Reports

PLANT HUSBANDRY IN PREHISTORIC EASTERN NORTH AMERICA: NEW EVIDENCE FOR ITS DEVELOPMENT

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Squash remains from three Late Archaic archaeological sites constitute the earliest evidence for cultigens in eastern North America. The new data indicate the tropical cultigen, squash, was introduced into the area prior to the domestication of native plant resources.

Mesoamerica, one of the centers of the origin of horticulture, was the locus for the domestication of a variety of New World cultigens (Flannery 1973:287-301). One of these cultigens, squash, is now known to have occurred in eastern North America by 2300 B.C., predating any evidence for native domesticates. The new data indicate that the eastern horticultural complex was not an independent development but was a regional adaptation of the concept of horticulture that originated in Mesoamerica.

Archaeological evidence documents that a well-developed horticultural complex, based on tropical (maize-beans-squash) and native (sunflower-sumpweed) cultigens, was established in eastern North America by A.D. 1000 (see Cutler and Blake 1973; Struever and Vickery 1973). Plant remains from Salts Cave, Kentucky, indicate that by 500 B.C., Early Woodland groups utilizing the cave may have relied on cultigens for as much as 40% of their food on at least a seasonal basis (Yarnell 1969:45, 1974:122). Explanations of the origin of the complex postulate either independent domestication of native plant resources or development of native domesticates following the introduction of cultigens from Mesoamerica. Evidence from 3 Late Archaic archaeological sites in Missouri and Kentucky (Figure 1) indicates that squash was introduced into the area by 2300 B.C., while the earliest known native domesticate, sunflower, does not appear until ca. 1000 B.C. The present evidence indicates that the development of the eastern horticultural complex was initiated following the introduction of a cultigen domesticated in Mesoamerica.

Squash was among the botanical remains in the Late Archaic components of the Phillips Spring site, 23Hi216, located on a Holocene terrace of the Pomme de Terre River in southwestern Missouri (Chomko 1976). The earliest component at the site, a lenslike stratum designated Feature 2, was exposed in a backhoe trench on the northern margin of the spring. No further excavations took place in that area, but soil and radiocarbon samples were collected from the profile wall. Charred wood from the base of the lens dated at 4,310 ± 70 radiocarbon years: 2360 B.C. and 4,240 ± 80 radiocarbon years: 2290 B.C., with an average of 4,280 ± 50 radiocarbon years: 2330 B.C. (Hass and Haynes 1975:359). Carbonized wood from the soil sample yielded a date of 3,927 ± 61 radiocarbon years: 1977 B.C. (SMU-319). Excavations at the site concentrated on a second Late Archaic component, dating from 3,330 ± 50 radiocarbon years: 1380 B.C. (SMU-331) to 2,910 ± 50 radiocarbon years: 960 B.C. (SMU-238), which did not yield evidence of cultigens. No unit comparable to this second component was visible in the profile above Feature 2, nor was a unit comparable to Feature 2 present in the area of the major excavations. The lithological discontinuity may be a result of localized strata related to spring genesis.

The Feature 2 soil sample (processed by washing the sediments through a 250 μ screen) yielded seeds of squash, grape, bulrush, pokeweed, elderberry, blackberry, amaranth, and bedstraw;

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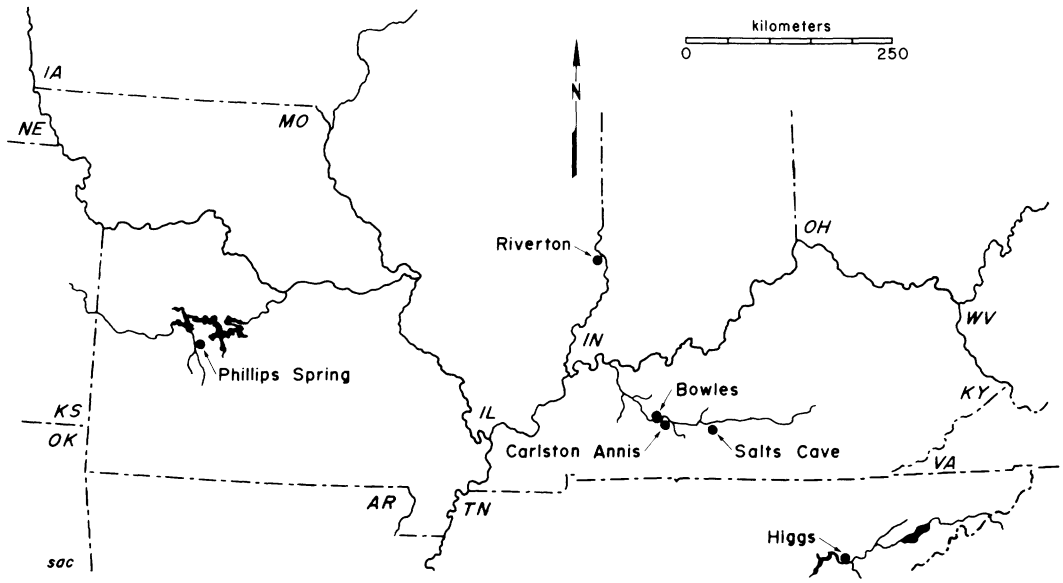

Figure 1. Location of sites discussed in the text.

acorns, hickory nuts, and walnuts were also present. Hugh Cutler of the Missouri Botanical Garden identified the squash as *Cucurbita pepo* L., similar to early forms of a cultivar named "Mandan." The seeds measure: 10.2 × 7.6 mm; 8.9 × 6.7 mm; 10.6 × 7.5 mm; and 10.0 × 6.8 mm; a minimum of 7 additional seeds were too fragmentary to permit measurement. Although the seeds were not charred, the peatlike sediments of the spring margin provided ideal conditions for their preservation.

Squash remains have also been recovered from 2 Late Archaic shell mounds near the Green River in western Kentucky (Marquardt and Watson 1977a, 1977b). The sites, Carlston Annis (15Bt-5) and Bowles (15Oh-13), are components of the Indian Knoll phase originally described by Webb in the 1940s (Webb 1946). Ten radiocarbon dates are available for Carlston Annis; 5 of the determinations, made on antler and shell collected by Webb, range from 5,149 ± 300 radiocarbon years: 3199 B.C. to 4,289 ± 300 radiocarbon years: 2339 B.C., with a probable unreliable determination of 7,374 ± 500 radiocarbon years: 5424 B.C. (Webb 1951; Libby 1952). Four dates on wood charcoal collected by Marquardt and Watson (1977a; 1977b) range from 4,500 ± 60 radiocarbon years: 2550 B.C. to 3,330 ± 80 radiocarbon years: 1380 B.C., with a fifth date of 2,515 ± 80 radiocarbon years: 565 B.C. occurring out of the expected stratigraphic sequence. The oldest date from the recent series (2550 B.C.) was from level 12 of unit C13. In addition, 2 dates were obtained on wood charcoal from unit A3 of the Bowles site (Marquardt and Watson 1977a): 3,440 ± 80 radiocarbon years: 1490 B.C. from level 11 and 2,420 ± 200 radiocarbon years: 470 B.C. from level 7. A third date of 1,820 ± 300 radiocarbon years: A.D. 130 is associated with a burial just below the plow zone.

One of the primary objectives of the recent excavations in Kentucky was the recovery of plant remains. Units of 1 m^2 were excavated by 15 cm levels at both sites: all the fill from units C1 and C13 at Carlston Annis and approximately 50% of the fill from unit A3 at Bowles was processed by immersion in water to "float" off the light fraction (organic material). Both shell mounds contained remains of hickory nuts, acorns, walnuts, and hazelnuts; the most numerous seeds were grape, persimmon, and honey locust.

Crawford and Richard Yarnell identified 11 small, carbonized fragments of squash rind (less than 4 mm in diameter and 1.4 mm thick), which were in levels 3, 6, and 20 of unit C1 and level 8 of

unit C13 at Carlston Annis and in levels 5, 12, and 15 of unit A3 at the Bowles site. In addition, 2 squash seeds, 1 from level 11 of unit C13, and 1 from level 9 of unit A4 of the Carlston Annis site, have been tentatively identified. The squash is probably *Cucurbita pepo* L., since Kentucky is well outside the range of the nearest wild species, *Cucurbita foetidissima* L.

Squash remains from the Bowles site occur well below the earliest available date from the site (1490 B.C.). Two radiocarbon dates of 4,040 ± 180 radiocarbon years: 2090 B.C. (from level 8) and 4,250 ± 80 radiocarbon years: 2300 B.C. (from level 10), both from unit A1, are stratigraphically above the cucurbit remains in level 20 of unit C1 of the Carlston Annis site. These dates, and those from Phillips Spring, indicate that squash was present in eastern North America by 2300 B.C.

Prior to the Phillips Spring and Indian Knoll materials, it appeared that native plants were being domesticated before the introduction of squash into the east. Previously, the earliest record of a tropical cultigen was squash associated with domesticated sunflower from the Riverton site in Illinois, which may date as early as the late second millennium B.C. (Yarnell 1976:269). In addition to the sunflower from the Riverton site, domesticated sunflower was present at the Higgs site in Tennessee, associated with dates which range from 1020 to 780 B.C. (Brewer 1973; McCollough 1974). Based on the presence of domesticated sunflower by 1000 B.C., Yarnell suggests the process of domestication began early in the second millennium B.C. (1976:267).

Furthermore, the stratigraphic sequence of cultigens at Salts Cave indicated that eastern plant husbandry was established prior to the introduction of tropical cultigens. The site, about 60 km east of the Indian Knoll mounds, was occupied from approximately 1500 B.C. to A.D. 100 (see Watson 1974). Sunflower and sumpweed, both native domesticates, first occurred in level 11 and were present upward through level 4, while squash did not appear until level 5, at a time when there was an apparent increase in horticultural activity (Yarnell 1974:117, 1976:267). Yarnell suggests that squash was introduced at the site by approximately 600 B.C. (1976:268) while sunflower and sumpweed first appear as early as 1500 B.C. (personal communication). Thus, the Salts Cave data seemed to corroborate the previous evidence of the developmental sequence of cultigens in the east. In addition, these data appear to suggest an independent indigenous development of the eastern horticultural complex; that is, the domestication of a native cultigen prior to the introduction of a tropical cultigen.

At present, the new data (the squash from the Phillips Spring and Indian Knoll phase sites) indicate the beginning of the eastern horticultural complex by 2300 B.C. By approximately 1000 B.C. some groups had domesticated native plant resources (sunflower and sumpweed) and by 500 B.C. the sequence at Salts Cave documents that native and tropical cultigens were important subsistence items. The route of introduction of squash into eastern North America remains unclear. The earliest evidence for squash in the southwest is a minimum of 1000 years younger than the squash in the east (Yarnell 1976:266-267). The difference between southwestern (squash-maize) and eastern (sunflower-sumpweed) plant husbandry led Yarnell to suggest that both were taking place without a direct relationship between the 2 early sequences (1976:267). Although the new data do not help to explain the relationship between southwestern and eastern horticulture, they do indicate that both sequences were initiated following the introduction of tropical cultigens. Furthermore, the new data indicate that the eastern horticultural complex was not an independent development but was a regional adaptation of the concept of plant husbandry which originated in Mesoamerica.

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CHANGING HOLOCENE ENVIRONMENTS AT THE KOSTER SITE: A GEO-ARCHAEOLOGICAL PERSPECTIVE

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Geomorphologic and sediment-stratigraphic study of the Koster site has been carried out in the broader context of the lower Illinois Valley. Accumulation of reworked loess in an overdeepened tributary valley began at Koster shortly after 10,000 B.P., and continued through Holocene times with major sedimentary breaks. The Illinois floodplain began to stabilize ca. 5000 B.P. after rapid aggradation, but remained a dynamic environment that developed its present patterns after 2500 B.P. Valley-margin hillside vegetation was considerably more xeric during the periods 1200-950 B.P., 2100-1900 B.P., and ca. 9700-5000 B.P., with hillside woodland reduced to hill prairie or parkland ca. 8500-7700 B.P. These dramatic Holocene environmental changes suggest that interpretative archaeological models for cultural adaptations through time must consider the environment as a critical variable, rather than as a constant.

The Koster archaeological complex is stratified within a thick suite of Holocene deposits in a minor tributary valley of the lower Illinois River. The locality is at the contact between two macroenvironments—limestone bluffs and upland loess or till plains to the east and the Illinois floodplain to the west. It is also situated within a mosaic of mesoenvironments on the sloping

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