Early Agricultural Societies in the Southwest: The Basketmaker II Case

Talk by Bill Lipe for
Anthropology 539, Nov. 1, 2018
Early Agricultural Sites in the Southwest (2200 BC to 500 AD)
By around 2000 BC, maize farming spread from the low lying southern Arizona desert to the higher elevations of the Colorado Plateau and Mogollon Rim. Maize is a tropical grass, so needed to become adapted to the shorter and cooler growing seasons of the Plateau. Evidence for heavy dependence on maize appears with the Classic Basketmaker period, BC 400 to AD 500.

The Colorado Plateau is a geologically undeformed highland, bordered by the generally lower elevations of the Basin and Range on the west and south, and the generally higher elevations of the Rocky Mountains on the east.
I’ll focus on the “Classic Basketmaker II” period, manifested in the “Four Corners” area, and dating from about 400 or 500 BC to 500 AD.
Cliff Palace in 1891. “discovered” by Richard Wetherill and Charlie Mason in Dec., 1888

Richard Wetherill gets credit for recognizing that the distinctive Basketmaker II complex stratigraphically underlay “cliff-dweller” (Pueblo period) structures and assemblages.
Richard Wetherill and party observed a stratigraphic sequence of Basketmaker to Cliff-dweller materials at Cave 7 in Nov. 1893. They also found evidence of what they thought was a massacre.
How the Basketmakers Got That Name

In a Nov. 29, 1893 letter to his financial backer, Talbot Hyde, Richard Wetherill wrote:

“In the cave [Cave 7] we are now working we have taken 28 skeletons and two more in sight and curious to tell, and a thing that will surprise the archaeologists of the country is the fact of our finding them at a depth of five and six feet in a cave where there are cliff dwellings and we find the bodies under the ruins, three feet below any cliff dweller sign. They are a different race from anything I have ever seen. They had feather cloth and baskets, no pottery…” (quoted in McNitt 1966 [1957])

In a Dec. 21, 1893 letter to Hyde, Wetherill wrote:

“We find that the basket people, or whatever you may name them, (which you should do I named the cliff dwellers, and you should have the honor at least of naming these, as it is your expedition).” In a reply, Hyde suggested “Basket Maker”, which Richard thought was “more distinctive than I could have thought [of] for a name” (from Blackburn and Williamson 1997)
In the early 20th century, Wetherill’s conclusions were supported by A.V. Kidder and Samuel Guernsey’s excavations at White Dog Cave and other sites in NE Arizona.
Basket Maker I, or Early Basket Maker—a postulated (and perhaps recently discovered) stage, pre-agricultural, yet adumbrating later developments.

Basket Maker II, or Basket Maker—the agricultural, atlatl-using, non-pottery-making stage, as described in many publications.

Late Basket Maker, Basket Maker III, or Post-Basket Maker—the pit- or slab-house-building, pottery-making stage (the three Basket Maker stages were characterized by a long-headed population, which did not practice skull-deformation).

Pueblo I, or Proto-Pueblo—the first stage during which cranial deformation was practiced, vessel neck corrugation was introduced, and villages composed of rectangular living-rooms of true masonry were developed (it was generally agreed that the term pre-Pueblo, hitherto sometimes applied to this period, should be discontinued).

Pueblo II—the stage marked by widespread geographical extension of life in small villages; corrugation, often of elaborate technique, extended over the whole surface of cooking vessels.

Pueblo III, or Great Period—the stage of large communities, great development of the arts, and growth of intensive local specialization.

Pueblo IV, or Proto-Historic—the stage characterized by contraction of area occupied; by the gradual disappearance of corrugated wares; and, in general, by decline from the preceding cultural peak.

Pueblo V, or Historic—the period from 1600 A. D. to the present.

The conference was hosted by A.V. Kidder. Above, in earlier days at Frijoles Canyon
Basketmaker Artifacts

Left: bag, atlatl darts, hair ament, and unfinished sandal. About 2000 years old, Basketmaker II period. (Photos by Laurie Webster from museum collections)

Below: Narrow-leaf yucca: source of fiber for cordage used in various manufactures

Left: top and bottom of nearly finished sandal.
Basketmaker II people specialized in the “Fiber Arts”

Coiled basketry bowl

Twined yucca fiber sandal

Both photos by Laurie Webster from the collections of the Field Museum
Some distinctive cultural characteristics Classic BM II in SE Utah

Left: Life-size figures, Grand Gulch
Below: Petroglyph panel, San Juan River

San Juan Anthropomorphic style rock art
Atlatl and Compound Dart

BM II projectile points, Cedar Mesa

BM II dart point and foreshaft

BM II projectile points, Sand Dune Cave

Bryce, MA thesis, NAU, 2010

Figure 2.25. Cedar Mesa Basketmaker II projectile points

Matson, 1991
RG Matson’s 1991 model suggesting Classic Western Basketmaker II of AZ and UT is derived from the San Pedro tradition in southern Arizona.
Likely Source for Western BM II: San Pedro Tradition

Here, aerial overview of Las Capas excavations, Tucson, AZ
Las Capas Site

- Primary occupation at Las Capas was in the San Pedro phase, BC 1200 to 800. Irrigation system dates to that phase.

- Some occupation in the succeeding Cienega phase

- AMS dates on redeposited maize kernels indicate farming began at the site by 2100 BC; some possibly earlier dates

- Preferred settlement model for Las Capas is year around occupation, with logistical camps in the surrounding uplands.

- Squash was cultivated, and there is some evidence that so were beans, cotton, tobacco, and some native amaranths.
Right: House floor at Las Capas

Left: one of many large storage pits at the site
Right: profile of canal, showing multiple episodes of sedimentation and use.

Left: fields bordered with low berms are outlined. Feeder canal visible in lower left part of photo.
Artist’s reconstructions of aspects of life at Las Capas

(Images courtesy of Archaeology Southwest)
Early Agricultural period on the Plateau. Old Corn Site, East-Central New Mexico (from Huber and Van West, 2005)

Multiple AMS dates on maize, calibrated 2200-1900 BC
Back to Grand Gulch and Cedar Mesa. Part of the Cedar Mesa Project study area, 1971-76
The Cedar Mesa Project study area (ca. 900 km²). Portions of the area were surveyed by randomly located quadrats, each 400 X 400 m in size. The entrenched canyons in each subarea were also inventoried for sites. The project was co-directed by Bill Lipe and R.G. Matson.
BM II habitation sites of the Grand Gulch phase (AD 200-400) had distinctive surface signatures, and a few were excavated (above). Habitations were located on the mesa top in areas of good soil for dry-farming. Earlier farming (AD 1-200) focused on floodwater farming in the canyons.

BM II houses were shallow pit structures with pole and mud superstructures. Storage pits or slab-outlined storage cists were located north or northwest of the house and trash was scattered to the south or southeast.
In the 1980s, RG Matson calculated average momentary population estimates for the Cedar Mesa phases. They were surprisingly similar from late BM II on. The occupation was episodic, as was that of the less agriculturally favorable Red Rock Plateau, in the Glen Canyon area just to the west.
Matson, who had previously worked with hunter-gatherer settlement patterns, calculated the catchment that would be required to support a Cedar Mesa sized population with a Walapai type subsistence system.
Right: Test pit under excavation, 1972. Human coprolites indicated heavy reliance on maize, as did macrobotanical analysis of the midden deposit. Midden is well dated to 1-200 AD (Basketmaker II period)
Joan Coltrain and associates have done a number of isotopic analyses indicating that most BM II individuals had about the same maize dependence (70-80 %) as later Puebloans.
Recent Studies: Stone-boiling

For her thesis at WSU Emily Ellwood (formerly Holstad) used Cedar Mesa limestone to experimentally stone-boil three traditional varieties of maize.

Paul Scott, (Iowa State U) analyzed the amino acids in Ellwood’s samples cooked with and without limestone.

Elwood and four co-authors published the results of this study in 2013 in the *Journal of Archaeological Science*.

Fragments of sandstone and limestone on the surface of a BM II midden. Pencil for scale.
Ellwood found:
1. Experimental limestone began to calcine at 700-800 C, temps achievable in juniper-fueled fires.
2. When the heated stones were dropped into water, maize kernels cooked in 15-20 minutes.
3. Archaeological limestone showed fragmentation and density changes consistent with repeated heating.

Scott found:
Cooking with limestone produced small but statistically significant increases in availability of lysine, tryptophan and methionine (see right)
In 2010, BM II turkey coprolites from the Turkey Pen site contributed to a larger genetic study of SW archaeological
We expected the archaeological turkeys to be related to the local Merriam’s wild subspecies or to the Mexican domesticated subspecies (historic distributions below).

Our samples from Turkey Pen (# 3 above) were the earliest—and the only ones from BM II contexts.
Surprise! 85% of the archaeological samples were not closely related to Merriams’ or the Mexican turkey. Also, restricted genetic variation indicates a small ancestral cohort, and the difference from local wild Merriam’s populations indicates BM II and later Puebloans were controlling breeding—one definition of domestication.
More recent work with BM III and early P II turkeys shows their isotopic profiles indicate a diet much more like that of humans than is seen in wild turkeys. This shows they were being fed maize.

BM II turkey droppings from the Turkey Pen midden also show high amounts of maize pollen.
Another turkey study—this one by led by Kyle Bocinsky, looks at some probably ritually buried BM III turkeys from The Croom Site on Cedar Mesa (excavated 1970).

The isotopic signatures (left) of the Croom site birds indicated they were eating primarily C-4 plants (likely maize) and little animal protein. This suggests they were being managed and fed maize.
Why were domestic turkeys important to the BM II people and later Puebloans? We think it was initially to ensure an ample supply of feathers for ritual purposes and for making feather blankets. These began to replace the older style of rabbit fur blankets in late Basketmaker II times, and were ubiquitous in the subsequent Pueblo periods. Turkeys didn’t become an important source of meat until deer herds were depleted in the AD 1100s and 1200s.

Right: a Mohave man wearing a rabbit-fur robe, early 20th century
Shannon Tushingham and I, along with several other colleagues, are attempting to estimate how many turkey body feathers an adult turkey will yield, and how many such feathers are needed to make a turkey feather blanket/robe. The examples here are from the AD 1200s. We estimate that the "stripped" one above required about 12,000 feathers.
In 2016, Catherine Cooper (PhD student at UBC) and co-authors did isotopic analysis of several individual loose hairs from the Turkey Pen BM II midden. She plotted the isotope values for 2 or 2.5 cm segments, each representing two or two and a half months of hair growth. This showed some short term variability in both maize and protein intake (See examples below). This type of study has considerable promise for future finer grained work with a larger sample.

Published in *J. of Archaeol. Science Reports* 5:10-18

This is a major article based on genomic analysis of maize from the Turkey Pen BM II midden (see right). It shows strong evidence that the TP maize had undergone selection for adaptation to the short growing seasons of the Colorado Plateau, and that this adaptation was important in allowing maize to subsequently spread through the temperate zone.

“We see incredible genetic variation in maize, but it took a long time to accumulate enough of the early flowering variants in the same plant to adapt to short growing seasons. A trait like flowering time is so complex that it involves changes to hundreds of genes,” says Kelly Swarts from Cornell University and now at the Max Planck Institute for Developmental Biology. The samples reveal that the first maize successfully adapted to grow in a temperate climate was short, bushy and was likely a pop-type corn compared to modern varieties, or landraces. The authors find that it helped lead to all temperate US and European maize grown today. (from Max-Planck-Gesellschaft, August 3, 2017)

Jenna Battillo is a former WSU grad student who analyzed human coprolites from the Turkey Pen BM II midden for her dissertation at SMU. She found that spores of corn smut, a fungal infection of maize, were present in such large quantities in the coprolites that it indicated a conscious preference for ingesting the smut. This fungus is a delicacy in Mesoamerica, where it is called *huitlocoche*, and it is eaten by some Pueblo people today. Importantly, it is an important source of lysine and some other amino acids in which maize is deficient.
“A single-event mass killing continues to be the most likely interpretation for around 58 individuals, mostly adult males (at least 35) but also adult females and children. This incident occurred between cal. AD 20 and 80 and doubtless had a significant social impact at the time because of its scale, reverberating throughout the early farming communities of the Southwest.”

Warfare!

Left: Depiction of “trophy head” mask at a site in Grand Gulch

Below: Article by Phil Geib and Winston Hurst supporting Wetherill’s original interpretation of the Cave 7 human remains.

A 2500 Year Neolithic Revolution

Generally, we see the following characteristics as indicative of “Full Neolithic” societies (e.g. Basketmaker III or Pioneer Period Hohokam)

- Heavy dependence on farming, with developed long-term crop storage techniques
- Year-around occupation of villages or stable dispersed communities of > 50 people
- Population undergoing the Neolithic Demographic Transition
- Evidence of continuously maintained socio-political institutions (e.g., public architecture)
- Pottery
- Tools specialized for processing agricultural products
“Gradualism” Revisited in the Northern SW

“In short, between 2000 B.C. and A.D. 500, cultivation of several new species of food plants was introduced into the Southwest. But the potential of this fundamentally different set of technological and subsistence techniques was not realized, and it had little economic significance until later”


“Basketmaker II appears to be adaptively transitional between the Archaic and later patterns…Maize and squash were cultivated to some extent…wild plant foods were important, as was hunting…”


“There are at least six Basketmaker and Pueblo subdivisions…; each marked a gradual increase in the importance of agriculture….

(Fagan, *People of the Earth* 2010)

In fact, heavy dependence on maize farming seems to have been early, and other elements of the “Neolithic Revolution” appeared later, and not always in the same sequence, in different areas of the SW