22. FLOTATION AND FLORAL REMAINS

Corn, cherries, and blueberries and other vegetable seeds from site inhabitants' diets were retrieved from the muck at the bottom of wells, preserved by anærobic conditions.

Flotation soil sampling was carried out as part of the feature excavation procedures. A total of 38 flotation samples from 19 features were processed and analyzed. This chapter documents the flotation processing and analysis methods, as well as the results of the analysis. These results are compared with discoveries from other archæological sites in Delaware and the region. In addition, a discussion of the implications of this work is offfered.

EQUIPMENT AND METHODS

Archæologists have long known that the types and sizes of artifact and ecofacts (animal and plant remains) that they recover from sites are directly related to the recovery techniques they employ (Struever 1968). In other words, when only coarse screens are used, only large floral and faunal remains are found. Flotation uses water and fine screens to recover small seeds, bone fragments, fish scales, beads and other tiny artifacts.

The Hurd Wetland Replacement Project used drum flotation devices. These flotation systems utilize water flowing under pressure to reduce the flotation soil sample into two components, a "heavy fraction" and a "light fraction." The heavy fraction was collected in a piece of nylon window screening, and recovered small artifacts, bones and fish scales, and other non-floating remains. The light fraction captures floating floral materials, like seeds, the occasional fish scale and other lighter than water objects.

The drum flotation devices used on this project were of the "Delaware Park" type, and were designed and built by the author (Thomas 1981; Sandy 1985).

Since the first device of this type was built for the Delaware Park Site in 1981, dozens of these devices have been sold to museums and archæologists throughout Delaware and the United States. The Delaware Park drum flotation device is based on a design by Williams (1973) and is somewhat similar to the SMAP-style flotation system (Pearsall 1990:32-35).

One major difference between SMAP-like systems and the Delaware Park system is that the latter is built primarily of plastic components, and is lighter and more portable.

The actual processing methodology was along the lines described by Sandy (1985:Appendix I).

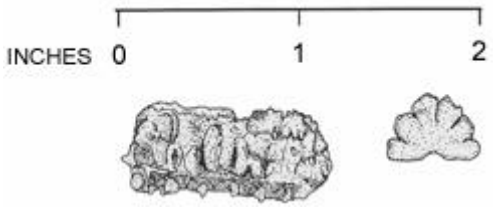

Figure 125
Corn cob from the bottom of the west well

Edible Cultigens
Bean
(Phasoleus sp.)
Blueberry
(Vaccinium sp.)
Corn
(Zea)
Nut
Peach
(Prunus persica)
Raspberry
(Rubus sp.)

Known Wild Edibles
Blueberry
(Vaccinium sp.)
Carpetweed
(Mollugo verticillata)
Cherry
(Prunus sp.)
Elderberry
(Sambucus canadensis)
Goosefoot
(Chenopodium hybridium)
Grape
(Vitis sp.)
Lamb's-quarters
(Chenopodium album)
Oxalis
(Oxalis stricta)
Pigweed
(Amaranthus sp.)
Pokeweed
(Phytolacca americana)
Purslane
Portulaca sp.)

Known Wild Edibles (cont'd.)
Raspberry
(Rubus sp.)
Smartweed
(Polygonum sp.)
Sweetclover
(Mellilotus sp.)

May also grow in Wetlands
Elderberry
(Sambucus canadensis)
Ladysthumb
(Polygonus periscaria)
Water Smartweed
(Polygonum amphibium)

Farmland Weeds
Bristlegrass
(Setaria sp.)
Carpetweed
(Mollugo verticillata)
Clover
(Trifolium sp.)
Copperleaf
(Acalypha virginica)
Crabgrass
(Digitaria sp.)
Flatsedge
(Cyperus compressus)
Goosefoot
(Chenopodium hybridium)
Goosegrass
(Ellusine indicu)
Grama
(Boutelova sp.)

Farmland Weeds (cont'd.)
Hawkweed
(Hieracium aurantiacum)
Jimson
(Datura sp.)
Lamb's-quarters
(Chenopodium album)
Nightshade, bittersweet
(Solanum dulcamara)
Pepperweed
(Lepidium campestre)
Pigweed
(Amaranthus sp.)
Pokeweed
(Phytolacca americana)
Purslane
(Portulaca sp.)
Ragweed
(Ambrosia sp.)
Sclerotia
(Cenocuccum sp.)
Skullcap
(Scutellaria integrifolia)
Smartweed
(Polygonum sp.)
Spurge
(Euphorbia sp.)
Sweetclover
(Mellilotus sp.)
Tearthumb
(Polygonum sagittatuna)

Woods
Arrow-wood
(Viburnum dentatum)

Table 1:
Plant materials represented in the flotation sample, classified by source

Heavy fraction collectors utilized consisted of nylon window screening (16 by 18 mesh per inch). The light fraction collectors were 80 mesh nylon drawstring bags.

SAMPLING METHODOLOGY

A total of 38 samples, taken from 19 features at the site, were processed.
Sample size ranged from 4 to 8 liters, with the majority 8 liters. Total soil volume for the project was 287 liters. The Excavation Register numbers (ER #), Feature Numbers, and size of the samples are listed below

IDENTIFICATION & ANALYSIS

Both the light fractions and the heavy fractions of the samples were analyzed and are inventoried below. Seeds were identified with the aid of identification manuals, other pertinant literature and a comparative collection (Martin and Barkley 1961; USDA 1971; McWeeney 1989; Foster and Duke 1990; Petrides 1977; Peterson 1977). The light fractions were divided by sifting through window screening ($^1/_{16}$"). One hundred percent of this larger sized material was examined with the aid of a hand lens or an ring magifier light.

A percentage (25 to 50%) of the smaller sized light fraction material was examined under a low power (20x) binocular microscope. Examining all of the larger sized material was not very time consuming, and increased the representation of the relatively rare larger seeds, nuts and pits. Heavy fractions were sorted and analyzed with the aid of a magnifier/ring light.

Following the identification of the floral remains, information was gathered on the types of environments frequented by these plants. In addition, a variety of sources were examined about the potential of these plants for providing food and medicine (USDA 1971; McWeeney 1989; Foster and Duke 1990; Petrides 1977; Peterson 1977; Moerman 1986).

Flot Samples

ER no.	Feature no.	Size (l.)
33A	53	4
42E	34	8
47I	45	8
47L	45	8
48A	59	8
63E	49	6
64G	39	8
70F	50	8
70G	50	8
71E	41	5
71F	42	8
77E	56	6
77G	57	8
123B	15	8
129E	17	8
137F	5	8
137H	5	8
145F	11	8
179E	22	7
180M	21	7
180O	21	7
180P	21	8
180R	21	8
180T	21	8
180V	21	7
180W	21	8
180Y	21	8
180Z	21	6
182I	18	8
182I(b)	18	8
182N	18	8
182M	18	8
182X	18	8
182Y	18	8
182Z	18	8
182AB	18	8
182V	18	8
210E	32	8

study in local perspective, a number of DelDOT sponsored historic site investigations were examined in terms of the results of flotation (Bachman and Catts 1990; Catts, Hodny and Custer 1989; Catts and Custer 1990; Coleman *et al.* 1990; De Cunzo, Hoseth, Hodny, Jamison, Catts and Bachman 1992; Hoseth, Leithren, Catts, Coleman and Custer 1990; Hoseth, Catts and Tinsman 1994; LeeDecker, *et al.* 1990,1995; Shaffer *et al.* 1988).

Only three of these nine reports included any information from flotation that could be compared to the Hurd site data (Coleman *et al.* 1990; LeeDecker *et al.* 1990; De Cunzo *et al.*1992).

One of these reports deals with the investigation of a site in Wilmington. The flotation analysis was limited to 13 samples of unspecified size, and only 156 floral specimens were recovered. (LeeDecker *et al.* 1990).

The least useful for this study was the John Ruth Inn Site, also in New Castle County. There was some flotation, but very little flotation data is provided in the report (Coleman *et al.* 1990:69, 150-151). The other DelDOT mitigation that included flotation was the John Darrach Store Site, Smyrna (De Cunzo *et al.* 1992). This study included 22 flotation samples from 11 different features. Like the Hurd site, wells were investigated.

However, at the John Darrach Store site the wells were not completely excavated (De Cunzo et al. 1992:72).

Tables 1, 2 and 3 are patterned after the "Feature Flotation Analysis" section of the Darrach Store report (De Cunzo *et al.* 1992: Appendix XVIII). The table lists the identified seeds and shows which are cultgens, wild edibles, and weeds. It also provides some habitat information. Table 2 shows the distribution of seeds by feature, while Table 3 shows the seed distribution according to excavation register number.

In the following inventory, sclerotia and seeds were sometimes present in such large number that counting them would have taken much more time than was alloted for this study. In these cases an estimate of the number is provided (e.g. >100 or >1,000). Tentative or uncertain identifications are indicated with a (?).

E.R 33A

Heavy Fraction -no finds

Light Fraction >1/16" -19 sclerotia -1 raspberry?

<$^1/_{16}$"(50%) -1 copperleaf -20 carpetweed -5 purslane ->500 sclerotia

ER 42E

Heavy Fraction -1 fish scale -3 burnt bone (?) fragments -1 glass (?) flake (?)

Light Fraction >$^1/_{16}$" -114 sclerotia -2 lambsquarter

<$^1/_{16}$" (25%) -1 purslane -19 carpetweed -4 lambsquarter ->1000 sclerotia

ER 47I

Heavy Fraction -10 fish scales -5 fish scale fragments -2 small fish (?) bones -8 bone fragments

Light Fraction >$^1/_{16}$" -29 sclerotia -1 lambsquarter -1 snail<$^1/_{16}$" (50%) ->1000 sclerotia -50 lambsquarter -44 carpetweed -13 goosefoot -11 purslane -1 copperleaf -1 grama (?)

HURD SITE SEEDS FROM FLOTATION BY FEATURE

Feature #	5	11	15	17	18	21	22	32	34	39	41	42	45	49	50	53/54	56	57	59	TOTAL
Seed Type																				
Arrow-wood (Viburnum dentatum)						X														1
Bean (Phasoleus sp.)	X																			1
Blueberry (Vaccinium sp.)					X															1
Bristlegrass (Setaria verticillata)					X	X													X	3
Carpetweed (Mollugo verticillata)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	19
Cherry (Prunus sp.)						X														1
Clover (Trifolium sp.)					X															1
Copperleaf (Acalypha virginica)	X				X					X			X			X				5
Corn (Zea)					X															1
Crabgrass (Digitaria sp.)						X														1
Elderberry (Sambucus canadensis)					X	X	X			X										4
Flatsedge (Cyperus compressus)					X															1
Goosefoot (Chenopodium sp.)										X			X	X					X	4
Goosegrass (Ellusine indicu)					X	X														2

Table 2, part 1: Seeds from flotation, by feature

ER 47L

Heavy Fraction -5 fish scales -3 fish scale fragments -2 small fish(?) bones -ant parts -round headed brass pin
Light Fraction >1/16" ->100 sclerotia -2 lambsquarter -1 water smartweed (*Polygonum Amphibium*) -9 snails
<1/16"(25%) ->1000 sclerotia -35 lambsquarter -7 goosefoot -7 purslane - 1 oxalis -20 carpetweed -10 snails

ER 48A

Heavy Fraction - 1 sclerotia - 2 unidentified seeds (Type A) - 1 bristlegrass seed
Light Fraction >1/16" - 9 sclerotia - 1 raspberry?
<1/16"(25%) - 2 purslane seeds (*Portulaca Oleracea*) - 9 carpetweed seeds - 1 unidentified seed (Type B) - 7 sclerotia - 1 smartweed (?) seed (*Polygonum* SP.)(charred)

ER 63E

Heavy Fraction -1small black glass bead -2 pins, round headed, head & shaft fragments -1 fish (?)bone -bone fragments
Light Fraction >1/16" -86 sclerotia -1 smartweed (*Polygonum Pennsylvanicum*)
<1/16" (25%) ->1000 sclerotia -13 lambsquarter -1 goosefoot -9 carpetweed -1 purslane -1 grama (?) -ant parts

ER 64G

Heavy Fraction -3 small black glass beads -2 ceramic -2 tooth (?) fragments -bone fragments, -3 sclerotia
Light Fraction >1/16" ->1000 sclerotia -2 elderberry
<1/16" (25%) ->1000 sclerotia -20 lambsquarter -7 carpetweed -3 goosefoot -1 copperleaf -1 purslane -1 elderberry - 1 unidentified seed fragment -ant parts

ER 70F

Heavy Fraction -1 sclerotia
Light Fraction >1/16" -11 sclerotia -1 insect wing
<1/16" (25%) ->100 sclerotia -1 lambsquarter -4 carpetweed -ant parts -1 snail

ER 70G

Heavy Fraction -no finds
Light Fraction >1/16" -2 pieces millepede -1 sclerotia
<1/16" (>25%) ->100 sclerotia

ER 71 E

Heavy Fraction -1 fish scale -12 fish scale fragments -fish (?) bone fragments -1 charred poke (?) seed fragment

Light Fraction >1/16" -71 sclerotia -2 smartweed (*Polygonum Pennsylvanicum*) -4 snails -2 fish scales -insect parts -ant parts

<1/16" (25%) ->1000 sclerotia -7 purslane -2 carpetweed -4 lambsquarter -insect parts -ant parts

ER 71F

Heavy Fraction -2 sclerotia -2 calcined(?) bone fragments

Light Fraction >1/16" ->100 sclerotia -4 smartweed(*Polygonum Pennsylvanicum*) -1 insect part -1 unidentified seed Type D

<1/16" (25%) ->1000 sclerotia -11 lambsquarter -4 purslane -2 carpetweed -ant parts -1 insect casing -2 unidentified seeds

ER 77E

Heavy Fraction -no finds

Light Fraction >1/16" -29 sclerotia

<1/16"" (50%) ->100 sclerotia -5 lambsquarter -62 carpetweed -7 purslane -1 oxalis -ant parts

ER 77G Heavy Fraction -no finds

Light Fraction >1/16"" -> 100 sclerotia -insect parts

<1/16"" (50%) ->1000 sclerotia -2 oxalis -8 lambsquarter -1 purslane -4 carpetweed -ant parts

ER 123B

Heavy Fraction -approximately 2,000 + fish scales and scale fragments - 8 bone fragments -4 fish (?) vertebra -2 fish (?) bones -5 snail -2 redware -2 porcelain -2 pipestem fragments

Light Fraction >1/16" ->100 sclerotia ->500 fish scales and fragments -9 snails -3 smartweed (1 recently germinated)

<1/16" (25%) ->1000 sclerotia -20 carpetweed -5 purslane -7 lambsquarter -7 snails -ant parts -1 fish scale -2 fish scale fragments

ER 129E

Heavy Fraction -1 fish scale -1 fish scale fragment -1 tooth fragment -3 bone fragments -2 calcined bone fragments

Light Fraction >1/16" ->100 sclerotia -1 snail -1 beetle

<1/16" (25%) _>1000 sclerotia - 8 lambsquarter -11 carpetweed -6 purslane -ant parts

ER 137F

Heavy Fraction - bone fragments - tooth fragment - 1 snail - 2 small (fish?) bone - 1 fish scale (~6mm) - 1 fish scale (?) frag.

Light Fraction >1/16" - 2 beans (?) (charred) - 1 snail - 12 sclerotia - lambsquarter (?) - 1 unidentified seed (Type C)

<1/16" - 20 lambsquarter - 20 Carpetweed seeds - 1 purslane seed (*Portulaca Lanceolata*?) - 2 oxalis seeds - 1 copperleaf seed - 6 snails - 6 sclerotia

ER 137H

Heavy Fraction

-1 glass fragment -1 bone fragment

Light Fraction >1/16" - 13 sclerotia

<1/16"(50%) - none

ER 145F

Heavy Fraction -95 fish scales and scale fragments -1 fish (?) bone -6 snails

Light Fraction >1/16" -> 100 sclerotia -3 lambsquarter -1 smartweed -24 snails -3 fish scales -5 fish scale fragments

<1/16" (25%) ->1000 sclerotia -3 oxalis -1 unidentified seed Type C -3 snails -83 lambsquarter -3 purslane -16 carpetweed -ant parts

ER 179E

Heavy Fraction -6 fish scale fragments

Light Fraction >1/16" ->100 sclerotia -1 elderberry -1 smartweed (*Polygonum Perisicaria*(?) -2 fish scale fragments -1 snail

<1/16"(25%) ->1000 sclerotia -11 lambsquarter -4 purslane -5 carpetweed >1000 ant parts

E.R 180M

Heavy Fraction -2 redware -1 tack, head w/ shaft fragment -1 fish(?) vertebra -2 fish scales -21 fish scale fragments -3 bone fragments -1 snail -1 sclerotia (?)

Light Fraction >1/16" ->100 sclerotia -5 snails -1 fish scale -1 fish scale fragment -2 jimson weed -2 jimson weed fragments -1 arrow -wood(?), charred

<1/16" (25%) ->1000 sclerotia -4 carpetweed -2 lambsquarter -40 purslane -5 snail -ant parts

ER 180O

Heavy Fraction -2 redware -2 sclerotia -1 jimson (?) seed -2 bone fragments -2 fish(?) bone fragments -3 snails -17 fish scales -27 fish scale fragments

Light Fraction >1/16" ->100 sclerotia -77 jimson weed -1 elderberry -1 lambsquarter -21 snails -5 fish scales -14 fish scale fragments

<1/16" (25%) ->1000 sclerotia -8 lambsquarter -1 crabgrass (*Digitaria*) -3 carpetweed ->100 purslane -6 snails -ant parts

ER 180P

Heavy Fraction -2 nails -1 nail fragment -2 tack fragments -3 ceramic fragments -1 grey chert flake (?) -10 snails -1 bivalve snail -4 bone fragments -4 fish (?) bone fragments -9 fish scales -52 fish scale fragments

Light Fraction >1/16" ->100 sclerotia -1 crabgrass -11 jimson weed -1 elderberry -38 snails -2 fish scales -2 fish scale fragments

<1/16" (25%) ->1000 sclerotia -20 lambsquarter -52 purslane -2 carpetweed -1 crabgrass -1 spurge(?) -20 snails -ant parts -1 fish scale

ER 180R

Heavy Fraction -2 nail fragments -14 jimson seeds & seed coat fragments -1 cherry pit fragment -1 unidentified seed fragment -2 rodent (?) teeth -1 fish (?) vertebra -9 bone fragments -46 fish scales and scale fragments

Light Fraction >1/16" ->100 sclerotia -75 jimson weed -3 lambsquarter -3 raspberry ? -5 snails -9 fish scale fragments

<1/16" (25%) ->1000 sclerotia ->100 purslane -26 lambsquarter -1 carpetweed -1 snail

ER 180T

Heavy Fraction - 2 fish scales - 1 glass fragment - 1 yelloware fragment - 1 redware fragment - 1 grey chert flake(?) - 1 unidentified seed coat (?) fragment - 3 bone fragments

Light Fraction >1/16" - 9 jimson seeds - 4 raspberry ? seeds - 1 elderberry seed - 6 sclerotia

<1/16" (33%) - 7 purslane (*Portulaca Oleracea)* - 1 purslane (*Portulaca Lanceolata*) - 1 lambsquarter - 3 sclerotia

ER 180V

Heavy Fraction -2 fish scales -3 fish scale (?) fragments -1 fish (?) bone -2 nutshell(?) fragments -2 sclerotia -13 jimson seeds and seed coat fragments -1 bone fragment

Light Fraction >1/16" ->100 sclerotia -27 jimson weed -9 raspberry? - 2 insect fragments -1 fish scale fragment

<1/16" (25%) ->1000 sclerotia -59 lambsquarter ->100 purslane -6 raspberry? -4 carpetweed -2 nightshade -insect parts

ER 180W

Heavy Fraction -5 raspberry? seed fragments -20 jimson seeds and fragments -4 unidentified seed fragments -1 glass -3 tack fragments -1 bone fragment -2 insect fragments -2 peach pit fragments

Light Fraction >1/16" ->100 sclerotia ->100 jimson -36 raspberry -6 lambsquarter -4 bristlegrass -4 smartweed (*Polygonum Pensylvanicum*) -3 elderberry -2 peach pit fragments -1 tearthumb -insect parts

<1/16" (25%) ->1,000 sclerotia ->1,000 purslane -79 lambsquarter -15 nightshade -6 goosegrass -6 raspberry -8 hawkweed -6 carpetweed -4 smartweed -1 tearthumb -19 grass(?) -ant parts

ER 180Y

Heavy Fraction -1 redware -1 nail fragment -3 bone fragments -1 small bone -3 raspberry? seed fragments

Light Fraction >1/16" -35 sclerotia -15 jimson -14 raspberry? -1 grape -2 insect parts

HURD SITE SEEDS FROM FLOTATION BY FEATURE

Feature #	5	11	15	17	18	21	22	32	34	39	41	42	45	49	50	53/54	56	57	59	TOTAL
Seed Type																				
Grama (Bouteloua sp.)					X								X	X						3
Grape (Vitis sp.)						X														1
Grass						X														1
Hawkweed (Hieracium aurantiacum)					X	X														2
Jimson (Datura sp.)					X	X														2
Lamb's-quarters (Chenopodium album)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	18
Nightshade, bittersweet (Solanum dulcamara)					X	X		X												3
Nut					X	X														2
Oxalis (Oxalis stricta)	X	X											X				X	X		5
Peach (Prunus persica)						X														1
Pepperweed (Lepidium campestre)					X															1
Pigweed (Amaranthus retroflexus)					X			X												2
Pokeweed (Phytolacca americana)											X									1
Purslane (Portulaca sp.)	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	18

Table 2, part 2: Seeds from flotation, by feature

<1/16" (25%) ->500 sclerotia -46 purslane -1 lambsquarter -1 hawkweed -1 tearthumb -1 carpetweed -1 skullcap -1 unidentified -ant parts

ER 180Z

Heavy Fraction -1 jimson seed -1 raspberry? seed fragment -1 smartweed seed -1 insect casing -1 insect fragment

Light Fraction >1/16" -29 sclerotia -18 jimson -6 raspberry? -4 smartweed (*Polygonum Lapathifolium*?) -3 smartweed *(Polygonum Punctatum*?) -3 smartweed (*Polygonum Pensylvanicum*?) -1 lambsquarter

<1/16" (25%) ->1,000 sclerotia ->100 purslane -80 lambsquarter -20 goosegrass -4 hawkweed -4 smartweed (*Polygonum Pensylvanicum*?) -1 smartweed (*Polygonum Lapathifolium*?) -3 nightshade -4 unidentified Type E -4 crabgrass -2 carpetweed -2 unidentified -ant parts

ER 182I

Heavy Fraction -5 ceramic -1 rusted metal -1 copperish pin, head and shaft -1 copperish pin -36 fish scale fragments -35 fish scales -7 small fish (?) bones -6 bone fragments -1 rodent (?) tooth fragment -4 snails -1 horse (?) tooth

Light Fraction >1/16" ->100 sclerotia -6 jimson -1 raspberry (?) fragment -44 snails -2 fish scales -4 fish scale fragments -ant parts

<1/16"(25%) ->1,000 sclerotia -35 purslane -9 carpetweed -2 lambsquarter -14 snails

ER 182I (b)

Heavy Fraction -1 ceramic -49 fish scales -36 fish scale fragments -14 snails -9 small fish (?) bone fragments -2 bone fragments -1 unidentified seed (Type A)

Light Fraction >1/16" ->100 sclerotia -2 jimson -49 snails -4 fish scales -4 fish scale fragments -ant parts

<1/16"(25%) ->1,000 sclerotia -11 carpetweed -9 purslane -5 lambsquarter -29 snails -1 fish scale fragment -insect parts

ER 182M

Heavy Fraction -no finds

Light Fraction

>1/16" - 5 sclerotia

<1/16" (50%) - 1 purslane seed (*Portulaca Oleracea*) - 6 sclerotia

ER 182N Heavy Fraction -1 small fossil? mollusc

Light Fraction >1/16" -102 sclerotia

<1/16" (25%) ->1,000 sclerotia -5 purslane -1 carpetweed -insect parts

ER 182V

Heavy Fraction - 22 snails - 10 fish scales - 20 fish scale fragments - 3 bone fragments

Light Fraction >1/16" - 13 snails (2 types) - 1 insect - 5 sclerotia

<1/16" (20%)

- 1 purslane seed fragment - 9 sclerotia - 2 snail - 3 insect parts

ER 182X

Heavy Fraction -2 redware -1 fish scale -2 bone fragments

Light Fraction >1/16" ->100 sclerotia -2 elderberry -1 jimson

<1/16"(25%) ->1,000 sclerotia -13 lambsquarter -2 carpetweed -1 purslane -1 raspberry (?) -1 copperleaf -1 sweetclover

ER 182Y

Heavy Fraction -1 calcined fish (?) vertebra -1 nut (?) charcoal

Light Fraction >1/16" -38 sclerotia -1 insect

<1/16" (25%) ->1,000 sclerotia -1 pepperweed - insect parts

ER 182Z

Heavy Fraction -1 tack fragment -1 raspberry (?) -1 fish scale

Light Fraction >1/16" -39 sclerotia -1 insect part

<1/16"(50%) ->1,000 sclerotia - 2 pepperweed -1 carpetweed -insect parts

ER 182AB Heavy Fraction -10 pieces leather shoe -6 redware -8 tack (?) fragments -3 fire cracked rocks -1 unidentified metal -8 smartweed (*Polygonum Pensylvanicum*?) -1 ragweed (*Ambrosia* SP.) -1 jimson seed -3 corn cob fragments -insect parts

Light Fraction >1/16" ->100 sclerotia -44 smartweed (*Polygonum Pensylvanicum*?) -22 smartweed (*Polygonum Hydropiperoides*?) -11 raspberry (?) -10 ragweed (*Ambrosia Psilostachya*?) -1 ragweed (*Ambrosia Trifida*?) -5 jimson -1 nightshade -1 bristlegrass -1 lambsquarter

<1/16"(25%) ->1,000 sclerotia -82 pigweed -81 hawkweed -67 purslane -34 goosegrass -34 lambsquarter -31 smartweed (*Polygonum Hydropiperoides*?) -20 nightshade -4 raspberry (?) -4 grama(?) -4 flatsedge -2 carpetweed -2 unidentified seed fragments -1 pepperweed -1 jimson(?) -1 clover -1 blueberry -insect parts

ER 210E

Heavy Fraction -1 bone fragment -1 raspberry (?) -1 sclerotia

Light Fraction >1/16" ->100 sclerotia -4 raspberry (?) fragments -1 nightshade

<1/16" (25%) ->1,000 sclerotia -19 lambsquarter -6 carpetweed -3 pigweed -1 purslane -1 smartweed(*Polygonum Hydropiperoides*?) -ant parts

UNIDENTFIED SEEDS

Type A - irregular U-shaped, dark brown, 3 x 1.3 mm, like Martin and Barclay 1973:#119 *Crotalaria.*

Type B - long, thin, tapering on both ends, tan, ~2.5 x0.8 mm, like Martin and Barclay 1973:#405 Grama and #543 waterweed.

Type C - ovoid, tan, one end pointed, one end blunt w/ black tip, 1.8 mm, like Martin and Barclay 1973:#240 selfheal, possible modern contaminant

Type D - ovoid, tan, rounded ends 2.2 x 1.2 mm

Type E - long, thin, tapering on both ends, tan, like Type B, but smaller. 1.2 x 0.3 mm

QUESTIONS TO BE CONSIDERED

In analyzing the ecofacts from any archeological site, a number of questions need to be considered. With respect to floral remains, these include: "Are the recovered remains related to the occupation of the site?" if so, then "How do the recovered plant remains relate to subsistence and/or medicinal plant use?" Some of the major issues in the analysis of archæological plant remains include how factors such as cultural selectivity in plants exploited, soil acidity, moisture and bioturbation effect archæobotanical remains, and the significance of uncharred seeds.

A number of practices – of which subsistence is only one – can contribute to the floral inventory from a site. For example, using plants as fuel to smoke shellfish may introduce seeds to a deposit that is later sampled for flotation. Following occupation and site abandonment, matrices are subject to diverse sources of alteration. Such processes include treefalls, animal and insect burrowing, and erosional/depositional processes. These processes can disrupt "sealed" contexts, and can be responsible for the introduction of contaminants. Soil acidity and alternate wetting and drying are only two of the factors that can contribute to the destruction of floral remains.

Most flotation studies to date have involved prehistoric sites. Flotation studies on historic sites have been scattered and inconsistent, and are sometimes included only as tables or appendices. Even when the flotation information is included in the report, it is rarely discussed in terms of preservation variables, charred versus uncharred seeds, the importance of the plants, and the many other factors that should enter into the discussion. For example, prehistorians often presume that charred seeds are prehistoric and uncharred seeds are modern contaminants. Evidence now indicates that this is not always a true assumption, and some species of uncharred seeds may persist in the ground for thousands of years (Moeller 1982). Seed viability studies have shown that some seeds may remain vital for up to a century, and it is likely that the seed shell may remain for centuries. Another problem with comparing data between sites is that none of the previous DelDOT-sponsored flotation studies have detailed the flotation processing methods or equipment employed. However, since both Louis Berger & Associates (Block 1184) and University of Delaware (Darrach Store and John Ruth Inn) own equipment similar to that used for the

Hurd samples, it is possible that the same equipment was used in all these studies.

IDENTIFIED PLANTS

Northern arrowwood (*Viburnum Dentatum*) is a small tree that produces black fruit from July thru September. The fruit are consumed by wildlife. As the name suggests, this tree was used for arrow shafts in prehistoric and historic times (Petrides 1972:93). Arrowwood, also known as arrowhead has a bitter fruit not recommended for human consumption. Fruits of other species of viburnums are used for food and for treating ailments by many Native American groups (Peterson 1977:178; Moerman 1986:511-513). One seed of Arrowwood was tentatively identified from Feature 21.

Two charred beans (*Phaseolus* SP.) were found in one flotation sample from Feature 5.

Bristlegrass (*Setaria* SP.) is a weed that was introduced from Europe (USDA 1971:84-85). The Navaho rubbed the "fruits" of a bristle grass (*Setaria Glauca*) on open facial pimples (Moerman 1986:451). The seeds are said to provide a valuable food for both man and wildlife. However, their short seed production period makes them undesirable for a pasture grass (LeeDecker *et al.* 1990:182). Bristlegrass seeds were recovered from three samples from three features at the Hurd Site. A bristlegrass seed was found at an archæological site in Wilmington (LeeDecker *et al.* 1990:174-182).

Blueberries (*Vaccinium* SP.) are a large genus of acid loving plants in the heath family. The species of any seed specimen is difficult to determine. Their fruit, sought by man and beast, is available between late July and September (Petrides 1972:277-279). The Chippewa, Ojibiwa and other groups used the roots, leaves and berries to treat various infirmities. (Moerman 1986:500).A single blueberry seed was tentatively identified from the bottom of the western well. Blueberry seeds were recovered from a historic site in Wilmington (LeeDecker et al. 1990:174-180).

Carpetweed (*Mollugo Verticillata*) is native annual "weed" can be used as a potherb, and may be linked to the spread of agriculture (Sandy 1985:133). It has been naturalized from Central America and it is a common weed in fields and a variety of other settings (LeeDecker *et al.* 1990:182).

It has been found at the Delaware Park Site, and at sites in the New Jersey coastal plain (Sandy 1985:133).

Carpetweed was found in 32 of the 38 flotation samples from Bloomsbury, and these include samples from all 20 features examined. Carpetweed was found in 9 of 11 features at the John Darrach Store site, and also on Wilmington Block 1184 (De Cunzo *et al*. 1992:389; LeeDecker *et al.* 1990:174-180).

Cherries (*Prunus* SP.) include a variety of species of shrubs and trees. They produce their red to black fruit from late Summer to early Fall. They can be eaten fresh, or used in jams, juices, wines and ciders (Peterson 1977:218-219). A cherry (*Prunus* SP.) pit fragment was found in ER 180R (Feature 21). Cherry pits were abundant in the privy features excavated along South Wilmington Boulevard, Wilmington, in 1979-1980.

Clover (*Trifolium* SP.) is a European import and an important forage plant. It produces seeds from April through October. The greens and flowers have various medical uses (Foster and Duke 1990:74, 158; LeeDecker *et al.* 1990:181). Clover seed was recovered from the bottom of the western well (ER 182AB). A lone charred seed of clover was recovered from Wilmington's Block 1184 (LeeDecker *et al.* 1990:181).

Corn (*Zea*) cob fragments (Figure 125) were retrieved from the bottom of the west well (ER 182AB). Corn was also identified at the John Darrach Store Site (De Cunzo *et al.* 1992:389).

Copperleaf (*Acalypha* SP.) contains a few species of weeds common to farmlands. They are in the Spurge Family (Martin and Barkley 1961). The Cherokee used the root of a copperleaf they called Wild Mercury (*Acalypha Virginica*) to treat a variety of ills, including

pox (Moerman 86:4). The seeds of copperleaf were found in five of the Hurd flotation samples. Copperleaf was found in five of 11 features at the Darrach Store (De Cunzo *et al*. 1992).

Crabgrass (*Digitaria* SP.) contains several varieties of persistant annual weeds. Thought to be a European native, it has spread throughout the country and frequents fields, lawns and gardens (USDA 1971:58-59). A few crabgrass seeds were found in three samples from Feature 21. Crabgrass was also found in one feature at the Darrach Store site (De Cunzo *et al.* 1992:386-393).

The elder (*Sambucus Canadensis*) is a common shrub that grows in abundance along floodplains and other moist places (Petrides 1977:48) The flower and fruit of this plant can add flavor to food and drinks, and other parts had a variety of medicinal uses (Sandy 1985:134-135). It is used in wine, but care must be exercised, since all parts of the plant contain hydrocyanic acid (Petrides 1977:48). The seeds are used for a dye, and the seeds and leaves might be used as an insect repellent (LeeDecker *et al.* 1990:180). Elderberry seed was recovered from samples of four features: Feature 18, 21, 22 and 39. Elderberry seeds were recovered from 2 of 3 flotation samples at Block 1184 in Wilmington (LeeDecker *et al.* 1990:174-180).

Flatsedge (*Cyperus Compressus*) is a small perennial herb (USD:1971:96-99). Four flatsedge seeds were recovered from a simple at the bottom of Feature 18 (ER 182AB). Flatsedge was found in Feature 75 at Darrach Store (De Cunzo et al. 1992:386-393).

Grama (*Bouteloua* SP.) is a weed that is common on farmlands. It is in the grass family (Martin and Barkley 1961:12,133). Grama was tentatively identified from three samples from three different features (Features 18, 45 and 49).

Goosegrass (*Eleusine Indica*) is an annual from Asia. It frequents waste places and thrives in hard packed ground, like paths and house sites (LeeDecker *et al.* 1990:182). Goosegrass seeds were identified from Feature 18 and Feature 21 at the Hurd Site. One charred goosegrass seed was found in Wilmington's Block 1184 (LeeDecker *et al.* 1990:182).

Grapes (*Vitis* SP.) include a variety of wild and domestic species. They can be eaten fresh, dried into raisins, or made into soft or alchoholic drinks. A single grape seed was found in a flotation sample from near the bottom of Feature 21 (ER 180Y), the eastern well.

Hawkweed (*Hieracium Aurantiacum*) is a weed commonly found on farmlands (Martin and Barkley 1961:52).

Hawkweed seed was found in four samples from two Hurd Site features (Feature 18 and Feature 21).

Jimson weed, also called jimson or thornapple (*Datura* SP.) is common in fields, and is abundant in old feed lots, barnyards and waste places. This coarse, foul smelling plant grows up to five feet high, and produces spiny seed pods from July to October. All parts of this plant are poisonous, and just gathering the plant can cause swollen eyelids. It is a folk cancer remedy, and the leaves were once smoked as antispasmodic for asthma (Foster and Duke 1990:182). The early settlers at Jamestown were familiar with the plant, hence it was known as Jamestown Weed. Although it is now considered a weed, it was a popular ornamental as early as the 1600's. It appears consistenly, and in large numbers in archæological excavations throughout New England, New York and Wilmington. Throughout the region, it may have been widely consumed as a convenient narcotic, with its use covering a considerable period of time (Mrozowski 1987; LeeDecker *et al.* 1990:181;Sandy 1992b). Jimson seeds, occasionally in large numbers, were found in 13 of the Bloomsbury flotation samples. All these samples were from two wells (Feature 18 and Feature 21). At Wilmington's Block 1184 excavations, jimson was the second most common seed recovered (LeeDecker *et al.* 1990:174-180).

Lamb's-quarters (*Chenopodium Album*), also called chenopodium, and goosefoot (*Chenopodium Hybridum*) are similar members of a large family of annual herbs that go to seed from June to October.

Each plant can produce thousands of seeds, and some of the seeds can persist on the plant into the winter.

They grow in a variety of habitats including fields, meadows, clearings and disturbed soils (USDA 1971: Kavasch 1981:44). Chenopodium was considered to be a healthful food by many Native American groups. Its leaves were used as a green and were parboiled. Seeds were ground into meal and baked into bread, sometimes being mixed with cornmeal. The root was brewed into tea, and used for kidney ailments (Kavasch 1981:44; Weiner 1980:177; Tantaquidgeon 1972:128; Sandy 1985:135). Other medicinal uses for parts of this plant include as an antidiarrheal, as a salve for burns, as a stomach aid and as a gynecological aid (Moerman 1986:114- 115). Lambsquarter's seeds were recovered from 18 of the Hurd Site features, but were not present in great numbers. The seeds of its cousin, goosefoot, were found in small numbers in four of the features. Chenopodium seeds are arguably the most ubiquitous seed recovered from prehistoric sites in the Northeast (Sandy 1985, 1989, 1991, 1992; Crowley and Sandy 1991; Camissa et al. 1993). A lone seed of lambsquarter was identified at the historic Block 1184 site (LeeDecker *et al.* 1990:174-180). During the excavation of the Hurd site there were large stands of this weed in the disturbed areas around the site. The excavations took place during the period these plants were producing seeds.

Nightshade, bittersweet (*Solanum Dulcimara),* is a two to eight foot high woody stemmed vine found in moist thickets, clearings and gardens. After it flowers (May-October) it produces poisonous berries (Peterson 1977:134). Bittersweet nightshade seeds were recovered in five of the flotation samples. These samples came from 3 different features: 18, 21 and 32.

Nutshell fragments or possible fragments were found in one sample from each of two well features (Features 18 and 21. The fragments were small and it was not possible to determine what variety of nut they are.

Oxalis (*Oxalis Stricta),* also known as wood sorrel, is a small plant whose leaves and seed pods can be used as a salad ingredient and to make a cold drink (Peterson 1977:72). Oxalis seeds were found in low numbers in one sample from each of five features at the Hurd Site (Features 5, 11, 45, 56 and 57). This type of seed has been recovered from a number of prehistoric archeological sites in Delaware, New Jersey and West Virginia (Sandy 1985:141). It was found in historic features at the Darrach Store (DeCunzo *et al.* 1992:389).

Pigweed is one of the Amaranths, a large family of annual weeds and herbs that frequent cultivated fields, fence rows and waste places throughout the country. They are infamous for the tremendous number of small seeds they produce (USDA 1971:142-147). The plant had a variety of medical uses. The seeds can pass through the digestive system without harm and have remained viable for 40 years. Its food uses are similar to chenopodium: greens can be eaten fresh or boiled, and the seeds are a source of grain or flour (LeeDecker *et al.* 1990:179). Pigweed (*Amaranthus* SP.) seeds were identified from flotation samples of two features, Feature 18 and Feature 32). A single specimen of amaranth was recovered in Wilmington's Block 1184, and the seeds were found in three features at Darrach Store (LeeDecker *et al.* 1990:174-180; DeCunzo *et al.* 1992:389).

Pokeweed (*Phytolacca Americana*), also known as poke, is a common weed that grows up to 8 feet high. The purple berries of poke were used for a dye in prehistoric and historic times. Poke root was used in a variety of medicines, while the young shoots were a source of greens (Sandy 1985:141). In historic times, colonists cultivated it for food and dye (Wacker and Clemens 1995:157). Pokeweed seeds were found in Feature 41 at the Hurd Site. Poke seeds have been found at numerous prehistoric sites in Delaware, New Jersey and throughout the region (Sandy 1985:141). These seeds were also found in 4 of 11 features at the Darrach Store (DeCunzo *et al.* 1992:389).

The peach is a small tree that is a native of Asia. On occasion, the cultivated peach will escape to thickets (Petrides 1977:237). Peach pit fragments were recovered

from a single flotation sample near the bottom of feature 21.

Pepperweed (*Lepidum Campestre*) or pepper grass is an annual herb naturalized from Europe. It frequents grainfields, meadows and wastelands, and flowers from May through September (USDA 1971:206-207). Various species of pepper grass were used for a number of medicinal uses by a variety of native groups. For example, it was used as a sleep medicine for babies, a wash to cure poison ivy and a veterinary aid to help chickens (Moerman 1986:257-258). A few seeds of pepperweed were tentatively identified from three samples from the bottom of Feature 18.

Purslane is a small prostrate plant with succulent leaves and reddish stems. It is cultivated both for food and as an ornamental. In addition, it is also a tenacious, prolific little weed (Peterson 1977:72). The leaves, shoots and stems can be eaten steamed or raw throughout the growing season. In the Southwest, Indians used the seeds for mush or bread. Purslane seeds were recovered from 18 of the features. Without a doubt they were the most numerous seeds in the flotation samples. In some samples, more than 1,000 purslane seeds were recovered. The purslane seed specimens from these samples were tentatively identified as belonging to at least two different species of purslane (*Portulaca Oleracea* and *Portulaca Lanceolata*).

Evidence for the use of purslane in prehistory comes from Salt Cave, Kentucky and sites in central New Jersey (Sandy 1985:142). Historically, purslane was simultaneously a garden favorite and (because of its incredible ability to spread) a gardener's nightmare. Two purslane seeds were discovered in recent excavations in Wilmington (LeeDecker *et al.* 1990:174-179).

Ragweed (*Ambrosia* SP.) includes a number of annual herbs that inhabit waste places and fields, and produce seeds from July through October. Many species were used for a variety of medicinal uses by Native groups. The Delaware used *A. Artemesia* in making a poultice which was applied to prevent blood poisoning. Ragweed seed was identified in a single sample at the very bottom of Feature 18. Charred ragweed seeds were found on two prehistorc sites on the Abbott Farm National Landmark, near Trenton, and it also appears on the species list from Salt Cave (Sandy 1985:185).

Raspberries are included in a genus (*Rubus*) that includes hundreds of varieties of similar berries, including the common blackberry and raspberry.There are also numerous food and medicinal uses for the fruit. Raspberry seeds were recovered in relatively small numbers from 5 of the Hurd features (Features 18, 21, 32, 53/54 and 59. It was not possible to determine which of the countless varieties of berry is represented by the seeds from these samples. "Blackberry" seeds were the most numerous type at Block 1184 in Wilmington. It has been suggested that the presence of household yard fences encouraged the spread of weedy vines such as blackberry (LeeDecker *et al.* 1990:174-180; Mrozowski 1987). It could be further argued that having fenced yards encouraged the cultivation of domestic raspberries, since the fence would offer the berries some protection from grazing farm animals.

Sclerotia were found in all 38 samples, and most of these samples contained thousands of sclerotia. These black, ball shaped objects vary in size from less than 1 mm to more than 4 mm, and are part of the resting stage of mycorrhizal fungi. Called *Cenococcum Graniforme* or *Cenococcum Geophilum*, these fungi live in a symbiotic relationship with a large variety of both deciduous and evergreen trees.

They have been identified at a variety of prehistoric sites throughout the northeast (McWeeney 1989; Sandy 1991, 1992a; Crowley and Sandy 1992).

On most of these sites, like the Hurd Site, the sclerotia were recovered in large numbers. How these fungi were introduced to the sites is not clear, and no direct link to human utilization has been made. Their archeological value might lie in their value as environmental indicators. Sclerotia are presumably the same thing as the "spores" recently identified from a number of features at the Darrach Store Site (DeCunzo *et al.* 1992:388-393).

Skullcap (*Scutellaria Integrifolia*) is a weed common to farmlands. It is a member of the mint family (Martin and Barkley 1961:195). A single seed was identified from a sample near the bottom of Feature 21.

Polygonums are a large family of weedy annual and perennial herbs. They include knotgrass, various smartweeds and similar common weeds.

Polygonum seeds (*Polygonum*), believed to be smartweeds, were recovered in 12 of the flotation samples. These seeds are tentatively identified as belonging to at least three similar species (*Polygonum Pensylvanicum*, P. *Punctatum* and P. *Lapathifolium*).The seeds of some smartweeds can be used as a grain substitute, and they have been recovered from the Abbott Farm National Landmark and other prehistoric sites in Mercer County, New Jersey (Sandy 1985:142).

Water smartweed (*Polygonum Amphibium*) is a large perennial smartweed that frequents wetlands. Delaware is near the southern end of the range of this European immigrant (USDA 1971:114). The seeds of this amphibious plant were found in Feature 45.

Tearthumb (*Polygonum Sagitatum*) is the final Polygonum identified at the Hurd Site. Its seeds were recovered from two samples, both from Feature 21.

Spurges are a widespread genus of small annual and perennial herbs that frequent waste places, gardens and pastures. The Cherokee used the flowering spurge (primarily the root) to treat a variety of ailments, from toothache to cancer. The Fox, Micmac, Iroquis and Ojibwa all used the root to treat various ailments (Moerman 1986:184-185). Spurge (*Euphorbia* SP.) was tentatvely identified from a single seed in Feature 21.

Sweetclover (*Melilotus* SP.) is a small, common European import which produces seeds from April through September. Native Americans adopted a tea of the greens for treating a variety of ailments. Studies have shown its active ingredients lower blood pressure and reduce clotting (Foster and Duke 1990:74, 158; Moerman 1986:285-286). The young greens and flowers can be used in salads, or cooked as a potherb. The seeds are used to flavor soups and stews (Peterson 1977:56). Clovers were important plants on grazing lands in colonial times (Wacker and Clemens 1995:135).

CONCLUSIONS

The results of flotation analysis give an expanded, more accurate picture of the artifacts and ecofacts present on the site. The flotation processing produced information on three things: artifacts, faunal remains and floral remains.

The flotation heavy fractions contained artifacts not recovered, or recovered only in small numbers during excavation. Features 18, 45 and 49 produced pins made of a copper alloy. Features 39 and 49 both produced small black glass beads.

Recovery of small bones and fish scales has been greatly expanded through the use of flotation. During the course of excavations, fish scales were noted from only one feature. However, flotation has shown that fish bones and/or scales were present in more than half the features examined (Features 5, 11, 15, 17, 18, 21, 22, 34, 41 and 45). The recovery of thousands of scales, and some small fish bones, will result in a better understanding both of the fish species exploited and their relative importance in the diet of the inhabitants.

The only definite crops found in the flotation samples were two charred beans from Feature 5 and corncob fragments from Feature 18, the west well. Fruit from trees included a cherry pit and peach pit fragments from Feature 21, the east well. Raspberries and blackberries were the most important berries, followed by elderberry and blueberry. Seeds from a large number of weedy plants were recovered from the site. Most of these "weeds" have documented medical or food uses, and many have been found on other archæological sites. Most prominent in this group are purslane, carpetweed and lamb's-quarter. Other plants that were probably also exploited include clovers, jimson, oxalis, pigweed, poke and smartweeds.

Urban archæology has shown that jimson was widespread in urban areas of the Eighteenth Century, and its presence in two wells at Hurd shows it was also present in rural areas (Mrozowski 1987; LeeDecker *et al* 1990; Sandy 1992b). It is common in farmyards, and was used medicinally and, perhaps, abused as a readily available drug (Mrozowski 1987).

All the flotation samples produced sclerotia, which are the fruitng bodies of fungi symbiotically linked to certain trees. Present by the thousands in most samples, the nature of their introduction into archeological matrices is not clear, nor is any link to human uses.

It is worth noting that the bottoms of the wells at the Hurd site had exceptional seeds, both in terms of total numbers, and in the number of species represented. Several species are present only in these contexts.

The flotation information from the Hurd site provides archæologists with an important new type of environmental information, although there are problems associated with interpreting this information. Some of these problems include assesing bioturbation and other sources of disturbance, along with a lack of comparable data from other sites. However, the Bloomsbury data, along with information from Darrach Store and other sites is beginning to detail some of the seeds present on historic sites. In doing so it provides environmental information available nowhere else.

One area of interest to natural scientists concerns how long seeds last in the ground. Studies conducted at Michigan State University have documented seed viability over a more than 100 year period, but have not studied the preservation of non-viable seeds. Of course seed preservation is a complex issue involving many factors, like soil acidity and moisture. Also, seed viability and preservation clearly varies tremendously by Family. Chinese archeologists have made exciting claims about seeds, including tomatoes and others, remaining vital for over 2,000 years. Closer to home, archeologists at the Shawnee-Minnisink Site on the Upper Delaware River claim to have found preserved seeds that are at least Archaic in age (Moeller 1982:8-9). Data from the 3 wells at the Hurd Site might provide relevant information about seed preservation. It is clear that seeds can survive for as long as two of the wells (Features 18 and 21) have been filled (over 190 years). The lack of seeds from the deeper sample in the other well (Feature 5, ER 137H) is of interest. It may be that the age of this feature exceeds the length of time that seeds last in the soil.

The Bloomsbury data joins a growing body of evidence that suggests that flotation and the recovery of botanical material may become of considerable importance in future archæological investigations. Flotation studies followed by germination experiments has the potential to yield vital seeds and plants that are true "heirlooms". Recent advances in the isolation of DNA indicate that it might be possible to extract DNA from "dead" seeds. It might even be possible to introduce this genetic material into a living seed and produce vital plants with the DNA of the "dead" plant.

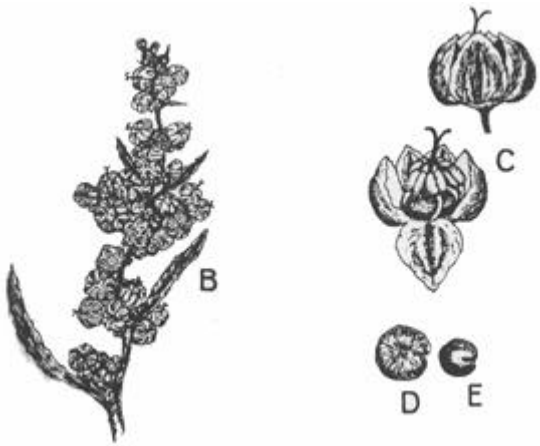

Figure 126

Common Lambsquarter

Chenopodium: B: Floral Spike, C: flowers, D: utricle, E: Seed. Detail from *Common Weeds of the United States,* USDA