1988

80-Archaeobotany of Sites 11-J-812 (24B2-185) and 11-J-818 (24B2-185E), Burning Star Mine #5, Jackson County, Illinois

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REPORT OF INVESTIGATIONS NO. 80

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The Schwartz (11-J-812; 24B2-185) and Copeland (11-J-818; 24B2-185E) sites are single component early Late Woodland encampments located in the Westfield Extension of Consolidation Coal Company's Burning Star Mine #5 in northeastern Jackson County, Illinois. The Westfield lies within but near the southern terminus of the Mt. Vernon Hill Country of the Southern Till Plains Division and is characterized by mature topography and low relief (Schwegman 1975). Elevation in the study area ranges from approximately 108 m ASL along the Little Muddy River, the principal stream passing through the Westfield, to 120 m ASL on adjacent uplands. The Little Muddy is tributary to the Big Muddy River, which it joins near the corner of Sections 14, 15, 22, and 23 of DeSoto Township (T8S R1W) at a distance of about 4.8 km SSE of the sites in question.

Braun (1950) includes the research area in the Oak-Hickory Forest Region of the Western Mesophytic Forest. Recent vegetation studies summarized by Lopinot (1980: 2-3) indicate that uplands in the Westfield formerly supported thinly timbered post oak flats, dominated by the post oak and blackjack oak, and prairie, while slope woodlands flanking the Little Muddy Valley were characterized by white oak and black oak, but with red oak and pignut hickory being prominent in this forest association. Bottomlands supported forests of mixed composition, including water tolerant species of oak and hickory, together with cottonwood, sycamore, black willow, elm, gum, and maple, to name just a few of the more common trees.

According to Lopinot (1980: 3) and to the environmental map provided

by Pulcher (1987: 213), the uplands in the immediate vicinity of Schwartz and Copeland at the time of the GLO surveys in 1807 were either thinly timbered and characterized by a brushy understory of shrub oak, hickory, hazel, grapevines, and briers or supported prairie vegetation of grasses and herbs. The aforementioned map places prairies of limited extent within a short distance to the north, east, and northwest of the sites.

Both sites are situated on slight ridges overlooking the Little Muddy River to the south. They lie at an elevation of about 117 m ASL, are between 40-80 m of the river, and are separated from one another by approximately 400 m distance east-west. Although originally estimated to encompass 13, 536 m^2 (Schwartz) and 1800 m^2 (Copeland), mitigation (Phase III excavation) was limited to machine removal of the plowzone from perhaps 1800 m^2 and 1000 m^2, respectively, followed by excavation of those cultural features exposed during the site stripping operation.

All cultural features recorded (15 at 11-J-812 and 25 at 11-J-818) are shallow basin-shaped pits, and Pulcher (personal communication, 3 Jun 86) has estimated that 80% of the 40 features contained Late Woodland ceramics; no other diagnostics are reported from feature contexts. A single radiocarbon assay of $1490^{+}_{-}110$ years: A.D. 460 from a feature at the Schwartz site is though to accurately date this component. However, the single date of $1750^{+}_{-}80$ years: A.D. 200 that was acquired from a feature on Copeland is regarded as being too early (Charles Moffat, personal communication, 30 Nov 87).

The macroplant remains that are the subject of this report were retrieved from feature fill screened through 12.5 mm hardware mesh

and a 5 l flotation sample collected from each feature. Following preparation of the tables in which all plant data submitted to this analyst are enumerated, AGR personnel continuing the study of the cultural context at the sites concluded that some of the soil stains previously identified as cultural features should rather be attributed to natural causes. Thus, while all the archaeobotanical remains included in the original submission are listed in Tables 1 and 2, the following lots are excluded from the text of this report.

Schwartz site	Copeland site
Lot #9, Feature 8	Lot #2, Feature 2
Lot #15, Feature 15	Lot #19, Feature 20
Lot #16, Feature 16	Lot #23, Feature 24

All of the above represent 5 l samples of sediment that yielded trace quantities of wood charcoal and carbonized nutshell in five of six instances.

DATA PRESENTATION

In aggregate, and excluding from further consideration the contents of the aforementioned six lots, the archaeobotanical assemblage from the sites is derived from 44 flotation samples aggregating 217 l of feature fill and seven samples hand picked from the sifting screen. A total of 9147 specimens weighing 91.77 g have been sorted and identified using 10X-20X magnification and reference to standard manuals for wood and seed identification (Core, Cote, and Day 1979; Martin and Barkley 1961; and Montgomery 1977). In addition, many specimens, both wild and domestic, were compared with both fresh and carbonized plant specimens collected and prepared by Mr. David DeFant, who studied the wood charcoal, and this analyst and maintained as a synoptic set in the Archaeology laboratory at Western Michigan University in Kalamazoo, Michigan.

SCHWARTZ SITE

The archaeobotanical material from 11-J-812 is summarized in Table 1. A total of 80 l of sediment from 16 feature floats yielded 7516 pieces weighing 61.74 g, with an additional 14 charcoal fragments totaling 3.43 g being collected from three screened samples.

Wood charcoal in the flotation residues, numbering 6762 pieces and weighing 50.72 g, occurs in 100% of the samples, represents 90% of all charcoal by count, and constitutes 82.2% of the total charcoal weight. While much is unidentifiable, the following woods (together with their frequency of occurrence in the samples) have been recorded: Quercus alba- 7; Q. rubra- 4; Carya spp.- 10; and Castanea dentata- 1. In addition, ring porous charcoal occurs in one sample, and oak bark has been identified in one flotation sample and a single sample from the sifting screen. Fully 88.7% of the identified wood charcoal by weight and 98.3% by count can be attributed to the genus Quercus and, presumably, the vast majority of the unidentified wood charcoal is also representative of oak firewood. Chestnut and hickory wood residues occur only in trace quantities in the samples.

By way of comparison, wood charcoal is both more abundant and varied at this small open air site than has been noted for the two Late Woodland components identified at the recently reported Little Muddy Rock Shelter located downstream and to the south of 11-J-812 (Cremin 1988). Not only do the Schwartz wood charcoal residues exhibit greater ubiquity and percentage frequency in the archaeobotanical sample, but the charcoal density or concentration in the floats (845.25 pieces per 10 l of sediment; 6.34 g/10 l) ranges between 32-47 times and 17-32 times greater than the values recorded for the

Table 1: Plant Residues from Flotation and Screened Samples, J-812 (24B2-185), Illinois.

Lot no.	ARG no.	Provenience	Sample Volume	Contents wt(g)/ ct		Comments
1	1	F-1, 0-8 cm	5			-Wood Charcoal
				.10	14	unid. wood charcoal
						-Nutshell
				.17	3	thickshelled Carya spp., hickory
				.02	1	thinshelled Carya sp.
				.26	49	unid. nutshell
						-Seed
				.05	8	Rhus glabra, smooth sumac
				.09	1	Viburnum prunifolium, viburnum or black haw
2	2	F-2	5			-Wood Charcoal
				.04	1	Quercus alba, white oak
				.13	14	unid. wood charcoal
						-Nutshell
				.09	1	C. glabra, pignut hickory
				.32	11	thickshelled Carya spp.
				.60	73	unid. nutshell
3	3	F-3, N 1/2	5			-Wood Charcoal
				.13	2	Carya spp. charcoal
				.36	63	unid. wood charcoal

Table 1, cont.

Lot no.	ARG no.	Provenience	Sample Volume	Contents wt(g)/ ct		Comments
						-Nutshell
				.35	7	thickshelled *Carya* spp.
				.14	6	*Carya* spp.
				.28	64	unid. nutshell
4	3	F-3	screened			-Nutshell
				.18	5	*Carya* spp. nutshell
5	4	F-4, N 1/2	5			-Wood Charcoal
				.12	2	*Quercus rubra*, red oak
				.08	1	*Carya* sp. charcoal
				.38	60	unid. wood charcoal
				.01	1	unid. bark charcoal
						-Nutshell
				.30	9	thickshelled *Carya* spp.
				.94	167	unid. nutshell
6	5	F-5, N 1/2	5			-Wood Charcoal
				.38	6	*Carya* spp. charcoal
				.12	2	*Q. alba* charcoal
				1.21	169	unid. wood charcoal
						-Nutshell
				.31	5	thickshelled *Carya* spp.
				.38	29	*Carya* spp. nutshell

Table 1, cont.

Lot no.	ARG no.	Provenience	Sample Volume	Contents wt(g)/ ct		Comments
7	6	F-6, W 1/2	5			-Wood Charcoal
				.93	13	Q. alba charcoal
				1.39	91	Quercus sp., probably Q. alba or white oak
						-Nutshell
				.41	9	thickshelled Carya spp.
				.16	27	unid. nutshell
8	7	F-6, E 1/2	5			-Wood Charcoal
				.21	4	Q. alba charcoal
				1.72	18	Carya spp. charcoal
				3.44	387	unid. wood charcoal
						-Nutshell
				.28	9	thickshelled Carya spp.
				.07	12	unid. nutshell
9	8	F-8, W 1/2	5			-Wood Charcoal
				.10	2	Q. alba charcoal
				1.42	51	unid. wood charcoal
10	10	F-10	5			-Wood Charcoal
				.15	2	Q. alba charcoal
				.13	3	Carya spp. charcoal
				.32	39	unid. wood charcoal

Table 1, cont.

Lot no.	ARG no.	Provenience	Sample Volume	Contents wt(g)/ ct		Comments
						-Nutshell
				.32	3	C. ovata, shagbark hickory
				.30	36	Carya spp. nutshell
11	11	F-11, N 1/2, 0-16 cm	5			-Wood Charcoal
				.09	2	Carya spp. charcoal
						-Nutshell
				.24	21	unid. nutshell
12	12	F-12, N 1/2	5			-Wood Charcoal
				.11	2	Q. rubra charcoal
				.32	1	Castanea dentata, American chestnut
				.07	1	Carya sp. charcoal
				.83	92	unid. wood charcoal
						-Nutshell
				.11	23	unid. nutshell
13	13	F-13, 0-11 cm	5			-Wood Charcoal
				.06	12	unid. wood charcoal
						-Nutshell
				.23	15	Carya spp. nutshell

Table 1, cont.

Lot no.	ARG no.	Provenience	Sample Volume	Contents wt(g)/ ct		Comments
14	14	F-14	5			-Wood Charcoal
				.20	6	Q. rubra charcoal
				.91	19	Q. alba charcoal
				.10	3	unid. ring porous charcoal
				5.70	1049	unid. wood charcoal
						-Nutshell
				.08	1	thickshelled Carya sp.
				.15	15	unid. nutshell
						-Seed
				.05	1	unid. seed coat fragment
15	15	F-15, N 1/2	5			-Wood Charcoal
				.09	3	Carya spp. charcoal
				.40	71	unid. wood charcoal
						-Nutshell
				.03	4	unid. nutshell
16	16	F-16, W 1/2	5			-Wood Charcoal
				.11	2	Carya spp. charcoal
				1.22	250	unid. wood charcoal
						-Nutshell
				.11	12	unid. nutshell

Table 1, cont.

Lot no.	ARG no.	Provenience	Sample Volume	Contents wt(g)/ ct		Comments
						-Seed
				.08	3	fragments of an unid. seed or nutlet
17	17	F-17, N 1/2	5			-Wood Charcoal
				.09	2	Carya spp. charcoal
				.36	46	unid. wood charcoal
				.08	1	unid. bark charcoal
						-Nutshell
				.32	7	thickshelled Carya spp.
				.24	42	unid. nutshell
						-Seed
				.07	1	fragmentary seed of the black locust, Robinia pseudoacacia
						-Other
				.03	1	squash (Cucurbita pepo) rind fragment
18	17	F-17	screened			-Nutshell
				2.49	8	C. laciniosa, shellbark hickory
19	18	F-18	5			-Wood Charcoal
				.08	1	Q. alba charcoal

Table 1, cont.

Lot no.	ARG no.	Provenience	Sample Volume	Contents wt(g)/ ct		Comments
				.16	3	Carya spp. charcoal
				.47	63	unid. wood charcoal
						-Nutshell
				.34	6	thickshelled Carya spp.
				.03	2	Quercus spp. nutshell
				.46	64	unid. nutshell
20	901	F-9, Level A[1]	5			-Wood Charcoal
				1.15	23	Q. rubra charcoal
				9.06	2415	unid. wood charcoal
						-Seed
				.01	1	unid. seed
						-Other
				.01	1	Vitis sp. (wild grape) peduncle
21	902	F-9, Level A[2]	screened			-Wood Charcoal
				.76	1	Quercus sp. bark charcoal
22	906	F-9, Level A[2], C & D	5			-Wood Charcoal
				19.49	2129	Quercus spp. bark charcoal
				.04	1	unid. distorted wood fragment
						-Seed
				.03	3	unid. seeds

Late Woodland I and Late Woodland II components at the rock shelter, respectively. Whether the observed differences in charcoal density reflect site seasonality, site function, duration of occupation, composition of the resident population, or some combination thereof, or, alternatively, aspects of differential organic preservation (i.e. feature context vs. midden) at the two sites, cannot at this time be ascertained.

Although nut charcoal exhibits a frequency of occurrence (93.3%) in the sample that is not markedly dissimilar from that recorded for wood charcoal, this material aggregates only 734 (9.8%) specimens weighing 10.60 g (17.2%) of all charcoal in the flotation residues. An additional 13 pieces of Carya nutshell (including one piece that has been identified as C. laciniosa) weighing 2.67 g have been hand picked from the sifting screen.

Of 734 nutshell fragments in the assemblage from Schwartz, fully 76.4% cannot be identified and are herein assigned to the category of "nut charcoal". The unidentified nut charcoal also aggregates 33.4% of all nutshell remains by weight. Aside from trace amounts of acorn shell and thinshelled hickory nutshell in single flotation samples, all of the identified shell fragments are representative of thickshelled hickory nuts. Thickshelled specimens (including shagbark hickory, pignut hickory, and kingnut hickory) occur in 13 of 14 floats yielding nut remains and aggregate 99.4% by count and 99.5% by weight of all identified nutshell in the samples. These figures are even more impressive than those noted for the two Late Woodland components at 11-J-814; albeit thickshelled hickory nuts clearly dominate the identified remains at the rock shelter.

Seed remains are poorly represented in the archaeobotanical material. A total of 18 (0.2%) specimens weighing 0.38 g (0.6%) occur in six flotation samples from five features. Eight seeds are unidentifiable. Single seeds of the black locust and black haw or viburnum and eight seeds of the smooth sumac, all from a single sample, constitute the remainder. The modest concentration of sumac seeds in one pit feature represents the best line of evidence for human utilization of fleshy fruits at the site, but given the general paucity of seeds of all kinds it is not possible to rule out accidental inclusion during the Late Woodland occupation as being responsible for their occurrence in archaeological context.

Finally, the residues include a single rind fragment of squash and the peduncle of a wild grape. The latter documents the occurrence of another fleshy fruit at this site that could have been collected in the immediate environs of 11-J-812. And the presence of squash, together with its occurrence in Late Woodland components at the rock shelter, provides additional evidence for the cultivation of this tropical plant by the Late Woodland residents of the Westfield.

COPELAND SITE

While the assemblage from 11-J-818 is much smaller than that presented above, in many respects it is more interesting. Twenty eight flotation and four screened samples from 25 features have produced 1599 and 18 carbonized remains, respectively. These aggregate 22.06 g and 4.54 g by weight. The archaeobotanical residues from the site are listed in Table 2.

In contrast to the aforementioned site, wood charcoal is not the dominant category in the Copeland site residues. Numbering 779 pieces

Table 2: Plant Residues from Flotation and Screened Samples, J-818 (24B2-185E), Illinois.

Lot no.	ARG no.	Provenience	Sample Volume	Contents wt(g)/ ct		Comments
1	1	F-1, 0-15 cm	5			-Wood Charcoal
				.07	2	Quercus rubra, red oak
				.05	2	Carya spp., hickory
				.07	4	unid. diffuse porous charcoal
				.60	34	unid. wood charcoal
				.03	2	unid. bark charcoal
2	2	F-2, 0-73 cm	5			-Wood Charcoal
				.47	11	Carya spp. charcoal
				.66	65	unid. wood charcoal
						-Nutshell
				.10	4	Carya spp. nutshell
3	3	F-3	5			-Nutshell
				.04	1	C. ovata, shagbark hickory
				.15	15	Carya spp. nutshell
4	4	F-4, 0-9 cm	5			-Nutshell
				.29	47	Carya spp. nutshell
5	5	F-5, 0-9 cm	5			-Wood Charcoal
				.04	1	Quercus alba, white oak
				.06	2	Carya spp. charcoal
				.07	22	unid. wood charcoal

Table 2, cont.

Lot no.	ARG no.	Provenience	Sample Volume	Contents wt(g)/ ct		Comments
						-Nutshell
				.39	78	Carya spp. nutshell
6	6	F-6, 0-10 cm	5			-Nutshell
				.01	2	unid. nutshell
7	9	F-9	5			-Wood Charcoal
				.08	2	Carya spp.
				.11	8	unid. wood charcoal
						-Nutshell
				.20	12	Carya spp. nutshell
						-Other
				.08	3	squash (Cucurbita pepo) rind fragments
8	10	F-10	2			-Wood Charcoal
				.36	34	unid. wood charcoal
						-Nutshell
				.27	11	Carya spp. nutshell
				.09	13	unid. nutshell
9	12	F-12, 0-9 cm	5			-Nutshell
				.20	7	thickshelled Carya spp.
				.25	45	unid. nutshell

Table 2, cont.

Lot no.	ARG no.	Provenience	Sample Volume	Contents wt(g)/ ct		Comments
10	13	F-13	5			-Wood Charcoal
				.07	2	Juglans nigra, black walnut
				.09	3	Carya spp. charcoal
				.21	18	unid. diffuse porous wood charcoal
				.62	94	unid. wood charcoal
						-Nutshell
				.18	19	unid. nutshell
11	14	F-14, 0-15 cm	5			-Wood Charcoal
				.09	4	J. nigra wood charcoal
				.18	25	unid. wood charcoal
						-Nutshell
				1.01	1	Carya laciniosa, shellbark hickory
				.54	2	C. glabra, pignut hickory
				.38	11	thickshelled Carya spp.
				.10	5	thinshelled Carya spp.
				.08	2	Juglans sp., probably J. nigra
12	14	F-14	screened			-Nutshell
				2.30	7	Quercus spp. kernels, probably Q. alba and Q. rubra
				.54	1	C. ovata nutshell

Table 2, cont.

Lot no.	ARG no.	Provenience	Sample Volume	Contents wt(g)/ ct		Comments
13	15	F-15	5			-Nutshell
				.22	12	thickshelled *Carya* spp.
				.05	3	thinshelled *Carya* spp.
				.27	51	unid. nutshell
14	16	F-16, E 1/2	5			-Wood Charcoal
				.03	1	*C. illinoensis*, pecan
				.03	1	*Q. alba* charcoal
				.14	25	unid. wood charcoal
				.02	1	unid. bark charcoal
						-Nutshell
				.09	2	thickshelled *Carya* spp.
				.10	10	unid. nutshell
15	17	F-17	5			-Wood Charcoal
				.11	7	unid. wood charcoal
						-Nutshell
				.03	1	thickshelled *Carya* sp.
				.08	2	unid. nutshell
16	18	F-18, W 1/2	5			-Wood Charcoal
				.37	75	unid. ring porous charcoal

Table 2, cont.

Lot no.	ARG no.	Provenience	Sample Volume	Contents wt(g)/ ct		Comments
						-Nutshell
				.04	4	*Quercus* spp. nutshell
				.25	29	unid. nutshell
						(1 carbonized fungal nodule)
17	18	F-18	5			-Nutshell
				4.31	16	*C. ovata* nutshell
18	19	F-19, 0-14 cm	5			-Wood Charcoal
				.10	12	unid. ring porous charcoal
						-Nutshell
				.11	1	thickshelled *Carya* sp.
				.42	64	unid. nutshell
						-Other
				.05	1	*C. pepo* rind fragment
19	20	F-20, N 1/2	5			-Wood Charcoal
				.06	1	*Q. alba* charcoal
				.25	60	unid. wood charcoal
						-Nutshell
				.07	4	unid. nutshell

Table 2, cont.

Lot no.	ARG no.	Provenience	Sample Volume	Contents wt(g)/ ct		Comments
20	21	F-21, 0-14 cm	5			-Wood Charcoal
				.54	45	unid. wood charcoal
						-Nutshell
				.34	11	Carya spp. nutshell
						(27 carbonized fungal nodules)
21	22	F-22	5			-Nutshell
				.03	1	Carya sp. nutshell
				.05	9	unid. nutshell
22	23	F-23	5			-Wood Charcoal
				.95	72	Carya spp. wood charcoal
						-Nutshell
				.04	1	Carya sp. nutshell
				.05	1	Juglans sp. nutshell
				.18	24	unid. nutshell
23	24	F-24	5			-Nutshell
				.05	4	unid. nutshell
24	25	F-25	5			-Wood Charcoal
				.22	7	Carya spp. charcoal
				.49	92	unid. wood charcoal

Table 2, cont.

Lot no.	ARG no.	Provenience	Sample Volume	Contents wt(g)/ ct		Comments
						-Nutshell
				.25	45	unid. nutshell
25	26	F-26	5			-Wood Charcoal
				.15	1	Carya sp. charcoal
				.33	18	unid. wood charcoal
				.11	2	unid. bark charcoal
						-Nutshell
				.16	4	thickshelled Carya spp.
				.41	44	Carya spp. nutshell
						-Other
				.03	1	C. pepo rind fragment
26	26	F-26	screened			-Nutshell
				.45	2	thickshelled Carya spp.
27	27	F-27, 0-14 cm	5			-Nutshell
				.09	1	thickshelled Carya sp.
				.16	11	unid. nutshell
28	29	F-29	5			-Nutshell
				.16	21	unid. nutshell
29	30	F-30, 0-17 cm	5			-Wood Charcoal
				.36	43	unid. wood charcoal

Table 2, cont.

Lot no.	ARG no.	Provenience	Sample Volume	Contents wt(g)/ ct		Comments
				.17	10	unid. bark charcoal
						-Nutshell
				.16	1	C. ovata nutshell
				.10	1	thickshelled Carya sp.
				.22	6	Carya spp. nutshell
				.53	91	unid. nutshell
30	30	F-30	screened			-Wood Charcoal
				.25	3	unid. bark charcoal
31	701	F-7, Zone A	5			-Wood Charcoal
				.10	5	Carya spp. charcoal
				.16	40	unid. wood charcoal
						-Nutshell
				.18	1	C. ovata nutshell
				.03	4	thinshelled Carya spp.
				.07	11	unid. nutshell
32	702	F-7, Zones B & C	5			-Wood Charcoal
				.01	1	Carya sp. charcoal
				.03	4	unid. wood charcoal
						-Nutshell
				.07	3	probably Carya spp. nutshell

Table 2, cont.

Lot no.	ARG no.	Provenience	Sample Volume	Contents wt(g)/ ct		Comments
33	800	F-8	screened			-Nutshell
				.27	1	*J. nigra* nutshell
				.48	2	probably *C. laciniosa*
				.25	2	*Quercus* spp. nutshell and kernel fragments
34	801	F-8, NW 1/4	5			-Wood Charcoal
				.01	1	*Q. alba* charcoal
				.10	5	*Carya* spp. charcoal
				.13	28	unid. wood charcoal
				.03	1	unid. bark charcoal
						-Nutshell
				.28	12	thickshelled *Carya* spp.
				.01	3	thinshelled *Carya* spp.
				.22	25	*Carya* spp. nutshell
35	802	F-8, NE 1/4	5			-Wood Charcoal
				.01	1	*Q. alba* charcoal
				.08	7	*Carya* spp. wood charcoal
				.16	15	unid. wood charcoal
						-Nutshell
				.06	9	*Carya* spp. nutshell
						-Other
				.06	4	*C. pepo* rind fragments

and aggregating 7.74 g by weight, wood residues show a percentage frequency of 48.7% and comprise 35.1% of all charcoal by weight. The occurrence frequency for this material in the samples in 71.4%. Based on 137 l of feature fill floated, mean charcoal densities are 56.86 pieces/10 l by count and 0.56 g/10 l by weight for this plant assemblage. Comparison with the values recorded for Schwartz shows decreases in the Copeland residues on the order of 84% for percentage frequency, 40% for occurrence frequency, and 134% for wood charcoal as a percentage of the total weight of all charcoal remains. And the mean charcoal densities calculated for Copeland are 15 times and 11 times less by count and weight than similar values recorded for Schwartz.

Unidentified wood charcoal in the 11-J-818 residues comprises 70.6% by count and 61.4% by weight of all carbonized wood fragments. Be that as it may, greater species diversity is evident in the identified wood charcoal from this site. Once again, Carya, with a frequency of occurrence in the sample of 42.9%, is the most ubiquitous wood in the flotation samples. Specimens assigned to this genus constitute 41.2% by count and 64.2% by weight of all identified wood charcoal remains. Eleven occurrences are represented by Carya spp. charcoal, and one occurrence of pecan (C. illinoensis) wood has also been recorded. The oaks are represented by four occurrences of Q. alba and a single occurrence of Q. rubra; all constitute trace quantities totaling a mere 6 pieces weighing 0.16 g. Finally, two occurrences each of black walnut, ring porous wood, and diffuse porous wood comprise the remaining wood charcoal residues in this assemblage. These minute specimens represent the remaining 50.2% by count and 30.4% by weight of all identified wood charcoal remains in the Copeland assemblage.

Nut charcoal is both more ubiquitous (100%) and abundant (50.7% by count; 63.9% by weight) in the Copeland site remains than was the case at Schwartz. In fact, as a percentage of the total charcoal count and weight, nutshell fragments show a fivefold increase in the number of specimens and an increase in weight that is almost four times greater than has been observed in the charcoal remains from 11-J-812.

Of 811 nutshell fragments comprising this category at 11-J-818, 447 (55.1%) pieces weighing 3.05 g (21.8%) cannot be identified. However, the remaining nutshell exhibits much greater species diversity than was noted in the Schwartz site nutshell. Not unexpected is the dominance of hickory nuts in the identified remains. Hickory nuts are evident in 89.3% of the flotation samples and aggregate 44% by count and 77.2% by weight of all nut charcoal in the archaeobotanical assemblage. While trace quantities of thinshelled hickory have been recorded in four flotation samples, the vast majority of all hickory nut residues can be attributed to thickshelled species. Shagbark hickory, pignut hickory, and kingnut hickory, while represented by only 22 specimens, aggregate 57.4% of all hickory nutshell and 44.3% of all nutshell residues by weight. The roster of identified nutshell in the flotation residues is completed by trace quantities of acorn shell in one sample and *Juglans* (including one occurrence of *J. nigra*) in two samples. Finally, 18 specimens weighing 4.29 g, and including one occurrence of black walnut, three of hickory nut (with one each attributable to shagbark and kingnut hickory), and two of acorn nutshell and kernel fragments, have been hand collected from four screened samples of carbonized plant remains.

One additional onservation regarding the nutshell residues at these two sites requires brief comment. While the aforementioned values strongly suggest that nutshell is more dominant in the composition of samples from Copeland than Schwartz, volumetric indices produce some results that are at variance with this observation. Mean nutshell densities calculated for the small sample at Schwartz show that 92 pieces of nutshell weighing 1.33 g were recovered for every 10 l of feature fill floated; the corresponding values for Copeland are 59 pieces and 1.03 g, respectively. In other words, when the nutshell residues are compared with an eye toward the quantities retrieved from a standard volume of sediment, carbonized nutshell is relatively more abundant in the smaller sample (80 l of sediment) from features at 11-J-812 than the sample of nutshell remains taken from 137 l of feature fill processed at 11-J-818. This observation may reflect sampling error associated with a 71% difference in the volume of feature fill comprising the flotation sample from the two sites and/or the standard application of the very small 5 l flotation sample in collecting subsistence data from feature contexts at these sites.

Finally, the only other plant material observed in the floats from Copeland is squash rind. A total of 9 rind fragments weighing a mere 0.22 g have been observed in four flotation samples. While this cultigen occurs more frequently in the sample from this site, a percentage frequency of 0.6% and a frequency of occurrence of 14.3% is hardly more notable than the trace quantity recorded for 11-J-812; moreover, the Late Woodland components at the Little Muddy Rock Shelter show squash rind to comprise 0.8% and 1.0% of all charcoal remains and to occur in 42.9% and 61.9% of all flotation samples

(Cremin 1988). Nevertheless, this observation does serve to further extend the number of Late Woodland contexts within the Westfield research area where this tropical cultigen is present.

CONCLUDING REMARKS

Although the macroplant remains from the Schwartz (11-J-812) and Copeland (11-J-818) sites are not especially numerous, when compared with the archaeobotanical assemblage from Late Woodland components in the nearby Little Muddy Rock Shelter they may serve to distinguish the manner in which residence at these small open air encampments differed from occupation of a protected rock shelter site in the same tributary stream drainage.

First, with respect to the firewoods, species diversity is not great in any of the four components attributed to the Late Woodland occupation of the Westfield. At both encampments and in the rock shelter, hickory and oak dominate the wood charcoal spectra, with the latter being somewhat more common in the Late Woodland components in the Little Muddy Rock Shelter. Moreover, there is really no evidence in the scant identified wood remains to permit a determination as to whether the occupants of these sites were at all selective with respect to the collection of this resource. Suffice it to say that all species identified in the wood charcoal remains could have been collected in the immediate vicinity of the sites and that both the oaks and hickories are notable for their comparatively high heat values; thus making the selection of these woods especially appropriate for fuel to feed fires.

Furthermore, comparing nutshell and wood charcoal residues at these sites might be construed to indicate at least incidental, if not

deliberate utilization of nutshell for fuel; with the very real possibility that nutshell preserves more readily as charcoal than wood. Certainly, the proportionately greater abundance of charred nutshell in flotation samples from both components at the Little Muddy Rock Shelter and the Copeland site can be interpreted to possibly reflect such differential preservation of these two categories of plant remains in contexts suggesting use as fuel for fires.

Secondly, the diversity and abundance of nutshell residues in all four components attest to the role of nuts in the diet; especially in light of the great paucity of seed remains and the small (albeit often reasonably ubiquitous) quantities of the tropical cultigen, squash, in flotation samples from Late Woodland contexts. At both Schwartz and Copeland, and the Late Woodland components at the rock shelter as well, thickshelled hickory nuts comprise well over 90% of all identified nutshell residues by both count and weight. All other hickory residues, as well as the remains of acorn and the walnuts when present, are recorded in trace quantities, only. Clearly, nut exploitation favored those oily nuts occurring in close proximity to the sites and those which could be most easily processed for human consumption.

With respect to the matter of nut consumption immediately following autumn harvesting of the local nut crop vs. consumption of stored nuts at these sites when they were possibly occupied later in the year, the evidence from the archaeobotanical assemblages is far from unambiguous. Few if any good seasonal indicators are present. Thus, season of occupation of both the open air sites and the rock shelter

must necessarily await examination of various lines of evidence in addition to possible indicators of seasonality in the plant remains (i.e. given the eminent storability of almost all plant foods represented by residues, it would be unwise to attempt to infer season of occupation without confirmation from the faunal assemblages, site locational information, etc.).

Thirdly, no "native" cultigens of either the oily or starchy seed complexes are in evidence at Schwartz or Copeland; nor does the identification of a single knotweed seed in each of the two Late Woodland components at the rock shelter make for an especially strong case of intensive seed utilization by Late Woodland groups residing in the Westfield.

To the contrary, the only seed remains that consistently occur in Westfield Late Woodland contexts are representative of fleshy fruits that might be expected to have been collected in the immediate site environs, perhaps in conjunction with the harvesting of the autumn nut crop. Unfortunately, in most cases these remains occur in such sparse numbers as to make it almost impossible to rule our accidental inclusion in middens and/or feature fills. The only concentrations of seed remains possibly pointing to human utilization of fleshy fruits as food are the occurrence of eight seeds of smooth sumac in a flotation sample from Feature 1 at the Schwartz site and eight wild grape seeds found in a single level sample from the Late Woodland I component at 11-J-814 (Cremin 1988: 43).

Finally, it bodes well for Late Woodland cultivation of tropical cultigens that rind fragments of C. pepo are evident, albeit in small numbers, at all three sites under discussion. It was not anticipated,

however, that squash rind would be less abundant at the open air sites than at the rock shelter. Moreover, while corn remains are absent from Swartz and Copeland, seven cob fragments of Z. mays co-occur with squash in the Late Woodland I component at the Little Muddy Rock Shelter (Cremin 1988: 43). It is quite reasonable to presume that the comparative rarity of squash residues and the absence of corn cobs from 11-J-812 and 11-J-818 reflect less on season of occupation than on site function. That is, the purpose(s) for which Late Woodland groups occupied these open air sites quite possibly precluded more intensive activity centered on the tropical cultigens.

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