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CONTENTS

CHAPTER 5

CORNCOBS AND BUTTERCUPS: PLANT REMAINS FROM THE GOLDKREST SITE

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The Goldkrest site is located on Kuyper Island in the floodplain of the Hudson River in the Town of East Greenbush, Rensselaer County, New York (Figure 5.1). In the seventeenth and eighteenth centuries, Kuyper Island was a discrete island adjacent to the larger Papscanee Island. The two islands were separated by the Kuyper Kill (Dunn 1994:28; Huey 1993:Figure 1). Today, Kuyper Island is attached to Papscanee, no longer an island but part of the mainland.

The site was discovered in May 1993, during investigation of a natural gas transmission pipeline corridor. Data recovery was conducted in Autumn, 1993, by a multidisciplinary team of researchers. Excavation at the Goldkrest site unearthed a buried living floor (Stratum III) radiocarbon-dated to the Late Woodland (A.D. 1000 to Contact) and early Historic (A.D. 1500 to 1600) periods. Associated with it were hearths and pit features, numerous post molds forming rectangular and oval patterns representing community structures, and biological remains such as charred plant parts, calcined bone, and shell (Lavin et al. 1996, 1997).

A small Middle Woodland (A.D. 1 to 1000) occupation was uncovered in the lower portion of Stratum IV, three feet below the Late Woodland-early Historic component. It contained few artifacts, one unidentifiable seed part, and two possible charred *Chenopodium* sp. or *Amaranthus* sp. seeds. The Middle Woodland component's irrelevance to archaeobotany precludes its discussion in this chapter.

Goldkrest is the first undisturbed major Late Woodland and early Historic Native American habitation site discovered in the upper Hudson valley. Additionally, it is the first site in the upper valley (and the second site within the entire length of its eastern side) to contain evidence of pole-frame community structures, including a longhouse. Significantly, Goldkrest is located in the heart of Mahikan tribal territory (Lavin et al. 1997, Vol. I). A mighty nation respected by both the Dutch and the English in the seventeenth and eighteenth centuries, the Mahikan once controlled huge land tracts on both sides of the upper and middle Hudson valley from Pine Plains, the Roeliff Jansen Kill on the south to Lake Champlain on the north, and as far east as the Housatonic River valley in what is now west-central Massachusetts and northwestern Connecticut (Dunn 1994). Except for scanty information derived from early European documents, relatively little is known about the early history of this once powerful Algonquian-speaking population.

Other Native American archaeological sites on the west bank of the Hudson have uncertain historic affiliations because at various points in time they were controlled by the Mohawk

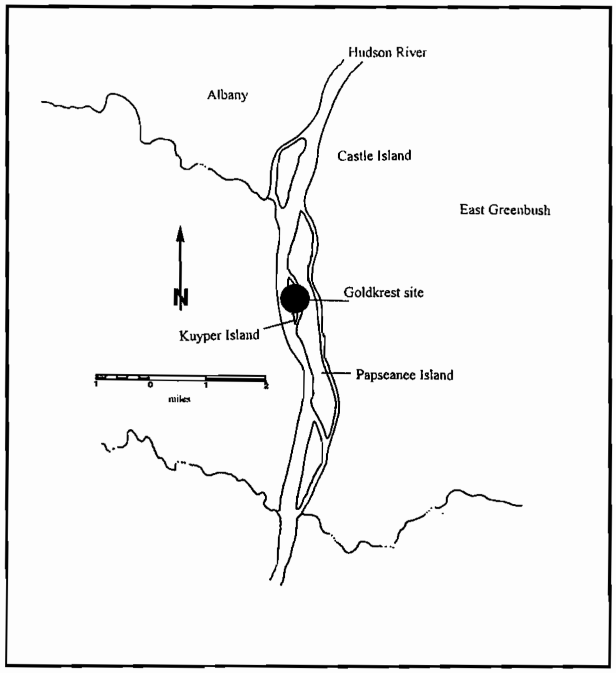

Figure 5.1 Approximate location of the Goldkrest site in the Hudson River Valley. Map adapted from Huey (1993: Figure 1).

Iroquois as well as the Mahikans. Goldkrest's association with the Mahikan cultural group, however, is undisputed (Dunn 1994:45-62). Consequently, archaeological investigations at Goldkrest are unearthing invaluable information on the lifeways of late prehistoric and early historic Mahikan people. Specifically, botanical remains from the site provide a window into the economy, medical herbalism, extractive technology, and settlement system of a fifteenth- to seventeenth-century Mahikan community.

CHRONOLOGY

As noted above, the Late Woodland/early Historic occupations at Goldkrest were located in a buried living floor extending from Stratum III to the top of Stratum IV. Five features from the interface of these two strata were analyzed for this chapter. Three of these (Post Mold 3 in Excavation Unit 118, Post Mold 3 in Excavation Unit 127, and Red Stain A in Excavation Unit 127) were associated with the floor of a rectangular longhouse (Structure B) located in Locus 1 in the northern portion of the site (Figure 5.2). A date of 1090 ± 90 B.P. (Beta-70836; uncalibrated) was obtained on wood charcoal from Feature 22, a central post within the structure. However, this date likely is invalid since the feature had exhibited extensive rodent disturbance. A second date of 340 ± 50 B.P. (GX-22663-AMS, ^{13}C-corrected) on wood charcoal from Red Stain A most probably dates the construction of the building.

An early Historic hearth (Feature 59) associated with Stratum III was discovered during monitoring at approximately S15E0. It lies within Locus 1 some distance from Structure B. It is not assumed to be associated with that structure at this stage of analysis. Its radiocarbon date of 350 ± 50 B.P. (Beta-76846; uncalibrated) identifies it as an early Historic feature. Its calibrated (Stuiver and Reimer 1993) date at 1σ is A.D. 1472-1641, however, which suggests it may have been a Late Woodland or Historic feature. Two sheet-brass fragments, which support an early Historic context, were recovered along with charred plant remains.

A concentrated deposit of shell remains (Feature 41) was recovered from the Late Woodland/early Historic levels at the interface of Strata III and IV in Locus 3 at the southern end of the site.

ANALYTICAL METHODS

Flotation was carried out using a machine modeled after that used by Struever (1968). The contents of all cultural features were floated, and 50 percent of each sample was sorted by Archaeological Research Specialists (ARS) staff under low magnification using a stereomicroscope. Preliminary analysis of recovered botanical materials was conducted by Kathleen Furgerson and Marina Mozzi (Furgerson 1994). Those botanical specimens deemed to have high research potential and significance were analyzed further by Tonya Largy.

All specimens were examined under magnifications of 5X to 300X. All specimens (except seeds) were weighed to within 0.01 g. Individual specimens were manipulated with "feather-light" forceps to protect these fragile materials from breakage. Specimens were resorted into classes such as seed, nutshell, wood, and other plant parts. Uncharred seeds, discussed below, were identified without recording frequency (total numbers), but a representative sample of each taxon was saved. Wood fragments were only incidental in the samples submitted for analysis, and the request for analysis did not include identification of charred wood.

Taxa were identified to family, genus, and species using manuals (Martin and Barkley 1961; Montgomery 1978) and reference collections, including Largy's personal collection of charred seeds and nutshell supplemented by herbarium collections housed in the Morrill Science Center at the University of Massachusetts, Amherst. Identification of all species was made to the nearest taxonomic level possible using the described methods. All taxonomic nomenclature follows *Gray's Manual of Botany*, 8th edition (Fernald 1973 [1950]).

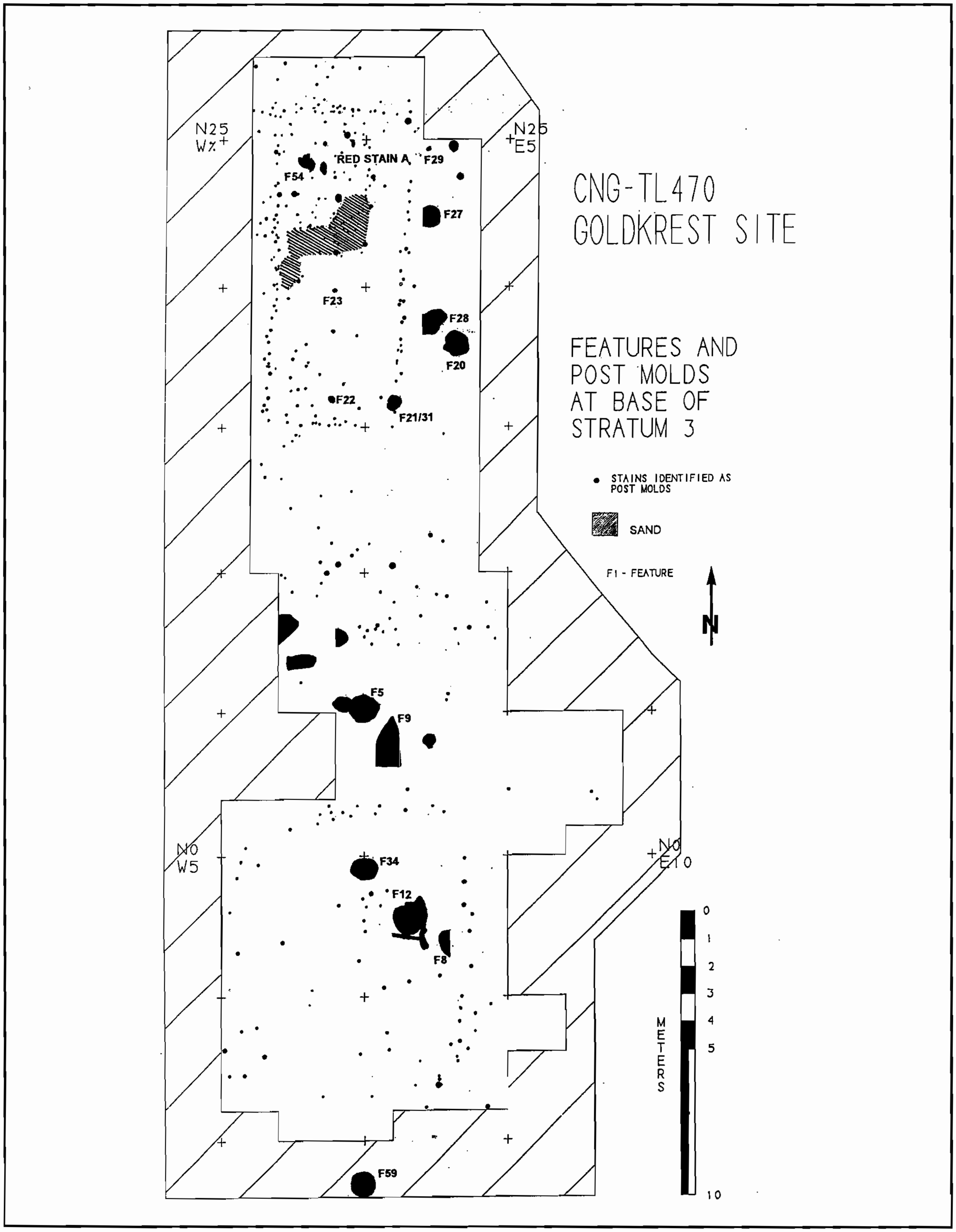

Figure 5.2 Postmold and feature distribution Map of Locus 1 at the Goldkrest site.

Table 5.1. pH Values for Selected Features at the Goldkrest Site.

Feature	Inventory Number	pH Value
Feature 59	Flot. No. 216	6.7
Post Mold 3, EU 127	S.S. No. 89	6.9
Red Stain A, EU 127	Flot. No. 173	6.9

Preservation and Recovery

Preservation

Preservation bias is a factor in the recovery of aboriginal plant remains from archaeological sites. In northern temperate latitudes with acidic soils such as are often found in New York and New England, plant remains are limited generally to the more structurally robust plant parts that preserve well when charred, unless unusual conditions are present. Goldkrest plant remains are limited to charred seeds, nutshell, maize (*Zea mays*) cob fragments, miscellaneous fragments of stems/roots, and very small fragments of unidentified plant material.

Soil pH values from both column and feature soil samples are close to neutral, ranging from 6.37 to 7.66. The literature on soil chemistry suggests that pH values are affected by a number of variables. For example, pH values measured in the laboratory may be different from measurements taken in the field due to the added absorption of carbon dioxide when soil samples are allowed to equilibrate with the atmosphere, a standard procedure (Coleman and Mehlich 1957:79). Table 5.1 lists the pH values for three of the five features submitted for analysis.

Another factor which contributed to the preservation of organics at the Goldkrest Site, and one which must not be underestimated during this analysis, is that of alluvial deposition. Frequent flooding of the Hudson River during historic times effectively protected Goldkrest's fragile archaeological components, as well as the faunal and botanical remains they contain, from oxidation. As such, a comparatively high preservation potential was anticipated prior to, and confirmed upon, excavation and analysis.

No pH value was obtained from Feature 41, described as a "shell concentration" (Furgerson 1994), but we assume it is within the neutral range due to the calcium carbonate in the shell. Non-calcined bone and shell are preserved at Goldkrest, although in varying degrees of degradation due to taphonomic processes (Dirrigl in Lavin et al. 1997).

Plants are more fragile than animal bone and shell, which have a different set of preservation biases (Pearsall 1989), and therefore they would not be expected to preserve as well in an uncharred state in this region under normal conditions, unless the site were waterlogged. Plant preservation from Strata III and IV at Goldkrest is comparable to other sites examined by Largy in Southern New England. The literature reflects the difficulty in interpreting uncharred seeds recovered by flotation. We follow Minnis (1981) in considering only charred remains as prehistoric unless there is a specific reason to believe otherwise. Because of the nature of this project, no off-site controls are available for comparison with samples recovered on-site.

Recovery

Recovery bias may affect plant macrofossil data obtained by flotation. Recovery rates may be monitored by adding controls to the flotation process, such as distinctive exotic charred or uncharred seeds of a certain number. The rate at which these controls are recovered by flotation gives some idea of the percentage of archaeobotanical seeds being recovered, although an equal rate cannot be

Table 5.2. Uncharred Seed Taxa Recovered from Selected Features at the Goldkrest Site.

Feature No.	Unit No.	Item No.	Flotation No.	Common Name	Scientific Name
59	S15E0	02	216, 218	Common purslane	*Portulaca oleracea*
59	S15E0	02	216, 218	Common elderberry	*Sambucus canadensis*
59	S15E0	02	216, 218	Green amaranth/pigweed	*Amaranthus retroflexus*
59	S15E0	02	216, 218	Goosefoot	*Chenopodium* sp.
59	S15E0	01	216, 218	Pink Family	Caryophyllaceae
59	S15E0	02	216, 218	Composite Family	Compositae
PM 3	EU127	20	SS 54	Grass Family	Gramineae
PM 3	EU127	20	SS 54	Chickweed	*Stellaria* sp.
PM 3	EU127	20	SS 54	Wood-Sorrel	*Oxalis* sp.
PM 3	EU127	20	SS 54	Common purslane	*Portulaca oleracea*
PM 3	EU127	20	SS 54	Goosefoot	*Chenopodium* [*album*]
PM 3	EU127	20	SS 54	Green amaranth/pigweed	*Amaranthus retroflexus*

assumed. Although no controls were used during flotation, the uncharred seed data suggest the recovery rate was good (Table 5.2). One of the smallest (<1.0 mm) seeds in the flora of New England, common purslane (*Portulaca oleracea*), was recovered from both Feature 59 and Post Mold 3, Unit 127. Most of the remaining uncharred seed species measure approximately 1 mm in length/width. It is probable that a high percentage of preserved charred plant data was recovered from Goldkrest soil samples.

Results of Analysis

Uncharred Seeds

Nine taxa were identified from two features, Feature 59 (a hearth) and Post Mold 3. These taxa, with common names, are listed in Table 5.2. Six were identified to genus/species, while three were identified only to family. *Portulaca oleracea* (common purslane); *Chenopodium* sp. and *C. album* (goosefoot); *Amaranthus cf. retroflexus* (green amaranth or pigweed); *Stellaria* sp. (chickweed); *Oxalis* sp. (wood-sorrel); and families Caryophyllaceae (pink); Compositae (composite or daisy); and Gramineae (grass) are herbaceous taxa while *Sambucus canadensis* (common elderberry) is a woody shrub. Common elderberry is found in moist soils along stream and riverbanks and other moist habitats. All other taxa are weedy species that invade disturbed habitats such as gardens, roadsides, and clearings. Many of the identified taxa are native to northeastern North America, while at least one, *C. album*, was introduced from the Old World.

There are no clear guidelines to the interpretation of uncharred seeds, as stated above. There often is no undisputed indication of contemporaneity with a prehistoric occupation, and the problem is compounded when more recently dated sites, such as Goldkrest, are under consideration. However, it is significant that insect body parts are present in the same samples. Extensive experience in analyzing archaeobotanical samples from sites in Southern New England leads us to conclude that there is a significant correlation between the presence of numerous taxa of uncharred seeds and insect body parts in the same sample.

Insect remains in an archaeological site may be interpreted in several ways. Dirrigl and Greenberg (1995) have discussed the usefulness of examining the role of insect remains in site interpretations. Elias (1994) has summarized many Quaternary fossil insect studies from North America and Canada. He has stated, "Insect exoskeletons are found chiefly in anoxic sediments that contain abundant organic detritus. Insects decompose rapidly in heavily oxidized sediments" (Elias 1994:18). Therefore, the long-term preservation of insect chitin from late Holocene archaeological contexts in very recent alluvial sediments, such as Goldkrest, is unknown for northeastern North America.

Little is known, too, about microhabitat segregation of insects (i.e., the vertical distribution of their living areas beneath the soil). Different insect species live in different microhabitats during various stages of their development, making it difficult to determine their microhabitat for each stage (Stefan Cover, personal communication). Direct dating of the insect remains from deeper contexts would address the issue of contemporaneity with cultural materials of a certain age in contexts other than human burials. (See Dirrigl and Greenberg 1995 for a discussion of insects associated with human burials).

Insect remains also may provide evidence of bioturbation. One unpublished example is Largy's identification of nutlets of *Crataegus Phaenopyrum* (Washington Thorn) from a prehistoric feature on Liberty Island in New York harbor. This commonly planted ornamental species of hawthorn has not ranged historically in that area; rather, it is native to regions much further south and west. These nutlets were present in flotation samples from all levels of the feature, which underlay a thick shell midden deposit and two strata of historic fill. Largy interpreted their presence as intrusions resulting from earthworm activity in the shell layer above, which she observed while samples were being collected from the feature. Following this, we argue that the uncharred seed from Goldkrest likely are intrusive and have no cultural association.

Charred Seeds

Eight taxa were identified among 368 seeds from four features at the Goldkrest site. These taxa, with common names listed in Table 5.3, are summarized in Table 5.4.

Seven taxa native to Southern New England and one cultigen are included. Five seeds remain unidentified since no diagnostic landmarks are preserved. In addition, six specimens either are questionable as seed, incomplete, fragmentary, or lack their testa (outer seed coat), which precludes identification. Several are identified with the designation "cf.", meaning they "compare with" that taxon, but the specimen may be incomplete or somewhat distorted, preventing a definite identification.

Feature 59, an early Historic rock hearth feature dated to 350 ± 50 B.P., yielded 361 (98 percent) of the total number of charred seeds and 6 of the identified taxa (*Ranunculus* sp; *Rubus* sp.; *Sambucus canadensis*; cf. *Chenopodium* sp.; *Zea mays*; and Paniceae). From the features associated with the longhouse floor, three taxa (*Zea mays*; Polygonaceae/Cyperaceae; and cf. *Vitis* sp.) were identified from Post Mold 3, EU 127; one taxon (*Zea mays*) from Post Mold 3, EU 118; and one taxon (*Zea mays*) from Red Stain A, EU 127. No identified taxa were recovered from Feature 41.

All identified taxa, except maize, are native to northeastern North America, and all have economic uses as food or medicine, or ritual purpose (Moerman 1986; Tantaquidgeon 1972; Waugh 1973). However, most of the wild taxa also may be classified as ruderals, early succession "weedy" species that invade disturbed soils such as clearings and gardens. These taxa are commonly found in floodplain habitats. Common elderberry, the only shrub species represented, requires moist soils and grows in riparian habitats along stream banks, in swamps, and in wetlands.

Ranunculus sp. (buttercup) is the most frequently (317) recovered taxon (Figure 5.3). An additional 25 achenes distorted by the charring process came from the same sample and closely resemble this taxon. If both groups are combined, they represent 93 percent of the charred seed assemblage. The buttercup flower produces numerous fruits, technically referred to as ach-

Table 5.3. Charred Seed Taxa Recovered from Selected Features at the Goldkrest Site.

Feature No.	Unit No.	Item No.	Flotation No.	Qty.	Common Name	Comments
41		18	160	1		Seed?
59	S15E0	07	216, 218	1		Seed endosperm
59	S15E0	07	216, 218	5		Unidentified Seed (no landmarks)
59	S15E0	07	216, 218	1		Incomplete seed
59	S15E0	07	216, 218	1		Incomplete seed
59	S15E0	07	216, 218	1	Millet	Tribe Paniceae
59	S15E0	07	216, 218	2	Common elderberry	*Sambucus canadensis*
59	S15E0	07	216, 218	3	Bramble/Berries	*Rubus* sp.
59	S15E0	07	216, 218	9	cf. Goosefoot	cf. *Chenopodium*
59	S15E0	07	216, 218	25+	cf. Buttercup	cf. *Ranunculus*
59	S15E0	07	216, 218	317	Buttercup	*Ranunculus* sp.
59	S15E0	07	216, 218	4	Maize?	*Zea mays* kernel? frags
PM3	EU127	15	SS 52	1	cf. Maize	cf. *Zea mays* seed frag
PM3	EU127	14		1	Maize?	Poss. *Zea mays*
PM3	EU127	14		1	Maize	*Zea mays*
PM3	EU127	21	SS 54	1		Seed? frag
PM3	EU127	21	SS 54	1	cf. Grape	cf. *Vitis* sp.
PM3	EU127	21	SS 54	1	Buckwheat/Sedge Family	Polygonaceae/ Cyperaceae
PM3	EU127	19	SS 89	1	Maize	*Zea mays* kernel
Red Stain A	EU127	07	177	1	Maize	*Zea mays* kernel

Table 5.4. Summary of Charred Seed Taxa Recovered from Selected Features at the Goldkrest Site.

Plant Type	Genus/Species	Count	Common Name
Woody Shrub	*Sambucus canadensis*	2	Common elderberry
Woody Vine	*Rubus* sp.	3	Bramble/berries
Herbaceous	*Ranunculus* sp.	317+	Buttercup
Herbaceous	cf. *Chenopodium* sp.	9	Goosefoot
Herbaceous	cf. *Vitis* sp.	2	Grape
Herbaceous	Family Polygonaceae/Cyperaceae	1	Buckwheat Family/Sedge Family
Herbaceous	Gramineae, Tribe Paniceae	1	Grass Family, Millet Tribe
Cultigen	*Zea mays*	3+5?	Maize

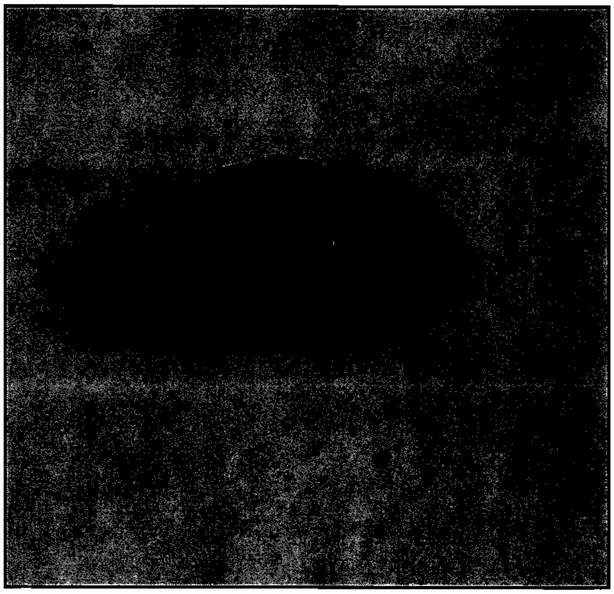

Figure 5.3. Sample of Charred *Ranunculus* Seeds recovered from Feature 59.

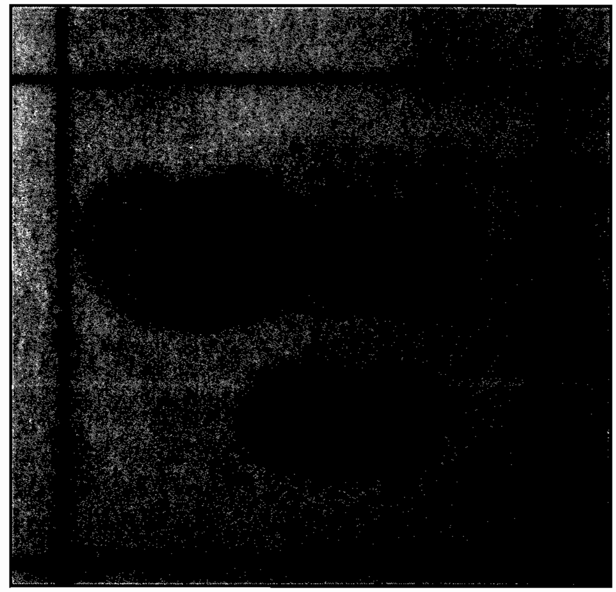

Figure 5.4. Modern uncharred *Ranunculus abortivus* Seeds for comparison (grid=5mm).

enes, clustered in a "head." These achenes, each consisting of a kernel (the true seed) inside the thin, dry fruit coat (pericarp), may number 30 or more per flower. Among the various species, uncharred achenes range from approximately 1 mm to 3.5 mm in size. This is the most unusual taxon identified at Goldkrest and may be a first for Southern New England. One achene has been reported by Asch Sidell (this volume) from a site in Maine. To our knowledge, there has been no other published identification.

The genus *Ranunculus* includes a number of species native to the Northeast. Six native species of buttercup are listed as growing in eastern New York within the geographic range of the Goldkrest site (NYFA 1990). None is edible, since they contain "acrid-narcotic poisons" (Fernald 1973 [1950]:642). Fernald and Kinsey (1958:202-203) discussed emergency food uses for two species, *R. bulbosus* and *R. scleratus*, but these are naturalized from Europe and Asia (Fernald 1973 [1950]). Several scholars (Arnason et al. 1981; Duke 1986; Herrick and Snow 1995; Moerman 1986) have listed numerous medicinal uses for plants of this genus by many native groups, including the Iroquois who used *R. abortivus* (Figure 5.4) against witchcraft, for counteracting "poison another has given you" (Herrick and Snow 1995:88). Possibly, this plant was considered as powerful medicine because it possesses a hook-like structure, one of the features which the Iroquois associated with "love and/or basket (witching) medicines" (Herrick and Snow 1995:90). *R. abortivus* is also included among the group of plants "thought to be effective in curing or preventing certain severe, English-named diseases" (Herrick and Snow 1995:90-91).

Ranunculus was used to treat ills ranging from toothache to venereal disease. All methods, save one, given by early twentieth-century Iroquois informants, involve crushing or steeping roots and drinking or applying the liquid to the affected area. According to Herrick and Snow (1995:124), Cayuga informant David Jack related to F. W. Waugh that the method for treating venereal disease was to "dry and cut up 4 plants and boil them down a little in 3 qt. water and drink often until quantity is gone." The time of year for collecting the plant was not specified, so it is unclear whether the seeds themselves were an integral part of the process. If treatment was administered in the spring, the seeds would have been available for collection, as well.

Significantly, this taxon was found in Feature 59, the same feature that produced the two European sheet-brass fragments and a radiocarbon date of A.D. 1600. The frequency of *Ranunculus* achenes in the rock hearth suggests it is not an accidental inclusion. Assuming that the presence of this species represents intentional use, some medicinal or ritual (charm) purpose likely accounts for its presence in the hearth.

Chenopodium sp. has been recovered frequently from archaeological sites in eastern North America (George and Dewar, this volume). This prolific seed-producer colonizes disturbed ground and is commonly found in gardens and larger agricultural fields. *Chenopodium* likely was an important high-carbohydrate food resource for aboriginal foragers (Fritz 1990:403; Smith 1995). Reduction in testa (seed-coat) thickness of seeds recovered from sites in the midwestern United States shows that *Chenopodium berlandieri* ssp. *jonesianum* was domesticated between 3,500 and 3,400 B.P. (Smith 1992:108). There is no published evidence as yet for domestication of this taxon in New England (George and Dewar, this volume). When charred *Chenopodium* sp. is recovered, frequently its condition is very fragile, as was the case for the nine Feature 59 specimens, which fell apart during examination. Seeds of *Chenopodium* sp. from the Burnham-Shepard site in South Windsor, Connecticut, were well preserved. A small sample examined by Bruce Smith was found not to be domesticated (Bendremer et al. 1991). Subsequently, the entire sample was examined by George and Dewar. They concluded that a number of specimens "exhibit variability in some characters that have been used to identify cultivated and feral status in the Midcontinent" (George and Dewar, this volume).

Sambucus canadensis, common elderberry, produces a small purple-black berry borne in large panicles. Both flowers and fruits are edible. The fruits ripen in very late summer and early fall. The Mohegan of Connecticut used both flowers and fruit in various medicinal remedies (Tantaquidgeon 1977:75). Waugh (1916:127) included elderberry in his list of "principal varieties" of berries used by the Iroquois. Aranson et al. (1981:2198) listed it among foods high in crude fiber.

Rubus sp. is another commonly eaten berry, usually borne on canes or long stems with prickles and found in a variety of soils. The genus includes blackberry, black raspberry, and red raspberry. Dewberry, another species in the genus, grows on vines that form mats and run along the ground in dry, sandy soils. All species require sunlight to produce a good crop of fruit and often colonize disturbed areas, clearings and the edges of woods and thickets. The berries ripen in July and August.

The Mohegan used juice of *R. hispidus* (blackberry) as a cure for dysentery (Tantaquidgeon 1977:75). It is also eaten extensively by birds and small mammals. Largy once observed in the field small mammal droppings with more than a dozen nutlets of *Rubus*, sp. There are many such circumstances for the accidental deposition of this species (as with many others) on archaeological sites. *Rubus* nutlets are dense-walled, which contributes to excellent preservation, and it is one of the most commonly preserved charred taxa from sites in the Northeast.

One seed, identified as belonging to either of two families (Polygonaceae or Cyperaceae), from Post Mold 3, Unit 127, lacks certain landmarks for definite identification to family. Seeds of both families bear many morphological similarities and are difficult to separate unless these landmarks are preserved after charring. Both families are prolific producers of edible seeds. Species of both families are found in a variety of soils, including wet and dry, and both often colonize disturbed habitats.

Preliminary interpretations of the Goldkrest site describing flotation methodologies and tentative results have been published elsewhere (Lavin et al. 1996:125). Subsequent analyses have shown certain of the tentative identifications to be incorrect. The *Portulaca oleracea* (purslane) seed was uncharred rather than charred. The seed thought to have been Caprifoliaceae or *Celtis* sp. (viburnum or hackberry) does not resemble these taxa and the specimen remains unidentified at this writing.

Cultigens

Zea mays (maize) is represented by kernels (Figure 5.5), cupules, and glumes. Two definite and 6

Table 5.5. Distribution of Maize Kernels and Cob Fragments Recovered from Selected Features at the Goldkrest Site.

Feature	Kernels Count	Kernels Item No.	Kernels Wt.	Cob Fragments Description	Cob Fragments Count	Cob Fragments Item No.	Cob Fragments Wt.
59	4 [a]	5	0.05	Cupule fragment	1	1	0.01
	–	–	–	Cupule	12	1	0.10
	–	–	–	Paired cupule	13	4	0.65
Post Mold 3.	1 [a]	14	0.02	–	–	–	–
Unit 118	1	14	0.02	–	–	–	–
	1 [b]	15	<0.01	–	–	–	–
Post Mold 3 Unit 127	–	–	–	Glume fragment	2	19	0.01
Red Stain A	1	9	0.13	–	–	–	–

Notes

[a] Identification uncertain.

[b] cf. *Zea mays*

probable kernels, 26 cupules, and 2 glume fragments were found in 4 of the 5 features analyzed (Table 5.5). Morphologically, the kernels appear to be those of Northern Flint maize, being wider that they are deep (Figure 5.6).

Preservation of maize kernels and cobs apparently differs depending on which part of the maize plant is charred. An informal experiment to carbonize an ear of maize in Largy's wood stove resulted in complete combustion of the entire cob while the charred kernels were preserved among the ashes. This same result was obtained by Mozzi with a class of Connecticut schoolchildren conducting ethnoarchaeological experiments. However, at Goldkrest, fewer kernels than cob fragments were recovered. Cassedy and Webb (this volume) report the recovery of similar ratios of maize kernels to cob fragments from Late Woodland sites in the eastern Hudson River valley. Adding to the mystery is the discovery of maize parts in features such as post molds, which are not directly associated with food preparation and consumption and (assuming the community structures had been constructed prior to harvesting) not open during such procedures. This suggests that maize was originally present in greater abundance than indicated by the actual recovered quantity. One possible explanation for this is that the inhabitants of Goldkrest were shucking the cobs and transporting the majority of kernels for future consumption at another encampment within the group's settlement system such as the main village or a winter hamlet. Goldkrest has been interpreted as a seasonal summer-fall hamlet.

Bendremer and Dewar (1994:372) summarized Late and Final Woodland sites with cultigens in New England and eastern New York known before Cassedy and Webb's results were disseminated. Their map of sites west of the Hudson River shows only two sites, Getman and Nahrwold, on two tributaries in the general vicinity of Albany, New York. Goldkrest makes important additions to the sparse data recovered so far in this region.

Maize had medicinal and industrial uses among the Mohegan of Connecticut. Dried cobs were boiled, and the liquid was used as a wash to cure the toxic effects of poison ivy (*Rhus toxicodendron*) (Tantaquidgeon 1977:77). Cobs were also used in games and to make dolls for children, while the husks were used to make baskets, as well as dolls (Tantaquidgeon 1977:80).

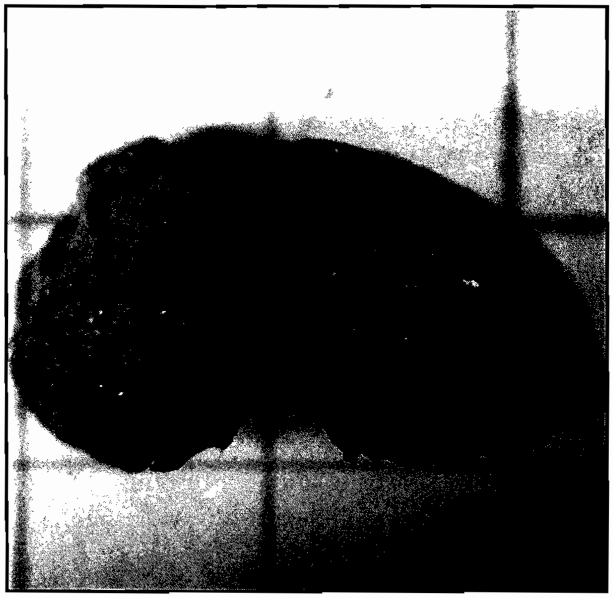

Figure 5.5. Maize kernal recovered from red stain A (grid=5mm).

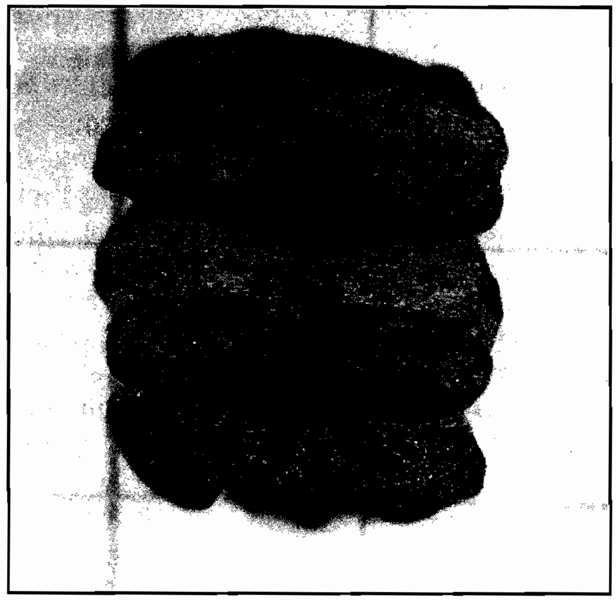

Figure 5.6. Paired cupules of maize recovered from Feature 59 (grid=5mm).

Little (1994; Little and Schoeninger 1995) has been working to establish a database of radiocarbon ages and ^{13}C values for maize in the Northeast. At her suggestion, a single charred maize kernel from Red Stain A, Unit 127, was submitted for AMS radiocarbon dating and isotope measurement to Geochron Labs., Inc., Cambridge, Massachusetts. A small wood charcoal sample, also from Red Stain A, Unit 127, was submitted for AMS dating for comparison (see Appendix I). The reported date for the kernel is 380 ± 50 B.P. (^{13}C-corrected; GX-22651-AMS). The date reported for the wood charcoal is 340 ± 50 B.P. (^{13}C-corrected; GX-22663-AMS). Little has reported that the two dates are likely to be nearly synchronous (Appendix I).

Nutshell

A total of 260 *Juglans cinerea* (butternut) shell fragments (9.31 g) was recovered from three features, (Feature 59, Post Mold 3 in Unit 118, and Post Mold 3 in Unit 127). Feature 59 yielded 90 percent of this sample. Post Mold 3 in Unit 118 produced 3 percent, and Post Mold 3 in Unit 127 produced 7 percent of the total. Note that this chapter does not include discussion of the 406 additional fragments of butternut from Goldkrest Features 12, 12A, 22, 23, 26, 27, 37, 43, 49, 54, 55, Post Mold 12, Post Mold 16, and three samples within Unit N10W4, identified by Furgerson (1994) during the earlier stage of analysis. Furgerson also reported 77 fragments of hickory (*Carya* sp.) from Features 22 and 26. No hickory nutshell was present in the five features analyzed by Largy.

Charred nutshell of any species may become incorporated in archaeological sediments in numerous ways. It may be indicative of cultural use for food, medicine, dye, or smudging to discourage insects. Non-cultural agents may include rodents, natural deposition from nearby trees, or the results of predation by other animals. Since nutshell is composed of dense plant tissue, it preserves well and can be charred as a result of a natural fire. However, when large numbers of nutshells are recovered from features and in the absence of off-site samples for comparison, we assume their presence indicates cultural use.

Butternut (*Juglans cinerea*) grows in bottomlands, on floodplains, and in mixed deciduous forests. Hickory (*Carya* sp.) grows in a variety of soil types and elevations. Both butternut and hickory ripen and are available through the fall. However, neither species produces a consistent crop annually. Both may be eaten fresh or stored for later use. Certainly butternut, also known as white walnut, would have been an important dietary component of aboriginal people. It contains exceptional amounts of iron, exceeding 6.5 mg/g, as well as protein and "significant quantities of oil" (Aranson et al. 1981:2197-2198).

Waugh documented butternut as one of the nut species used by modern Iroquois in a variety of ways (Waugh 1916:122-124). He stated that "the gathering of nuts was usually left to the women and children, who gathered the harvest after the frosts had brought it down. The hickory nut seems to have been the most widely esteemed" (Waugh 1916:122). In a small settlement such as Goldkrest, the presence of nutshell may represent women's and children's activities. He writes "nut-cracking outfits, consisting of a couple of rounded stones with pitted centres, were used in removing the shells. Many of the older people still remember these and a few specimens are occasionally found" (Waugh 1916:123). Native peoples boiled cracked hickory, walnuts, and "several others" to extract oil and to separate shells from nutmeat.

During boiling, shells fall to the bottom, nutmeats rise just above the shell, and oil rises to the surface where it is skimmed off and placed in a separate container (Fernald and Kinsey 1958:148). After skimming the nutmeats, these were mixed with other foods or crushed and added to maize soup (Waugh 1916:124). Nutmeat oil had numerous uses besides food. Waugh (1916:124) wrote, "It was often added to the mush used by the False-Face Societies. Nutmeat oil also was used formerly (like sunflower oil) for the hair, either alone or mixed with bear's grease." According to Lafitau (cited in Waugh 1916:124), the mixture was used as protection against mosquitos.

Talalay et al. (1984) suggested that butternuts were processed by cracking and extracting the meats by hand as described by Waugh rather than by boiling. Experiments show that boiling crushed walnuts (*Juglans nigra*) with shell density similar to butternut results in sinking of both shell and nutmeats to the bottom of the pot, unless the nuts were kept very dry for at least several months (Talalay et al. 1984:354). Their experiments further showed that during extended boiling, walnut hull fragments dissolve and quickly contaminate the nutmeats and oil, rendering them "unpalatable, if not inedible" (Talalay et al. 1984:354).

Late Woodland/early Historic stone-filled hearths discovered on the site contained nutshells and numerous charcoal and reddened earth and stone indicative of very intense firing. Several explanations exist to explain the presence of butternut shell in Goldkrest's hearths. One possible scenario is that the butternuts were first dried out by heating in the fires, then crushed and boiled in water as mentioned above. Other explanations include nut roasting and processing, and the incorporation of the sharp butternut shell fragments into the fire for use as fuel.

Summary and Conclusion

As the first intact Late Woodland and early Historic settlement investigated in the upper Hudson valley, Goldkrest offers the first opportunity for the archaeobotanical study of a Mahikan site. No other habitation sites with undisputed Mahikan affiliation have been excavated to date.

No written ethnobotany exists for the Mahikan people. In fact, few written ethnobotanies for northeastern Native Americans exist for the early Historic period other than general observations of early explorers and Jesuit missionaries.

The archaeobotanical data help to define early Mahikan diet, use of herbal medicine, and settlement patterning. The lithic, ceramic, and feature data suggest the Goldkrest site was an unfortified hamlet recurrently occupied by family groups over hundreds of years. Faunal analyses conducted by Dirrigl (Lavin et al. 1997, vols. I and IIIa) suggest the Goldkrest occupants fished, collected fresh-water shellfish, and hunted terrestrial mammals, all within the floodplain area. The archaeobotanical analysis expands the economic picture by demonstrating that the Mahikans also collected locally available wild plant resources and grew maize. The seasonal availability of several species allows us to establish the seasons of site occupation as mid-summer to early fall. The recovery of both maize kernels and cob fragments suggest that the planting fields may have been nearby. The discovery of a possible hoe fragment supports this theory (Lavin et al. 1997:60), as does documentary information. Seventeenth-century Dutch records note that land on the river in East Greenbush and Papscanee Island were cleared Indian fields prior to their purchase by the Dutch in the early 1600s (Dunn 1994:225-226). Goldkrest also allows a glimpse of how plants were used in ways other than subsistence.

Feature 59 represents the first occurrence of an obviously poisonous species found in great numbers in a context which may be interpreted as ritual or ceremonial. The recovery of Euro-American trade goods in the form of brass fragments from the same feature that yielded evidence of a plant species possibly used as a charm to ward off European disease is, perhaps, an omen of hard times to come.

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APPENDIX I: MAIZE AGE AND ISOTOPE VALUES AT THE GOLDKREST SITE

Elizabeth A. Little

Background

Archaeological finds of maize kernels in the Northeast have been, until recently, few and far between. In case their one or two kernels might provide genetic or other information, archaeologists on the coast have been averse to sacrificing these kernels to radiocarbon-dating procedures. Instead, we have been dating charcoal "associated" with maize kernels since William Ritchie's time (1969; see Bendremer and Dewar 1994; Hart, this volume). Now that Accelerator Mass Spectrometry (AMS) dating is available and well tested (Creel and Long 1986; Hedges and Gowlett 1986), single kernels can be dated. It is more costly than the ^{14}C-decay counting method, but it requires only one kernel and gives greater accuracy than the method using radiocarbon activity measurements.

Comparisons between "associated" charcoal and AMS maize ages in Illinois by Conard et al. (1984) suggest that many charcoal dates may not apply to the "associated" maize kernels. Some reasons suggested for this poor association are that:

> (1) The wood used in a particular fire may have been old when it died (see Schiffer 1986), may have stood dead for many years before falling, or may have been drifting from one river or coastal shore to another over a long period of time.
>
> (2) The feature or site may have been disturbed at any time by the activities of animals or people, or by trees toppling. Thus, young maize might have been introduced into an old feature, or, alternatively, very old charcoal could have come from an old forest fire or an early component of the site.

In summary, maize ages should be evaluated by comparing AMS ages of kernels with "associated" charcoal ages until we understand our site and feature chronology better than we do at present.

Along with ^{14}C aging, the lab can measure $\delta^{13}C$ and $\delta^{15}N$ isotope values for a kernel. The $\delta^{13}C$ values provide a correction for fractionation in maize up to 200 years (Hall 1967). They are also valuable for diet studies in the Northeast (Little and Schoeninger 1995) and can provide data on the changes in $\delta^{13}C$ values of the atmosphere (Marino and McElroy 1991). $\delta^{15}N$ values can provide information on the use of fertilizer by prehistoric people (DeNiro and Epstein 1981). However, since the nitrogen appears to have been destroyed by charring in the one northeastern archaeological kernel analyzed so far (Strauss 1994), in this instance we only plan a test to confirm the negative results.

Goldcrest Maize Kernel and Wood Charcoal

One nearly whole kernel, identified by Tonya Largy as typical maize with skin striations, was selected for ^{14}C aging, $\delta^{13}C$ and $\delta^{13}N$ measurements at Geochron Labs, Inc., Cambridge. The sample is illustrated in Figure 5.5. Its provenience is Item No. 9, Red Stain A, E1/2, Unit 127, N23W2; Light Fraction of Flotation No. 177. A small sample of wood charcoal from the same Red Stain A, Unit 127, was also selected for aging and $\delta^{13}C$ measurement. Both samples were associated with the longhouse with an estimated age of less than 1000 years. Because of the very small sizes of both samples, both were aged by the AMS method.

Results

For the charred maize kernel from the Goldkrest Site, Item No. 9, Unit 127, Geochron Labs reported the AMS radiocarbon age, GX-22651-AMS as 380 ± 50 ^{14}C yrs B.P., $\delta^{13}C$-corrected for fractionation. The value of $\delta^{13}C$ is -9.8‰. There was no nitrogen in the sample (NR-82895) for measurement of $\delta^{15}N$.

For the Goldkrest small wood charcoal sample from Red Stain A, Unit 127, Geochron Labs reported the AMS radiocarbon age, GX-22663-AMS, as 340 ± 50 ^{14}C yrs B.P., $\delta^{13}C$-corrected for fractionation. The value of $\delta^{13}C$ is -26.7‰.

Discussion

These two $\delta^{13}C$-corrected radiocarbon ages may be calibrated by Stuiver and Reimer's (1993) 20-year CALIB 3.03 program. The ages, now cal dates A.D., with the intercepts in parentheses and the ± 1-σ range (67 percent probability) on the left and right, become:

Maize: cal A.D. 1448 (1483) 1631, and
Charcoal: cal A.D. 1477 (1520, 1569, 1627) 1644

For ± 2σ, or 95 percent probability, the ranges are:

Maize: cal A.D. 1435-1648, and
Charcoal: cal A.D. 1445-1660

Because of the large overlap in age ranges, the two dates are likely to be fairly close in time (Long and Rippeteau 1974).

Summary

The radiocarbon ages and $\delta^{13}C$ values for associated maize and charcoal are valuable early contributions to a maize radiocarbon and stable isotope database for the Northeast. There are no surprises here. The lack of nitrogen in charred maize suggests that for the measurement of $\delta^{15}N$ in maize, uncharred kernels or cobs would be valuable to test.

References Cited

Aranson, T., R. J. Hebda, and T. Johns. 1981. Use of Plants for Food and Medicine by Native Peoples of Eastern Canada. *Canadian Journal of Botany* 59:2189-2325.

Bendremer, J. C. M., and R.E. Dewar. 1994. The Advent of Prehistoric Maize in New England. In *Corn and Culture in the Prehistoric New World*, edited by S. Johannessen and C. A. Hastorf, pp. 369-393. Westview Press, Boulder.

Bendremer, J. C. M., E. A. Kellogg, and T. B. Largy. 1991. A Grass-Lined Maize Storage Pit and Early Maize Horticulture in Central Connecticut. *North American Archaeologist* 12:325-350.

Coleman, N. T., and A. Mehlich. 1957. The Chemistry of Soil pH. In *Soil: The Yearbook of Agriculture*, pp. 72-79. United States Department of Agriculture, Washington, D.C.

Conard, N., David L. Asch, N. B. Asch, D. Elmore, H. Gove, M. Rubin, J. A. Brown, M. D. Wiant, K. B. Farnsworth, and T. G. Cook. 1984. Accelerator Radiocarbon Dating of Evidence for Prehistoric Horticulture in Illinois. *Nature* 308:443-446.

Creel, D., and A. Long. 1986. Radiocarbon Dating of Corn. *American Antiquity* 51:826-837.

DeNiro, M. J., and S. Epstein. 1981. Influence of Diet on the Distribution of Nitrogen Isotopes in Animals. *Geochimica et Cosmochimica Acta* 45:341-351.

Dirrigl, F. J., Jr., and B. Greenberg. 1995. The Utility of Insect Remains to Assessing Human Burials: A Connecticut Case Study. *Archaeology of Eastern North America* 23:1-7.

Duke, J. A. 1986. *Handbook of Northeastern Indian Medicinal Plants*. Quarterman Publications, Inc., Lincoln, Massachusetts.

Dunn, S. W. 1994. *The Mohicans and Their Land 1609-1730*. Purple Mountain Press, Fleishmanns, New York.

Elias, S. A. 1994. *Quaternary Insects and Their Environments*. Smithsonian Institution Press, Washington, D.C.

Fernald, M. L. 1973. [1950] *Gray's Manual of Botany*. 8th edition. Corrections supplied by R. C. Collins. Dioscorides Press, Portland, Oregon.

Fernald, M. L., and A. C. Kinsey. 1958. *Edible Wild Plants of Eastern North America*. Harper and Row, New York.

Fritz, G. J. 1990. Multiple Pathways to Farming in Precontact Eastern North America. *Journal of World Prehistory* 4:387-435.

Furgerson, K. 1994. Archaeobotanical Remains from the Goldkrest Site: Preliminary Results. Paper presented at the November Meeting of the Eastern States Archaeological Federation, Albany, New York.

Hall, R. 1967. Those Late Corn Dates: Isotopic Fractionation as a Source of Error in Carbon-14 Dates. *Michigan Archaeology* 13(4):171-180.

Hedges, R. E. M., and J. A. J. Gowlett. 1986. Radiocarbon Dating by Accelerator Mass Spectrometry. *Scientific American* (January): 100-107.

Herrick, J. W., and D. R. Snow. 1995. *Iroquois Medical Botany*. Syracuse University Press, Syracuse, New York.

Huey, P. R. 1993. The Mahicans, the Dutch, and the Schodack Islands in the 17th and 18th Centuries. In *Northeast Historical Archaeology, From Prehistory to the Present: Studies in Northeastern Archaeology in Honor of Bert Salwen*. Northeast Historical Archaeology pp. 21-22, 96-118.

Lavin, L., M. E. Mozzi, J. W. Bouchard, and K. Hartgen. 1996. The Goldkrest Site: An Undisturbed, Multi-Component Woodland Site in the Heart of Mahican Territory. *Journal of Mid-Atlantic Archaeology* 12:113-129.

Lavin, L., M. Mozzi, K. Furgerson, S. D. Dumas, T. Largy, F. J. Dirrigl, Jr., J.W. Bouchard, A. Krievs, and D. Mackey. 1997. *Stage III Archaeological Investigations: The Goldkrest Site, CNG TL-470, East Greenbush, New York*. 4 vols. Report submitted to the CNG Transmission Corporation, Clarksburg, West Virginia. On file at the New York State Office of Parks, Recreation, and Historic Preservation, Peebles Island, New York.

Little, E. A. 1994. Radiocarbon Ages of Shell and Charcoal in a Pit Feature at Myrick's Pond, Brewster, MA. *Bulletin of the Massachusetts Archaeological Society* 55:74-77.

Little, E. A., and M. J. Schoeninger. 1995. The Late Woodland Diet on Nantucket Island and the Problem of Maize in Coastal New England. *American Antiquity* 60:351-368.

Long, A., and B. Rippeteau. 1974. Testing Contemporaneity and Averaging Radiocarbon Dates. *American Antiquity* 39:205-215.

Marino, B. D., and M. B. McElroy. 1991. Isotopic Composition of Atmospheric CO2 Inferred from Carbon in C4 Plant Cellulose. *Nature* 349:127-131.

Martin, A. C., and W. D. Barkley. 1961. *Seed Identification Manual*. University of California Press, Berkley.

Minnis, P. 1981. Seeds in Archaeological Sites: Sources and Some Interpretive Problems. *American Antiquity* 46:145-152.

Moerman, D. E. 1986. *Medicinal Plants of Native America*. 2 vols. Technical Reports No. 19, Research Reports in Ethnobotany Contribution 2. Museum of Anthropology, University of Michigan, Ann Arbor.

Montgomery, F. H. 1977. *Seeds and Fruits of Plants of Eastern Canada and Northeastern United States*. University of Toronto Press, Toronto.

New York Flora Association (NYFA). 1990. *Atlas of New York State Flora*. New York State Museum Institute, Albany.

Pearsall, D. M. 1989. *Paleoethnobotany: A Handbook of Procedures*. Academic Press, New York.

Ritchie, W. A. 1969. *The Archaeology of New York State*. Revised edition. Natural History Press, Garden City.

Schiffer, M. 1986. Radiocarbon Dating and the "Old Wood" Problem: The Case of the Hohokam Chronology. *Journal of Archaeological Science* 13:13.

Smith, B. D. 1992. Prehistoric Plant Husbandry in Eastern North America. In *The Origins of Agriculture: An International Perspective*, edited by C. W. Cowan and P. J. Watson, pp. 101-119. Smithsonian Institution Press, Washington, D.C.

———. 1995. *The Emergence of Agriculture*. Scientific American Library, New York.

Struiver, S. 1968. Flotation Techniques for the Recovery of Small-Scale Archaeological Remains. *American Antiquity* 33:353-362.

Struiver, M., and P. J. Reimer. 1993. High-Precision Bidecadal Calibration of the Radiocarbon Time Scale, 500-2500 B.C. *Radiocarbon* 35:25-33.

Straus, A.E. 1994. *Intensive Archaeological Survey and Excavation of a Prehistoric Shell Pit Feature at Houselot 37, Bates Lane in Brewster, Massachusetts*. Report submitted to Massachusetts Historical Commission, Boston.

Talalay, L., D. R. Keller, and P. J. Munson. 1984. Hickory Nuts, Walnuts, Butternuts, and Hazelnuts: Observations and Experiments Relevant to Their Aboriginal Exploitation in Eastern North America. In *Experiments and Observations on Aboriginal Wild Plant Food Utilization in Eastern North America*, edited by P. J. Munson, pp. 338-359. Prehistory Research Series 6(2). Indiana Historical Society, Indianapolis.

Tantaquidgeon, G. 1977. *Folk Medicine of the Delaware and Related Algonkian Indians*. Pennsylvania Historical and Museum Commission, Anthropology Series, No. 3. Harrisburg.

Waugh, F. W. 1916. *Iroquois Foods and Food Preparation*. Geological Survey Memoir 86, Anthropological Series No. 12, Ottawa. (Facsimile edition published by National Museums of Canada in 1973).