting indicate a binding that allowed deep penetration of the spear into an animal. Many exhibit impact fractures, and resharpened points seem to be simply shortened versions of a tip-

damaged larger point. Other possible Paleoindian tools found in Florida include bola-like stones and a boomerang (Milanich 1994). Also in northwest Florida, points and scrapers were made from flakes removed from large bifaces. These bifaces functioned as combination core and knife tools, emphasizing the need for a portable toolkit. Unfortunately, little is known of the cultural expression except for base camps, extraction (almost exclusively hunting) camps, quarry locations, and the apparent focus on hunting. Logically, gathering wild plants and fishing must have been as prominent, if not more so, but we are only on the verge of discovering sites that can produce confirmatory data (McNett et al. 1977). Our point of reference remains a combination of western United States sites (mostly kill sites) and our knowledge of the late Upper Paleolithic of Europe.

The movements of Paleoindian populations, specifically the determination of settlement ranges, are being explored throughout the East through detailed lithic raw material source identification analyses (e.g., Ellis and Lothrop 1989; Tankersley 1989, 1990, 1991). Unfortunately, regional and subregional scale analyses are in their infancy, although Geographic Information System (GIS)-based efforts are beginning to emerge encompassing large areas and datasets (Faught 1995; Faught et al. 1994; Gillam 1995). While population estimates have yet to be attempted on a regional scale, analyses of sites and artifact incidence over a number of localities in the region indicate that appreciable population growth was likely occurring during the Paleoindian period (Anderson 1990b).

### The Emergence of Regional Traditions (10,750–10,000 BP)

There are a great many named varieties of fluted and unfluted lanceolate Paleoindian projectile points in the eastern United States, assemblages that are commonly if somewhat arbitrarily placed into Early, Middle, and Late subperiods, with estimated temporal ranges of from circa 11,500 to 10,900 BP, 10,900 to 10,500 BP, and 10,500 to 10,000 BP (Anderson 1990b, 1995a,b; Goodyear in press). These subperiods are thought to correspond to the occurrence of lanceolate fluted points resembling Western Clovis forms that are variously called Eastern Clovis, Gainey, or Clovis Variants; fluted and unfluted forms with broad blades and constricted hafts like the Barnes, Cumberland, Suwannee, Simpson (Daniel and Wisenbaker 1987; Dunbar and Waller 1992), Quad, and Beaver Lake types; and resharpened lanceolate corner- and side-notched forms like Dalton, San Patrice, Hardaway (Coe 1964), Crowfield, Bolen, and Big Sandy. As we have seen, however, absolute dating for the first two of these subperiods is minimal outside the Northeast. The increasingly evident close technological affinities between Clovis and northeast Arkansas/central Mississippi Valley Dalton technology (Bradley in press) suggest, furthermore, that Dalton evolved directly from Clovis in the central Mississippi Valley, perhaps as early as 10,800 years ago. Thus, traditional dates assigned to Dalton, from circa 10,500 to 9,900 BP (Goodyear 1982), may eventually be pushed back.

Accordingly, given the ambiguity that attached to the "Middle Paleoindian" temporal construct as it is presently conceived—Dalton assemblages may well overlap with some or all of the period—in this discussion we have chosen a date of 10,750 BP as a useful dividing line for the Paleoindian period, with the hope that distinct assemblages will be discovered and firmly dated in the near future to help refine the regional sequence and chronology. Because appreciable variability is evident in the initial Clovis occupations in the region, which occur in areas as diverse as the karstic river valleys of Florida, along the major

drainages of the midsouth, and along the northern glacial lake and sea margins (Storck 1984), some of the diversity currently attributed to later societies likely began to emerge at a very early time level. Finally, because existing well-dated later fluted point assemblages date to circa 10,600 BP or later in the region (Lepper and Meltzer 1991; Levine 1990), it is unlikely that major stylistic changes indicative of the emergence of subregional cultural traditions occurred precisely at 10,900–10,800 BP. Such changes are evident, however, by 10,750 BP or soon thereafter.

The demise of classic Clovis projectile point forms appears to correspond closely with the extinction of Pleistocene megafauna, suggesting that the two events are closely related. While timing is uncertain, these events appear to have occurred some time around 10,900–10,800 BP (Haynes 1987, 1992; Mead and Meltzer 1984). The emergence of a number of subregional cultural traditions, identified by distinctive stylistic projectile point forms, has been noted at this time and explicitly linked to decreases in group mobility and interaction that occurred with the changeover in hunting from a strategy targeting megafauna to one focused on essentially modern game animals, amid a regional landscape characterized by increasing numbers of people (Anderson 1990b; Anderson *et al.* 1992; Morse and Morse 1983). That is, populations throughout the East are assumed to have been adopting habitual use areas, precluding the option of group movement into previously unoccupied areas. The disappearance of key target megafauna would have comprised the earlier big game or “high technology foraging” adaptation (*sensu* Kelly and Todd 1988), which was simultaneously under stress given the increase in groups occupying more or less fixed ranges. Such a view of developments in the East does not require massive population growth, only the adoption of fixed ranges by local populations. Furthermore, as subregional cultural traditions emerged, specific adaptations would have varied from area to area, due to differences in climate, physiography, and resource structure.

In the idyllic environment of the middle portion of the Mississippi River Valley, the late Paleoindian expression climaxed in what is called Dalton culture. Dalton culture ( $\approx$  10,700–10,200 BP) existed throughout the southeastern United States and in much of the Midwest (Goodyear *in press*). However, the richness of the remains, site types, and formal tool assemblages characteristic of the central Mississippi Valley do not seem to have existed elsewhere. In the central Mississippi Valley, over 750 Dalton sites have been plotted and well over 1000 complete Dalton points have been collected; at some sites 100–350 points have been professionally collected. One reconstructed settlement system model (Morse 1971) postulates a base camp with satellite extraction sites including hunting camps similar to the Brand site (Goodyear 1974). The cemetery is also separate from the base camp or village. A base camp represented a local group or microband that was associated with a single watershed that extended from hardwood uplands with raw stone resources into the cypress–gum floodplain. Up to 6 microbands in neighboring watersheds interacted as a band network held together by trade in exotic stone and red ocher and by the marriage exchange of mates. Another settlement model postulated is seasonal nomadic movement of bands across parallel watersheds from one upland to another (Schiffer 1975), a trek that took DeSoto’s Spanish army 4 days to accomplish in 1541. Gillam (1995) has demonstrated that group territories likely were oriented along rivers and near lithic sources in northeast Arkansas.

A most unique expression is the cemetery, as exemplified by the Sloan site (Morse *in press*; Morse and Morse 1983:89–95). The Sloan site excavation (14 m  $\times$  14 m  $\times$  0.5 m deep) produced 144 points, 30 adzes, 36 endscrapers, and over 200 other tools. A total of 141

fragments of human bone were also recovered (Condon and Rose in press). With very rare exceptions, the points were in pristine unused condition and ranged up to 20 cm in length.

Dalton points are different from earlier points. While still lanceolate, the hafting area attached to the foreshaft is considerably shortened, based on length of lateral grinding. Serrated points were resharpened laterally as knives to cut meat (Yerkes in press). Impact fractures are characteristic of unresharpened points; presumably resharpened points would penetrate deeply only with difficulty owing to the creation of a "shoulder" that would have hindered penetration beyond the haft. Another tool of note was the true woodworking adze (Morse and Goodyear 1973). Adzes hafted in handles by leather and characterized by wear typical of wood and charred wood (Gaertner in press) were evidently used to make dugout canoes. While these technological changes are easily recognized, the effects of these changes, if any, on the later mid-Holocene shift to food production is not readily understood as yet. But it is evident that people before the end of the Pleistocene were very sophisticated technologically in a number of regions of the world, including the eastern United States. The carved wooden objects are now gone, but the stone tools that produced them survive. Other tools include end-scrapers and a variety of other unifaces, abraders, and cobble tools (Morse and Morse 1983). Found at Sloan was an edge-abraded cobble that was probably used to pound wild plant food. In fact, *Chenopodium*, one of the plants destined to be cultivated, was recovered from Dust Cave and dated circa 10,000 BP (Driskell and Goldman-Finn 1994). An eyed bone needle was recovered from the Dalton deposit at Graham Cave in Missouri (Logan 1952:55). Such needles would have been necessary for the production of tailored clothing by the original immigrants, who had to adapt to an Arctic environment.

Paleoindian points are normally manufactured of high-quality chert. These cherts are often traceable to specific outcrops, and there is a clear association of many sites with quarry activities (Goodyear in press). Movements of peoples over a distance of 150–200 km or more have been postulated. At the Arkansas Sloan site, many points were manufactured of Crescent Quarry chert, which outcrops immediately south of St. Louis, Missouri, or about 300 km north of Sloan. Dalton-like points that appear to have been made of Arkansas Pitkin chert (House 1975) have been reported to Morse as found in Alabama and near the Texas–New Mexico border. There is a potential wealth of information in chert-sourcing studies, but better means of identification and closer attention to known hunter–gatherer behavior must accompany these investigations (Binford 1980; Cable 1982, 1992; Ellis and Lothrop 1989; Kelly 1983, 1992; Morse 1975; Tankersley 1989, 1991).

Radiocarbon dates on Dalton deposits tend to be later than expected (Goodyear 1982). Most of these dates were based on charcoal fragments contained within Dalton-bearing levels that also contained early Archaic notched points. It was assumed previously that bioturbation was minimal and that the stratigraphic context was properly interpreted. At Rodgers Shelter, two dates were derived from samples associated with Dalton hearths:  $10,530 \pm 650$  BP and  $10,200 \pm 300$  BP (Wood and McMillan 1976). The 10th millennium BP dates (i.e., 9,000–9,999 BP) supposedly on Dalton deposits at other sites probably date the initial Holocene expression in the East; notched points were also part of the basal deposits of those sites. Samples from Rodgers definitely need to be redated via AMS, but these two dates are considered the best Dalton dates extant (Goodyear 1982).

The Dalton expression is most evident in the central oak–hickory vegetation zone. To the south in the mixed pine and hardwoods section are found fewer sites and artifacts, but the technology is clearly Dalton in character (Goodyear in press). To the north in the

boreal forests and the mixed conifer–northern hardwoods, Dalton points decline in number but seem to be replaced by late non-Dalton fluted points. Despite its variable regional distribution, according to distinctive local culture areas, Dalton is significant in that it is the first adaptation since Clovis that has such a large areal distribution, covering in this case the lower half of the eastern United States. Counting the various regional expressions with included Dalton-like points, an area spanning from east Texas to Missouri, and to Virginia and south Georgia can be reconstructed (Goodyear in press).

Typologically, Dalton points really begin the intensive resharpening of the Paleoindian lanceolate for hafted knife usage. Prior to this resharpening, the concern seems to have been with retipping the point. The beveling often seen on the Central Mississippi Valley Dalton, and other subsequent Early Holocene notched and stemmed points, is a by-product of the repeated application of serrations to the knife margins. These resharpened serrations are a functional hallmark of the Early Holocene hafted bifaces that follow in time. Regular resharpening of blade edges that eventually leaves a shoulder because it is covered by the haft is the technological common denominator of a variety of point types within the Dalton horizon.

### Initial Holocene Adaptations (10,000–9,000 BP)

After the Dalton horizon, there is a generally recognized sequence of two more projectile point horizons that follow closely in time. Following Tuck (1974), these are the “Big Sandy” (side-notched) and Kirk (corner-notched) horizons. Side-notched points are radiocarbon-dated to the first millennium of the Holocene (Broyles 1966, 1971; Chapman 1976). The side-notched horizon is best represented by Bolen points in Florida, where they have been found in underwater karst deposits (Dunbar *et al.* 1988), and at Dust Cave in northern Alabama in stratigraphically discrete layers (Driskell 1992).

Dust Cave and Page-Ladson have produced large numbers of logically ordered radiocarbon dates, demonstrating that side-notched point forms (locally described as Big Sandy, Bolen, or Early Side Notched) may have first appeared around 10,200 BP, somewhat earlier than previously thought. Dust Cave yielded only minimal evidence for Dalton occupation or use, in the form of a few badly reworked and fragmentary points that may have been brought in by later occupants. The site is only a few kilometers from the Stanfield-Worley rock shelter, one of the region’s major excavated Dalton sites (DeJarnette *et al.* 1962). Dalton sites in northeast Arkansas and southeast Missouri do not contain early notched points, suggesting that Dalton and side notching are temporally and perhaps culturally distinct horizons. There are point forms in the region, however, that appear to reflect a mixture of Dalton and side-notched characteristics, such as Hardaway and San Patrice, suggesting that an evolution between the two forms did occur (Brookes 1979; Morse and Morse 1983; Goodyear in press; C. H. Webb *et al.* 1971).

The Kirk corner-notched horizon or “cluster” (Chapman 1976) is well-dated throughout most of the eastern United States. Corner-notched Early Archaic points consistently date from 9,500 to 8,800 BP (Broyles 1971; Chapman 1976). The chipped stone tools of the side- and corner-notched complexes are essentially the same, with a strong emphasis on unifacial flake tools, nearly all of which can be traced back to previous fluted point complexes. The Kirk horizon is significant for its areal distribution over the East. Owing to its widespread occurrence, from Florida to Ontario (see Ellis *et al.* 1991), it represents a large-scale

reunification of the East for the first time since the colonial Clovis culture some 1,500 years earlier. No doubt by 9,000 BP, most climatic barriers and biotic limitations had ameliorated such that aboriginal populations or ideas could freely migrate and exist in an effectively modern Holocene environment. Models have been constructed at this time period of band-level local groups occupying individual drainages, or portions of drainages, and loosely tied together into larger entities consisting of a number of bands (Anderson and Hanson 1988; Anderson and Sassaman in press; Kimbal 1992). Similarity in artifact style is evident over the region, suggesting that there were no distinct cultural boundaries and that individual movement was fairly open and unconstrained. Factors shaping Early Archaic settlement included environmental structure, specifically seasonal and geographic variation in food and other resources; the need for maintenance of mating networks; information exchange, notably for mating network maintenance, social interaction, and subsistence resource regulation; and regional demographic structure, evidenced in population size and spacing. Settlement is thought to have been characterized by the use of a logistically provisioned seasonal base camp or camps during the winter and a series of short-term foraging camps throughout the remainder of the year. Fall aggregation events by groups from two or more different drainages are assumed to have occurred at prominent and resource-rich locations.

The decrease in hafting area seen on notched points continues a trend seen in Dalton points. Either the atlatl appeared at this time or this spear thrower underwent a significant technological advance immediately after the Pleistocene. The early Holocene notched horizon in Louisiana and southern Arkansas is known as San Patrice (corner-notched and side-notched) and the expression in Tennessee (north of the southern pine zone) is known as Kirk. Actually, many corner-notched types include side-notched varieties. During almost a millennium, corner-notched points increased in size. Larger points were beveled as knives; however, they were beveled opposite the way classic Dalton points in the Central Mississippi Valley were beveled. A shift in point orientation during the knapping process may have taken place. Dalton points are thought to have been resharpened by right-handed knappers with the tip held toward the knapper and notched points renewed as knives with the point tip held away from the knapper. The foreshaft may have undergone some sort of design change, possibly requiring the knapper to hold it in a different position on the thigh for proper balance during rejuvenation. It is also possible that pressure was applied in opposite directions on a point held in the same position during these respective time periods.

### **Terminal Early Archaic Adaptations (9,000–8,000 BP)**

The western and midwestern parts of the eastern United States are characterized by Hardin Stemmed points during this period. These points seem to have developed from earlier larger corner-notched points called St. Charles. Southward Kirk Stemmed and other stemmed varieties were characteristic. This millennium saw the demise of classic corner notching of the Kirk type and an evolution toward the last horizon of the Early Archaic, that of the Bifurcate horizon in the Appalachian portion of the East (Anderson 1991b; Chapman 1976:5). Such a horizon had been posited by James Fitting (1964) earlier. Bifurcate points are essentially created by removing a notch in the base of a corner- or side-notched point. Toward the end of the 9th millennium BP, bifurcates begin to be replaced by true stemmed points such as Stanly, which ushered in several other changes in the chipped stone inventory. A number of poorly dated phases based on differences in projectile

point types comprise the last early Holocene complexes of the East. It is clear, however, that significant regionalization occurred during the post-Kirk period such that geographic lacunae appear to exist. There is the strong possibility of whole regions being abandoned or lightly occupied from 8,500 to 7,500 BP, something evident when regional scale maps showing the distribution of Early and Middle Archaic sites are examined (Anderson and Sassaman *in press*).

The expansion of pine and cypress forests in the interriverine and riverine zones of the southeastern Coastal Plain at the end of the Early Archaic and the onset of the Middle Holocene, for example, appears to have led to appreciable depopulation of this region, something attributed both to the broad-scale global warming occurring at this time and to an increase in the occurrence of fires accidentally or intentionally set by Indian populations (Delcourt and Delcourt 1981, 1987a). Increased use of interior areas, in the Piedmont and Appalachian Summit, by populations using bifurcate-based projectile points is clearly evident at this time, with major reoccupation of the Coastal Plain not indicated until later in the Middle Archaic (Anderson 1991a; Anderson and Sassaman *in press*; Chapman 1975).

Over the course of the Paleoindian and subsequent Early Archaic era, group settlement range decreased, regional population densities grew, and mobility over a wide area was no longer feasible or desirable, leading to the abandonment of the formal stone toolkit that so characterizes this period of settlement. There may have been climatic factors at work that were particularly related to the Hypsithermal period (8,000–4,000 BP). This period was one of warmer and drier conditions, the effect of which was most pronounced in the midwest. The climatic situation farther east, north, and south is not as clear. Strong regional differentiation took place both altitudinally and latitudinally within the East.

It is also within this period or immediately afterward or both that we see the final dissolution and loss of an essentially Upper Paleolithic chipped stone technology that had continued from Clovis times in the selection of cryptocrystalline raw materials used to make finely crafted unifacial flake tools and bifaces, most of which were heavily curated. With the onset of early Holocene stemmed point technology in much of the East (Hardin Stemmed is an apparent exception to this rule), there was a decrease in the use of exotic cryptocrystalline lithics in favor of more local and often poorer raw materials and a loss of most of the well-made unifacial tool forms of the previous 2,500 years. As some have noted, the real technological break in lithic traditions in large parts of the East may not be at the Paleoindian–Early Archaic transition (or the Pleistocene–Holocene border), but between early Holocene and middle Holocene lithic technologies.

## SUMMARY AND CONCLUSIONS

The eastern United States and southeastern Canada comprise a large and diverse region. At the end of the Pleistocene, there were also major changes in fauna and flora. At one time, spruce forests existed as far south as Memphis, Tennessee. Until about 10,900 BP, mastodon, mammoth, bison, tapir, llama, horse, camel, giant beaver, and ground sloth were present in much of the region. The Great Lakes evolved toward their present configuration, a rising sea level covered large parts of the Coastal Plain and flooded the karst region of Florida, and the plains/prairie in the west began to expand eastward. Deciduous forests expanded within the midsection of the region.

Initial colonization is thought to have begun by about 12,000–11,500 BP and probably was rapidly funneled down the Mississippi drainage into most of the eastern United States. Primary staging areas of small bands of local groups were located in large river valleys within exceptionally rich environments and near excellent chert sources. Over 8000 fluted points have been recorded so far in the eastern portion of North America. The points probably were mainly used as weapons to hunt larger land game. The environments occupied, however, would also have contained abundant waterfowl, fish, and a diverse and rich assemblage of edible flora. Only in the Northeast might there have been limits on edible flora. There is very little evidence of actual big-game hunting, and most investigators interpret this lack to mean that white-tailed deer and caribou contributed the major largest game sought.

Initial colonization is thought to be represented by Clovis-like points. Fluted points that are similar to Folsom are interpreted as representative of a later, post-Clovis occupation. After about 10,750 BP, there was a wide range of locally diverse styles, all of which are only very generally dated. Together, they provide evidence of increased populations, increased geographic occupation, and increased specialization in the exploitation of diverse ecologies. It is at this time (10,750–10,000 BP) that we get a glimpse of the sophistication of these earliest Americans in the East who were responsible for the fluted points. Bone needles are a reflection of the need for tailored clothing to the north. Red ochre reflects the very early use of a color primary to modern Native American life. Sophisticated stone tools interpreted to have been specially manufactured for woodworking are indicative of the possibility that objects such as masks and dugout canoes were made by the earliest colonists. Stone tools interpreted to have been used to grind vegetation for food have helped to defuse a total protein diet hypothesis. Cemeteries can mean that some populations were much less nomadic than thought and that there was a rich religious element to the matrix of what has always been assumed to be family local groups. Expansion of populations beyond the chert sources is an indication of the presence of sophisticated and peaceful trade relations to ensure access by all inhabitants to stone to make tools. That there is widespread similarity in styles of fluted points reflects a Paleoindian world view that encompassed much of the eastern part of the United States and Canada.

In the past, interpretations of the eastern United States Paleoindian have focused on the big-game-hunting model generated by the discoveries of kill sites in the western United States. There are many more points and sites in the east. There is more water, more game, and more vegetation diversity. Chert is universal, much of it in the form of gravel disbursed by glacial meltwater. Marine resources are vast. Populations have traditionally been larger and more advanced technologically in the east. Models of Paleoindian behavior have to be based on internal Eastern data, not tied to being modeled on a single aspect of western Paleoindian cultural reconstruction.

What were the cultural changes during the circa 10,000 BP shift from the Pleistocene to the Holocene? As archaeologists, we see a very significant change in projectile point styles. Fluted lanceolate points terminate and triangular notched points appear. The change is evidently sudden and universal, with a possible transitional period *thought* to be represented by points that can be classified as intermediate in basic style. If diet has not changed significantly, we can only infer that there was a technological advance in the weaponry used to obtain part of that diet. More significant cultural changes (in settlement and in tool technology), however, seem to have taken place after 8,000 BP. A decline in end scrapers may reflect a decreased emphasis on hide production for example.

What effects have the expansion of the northern land surfaces and the shrinkage of the eastern and southern coastal plain had on Paleoindian populations? Obviously, these effects constitute important aspects of changes in settlement and exploitation. Changing forests also were important aspects. Emphasis must have been on those natural resources that offered a high predictability of reliability and that continued to be hunted and gathered and then domesticated during the ensuing Holocene. No one lives for the distant future, but there is a tradition of the past that guides our futures.

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