David G. Anderson

BULLETIN 3

SOUTHEASTERN ARCHAEOLOGICAL CONFERENCE

Proceedings of the

Twenty-First

Southeastern Archaeological Conference

Edited by
Stephen Williams
Cambridge, Massachusetts
1965

EDITOR'S NOTE: A LAST GASP

This volume is the last to be edited from Cambridge and reports the results of the Twenty-first Conference held at New Orleans on November 6th and 7th, 1964. I feel that this was one of the most successful of recent conferences. What the location in New Orlenas had to do with this outcome will have to be answered by the individual participants. Surely the fine hospitality of our host, Bob Wauchope and Tulane, was important in creating a favorable situation for our meetings both at the Fontainebleau Motel and the University itself.

The papers have been transcribed from the tapes by Diane Agnes of this office and were then distributed to the authors for correction. This particular issue was typed by a variety of willing and sometimes able young ladies. Continuity was not present in this phase, however, and I am afraid some errors still remain in these published results.

As the program indicates, a few papers were given that have not been included in this volume. The field reports were not taped for posterity. There was also a rather lengthy portion of the program chaired by the Editor during which an attempt was made to integrate data on the economic basis of Southeastern prehistory by using regional sequences. The resulting charts, not reproduced here, will be used as a start for the next conference topic.

An additional paper on another topic by Gene Waddell is appended, since it was submitted while this volume was going to press.

A word of farewell will conclude my five year term as editor. I wish my successor, Ed McMichael, all the best of luck and hope he can find the opportunity for speedier execution of the task at hand. I also want to thank the membership for its patience where and when it has been needed.

Stephen Williams
Peabody Museum
Cambridge, Mass. 01238

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List of Conference Participants

David Baerreis
C. F. Bohannan
Margaret Nell Bond
James Brown
Bettye J. Broyles
Reid Bryson
Adelaide K. Bullen
Ripley P. Bullen
Joseph R. Caldwell
Carl H. Chapman
David W. Chase
Berle Clay
John Cottier
Hester A. Davis
Clemens De Baillou
David L. DeJarnette
Roy S. Dickens, Jr.
William E. Edwards
Charles H. Faribanks
James A. Ford
Leslie Freeman
H. F. Gregory, Jr.
James B. Griffin
Alfred K. Guthe
William G. Haag
John B . Huner
Harold A. Huscher
Frederick Johnson
A. R. Kelly
Thomas H. Koehler
Lewis H. Larson, Jr.
Edward McMichael
Richard A. Marshall
L. Ross Morrell
R. Stuart Neitzel
Dorris L. Olds
David Phelps
Inis Pickett
William A. Ritchie
Frank T. Schnell, Jr.
Douglas Schwartz
Edward M. Simmons
Lanier A. Simmons
Allan H. Smith
Stanley A. South
Pheriba K. Stacy
Robert L. Stephenson
Stuart Struever
William C. Sturtevant
John W. Walker
Trawick Ward
Robert Wauchope
C. H. Webb
Stephen Williams
Rex L. Wilson
R. A. Yarnell

PROGRAM

THE TWENTY-FIRST SOUTHEASTERN ARCHAEOLOGICAL CONFERENCE

Session I: REPORTS ON CURRENT FIELD WORK IN THE SOUTHEAST
Chairman: Robert Wauchope

Florida	Virginia	Missouri
Georgia	Tennessee	Alabama
South Carolina	Kentucky	Mississippi
North Carolina	Illinois	Louisiana

Session II: DESCRIPTIVE DATA ON THE ECONOMIC BASIS
Chairman: James B. Griffin
Contributions by William A. Ritchie, Edward McMichael, Ross Morrell, A. R. Kelly, Charles Fairbanks, R. A. Yarnell

Session III: SOME HYPOTHESES ABOUT EASTERN ECONOMICS
Chairman: Stephen Williams
Contributions by Joseph Caldwell, Lewis H. Larson, Pete Gregory, Trawick Ward, Stuart Struever, A. R. Kelly

Session IV: INTEGRATION OF DATA AND SUMMARY
Chairman: Douglas Schwartz
Contributions by William C. Sturtevant, R. A. Yarnell, James B. Griffin, Reid Bryson

PRELIMINARY ANNOTATED BIBLIOGRAPHY ON EASTERN NORTH AMERICAN INDIAN AGRICULTURE

by

William C. Sturtevant

The following is a preliminary bibliography on aboriginal North American agriculture east of the Plains, including ethnological, archeological, historical, and botanical sources. The coverage includes accounts of the characteristics and history of agricultural techniques and tools, lists and discussions of cultigens, and some of the principal botanical sources on these cultigens. Only those items of the extensive botanical literature on maize which specifically refer to Eastern Indian maize are included; obviously there are a great many other sources which are crucial to an understanding of the origin, development, and spread of maize varieties in the aboriginal East. Material on the uses of cultivated plants, on agricultural ceremonies and mythology, and on non-agricultural ethnobotany are excluded from the bibliography.

This listing results from casual collecting over the past few years rather than from systematic search of serial runs, published bibliographies, library catalogs, and abstract series. It is thus very incomplete; important gaps can be expected particularly in the archeological and historical literature, and in titles published during 1963-64 (the compiler having been outside the U. S. for one year during this period). Not every item mentioned has been checked for relevance and bibliographic accuracy. Corrections and additions to the titles and the annotations will be gratefully received, and acknowledged in any future edition. (Help has already been given by W. N. Fenton, B. G. Trigger, F. P. Bullen, C. H. Fairbanks, and especially Stephen Williams.)

Aller, Wilma F.
1954. Aboriginal food utilization of vegetation by the Indians of the Great Lakes Region as recorded in the Jesuit Relations. Wisconsin Archeologist ns. 35(3): 59-73.

Anderson, Edgar
1952. Plants, man and life. Boston: Little, Brown & Co. (Especially ch. 10, "A roster of our most important crop plants and their probable origins," and ch. 11, "Sunflowers--the one native [North] American crop.")

1956. Man as a maker of new plants and new plant communities. Pp. 763-777 in Man's Role in Changing the Face of the Earth, ed. by William L. Thomas. Chicago: Univ. of Chicago Press. (Especially for origin and spread of cultivated sunflower.)

Anderson, Edgar and William L. Brown

1952. The origin of corn belt maize and its significance in heterosis. Chapter 8 in Heterosis, ed. by John H. Gowen, Ames, Iowa. (References to Northern Flints collected by Anderson & Brown among the Fox of Tama, the N. C. Cherokee, and ? the N. Y. Iroquois.)

Anon.
1921. Find prehistoric corn in Tennessee stone graves. Jersey Bul. and Dairy World 40: 2588. (Found by W. E. Meyer for B.A.E. in Davidson County, Tenn.)

Atkinson, Alfred and M. L. Wilson
1915. Corn in Montana; History, characteristics, adaptation. 123 pp. Mont. Agr. Expt. Sta. Bul. 107. Bozeman. (Includes material on Northeastern Indian agriculture.)

Bailey, Liberty Hyde
1929. The domesticated Cucurbitas. Gentes Herbarum vol. II, fasc. II, art. 4. Ithaca.

1932. Addenda in vol. II, particularly in relation to nomenclature. Gentes Herbarum, vol. 2, Fasc. 7, art. 13. Ithaca. (For Seminole pumpkin, Cucurbita moschata.)

1949. Manual of cultivated plants most commonly grown in the continental United States and Canada. Rev. Ed. N. Y.: Macmillan.

Balmer, F. E.
1926. The Farmer and Minnesota history. Minn. Hist. 7:199-217. (Indian agriculture, pp. 200-205.)

Bareis, Charles
1957. Comments on prehistoric corn samples (from eastern Oklahoma). Oklahoma Anthropological Society Newsletter 6 (5): 7-8.

Bergaw, Louise O., Annie M. Hannay, and Nellie G. Larson
1940. Corn in the development of the civilization of the Americas: A selected and annotated bibliography. U. S. Bureau of Agricultural Economics Bibliography 87. 195 pp. Washington (Not seen.)

Birket-Smith, Kaj
1918. A geographical study of the early history of the Algonquian Indians. Internationales Archiv fur Ethnographie 24: 174-222. Leiden. (Discusses swidden agriculture, with page references to early sources, including some in Dutch and Swedish.)

Black, M. J.
1963. The distribution and archaeological significance of the marsh elder, Iva annua L. Papers of the Michigan Academy of Science, Arts, and letters 48: 541-547. (Apparently an early cultigen - Yarnell, 1964: 102.)

Blair, E. H.
1911. Indian tribes of the Upper Mississippi and the Great Lakes Region. 2 vols. Cleveland: Arthur H. Clark Co.

Bland, Edward
1651. The discovery of New Brittaine. (Not seen. An account of an expedition inland from the head of the Appamattuck River, said to contain an illustration of "Indian Wheat.")

Brooks, Jerome E.
1937. Tobacco, its history illustrated by the books, manuscripts and engravings in the library of George Arents, Jr. .... N. Y.: Rosenbach.

1944. The early iconography of tobacco. Journal of the New York Botanical Garden 45: 217-225, 248-255.

1952. The mighty leaf, tobacco through the centuries. Boston.

Brown, William L. and Edgar Anderson
1947. The Northern Flint Corns. Annals of the Missouri Botanical Garden 34 (1): 1-30.

Bruce, Philip Alexander
1896. Economic history of Virginia in the seventeenth century; an inquiry into the material condition of the people, based upon original and contemporaneous records. 2 vols. N.Y. & London: Macmillan & Co. (ch. 2, Aboriginal Virginia: Its Physical Character, 1: 71-139; ch. 3, Aboriginal Virginia: Indian Economy, 1:140-188.)

Bullen, Ripley P.
1958. Six sites near the Chattahoochee River in the Jim Woodruff Reservoir area, Florida. River Basin Survey Papers No. 14, Bureau of American Ethnology Bulletin 169, pp. 315-357. ("Charred corn" from four pits (p.344) of late Fort Walton date (p.348), described by Galinat and Mangelsdorf (p.347).)

Butler, Eva L.
1948. Algonkian culture and the use of maize in southern New England. Bulletin of the Archeological Society of Connecticut 22. 56 pp., 1 fig.

Byers, Douglas S.
1946. The environment of the Northeast. Pp. 3-32 in Man in Northeastern North America, ed. by Frederick Johnson, Papers of the Robert S. Peabody Foundation for Archaeology 3. Phillips Academy, Andover, Mass. (Pp. 11-12: climatic limitations on maize agriculture; pp. 17-23: clearing and burning of forest.)

Caldwell, Joseph R.
1962. Eastern North America. Pp. 288-308 in Courses toward Urban Life: Archeological Considerations of Some Cultural Alternates, ed. by Robert Braidwood and Gordon R. Willey, Viking Fund Publications in Anthropology No. 32. (Eastern North American cultigens, including Chenopodium and amaranths; see also Braidwood & Willey's "Conclusions and Afterthoughts" in the same volume.)

Capitan, Louis and Henri Lorin
1930. Le Travail en Amérique avant et après Colomb. 463 pp. Paris: Librairie Félix Alcan. (Not seen.)

Carr, Lucien
1893. The Mounds of the Mississippi valley, historically considered. Smithsonian Institution Annual Report for 1891, pp. 503-599. (Pp. 507-533 deal with Eastern Indian agriculture, and give many useful references to, and quotations from, the early historical literature.)

1895. The food of certain American Indians and their methods of preparing it. American Antiquarian Society Proceedings n.s. 10(1): 155-190.

Carrier, Lyman
1923. The beginnings of agriculture in America. xvii, 323 pp., 30 pls. N. Y.: McGraw-Hill

1929. Indian agriculture. South. Agr. 59(4): 16-17.

Carter, George F.
1945. Plant geography and culture history in the American Southwest. Viking Fund Publications in Anthropology 5. 140 pp. (Contains discussions of the East--e.g. "Domestication of Cucurbita pepo in Eastern United States," pp. 25-29; "Relation of Eastern Corn to the Southwest," pp. 50-53; Lima bean "Origin and dispersal in America," pp. 76-79. Should be used with caution.)

1946. Origins of American Indian agriculture. American Anthropologist 48(1); 1-21. (Maize, beans, and squash; including distributions and history in the East. Should be used with caution.)

1947. Sweet corn an important Indian food plant in the pre-Columbian period. Journal of the American Society of Agronemy 39: 831-833. (See Erwin 1947, 1951.)

1948. Sweet corn among the Indians. Geographical Review 38(2):206-221. (See Erwin, 1947, 1951.)

1949. Historic implications of chromosome distributions of North American Indian maize. Southwestern Journal of Anthropology 5: 199-207.

1951. An early American description probably referring to Phaseolus lunatus. Chronica Botanica 12(4/6): 155-160. Waltham, Mass. (Evidence for lima beans in aboriginal eastern North America--especially Hariot's 1585 Carolina description. Discusses early writers' use of "beans and peas.")

Chamberlain, A. F., and W. R. Gerard
1910. Squash. Vol. 2, p. 629, in Handbook of American Indians North of Mexico, ed. by F. W. Hodge, Bureau of American Ethnology Bulletin 30. (Includes some useful references.)

Chamberlain, L. S.
1901. Plants used by the Indians of Eastern North America. American Naturalist 35(409): 1-10.

Collins, Guy N.
1919. Notes on the agricultural history of maize. Amer. Hist. Assoc. Ann. Rpt. 1: 409-429. Also in Agr. Hist. Soc. Papers 2: 409-429, 1923.

Conklin, Harold C.
1963. El estudio del cultivo de roza. The study of shifting cultivation. Studies and Monographs 6, Unión Panamericana, Washingtnn, D. C. 185 pp. (Bilingual 2d edition of Conklin's paper and bibliography in

Current Anthropology 2(1): 27-61, 1961. The general discussion of swidden agriculture on pp. 1-29 is important; the specifically eastern North America items in the bibliography are all included in the present listing, but many of the other references, especially those few which refer to temperate areas, are important for any attempt to reconstruct the aboriginal swidden practices of eastern North America.)

Cutler, Hugh C.
1956. Corn from the Dietz Site, Dane County, Wisconsin. Wisconsin Archeologist 37(1): 18-19.

Cutler, Hugh C. and George A. Agogino
1960. Analysis of maize from the Four Bears Site and two other Arikara locations in South Dakota. Southwestern Journal of Anthropology 16(3): 312-316. (Contains comparative data on archeological Northern Flint maize from the East.)

Cutler, Hugh C. and Thomas W. Whitaker
1961. History and distribution of the cultivated cucurbits in the Americas. American Antiquity 26(4):469-485.

Day, Gordon M.
1953. The Indian as an ecological factor in the Northeastern forest. Ecology 34(2): 329-346.

Delabarre, Edmund B. and Harris H. Wilder
1920. Indian corn-hills in Massachusetts. American Anthropologist 22(3): 203-225, 13 figs. (Archeological and historical evidence.)

Driver, Harold E.
1961 Indians of North America. Chicago: University of Chicago. xviii, 668 pp. (Ch. 4, pp. 38-56, "Horticulture.")

Driver, Harold E. and William C. Massey
1957. Comparative studies of North American Indians. Transactions of the American Philosophical Society, n.s. 47(2): 165-456. Philadelphia. (Pp. 215-228, incl. 7 maps, "Farming.")

Edwards, Everett E. and Wayne D. Rasmussen
1942. A bibliography on the agriculture of the American Indians. U. S. Dept. of Agriculture, Miscellaneous Publications 447. 107 pp. Washington. (Relevant titles copied for the present listing.)

Erwin, A. T. [illegible], A. T.
1934. Sweet corn--its origin and importance as an Indian food plant in the United States. Iowa State Col. Jour. Sci. 8: 385-389.

1947. Sweet corn not an important Indian food plant in the pre-Columbian period. Journal of the American Society of Agronomy 39: 117-121. (see Carter, 1947, 1948.)

1951. Sweet corn--mutant or historic species? Economic Botany 5(3): 302-306. (Believes not to be Indian in origin, despite one archeological specimen and an 1810 mention by Jefferson.)

Erwin, A. T. and E. P. Lana
1956. The Seminole pumpkin. Economic Botany 10(1): 33-37. (Affirm correctly that Cucurbita moschata is a Florida Seminole cultigen; however, authors' suggestion that this is native to Fla. is not worthy of credence.)

Evans, Louis
1939. Analysis; Map of the Middle British Colonies in 1755. In Louis Evans: To which is added Evans' A brief account of Pennsylvania, by Lawrence Henry Gipson, Historical Society of Pennsylvania, 246 pp. (P. 155 on maize fields in the Ohio country, according to Fenton, 1940: 198 n.21.)

Fenton, William N.
1940. Problems arising from the historic northeastern position of the Iroquois. Smithsonian Miscellaneous Collections 100:159-251. (Contains considerable information, passim, on contact and early historic period crops, fields, agricultural production, and annual economic round of all the Northern Iroquoian tribes.)

Fitzer, Pete
1962. Evidence for horticulture during Early--Middle Woodland times in the eastern United States. Pennsylvania Archaeologist 33(1): 14-20.

Flannery, Regina
1939. An analysis of coastal Algonquian culture. Catholic University of America Anthropological Series 7. 219 pp. Washington. (Agriculture and cultigens, pp. 5-13, 77-78, 105; especially useful for detailed references to the historical and anthropological literature.)

Fowells, H. A. and R. E. Stephenson
1934. Effect of burning of forest soils. Soil Science 38: 175-181, 3 tables. Baltimore.

Fowler, William S.
1954. Agricultural tools and techniques of the Northeast. Massachusetts Archaeological Society Bulletin 15(3): 41-51, ill. (Historical and ethnological evidence, without documentation; no mention of swiddens.)

1960. Did Lafitau draw what he saw? Massachusetts Archaeological Society Bulletin 21(3-4): 38-43, ill. (L.'s illustration of Huron maize planting is reversed; this and other evidence for the triangular hoe.)

Galinat, Walton C., and James H. Gunnerson
1963. Spread of eight rowed maize from the prehistoric Southwest. Botanical Museum Leaflets, Harvard Univ., 20 (5): 117-160, 8 pls. (incl. 2 maps). (Including eastern N. Amer.; map & table show archeological distribution of "Maíz de Ocho"--i.e., "Northern Flints" or "Eastern Complex.")

Gerard, W. R.
1906. The "Virginia" potato. Scientific American 95(11):187. (Suggests identifications for various plants mentioned in the Roanoke accounts.)

Gilmore, Melvin R.
1931. Vegetal remains of the Ozark Bluff-Dweller Culture. Papers of the Michigan Academy of Science, Arts and Letters 14:83-102. (Cultigens: maize, beans, sunflower, Cucurbita maxima, C. pepo, C. ovifera; probable cultigens: Chenopodium, Amaranthus, Ambrosia [but cf. Payne and Jones, 1962], Iva [cf. Black, 1963]; perhaps a cultigen; Phaleris carolinians.)

Goggin, John M. and William C. Sturtevant
1964. The Calusa: A stratified, nonagricultural society (with notes on sibling marriage). Pp. 179-219 in Explorations in Cultural Anthropology: Essays in Honor of George Peter Murdock, ed. by Ward H. Goodenough, New York: McGraw-Hill. (Pp. 183-184: the evidence for the lack of agriculture in aboriginal South Florida.)

Goode, G. Browne
1880. The use of agricultural fertilizers by the American Indians and the early English colonials. American Naturalist 14: 473-479.

Goodspeed, Thomas Harper
1954. The genus Nicotiana; origins, relationships and evolution of its species in the light of their distribution, morphology and cytogenetics. Chronica Botanica 16 (1/6): i-xxii, 1-536.

Goslin, Robert M.
1952. Cultivated and wild plant food ffom aboriginal sites in Ohio. Ohio Archaeologist 2(2): 9-29.

1957. Food of the Adena People. Ch. 4, pp. 41-46, in The Adena People, No. 2, by W. S. Webb and R. S. Baby. Columbus: Ohio State Univ. Press for Ohio Historical Society.

Gray, Asa and J. Hammond Trumbull
1883. Review of De Candolle's Origin of Cultivated Plants; with annotations upon certain American plants. American Journal of Science, 3rd Series, 25(148): 241-255, 25(149): 370-379, 26(152): 128-138. New Haven.

Gray, Lewis Cecil
1933. History of agriculture in the southern United States to 1860. 2 vols. Carnegie Institution of Washington Publication 430.

Greenman, Emerson F.
1937. The Younge Site, an archaeological record from Michigan. Occasional Contributions from the Museum of Anthropology of the Univ. of Michigan, No. 6. (Maize here "perhaps the earliest direct evidence of agriculture in the Upper Great Lakes region"--Yarnell, 1964: 14)

Griffin, James B.
1949. Meso-America and the Southeast: A commentary. Pp.77-79 in The Florida Indian and his Neighbors, ed. by John W. Griffin. Winter Park, Fla.: Inter-American Center, Rollins College. ("Agriculture," pp. 83-86: history and distribution of cultigens.)

1963. A radiocarbon date on prehistoric beans from Williams Island, Hamilton County, Tennessee. Tennessee Archaeologist 19(2): 43-46. (Phaseolus vulgaris; A.D. 1620± 75; cultural associations unknown, except for one Mississippi bowl.)

Griffin, James B. and Richard A. Yarnell
1963. A new radiocarbon date on corn from the Davis Site, Cherokee County, Texas. American Antiquity 28(3): 396-397. (Including botanical discussion by Yarnell.)

Hallowell, A. I.
1921. Indian corn hills. American Anthropologist 23(2):233. (Remains of old hills at two sites near Mohegan, Conn.)

Harrington, M. R.
1908. Some Seneca corn foods and their preparation. American Anthropologist 10(4): 575-590. (A little on modern varieties of maize and beans, and mention of a few planting and harvesting implements; otherwise devoted entirely to food preparation.)

1960. The Ozark Bluff-dwellers. 185 pp. Indian Notes and Monographs, vol. 12. Museum of the American Indian, N. Y. (Pp. 151-154: maize, beans, squash, gourds, sunflowers and perhaps Chenopodium, amaranth, ragweed, marshelder, as cultigens.)

Harshberger, John W.
1893. Maize: a botanical and economic study. Pa. Univ. Bot. Lab. Contrib. 1(2): 75-202. Philadelphia.

Hatt, Gudmund
1953. Early intrusion of agriculture in the North Atlantic subarctic region. Anthropological Papers of the University of Alaska 2(1): 51-107. College, Alas.

Haucourt, Geneviève d'
1961. La vie agricole et rurale dans l'État d'Indiana à l'époque pionnière. 410 pp., 12 pls., 9 graphs, 33 maps. Le Monde d'outre-mer passé et présent, première série, études 12. Paris and La Haye: Mouton & Co. (A good historical ethnography. Contains nothing on Indian agriculture, but pp. 115-126 on pioneer agriculture describe techniques, yields, etc. useful for comparison with Indian methods in the same and similar environments.)

Havard, V.
1895. Food plants of the North American Indians. Bulletin of the Torrey Botanical Club 22(3): 98-123.

Hedrick, U. P.
1933. A history of agriculture in the state of New York. Albany: J. B. Lyon Co.

1950. A history of horticulture in America to 1860. Oxford. (Not seen.)

Hedrick, U. P., ed.
1919. Sturtevant's notes on edible plants. Report of the N. Y. Agric. Exper. Sta. for 1919 (27th Ann. Rep., N.Y. State Dept. Agric.), vol. 2, pt. 2. Albany.

Heiser, Charles B., Jr.
1951. The sunflower among the North American Indians. Proceedings of the American Philosophical Society 95: 432-448.

Heiser, Charles B., Jr.
1954. Variation and subspeciation in the common sunflower, Helianthus annuus. American Midland Naturalist 51(1): 287-305.

1955. The origin and development of the cultivated sunflower. American Biology Teacher 17: 162-167.

Hendrick, "Capt."
1925. History of the Muhheakunnuk Indians. Pp. 101-105 in Notes on Mahikan Ethnology, by Alanson Skinner, Bulletin of the Public Museum of the City of Milwaukee 2(3): 87-116. Another version: Anon., Extract from an Indian History, Collections of the Massachusetts Historical Society, 1st Series, 9:99-102, 1804. (Two fragmentary versions of a very interesting account of Mohegan culture written by a Mohegan "chief" about 1790. Included is a brief description of agriculture, with mention of clearing, burning, planting, and the shifting of fields, and of agricultural tools, including the scapula hoe. 1925: p. 102; 1804: pp. 100-101.

Herriott, W.
1923. Aboriginal agriculture in south western Ontario. Waterloo Historical Society, Annual Report 11:18-21. (Not seen.)

Hibbard, Benjamin Horace
1905(?). Indian agriculture in southern Wisconsin. Wis. State Hist. Soc. Proc. 1904: 145-155. Also in Mag. Hist. 1: 97-104, 1905.

Hinsdale, Wilbert B.
1927. Indian corn culture in Michigan. Papers of the Michigan Acad. of Sci., Arts and Letters 8:31-49, 1 fig.

Hulton, Paul and David Beers Quinn (eds)
1964. The American drawings of John White, 1577-1590, with drawings of European and Oriental subjects. [vol.] I, A catalogue raisonne and a study of the artist; [vol.] II, Reproductions of the originals in colour facsimile and of derivatives in monochrome. London, The Trustees of the British Museum, and Chapel Hill, The Univ. of N. C. Press. (Notes on Carolina Algonkian agriculture, by W. C. Sturtevant, vol. 1, pp.38-39, 91-92; cultivated amaranth or Chenopodium, p.91 n. 5; determination of maize variety by H. C. Cutler, p. 91 n.3, and by W. H. Brown, p. 120; determination of pumpkin species by Cutler, p. 92; for agriculture as depicted in the drawings, see Sturtevant's index of Carolina Algonkian culture traits, pp. 42-43.)

Jackson, Eric P.
1926. Early uses of land in Rhode Island. Geog. Soc. Phila. Bull. 24: 69-87. (Indian land use, pp. 69-74.)

Jenness, Diamond
1932. The Indians of Canada. 446 pp. Nat'l. Mus. of Canada Bulletin 65. Ottawa.

Johnson, Amandus
1917. The Indians and their culture as described in Swedish and Dutch records from 1614 to 1664. Proceedings of the 19th International Congress of Americanists, pp. 277-282. Washington. (P. 279: very brief account of Delaware agriculture, including cutting, burning, and abandonment; lists cultigens.)

Jones, Charles Colcock
1873. Antiquities of the Southern Indians particularly of the Georgia tribes. 532 pp. N.Y.: D. Appleton & Co. (Agriculture, pp. 296-303, 307-310, with citation of sources.)

Jones, Volney H.
1936. The vegetal remains of Newt Kash Hollow shelter. In Rock shelters in Menifee County, Kentucky, by W. S. Webb and W. D. Funkhauser, Univ. of Kentucky Reports in Archaeology and Anthropology, 3: 101-167. (Corn, squash, gourd, sunflower, tobacco; "The earliest site in the eastern United States with cultigen remains that were in close association with radiocarbon dated materials"--Yarnell, 1964: 101.)

1948. Notes on Indian maize. Pennsylvania Archaeologist 18: 23-24.

1949. Maize from the Davis Site: its nature and interpretation. Pp. 241-249 in The George C. Davis Site, Cherokee County, Texas, by H. Perry Newell and Alex D. Krieger, Socoety for Amer. Archaeology Memoir 5.

Kaplan, Lawrence
1956. The cultivated beans of the prehistoric Southwest. Annals of the Missouri Botanical Garden 43(2): 189-251. (Introductory section discusses Phaseolus as a whole and "centers of domestication of American beans.")

Keesing, Felix M.
1939. The Menomini Indians of Wisconsin: A study of three centuries of cultural contact and change. Memoirs of the American Philosophical Society 10. 261 pp. (Agriculture of minor importance aboriginally, p. 23; see index under "Agriculture" & "Farming.")

Kinietz, William Vernon
1940. The Indians of the western Great Lakes, 1615-1760. University of Michigan, Museum of Anthropology, Occasional Contribution 10. 427pp. Ann Arbor.

Kroeber, A. L.
1939. Cultural and natural areas of native North America. Univ.of Calif. Publications in American Archaeology and Ethnology 38. (Pp. 146-150: Eastern agriculture and population density.)

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1963. Comments on Struever's discussion of an "Early Eastern Agricultural Complex" American Antiquity 28(4): 547-548.

Yarnell, Richard A.
1964. Aboriginal relationships between culture and plant life in the Upper Great Lakes region. Anthropological Papers, Museum of Anthropology, University of Michigan, No. 23. 218 pp. Ann Arbor. (Very thorough study, covering a much wider geographical area than the title indicates. For agriculture and cultigens, see especially ch. 5, "History of the aboriginal distribution of cultigens in the Midwest as indicated by archaeological remains" [pp.101-125], ch. 6, "Climate and the distribution of prehistoric agriculture in the Midwest" [pp. 126-140], pp. 147-151 of the "Summary and conclusions," and "Appendix H. Catalogue of archaeological plant remains" [pp. 193-204]. Contains many new botanical determiations of archeological remains of cultigens, and a thorough listing and critique of previously published determinations, with modern dating of the archeological manifestations involved. Bibliographic references to Midwestern archeological reports not here copied, since Yarnell's listing is thorough and convenient and his own comments on these reports should be consulted.)

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ADDENDA

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Bartram, William
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THE DEVELOPMENT OF ABORIGINAL SETTLEMENT PATTERNS IN THE NORTHEAST AND THEIR SOCIO-ECONOMIC CORRELATES

by

William A. Ritchie

I will be even briefer than my notes would indicate. I'll take off my watch and put it in plain view so I won't run over my time and take somebody else's. In a few words I can say that we now have six well-defined, radio-carbon-dated, descrete, and very definite Archaic phases, or phases of the Archaic stage of culture, if you will. These begin with the Lamoka phase, which I discovered a number of years ago, and which radiocarbon dates place between about 2500 and 3000 B.C. The terminal Archaic, that we have recently discovered and elucidated, and have not yet published - it will be coming out in a book of mine next year - dates around 1200 B.C.

In every one of those Archaic phases for which we have considerable information relative to such things as the settlement pattern, material culture, and so forth, we find wild vegetal foods. Acorns are present in most, as are butternuts, hickory nuts, wild cherry pits, and a few other such items.

The acorns undoubtedly are the most important food element in these Archaic cultures, and particularly this is true of Lamoka. Lamoka was an Archaic culture that depended very largely on acorns, and the culture is full of grinding tools - cylindrical pestles and mullers, and various kinds of mortars, trough-shaped and bowl-shaped, etc. - and the fire beds on the site were just literally packed with carbonized acorn shells. We found some whole acorns there too, but no botanist was able to tell us whether they were white oak acorns or red oak acorns. Presumably they may have been from the white oak group because such acorns have less tannic acid and therefore were better suited for use as food.

The nutrient value of acorn meal is very high. It contains 25.31% of fat. It is rather low in protein by comparison with corn meal - it has 4.5% of protein as against 9.2% in corn meal. Corn meal, however, has only 1.9% of fat. It is high in carbohydrates - 62% as against 74.4% for corn meal. So acorns, properly used, could furnish a great deal of the food of these people. And there is ample evidence that they lived in an oak-chestnut-deer-turkey biome.

Now there's an awful lot I could tell you here, and I've got all these notes, but I think I had better say that we do not find in the Northeast - and I'm thinking of New England as well, of course, as of New York and adjacent portions of

Canada - any indication whatsoever that any of these Archaic peoples were acquainted with any cultigens. They certainly stored these wild foods because many of the sites contained storage pits. They contained fire beds also, apparently for the leaching or removal from the acorns of tannic acid by heating, and one of the new cultures we recently discovered, dating around 1930 B.C., has numerous burned stone beds with carbonized acorn remains.

I now regard as dubious the Early Woodland occurrence of corn in western New York. This was based upon our finding in 1930 of what strongly appeared to be a carbonized corncob fragment at the Wray site of the Early Point Peninsula Focus, which I am now calling the Meadowood phase. The fragment was recovered from dark organic material in the bottom of a burial pit which produced grave goods of late Meadowood forms. It was boxed with cotton and taken to the Rochester Museum, to which I was then attached, and in subsequent years the untreated specimen disintegrated into tiny flakes. Since we have not been able to duplicate this find in any other site of the Early or early Middle Woodland stages in our area, I have grown skeptical of the identification of this fragment.

Currently the earliest probable appearance of corn in our area is in a terminal phase of the Middle Woodland, transitional into Late Woodland, in what I have named the Hunter's Home phase, radiocarbon dated between A.D. 905 and 955. A specimen found in 1963 on the Kipp Island No. 4 site, during our extensive settlement pattern investigations, with generous NSF assistance, is believed to be a cornstalk node by Hugh Cutler, who has it for study. Probable chenopodium seeds were found on the same site. Sites of the Hunter's Home phase produce presumably storage pits, cylindrical pestles, and apparently the beginnings of a semipermanent sedentary community pattern, that is, most of the elements which suggest to me that finally, at this late date, there was some reliance on cultivated plants in our area.

With the emergence of the Owasco culture we are definitely and positively on secure and unequivocal ground. We have three recognized phases of Owasco, an early or formative, what I call the Carpenter Brook phase; a middle, mature or Canandaigua phase; and a late efflorescent or Castle Creek phase. We have 21 dug components of the Owasco culture. Actually we have a cultural continuum in Owasco, a continuity with change that's difficult to separate into phases, but I've attempted, somewhat arbitrarily, to do so. At any rate, from the very beginning we have definite evidence of corn culture in the form of carbonized corn; and also, indirectly, in the storage pits and grinding tools. Corn is present in all these phases and on almost very site. Samples have been identfied as a flour corn and a flint corn, but I understand from the newest discussion in Yarnell (which is a very valuable contribution, although he doesn't mention the acorns in Lamoka, which surprises me) that it's now called Eastern Complex corn.

The first firm date that we have for agriculture is A.D. 1100. We have a series of dates that cluster around A.D. 1100. We believe, however, that around A.D. 1000 the beginnings of the Owasco culture can be picked up in our area. This past summer, in addition to working in New England on Martha's Vineyard, we dug a site in southern New York where corn was found in considerable quantities associated with extremely early forms of Owasco pottery, with houses that were, like our established Owasco form, large oblong structures, prototypic, I believe, of the Iroquois longhouse, in a community that was of considerable size, covering well over an acre, and with storage pits lined with grass and bark. We think we'll get a date earlier than A.D. 1100 from this Roundtop site in Broome County, N. Y. At the Sackett site in Canandaigua, N. Y., which has a radiocarbon date of A.D. 1125± 100 years, we found the first definite evidence of beans, and in sites subsequent to this we have found beans in a number of instances. So far we have no positive cucurbit remains, unless some seeds that are still in the boxes from our dig of last August at Roundtop prove to be such. We have yet to sift this material in the lab. We were pressed for time so we took all the material right out of some of the pits and brought it into the lab to be processed there.

On these Owasco sites, in addition to the corn and beans, we find acorns, hickory nuts, butternuts, hazel nuts, hawthorn apples, cherries and plums. Most of these sites, as you probably know, have deep grass-lined or bark-lined storage pits of various shapes. Cylindrical pestles, mullers, and shallow mortars are present, as well as stone and antler hoes. Antler picks occur, too, but whether they were for digging the pits or for agricultural purposes, I don't know. Stone hoes, I believe, are difficult to identify, and I think people have mistaken heavy hide scrapers and what we call choppers for hoes when they occur in contexts where I don't believe there was any agriculture. Incidentally, all of these major Owasco sites are town sites; many of them were palisaded, although the earliest ones were open sites. We have big oblong houses - one we cleared completely this summer at Roundtop was 86½ feet in length by 26 feet in width. I could tell you a great deal more about them but time is slipping along too fast.

By the time we get to the earliest phase of the Iroquois culture, which develops out of our Castle Creek horizon of Owasco, on what we call the Oak Hill horizon of Iroquois, dated around A.D. 1300, we find a whole series of wild plants - hickory nuts, acorns, butternuts, walnuts, cherries, plums and so forth, together with corn, beans, and now cucurbits. Bits of the rind and seeds that have been identified as pumpkin and squashes are present. Also, we have, of course, the big storage pits, the stone hoes, mullers, and so on.

At the Alhart site in western New York, which is fully developed Iroquois, I found that the village had apparently been swept by a forest fire. The charred bark storage barrels were still in pits in the ground. These receptacles, almost unknown archeologically, had chamfered bottoms and laced sides, the same as in ethnohistorical times, and they were filled with carbonized corn and beans. There were bushels of these cultivated seeds and they are still at Rochester. Dr. Yarnell refers to this published site and I know some of this material has gone to other museums in the country.

By this time in our archeological history, or between approximately A.D. 1400-1500, we have the full pattern of agriculture as it was known historically in the area, associated with semipermanent sedentary village life, as it was described by the earliest explorers. But there's one thing I should say with reference to the late phase of Iroquois, namely, that then, and even to this day, the Iroquois never depended wholly on agriculture. They never completely relinquished their hunting, fishing and collecting activities, so in the most recent of the historic sites which we have excavated we still find remains of wild plants, fish bones, mammal bones, bird bones, and so on.

Now, I have about one minute left and I will tell you that in the coastal areas of New York - I won't extend this to Massachusetts where we worked last summer because my data have not yet been fully processed - in the Sebonac, the Bowmans Brook, and the Clasons Point phases, which date between A.D. 1100 and about 1300 (in fact, Clasons Point comes up to 1600) we see a very similar picture to Iroquois, viz., semipermanent community pattern with the use of hickory nuts, walnuts, sweet flag roots, and various other wild plants, with corn and, in one case at least, with carbonized beans present, with deep storage pits for the accommodation of these foods, and with suitable stone artifacts for their reduction into meal. And I suppose the wooden mortar was frequently used because we have the cylindrical stone pestle present on certain of the sites. But here, too, although these people depended heavily on agriculture, they also lived extensively off the land, and along the coast, of course, the adaptation was to a coastal environment which included a large amount of shellfish. And let me say that it is my current opinion that there is no such thing as a Coastal Archaic culture per se, there are only various adaptations to the coast, and to a littoral environment, of every culture that reached the coastal region.

Finally, there was a piece of research that went on this summer under our auspices that may be of interest to you. It has often been said, I believe, that one way of researching the possibility of corn agriculture in a prehistoric community, is to look for fossil corn pollen in the site, and we did that for several years. We had soils from known sites of agricultural

people processed by some of our experts, and no corn pollen could be found. Our state botanist, in July of this year, under a grant from the National Institutes of Health (this was only a part of the research he was doing) put out a field of maize at Brookhaven National Laboratory. This corn plot measured 60 feet in diameter, and instruments were set up around it for collecting the pollen. The sampled the plot for four hours. The wind speed, between 1.5 and 15 feet from the ground, varied between four and six miles an hour. Air concentrations were measured at four heights and at five distances from the plot. Depositional samples were taken both within and without the plot. Pollen output, they estimated, totaled at least 960 million grains, of which over two-thirds fell to earth within the plot, and about one-third passed through the inner circle of samplers. Over 90% of this latter pollen was deposited within 25 feet of the source and virtually all the remainder fell within 200 feet. "The resultant angle the pollen would travel if governed solely by the horizontal wind and its rate of settling would bring it to the surface within 40 feet. Since nearly all did deposit within this distance it is evident that atmospheric dispersions have little effect upon particles this large and their gravitational settling is of paramount importance." I don't think you need to waste your time looking for fossil corn pollen very far from the actual cornfields themselves, although an occasional pollen grain may drift to greater distances. Thank you.

Griffin: Now, a year ago when I was in Copenhagen, a pollen analyst from Williams was there going over a pollen diagram from the middle of the Dismal Swamp in Virginia, and at the depth equating approximately 1000 B.C., big as life, is an unmistakable corn pollen grain.

The next paper will be by Richard Yarnell, now of Emory University, who will talk on the Great Lakes area. We (University of Michigan) have just published Yarnell's paper on the distribution of plants and utilization by prehistoric peoples, with particular emphasis on the general northeast Great Lakes area. It is for sale at $2.50 the copy.

DESCRIPTIVE DATA FROM THE UPPER GREAT LAKES

by

Richard A. Yarnell

The earliest indication of subsistence (as evidence from plant remains) that I know of in the upper Great Lakes region, is from an early Archaic site located a short distance north of Detroit, Michigan, the Holcomb site, where there was a carbonized chestnut. However, according to some sources, chestnuts are not supposed to be in the area as early as that; so it's possible that this was intrusive. This has not been demonstrated either way, of course. I'm very sorry I missed the acorns from Lamoka that Dr. Ritchie mentioned. I was well aware that my information was incomplete, but until now I didn't realize just how incomplete. There are great gaps in this information that need to be filled in.

At the Feeheley site near Saginaw (another Archaic site, although from about 2000 B.C., so quite a bit later than the Holcomb site) there were a number of plant remains such as grape seeds, walnut shells, butternut, hickory nut, and acorn. Here again nuts are the primary evidence of plant food. I am not ready to admit that this is all we're going to get in the nature of plant remains from this region or from any other region going back that far in time. The kind of plant remains we've found, such as acorns and nutshells, are large and I'm inclined to think (and I'm not an archaeologist) that what we have so far represents the size of the screens we're using more than it represents the subsistence of the people involved. Stuart Struever will have more to say about recovery of plant remains, so I will not go into that here, but I am inclined to feel as strongly about the recovery problem as he does himself.

It would appear, then, from the evidence we have, that the people of the Archaic period used nuts and grapes and that's about all. But I do not think we've even scratched the surface yet on evidence of plant foods that can be collected.

Early Woodland evidence for the upper Great Lakes is not much better. We have blackberry seeds, the nuts, and a few chenopod seeds, but these are actually from Ohio and New York, so couldn't be included in the upper Great Lakes region. Here again these are mostly large plant remains; and we can continue to say, as everybody else is saying, that the people in the eastern United States ate nuts and berries. I think this is obvious. It seems to me we know little about what other plant foods were eaten. We do know a bit more about Middle Woodland subsistence, primarily as a result of very recent excavations, especially at Spoonville, but except for nuts I don't know very much about what has been found there. I understand, however, that for the first time we have corn from a Middle Woodland site in Michigan. Dr. Griffin was telling me that there is corn from Spoonville which is very much like the McGraw corn. Up until this evidence of agriculture there was no direct evidence in terms of plant remains of any agriculture in the upper Great Lakes region before Late Woodland times. I would be disinclined to deny there was agriculture in this area as early as Early Woodland times because of quite a bit of indirect evidence, but I couldn't say how early it was introduced. There is quite a bit of evidence of agriculture for Late Woodland, and there is evidence of various wild plant food utilization. I'd like to mention a few of these, such as grape, the various nuts, chenopodium seeds (which, incidentally, possibly represent weeds growing on a site). Struever has said he has found a concentration of chenopodium seeds in one of his Havana sites and I think this is undeniable evidence that they were using this for food. But when you get a <u>few</u> chenopodium or polygonum seeds I don't believe it can be said definitely that they were using these for food - they may have been, and they may not have been, it's difficult to tell.

There are a lot of sites with plum pits and from one particular location, the <u>Juntunen</u> site on Bois Blanc Island, we have evidence of about 15 different wild plant foods. This is the only site I know of (up until recently at least) in this area that was excavated with the idea of getting as many of these wild plant foods as possible. From this site we have pepper root, elderberry, blackberry, grape, blueberry, bearberry, sumac berry, cherry, plum, hazelnut, beechnut, acorn, and chenopod. The Late Woodland cultivated plant remains from upper Great Lakes sites include much corn, a little beans, squash, and sunflower.

THE "FLOTATION" PROCESS FOR RECOVERY OF PLANT REMAINS

by

Stuart Struever

There has been considerable discussion about a "flotation process" that we have been experimenting with for the past three years, so perhaps I had better say a word about it. I might mention that I am trying to put together a detailed description of the method for publication, probably in 1965.

Actually the name "flotation" is a bit misleading, since only during the final stage of the process are data recovered as they float on a liquid surface. What we have termed the "flotation method" has two aspects: the first step is a water separation process, the second a chemical flotation process. The water separation process utilizes the principle that materials (e.g. stone, burnt clay, bone, plant remains, etc.) with different specific gravities, when placed in water, settle at different rates. In short, the heavier material sinks faster than lighter; in our situation this means that stone and burnt clay fragments sink faster than bone and carbonized plant remains. Using this principle it is possible to pour a sample of soil taken from a refuse pit or hearth into a washtub with a fine-screen bottom, gently slosh it around in water, and allow the fine-grain silt, sand, etc. to escape. In a few seconds only the larger fragments of burnt clay, chert, plant remains, and bone remain. These were too small to be caught on the site by the 1/4" or 1/2" - mesh hardware cloth on the screens, yet were too large to go through the fine-mesh screening (i.e. like window screen) in the bottom of the flotation washtub. By dipping this material in the tub into water a particular way a second person working in coordination with the individual manipulating the washtub is able to use a small hand-strainer made of carburetor cloth to scoop off the bone and plant remains as a unit, allowing the heavier stone and other materials to stay in the tub. This takes practice, but our students shortly became efficient at it.

The bone and plant remains scooped off with the hand-strainer are dried on large paper sheets, and are then ready for the "chemical flotation" procedure.

The chemical process is best done in the field laboratory or back at the university. It involves making a solution of Zinc Chloride with a specific gravity of 1.62. In cookbook terms, the geologist who developed this method for us prescribes that we mix 860 grams of $ZnCl_2$ with enough water to make one liter of solution; stated differently, 7.1 lbs. of $ZnCl_2$ is used to make one gallon of solution. Pour the dried plant remains

and bone that you earlier recovered by the water separation method into this solution. All the corbonized plant remains will float to the surface, the bone will sink. You get an almost 100% separation of the two. This allows you to send the plant remains to a botanist, the bone to a zoologist, both of whom are happy because they don't have to mechanically sort out the remains on which they are going to work.

As a footnote on the chemical flotation process, it is best to buy Technical Grade $ZnCl_2$ from a supply house in 25 lb. drums. Cost is about 12.50 per drum. 5 lb. bottles of the chemical are much more expensive. 25 lbs. of $ZnCl_2$ will probably be sufficient for processing the flotation materials from a single site. Be sure to use rubber gloves, apron, etc. since $ZnCl_2$ is extremely caustic.

I have often been asked about the results that can be had using this water and chemical recovery process. First, and perhaps most important, is that employment of these techniques at four sites in the lower Illinois Valley strongly suggests that the commonly accepted idea that food plant remains are poorly preserved in sites of the eastern United States is not valid. Flotation yielded carbonized seeds, nuts, stems, rind, etc. from every one of the four sites, ranging from Early through Late Woodland, in which it was tried.

At the Apple Creek site, with its Middle and early Late Woodland components, we carried on extensive flotation work. Samples of soil from 218 features were processed, and food plant remains were found in every one. All of these charred plant remains had slipped through the screens as the fill of each feature was processed on the site. Without flotation they would have been lost.

At Apple Creek the striking thing was the great amount of plant remains that came to light with flotation, in contrast to the paucity of such remains found during excavation. Hardly more than a handful of plant materials turned up as the site was being excavated and the soil screened, but nut shell fragments in the thousands and between 5,000 and 6,000 carbonized seeds were recovered by flotation. In addition, more fish bone and scales were collected by flotation than by digging and screening.

The important point coming out of all this Apple Creek data, even before the analysis is completed, is that our interpretation of Middle and Late Woodland subsistence activities at this site would be greatly skewed had we not used some method of getting the small particles of plant and animal food still preserved there. The screens miss these small particles, flotation gets them. The whole concept of the Hopewellian dependence on hunting that has begun to emerge from the excellent studies of faunal assemblages by Paul Parmalee and others appears

now to be at least in part a function of archaeological digging techniques and not of prehistorical subsistence patterns.

At Apple Creek far more than 90% of the preserved plant remains and more than half of the fish bone slipped through the screens. Therefore, from the screened materials it looks as though the Apple Creek residents depended heavily on hunting, somewhat on fishing, and very little on natural or cultivated plant foods. When flotation-recovered remains are added to the screen-recovered material a different picture of subsistence takes form. Hunting is still important, but fishing is seen as equally important, and dependence on nuts and certain commensal plants (e.g. Chenopodium, Amaranthus, Iva, and Polygonum) is seen as exceedingly important.

In blunt terms, the subsistence pattern reconstructable at Apple Creek from the screen-recovered data alone when compared with that based on combined screen- and flotation-recovered data, presents the appearance of two different exploitative economies. But what is being reflected are not two different kinds of adaptation, but what appears to be two different ones. The differences are a reflection of the archaeological techniques used to extract data from the soil, not varying patterns of exploiting the environment.

The inevitable problem arises that when flotation methods are used on a site, the data on food remains are not comparable with those recovered from sites in which this recovery method was not used. If archaeologists in the East agreed on similar recovery techniques, and quantification of the plant and animal remains were carried out by the specialists who are identifying the material, then it should be possible to compare economic patterns between sites, cultural phases, etc., in terms of the relative importance of the various species that go into making up the total subsistence complex.

The nice thing about this water separation process is that it requires almost no equipment. The biggest need is man-hours. It takes washtubs, hand-strainers, and a considerable number of man-hours just standing in the stream and scooping things off.

Question: What if you don't have a stream nearby?

Well, we hauled our soil a quarter of a mile. You put it in the back of a pick-up truck and carry it somewhere. Unless you are in a desertic environment, it should be feasible.

Question: What would be wrong with putting water in a wheelbarrow and just working that way if water isn't available?

To process soil like this on any scale you really need a moving source of water such as a stream. If you don't have one, it doesn't take long after you start processing soil before a build-up of sediment begins around the person. So a pond is

not good. Whatever source you use, between knee- and waist-deep water is needed.

Question: Did you ever try progressively smaller mesh screens until you got to a sixteenth of an inch mesh for your final sifting, instead of using flotation? If you didn't have water, don't you think it would produce the same good results if you got down to a 32nd inch screen, for example?

Well, the nice thing about a water and chemical "flotation method" as opposed to progressive screening is that only two procudures are needed, specifically water separation and $ZnCl_2$ flotation. Now you could use differential screen sizes but in doing so you recover masses of other things you don't want, namely bits of stone, burnt clay, etc. This flotation process, if used properly, separates out bone and plant remains that can be analyzed, each by a separate specialist. Screening separates out material by size not by class. Specialists work with classes of data, not with sizes.

Dick Yarnell, Jean Black Yarnell, Larry Kaplan, and April Allison have all been sweating over the identification and quantification of the Apple Creek plant remains. They find hickory nut far-and-away numerically most important, with acorn, walnut, hazelnut, and butternut poor seconds. Among the small seeds, Polygonum (Smartwood) far outnumbers any other. The only certain cultigen so far identfied is a single Lagenaria seed identified by Hugh Cutler.

Question: Are there any bones lost through the flotation process?

I would guess that we miss about three to five per cent of the bone. We've actually done a control on this so we will know just how much we are missing.

ETHNOBOTANICAL MATERIAL FROM THE OHIO VALLEY

by

Edward McMichael

I'll try to cover the upper and middle Ohio Valley area. We've been restricting ourselves here mainly to plant remains but I think we should go back to the general economic basis. One thing we should consider is that there are two kinds of evidence that we have, the direct evidence, which amounts to the actual shell, bone and plant remains that you find, and the indirect evidence from which we make certain inferences. For instance, in Bill Ritchie's paper, what does a pestle mean? Does it mean that they were smashing corn with this, or were they smashing some natural wild seed? Or, in the case of a hoe, were they grubbing out natural roots, or were they cultivating with it?

So the earliest that we have any data at all would be the Paleo-Indian period, and there we only have indirect evidence for this whole period. That is just the fluted point which, from associations elsewhere, we can assume was largely used for big-game hunting. In the Archaic period in this area about the only direct evidence I can think of offhand is in the northern panhandle of West Virginia, where there are small shellheaps. There are also shellheaps on down the Ohio Valley in southern Indiana and the Green River area. Here they're generally later Archaic and pretty intensive collectors. There's much indirect evidence, of course, such as projectile points, and at Bettye Broyles' St. Albans site, there seems to be a lessening of interest in the projectile point. In her sequence, for instance, from the Kirk up to the Le Croy, the attention paid to making these points is less and less; the little Le Croy points are usually nothing but flakes with a few little chips knocked off on them. So they're apparently not as interested in hunting any more and they're turning to other gathering activities presumably. Also, in the Panhandle Archaic you get harpoons so we know they're a pretty riverine-oriented people, basing much of their subsistence on the river in one way or another. I don't believe we have any other direct evidence for the general Archaic period outside of the animal bones and shell heaps, which were fairly plentiful, and the actual mussel shell itself.

In Early Woodland we haven't any direct evidence on Adena which is the main consideration in this area, although in other areas it looks probable that there's sunflower, and there may be a few other domesticated plants which are beginning to appear. About the best evidence, I think, is the rock shelters in eastern Kentucky, but they were dug early with no attention

paid to stratigraphy, so we can't say too much about them. But just the fact that they were building big mounds and earthworks of various sorts certainly implies some sort of better and more efficient economy for the general Early Woodland period.

In Middle Woodland we begin to pick up a little more direct evidence in a small mound in the Kanawha Valley. That evidence was sunflower seeds, acorns, and hickory nuts found in postholes under the Leslie mound. This mound was dated 388 B.C., but I don't believe it. This is a carbon 14 date but it's our local equivalent of Hopewellian and I don't think it should be that early. At another mound which hasn't been reported, the Fairchance mound near Moundsville, West Virginia, in the northern panhandle again, walnut was found and a plum seed, as well as much animal bone. There's very good bone preservation there. A carbon 14 date of 178 A.D. has been secured for the Fairchance mound. At Watson Farm in the northern panhandle, there were acorns found and also some animal bone, although generally bone wasn't preserved very well there. And finally, there was a Hopewellian component at the Mount Carbon site. Mussel shell and bone found in one or two of the pits that we uncovered there probably date from 1 to 500 A.D. I believe about this time level corn is introduced, probably in later Middle Woodland. However, I don't think we need to make the assumption that this is a horticultural economy. I don't think that Olaf Prufer's one or two corncobs at McGraw site make a corn-based culture. From the amount of work that's been done now, we can only say that there's incipient agriculture in Early and Middle Woodland, in this general area at least.

Finally, in the late prehistoric there are several Fort Ancient and Monongahela sites where corn has been recovered, and there's been some sunflower found at my Fort Ancient Buffalo site, as well as walnuts and hickory nuts. There are tremendous quantities of animal bones so they're still depending a great deal on hunting and gathering apparently. I think Driver in his estimation of the economy in the Southeast even says that man probably was no more than 50% dependent upon agricultural products. The Southeast had even more concentrated horticulture I'm sure, than in the Ohio Valley, so I don't think they ever were very intensively agricultural in our area. There were possibly as many as a thousand people living in this town at the Buffalo site, and a rough estimate has it that there were possibly about 130 houses in the village so they must have had a fairly efficient economic base. But I would think we would find more corn than we have; there hasn't been a great quantity of it.

To sum up, it seems that at the beginning of the Paleo-Indian era, big-game hunting prevailed, and then, in the Archaic, "usufruction," to borrow a term of Brennan's, which means using all the fruits of the earth. In the later Archaic, there were more specialized gathering activities, incipient agriculture in Early and Middle Woodland, and somewhat intensive agriculture in the late prehistoric Fort Ancient and Monongahela cultures.

A SUGGESTED METHOD FOR LOCATING ABORIGINAL GARDEN AREAS

by

L. Ross Morrell

At Southern Illinois University we have been experimenting with the use of aerial photographs as an aid in interpreting the archaeological sites in southern Illinois. This method need not be described in detail (and to be published elsewhere) here, but I would like to mention some of the results I got last summer (1964) in the Carlyle Reservoir.

The Texas #1 Site rests on a slight ridge on the eastern edge of the Kaskaskia River floodplain in Clinton County, Illinois. The portion of this ridge exhibiting surface accumulations of artifacts was plowed with a wheeled disc. The following day the entire site was photographed from the air with black/white (Panatomic X), infrared, and color films. A complete mosaic with all three films was taken at a 2000-feet altitude plus a series of low obliques at approximately 100 feet. The site was then surface collected (after a rain) in controlled six meter squares. The collected artifacts were then plotted on a map according to material, types, uses, etc. These various categories were arranged by number and weight into contour intervals, so as to give a contoured horizontal distribution. Of particular interest to this conference was the distribution of soil polished chert chips (hoe fragments). Their horizontal arrangement is that of a rather large (65 x 80 meters) irregular rectangle. Looking then at this area on the aerial photograph, long light colored striations were noted. These striations are regular in length approximately 80 cm. to a meter in width and are spaced at intervals of every 2-1/2 to 3 meters. These striations plus the hoe chip frequency in this area indicates some type of Horticultural activity. In following up this hypothesis, a profile cut was made at a 90° angle to the "rows." This cut exposed a very badly eroded, but quite visible, row and furrow cross section.

The following is the slide discussion.

There is an enlargement of one of the infrared shots, although I doubt if you can see anything from that distance. But the light and dark of the midden in relation to the white silt really worked out beautifully on this infrared shot, considering the heat. And with this infrared film heat is so critical that you have to be very careful with it even in the airplane because it will expose itself right in the film cassette.

Ritchie: Are these modern plow streaks?

Morrell: No, they are not.

Ritchie: How can you be sure? Did you take all the topsoil off to see if there were any plow furrows or streaks left in the subsoil?

Morrell: Indeed I did. I guess I ought to say, too, that we did control hand excavations in areas of surface accumulation and then when we felt we'd taken as much time as we could afford in salvage operations, we brought in a turn-a-pull and road patrol and stripped the plowed zone off. In the area north of the road most of the striations show up. I had all the topsoil removed in this whole area with exception of a 3-meter wide piece running right down here (slide) and this is where I cut profiles. What we got really wasn't spectacular unless you really move off from a distance and look at it. You have the surface, and you have your plow zone, and then very, very light things like this (slide). This light area that you see is the admixture you get - like so - and here where you get no plow scars. The bulk of the plow zone runs something like this - this is somewhat mottled midden.

Question: How big is the tilled soil area?

Morrell: This area here (slide). This is something like 8 to 10 inches deep. It's below modern plowing - where we're picking up these furrows is now like this (slide). I spoke with a friend at SIU who said he'd discussed something like this with Glenn Black several years back, and that he'd gotten these long striations and had done more or less a controlled surface pick-up on this type of thing. He found an area in between two ridges that had a slight wash in it, and had obvious sheet erosion coming off these ridges (blackboard) and sealing off this area here. This area where he found sealed off furrows had enough control that he could go down these furrows and pick out hoe chips, and not a single chip from the rows themselves. Again, this is second hand. And most of these, of Glenn Black's, were like this (blackboard) which I suppose could be what we have after you've got several erosions washing these things back and forth. It's just something that we did that I thought would be of particular value and interest for the Conference. I think with the profile, with the controlled pickup, and the concentration of soil polished flakes in this area you can say with reasonable certainty that this was an aboriginal garden or field area. I don't think with just one of these methods you can be certain of their origin, because the striations can be drainage patterns.

Question: Do you have any ethnographic evidence that furrows were used?

Morrell: No.

Comment: Because it seems to me that furrows are a result of plow agriculture. . .

Morrell: These furrows are tremendously wide; they're this far apart, about a meter and a half or two meters. They're very large. No, it's not a plow furrow.

Comment: There are areas where digging sticks were used in gangs so that people walked along side by side and turned over the earth. You can actually turn a furrow with digging sticks. Two people, for example, might move along with one moving to the left all the time, or to the right, I'm not sure what it is. This wouldn't be as wide as this, but it doesn't necessarily mean plowing if you find furrows.

Question, Griffen: You haven't said, were there Indians living here.

Morrell: I'm not going to say who these fields belonged to, but we got quite a bit of Cahokia material, and the bulk, by far, is Havana material. We got pounds and pounds of cob associated both with Havana and with shell-tempered materials. We plan to have some dates run on this material - but then again it's intermixed with Mississippian material, too, so what can you say? We do have one very deep pit that we took out in 5 centimeter levels that went down to about 3 feet, and we do have seasonal sealed areas that are all Havana material - no Mississippian material in this pit - and we hope to run it for fossil pollen.

Question: Ross, do you have a feature such as a pit or a hearth in which you get Havana sherds, no Mississippian sherds, and in which you get corn cobs? In other words, good, close, relational ties between Havana and corn cobs?

Morrell: Well, you might not have this in the bottom of the pit (meaning corn), but in the top we do. And by the way, Stuart, we did use your flotation method. We had fixed a nice little pier out into this creek, but when we came back somebody had cleaned catfish there. What a mess. So - we borrowed a 2000 gallon tank truck and, like Rich said, we used wheelbarrows. We could float one bushel basket of material per wheelbarrow of water, which really isn't bad. It's slow, but Rich and I, in an afternoon, floated about 10 to 12 test pits, so we do have all this material.

Question: I can better understand why you'd get that pattern with the striations with the infrared than I can with the color pictures. Would you explain that again?

Morrell: I'm not sure I can - I'm not that good a photographer. But I do know they show up better on the infrared than they do on the color and the black-and-white.

Comment: I'm surprised they show up at all on the color.

Morrell: Well, it's dark and it's light, there's that much difference. You can't see it from the surface, when you get up over it you can't see it with the naked eye. But when you get

it on film you can. But even when you're flying over it you can't see it. There's enough of an admixture of this lighter soil in these areas that you can see it on the film.

Question: You mean with a century or more of plowing there's been so little admixture of material that it's still arranged according to the subsoil?

Morrell: Yes, I do. These are wide things, the rows themselves are very wide and then you've got nearly twice that distance in between them. It's not something that was thrown up by a plow, quite obviously it's too large, there's too much space.

Williams: Ross has talked about stone hoes and hoe chips and I think this is very worthwhile. There are few reports that even deign to mention this. The other neglected aspect is shell hoes. I was interested to read several reports on Hopewell villages that shell hoes are very common but the reports offered no citations as to where this information originated. They do occur on the Irving site, but are infrequent in Ohio Hopewell. And they do occur in the most recent site report (Steuben) of Dan Morse quite frequently. One of my students, Will Andrews, has made a study of the literature and the distribution of shell hoes and one of the things that came out of it was that they are quite widespread. Everyone has at one time, I'm sure, thought of Holmes' illustration of them from Madisonville, and I'm sure everyone thinks of them as very late. They certainly do occur in Fort Ancient and out on the plains very late, up to Historic context. It was surprising to me to find them in Hopewell context without any comment as to what they were doing with these things. If we're arguing about agriculture and Hopewell, it's surprising that no one has suggested that maybe these shell hoes were perhaps used in this. They do occur in great frequency in the Lower Mississippi Valley about 500 A.D. at a site that I excavated, and that's how I got interested in them. But I think I'd like to get some other information on the distribution of these things. You have on your program a nice illustration of a shell hoe being used in corn agriculture. This is drawn from a very fine specimen that occurs in the Ozark Bluff context. We have no idea what it's age is; it's very poorly illustrated in Harrington's little Heye Foundation publication on the Ozark Bluff Dweller. I've had some better enlargments of it showing the method of hafting which my artist used in drawing this thing. There's no question at all that this was used. These hoes show the same kind of wear, and everything must have been hafted in exactly the same way. In other words, in a method for this kind of utilization, I certainly think we have to view them as some kind of agricultural tool.

CORRELATION OF MISSISSIPPIAN SITES AND SOIL TYPES

by

Trawick Ward

It has long been recognized that environmental factors are important in determining the location of any group of primitive people. It is my purpose here to examine soil types and their relationship to the location of archaeological sites classified as Mississippian, both in time and culture. I feel that soil types are a determining factor in site locations if it is granted that the primary technological basis for Mississippian culture was an agriculture which emphasized the production of maize. Therefore soil type in conjunction with certain other cultural criteria are indictive of a site with Mississippian culture.

It is evident that soils would have to have met certain requirements for aboriginal cultivation of maize to have been possible. These requirements were determined by the technological aspect of Mississippian culture and by the nutrient needs of the maize plant.

There are a number of descriptions of agricultural procedures of the Southeastern Indians which can be found in the early documentary sources. Generally, the clearing of the fields was accomplished by a slash and burn technique; and then by using a dibble or digging stick, the ground was made ready for planting, while hoes of bone, shell, or wood were used in tending the planted fields. Such procedures held for the Florida Indians as described by Calderón (Wenhold, L., 1936, p. 13), the Natchez as described by Du Pratz (Swanton, J., 1911, p. 75), and the North Carolina Indians as described by Hariot (Lorant's, S., 1946, p. 244).

Turning for the moment to a discussion of soils, we find that there are four general categories of soil textures which are determined by particle size. These are clay, silt, sand, and loam - clay pertaining to the smallest particle size; and loam whose composition mechanically lies more or less midway between clay and sand.

> "The presence of silt and <u>especially</u> clay in a soil imparts to it a fine texture, and a slow water and air movement. Such a soil is highly plastic, becoming sticky when too wet, and hard and cloddy when dry unless properly handled.... Such soils are spoken of as heavy because of the difficult working qualities, markedly in contrast with light, easily tilled sandy and gravelly surface soils." (Lyon, 1952, p. 49)

By definition a loam is ideally a soil wherein there is a mixture of sand, silt, and clay size particles. Such a soil will possess, in equal proportions, light and heavy properties. As a rule, loams have desirable features of both sand and clay without possessing their undesirable features, e.g. extreme looseness and low water capacity in the instance of sand, and stickiness in the instance of clay (Lyon, 1952, pp. 52-53). For this reason it has been often noted by Pedologists that those soils ideally suited for agriculture are loams (Lyon, 1952, p. 53). Almost without exception, because of factors of deposition, these soils are located immediately adjacent to rivers subject to overflow.

It is evident from these descriptions that the agricultural practices of people with Mississippian culture were restricted in so far as those soils which they could utilize for cultivation. It is a known fact that clays are extremely hard and cloddy when dry, and extremely sticky when wet. This suggests that a soil with these characteristics could not possibly have been cultivated with Mississippian agricultural implements. Therefore, Mississippian technology would not have allowed advantageous cultivation of soils which were predominantly clayey or silty. However, from the standpoint of texture, loams are suited extremely well for digging stick, and hoe cultivation.

After examining to some extent the physical characteristics of soils it is necessary to see which soil classification produces better yields of corn.

The aboriginal farmer was conscious of soil fertility. A soil was judged on its ability to grow vegetation. Oviedo y Valdéz mentions that "to plant maize they clear away the forest or the canebrake; land producing only herbage is not rich enough" (Weatherwax, P., 1954, p. 121).

Corn is a heavy feeder requiring large quantities of plant food for its best growth. With plenty of water and plant food available corn can be grown successfully on soils ranging from a fairly coarse sand to the heaviest of clays. As far as natural fertility is concerned a moderately heavy clay loam, (silt loam) or fine sandy loam is best suited to corn production in most areas (Wilson, 1955, p. 647). From a textural standpoint, clayey soils can be eliminated as far as aboriginal cultivation is concerned. Extremely light (sandy) soils can also be excluded because of the necessity of commercial fertilizers, and because of their low water capacity.

I think it is important at this point to mention that many soils associated with the sites I researched were subject to periodic flooding. This would have had a tremendous effect on renewing their fertility. Also, it has long been recognized that beans, as well as other legumes, improve the soils markedly, making it possible to grow larger yields of cereals after these plants have occupied the land (Lyon, 1952, p. 458).

Thus the common aboriginal practice of planting beans along with the corn would have in no small measure replenished the nitrogen content of the soil. As one leading soil chemist, Hans Jenny, has pointed out, "Continuous cropping of corn has a destructive effect on soil fertility, whereas the intensive use of legumes will preserve the original nitrogen content or may even increase it" (Jenny, 1941, p. 257). Therefore, periodic flooding along with inter-planted legumes probably made it unnecessary for the aboriginal farmer to have been greatly concerned with crop failure due to depleated fertility.

Of the 90 sites attributable to the Mississippian culture complex and chronological period which were selected for analysis by this study only 24 could be located with accuracy on the soil maps available to me. These 24 sites are summarized on the chart.

20 of the 24 sites were located on or had access to (within one mile) areas of soils large enough and well suited for aboriginal cultivation, with respect to texture and fertility. The soil type was either a fine sandy loam or a silt loam.

For a detailed discussion of the relationship between soils and the locale of Mississippian sites, we may select Etowah, Duck River and Hiwassee Island as being approximately representative.

The Etowah site is located on the flood plain of the Etowah River. A strip of Huntington fine sandy loam, varying greatly in width (from about one-fourth mile to less than one-tenth mile), is found on both sides of the river. The site lies in the middle of this soil's widest expanse. For about two miles along the river on either side of the site an area of approximately 1,000 acres of this soil is encountered. The soil geologists point out that "Huntington fine sandy loam has a surface soil consisting of very friable, mellow light-brown or grayish brown fine sandy loam from 8" to 16" thick. This soil is subject to seasonal overflow, but is well drained between inundations. It is especially desirable for corn....." (Fuller and Shores, 1926, pp. 54-55).

All of Hiwassee Island is covered with Elk silt loam except for a thin band about one-fourth mile wide on the southwest side which is covered with Huntington silt loam.

"Huntington silt loam is periodically flooded and only occasionally are common crops damaged by inundation or failure to remove excess water. It is probably the most fertile, strongest and most productive soil in Tennessee. High natural fertility and durability have made it possible to produce large yields of corn year after year" (Wells and Robbins, 1946, p. 37).

The Elk silt loam resembles in appearance and crop value Huntington silt loam. The total area of Elk silt loam and Huntington silt loam on Hiwassee Island is approximately 404 acres.

The Duck River site is located on a band of Huntington silt loam along the Duck River. "The total area of this soil in Humphreys County is 5,184 acres and the largest proportion is along the Duck River" (Wells and Robbins, 1946, p. 37).

Therefore, it would appear that sites which are Mississippian are located on or approximate to soils with a high degree of natural fertility and a highly friable texture. Silt loams and fine sandy loams have both of these characteristics. Characteristics which apparently were prerequisite to the intensive maize agriculture as carried on within the technological limits of Mississippian culture. This correlation between site locale and a specific soil type can hardly be any more fortuitous than is the distribution of Mississippian sites on the landscape random.

If we accept the proposition that a prime factor in determining the locale of Mississippian sites in the Southeast was soil type because of a presumed technological orientation toward agriculture, we must therefore ask ourselves why some Southeastern sites which appear, at least stylistically, to be contemporary with the Mississippian manifestation are not located on sandy loam or silt loam soils.

The Irene Mound and other Southeastern coastal sites may be cases in point. The extreme sandyness of the soils would make it impossible for productive cultivation, especially in time of drought, because of the low water capacity of predominantly sandy soils. Also, the natural fertility of sandy soils is at a minimum. These two facts suggest that we exclude the possibility of a productive agricultural system as being the economic basis of these cultures.

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SITE	LOCATION	PREDOMINANT SOIL TYPE
Etowah	Bartow Co., Georgia	Huntington Fine Sandy Loam
*Hollywood	Tunica Co., Miss.	Sharkey-Alligator Clays
Stokes Bayou	Bolivar Co., Miss.	Forestdale Silt Loam and Alligator Clay
*Alligator Mounds	Bolivar Co., Miss.	Alligator Clay
*Posey Mound	Quitman Co., Miss.	Alligator & Sharkey Clays
Blanchard	Bolivar Co., Miss.	Robinsonville Fine Sandy Loam
**Winterville	Washington Co.,Miss.	Sharkey Clays
Parchman Place	Coahoma Co., Miss.	"Alluvium Soils" (sic)
Solomon Site	Coahoma Co., Miss.	"Alluvium Soils" (sic)
Emerald Mound	Adams Co., Miss.	Memphis Silt Loam
Fuller Mounds (Shelby Site)	Shelby Co., Tenn.	Memphis Silt Loam
Shiloh Temple Mound	Hardin Co., Tenn.	Waverly Silt Loam
McKelvey Mound	Hardin Co., Tenn.	Waynesboro Fine Sandy Loam
Zimmerman's Island	Jefferson Co., Tenn.	Congaree Silt Loam
Bell	Roane Co., Tenn.	Huntington Silt Loam
Citico	Hamilton Co., Tenn.	Dewey Silt Loam
Talassee	Blount Co., Tenn.	Staser Loam & Staser Fine Sandy Loam
Knox County Island	Knox Co., Tenn.	Staser Fine Sandy Loam
Duck River	Humphreys Co., Tenn.	Huntington Silt Loam
Hiwassee Island	Meigs Co., Tenn.	Huntington Silt Loam
Pinson Mounds	Madison Co., Tenn.	Waverly Silt Loam
Fain's Island	Jefferson Co., Tenn.	Congaree Silt Loam
Rembert Mounds	Elbert Co., Georgia	Congaree Fine Sandy Loam

NOTES

*The Hollywood Site, Alligator Mounds, and Posey Mound are located on old Mississippi meander scars. It is probable that during the aboriginal occupation, the soils were of the Sarpy series which are very well suited to agriculture.

**The Winterville Site seems to be on a "clay plug" or oxbow filled with sediments. It too, was probably at the time of habitation adjacent to the Mississippi River and on soils of the Sarpy series.

NOTES ON A PREHISTORIC CULTIVATED FIELD IN MACON, GEORGIA

by

A. R. Kelly

Some points have been raised in the discussion in reconstructing the plan and appearance of a prehistoric cultivated field. Now, thirty years ago at the Macon Plateau site in middle Georgia, on a protracted excavation initiated by the Smithsonian Institution and continued by the National Park Service after the establishment of the Ocmulgee National Monument, some unique features of a remarkably preserved cultivated field were uncovered beneath Mound D. of the Macon Group.

The approximate dimensions of Mound D, allowing for 100 years of truncation and spreading of featheredge, were 180 feet in the long axis, about 120 feet broad, and 10 to 12 feet in height with 4 to 6 feet removed in historic cultivation since antebellum days. A one-foot clay summit, extending downslope of the mound, was the seat of multiple rectangular buildings of which one dominant structure was honeycombed with storage pits and was dubbed the GRANARY.

Beneath the clay summit was some 8 feet of basket-loaded, lensed mound fill, surmounting mound base, a dark magenta or chocolate colored soil a foot thick, relic of the rich forest soils that once abounded in Georgia before the erosive cycle of modern soil exhaustion set in.

We were cross-sectioning the mound in vertical profiles at five-foot intervals, beginning with featheredge, following a procedure of microtome cross-sectioning and meticulous profile recording then almost prescriptive for most archeologists trained in mound archeology.

As soon as we had cut in from the diffuse featheredge to definitive submound occupation, a curious and persistent feature emerged and engaged our attention - this was a distinct undulation of the dark soil at mound base with alternate crests and troughs, very regular and consistent in appearance. The purely romantic notion, an extrapolation warranted only by the consequences, in the mind of the supervising archeologist, led to a radical departure in our excavation technique - this was the idea that perhaps the mound had been built over and had sealed in and preserved a prehistoric cultivated field. From this point of departure the approximate 8 feet of lensed, basket-loaded fill was carefully removed from the dark level at mound base and the sandy loam mantle over the undulations was spooned away by the workmen standing or kneeling on protective burlap or tarpaulin.

In this manner approximately half of Mound D was excavated to mound base, the other half left standing. The sharply contrasting alternate crests and troughs of the "rows" of the cultivated field were exposed over an area some 60 feet deep and 50 feet wide, extending from the side of the excavation to the standing profile of the unexcavated half of the mound.

The project happened to have the best photographer in the county on our WPA crew. Excellent photos of the "cultivated field" were taken from a specially constructed 40 foot wooden tower. These wide-angled views revealed in sharp detail the "rowed" effect of the alternate crests and troughs, sweeping in a broad parabola beneath the mound. One "bald spot" in the foreground exhibited the wall-trenches and postmould continuity of a rectangular structure which had been built on a low mound in the middle of the "cultivated field". A corner of another such structure showed in the background, the remainder still covered by the unexcavated portion of the mound. The rows terminated at the periphery of the small "log-town house." The detail was startling - one could even make out a "path" that had wound across the field in prehistoric times. It was necessary to advise the critical visitor that this path was not made by our WPA workmen.

On closer observation one could detect another interesting feature of these "rows", so realistic that our "Georgia Cracker" workmen anticipated finding iron cultivator plowshares almost any day. This was a tendency for the "rows" to be constricted or "noded" at regular intervals in their continuity. Our working hypothesis at the time, to explain this phenomenon, was that the continuity of the "rows" was more apparent than real; the native cultivators were "hoeing" elonated hillocks and these tended to be pulled together, synastosed or sutured at their distal ends, as time went by.

One calls to mind some of the 16th century drawings of the Huguenot camera artist, LeMoyne, sketching some of the cultivated fields he saw in Florida at that time. The small thatched cabins stood in the midst of parterres of growing maize, and there were paths between not unlike the arrangement still faithfully preserved in the Ocmulgee model. The "gardens" of the Timucua were very much like the exhibit at Macon Plateau.

The National Park Service had the difficult problem of preserving this highly perishable exhibit of an original prehistoric cultivated field until such time as it could be housed over and shown to the visiting public in the National Monument. They solved it by covering over the "field" by nearly two feet of sand, to be re-excavated and exposed when some permanent shell or cover, with humidity control, could be erected over the site.

Gordon R. Willey, then archeological assistant on the CCC setup at Macon, carried out additional excavations on the house site encountered in the middle of the "cultivated field."

Pottery from the floor of this structure and the surrounding "field," with one whole vessel of Bibb Plain found near the structure, belonged primarily to the Mississippian occupation of Macon Plateau.

The prehistoric cultivated field was widely and loosely known as a preserved "cornfield" but this was really an unwarranted extrapolation. Hindsight is better in archeology as in other human situations, and I have wondered many times subsequently if we could have recovered corn pollen from the submound soil at Mound D. Of course, if and when the National Park Service plans to re-excavate and exhibit, their archeologists can cut a fresh five foot profile in the remaining half of Mound D and can check on this possibility.

Gordon Willey, one of the students of the Laboratory of Anthropology at Santa Fe who were spending this last field season of the Laboratory at Macon, took charred timbers from the collapsed and burned section of the earthlodge located some fifty feet away from Mound D and the "cultivated field" - these later provided Carbon 14 dates for the Macon Plateau occupation of around 900-1000 years ago.

Due to a remarkable set of circumstances, then, we have on Macon Plateau, an astonishingly well-preserved example of a cultivated field that flourished circa 1000 years ago. The photographs from the viewing tower reveal the special arrangements and details, row upon row, as faithfully as some "old field" still exhibiting its contours beneath a new field of pine some 20 or more years later. I recall another photograph - I believe it is in Henry C. Shetrone's "Mound-Builders"-of a cornfield revealed starkly after a light snow, preserved on the campus of a Wisconsin college, another aboriginal relic of considerably less antiquity but still very interesting and pertinent to this discussion.

My recollection of the "rows" at Macon beneath Mound D was that these were separated, from crest to crest, by a span of around 12-14 inches of sterile sand.

COMMENT: (Fairbanks): 18 inches, crest to crest, on the average.

ADDENDUM TO NOTES ON INCIDENCE OF MAIZE AT CARTER'S DAM SITE

by

A. R. Kelly

A typical profile in the Sixtoe Field unit of the Carter's Dam site would show schematically an average of 18 inches of midden and humic soil at the top, including the plowed ground averaging around 8 inches. Then there is an average 30 inches sandy alluvium, homogenous through long leaching without any depositional indications except for a hardpan of 6 inches of varved sandy loam with impregnations of iron leached from above which occurs in the approximate middle of the 30 inches of sand. Then at the base of the 30 inches of sand with its middle iron impregnated and thin varved section there is a discernible brown sandy deposit averaging 5-8 inches mantling a stiff tan clay of amost kaolinitic consistency which goes on down to water-table encountered at around 9 feet from the surface.

The 30 inches of sand in Zone II described above is absolutely sterile, at least in the pits and trenches exposed so far, although the middle varved layer would be theoretically a stabilized and buried old land surface which might have been occupied. This considerable sterile zone is interposed between the Mississippian and Woodland occupations compressed in the top 18 inch Zone I, and the initial finds of Morrow Mountain archaic in the 6-8 inches of brown sand mantling the stiff clay at base of cut. An apparent second occupation of the Morrow Mountain Archaic seems to be defined at a depth of 4 inches in the basal tan clay stratum.

The above profile in the contoured ridge paralleling the Coosawattee river is remarkably constant, exposed in several cuts and extensions of the original 20x20 foot strat cut which exposed the above described sequence in profile. Burials, pits, housefloors occur in the top 18 inches, with diagnostic materials <u>in situ</u> indicative of Mississippian and Woodland provenience. Since our primary concern is with the evidences of maize and other cultigens in the Mississippian segment of top occupation, we will note that the Woodland materials appear telescoped or compressed in the top 18 inches, with some indications of a Late Archaic, similar to the blue chert and straight stemmed types originally described by Joseph R. Caldwell as Stamps Creek Prepottery in his report on the Allatoona Basin Survey for the Smithsonian Institution. (We are advised that the Allatoona Report is scheduled for publication in the near future by the Smithsonian.)

Closely compacted with the upper Mississippian deposits (Etowah, Savannah-Wilbanks, Dallas and Lamar) but occurring a few inches below in strongest concentration are diffuse Woodland

pottery types: Swift Creek, Cartersville check and Simple Stamped, Kellogg Fabric-Impressed, a few sherds of plain fibre-tempered, and a few pieces of steatite ware.

Sixtoe Field has been in modern cultivation since antebellum days. The original landowner, Farish Carter, acquired part of his holdings from two Cherokees after the Removal, Six Toe and Cow Bell - from which the two main mound and village occupations on either side of the Coosawattee take their present name, i.e. Sixtoe Field and Bell Field. Inasmuch as Dallas, and Dallas-Lamar house sites have been troweled out with good architectural detail just below plow line in Sixtoe Field, some bearing plow scars from recent cultivation, and some of the Dallas-Lamar series shows historic trade contact in the upper house occupations, we have good indications that the top 18 inches of occupation in Sixtoe have maintained a consistent, homogenous profile for a calculated 4000 year interval, despite attrition and erosion from long cultivation with modern farm equipment. Joffre Coe and others, in more recent work in Tennessee and Alabama, have indicated their view that the Morrow Mountain culture existed around 6000-8000 years ago. Inasmuch as John Griffin reports he is encountering a variety of Morrow Mountain in current Virginia survey and Dr. Soday communicates he has experienced a similar type in West Virginia, it would appear that this is one of the most widespread Archaic manifestations in the Southeast.

Again, we are concerned with the basal profile and Archaic picture at Carter's, in the six foot profile described, only because all of the depositional (and erosional) history implies a remarkable stability within narrow compressed limits. Where maize occurs in definite <u>in situ</u> penpointed occurrence, as on house floors, in trash pits, or in circumstances implying storage, considerable care and precision must be taken to define the cultural source in such telescoped and narrowed limits.

We have now completed three summer seasons, extending into the fall to frost or freezing in two seasons, at Sixtoe Field, and have encountered numerous rich depositories of garbage and normal refuse collections in good archeological context in the Mississippian horizon, particularly on the floors or along the walls in pits in residential situations ascribable to the Dallas and Lamar periods. This was the normal occurrence found in 1962 and 1963 seasons.

At the end of 1963 season, in view of threatened termination of exploration in the rich and congested Sixtoe Village area, a half dozen long strips 20 feet wide and 100 feet long were removed mechanically by road scrapers down through the top 8-10 inches of plowed ground, to permit of horizontal scraping to uncover house patterns and building activity. This operation disclosed dozens of large irregularly shaped prehistoric excavations, filled with occupational debris, sometimes to a depth of 3 feet or more. These were very similar to the large, saucer-shaped excavations found by W. H. Sears, Lewis Larson, and A. R. Kelly

in the "plaza area" between Mounds A, B, C. at the type Etowah site, where these features were also encountered beneath Mounds B and C. Literally tons of prehistoric garbage were systematically sifted at Etowah and this vast accumulation of catalogued material is still being winnowed by laboratory workers. Everyone who has worked at Etowah, and who has seen these "trash pits" at Carter's, agrees that they were probably the quarry pits from which soil was taken for mound construction, later back-filled by the villagers and nearby householders with their daily trash disposal. Some of the villagers were interred in the garbage pits.

Despite the considerable amount of occupational refuse, containing every conceivable bone, shell, plant remains, along with other artifactual elements and pottery, up through the 1963 Season at Carter's, we had not encountered any corn cobs or charred vegetal matter indicating maize cultivation, or other cultigens. On the contrary we had barrels of animal bones, with some representation of practically every riverine species. Preservation was very good in the garbage fill, richly concentrated with heavy ash deposits. Even small fish bones, scales, and minute particles could be recovered. At Carter's we were putting the midden through a mechanical shaker, and were also using water and 1/4 inch sieves with pressure from a ram pump installed at the Coosawattee margin.

At the time, with the heavy pressure to expedite operations in a salvage dig carried on with money and time a consideration, we thought we were taking maximum precautions to uncover as much animal and vegetable remains for analysis. After listening to descriptions of some of the more careful, precise, and quantifiable methods employed at other sites in recent archeological work, we admit to considerable inadequacy. Still, we do consider that we should have recovered charred corn kernels, corn cobs, beans, and the larger cultigens if they were indeed present in the ash and midden lenses of the large trash pits at Carter's Dam, Sixtoe Field.

Let it be recorded that we did find maize and other plant elements not yet botanically identified in a large storage pit located in the midst of a maze of superimposed house sites exposed in the summer season of 1964. At least 7 house patterns have been defined in an excavated area of some 3000 square feet. The large storage pit, Feature 66, found this summer, was 8 feet long and at least 4 feet wide, around 2 to 2½ feet deep in portions, apparently lined with split cane or basketry weave. Several pecks of charred corn kernels were recovered. The corn had apparently been shelled and stored, along with other plant materials. Some wild fruit seeds, plum?, also occurred. The kernels had ballooned or mushroomed to hominy proportions in the process of carbonization. Everything in this large pit was thoroughly carbonized, including the split cane which came out at the base and sides of the pit. Inasmuch as two house patterns on either side of this large pit had burned completely, with many charred timbers <u>in situ</u>, the storage pit might have been burned at the same time.

The pit was intrusive from just beneath the plowline into a much larger and deeper storage pit, with compartments separated by large boulders from the nearby stream. Analysis of the sherds in fill lead to the conclusion that the cache of shelled corn and other materials probably was of Savannah-Wilbanks origin. Actually, both Lamar, Dallas, and Late Etowah (Savannah-Wilbanks) structures were in close proximity in this congested and superimposed area of intense building activity.

One other occurrence of maize was encountered in a small deposit alongside the wall of a large 25/25 foot Lamar Period house. A third occurrence just under plowline came out at the beginning of the season in July as the excavation unit around a Dallas period house was widened. The source of this maize was uncertain.

Much of the 1963 season was centered on the exploration of the mound in Sixtoe Field. On the summit numerous domiciliary structures were found, some of considerable size, one large rectangular structure with nearly one foot thick walls and wall trenches, was 40x70 feet. On the floors of other structures on top of Sixtoe Mound, along with pottery imbedded in the clay floors, we catalogued charred corn cobs occurring in discrete small piles. No kernels were evident. The meaning of these separate small piles of charred corncobs was not clear. As many as five or six would be encountered on the floor of a house in troweling. The main occupation and utilization of the mound surface belongs definitely to the Savannah-Wilbanks period, with a fair inclusion of types ascribable to Etowah. Burials on the mound were in sharp contrast to those of villagers found in the large trash pits. Here there were largely adult individuals, ages 25-30 for most part, interred in round to oval, bathtub shaped pits dug laboriously through touch mound clay to a depth of as much as 3 feet, with a pattern of limestone stone arrangements defining the burials. These special limestone interments, usually without burial accompaniments, and with almost no "cult" associations, were interpreted as the particular burials of a priestly or shaman class who lived in large dormitory-like structures on top of the mound. They were in sharp contrast to the village burials in the "trash pits."

Time does not permit further elaboration of theory here but the hypothesis os offered that these Sixtoe Mound special limestone slab interments were those of a shaman class, living in special dormitory constructions on top of the mound apart from the village, and that these individuals were apparently using corn, found in peculiar small piles on their house floors in a manner suggesting some ritualistic implications.

Finally, ceramic and artifact analysis of mound and village at Sixtoe Field indicate a major occupation of the site during Etowah to Savannah-Wilbanks times, but without the "cult features" and elaborated temple constructions found at the type Etowah site.

It is noteworthy that the large trash pits at Carter's do not contain the numerous small, perforated shell "hoes" or presumed agricultural tools which abound at the type Etowah site. One is impressed with the enormous quantities of animal remains, with occasional Unio shells and periwinkles, charred hickory nuts, indicative of a primary reliance on hunting, fishing, and gathering subsistence patterns.

In summary, the thesis tentatively maintained here is that the group of people living on the Coosawattee in Etowah and late Etowah times, represent a time interval just prior to the main efflorescence in Savannah-Wilbanks times at the type Etowah site, and that these people were still relying conservatively on their old food gathering subsistence, even though their shaman may have been experimenting with maize and perhaps undergoing a novitiate in the early missionizing of the Cult.

Study of the profiles to the Carter's trash pits imply that the quarry pits were never entirely filled to surface with garbage; the ultimate filling at the top was largely washed in or blown in, and the Dallas burials sometimes occur in and around this terminal crust of the fill. This suggests a hiatus or interval of partial abandonment, or a declining population, at about the time theoretically when more intensive mound building, temple construction, elaborate rituals with cult paraphernalia, came into efflorescence at the type Etowah site.

One is tempted to extrapolate a little further and wonder if this abandonment or declining occupation of the site might represent a drawing away of the local populations to the powerful attraction of the new religion and major cult mushrooming at Etowah.

"Late Cult" elements are indicated for the mound situation at Little Egypt, below Sixtoe Field and the Talking Rock Creek confluence with the Coosawattee, intercepted in some burials by the Andover excavations in the late '20s by Warren K. Moorehead and Margaret Ashley. Dallas burials on Bell Field mound, washed out in a heavy freshet some twelve years ago and partially recovered by John Wear of Fairmount, also have some "late Cult" associations. These sites in the Coosawattee have not been available or scheduled for salvage operations during current Inter-Agency programs.

GULF COMPLEX SUBSISTANCE ECONOMY

by

Charles H. Fairbanks

The presence of agriculture of the maize-beans-squash-tobacco swidden type is clearly indicated for the Mississippian levels in the Southeast on both archeologic and ethnographic evidence. What seems more open to question is whether pre-Mississippian levels had an agricultural base, partial agriculture, or were exclusively hunters and collectors. Caldwell has expressed the opinion that a "primary forest efficiency," developing out of an Archaic substratus served to prevent the spread of early agriculture such as the California acorn complex denied agriculture to the West Coast (1958).

Archeological evidence of cultigens is largely lacking before Early Mississippi times in the Southeast. Until we get thorough pollen analyses of earlier strata we seem to have little chance of direct archeological evidence of agriculture from the middle periods. On the Florida Gulf Coast this level is represented by the Weeden Island Phase, the major member of the Gulf Complex. Weeden Island represents, in this area, the climax of the burial mound tradition and a mature ceramic tradition whose roots grew in (or whose branches spread into) both the Mississippi valley and the Georgia Piedmont. The complexity of the burial complex and the sophistication of the pottery have repeatedly raised the question of the energy base on which such a structure could have rested. The midden material presents a picture of a well developed hunting, fishing, collecting economy with no direct evidence of agriculture. In addition the possibility, exists, at least, that Weeden Island communities could have had contact with such agricultural complexes as Macon Plateau to the north. Such seemingly late and geographically peripheral Weeden Island communities as Kolomoki (Sears, 1956) certainly did have contacts with the Mississippi Phase as indicated by a number of ceramic features as well as the pyramidal mound.

Griffin has argued (1964:243) that the somewhat comparable, and somewhat earlier, Hopewell Phase in Ohio and Illinois was not fully agricultural but that they did depend on cultivation for their population concentration. More recently Prufer has described the presence of corn in at least some Hopewell sites. A recent paper by Goggin and Sturtevant has shown that the non-agricultural Calusa of Southwestern Florida possessed a redistributive system with sufficient energy to support a ramage type of socio-political system. (1964:179-219) It is my purpose here to review the evidence, in a general ethnohisorical fashion, to advance the proposition that the Weeden Island Phase also represents a technology with a well developed redistributive system.

The argument has been advanced that the burial mounds of Weeden Island, and similar burial complexes, represent the remains of rituals involving the burials of powerful shamen. Their burial spot thus became an area tinged with the supernatural where later members of the community were buried. The relationships of Weeden Island burial mounds to both Adena and Hopewell mounds is general, rather than specific. Weeden Island burial mounds rarely contain objects that seem to represent insignia of rank which one would expect in a hunting-collecting technology where shamen were the principal possessors of rank. The large deposits of pottery vessels, usually ceremonially "killed," suggest the concept of rites of augmentation in which the spirits of the dead could be brought into a more favorable relationship to the living community. This in turn suggests, to me at least, the possibility, that the mounds were lineage burial places and lineages certainly seem more characteristic of simple agriculturists than they do of hunters or fishers. I do not mean to suggest that they generally represent ramage organizations, although the Calusa and the Puget Sound areas do demonstrate the development of lineages on a food-getting base.

The Mobile area of the Gulf Coast may represent a useful comparison with the major Weeden Island area to the East. During the period of first settlement by the French in 1699 and 1700 there were two groups of agricultural but non-temple mound Indians. One group was composed of the Mobile, Naniaba, and Tohome. The Mobile in 1699 seem to represent but a small remnant of the powerful Mobile nation encountered by De Soto in 1540. The second group was the Pascagoula, Biloxi, and Moctobi to the west of the Mobile River. Both groups were thoroughly agricultural with central towns and scattered homesteads, according to the statements of Iberville and Bienville (Margry 1776). Neither group possessed temples or temple mounds, yet there is inferential evidence of traits that seem to be part of the Gulf Complex. The French on a visit to the Mobile-Naniaba-Tohome area collected a series of five pottery effigies from what appears to have been a burial mound as the "spirits" were supposed to infest the place (Margry Vol. IV; 512-3). It is not at all clear whether the Mobile were still building burial mounds or simply had a special regard for an earlier monument. At any rate, they do seem to represent a rather fully agricultural people without the temple-laza complex of full Mississippian phases.

The Biloxi seem to represent a survival into historic times of what may be another facet of the Gulf Complex. They were described as having a temple where the mumified bodies of past chiefs were kept on display (Dumont 1753:240-3). I suppose that even the best smoke-curing would eventually break down on the humid Gulf Coast or that movement of the community would make disposal of the collection necessary. I can think of no better explanation for a Gulf Complex mass burial mound. The

fact that the Biloxi were a relatively isolated Siouan group nearly surrounded by Muskhogean populations, perhaps influences my view of them as a remnant of an older way of life.

During the nineteenth century much of the Gulf Coastal Plain was largely settled by farmers who have largely disappeared leaving fish, forest products, and tourists as the principal sources of subsistence. Nineteenth century plantation agriculture is, however, a far different thing from aboriginal subsistence part-agriculture. For one thing, the Indians did not find the necessity to support cattle and mules on their agricultural base. Until we know considerable more about the swidden practices which might have been used, we cannot rule out cultivation on ecological grounds.

Another factor is our increasing awareness of the inland extent of Weeden Island. Sears excavations at Kolomoki revealed the largest site of the phase to lie far from the Gulf. A number of smaller inland sites are now known. To the east in the Alachua, Dixie, and Levy county areas we find an inland extension of Weeden Island sites extending to the Oklawaha where it seems to blend with the St. Johns tradition (Goggin 1952:86-92). Often these sites have burial mounds, of the continuous use type. At least some of them, as at Cross Creek, have platform mounds and even extensive "canals" which may indicate relationships with the Glades area. While much of Dixie and Levy counties are poorly drained and seem to continuously revert to forest extraction industries, there are some extensive areas of prime agricultural lands. When these inland sites are considered, Weeden Island sites are not nearly as dominated by shell and fish-bone middens as the better-known coastal sites had led us to believe. I find it hard to picture a non-complex culture having one way of life for inland communities and another quite different one for coastal sites sharing practically the same material traits. I believe we must postulate a redistributive system between coastal and inland communities.

We are thus presented with two seeming adaptations of Weeden Island: one toward a coastal equitone of Gulf-marsh-swamp environment; the other to an upland-hammock-minor stream situation. The coastal sites contain major amounts of mammal, reptile, fish, and shellfish remains. This could easily be considered as indicating a very generalized hunting-fishing-shellfishing, and perhaps gathering technology. It does not exclude, however, the possibility of coastal agriculture as is suggested by the historic Biloxi, Pascagoula, Mobile, Naniaba, and Tohome. These tribes shared much the same ecological situation as Weeden Island ritual patterns.

The inland sites fall into two general areas. One is the Tallahassee Red Hill region which is certainly prime agricultural lands for Indian swidden agriculturists. This is clearly indicated by the frequency of later fully agricultural Ft. Walton

temple mound sites and smaller, scattered sites. It seems clear that Ft. Walton, of the Lake Jackson sub-type and in the Tallahassee area, was the material culture of the Apalachee, who were fully agricultural. The temple mound sites are thus certainly the "square-ground towns" while the small sites are the supportive agricultural homesteads.

When we look at the distribution of Weeden Island sites we see a very similar distribution. Larger sites are rather widely scattered. Each of them is marked by fairly thick midden and a nearby burial mound. Between these centers with ritual features are a series of small sites with a somewhat simpler representation of Weeden Island traits. These could again be homesteads. Again the location of the sites tends to concentrate along equitone lines. It may be argued that this indicates a hunting-gathering-technology with concentration where two or more biotas were available. These people certainly did a lot of exploitation of a wide variety of resources. Without domestic animals, they must have derived the bulk of their protein from wild sources. But so did the Apalachee or the Creek. Certainly gardening cannot be ruled out. The complexity of the large sites such as Kolomoki argues not only for some agricultural but perhaps for a ramage if not a class system.

The central Florida area seems to present a somewhat similar situation with coastal sites marked by extensive shellfish, mammal-bone, fish-bone middens, as well as inland sites. Again we have a series of larger sites. At least one, Cross Creek, has one or two burial mounds, a low pyramidal mound, and an extensive ditch-embankment. Smaller sites without mounds or embankments could be either hunting collecting camps or farm homesteads. Only excavation with attention to organic remains will demonstrate the situation surely. But, again, gardening cannot be ruled out. It is my impression that many of these sites on Live Oak hommocks near lakes would be rather well suited to simple swidden agriculture.

On or adjacent to many central Florida Indian sites are heavy stands of Zamia, so widely used as a starch source. A recent study by Hewett has shown that Zamia has a very high tolerance for calcium and magnesium. It may be that the presence of marine or riverine shells in the middens has contributed to this distribution. In predominately limey soils, however, it is just as likely that the distribution of the Zamia has contributed to the location of the sites. My own experience has shown that Zamia is not really difficult to grow and I wonder whether we should entertain the possibility of its having been "tended" at times.

Finally I would like to raise the question of non-agricultural potters. I know no culture with a vigorous ceramic tradition which is not also agricultural. I do not consider that the Andaman Islanders, Siriono, and Eskimo contribute anything

useful to the discussion. Certainly Weeden Island has a mature vigorous, and agriculturally suggestive ceramic tradition.

The evidence of the Mobile-Naniaba-Tohome and Biloxi-Pascagoula-Moctobi groups has been cited as an argument that temple mounds, plazas and full Mississippianization are not necessarily the only concomitants of agriculture in the Southeast. Alternative patterns are possible but too little direct historical archeology or ethnohistory has so far been done for us to speak with any authority.

The coastal situation of so much of the known Weeden Island sites has perhaps affected our view of their technology. The type site and many others (see Willey 1949: 103-112, 396-451) gives the impression that this phase was pretty well concentrated along the coastal equitone where bay and land meet. Thus they could readily exploit the faunal, and floral resources of two ecological niches. One result has been that the extensive shell middens, which usually contain large quantities of pharyngeal bones of large marine drum fish species, certainly give the impression of a definitely hunting-fishing-collecting economy, a fully efficient coastal economy in short. It could be argued, in addition, that these coastal lands are very poor garden spots. The French and Spanish, from the mid-seventeenth century to the early nineteenth centuries, complained of the difficulty of wresting a bare subsistence from these coastal soils. Perhaps the methods of maize-beans-squash-tobacco could have been adapted to coastal conditions along with some selection of the cultigens themselves. We do know that the protohistoric Ft. Walton Phase occupied as part of its range much of these same lands. The Pensacola and Chatot seem to have been pretty fully agricultural and to have been responsible for the extensive coastal middens as well as at least two major temple mounds, Bear Point and Ft. Walton. There can be little doubt that Mississippian agriculture could and did adapt to a sand dune milieu.

The Weeden Island Phase thus seems to represent a local climax with at least a possibility that it had some swidden agriculture. Only identification of the cultigen remains or their pollen will determine this point. What does seem sure is that Weeden Island represents a redistributive pattern. Some sort of stored and parcelled-out supplies had to feed the mound builders and the potters who made the non-utilitarian vessels so common in those mounds. The high degree of similarity between coastal and inland communities suggests a redistributive system, rather than seasonal transhumance from coast to hammock.

If this view can be entertained, we should look at the burial mounds as the sepultures of the lineage-elite within a ramage system rather than monuments to dead shamen.

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Griffin: Ladies and gentlemen, I would like to make a brief comment about the papers this afternoon. The general heading of the session was "The Descriptive Data." It might be suggested that Mr. Struever was one individual who, when he completes the presentation and analysis of his data, will have, presumably, both from the vegetational side and also from the other food supplies available, data which may help to interpret whether this particular site was occupied seasonally or throughout the year. And that until we can get sites that are excavated to present whether these sites are occupied seasonally or throughout the year, the relative proportions of vegetational remains and animal remains and fish remains and molluscan remains, and until we can determine at any particular period of time what the yearly cycle of food supply is for the people at this particular level that we're not even getting close to finding out what the economic base is of the societies with which we're trying to deal. And so tomorrow morning we will engage again. (Session breaks up)

Griffin: To me Bill, acorns mean fall collection, fall occupation. And what were they eating during the spring, and winter and summer?

Ritchie: In the summer they were eating fish and what they could get in wild plants. They were also killing some game.

Griffin: Yeah, I know what they were doing, but where are the sites to give us this data?

Ritchie: Well, we've got some sites. A site like Lamoka I think is an all year round site. I think that's a sedentary site.

Question: How many Lamoka sites had acorn material?

Ritchie: Well, we only have three with any refuse and there were acorns on all of them. But only at Lamoka Lake were there massive quantities of them.

Griffin: I think that the significant thing is that most of these Lamokoid sites, or sites that are on that same time level, roughly, in the northeast where you do have evidence of fairly good occupation, are all up in the primarily deciduous area. You don't get them up in the coniferous forests.

Ritchie: This whole terminology of the boreal archaic I don't like.

Griffin: I don't either.

Ritchie: The boreal forest had nothing to do with it. These people lived and moved in the mixed forests, what might be called the lake forest.

HISTORIC CAROLINA ALGONKIAN CULTIVATION OF CHENOPODIUM OR AMARANTHUS

by

William C. Sturtevant

In the materials deriving from the Roanoke voyages (Quinn, 1955), there is an eye-witness description by Thomas Hariot of coastal Carolina Algonkian agriculture in 1586. He describes (pp. 337-342) the Indian custom of interplanting fields of maize with beans, cucurbits, sunflowers, and a curious cultivated plant which he describes as follows:

> "There is an hearbe which in Dutch is called Melden. Some of those that I describe it unto take it to be a kinde of Orage; it groweth about foure or five foote high: of the seed thereof they make a thicke broth, and pottage of a very good taste: of the stalke by burning into ashes they make a kinde of salt earth, wherewithall many use sometimes to season their broths; other salte they know not. Wee ourselves used the leaves also for pot-hearbes." (Quinn, 1955:340).

Various identifications have been suggested in the published literature for this plant: the salt-bush or orache, Atriplex hastata (Swanton, 1946:244), in the family Chenopodiaceae (evidently because of the name "orage" and the use as a salt source), amaranth (Weatherwax, 1954:61), and Chenopodium (Willoughby, 1907:83). The last two are obviously the most likely - I know of no other evidence for Indian use of Atriplex. But it is interesting that thus far the recent discussions of pre-maize domesticates in the East have not mentioned archeological evidence for either amaranths or chenopods anywhere near this far east, nor have they cited any ethnographic or historical evidence for the cultivation of these two plants, despite the real problems of discovering from archeological evidence alone whether and to what extent these plants were actually cultivated. Over thirty years ago, however, Gilmore (1931:97-98) called attention to an early description of Natchez "use and partial cultivation" of Chenopodium.

Hariot was a good observer who spent considerable time investigating local economic products, and I see no reason to

doubt his evidence. Idenfication of the plant depends on the characteristics he mentions:

1) a resemblance to the Dutch melden, that is, spinach and beets, i.e., pot herbs;
2) a resemblance to the English orage, that is, a pot-herb of the genus Atriplex, especially "garden orache," Atriplex hortensis;
3) growth to a height of four or five feet;
4) seeds edible as broth and porridge;
5) leaves edible as pot-herb;
6) ashes of the stalk salty enough to serve as a salt substitute.

All but the last of these characteristics, as far as I can tell from a preliminary search, seem to be compatible with both amaranth and chenopod. But I have not located any mention of the use of either one as a source of salt. An easily-tried experiment might result in eliminating either amaranth or chenopod as a likely possibility, leaving us with quite firm historical evidence for Indian cultivation of the other plant.

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PRIMARY FOREST EFFICIENCY

by

Joseph R. Caldwell

Steve asked me to speak in the session on hypotheses and he said that if I had any facts I could use them in another session. Let's get one thing straight - some people are against sin, but I am simply against corn. But, I'm only against corn in certain circumstances.

Question: If you're against corn, why did you give that paper the other day?

To the unknown voice, let me reply that he ought to take a look at my whole bibliography. Only in certain circumstances am I against corn - I could distill for you many reasons why corn is a valuable plant.

The hypothesis of Primary Forest Efficiency is a very simple thing, as all good hypotheses should be. There are many characteristics of a hypothesis which I won't go into, but I should say that one important thing you can do with any hypothesis is to defend it and I came down here with that point of view. This was published in 1958 and it simply says that Primary Forest Efficiency is an idea for characterizing prehistoric economic development in eastern North America as strongly influenced by its forest environment - that's all.

At that time, you will recall, there was a renewal of interest in the question of whether such areas as western Asia and Meso-America had developed in similar ways. Braidwood had written of the primary farming community in western Asia so that it might be regarded either as a historical datum or an economic type. An analogous idea of the "village formative" was being used in Meso-America to denote the establishment of efficient food production in that region. It did not seem to me, however, that anything could be gained by assuming that the path of development in eastern North America would be similar to whatever paths of development we might discover in the civilizationally nuclear areas. Yet Willey and Phillips had made this assumption when, in 1955, they classified North American materials as successively Archaic, Pre-formative, and Formative. The question could be asked, formative to what? Formative to Meso-American civilization? I didn't think so. I didn't think we had any reason to assume that this was so. The fact that Meso-American features had been introduced into eastern North America, and the possibility that if the Europeans had not come to this country eastern North America might have been swept eventually into the Meso-American civilizational orbit has no bearing on this particular question. North American developments needed to be understood in their own terms.

Most students at that time certainly had been aware of the importance of the eastern forest environment on the development of eastern cultures. Quimby, for example, had written in 1954 of Lamoka and Laurentian as forest-adapted and he had proposed a cultural climax in the eastern forest after the Altithermal of 4500-2000 B.C. had made the western grasslands marginal. He further listed as innovations the domestic dog, manufacture of copper tools, and such ground stone tools as axes, adzes, gouges. Here was a possible way to characterize eastern cultural development in its own terms, to regard the course of many adaptations to the eastern forest as a great overriding process. And if indeed we could find evidence that it was an important one we could expect eastern developments to have been significantly different from those which were believed to have operated in the areas of nuclear civilization. This is essentially what I mean by Primary Forest Efficiency. Quimby, incidentally, has not stepped forward to admit paternity. I will not press this suit; I will simply say that if he does not, it's not the first time I developed a darn good hypothesis by misunderstanding somebody else.

I proposed that Primary Forest Efficiency might be seen in adaptive innovations. I made a guess that the broadly barbed points characteristic of many Archaic manifestations might indicate an adaptation to an ambush and atlatl hunting method which would be contrasted to the other kinds of hunting represented by lanceolate thrusting spears of earlier times. Forest Efficiency might also be seen in the emergence of food specializations and transhumance. The use of shellfish as a major item of diet seems to be an Archaic innovation. And we had numerous historic accounts of regular seasonal movements of the Indians to secure particular varieties of food. I imagined such seasonal cycles to have been another Archaic innovation. In 1960, Fowler and Parmalee concluded that such a development could be documented at the Modoc Rock Shelter in southern Illinois. Between 8000-6000 B.C. the inhabitants of Modoc had used all food sources available. Everything that walked, flew, or crawled went down the alimentary tract into the inhabitants of Modoc at that time. However, between 3000-2000 B.C. a preponderance of deer and water fowl remains, in addition to a more restricted series of artifacts, suggests to these authors that Modoc had become a hunting camp for people who didn't spend all their time there. They contrast this with the Ferry site in southeast Illinois which was devoted to the preparation of acorns. And it was indeed - I have been there and seen the earth literally speckled with charred acorn fragments. And off to the side of the site where the farmer has recently thrown them are stone mortars and nutting stones. Also, large fired areas were exposed in our excavations which may have something to do with acorn preparation. They also found other kinds of specializations at Webb's shell midden sites in Kentucky.

If a Forest Efficiency could be regarded as an important developmental trend in eastern North America, it would expectably have certain consequences. One of these might be a

resistance to intensive food production. Even in historic times, food productinn was only supplementary in many regions and was the sole economic basis in none. Eastern agriculture, moreover, differed in important respects from the agriculture of western Asia, for example. Animal domostication was nEglibible and there was nothing here corresponding to the peasant or the agricultural specialist. What we had here were communities of hunter-warriors and part-time feminine cultivators. I was inclined to take a good hard look at these earlier cultures which had been characterized as agricultural. If you page through the Cole volume, edited by Jimmy Griffin, you'll find quite a number of authors there who were willing to write that Mississippian food production was more efficient or more important than Hopewellian or Adena food production. But you will find none who say Hopewellian or Adena food production was less important than Mississippian. Such are the curious ways of human caution. And in 1958 I wrote

> "The Hopewellian and Adena peoples evidently practised some food raising. But the comparatively infrequent instances of preserved maize in Ohio and Illinois and maize and beans (beans here are pretty doubtful) near Kansas City are a marked contrast to the frequency of maize at Mississippian and later sites. The Hopewellian peoples depended to a large degree on hunting and collecting. Since the manifestly agricultural orientation of the Mississippians is seemingly absent, one may suppose the cultivation provided simply another source of food to the Hopewellian and Adena peoples, no more, if not less, of staple use than deer, shellfish, nuts, and acorns."

After this appeared I began to get the feeling that, like Karl Marx and Jesus Christ, I was being widely quoted but seldom read. And since that time no one who has found maize at a Hopewellian site has failed to send me a telegram announcing that fact.

In conclusion, let me say that I have yet found no reason to alter my position, that by and large, little maize is going to be found at Hopewellian sites. And if we must characterize Hopewellian culture in economic terms let us characterize it as hunting-gathering rather than agricultural. To do this will allow us to look for the steps by which food production was slowly being woven into the fabric of eastern cultures. You can't look for something that you are sure is already there. So I say leave the ground open to see how food production may fit into this eastern developmental situation. I'm not completely against corn because it is distinctly possible that some of the large Hopewellian sites in broad bottom land may have made food production and/or maize of considerable importance to their economy. Lord knows I am in no position to deny that this was true. But it would be an errant assumption

to suppose that all economices during a given archaeological period were identical. So if you find a Hopewellian site just chock full of maize, I've still got a leg to stand on. I don't think economies in any archaeological period are necessarily identical, nor can we characterize a whole archaeological period by one economy. They were far from identical in historic times.

MAXIMUM FOREST EFFICIENCY: SWAMP AND UPLAND POTENTIALS

by

H. F. Gregory, Jr.

Rather contrary to Dr. Caldwell, I would like to believe in corn. The only problem is that in the area where I have been doing some ecological studies there is no direct evidence, at least in the literature, of agriculture. We have no evidences of corn in east central Louisiana. The problem came up a couple of times in the Conference of production of agriculture in the alluvial areas. Almost all of the Lower Mississippi Valley falls into this ecological province. It has inherent in it certain very specific ecological benefits for people who hunt and gather.

I have chosen one of the oxbow meander lakes in the Lower Valley upon which we've had quite an extensive surface survey, and where Dr. C. H. Webb and I made three of four strata cuts in the deepest sites, to talk to you specifically about evidences of hunting and gathering, of ecological exploitation of this oxbow lake. It is a rather unique lake because it is one of the oldest oxbow lakes in the whole Lower Mississippi Valley. It is the westernmost of those oxbows that's been preserved. The local inhabitants call it Lake Larto. Upon this lake we found about eight or nine sites that cover the time range from Marksville to almost proto-Historic, and the lake is still occupied by people who are, let us say, barely agricultural. They do raise a few small crops of beans, corn, squash, probably very much like the Indians did before them, but agriculture is still a secondary occupation. The area is subject to periodic overflow, and periodic overflow, as someone mentioned yesterday, always has the nasty habit of coming in the Spring when corn should be planted, or in the Fall when corn should be harvested - it plays hell with corn. It does leave deposits of silt, but it also does mess up the cropping techniques that would be more or less associated with corn crop planting. Presumably you would plant Indian maize in the same seasonal range that you now plant hybrid corn. This is not good corn country, mainly because of the overflow. However, there is also some documentary evidence indicating there possibly was no overflow in Indian times. As late as the 1850's this was an ephemeral lake. And in the 1700's LePage DuPratz has a map that lists it as a marais, a swamp, and he said it was where the Tunica went to hunt boeufs, which are supposed to be buffalo. However, the midden cuts here have revealed no bones that seem to be anything like buffalo.

Yesterday I shot about a third of this talking about palmetto. It's a rather important ecological factor here if you

consider agriculture, because it would make slash-burn agriculture a rather tenuous way to farm the lower areas adjacent to these lakes. Only the natural levees themselves could be considered arable land for slash-burn agriculturists. Now in Louisiana they had a slight advantage over some of the Floridian species I've studied because some of the Florida palmettos are pyrophytic. Here the palmetto does not seem to be, but it is restricted to soil types. So you get in this area a ridge-and-swale topography. The swales, although they are frequently not flooded, are, for all practical purposes, ineligible for any kind of slash-burn agriculture. The ridges have all the sweet characteristics you'd want provided there wasn't a flood - in a flood year you'd starve. This would be the lean time, and there probably was periodic overflow even in Indian times.

The people here now gather. Their basic economy is fishing and trapping. They not only fish and trap commercially, they live a great deal of the time right out of this same swamp. If you eat with these people most of the time you'll be eating something the Federal game wardens would like to keep off the table. Much of this area now is in a Federal game preserve, but this doesn't bother the natives a bit - they still eat. The animals taken most frequently here and those in the midden cut bone assemblages are about the same, the squirrel and the deer overwhelmingly. These are never hunted with dogs; these people are "still" hunters, and as they're "still" hunting game remains easy to stalk. The minute dogs are introduced into a swamp environment such as this, game tends to get much wilder. The Indians of this area, at least at one site on the Troyville-Coles Creek level, had dogs. But I doubt seriously that dogs were used for hunting here.

There are also in these sites lots of small game remains such as raccoon, occasionally mink and otter, and, of course, lots of fish, and I have recently seen people in this same area gather these rough fish in the sloughs and swales after overflows with just their bare hands. These fish are gathered for commerical sale, and two men may gather 2-300 pounds of fish in a half day's time. Most of the fish in the middens here also are catfish and buffalo and fresh-water drum, fresh-water sturgeon, or the spoonbill catfish.

Now I've had the question put to me several times, primarily by Dr. Haag, was this the river when these people were here. I think it was the river when they first got here. The lower levels of one of the older sites here are full of large river shell, unios, and shellfish were extensively gathered. By Plaquemine times the midden cuts are filled with smaller, seemingly lake shells, not nearly of the texture and thickness that you find in river shell. So evidently these sites were occupied for a long time span and through an ecological change. Ideally, the fishermen now prefer backwater lakes away from the active channel of the river. I would consequently suspect that people who leaned heavily on hunting and gathering in the past would prefer the inactive oxbow to the active river. The active river is again a limited ecological niche

in the Lower Valley. The vegetation along the river here is primarily cottonwood and willow. There's practically no oak, no pecan, no hickory. On an oxbow such as this you have twelve varieties of oak and there are caches of acorns in middens. You have at least one native variety of pecan, and two varieties of hickory. Unfortunately I can't tell you too much about faunal remains from this site because we didn't float any carbon out, but we do at present have oak acorns, and white oak acorns, from the Willey site. This is the oldest site on the lake. It is a mound site and there are four mounds. Strata cuts indicate a Marksville-Plaquemine occupation. We've also found beans in the midden here. I'd be very happy to have anyone who'd care to identify those beans. My basic problem here is that I cannot tell whether these are discarded beans of the honey locust tree that grows in the back swamp here and just got cast into a fire, or whether they are some kind of weird domesticated beans. They occur here on the Troyville-Coles Creek time level, which is rather late. (Recently these beans have proven to be honey locust, Gladitsia sp. It is notable that Gladitsia remains also were reported from the midden at the Troyville site (Walker, B & E Bull. 113, 1936:39).)

I would like to suggest to you today that this area would be very good in terms of Dr. Caldwell's Maximum Forest Efficiency, but as an oxbow lake, not as an active river channel. Now possibly the first occupations were here when the river was active. This site is only about 30 airline miles north of Marksville, and it probably simply was a colony of Marksvillians. It's also about 20 airline miles from the Troyville site, and I have a sneaking suspicion it was also a colony of Troyvillians. It is marginal today and it was marginal in the past, yet in both times the forest fed the people with a minimum of agriculture and a maximum of gathering. I had hoped to go into a series of things that could be gathered here and a series of things that I have seen gathered by these fisherman-trappers that include mayhaw berries growing out along the hills to the west on the valley margin (again one of these double ecological niches that Dr. Larson talked about). They make seasonal treks across the swamps for these berries and scoop them up in dip nets by the bucketsfull, the barrelsfull, the boatload, and bring them back here. This is about a 4-hour trip with an outboard and the old people tell me they can paddle it in a pirogue in about 6 hours. And I see no reason why the Indians could not have done the same thing. There are also large accumulations of blackberry and dewberry vines around wind downed trees which are seasonally gathered by the natives. There are crawfish, frogs (four species), and, recently, chameleons. That may not sound like much, but I guess if you can eat acorns, you can eat chameleons. There are some references to chameleons in the literature. William Bartram observed the Creeks gathering them. So here again is a food source, and you have a total gathering situation. If you can get a little coffee and a little corn meal you can get along here. In the old days salt was made

in the hills to the west where there were some open salines. There was Indian occupation - and long Indian occupation - at every saline. Ducks are taken readily in the sloughs here by half a dozen different techniques that include going right in when they're eating acorn mast, which occurs here, I might add for Dr. Caldwell, about a foot deep. It floats across the sloughs in good times. Of course, lumbering activities cuts down the production of mast. But the people go into the sloughs and kill the ducks with sticks while they feed on the mast. It is nothing for a man to kill a hundred ducks in a day and not tell anyone. But the ducks are moving - their flyway seems to have shifted away from here. Catahoula Lake, immediately west of this area at the margin of the hills, still has a tremendous duck population. It has been estimated that 30-50,000 ducks wintered there last season. And that's enough to feed a few Indians.

Other birds are taken locally by the natives such as the wood ibis, the ibis that are called locally gourd head, bec'roche, and the heron.

So here is an invironmental exploitation that has gone on almost without any great hiatus from Marksville times to the present, and without a great deal of alteration. Here again agriculture has been and seems to be sort of a minimal kind of occupation. As I said earlier, I'm not against corn, but I sure am for fish. I think that maximum forest exploitation was of equal importance, if not more important, to all of these Lower Valley cultures or ceramic horizons than was corn production. This is, to use Dr. Caldwell's term again, a hypothesis. It seems to be an environmental exploitation of some degree of efficiency and value. It seems to have sustained a good number of people for a long time. Three hundred families live here now and they grow a little cotton. The first roads went in here in the 1940's, before that all transportation was by water. Before commercial fishing began in 1900 they lived strictly on corn, beans, squash and the woods. They do graze hogs here, and the wildlife experts tell me that for every 5000 deer you may equate in mast, in a hardwood swamp, about 30,000 hogs. This swamp now grazes about 1 million hogs. So you can estimate the deer population in the past. In 1949 50,000 hogs came from right around this lake alone; so you see this would give you roughly a herd of 10,000 deer, if the wildlife people are correct. The middens here are chock full of deer bones. The projectile points at this site, the Willey site, are predominatly small arrow points, and the bow seems to have been the primary weapon. In Marksville times you get a few sloppy projectile points for the atlatl, but on the Willey site from a collection of 7-800 points over two-thirds were small arrow points. Flakes tend to be more predominant in the later occupation, again possibly indicating the introduction of the bow. And, strangely, enough, there are Caddoan influences coming into these sites from the west indicating probably not only seasonal population but cultural exchanges.

Possibly these Caddoan (Alto Pacus) people even introduced the bow. I think the area is a very good example of maximum forest efficiency.

ANALYSIS OF CORN FROM THE BANKS SITE CRITTENDEN COUNTY, ARKANSAS

by

Hugh Cutler and Leonard Blake

Corn grown by the Indians in the Middle Mississippi Valley was increasingly influenced after A.D. 1250 by eight-rowed Eastern Flints which appear to have come in from the north and east. The varieties grown earlier were predominantly 14-rowed Tropical Flints with, perhaps, slight traces of Mexican Pyramidal Dent. The mixture of these races resulted in varieties with fewer rows of grain and relatively larger shanks and cobs. For accurate comparisons of cob size, the width of the cupules on which a pair of grains is borned was measured. This made it possible to compare fragments as well as whole cobs.

The large Cahokia village site was near enough to Northern Flint Centers to receive direct infusion of this race of corn by about A.D. 1100. Eight-rowed ears made up seven percent of the collection Gregory Perino excavated from Mound 34 at Cahokia. Eight-rowed ears were also present in collections made at Cahokia by Preston Holder and Joseph Caldwell. In at least one instance eight-rowed cobs were associated with Old Village sherds.

The mean low number of the collection from the Banks Site is 11 as compared to the average of 12 for Cahokia. This is to be expected in view of the relatively late C-14 date for the Banks Site (A.D. 1535) but only 4 percent of the cobs are eight-rowed. One interpretation is that Northern Flint influences reached the more distant Banks Site as mixtures rather than relatively pure forms of the Northern Flint race. These influences were not strong enough to greatly widen median cupuled width which is only 5.4mm. as against 6.4 to 7.5mm. for collections from Cahokia and even larger in collections from some historic and proto-historic sites. Another interpretation is that corn with low row numbers entered from the southwest where corn with 8 and 10 rows of grain dominates after A.D. 700. This possibility is supported by the similarity of Banks Site cobs to a few specimens from central Oklahoma.

From the Banks Site there are several small cobs with very narrow cupules (3 to 4mm. wide). These cobs are probably from a popcorn or very small flint corn similar to the ancient race "Chapalote" of northwestern Mexico which is still grown in that region. Similar cobs were excavated at Mandan Village sites and Cahokia by Perino, Caldwell, and Holder.

The corn cobs from the Banks Site are from four locations. Four of the seven cobs from the south central part of the site are 10-rowed and are as large as much Northern Flint corn. It is possible that occupation of this area was later than other parts of the site, (This is true, G. P.) or it may be that these cobs are from specially selected corn stored in one spot.

The thickness of the kernels of corn at the Banks Site is less than that at other sites used for comparison. Median thickness was 3.3mm., less than the 3.5mm. median for the Great Osage Site. The thinness of the Osage Site kernels may be ascribed to an influence of thin-kerneled Tropical and Mexican corn which moved into the plains. Corn at the Banks Site appears to have an even stronger dose of this character.

This is the first good lot of dated corn we have examined from the Mississippi Valley below the mouth of the Ohio. When we have studied more collections, some modification of interpretations given here will probably be needed.

In a more recent analysis of corn cobs discovered by us at the Barton Ranch and Parkin Sites (both of which are contemporaneous with the Banks Site), Cutler noted that they were predominantly 8-rowed and more like the southwest varieties. Certainly, some of this local corn had cross polinated and affected the variety of 12-rowed corn brought into the area by the Banks Site inhabitants, so that it would produce a lower row number of corn.

It was this same corn that they persisted in growing at the Banks Site as is indicated by the analysis. It was also this same corn whose row number had dropped to ten in the later part of the Banks Village, the higher row count on cobs having been obtained in the earliest portion of the site. The total span of this site is estimated to have been from between seventy-five and one hundred years with the C-14 date being obtained from charred cobs found near the earlier section. It is also indicated by the analysis that early peoples were not quick to change from one type of corn to another, but continued to grow it until it became modified by accidental polination of 8-rowed corn which was grown by the long time local contemporaneous groups. In this instance it would seem that corn varieties might also support some evidence of migration patterns of cultural groups.

While excavating at the Banks Site, it became increasingly evident day by day that these people were intrusive in the area and that their ceramics and burial customs also differed from those of the local St. Francis and Walls Pecan-Point groups. The Banks Site people had adopted several of the ceramic styles such as the Barton Incised jars and various bowl forms from the St. Francis groups, and particularly from the Barton Ranch Site itself which is ten miles to the west. Trade between this site and the Banks Site is noted by the numbers

of Manly Puctated sherds and other cultural elements of a Banks Site nature, found in the debris at the Barton Ranch Site, Towards the end of the occupation of the Banks Village, these people began making a few Bell Plain vessels reminiscent of the Walls Pecan-Point groups. This is not surprising however since the contemporary Bradley Site is located but three miles away - while one of the Bradley hamlets was only three-quarters of a mile away.

Banks vessel types consisted of a greater number of Fortune Noded jars and plain jars having a horizontal row of nodes on the shoulder than is found on other local sites, indicating that these varieties may have been brought into the area as a result of a migration of people. This site also produced a very large number of Manly Punctated jars for which type the Lower Mississippi Alluvial Valley Survey could find no source. During experimental side excavations in the Memphis area, notably at the Barton Ranch Site in Crittenden County, and the McDuffee Site in Craighead County, Arkansas, we found many sherds of this vessel type. It is similar to some vessels found in the Mouse Creek Culture in Tennessee and, to a lesser degree, to a variety of Matthews Incised found in southeast Missouri. At any rate, the evidence indicates that the Banks Site people had migrated several generations before from northeast Arkansas or southeast Missouri, and before that, from somewhere in the Tennessee Valley where they had first grown their early 12-rowed corn.

RECENT CLIMATIC EPISODES IN NORTH AMERICA

by

Reid A. Bryson

I am a climatologist, not an anthropologist. I came to this conference on the economic basis of southeastern prehistory hoping to find out something about past climates, operating on the hypothesis that economic activities in the past were as closely tied to the climate in their differentiation and distribution as they are today -- or at least as they were in, say, 1900. We know that economic activities in the present era are very closely tied to climate; presumably the economic activities of the past were at least as closely tied. This is an hypothesis, and as long as we are hypothesizing at this conference I would like to suggest that we view some of the data from the standpoint of what we know of the outlines of climatic history.

We find a well-defined region in the midwestern United States known as the Corn Belt. You can find it on soils maps and land use maps, and you can see it in the economic activities of the people. The Corn Belt can be readily identified as a distinct climatic region (Baerreis and Bryson, 1964). In the Southeast, the distribution of cotton culture is very neatly tied to the distribution of climate. The "sea island" climate in Georgia is distinctly different from what is on the mainland, and the cotton culture there is distinctive. So assuming that the patterns of climate today are related to the economic activities of man, and that they were related in the past, the question for which I seek an answer is "How did economic activities and their time and space differentiation in the past reflect climatic patterns and changes?" I've been impressed, in looking at the charts and diagrams presented at this conference, that what we think we know about the distinctive climatic epochs of the past parallels what you think you know about the duration of given cultures. Let's look at what we know about the sequence of climatic episodes during the time range of your concern here.

We can identify certain dates when climatic changes appear to have taken place. Tentatively, 550 B.C. is the beginning of a distinctive climatic epoch which had a much less distinctive end about 400 A.D. The onset of this period is indicated by such things as recurrence surfaces in bogs and the onset of the development of upland muskeg in Canadian boreal forest, Scotland, and Germany. There is another climatic episode of a different character between about 900 A.D. and 1300 A.D. that is reflected by changes in glaciers and sedimentation in the Rockies, expanded corn cultivation in the southwest and Great Plains, and northward migration of the tree-line in Canada (Bryson and Julian 1963,

Bryson et al., 1965). There is another well-documented cold period which started about 1550-1600 A.D. and lasted until about 1850-1855 - there is no question about 1885 being the end. Then there is another mild climatic episode which ended about 1500 B.C.

Now, I'm going to use modified European terminology here instead of terms that imply the character of the climate in a given period, because as a climatologist I know that what happens in one part of the world is not necessarily the same as that which happens in another part. For example, when one speaks of the "altithermal" he implies higher temperatures, but it was probably colder in some areas. A good case is to be found in Canada, where Baffin Land and Central Canada appear to vary in opposition to each other (Wexler, 1956). Use of terms which imply global homogeneity is naive. So let's use a non-commital modification of the older European terminology (Table I). Let's call the climatic period from 550 B.C. to about 400 A.D. the Sub-Atlantic, and the older period ending about 1500 B.C. the Atlantic. One may also think of the sub-Atlantic as the Hopewell, Dorset, Graeco-Roman, or Han period. The point is that the climatic period and the cultural periods appear to coincide.

Table I

Tentative Sequence of Climatic Episodes

Dates	Name	Miscellaneous Comments
1885-present	RECENT	Warming of much of North America and N. W. Europe.
1550-1885 A.D.	NEO-BOREAL	Apparently cold; glacial advances; seems to have been a break in early 1700's.
1300-1500 A.D.	PACIFIC	Stronger westerlies; wet in western Europe; dry in high plains and southwest; wetter in Oklahoma, N. E. Texas, and Southeast.
900-1300 A.D.	NEO-ATLANTIC	Moist in high plains; glacial retreat, gullying in Rockies; warm in North Atlantic and Central Canada.
400 A.D.-900A.D.	SCANDIC	Amelioration of climate in "Scandia".
550 B.C.-400A.D.	SUB-ATLANTIC	Cool and wet in N. Europe and Central Canada; winter rains in southwest?; glacial advances in Rockies and stream deposition.
1500 B.C.-550 B.C.	SUB-Boreal	Colder and dry?
-1500 B.C.	ATLANTIC	Mild in N.Europe and North America; summer rains in S.W.

Some of the dates for breaks between climatic episodes are quite clear and some are not, so it is a little premature to argue whether they match cultural changes exactly.

What is given in Table I as the Neo-Atlantic has been discussed a great deal but never given a good name. I am on record as having called it the "Little Climatic Optimum" (Bryson and Julian op. cit.) but that is a poor name - so let's call it the Neo-Atlantic for it appears to have been a period similar to the Atlantic in climatic character. Under this suggested terminology the "Little Ice Age" becomes the Neo-Boreal.

I am suggesting two new names for periods between the Sub-Atlantic and Neo-Atlantic, and the latter and the Neo-Boreal - Scandic and Pacific respectively. While we do not know all the details we do have some idea of the sort of thing that happened. It appears that during the Pacific episode the westerlies were stronger and air from the Pacific flooded across the U. S. That means that the Great Plains and the Prairie plains got drier. Prof. Baerreis and I are beginning to get evidence from western Iowa, at the base of the prairie peninsula, that suggests this dessiccation in the Plains. As of last week, results of work some of my students have been doing indicate that as it got drier in the Plains, it got wetter in the Southeast. This is a period when apparently the frontal systems in the U. S. moved farther south. And you would expect that this might also be a period of wet, cool summers in the north. Differentiation on the basis of the changes we think we can see is probably more critical in the Ohio and Great Lakes area than it is in the Southeast.

The Neo-Boreal period had a break in it in the early 1700's and then went back to cold again. The Recent is a period of increase in warmth, as you all know, and it's been written about in great detail.

When you're talking about the history of economic activity it seems to me that you cannot generalize in terms of biotic and climatic regions, because what might be applicable to the lowlands of the Lower Mississippi Valley certainly isn't to the Upper Mississippi Valley. But what happens in one part of the country <u>is</u> related to what happens in another. The floods of the Lower Mississippi originated in the Upper Mississippi, and must be related to the climate because such flooding is a climatic phenomenon. You can't assume that what was observed in 1820 applies to thousands of years before that without modification, because there have been distinct changes which superimpose their effects on the cultural history which you have discussed. I hope somebody will give me some hard information that I can turn back into climatic data which you anthropologists may find interesting someday, too.

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A C-14 DATE FOR AWENDAW PUNCTATE

Eugene G. Waddell

Oyster shell from the Yough Hall Plantation Shell Ring (SC:CH:41) in Charleston County, South Carolina, was submitted by Antonio J. Waring on February 2, 1961 to the University of Michigan Radiocarbon Laboratory for dating. A date of 3770±130 years B. P. (ca. 1810 B. C.) was assigned to the sample, M-1209, when it was run on January 2, 1963. At that time the prevalent pottery of the site, a poorly fired shell-smoothed plain and fingernail punctated ware, was thought to be "related to but not identical to the Thom's Creek ceramic complex..." (Crane & Griffin, 1964: 9). Subsequent study of examples of this ware from other sites indicates that it may belong to the Thom's Creek Pottery Complex. A formal type description of Awendaw Punctate is forthcoming; but its relationship (supported by the C-14 date) to Stallings and Thom's Creek deserves separate comment.

The most common design found on Awendaw pottery is a linear arrangement of individual impressions (fig. 2) made with a thumbnail and fingernail (Gregorie 1925, Pl. 8; and Griffin 1943, Pl. 10--1 g, k). Random pinching and gouging are encountered frequently, and sherds have been found which have both fingernail impressions and other types of punctations.

Awendaw Punctate is apparently an early stage and Stallings Punctate a later stage in the development of Thom's Creek Punctate (Waddell, 1963: 3). The form and paste (excepting the temper) of Awendaw pottery closely resemble Stallings Island from the type site near Augusta, Georgia, and the Chester Field site in Beaufort County, South Carolina. Stallings pottery was apparently tempered with hair or some vegetable fiber. If the clay itself contained the fiber, some of the same clay almost certainly would have been used by later potters during the three thousand or more years which followed -- but see Weaver's study (1963). Awendaw pottery is less carefully finished and decorated than Stallings material.

Awendaw pottery resembles Thom's Creek less closely: the thickness is variable (often as much as 5 mm. on a sherd only several square centimeters in area); the sherds are less compact; the color is darker, ranging from grey to black and brown; the method of manufacture was apparently modeling; and linear pinching and shell smoothing seem to be confined to the coast.

Stallings sherds have been found with Awendaw pottery at eight sites, and examples of Thom's Creek Punctate have been noted at the same eight and two additional sites, most of which are located in lower Charleston and Beaufort Counties. The paste of the Thom's Creek pottery (without regard to temper) is usually more similar to Awendaw than to the wares from the two respective type sites. One pinched sherd in the Charleston Museum's collection from the Chester Field Site seems to be fiber tempered; and in an analysis of sherds from the same site, Griffin (1943: Table 1) includes three examples of fingernail impressed as Stallings Punctate (two of which had other varieties of punctations in addition to the fingernail impressions).

Awendaw pottery is well represented in Charleston Museum collections from nine coastal sites, and examples of the ware have been noted in collections from seven others (fig. 1). These sites are scattered in the tidal marsh of Charleston and Beaufort Counties with the exception of the northernmost (SC:CH:43) which is near a fresh water source approximately five miles west of McClellanville. The most northernly tide-water site known to contain the ware is the Fort (SC:CH:7) approximately two and one-half miles southeast of Awendaw on Salt Pond Creek; and the southernmost is the Chester Field Site (SC:BF:8) on the Broad River.

The greatest concentration of sites which have yielded Awendaw material is between the Cooper River and Awendaw Creek, and here the simplest forms are frequently found in single component sites. In this region the population seems to have increased rapidly during an Archaic shell gathering stage; but the supply of oysters was gradually depleted, and much of the population was forced to return to the interior to hunt and gather fresh-water mussels. During this period of coastal decline, pottery may have been discovered or rediscovered and widely used for the first time. Somewhat later, fiber tempering (Stallings) may have been discovered near the mouth of the Savannah River and knowledge of it spread to the interior before better firing

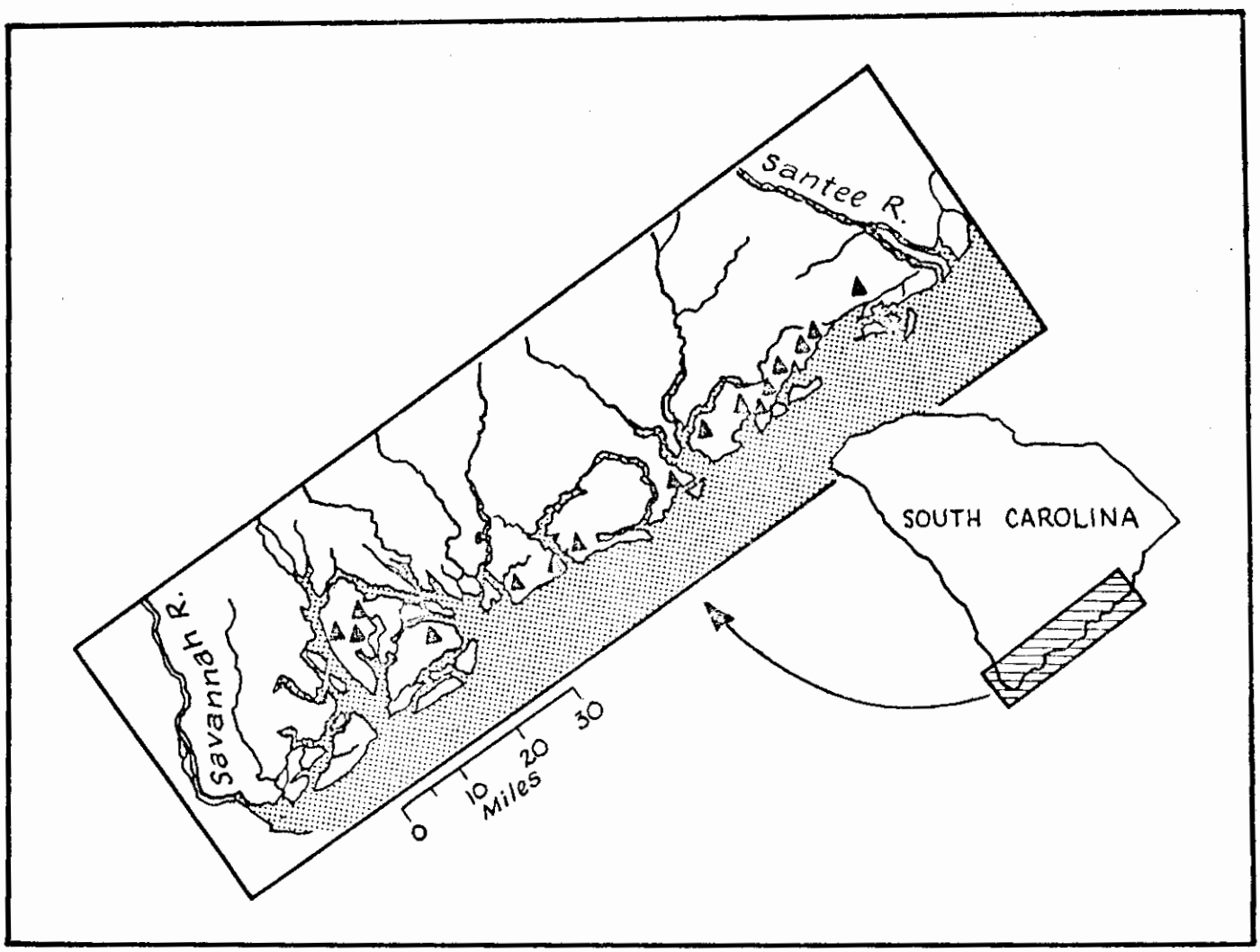

Figure 1.- Sites at which Awendaw Complex Pottery has been found.

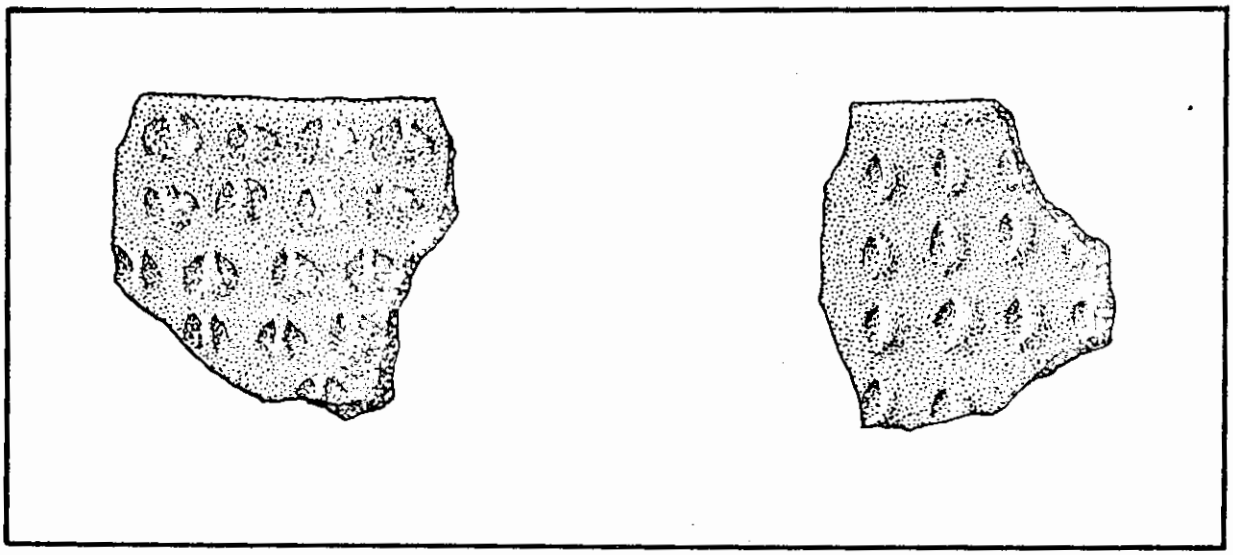

Figure 2.- Fingernail Impressed Pottery of the Awendaw Complex.

techniques were introduced (late Thom's Creek) and it became unnecessary. The people who made Thom's Creek Punctate seem to have become even more dependent on hunting and apparently were later forced to occupy the entire Low Country of South Carolina in smaller groups.

The date, ca. 1810 B. C., may be a valid one for the upper level of the Yough Hall Ring; but Awendaw pottery will probably prove to have been first made several hundred years earlier.

Editor's Note -

A. J. Waring's appraisal of the sample was the following: "Associated with pre-Deptford and post-Fiber-tempered wares, from a late shell ring, the northern-most and probably latest of these structures. Sample should be Terminal Archaic. Shell rings are earliest structures on south Atlantic coast suggesting group ceremonial activity, and probably involved northward movement of a single population from the earliest and southernmost sites on Sapelo Island, Georgia."

The following is Waring's comment on the date: "This is the Awendaw complex of Waring and is related to but not identical to the Thom's Creek ceramic complex (Griffin, 1945). Either the date is too early, or there is a previously unrecognized focus on the South Atlantic seaboard."

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