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DEPARTMENT OF ANTHROPOLOGY
WESTERN MICHIGAN UNIVERSITY

REPORT OF INVESTIGATIONS NO. 94
1990

PRELIMINARY RESULTS OF THE COLUMN SAMPLING PROGRAM
IMPLEMENTED TO RETRIEVE ARCHAEOBOTANICAL RESIDUES FROM THE
B-GRID AT THE BUCHANAN SITE (13SR153) NEAR AMES, IOWA

WILLIAM M. CREMIN
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INTRODUCTION:

In 1987, as part of a long-term research program jointly sponsored by Iowa State University and the Institute for the History of Material Culture, Polish Academy of Sciences intended to promote comparative studies of post-Pleistocene cultural adaptations on either side of the Atlantic, ISU's Dr. John Bower initiated archaeological excavations at the Buchanan site (13SR153) near Ames, Iowa. Situated in a narrow valley formed by several small deeply entrenched streams that are tributary to the Skunk River, Buchanan features alluvial/colluvial sediments revealing the presence of a Late Woodland component overlying multiple Archaic occupations extending to depths in excess of two meters below the modern surface in some places on the valley floor. Typologically distinctive artifacts and three radiocarbon assays providing multiple intercept calibrated ages ranging from 529-5192 B.C. confirm both the stratified nature of the cultural deposits and the temporal placement of the Archaic components represented.

Another important outcome of the 1987 field season at this site was the recognition of seemingly extraordinary organic preservation, especially in the area designated as the C-grid. Because Bower had not yet secured the participation of a paleoethnobotanist, the senior author was approached and invited to visit the site in the following year.

Although project fieldwork during the 1988 season was conducted in Poland, Bower did elect to return to Buchanan for a brief session with a CY-TAG (Challenges For Youth-Talented and Gifted) group prior

to departing for Europe. The major accomplishments of this field school were to further elucidate the nature of the Late Woodland occupation and to clear some 25 m² of Late Woodland deposits in the B- and C-grids in preparation for a 1989 field season during which the emphasis would be on the recovery of Archaic data.

The CY-TAG session on the Buchanan site also provided the senior author with an opportunity to visit Ames and the site. The 1987 data set was examined, open units on the site permitted viewing of the sediments, and discussions with Bower resulted in clarification of some possible ways in which we at Western Michigan University might assist in developing a strategy for retrieving data useful in determining conditions in the immediate site environs and the nature of plant resource exploitation during the succession of occupations represented by the cultural deposits. Thereafter, much of our time and energy were devoted to securing the funds necessary for implementing the research design created.

With financial support from the Office of the Provost, the College of Arts and Sciences, and the Department of Anthropology at WMU, the senior author was able to spend the first week on site with the 1989 ISU field school. A stratified random sample of grid coordinates in both the B- and C-grids was established for the collection of 20X20 cm column samples of site sediments, and field school personnel were instructed as to the manner in which soil samples were to be collected, provenienced, curated, and processed (floated) in the field prior to recovered residues being returned to the laboratory. Parenthetically, all flotation residues sent to WMU were collected from the B-grid as excavation during the 1989 field season was confined to this area of the Buchanan site.

SAMPLE COMPOSITION AND ANALYTIC PROCEDURES:

Initially, ISU personnel were to have performed the preliminary sorting of all flotation residues. But with the exception of samples comprising two columns and two 10 l judgement samples, all material arrived at WMU in an unsorted condition (per an agreement with Bower that we were better able to handle this task given our greater laboratory resources). Moreover, of the 14 column sampling loci shown in Figure 1, material from only 10 (in addition to the two special samples) reached us in time to be included in this preliminary analysis.

All 10 columns may be regarded as being incomplete, in that either 10 cm level samples (representing 400 cm^3 , or approximately four liters of sediment) were not collected or received by us or the 1 m^2 excavation unit in which a column sampling station had been located does not afford us with a continuous column extending from the top to the base of the cultural deposits. Typically, those units from which the Late Woodland "overburden" had been removed in 1988 have columns commencing at 60-70 cm below the surface, with the remainder beginning at a depth of 10 cm. Columns that do reach the base of the cultural deposits terminate from 220-260 cm below ground level, while those occurring in units that were not completed prior to the end of the field season extend to depths ranging from 60-160 cm. Presumably, the latter columns can be continued when excavations at Buchanan resume in 1991.

Of 128-10 cm levels excavated in units where column sampling stations occur, 116-4 l flotation samples were collected and processed to retrieve small-scale archaeological remains. And of this number we received a total of 111 samples representing 444 l of sediment.

COLUMN SAMPLING LOCATIONS IN THE B-GRID
AT THE BUCHANAN SITE (13SR153) NEAR AMES, IOWA
(1989 FIELD SEASON)

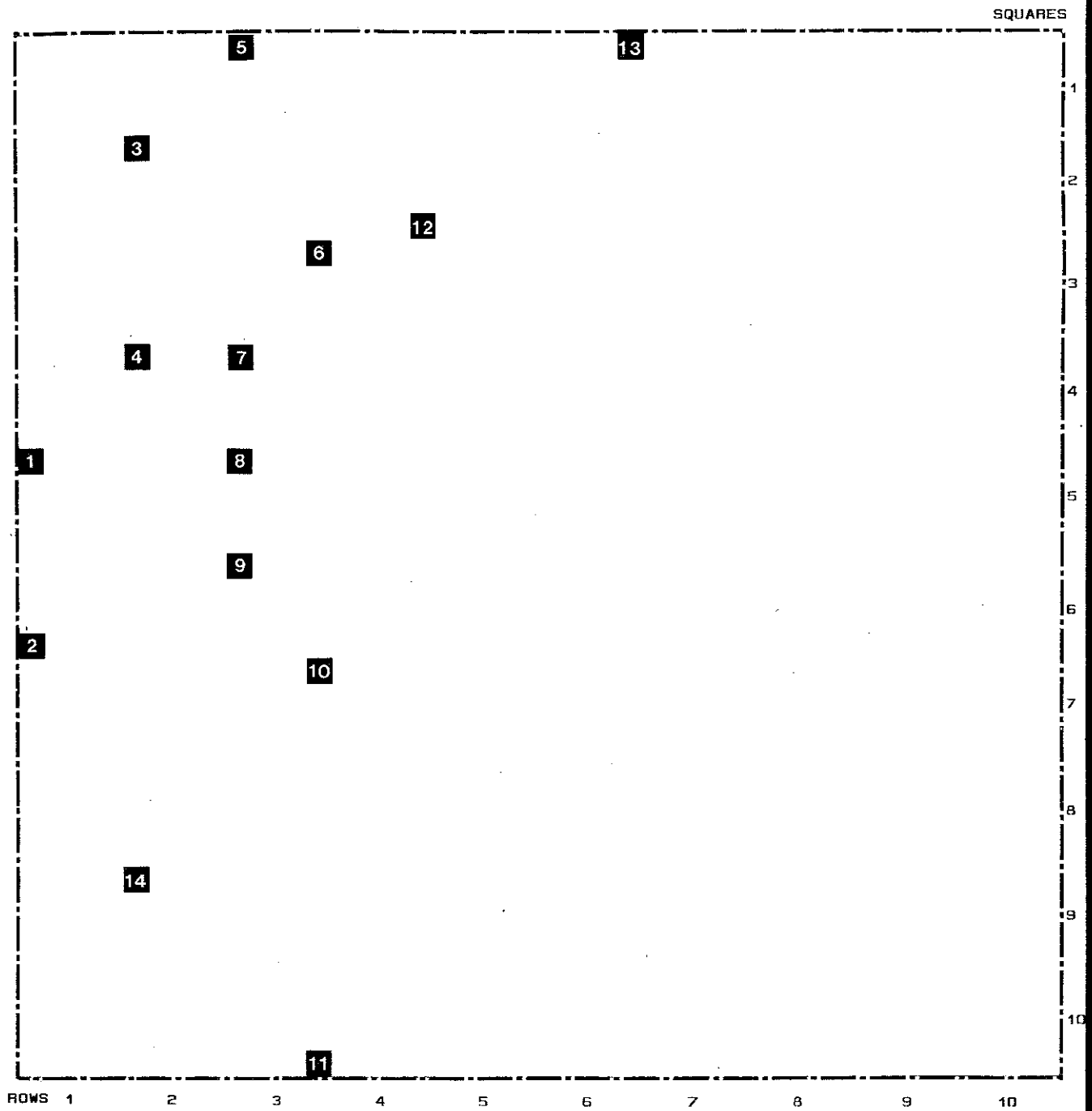
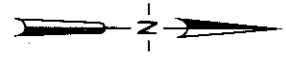
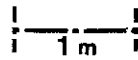


Fig. 1



Special or judgement samples totaling 18 by count and 130+ 1 by volume were collected from especially noteworthy contexts such as feature fills, but as previously noted only two samples will be included in this discussion.

Upon arrival in our laboratory at WMU, provenienced sample containers were checked against the flotation sample list provided by ISU. A gross weight was established for the contents of all samples, and if samples were unsorted the residues were passed through a series of size-graded geologic sieves to facilitate assignment of the material to various categories including gravel, fire-cracked rock, lithic debris, bone fragments, and plant remains. Removal of all inorganic debris reduced the weight (and count) of the residues from 13.2 kg to 147.6 g, or by 98.9%. And when pieces of bone, numbering 442 and totaling 46.0 g (0.3%) by weight, were separated from the plant remains, the latter were determined to aggregate a mere 101.6 g (0.8%) of all flotation residues.

Following separation of plant specimens from all other material in the samples, this small assemblage was further divided into non-carbonized (89.2 g) and carbonized (12.4 g) components. If any soil particles were observed to adhere to plant specimens, a mild solution of soap and water was used to disaggregate cohesive sediments prior to fine sorting for purposes of quantification and identification.

All sorting, counting, and detailed identification of plant material was accomplished through the use of a dissecting microscope capable of 70X magnification and reference to standard plant identification manuals (Core, Cote, and Day 1979; Martin and Barkley

1961; Montgomery 1977; Pammel 1913; Roosa and Runkel 1989; Van Der Linden 1984; UIUC-Agricultural Experiment Station 1960; and USDA 1974). In addition, some of the plant specimens required comparison with fresh and carbonized material maintained as type sets in the Archaeology Laboratory at WMU.

DATA PRESENTATION:

It should be stated at the onset that Bower's most intriguing observation of a thick mat or lens of excellently preserved non-carbonized plant material in C-grid excavation units during the 1987 field season, while piquing our desire to implement the column sampling program in the B-grid, has not been duplicated during the 1989 excavations. Aggregating almost 88.0% of all plant residues by weight, noncarbonized specimens were observed to occur in trace quantities in 101 (91.0%) column samples and both judgement samples. While most of this material consisted of rootlets, twig segments, and minute wood chips, also recorded were the fragments of grass stems, sedge stalks, and deciduous tree leaves. Several tree buds and scales, immature acorns, a partial conifer cone, and one rose thorn have been identified, as have an ash samara and the seeds or achenes of a number of arboreal and herbaceous plants common to the area.

While it is tempting to suggest that conditions favorable to the preservation of noncarbonized plant material characterize the archaeological sediments in the B-Grid at Buchanan, an interpretation not entirely out of line with Bower's earlier observation and our own recovery of such specimens from almost all excavation levels represented in the columns, we prefer to err on the side of caution. Given the kinds and quantities of noncarbonized plant material

recorded for 101 samples and, most notably, the absence of any dense concentrations as were noted during excavation of the C-grid in 1987, it is more prudent at this point in our investigation to attribute the presence of noncarbonized specimens in the samples to modern contamination.

Carbonized or charred plant remains have been observed in 83 column and both judgement samples, number 2718 specimens, and constitute a mere 12.4 g (12.2%) by weight of all botanical material. The charcoal categories (together with their frequency of occurrence) represented include: wood - 82; nutshell - 12; seeds - 9; and other (mostly unidentified) - 14.

Wood charcoal, aggregating 93.9% by count and 91.5% by weight, constitutes the predominant material and occurs, without exception, in trace quantities consisting of minute fragments. Only a single specimen has proven to be identifiable to the generic level (Quercus sp., white oak group). The remainder are simply too small and fragmentary to permit identification that is more specific than assignment to the category of wood charcoal.

Charred nutshell remains are also typically minute; so small in fact that erroneous assignment to the wood charcoal category cannot be ruled out. Nutshell totals 2.2% of all plant remains by count and 4.8% by weight. We have been more successful in identifying these remains, due in large measure to the presence of somewhat more sizeable fragments. Three occurrences of Juglans spp. have been noted, including three specimens of J. nigra, black walnut. In addition, 16 specimens of Carya spp. (hickory) have been recorded for one column sample extracted from the Late Woodland component at Buchanan. All occurrences of Juglans spp. nutshell are associated

with earlier Archaic occupations of this site.

Nine seeds were recovered from five column and one judgement sample and represent a negligible contribution (less than 1%) to both plant specimen count and weight. The two specimens that are well preserved and distinctive enough to permit identification are sheep sorrel (Rumex sp.) and poison ivy (Rhus radicans). We attach no significance to either the small number or specific plants that are represented by seeds in the botanical sample from Buchanan.

Finally, we have a total of 91 (3.4%) incomplete and very tiny specimens weighing only 0.40 g (3.2%) that cannot be assigned to any of the aforementioned categories or confidently associated with any other kind of plant part. We would suggest that several represent the scales of tree buds, but for the remainder we are at a loss to offer meaningful statements as to their identity. With respect to 26 specimens, ranging between 1-4 mm (but with most being less than 2 mm) in their longest dimension and exhibiting much erosion on both their internal and external surfaces, identification as rind fragments has crossed our minds. But we offer this suggestion with caution, especially as 20 of these small fragments were recovered from column samples deep (180-200 cm) within the Archaic deposits at the site.

According to Bower (personal communication), sediments at this depth in Row I, Square 6 (Column Sampling Locus #2) are associated with an episode(s) of redeposition of stream channel fills, and the sediments in question have produced good Middle Archaic projectile points and a radiocarbon date of 6120^{+240} years: 4170 B.C. This assay has yielded multiple intercept calibrated ages of

5193 B.C., 5185 B.C., and 5062 B.C. (Stuiver and Reimer 1986).

To date, the 20 specimens (as well as six other very similar fragments from a column sample collected from the Late Woodland component) have been examined only with a dissecting microscope and compared with type set material that is both much larger in size and better preserved. This cursory examination is more suggestive of affiliation with Cucurbita than anything else with which these specimens have been compared. For example, while erosion of both surfaces is very common, none of the specimens would appear to have been more than about 2 mm thick when intact. Secondly, at least one specimen on which some of the exterior surface is still preserved shows a moderately warted texture. And another specimen featuring some of the inner layer of "rind" exhibits cavities that may indicate the "popping off" of large, isodiametric and regularly arranged cells characteristic of the cultivated cucurbits. However, examination under higher power magnification will be required to confirm this observation. Finally, while none of the specimens shows tiny carbonate-containing cells appearing as white dots on the exterior surface, or epidermis, 70X magnification did suggest the presence of sporadically occurring pits or craters that could represent locations where such cells or cystoliths have dissolved away (see Asch and Asch 1985; Cutler and Whitaker 1961). Clearly, before we posit the presence of cucurbits in the Middle Archaic at Buchanan, more careful and detailed study of these specimens (and any others which may be forthcoming with continued excavation) will be necessary.

DISCUSSION:

When we initiated the column sampling strategy at the Buchanan

site in 1989, we most certainly anticipated that our efforts would be rewarded with the recovery of a more robust assemblage of archaeobotanical material. In retrospect, while we have given thought to enlarging of area of the column to perhaps 50 cm on a side in order to dramatically increase the volume of sediments in each flotation sample, it is still very questionable whether more dirt would have necessarily provided us with statistically significant quantities of residues. Moreover, a greater quantity of plant material would not guarantee better preservation and a greater number of identifications to the generic or specific levels.

Based upon the observations reported herein, and without recourse to the plant material from C-grid that still remains unstudied because of the absence of controls during the collection of these data, we can only conclude that plant preservation in the B-grid is not as good as we had hoped. And we do not recommend intensification of the column sampling strategy in this area of the site in 1991. Rather, we propose that judgement samples of an appropriate volume (10 l as a standard can be retained) be collected from those deposits critical to making a determination as to whether cucurbit rind (and possibly seed remains) is present in the Middle Archaic at 13SR153.

For comparative purposes, it is unfortunate that the 1989 excavations did not extend into the C-grid. For it is here that Bower originally observed that plant remains appeared to be extraordinarily well preserved at Buchanan. Now that the B-grid column sampling strategy has provided some control over the recovery of plant material, application of this same approach in the C-grid might reasonably be anticipated to provide some interesting "food

for thought"--that is, observations which might shed light on the matter of differential preservation of plant remains across the site and some possible explanations for it.

REFERENCES CITED:

- Asch, D.L. and N.B. Asch
 1985 Prehistoric Plant Cultivation in West-Central Illinois. In Prehistoric Food Production in North America, edited by R.I. Ford, pp. 149-203. Museum of Anthropology, University of Michigan, Anthropological Papers 75.
- Core, H.A., W.A. Cote, and A.C. Day
 1979 Wood Structure and Identification. Syracuse University Press, Syracuse.
- Cutler, H.C. and T.W. Whitaker
 1961 History and Distribution of the Cultivated Cucurbits in the Americas. American Antiquity 26(4):469-485.
- Martin, A.C. and W.D. Barkley
 1961 Seed Identification Manual. University of California Press, Berkeley.
- Montgomery, F.H.
 1977 Seeds and Fruits of Plants of Eastern Canada and Northeastern United States. University of Toronto Press, Toronto.
- Pammel, L.H.
 1913 The Weed Flora of Iowa. Iowa Geological Survey, Bulletin 4. Des Moines.
- Roosa, D. and S. Runkel
 1989 Wildflowers of the Tallgrass Prairie: the Upper Midwest. Iowa State University Press, Ames.
- Stuiver, M. and P.J. Reimer
 1986 A Computer Program for Radiocarbon Age Calibration. Radiocarbon 28(28):1022-1030.
- Van Der Linden, D.R.F.
 1984 Forest and Shade Trees of Iowa. Iowa State University, Ames.
- UIUC-Agricultural Experiment Station
 1960 Weeds of the North Central States. Circular 718. Urbana.
- USDA-Soil Conservation Service
 1974 Seeds of Woody Plants in the United States. Forest Service Handbook 450.