

# TECHNOLOGICAL STYLE AND SOCIAL BOUNDARIES OF PERISHABLE ARTIFACTS OF THE EARLY AGRICULTURAL/BASKETMAKER II PERIOD

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## ABSTRACT

Alcove sites in the Greater Southwest have yielded diverse assemblages of perishable artifacts dating to the Basketmaker II/Early Agricultural period. This chapter summarizes current knowledge about the major perishable traditions of this time period and their geographical, temporal, and cultural patterning. The concept of technological style is used to briefly explore the variability of six perishable artifact classes: twined bags, looped fabrics, woven sandals, coiled and plaited basketry, and atlatls. Interpretative problems of the perishable record are discussed, including the limitations of phase dating, the need for more direct dating of specimens, and the necessity for additional work with large unpublished museum collections.

Perishables have long been viewed as important markers of social identities and cultural boundaries. Learned motor habits related to the production of perishable artifacts, such as textiles and basketry, tend to be culturally ingrained and resistant to change, making the technological patterns that result from these actions ideal attributes for exploring social groups and learning networks (Adovasio 1970, 1971; Adovasio and Gunn 1986; Adovasio and Pedler 1994; Geib 2000; Haas 2006; Kent 1983; Maslowski 1996; Matson 1991; McBrinn 2002, 2005; Minar 2001; Webster 2007; Webster and Hays-Gilpin 1994; Webster and Loma'omvaya 2004). In this chapter, a preliminary examination of perishable patterns in the Greater Southwest is provided, with a focus on technological style and boundaries. After a summary of the Early Agricultural/Basketmaker II evidence for the Greater Southwest, the stylistic and technological variability of several forms of perishable constructions, such as twined bags, looped fabrics, sandals, coiled and plaited baskets, and atlatls, is examined. Finally, an overview of what is currently known about major perishable patterns and boundaries during this period in the Greater Southwest is presented (Table 1).

In many ways, this article puts the cart before the horse. Although there are several comprehensive studies of Early Agricultural/Basketmaker II perishable materials for the Colorado Plateau (Guernsey 1931; Guernsey and Kidder 1921; Kidder and Guernsey 1919; Morris and Burgh 1954; Nusbaum 1922)

and the Mogollon region (Cosgrove 1947; Martin et al. 1952), large quantities of perishables dating to the Early Agricultural/Basketmaker II have yet to be studied in depth. Early collections from Grand Gulch and other areas of southern Utah are a case in point. Because the perishables database from this period is vastly incomplete, archaeologists have yet to conduct the level of analysis to assess technological variability for a broad range of perishable artifacts on a regional scale. In fact, the most recent synthesis of Basketmaker II variability does not consider perishable technologies at all (Charles and Cole 2006). Meaningful interpretations of technological style require detailed comparisons of low-visibility attributes that must be obtained through the direct examination of a large sample of artifacts from broad geographical regions. Although some progress has been made (see Haas 2003, 2006; McBrinn 2002, 2005; McBrinn and Smith 2006), much more work remains to be done.

A larger problem is the lack of temporal resolution for these collections. Just as direct dating of maize has revolutionized the view of the transition to agriculture, direct dating of large samples of perishable artifacts will transform current understanding of the historical trajectories of perishable technologies in the Greater Southwest. Of the thousands of known perishable artifacts considered to date to the Early Agricultural/Basketmaker II, only a few have been directly dated (Geib 2004, 2011:Figure 5.33; Geib and Robins 2003:Table 1, Figure 5; Moreno 2000; Smiley 1997) (Table 2).

**Table 1.** Significant distributions of selected perishable classes during the Early Agricultural/Basketmaker II periods in six regions of the Greater Southwest.

	Sonoran Desert	Southern Colorado Plateau	Upper Gila and Mogollon Highlands	Southern Jornada Basin	Trans-Pecos Region	Northern Mexico
Twined rabbit-fur blanket	X	X	X	X	X	X
Twined bag	X	X	X	X	X	
Looped bag	-	X (simple)	X (simple, loop-and-twist, on foundation cords)	X (simple, loop-and-twist, on foundation cords)	X (simple, loop-and-twist)	X (simple, loop-and-twist)
Coiled basket, 1 rod foundation	X	X	X	X	X	X
Coiled basket, 2 rod-and-bundle foundation	X	X	X	X	-	-
Coiled basket, bundle foundation	-	-	-	X	X	X
Plaited basket and mat	-	-	-	X	X	X
Wickerwork sandal with fishtail heels	-	-	X (early?)	X	X	X
Wickerwork sandal without fishtail heels	X	X	X	X	-	-
Twined sandal	-	X	-	-	-	-
Atlatl	X	X	X	X	X	X

**Table 2.** Directly dated Early Agricultural/Basketmaker II worked perishable artifacts from the Greater Southwest.

Site Name	Object Dated	Conventional Radiocarbon Age	Calibrated Range	Reference
Black Dog Cave, Nevada	Twined bag	1740±30 B.P.	Not cited in report	Winslow 2003:225
Desha Cave I, Utah	Wickerwork sandal	1800±40 B.P.	A.D. 120-350 (2-sigma)	Geib and Robins 2003:Table 1
Falls Creek Rock Shelters (North Shelter), Colorado	Yucca cordage	2300±50 B.P.	410-200 B.C. (2-sigma)	Smiley 1997:Table A.1
Firebrand Cave, Nevada	Coiled basket	3242±153 B.P.	1890-1115 B.C. (2-sigma)	Blair and Winslow 2006:25; Winslow 2007
McEuen Cave, Arizona	Twined bag	2240±55 B.P.	400-180 B.C. (2-sigma)	Moreno 2000:Table 3
	Atlatl	2355±65 B.P.	761-260 B.C. (2-sigma)	Moreno 2000:Table 3
	Cradle	2430±55 B.P.	790-400 B.C. (2-sigma)	Moreno 2000:Table 3
Pictograph Cave, Arizona	Tumpline attached to large coiled carrying basket	1770±50 B.P.	A.D. 130-410 (2-sigma)	Smiley 1997:Table A.1
Sand Dune Cave, Utah	Prairie dog skin bag	1670±140 B.P.	A.D. 50-650 (2-sigma)	Geib 2004:Table 1
	Dog skin bag	1855±50 B.P.	A.D. 50-320 (2-sigma)	Geib 2004:Table 1
	Twined bag	1790±50 B.P.	A.D. 80-390 (2-sigma)	Geib 2004:279, Table 1
Ten January Cave, Sonora, Mexico	Atlatl	3230±70 B.P.	1691-1325 B.C. (2-sigma)	Ferg and Peachey 1998:175

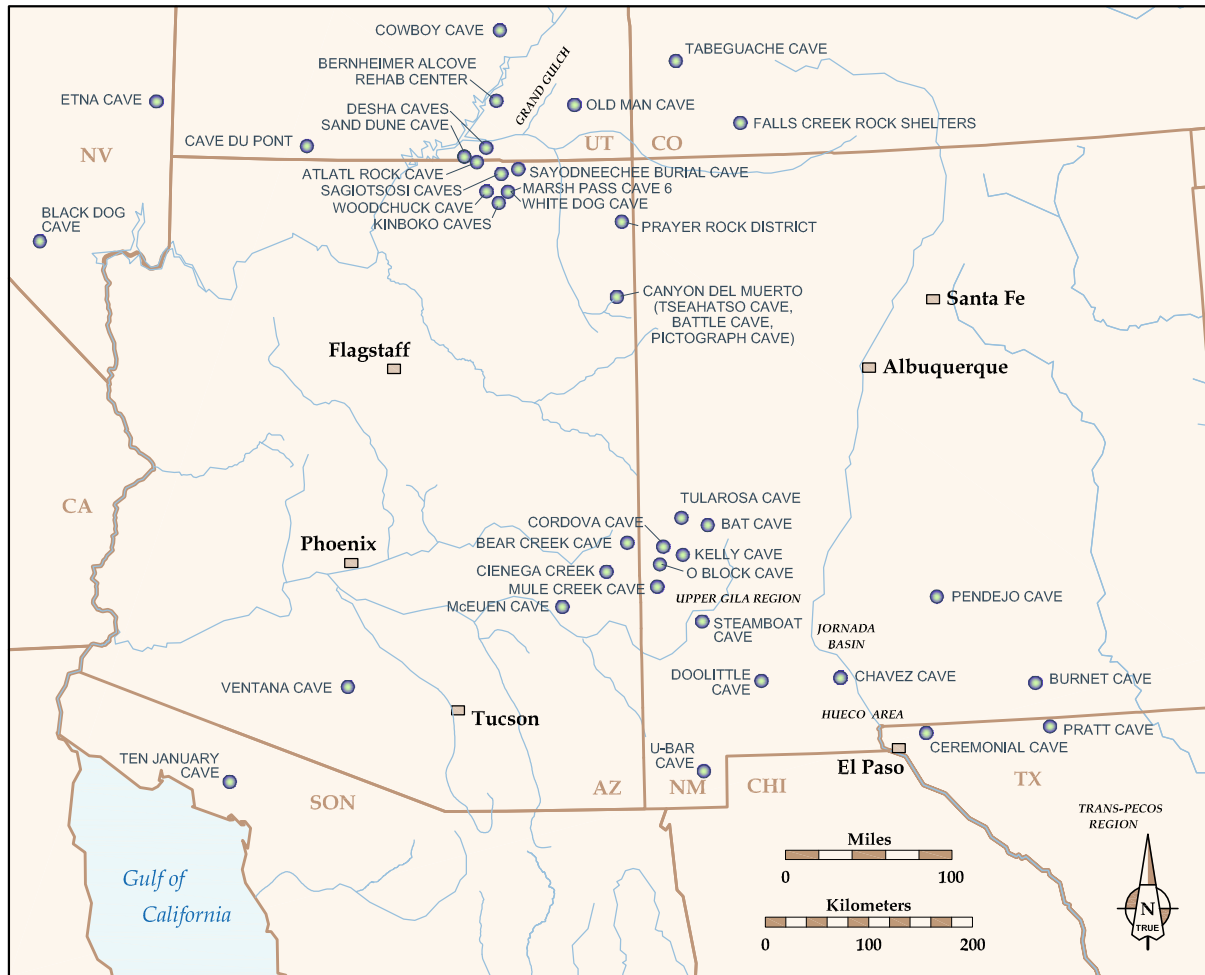
Current interpretations of Early Agricultural/Basketmaker II perishable artifacts are based largely on stylistic comparisons with other inadequately dated collections or on dates derived from maize or charcoal. This is problematic given the high likelihood of artifact displacement in cave stratigraphy. Interpretations based on phase dating are also unreliable, because most phases incorporate extremely long time spans or lack adequate radiocarbon assays. Although the spatial boundaries of many Early Agricultural/Basketmaker II perishable technologies can be estimated from the literature, their temporal relationships and cultural origins will remain inadequately understood until large samples of perishable artifacts are directly dated. Thus, all discussions of cultural origins and influences presented here should be viewed as hypotheses to be tested as more reliable chronological data become available.

#### THE EARLY AGRICULTURAL/ BASKETMAKER II PERISHABLES DATABASE

The perishables record of the Greater Southwest is one of the most extensive in the Western Hemisphere, matched only by records from the Great Basin and the dry deserts of Peru and Chile. Geographically, however, the Southwestern record is uneven. Conditions for the preservation of perishable objects are highly favorable in some environmental settings and poor to nonexistent in others. The best preser-

vation occurs in the San Juan region of the Colorado Plateau, which is peppered with deep alcoves that saw extensive use by Basketmaker II people for burial and storage purposes. Consequently, large and diverse assemblages of Basketmaker II perishable materials have survived from this region, for example, Grand Gulch (Blackburn and Williamson 1997), Old Man Cave (Geib and Davidson 1994), Atlatl Rock Cave (Geib et al. 1999), numerous sites in the Marsh Pass area of northeastern Arizona and the Monument Valley area of southeastern Utah (Guernsey 1931, Guernsey and Kidder 1921, and Kidder and Guernsey 1919), Woodchuck Cave (Lockett and Hargrave 1953), Cave du Pont (Nusbaum 1922), Falls Creek Rock Shelters (Morris and Burgh 1954), and Bernheimer Alcove and Rehab Center (Sharrock et al. 1963); see also Robins (1997) (Figure 1). Archaic and Basketmaker II perishables have also been preserved at rockshelters just north of the traditional Basketmaker II boundary, such as at Cowboy Cave and Tabeguache Cave (Hewitt 1980; Hurst 1940, 1941, 1942).

White Dog Cave, the type site for the earliest phase of Basketmaker II occupation on the Colorado Plateau, yielded an extensive assemblage of perishables, including decorated coiled baskets, looped and twined bags (the latter serving a secondary use as mortuary shrouds), vegetal sandals worked in plain weave and twining, hide sandals, twined mats, twined rabbit-fur blankets, twined hair and yucca aprons, bands worked in warp twining and plain weave, as well as cradles, atlatls, and various



**Figure 1.** Location of Early Agricultural/Basketmaker II sites mentioned in the text.

articles of personal adornment (Guernsey and Kidder 1921; Kidder and Guernsey 1919). Accelerator Mass Spectrometry (AMS) dates on bone collagen from six burials at White Dog Cave suggest a date range of circa 480-170 B.C. (Coltrain et al. 2007).

Additional burials dated by Coltrain et al. (2007) from Sayodneechee Burial Cave, Kinboko Cave 1, and Marsh Pass Cave 6 in the Kayenta-Monument Valley area are also attributed to this early time period. The assemblage from nearby Saglotsosi Cave 11 has yet to be dated, but the presence of similar artifacts suggests a roughly contemporaneous date. The only directly dated artifact assemblage from this area, a hunter's bag from Sand Dune Cave, produced a calibrated AMS date of A.D. 80-330 (Geib 2004). Earlier materials may also be present (Lindsay et al. 1968).

Tree-ring dates from Falls Creek Rock Shelters, Cave du Pont, and Woodchuck Cave suggest post-A.D. 1 occupation dates for those sites (Dean 1975; Lockett and Hargrave 1953; Morris and Burgh 1954; Nusbaum 1922), but more recent AMS dates on maize, matting, and cordage from Falls Creek Rock

Shelters (Lister 1997:134; Smiley 1997:27) and bone collagen from nearby Durango-area sites (Coltrain et al. 2006) indicate a time depth for Basketmaker II in the Durango area as early as 800 B.C. A reevaluation of the funerary basketry and textiles from Falls Creek Rock Shelters is currently underway (Jolie 2011; Webster 2011), but Native American concerns do not permit the direct dating of these collections.

Many other cave collections from the San Juan region have not yet been analyzed, dated, or studied, including the large Basketmaker collections made by the Wetherill brothers from Grand Gulch for the Hyde Expedition and by Charles McLoyd, Charles Graham, and Charles Lang from Grand Gulch and several tributaries of the Colorado River (Blackburn and Williamson 1997; Pepper 1902). Despite the wealth of Basketmaker perishable collections from southeastern Utah, almost nothing is currently known about the dating or technology of these artifacts. AMS dates on maize and unworked plant materials from Butler Wash indicate a Basketmaker II presence in the region by 650 B.C. (Smiley 1997:34).

Osborne's (2004) study of Mesa Verde region perishables provides the first published detailed descriptions of some of these Utah collections. Morris's extensive Basketmaker collections from Arizona's Canyon del Muerto, including the Basketmaker II collections from Battle Cave, are generally unstudied and unpublished. Geib is currently studying the weaponry from Battle Cave and several other Basketmaker II sites. Recent AMS dates on a carrying basket from Pictograph Cave and a yucca seed bead from Tseahatso Cave yielded midpoint dates of 1680 and 1710 years before present (circa A.D. 270 and A.D. 240, respectively), and maize from Tseahatso Cave yielded a midpoint date of 1930 years before present (circa A.D. 20) (Smiley 1997:30-32). Earl Morris's collections from the Prayer Rock District, published by Elizabeth Ann Morris (1980) have been interpreted as Basketmaker III, although they may also contain a Basketmaker II component. None have been directly dated.

To obtain additional information about some of the unpublished Basketmaker collections, in 2008, I briefly surveyed and photographed collections from Grand Gulch, Canyon del Muerto, and the Prayer Rock District at the American Museum of Natural History and the McLoyd and Graham collections from southeastern Utah at the University of Pennsylvania Museum. The following year, I conducted a more intensive survey of collections from southeastern Utah at the Edge of the Cedars Museum in Blanding, Utah (Webster 2009). Although these surveys were too brief to allow for the collection of detailed technological information, they substantiate the strong research potential of these collections for future work.

The Mogollon region of southeastern Arizona and southwestern New Mexico has also yielded a number of cave collections that have been or could date to the Early Agricultural/Basketmaker II period (Webster 2007). Cosgrove's (1947) work in the Upper Gila region of New Mexico and the Hueco area of New Mexico and Texas identified a "Basketmaker" component at many of these sites, while excavations at Tularosa Cave and other rockshelters in the Reserve area produced numerous artifacts from "pre-pottery" contexts (Martin et al. 1952). Based on stylistic and technological similarities between these artifacts and those recovered by Kidder and Guernsey from Basketmaker II sites in the Kayenta area, Early Agricultural period perishables may be present in collections from Bear Creek Cave, Steamboat Cave, Mule Creek Cave, and Doolittle Cave in the Mimbres branch, Cienega Creek in the Black River branch, and Bat Cave, Cordova Cave, Kelly Cave, O Block Cave, and Tularosa Cave in the Cibola branch (Cosgrove 1947; Dick 1965; Haury 1957; Hough 1914; Martin et al. 1952; Martin et al.

1954; see also Webster 2007:Table 16.1). To my knowledge, no Early Agricultural artifacts have been confirmed by AMS dating at these sites.

The most detailed information about Early Agricultural perishables from the southern Mogollon region comes from Kelly's (1937) unpublished manuscript on the McEuen Cave assemblage (see also Moreno 2000). Situated north of the Gila River and east of the San Pedro Valley, McEuen Cave provides strong evidence for an Early Agricultural period occupation (Huckell et al. 1999). Three perishable artifacts from McEuen Cave were AMS dated, producing calibrated ages of 400-180 B.C. on a twined bag, 761-260 B.C. on an atlatl, and 790-400 B.C. on a cradle (Moreno 2000). The McEuen Cave perishable assemblage strongly resembles the Basketmaker II assemblage from White Dog Cave and several other sites in the Kayenta region. Similarities include the presence of twined and looped bags decorated in the "dry dye" technique (color rubbed on as the weaving progressed), 6-warp wickerwork sandals, warp-twined bands, twined rabbit-fur blankets, cradles, atlatls, and grooved fending sticks. There are also notable differences, however, including the absence of twined sandals and twined mats at McEuen Cave, the presence of 2-warp wickerwork sandals at McEuen but not in the north, and different forms of fending sticks and cradles in each region.

East of the Mogollon region, large quantities of perishable artifacts that may date to the Early Agricultural period have been recovered from the Jornada Basin, the Hueco area of the Rio Grande Valley, and the Guadalupe Mountains (Cosgrove 1947; Howard 1931, 1932, 1935; Hyland 1997; Hyland and Adovasio 2000; Mera 1938; Schroeder 1983). They include coiled baskets, plaited baskets and mats, twined bags, wickerwork sandals, atlatls, darts, grooved fending sticks, and hair ornaments. Similar assemblages that also could date to this time period are known from the Trans-Pecos region of Texas (Andrews and Adovasio 1980; Setzler 1935). A "Basketmaker" perishable pattern is reported as far east as the panhandle of western Oklahoma, where collections include an atlatl of the San Juan Basketmaker II type, part of a twined bag, a twined fur blanket, yucca sandals, fire drill hearths, maize, and basketry of "the coiled variety so common in the Southwest" (Baker and Kidder 1937:51-52; Bell and Baerreis 1951:15).

In contrast with these extensive perishable assemblages from the San Juan, Mogollon, Jornada Mogollon, Hueco, and Big Bend regions, almost nothing is known about the use and production of perishables in northern Sonora and southern Arizona during the Early Agricultural period. Perishables are not reported from the important Early Agricultural period sites of Cerro Juanaqueña in the

northern Chihuahuan Desert, Las Capas or the Milagro site in the Tucson Basin, or La Playa in northern Sonora (Carpenter et al. 2005; Hard and Roney 1999; Mabry 2008).

To my knowledge, the only definite Early Agricultural period perishable artifacts come from Ten January Cave in the Sierra Pinacate of Sonora, which produced a few wooden artifacts, including an atlatl (Ferg and Peachey 1998). Some artifacts from Ventana Cave might also date to this period, based on stylistic similarities between some of the Ventana Cave artifacts and Early Agricultural assemblages from the Mogollon region (most notably the wickerwork sandals and possibly the two-rod-and-bundle coiled basketry). Haury (1950:358, 411, 443), however, indicated that perishable materials generally were not preserved in preceramic levels. Again, direct AMS dating is needed.

### **Stylistic and Technological Diversity in Six Perishable Artifact Classes**

To explore the question of social boundaries in the Greater Southwest during the Early Agricultural/Basketmaker II periods, stylistic and technological variability is examined in several kinds of perishable artifacts: twined bags, looped fabrics, sandals, coiled and plaited baskets, and atlatls. One of the most valuable frameworks for assessing artifact variability is the concept of technological style. This approach is based on the assumptions that individuals in small-scale societies customarily learn the culturally correct way of “doing things” through direct observation and first-hand instruction, that these patterns are maintained through the conservative learning process, and that this technical knowledge is passed down through kin groups or other learning networks.

The learned motor habits and production sequences embedded in an artifact’s technology and design can be studied (Lave and Wenger 1991; Lechtman 1977; Lemonnier 1986; see also Adovasio and Pedler 1994; Carr 1995; Clark 2001). Unlike high-visibility attributes, such as form, function, and decorative style, which can be easily imitated by people outside of one’s social network, low-visibility attributes are difficult to replicate without close observation and first-hand knowledge. For these reasons, though low-visibility attributes are more reliable indicators of population movement, enculturation processes, shared social histories, and cultural boundaries. Coiled basket foundations, basketry splice techniques, selvage finishes, warp and weft configurations, cordage-twist direction, and woodworking techniques are examples of low-visibility attributes embodied by perishable artifacts.

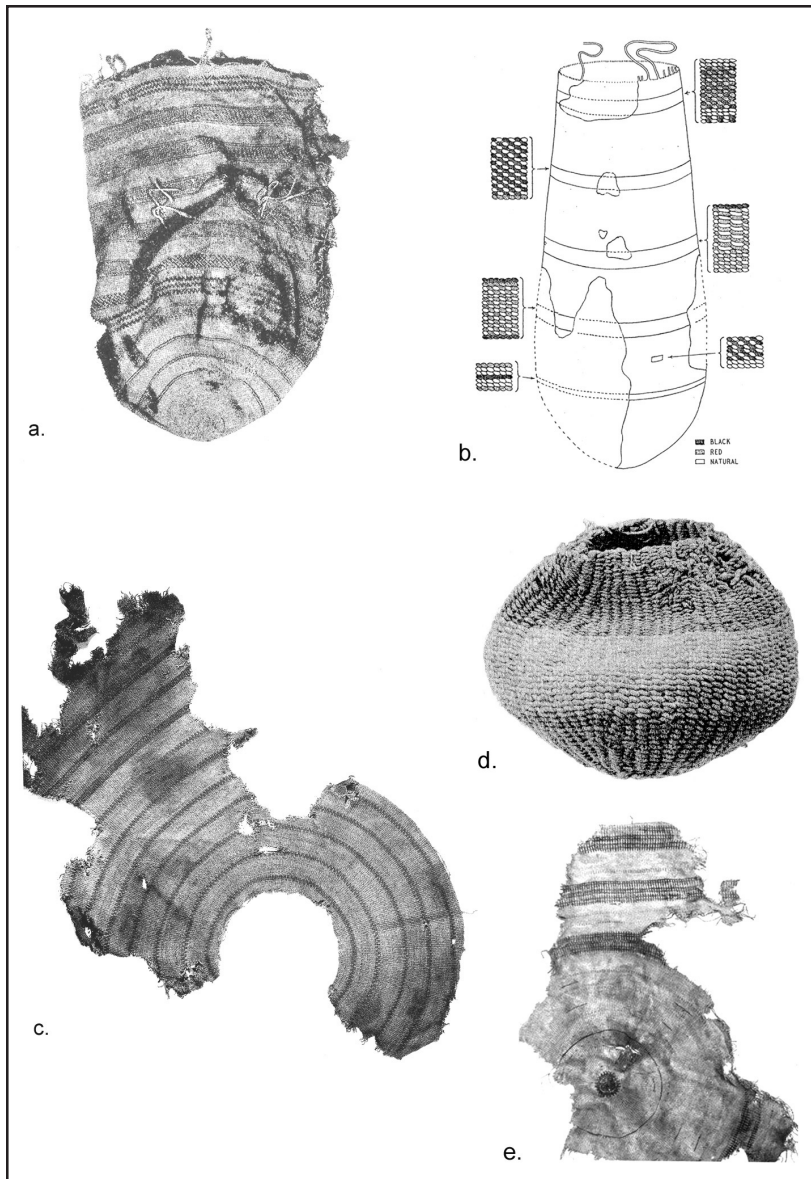
### **Twined Bags**

Twined bags (Figure 2) are a hallmark of Basketmaker II culture on the Colorado Plateau. Guernsey and Kidder (1921:66, 111) considered them “peculiarly characteristic of Basket-maker culture” in the Kayenta region and the most elaborate of all Basketmaker II textiles. Twined bags also occur at several Early Agricultural sites in the southern Southwest and elsewhere in North America. One of the oldest weaving techniques in the Americas, twining was used to produce bags and mats in the Great Basin during the earliest phases of the Western Archaic (Fowler et al. 2000). Adovasio (1970:16, 21; see also Hyland and Adovasio 2000:145) has argued that the twining technique spread from the eastern Great Basin into northern Mexico and the southern Southwest at a very early date, perhaps as early as 9000 B.C.

During the Early Agricultural/Basketmaker II period in the Greater Southwest, a simple twining technique was used to produce bags, fur or feather blankets, mats, and other items. The bags were made by compact twining (also known as close twining), and the blankets and mats were made by open twining (also known as spaced twining) (Adovasio 1977:16, Figure 7) (Figure 3). Wrapped twining, a variation of simple twining (Adovasio 1977:16-19, Figure 11a), was used in the San Juan region for cradleboards, hair ornaments, and some twined sandals. It was here that twined textiles reached their highest degree of elaboration during Basketmaker II. Twined artifacts are found in early assemblages from the southern Mogollon region, but seem not to be as widespread as on the Colorado Plateau. Further, if the Ventana Cave assemblage is any indication, twining was of even less importance in the Sonoran Desert (Adovasio 1971:104; Martin et al. 1952:247).

The earliest known compact-twined bags in western North America are from the western Great Basin, where one example produced an AMS date of approximately 7000 B.C. (Fowler 2000:134, Figure 7.12). Twined bags are also found in southern California, where undated “ancient specimens” are reported from the southern San Joaquin Valley and where historic examples were made by the Diegueño, Mohave, and Yuma (Kroeber 1925:722, Plate 63). Closer to the Southwest, fragments of probable twined bags are reported from Middle to Late Archaic levels at Hogup Cave in the eastern Great Basin (Aikens 1970:134). Adovasio (1971:104) considered Basketmaker II twined bags to be derived from a Great Basin tradition (see also Cressman 1942:Figure 83 for possible parallels between Basketmaker twined bags and some Great Basin baskets).

Twined bags known or suspected to date to the Early Agricultural/Basketmaker II are reported from



**Figure 2.** Twined bags: (a) White Dog Cave, Kayenta area (adapted from Guernsey and Kidder 1921:Plate 30c); (b) Falls Creek Rock Shelters, Durango area (adapted from Morris and Burgh 1954:Figure 39); (c) McEuen Cave, southeastern Arizona (adapted from Moreno 2000:Figure 3); (d) Chavez Cave, Hueco area (adapted from Cosgrove 1947:Figure 80a); (e) Buena Vista Lake, southern California (adapted from Kroeber 1925:Plate 63).

southern Nevada, the San Juan region of the Colorado Plateau, the Upper Gila, Mimbres, Hueco, and Big Bend areas, and as far east as western Oklahoma (Baker and Kidder 1937:52; Cosgrove 1947:80; Geib 2004; Guernsey and Kidder 1921; Morris and Burgh 1954; Nusbaum 1922; Sharrock et al. 1963:209-210; Winslow 2003:225, 236). The only known twined bag from the Sonoran Desert comes from Ventana Cave, but that object is thought to postdate the Early Agricultural period by a millenium or more (Hauray 1950:410). Twined bags have not been re-

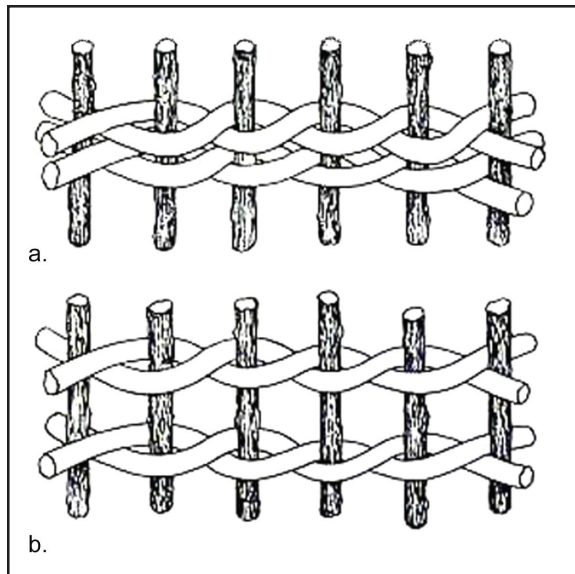
ported from early sites in northern Mexico, although other forms of twined artifacts have been found (Taylor 1966:75).

Only three directly dated twined bags are reported from the Greater Southwest. A decayed example from Black Dog Cave near Moapa, Nevada, produced an AMS radiocarbon date of 1740±30 years before present (Winslow 2003:225), another from Sand Dune Cave in northern Arizona returned a date of 1790±50 years before present (Geib 2004:279, Table 1), and an example from McEuen Cave in southeastern Arizona produced a date of 2240±55 years before present, or a calibrated date of 400-180 B.C. (Moreno 2000:353) (see Figure 2c). The McEuen Cave bag enclosed the skeletal remains of an adult male, an atlatl, a pipe, a pair of sandals, and a coarse looped and knotted bag. A second undated bag from McEuen Cave and two undated bags from Kelly Cave in the Cibola branch and Doolittle Cave in the Mimbres branch might also date to this early time period (see Cosgrove 1947:70, footnote 4).

Twined bags served as containers for a variety of items. Blackburn and Williamson (1997:94) illustrate an unfinished bag from Grand Gulch filled with cornmeal, and Nusbaum (1922:104-107, Plate LVI) describes a bag from Cave du Pont that contained

sunflower seeds and hanks of yarn. Another small bag from Falls Creek Rock Shelters contained amaranth seeds (Morris and Burgh 1954:94). A twined bag from Sand Dune Cave, found inside a larger hide bag, contained feathers and bone gaming pieces, and was probably part of a hunter's cache (Geib 2004).

Large twined bags also assumed secondary use as mortuary shrouds in some regions. This practice is reported from Glen Canyon, Grand Gulch, and the Kayenta area of the San Juan region, from McEuen Cave in southeastern Arizona, and from



**Figure 3.** Simple twining technique: (a) compact or close 2-strand twining; (b) open or spaced 2-strand twining (adapted from Adovasio 1977:Figure 7).

Burnet Cave in the Guadalupe Mountains of southwestern New Mexico (Blackburn and Williamson 1997:73-74; Guernsey and Kidder 1921:110, Plate 8a; Howard 1931:11, Plate V, 1932:11, Plate 2, 1935:67-69; Moreno 2000:351; Sharrock et al. 1963:46-53, 84, 209-210, Figure 27). The practice was not universal during this time period, however. For example, inhumations from Cave du Pont and Falls Creek Rock Shelters were not enclosed in twined bags (Morris and Burgh 1954; Nusbaum 1922).

The funerary treatment of the mortuary remains interred in twined bags also varies by region. In the San Juan region and at McEuen Cave, the twined bags enclosed inhumations, whereas at Burnet Cave, they served as containers for cremations. Treatment of the interments inside the twined bags from Buena Vista Lake in the southern San Joaquin Valley of California is unspecified (Kroeber 1925:722, Plate 63). In the southern Southwest, a variety of containers, such as twined bags, looped bags, and coiled baskets, were used to hold skeletal and cremated remains during the Early Agricultural period (Haury 1957; Schroeder 1983).

### Twined Bags: A Case Study in Technological Style

In the following section, current knowledge about the form, technology, and decoration of twined bags is summarized, and an example of the detailed level of analysis that would be required to assess the stylistic and technological variability of twined bag construction during the Early Agricultural/Basketmaker

II is provided. Of the estimated 50-70 twined bags from this time in museum collections, fewer than half (perhaps 15-20) have been analyzed at this level of detail. To assess the local and regional variability of twined bag construction, information would need to be collected at this level of detail for a much larger sample.

#### *Form*

All twined bags from the San Juan region of the Colorado Plateau are flexible cylindrical sacks with rounded bodies and elongated, truncated necks (Guernsey and Kidder 1921:Plate 30; Morris and Burgh 1954:67, Figures 39-40) (see Figure 2a-b). They range in size from very small bags about 10 cm in length, to bags more than 0.5 m long. The bags from McEuen Cave in southeastern Arizona are incomplete, but appear to resemble the San Juan examples in form, technique, and decoration (Kelly 1937:39) (see Figure 2c). The bags from Burnet Cave in the Guadalupe Mountains also reportedly resemble the San Juan examples (Howard 1935:67-69). In contrast, the bag from the Hueco site of Chavez Cave is squat and globular, and it differs considerably from the others (Cosgrove 1947:Figure 80a) (see Figure 2d).

#### *Technology*

All known examples of twined bags from the Greater Southwest are worked in compact, 2-strand twining (see Figure 3a). Wefts in all examples twist around each other in a Z-wise fashion (Z-twist wefts) (Adovasio 1977:20). Guernsey and Kidder (1921:65-76, Figures 12-14, Plates 25-30) provide a detailed analysis of the twined bags from White Dog Cave and other Kayenta area sites, and subsequent researchers have compared their bags to the Kayenta examples (see Cosgrove 1947:70-71, Figures 24-25, 79-80; Kelly 1937:39-43, Plate XIV; Martin et al. 1952:247, 303, Figure 113; Morris and Burgh 1954:67, Figures 39-41, 100c-d; Nusbaum 1922:Plate LVIX, endnote 13; Sharrock et al. 1963:209-210; Webster 1988). A decent level of comparability exists for twined bags across the region, although the sample is relatively small and incomplete. For example, twined bags from Grand Gulch and several other areas of southeastern Utah have yet to be analyzed. Twined-bag data from published collections are summarized in Table 3.

#### *Method of Starting the Base*

All twined bags from the Greater Southwest were started at the base and twined in a spiral fashion toward the rim. Guernsey and Kidder (1921:66, Figure 12) report two primary techniques for starting



Table 3. Variability in Early Agricultural/Basketmaker II twined bag manufacture, decoration, and context, based on published examples.

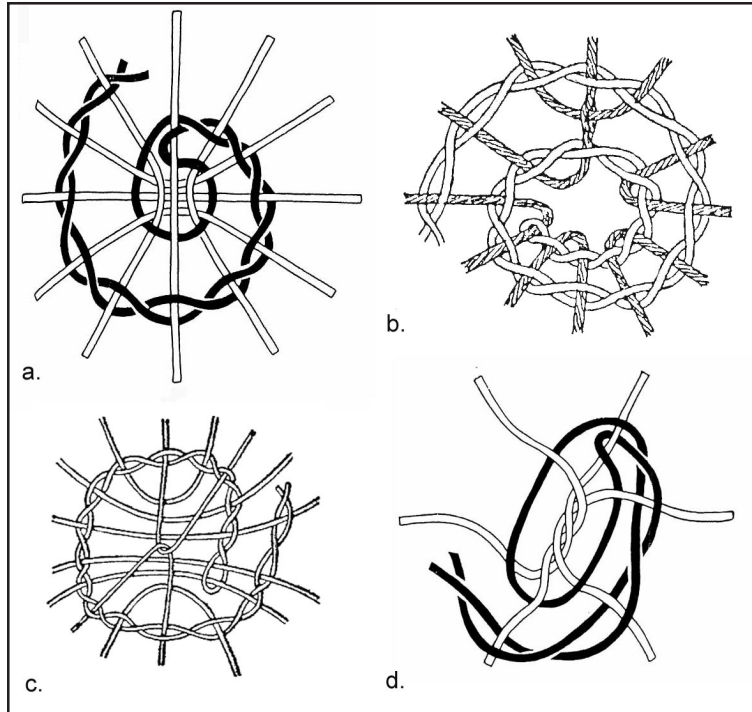
	Great Basin and Southern California:	Sonoran Desert	San Juan Region of the Colorado Plateau:	Upper and Middle	Jornada Basin and Hueco Area:	Trans-Pecos Region:
Sites/Areas with Definite or Possible Early Agricultural/Basketmaker II Examples	Hogup Cave in Eastern Great Basin; Buena Vista Lake in Southern San Joaquin Valley (Undated)	None from this Period	Kayenta Region (Numerous Sites), Grand Gulch, Colorado River Canyons, Cave du Pont, Falls Creek Rock Shelters	Doolittle Cave, Kelly Cave, McEuen Cave	Ceremonial Cave, Chavez Cave, Burnet Cave	Chisos Mountains
Principal twining direction	Z	-	Z	Z	Z	Z
Undecorated	X (Hogup Cave)	-	-	-	-	-
Simple stripes	-	-	X	X	X	-
Self-patterned bands (beaded designs)	X (Buena Vista Lake)	-	X	X	X	-
Self-patterned bands (countered twining)	-	-	X (Kayenta region)	X (McEuen Cave)	-	-
Painted designs	-	-	X	-	-	X
Dry-dyed wefts (color rubbed on as weaving progressed)	-	-	X	X	X	-
Method of starting the base	-	-	Methods A and B (Kayenta region), variation of Method A (Falls Creek Rock Shelters)	-	Variation of Method A (Chavez Cave)	-
Method of adding new warps	-	-	Methods C and D (Kayenta region), Method C (Cave du Pont), Method C and several variations of Method C (Falls Creek Rock Shelters)	Method E (McEuen Cave)	Method D and one of the same variations of Method C found at Falls Creek Rock Shelters (Chavez Cave)	-
Rim finish	-	-	Methods F, G, H (Kayenta region)	Method F (McEuen Cave)	Method H (Chavez Cave)	-
Associated with inhumations	X (Buena Vista Lake)	-	X	X	-	-
Associated with cremations	-	-	-	-	X	-
Recovered from non-mortuary contexts	X (Hogup Cave)	-	X	X	X	X

the Kayenta bags, one common, and the other rare. In the more common technique (labeled Method A here for comparability purposes), three strands were laid perpendicular to three other strands, and these were then bent into a spoke-like arrangement of 12 radiating warps (Figure 4a). A weft strand was interlaced through the warps, with the two ends brought together to create a pair of strands for weft twining. In the less common method (referred to here as Method B), three yarns were twisted together and their ends were separated to form six radiating warps (Figure 4d). Weft twining was begun in the same manner as described above.

The techniques used to start the bags from Falls Creek Rock Shelters (Figure 4b) and Chavez Cave (Figure 4c) are most similar to Method A, but differ slightly (Cosgrove 1947:Figure 24a; Morris and Burgh 1954:Figure 41k-l). Guernsey and Kidder (1921) illustrate the direction of twining in the Kayenta bags as clockwise (see Figure 4a, d), while the twining of the Durango and Chavez Cave bags is shown as counterclockwise (see Figure 4c-d). It is unclear, however, if all analysts were describing the bags from the same perspective, that is, the inner or outer face. Both McEuen Cave bags are missing their bases (see Figure 2c), so the method of starting these bags is unknown (Webster 1988).

#### *Method of Adding New Warps*

Guernsey and Kidder (1921:68) describe two methods of inserting new warps to increase the diameter of bags from the Kayenta region. In the first (referred to here as Method C), a new warp was folded and anchored to the existing warp by untwisting the new warp and inserting an existing warp through it (Guernsey and Kidder 1921:Plate 27a) (Figure 5a). In the second method (referred to here as Method D), a new warp was folded and laid between two existing warps (Guernsey and Kidder 1921:Plate 27b) (Figure 5e). The warps of the twined bag from Cave du Pont were added by Method C (Nusbaum 1922:endnote 13), whereas the Falls Creek Rock Shelters and Chavez Cave examples incorporate multiple techniques within a single bag. The Falls Creek bags use Method C (Morris and Burgh 1954:Figure 41g) (Figure 5b), as well as several variations of Method C, including one in which a new



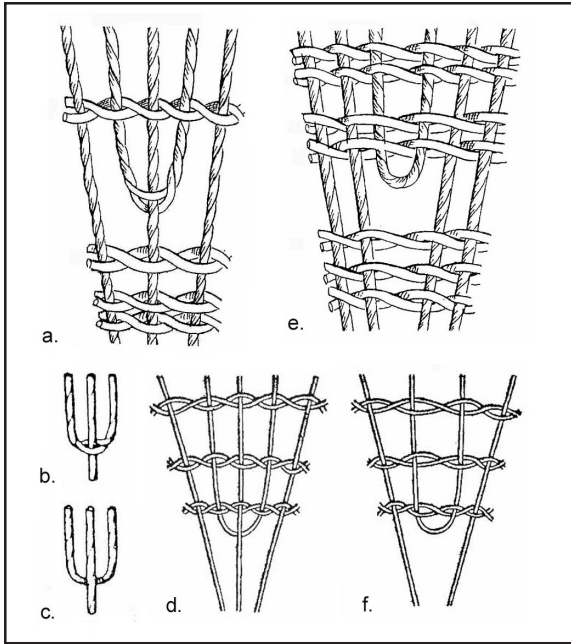
**Figure 4.** Methods of starting the base of twined bags: (a) Method A, Kayenta area (adapted from Guernsey and Kidder 1921:Figure 12a); (b) variation of Method A, Falls Creek Rock Shelters, Durango area (adapted from Morris and Burgh 1954:Figure 41l); (c) variation of Method A, Chavez Cave, Hueco area (adapted from Cosgrove 1947:Figure 24a); (d) Method B, Kayenta area (adapted from Guernsey and Kidder 1921:Figure 12b). (Method designations assigned by the author to enable comparisons.)

warp was folded and laid across an existing warp (Morris and Burgh 1954:Figure 41h) (Figure 5c). The twined bag from Chavez Cave in the Hueco area incorporates Method D (Cosgrove 1947:Figure 24b) (Figure 5f), as well as the same variation of Method C described for the Falls Creek bags (Cosgrove 1947:Figure 24c) (Figure 5d).

A completely different technique is described for one of the McEuen Cave twined bags. In that example, a new warp was knotted and laid over an existing warp, and then the two warps were used together for a distance before being separated (referred to here as Method E) (not illustrated). Knots are visible on the surface where the new warps were added (Webster 1988). With one possible exception (Sharrock et al. 1963:209), the use of knots is not reported for Basketmaker twined bags on the Colorado Plateau (Morris and Burgh 1954:67).

#### *Rim Finish*

Guernsey and Kidder (1921:69, Figure 14) identified three methods of finishing the upper edges of the Kayenta bags. In the first (referred to here as Method F), the warp ends were folded over an added edge cord, inserted back into the warp channel,

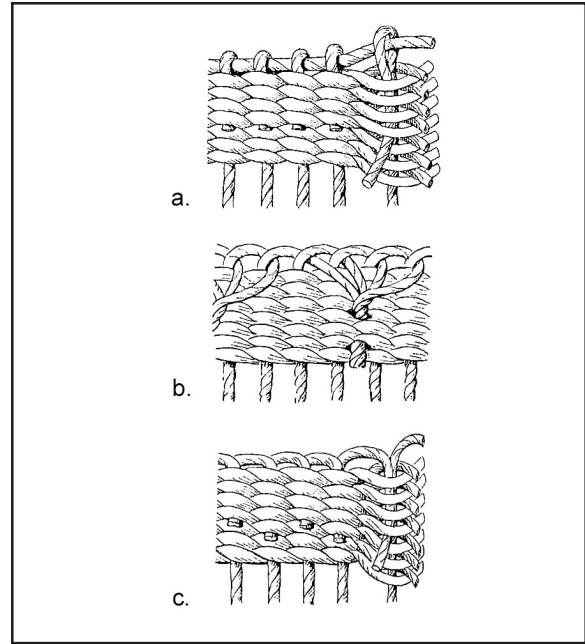


**Figure 5.** Methods of adding new warps during twined bag manufacture: (a) Method C, in which new warp is pierced by existing warp, Kayenta area (adapted from Guernsey and Kidder 1921:Plate 27a); (b) Method C, Falls Creek Rock Shelters, Durango area (adapted from Morris and Burgh 1954:Figure 41g); (c) variation of Method C, in which new warp is placed adjacent to existing warp, Falls Creek Rock Shelters (adapted from Morris and Burgh 1954:Figure 41h); (d) same variation of Method C as (c), Chavez Cave, Hueco area (adapted from Cosgrove 1947:Figure 24c); (e) Method D, in which new warp is inserted between existing warps, Kayenta area (adapted from Guernsey and Kidder 1921:Plate 27b); (f) Method D, Chavez Cave, Hueco area (adapted from Cosgrove 1947:Figure 24b).

and then clipped off (Figure 6a). In the second (referred to here as Method G), the warp ends were gathered into bundles of four or five, tucked back into the fabric, and clipped (Figure 6b). In the third (referred to here as Method H), each warp was folded and inserted into the neighboring warp channel, and were then clipped (Figure 6c). The Hueco bag from Chavez Cave utilizes Method H (Cosgrove 1947:71, Figure 80a), and the aforementioned McEuen Cave bag is finished by Method F (Webster 1988). The original finishes are no longer intact on the Falls Creek bags (Morris and Burgh 1954:67). Based on the discovery of some partially woven bags, some twined bags appear to have been intentionally left unfinished (Blackburn and Williamson 1997:55).

#### Decoration

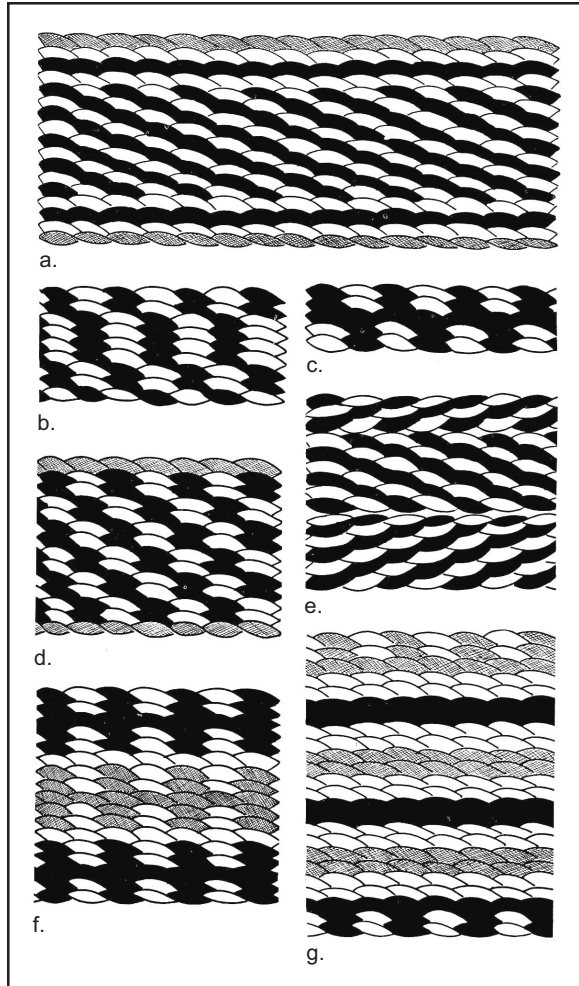
Although some twined bags are undecorated, most are decorated with woven self-patterned or painted designs. The self-patterned designs were



**Figure 6.** Methods of finishing the upper rims of twined bags: (a) Method F, warp ends folded over an added cord; (b) Method G, warp ends gathered into bundles and tucked into fabric; (c) Method H, warp ends inserted into adjacent warp channel (adapted from Guernsey and Kidder 1921:Figure 14).

produced in a variety of ways (Figure 7). Late Agricultural/Basketmaker II weavers on the Colorado Plateau and in the Upper and Middle Gila and Hueco areas created solid-colored bands by using paired wefts of the same color and made “beaded” designs by pairing wefts of two different colors. Solid and beaded rows were combined to produce vertical, horizontal, or diagonal patterns (Cosgrove 1947:70-71, Figure 25; Guernsey and Kidder 1921:65-74, Plate 29; Kelly 1937:Plate XIV; Morris and Burgh 1954:Figures 39-40; Webster 1988). In the Kayenta region and at McEuen Cave, weavers sometimes alternated the twining-twist direction of successive weft rows to produce chevron-like bands in a technique known as countered weft twining (Guernsey and Kidder 1921:Plate 29e; Webster 1988; see also Emery 1966:Figures 307-308) (see Figure 7e). Mineral pigments of various colors (red, black, yellow) were typically rubbed onto the yarns as the weaving progressed, a method known as the “dry dye” or “dyed weft” technique (Guernsey and Kidder 1921:70).

A few twined bags from the San Juan region and the Chisos Mountains of the Big Bend area were decorated by painting. Some of the painted San Juan bags have bold geometric designs (Figure 8) that resemble those found on Basketmaker II coiled baskets and twined sandals (compare Figure 8 with Kankainen 1995:53, 90). According to Guernsey and Kidder (1921:72, Plates 28, 30), if a bag was intended to be



**Figure 7.** Self-patterned designs on twined bags (adapted from Guernsey and Kidder 1921:Plate 29).

painted, markers were woven in the bag to enable the duplication of a design on both faces. Two fragments of painted twined bags are reported from the Big Bend region, but the decoration is not described (Setzler 1935:106).

### *Summary*

Although subtle technological differences are documented among regions, the existing literature suggests twined bags from the Colorado Plateau, Mogollon, and Hueco areas are more similar than different (Cosgrove 1947:80; Morris and Burgh 1954:67). Based on the small sample of bags discussed here, the preliminary comparisons in Table 3 suggest some technological attributes are shared by the McEuen Cave and the Kayenta twined bags, for example, one rim finish technique and countered weft twining, while others are shared by the Falls Creek Rock Shelters and Chavez Cave bags, such as one method of starting the base and one method of

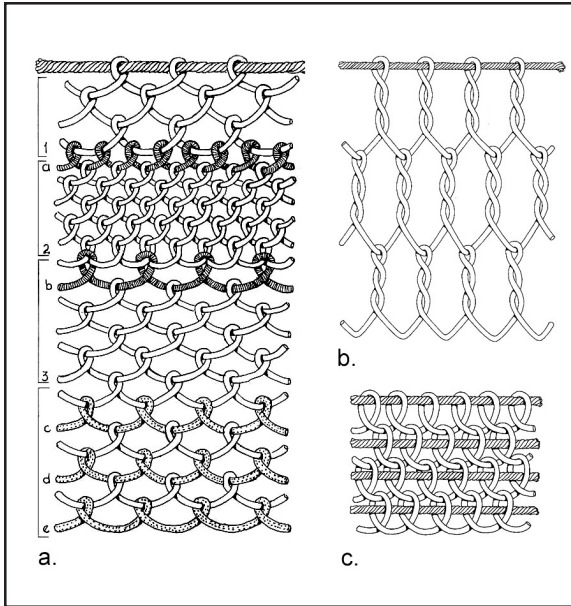


**Figure 8.** Twined bag with painted design, White Dog Cave, Kayenta region (adapted from Guernsey and Kidder 1921:Plate 28).

adding new warps. The Chavez Cave bag also shares similarities with the Kayenta bags (one method of adding new warps and one rim-finish method). The chronological relationship of these bags to each other is yet to be determined by direct dating. The greatest diversity in size, form, and decoration is found in the Western San Juan (Kayenta) region, although this area has also produced the largest published sample of twined bags. Banded designs are more elaborate in the Kayenta region than in the south, and the painted designs from this region are unparalleled.

### **Looped Bags and Leggings**

Looping, also known as coil without foundation or knotless netting, was another important finger-weave technique during the Early Agricultural/Basketmaker II, when it was used to produce flexible containers and leggings (Kent 1983:47-54). Simple looping (Figure 9a) reportedly had a wide distribution in Mexico by the Middle Archaic period (MacNeish et al. 1967:196, Figure 157) and appears to be



**Figure 9.** Looping techniques: (a) simple looping; (b) loop-and-twist; (c) looping on foundation cords (adapted from Kent 1983:Figure 14c, b, and d, respectively).

present in Tamaulipas, Coahuila, the Trans-Pecos region, the Hueco area (Figure 10c), and the southern Mogollon region by the Early Agricultural period (Coffin 1932:41; Cosgrove 1947:71-72, Figure 80b; Johnson 1971:306, Figure 3; Kelly 1937:35-39; MacNeish 1958:101; Martin 1933:48, Plates XLIV, no. 1, XIV, Nos. 1 and 2; Taylor 1948:159; 1966:75). The related technique of loop-and-twist (Figure 9b), used for coarse containers and nets, has a similar distribution during this time (Coffin 1932:41; Cosgrove 1947:71-72, Figure 26b; Johnson 1971:308; Kelly 1937:38; MacNeish 1958:101; MacNeish et al. 1967:196, 218, Figure 157) (Figure 10d). None of these artifacts have been directly dated.

Another variant, looping on foundation cords (Figure 9c), is generally confined to the Mogollon and Jornada Mogollon regions. Examples that could date to the Early Agricultural period include a flexible bag decorated in the dry-dye technique that may have been associated with an AMS-dated cremation (250 B.C.-A.D. 160) from Pratt Cave in the Guadalupe Mountains (Schroeder 1983:42, 51, 122), an undated bag from Steamboat Cave in the Upper Gila also decorated in the dry-dye technique (Cosgrove 1947:72, Figure 26d) (Figure 10e), and an undated, undecorated bag from McEuen Cave (Kelly 1937:39, Figure 11, Plate XIII). The bags from Pratt Cave and Steamboat Cave are nearly identical.

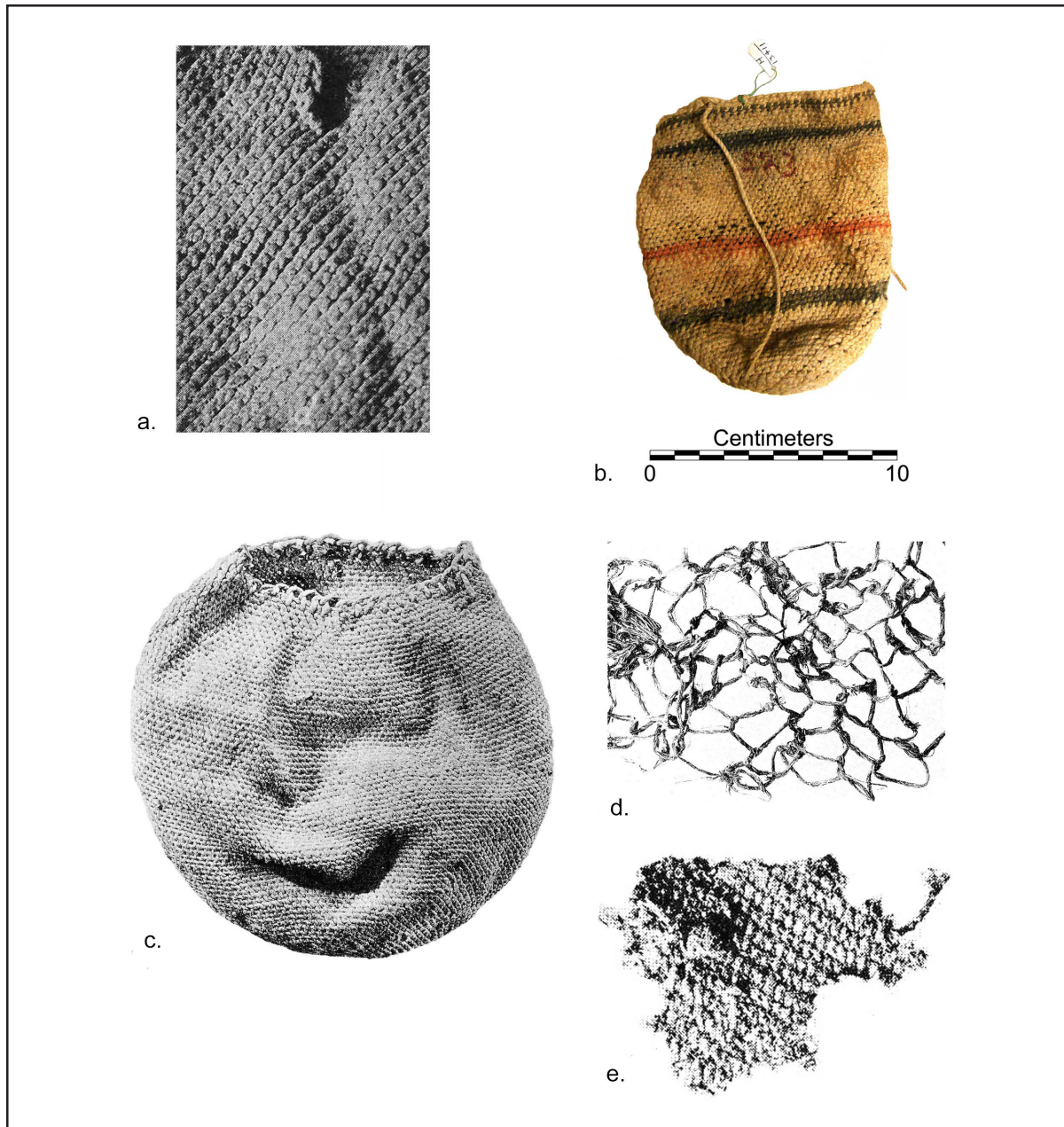
As discussed, the dry-dye technique, in which pigment was applied to a yarn as the weaving progressed, is also documented for Early Agricultural/Basketmaker II twined bags (Guernsey and Kidder 1921:71, 77). A bag from U-Bar Cave in southern

New Mexico, illustrated and described by Lambert and Ambler (1961:49, Figure 31) as “plain coiled netting” (that is, simple looping), appears from the illustration to be another possible example of looping on foundation cords. Lambert and Ambler proposed an A.D. 1350 date for the bag, but Matson (1991:291) suggests it could date to the Early Agricultural occupation, which seems feasible. Again, direct dating is needed.

Simple looping, but not loop-and-twist or looping on foundation cords, is reported from Basketmaker II sites in the central portion of the San Juan region. An example of loop-and-twist is known from a site near Dolores, Colorado, but it dates to the later Pueblo period (see Blinman 1986:60, Figure 2.7.) Fabrics worked in simple looping are reported from White Dog Cave (decorated bag) (Figure 10a), Sayodneechee Burial Cave (unidentified fragment), Kinboko Cave 1 (possible human hair legging), and Sand Dune Cave (undecorated bag) (Guernsey and Kidder 1921:77, Plate 25; Kidder and Guernsey 1919:173; Lindsay et al. 1968:88). Osborne (2004:167) also describes a looped human-hair bag from McLoyd and Graham’s unpublished collections from southeastern Utah. Unpublished examples of probable Basketmaker II looped bags are also present in the American Museum of Natural History collections from Grand Gulch, Utah (Figure 10b), and Battle Cave in Canyon del Muerto, Arizona. Decorated examples of looped bags appear to be colored by the dry-dye technique. Looped fabrics are not reported from Black Dog Cave near Moapa, Nevada, Cave du Pont near Kanab, Utah, or Falls Creek Rock Shelters in southwestern Colorado.

### Summary

Just as twining played a central role in the textile technology of the San Juan region during the Late Agricultural/Basketmaker II, looping appears to have been a very important and highly developed technique in the southern Southwest. The greatest diversity of looping techniques is reported from Coahuila, the Trans-Pecos region, and southern New Mexico. On the Colorado Plateau, looping is reported from Basketmaker II sites in the Kayenta region, Grand Gulch, Canyon del Muerto, and the Navajo Mountain area, but has not been reported from the eastern or western fringes of Basketmaker II settlement. The popularity and diversity of looped constructions in the southern Southwest and northern Mexico suggests looping may have spread northward onto the Colorado Plateau, although direct dates are necessary to test this hypothesis. More information is also needed about the early occurrence of looping in southern California before that area can be ruled out as a possible source.

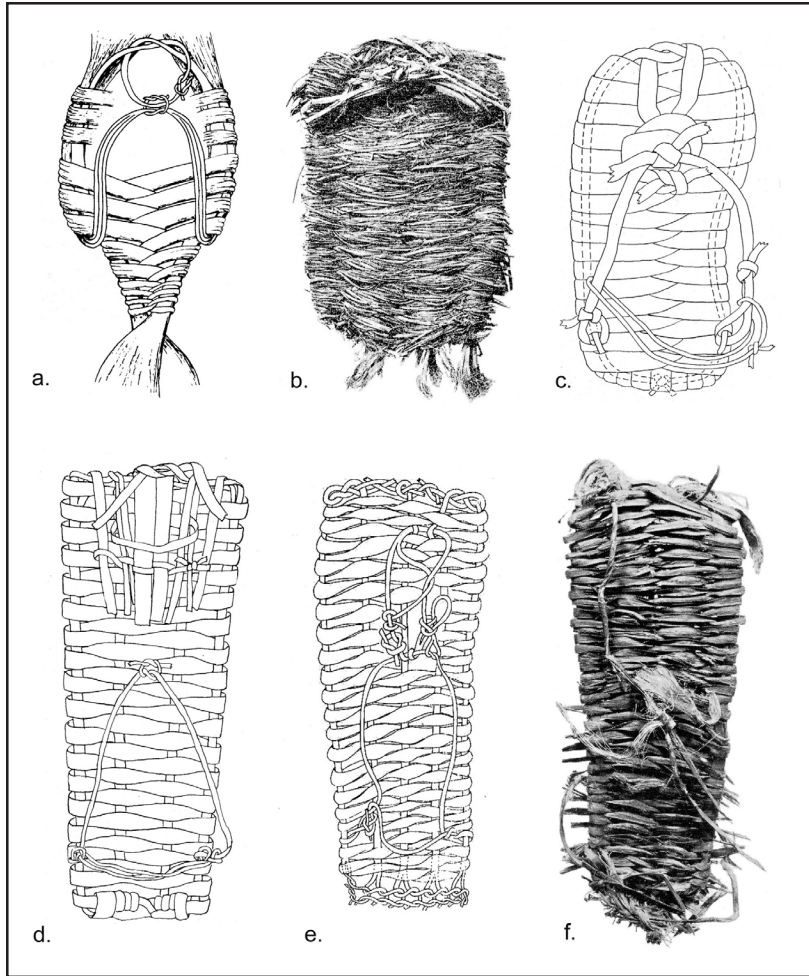


**Figure 10.** Looped artifacts: (a) close-up of bag made by simple looping, White Dog Cave, Kayenta area (adapted from Guernsey and Kidder 1921:Plate 25d); (b) bag made by simple looping, Cave 12, Grand Gulch, southeastern Utah (American Museum of Natural History catalog number H-13411, courtesy of the Division of Anthropology, American Museum of Natural History); (c) bag made by simple looping, Chavez Cave, Hueco Area (adapted from Cosgrove 1947:Figure 80b); (d) coarse carrying net made by loop-and-twist technique, Steamboat Cave, Upper Gila (adapted from Cosgrove 1947:Figure 81f); (e) bag made by looping on foundation cords, Steamboat Cave, Upper Gila (adapted from Cosgrove 1947:Figure 79e).

### Sandals

Early Agricultural/Basketmaker II people probably went barefoot much of the time, but when sandals were worn, distinctive styles were used in different areas (see Cosgrove 1947:Figure 32). Sandals appear to have served as important markers of social identity. During this time, most groups in the

Greater Southwest used some type of weft-faced plain-weave sandal (Figure 11), although there are regional differences in form and method of manufacture (Kidder and Guernsey 1919:158; Morris and Burgh 1954:65). For example, during the Archaic and Early Agricultural periods, people in the Trans-Pecos region, Jornada Basin, northern Coahuila, and probably Chihuahua typically used a short “scuffer toe”



**Figure 11.** Plain-weave (wickerwork) sandals: (a) two-warp scuffer-toe sandal with fishtail heel, Hueco area, unidentified site (adapted from Cosgrove 1947, Figure 90:Type 4b); (b) two-warp scuffer-toe sandal, Hueco area, unidentified site (adapted from Cosgrove 1947, Figure 87:Type 2b); (c) Mogollon full-length two-warp sandal, Tularosa or Cordova cave (adapted from Martin et al. 1952, Figure 88c); (d) Mogollon full-length four-warp sandal with warp elements folded back over toe, Tularosa or Cordova cave (adapted from Martin et al. 1952, Figure 90 center); (e) Mogollon full-length five-warp sandal, unidentified site (adapted from Cosgrove 1947, Figure 92:Type 12); (f) Basketmaker II four-warp sandal, Cave 1, Kinboko Canyon, Kayenta area (adapted from Kidder and Guernsey 1919, Plate 67a).

sandal that covered just the ball and instep of the foot (see Figure 11a-b). Many of these sandals had a “fishtail” heel in which the warps protruded at the rear (Cosgrove 1947:Figures 87-90, Types 1-5) (see Figure 11a).

A different style of wickerwork sandal was worn in the San Juan region of the Colorado Plateau, the Mimbres and Reserve branches of the Mogollon region, and the western Sonoran Desert. In these areas, people wore full-length wickerwork sandals that were oval to rectangular in outline and lacked the fishtail heel (see Figure 11c-f). Instead of protruding beyond the heel of the sandal, the warps of these sandals were knotted and trimmed close to the sandal body (Cosgrove 1947:Figures 91-92, Type 8; Kid-

der and Guernsey 1919:Figure 71; Martin et al. 1952:Figures 87-88; McBrinn 2002, 2005). In the Jornada Basin and some areas farther north along the Rio Grande, both the scuffer-toe and full-length styles were reportedly used by Late Archaic-Early Agricultural groups (McBrinn 2002:Tables 21-22). Scuffer-toe and fishtail sandals are not reported from the San Juan region.

Wickerwork sandals are the earliest sandal style in the Mogollon region and the predominant type from the Early Agricultural period through the San Francisco phase (Cosgrove 1947:82-98; Webster 2007:304-306). Most Mogollon wickerwork sandals are woven in 1/1 plain weave, are full-length, and lack the fishtail heel (see Figure 11c-e). Only a few scuffer-toe or fishtail sandals are reported from the Mogollon region, for example, Doolittle Cave on the Mimbres River, Bat Cave on the Plains of San Augustin, and a few sites in the San Simon region (see Cosgrove 1947). The temporal relationship of the scuffer-toe and fishtail sandals to the full-length style has yet to be determined by direct AMS dating.

Two-warp wickerwork sandals with a yucca-leaf warp and shredded fiber weft occur at nearly all Mogollon sites with perishables and are reportedly the earliest type of

plain-weave sandal in the region (see Figure 11c). This style is especially prevalent at sites in the Mimbres and Reserve areas. Wickerwork sandals with four, five, or six warps also occur in the Mogollon region. The warp elements of some of these sandals are folded over 180 degrees at the toe (see Figure 11d). Most of these multiple-warp sandals are reported from the Reserve area, and some may date to the late Early Agricultural period. A variation of this style in which the warps are not folded over at the toe also occurs in the Reserve area (see Figure 11e). These latter sandals bear a resemblance to Basketmaker II wickerwork sandals with four, five, and six warps from the Colorado Plateau (see Figure 11f). Evidence from Tularosa and Cordova caves suggests

the two-warp and four-or-more-warp varieties of wickerwork sandals are contemporaneous (Martin et al. 1952:233-235).

Although populations in the San Juan, Mogollon, Sonoran Desert, and eastern Great Basin regions used a similar ovoid form of wickerwork sandal, regional differences are seen in technological style. Basketmaker II groups in the San Juan region used plain-weave sandals with three, four, five, six, or more warps, with four and six the most common (Kidder and Guernsey 1919:158, Plate 67; Morris and Burgh 1954:65) (see Figure 11f). Early Agricultural populations in the Mogollon region reportedly used sandals with two, four, five, and six warps (Cosgrove 1947:Types 11-14) (see Figure 11c-e). Two-warp wickerwork sandals are not found in the San Juan region during this time. Strong stylistic and technological resemblances are seen among some early Mogollon and San Juan Basketmaker II four-, five-, and six-warp wickerwork sandals (Cosgrove 1947:Figure 92, Type 12 and Figure 93b; see also Kidder and Guernsey 1919:Plate 67a; Morris and Burgh 1954:Figure 34) (compare Figure 11e and 11f), whereas other styles differ considerably between these regions (compare Martin et al. 1952:Figure 90 and Kidder and Guernsey 1919:Figure 71).

Two-warp wickerwork sandals are the only style of wickerwork sandal reported from Ventana Cave and the eastern Great Basin site of Etna Cave (Haury 1950:433-435; Wheeler 1973:18-21, Figures 17-18, 41). Although two-warp wickerwork sandals were widespread across the southern Southwest, those from Ventana Cave exhibit a slightly different warp construction than those from Tularosa Cave and sites in the Upper Gila. The warps of the Ventana Cave sandals consist of a continuous leaf knotted at the heel, while those from the Mogollon region were typically fabricated from two leaves looped around each other at the toe and tied together at the heel (Martin et al. 1952:234). As noted, it has yet to be determined by AMS dating if any woven perishables from Ventana Cave date to the Early Agricultural period.

Plain-weave (wickerwork) sandals with four, five, or six warps are also the earliest style in the San Juan region during Basketmaker II (Kidder and Guernsey 1919:Figure 158) (see Figure 11f). Four-warp wickerwork sandals also occur north of the traditional Basketmaker II boundary at sites with early maize during this time (Hurst 1941:18, Plate III, Figure 26).

The most distinctive style of Basketmaker II sandal on the Colorado Plateau is the finely woven cordage sandal with a square toe, sometimes with an added decorative fringe and raised reinforcement on the sole (Figure 12). In contrast to wickerwork sandals, which were woven of yucca leaves and could be produced relatively quickly, these sandals

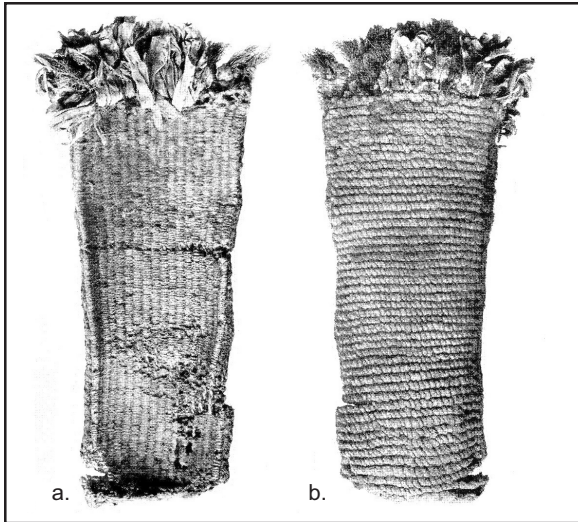
were made from highly processed yucca fiber that was spun into cordage, requiring a much greater investment of time and labor. Some of the coarser examples are woven in plain weave, but the more finely woven and elaborate sandals are twined or incorporate a combination of twined and plain-weave structures. Although a comprehensive technological study of these sandals, commonly known as twined sandals, has yet to be conducted, existing data suggest considerable stylistic and technological diversity in shape, weave structure, fringed toe construction, sandal tie configuration, and colored decoration across the Colorado Plateau (Blackburn and Williamson 1997:96; Guernsey 1931:Plate 47d; Kidder and Guernsey 1919:Plate 68b-d; Nusbaum 1922:Plates XXXVI-XXXVIII; Osborne 2004:Figures 63, 64). Basketmaker II cordage sandals occur as far east as the Chinle drainage and as far west as Black Dog Cave in southern Nevada, an area considered to be the western extent of Basketmaker II culture (Winslow 2003:308-315, Figures 27-29). They are not known to occur in the southern Basin and Range.

Twined sandals were not recovered from Falls Creek Rock Shelters near Durango, one of several differences cited by Morris and Burgh (1954:75-78) between the material culture of the Durango and Classic San Juan Basketmakers. The Falls Creek Rock Shelters produced the same general style of wickerwork sandal as more western Basketmaker assemblages, but the Durango examples lack the toe fringe found on some Classic San Juan examples (Kidder and Guernsey 1919:158, Figure 71, Type 1a). Another sandal type recovered from Falls Creek Rock Shelters, but not from any western Basketmaker II sites, is a 2/2 diagonal-twill plaited sandal with a square toe and tapered heel, which Morris and Burgh (1954:64, Figures 33, 99e) attributed to the Basketmaker II occupation (Figure 13). The twill-plaited sandals from Falls Creek are almost identical to sandals recovered from some of the Prayer Rock caves, attributed to Basketmaker III (Morris 1980:Figures 79a, c). None of the Falls Creek or Prayer Rock sandals have been directly dated, so it is unclear where they fall in the Basketmaker sequence. It currently appears that the twined sandals of the San Juan region may be more closely tied to a Great Basin perishable tradition and the Basketmaker twill-plaited sandals from Falls Creek may be more closely linked to the perishable traditions of Trans-Pecos Texas and northeastern Mexico. However, a large sandal sample must be directly dated to test this hypothesis.

### Atlatls

Ferg and Peachey (1998) provide a good summary of atlatl diversity in the Greater Southwest during





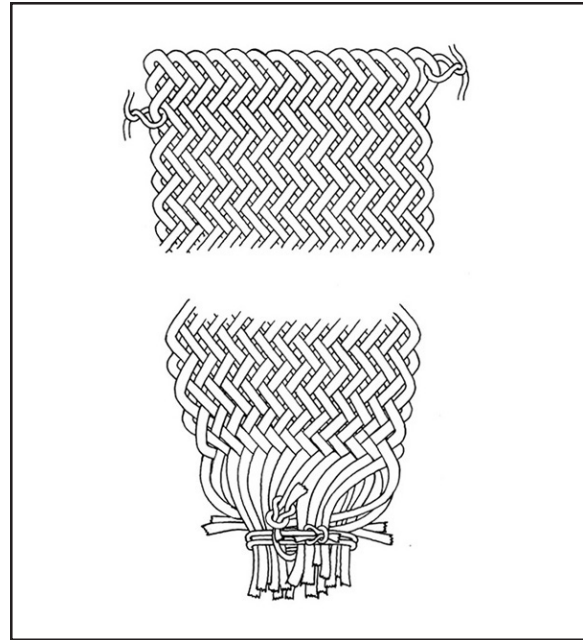
**Figure 12.** Twined cordage sandal with buckskin fringe, Cave I, Kinboko Canyon, Kayenta region: (a) upper face; (b) lower face, showing raised reinforcement on sole (adapted from Kidder and Guernsey 1919, Plate 68b, c).

the Late Agricultural/Basketmaker II, and much of the following discussion is summarized from their work. The key attributes of atlatl style and technology that vary by region are: (1) how the butt of the dart articulates with the atlatl (described as male, female, or mixed); (2) the construction of the grip, including the presence and type of finger notches and finger loops; and (3) the presence and types of accessories and decoration.

Male atlatls have a projecting hook or spur on the interior surface or face, whereas female atlatls lack a projecting hook and have a groove carved into the top. Mixed atlatls have a groove ending in a hook or spur. Flush spurs are typically a northern trait, and projecting spurs a southern one. The two types overlap in the Hueco-Guadalupe Mountains area (Ferg and Peachey 1998:191, Figure 8).

The geographical distribution of grip types is less well defined. In general, carved finger notches with buckskin finger loops are more common in the north, carved finger notches in the south, and straight-sided boards in the Hueco-Guadalupe Mountains and Coahuila. Ferg and Peachey (1988:191) suggest the straight-sided boards once held stone or shell finger loops secured with elaborate bindings, similar to those found on Aztec atlatls.

Accessories and decoration also vary by region. The use of stone charms is considered a San Juan trait, but pictographs from Chihuahua suggest charms may also have been used in this region (Ferg and Peachey 1988:191). Decoration with red pigment is characteristic of atlatls from southern Arizona, the Hueco-Guadalupe mountains of southern New Mexico and West Texas, and the Mexican states of Chihuahua, Coahuila, and Sonora. This type of decora-



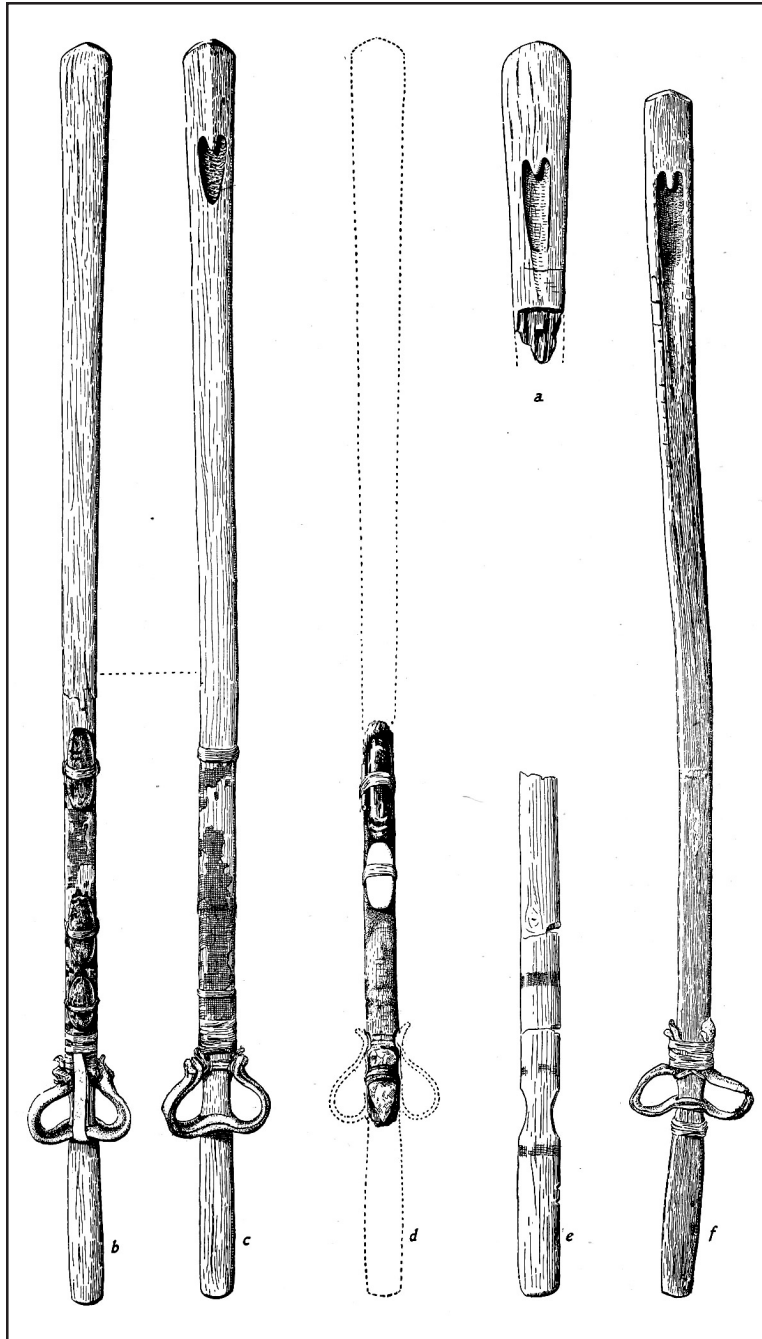
**Figure 13.** Twill-plaited sandal, 2/2 weave, Falls Creek Rock Shelters (North Shelter), Durango area (adapted from Morris and Burgh 1954, Figure 33).

tion is also found on Great Basin atlatls, but is not documented on atlatls from the San Juan region. Incised designs are also more of a southern pattern.

Atlatls from the San Juan region typically have flush spurs, elaborate buckskin finger loops, and as many as four stone charms lashed to the back of the board (Figure 14). All lack red pigmentation and most lack incised designs. A few deviations from this pattern are reported from Broken Roof Cave (possible projecting spur), Canyon del Muerto (definite projecting spur), and Falls Creek Rock Shelters (incised designs) (Cressman 1942:69, Figure 93a; Guernsey 1931:72; Morris and Burgh 1954:68, Figure 43). Another atlatl from Canyon del Muerto has the more typical flush spur. Atlatls from the Mogollon region resemble those from the north but are thought to lack the stone charms (Ferg and Peachey 1998:189, Table 1).

A complete atlatl from McEuen Cave in the southern Mogollon region exhibits a mix of northern and southern characteristics (Ferg and Peachey 1998:182, 191, Table 1). This atlatl produced a calibrated AMS age of 761-260 B.C. (Moreno 2000:Table 3). Like atlatls from the San Juan region, the McEuen example has a flush spur and finger loops. Its hide/fur charm is also more typical of northern atlatls. However, the board is painted red, a typical southern feature. Kelly (1937:67) noted its similarity to atlatls from the Hueco area.

Atlatls from the Hueco and Guadalupe mountains exhibit a broad mix of northern and southern attributes. Flush and projecting spurs, grips with



**Figure 14.** Atlatls with flush spurs, buckskin finger loops, and stone charms from White Dog Cave, Kayenta region: (b) and (c) are opposite faces of same atlatl (adapted from Guernsey and Kidder 1921, Plate 33).

finger notches, finger notches with finger loops, boards with straight edges, red paint, incised designs, and a stone charm are reported from various examples from this region (Ferg and Peachey 1988:189). Farther south, a mixed-type atlatl with red paint and shallow finger notches is reported from Chihuahua, and both mixed and male-type atlatls with variable grips are known from Coahuila (Ferg

and Peachey 1988: 190). A mixed-type atlatl with a ventral groove and projecting spur, opposed finger notches, and traces of red paint, dated to 1502 B.C., was recovered from Ten January Cave in the Sierra Pinacate of Sonora (Ferg and Peachey 1998:175). This is one of the few perishable artifacts reported from the Sonoran Desert.

### *Summary*

Because atlatls were almost certainly made and used by men, they provide an opportunity to explore male learning networks at various scales. Large-scale networks can be examined through the regional distributions of basic atlatl-dart articulation methods and grip types, while low-visibility attributes, such as finger-grip construction, can be used to investigate male learning networks at smaller scales. Ambler's (see Lindsay et al. 1968: 64-67) detailed description of the atlatl from Sand Dune Cave in northern Arizona provides a model for this level of analysis (Phil Geib, personal communication 2008).

The Hueco-Guadalupe Mountains area is one region where northern and southern atlatl styles overlapped (Ferg and Peachey 1988:Figure 8). Other significant atlatl patterns are: (1) the similarities of atlatls from the San Juan and Mogollon regions, and (2) southern influences in atlatls from Falls Creek Rock Shelters, Canyon del Muerto, and Broken Roof Cave. These patterns suggest the existence of shared, large-scale male learning networks between the San Juan and Mogollon regions.

### **Basketry**

#### *Coiled Basketry*

Coiled baskets offer several low-visibility attributes for study, including foundation structure, splicing techniques, and the ways in which the elements articulate, for example, interlocking or non-

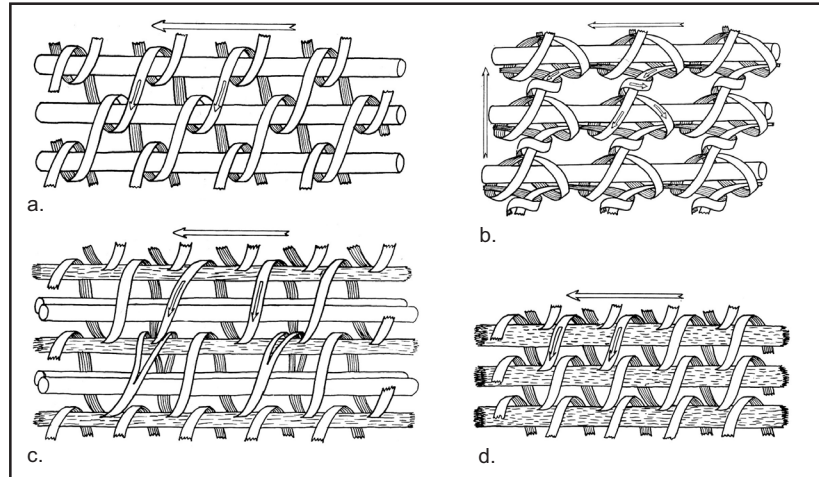
interlocking stitches (Adovasio 1977). In this section, some broad geographical patterns for three common foundation structures in the Greater Southwest during the Archaic and Late Agricultural/Basketmaker II are summarized (see Adovasio 1970; Morris and Burgh 1941; Weltfish 1932).

#### *Coiled Baskets with One-rod Foundations*

Close coiling on a one-rod foundation (Figure 15a) is the oldest coiling technique in western North America. An example from Cowboy Cave in southern Utah, north of the San Juan region, produced an AMS date of 7960±50 before present, making it the earliest directly dated coiled basket from the Americas (Geib and Jolie 2008). Adovasio (1970:16) postulated that one-rod coiling, together with twining, diffused southward into Mexico during the Middle Archaic period, forming the basis for subsequent coiled basket traditions in the Greater Southwest.

In the San Juan region, one-rod coiling was associated with Early Archaic Desha levels at Dust Devil and Sand Dune caves (Lindsay et al. 1968:99, 102, 119, 120). This coiled basket structure also occurs in Basketmaker II assemblages, but in much smaller proportions than the more common two-rod-and-bundle coiling (Kidder and Guernsey 1919:168, Plate 76a; Morris and Burgh 1941:7). One variant of one-rod coiling found at Basketmaker II sites is spaced coiling on a one-rod foundation (Figure 15b), which was used to make sifter-like baskets (Morris and Burgh 1941:17-18, Figure 5g; Nusbaum 1922:96-97).

A few close-coiled baskets with a one-rod foundation are reported from Mogollon sites dating to the Early Agricultural period. The earliest well-dated Mogollon example comes from Cienega Creek near Point of Pines, where a coiled basket with a one-rod-foundation basket and noninterlocking stitches was associated with a cremation dated circa 100 B.C.-A.D 100 (Haury 1957:19). The same cremation also yielded a coiled basket with a two-rod-and-bundle foundation. Another possible Early Agricultural period (or earlier?) example of one-rod basketry with interlocking stitches is reported from Bat Cave (Dick 1965:71-72), although there could be problems with the dating (Wills 1988). Two complete, undated close-coiled baskets with a one-rod



**Figure 15.** Coiled basket foundation structures: (a) close coiling on a one-rod foundation with interlocking stitches; (b) spaced coiling with an intricate stitch on a one-rod foundation with interlocking stitches; (c) close coiling on a two-rod-and-bundle foundation with (primarily) noninterlocking stitches; (d) close coiling on a bundle foundation with noninterlocking stitches (adapted from Morris and Burgh 1941, Figures 3a, 5g, 3j, and 3e, respectively).

foundation from McEuen Cave, one with a woven-in black design, the other with a red painted decoration applied as the coiling progressed (Kelly 1937:22) may also date to this early time period. The method of applying color to the latter basket is reminiscent of the dry-dyeing technique used to decorate Early Agricultural period twined and looped bags.

Hyland and Adovasio (2000:147) argue for the presence of one-rod coiling in the Jornada Mogollon region by 3900-2500 B.C. Undated coiled baskets with a one-rod foundation and split and interlocked stitches that could date to the Early Agricultural period are reported from Ceremonial Cave and Chavez Cave in the Hueco area (Cosgrove 1947:99, Figures 33h-i, 94a-b). Two sites in the Guadalupe Mountains, Burnet Cave and Cremation Cave, yielded cremated human bones in association with one-rod coiled baskets (Howard 1935:68; Mera 1938). The artifacts from Cremation Cave resemble those from Pratt Cave in the Guadalupe Mountains, and they could be roughly contemporaneous. A cremation in a looped bag from the latter site produced a radiocarbon date of 2200±60 years before present (Schroeder 1983). This is roughly the same time as the basket cremations from Cienega Creek near Point of Pines.

#### *Coiled Baskets with Two-rod-and-bundle Foundations*

Close coiling with a two-rod-and-bundle foundation and non-interlocking stitches (Figure 15c) was the most common coiling technique in the San Juan

region from Basketmaker II into the Pueblo III (Morris and Burgh 1941:12). Most of the coiled basketry recovered by Kidder and Guernsey at Basketmaker II sites in the Kayenta region were of this type (Guernsey and Kidder 1921:59). These baskets assumed various forms, including carrying baskets, trays, bowls, and trinket baskets. None of these baskets have been directly dated, but the tumpline attachment on an elaborately decorated carrying basket from Pictograph Cave in Canyon del Muerto yielded a calibrated date span of 1820-1540 years before present, or A.D. 130-410 (Smiley 1997:30, Figure 2.13, Table A.1). Basket assemblages from the far western Basketmaker II sites of Cave du Pont (Nusbaum 1922:90) and Black Dog Cave (Winslow 2003:208-216) were also dominated by two-rod-and-bundle coiled basketry. The earliest reported direct date on a two-rod-and-bundle basket (1890-1115 B.C.) comes from Firebrand Cave in southern Nevada (Blair and Winslow 2006:25; Winslow 2007).

In contrast to the predominance of two-rod-and-bundle foundations at these western Basketmaker sites, only one basket made in this technique was identified at Falls Creek Rock Shelters near Durango. Instead, that assemblage was dominated by half-rod-and-bundle basketry, which has ties to earlier and more northern basket traditions (Morris and Burgh 1954:67).

In the Mogollon region, coiled baskets with two-rod-and-bundle foundations are also the most prevalent type during this period. Significant quantities were recovered from pre-pottery levels at Tularosa Cave (Martin et al. 1952:250), and, as noted, a coiled basket with a two-rod-and-bundle foundation was associated with an Early Agricultural period cremation at Cienega Creek (Haury 1957:19). In the Sonoran Desert, the oldest basketry from Ventana Cave is reportedly of this type (Haury 1950:406). As noted, however, Haury (1950:358, 411, 443) questions the presence of preceramic perishables at the site.

In the Jornada Mogollon region, Hyland et al. (2003:342) reported two-rod-and-bundle-foundation coiling in Fresnal levels at Pendejo Cave in the Tularosa Basin by roughly 1200 B.C. These baskets were not directly dated. Two-rod-and-bundle coiling is also present in the Hueco area, but is a minority type. Twenty percent of the Hueco coiled basketry reported by Cosgrove (1947:105, 167) had a two-rod-and-bundle foundation, compared to 90 percent of the coiled basketry from the Mimbres-Gila area.

In the Guadalupe Mountains of southern New Mexico, coiled baskets with a two-rod-and-bundle foundation were used as containers for inhumations and cremations. At Burnet Cave, a large basket tray contained human bones (Howard 1935:67-69), and another two-rod-and-bundle basket served as a lid

(Cosgrove 1947:162). At the same site, a two-rod-and-bundle coiled basket contained a bag with cremated bones. Mera (1938:50, Plate 14, nos. 2, 3, 7) also reported two-rod-and-bundle basketry with cremations at Cremation Cave and with an inhumation at Burial Cave.

Only one example of two-rod-and-bundle coiled basketry is known from Chihuahua, Mexico (King 1974:106). This foundation type is not reported from Taylor's (1966) Coahuila caves or from the Trans-Pecos region (Andrews and Adovasio 1980; McGregor 1992). Its absence from the Trans-Pecos region and Coahuila seems to preclude a southeastern origin for this foundation type in the U.S. Southwest.

#### *Coiled Baskets with Bundle Foundations*

In contrast with two-rod-and-bundle coiled basketry, the use of a bundle foundation (Figure 15d) appears to have a more southern origin. This foundation type is rare in the Four Corners region until the Protohistoric period, and is not characteristic of Basketmaker II sites on the Colorado Plateau (Morris and Burgh 1941). A recent survey of the Mogollon perishables literature failed to reveal any Early Agricultural period examples of bundle-foundation coiling in this region (Webster 2007). Bundle-foundation coiling was the most popular foundation structure at Ventana Cave, but most, if not all, of these specimens appear to date to the later O'odham occupation (Haury 1950:402-403).

Hyland and Adovasio (2000:147; see also MacNeish 1993) date the appearance of bundle-foundation coiling in the Jornada Basin to the Fresnal phase, circa 2500-900 B.C. Another technique thought to be of southern origin, plaiting, also appeared in the region during this time. Hyland and Adovasio (2000) link the appearance of bundle-foundation coiling and plaiting to new southern projectile point styles, changes in settlement and subsistence patterns, and the appearance of new cultigens in the region.

Bundle-foundation coiling is the principal basketry technique at Cosgrove's (1947:105) Hueco sites, and it is also reported from Early Agricultural contexts in the Guadalupe Mountains (Ferdon 1946:15, Plate VII; Howard 1935:68-69; Mera 1938:Plate 14). At Pratt Cave in the Guadalupe Mountains, a fragment of bundle-foundation basketry was among the materials found in the vicinity of a cremation that produced a radiocarbon date of 2200±60 before present (Schroeder 1983:42).

Bundle-foundation coiling with noninterlocking stitches appears to be quite ancient in Coahuila and the Trans-Pecos region, where examples are attributed to the Middle and Late Archaic periods (Andrews and Adovasio 1980; McGregor 1992; Setzler 1932:138; Taylor 1966). This is also reportedly

the earliest coiled basketry tradition in the Tehuacan Valley, where it was associated with El Riego phase (6500-4800 B.C.) contexts (MacNeish 1962:33; MacNeish et al. 1967:10, 11, 164). Reliable AMS assays for this phase are lacking, however, and recent dating has shown many artifacts from the Tehuacan Valley to be much younger than originally claimed (Phil Geib, personal communication 2008).

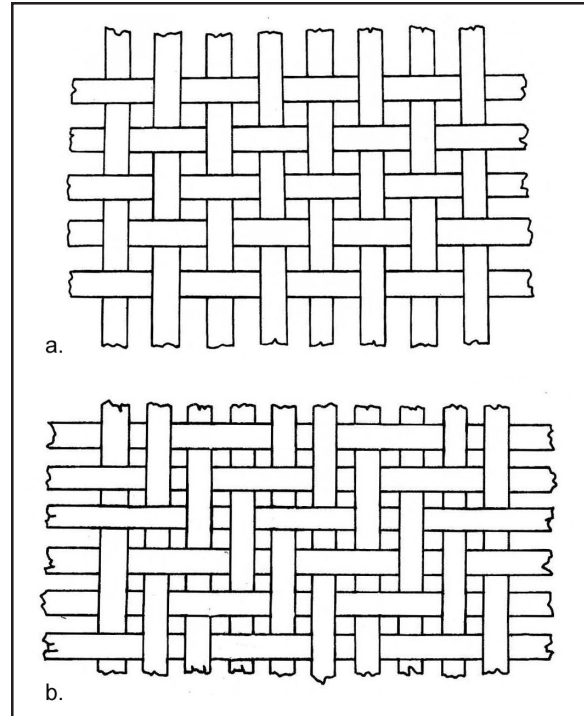
#### *Plaited Basketry*

Adovasio (1971:105) has argued that the roots of plaiting in the Greater Southwest lie in Mexico. Plaiting was reportedly the most common basketry technique in early levels (circa 5000-6000 B.C.) at Taylor's (1966:62, 73-74, Figures 15-17) Coahuila caves, where it appeared in the form of narrow bands and sandals. Plaiting was also reportedly present in the Mexican state of Tamaulipas prior to 3000 B.C. (MacNeish et al. 1967:166). Again, direct dating of specimens is necessary to confirm these early dates. In the Tehuacan Valley, MacNeish (1962:38-40; also, MacNeish et al. 1967:12, 164, 166) recovered twill-plaited basketry from agricultural, ceramic-producing villages dated to the Santa Maria period, circa 900-200 B.C.

Both simple plaiting, also known as checkerweave (Figure 16a), and twill plaiting, in which the weaver varies the rhythm to produce a diagonal design (Figure 16b), were common early in the Trans-Pecos region. It has been suggested that simple plaiting (1/1) from Hinds Cave in the lower Pecos Valley could date to Paleoindian times, and 2/2 twill plaiting is reported from levels dated to 7500 B.C. (Andrews and Adovasio 1980:333; McGregor 1992:64). Simple and twilled plaited mats were reportedly common in the Trans-Pecos region after 4000 B.C. (Andrews and Adovasio 1980:366).

Adovasio (1970:16) has proposed that plaiting entered the U.S. Southwest through the southern Jornada Basin. The technique was reportedly present in the region as early as the Fresnal phase, circa 2500-900 B.C. (Hyland and Adovasio 2000:147, 151-152). Evidence from the Hueco-Guadalupe Mountains area supports the presence of plaiting there by the Early Agricultural period. Mera (1938:52, Plate 13, no. B3) reported a 1/1 plaited yucca tray with a twig woven into the rim, possibly an early ring basket, from Burial Cave, a site that appears to date to the Early Agricultural period, and Cosgrove (1947:37, 161, Figure 101a) described a square pail-like basket woven in 1/1 simple plaiting ("checkerweave") in association with a flexed "basket-maker" burial from Cave 1 in the Hueco Mountains.

Despite the popularity of plaiting east of the Rio Grande during this period, it appears not to become common in the Mogollon Highlands or in other



**Figure 16.** Plaiting structures: (a) 1/1 simple plaiting; (b) 2/2 twill plaiting (adapted from Adovasio 1977, Figures 117 and 118, respectively).

Mogollon branches until considerably later (Adovasio 1970:104). Nor does plaiting seem to be an early technique at Ventana Cave (Hauray 1950:401-402). Based on the limited evidence from the southern deserts, plaiting appears to have been less popular in the Hohokam region than in other parts of the Southwest.

Current evidence from the Colorado Plateau suggests twill-plaiting may have been more popular among eastern Basketmaker groups than in the west. The Falls Creek Rock Shelters yielded three 2/2 twill-plaited sandals, a 2/2 twill-plaited "tule" tumpband, and a 2/2-twill braided rabbit-hair sash (Morris and Burgh 1954:Figures 37-38, 100b). The plaited sandals and tumpband from Falls Creek are currently the earliest reported examples of these artifact types on the Colorado Plateau. They have not been directly dated, however, so this may change as more plaited artifacts are dated. The only twill-plaited artifacts presently identified from more western Basketmaker II sites are two coarsely woven flexible bag-like baskets woven in 2/2 twill from White Dog Cave and Kinboko Cave 1 (Guernsey and Kidder 1921:63) and several 2/2-braided bands of human and animal hair from various sites across the region (Hauray 1945:37, Plate 14; Judd 1926:Plate 54b). Twill plaiting is absent from the eastern Great Basin (Adovasio 1970:13), but its early presence in Mexico and the Trans-Pecos region (Andrews and Adovasio 1980:366-

367) suggests the technique may have spread onto the Colorado Plateau from the east or southeast. A large sample of twill-plaited artifacts from different regions must be dated to test this hypothesis.

### *Summary*

Two-rod-and-bundle coiling was the principal coiling technique in the San Juan and Mogollon regions during the Late Agricultural/Basketmaker II, a pattern that continued into Pueblo III times. Bundle-foundation coiling was the dominant coiling technique in the Hueco Mountains and Trans-Pecos Texas. Plaited basketry was also common in the Hueco and Trans-Pecos regions. The Hueco-Jornada Mogollon region was the major region of overlap for these basketry techniques during the Early Agricultural period, just as it was for wickerwork sandals and atlatl styles (Cosgrove 1947:Figure 32; Ferg and Peachey 1998:Figure 8).

### **Major Perishable Patterns and Boundaries in the Greater Southwest**

A broad Early Agricultural adaptation has been documented for the Greater Southwest roughly bounded by the eastern Great Basin on the west, Utah and Colorado on the north, western Oklahoma and the Trans-Pecos region on the east, and inland northern Mexico on the south (Baker and Kidder 1937; Haury 1957; Howard 1932, 1935; Guernsey and Kidder 1921; Kelly 1937; Kidder and Guernsey 1919; Mera 1938; Moreno 2000; Schroeder 1983). Patterns common to this tradition include the use of caves for burial purposes, temporary camps, and storage; interment of the dead in woven containers (inhumations or cremations in coiled baskets or flexible fiber bags); and a distinctive suite of perishable material culture, including twined rabbit-fur blankets, coarse plain-weave (wickerwork) sandals, nets, coiled baskets, twined and looped bags, and wooden fending sticks and atlatls. Most of these assemblages also contained maize, although not all groups were fully committed to agriculture.

Between 1000 and 500 B.C., this pattern became more localized in different parts of the Southwest. Adovasio (1971:106; see also Hyland and Adovasio 2000) has suggested that Southwestern textile and basketry traditions were stimulated early by diffusion from the eastern Great Basin and later by developments from Mexico. In his reconstruction, perishable traditions, such as twining and one-rod coiling, spread from the Great Basin into the Southwest and northern Mexico, and bundle-foundation coiling and twill plaiting spread north from Mexico. However, the recent dating of a 9,000-year-old

coiled basket with a one-rod foundation from Cowboy Cave in southern Utah raises questions about the Great Basin origin of coiling, and highlights the importance of direct dating (Geib and Jolie 2008).

The origins of Basketmaker II culture on the Colorado Plateau are still widely debated, with influences suggested from such diverse regions as the northern Colorado Plateau (Matson 1991), southern Arizona and New Mexico (Berry 1982; Matson 1991; Morris and Burgh 1954:85), northern Mexico (Guernsey and Kidder 1921:115), California (Guernsey and Kidder 1921:62; Kidder and Guernsey 1919:210), the eastern and northern Great Basin (Adovasio 1971:103-104; Cressman 1942:3-4), and the northern plateau (Osborne 2004:88, 520). As noted by Geib (2004:280; also in his chapter in this online presentation), the degree of cultural continuity from the Archaic period to Basketmaker II on the Colorado Plateau has yet to be resolved. Basketmaker II textile and basketry assemblages are characterized by a suite of perishable artifacts that include twined robes (fur, feather, or both), twined and looped bags, twined mats, twined aprons, flat braided bands and sashes, coiled basketry dominated by two-rod-and-bundle foundations, and a diversity of sandal styles—coarse wickerwork (plain weave) sandals with three-or-more warps across the region, fine square-toed cordage sandals in the western and central areas, and coarse twill-plaited sandals in the east.

Based on current evidence, western Basketmaker II perishable traditions appear to show closer affinities to Great Basin and Californian coiling and twining industries, while the eastern Basketmaker tradition, exemplified by the Falls Creek Rock Shelters assemblage, appears to combine a regional twining tradition with coiled basketry more characteristic of Archaic traditions on the Colorado Plateau and twill-plaiting with possible connections to the south. Larger samples of directly dated artifacts are needed to refine these spatial patterns.

Early perishables from the Mogollon region are reported from rockshelters on the margins of the Mimbres, Pinos Altos, and southern Mogollon mountains and the Plains of San Agustín (Cosgrove 1947; Dick 1965; Huckell 1995; Martin et al. 1952; Martin et al. 1954; Moreno 2000; Wills 1988). Based on stylistic criteria, most of these artifacts appear to date to 800 B.C.-A.D. 150, the Cienega phase of the Early Agricultural period, but more direct dates are needed. Hallmarks of the Early Agricultural tradition in the Mogollon region include twined rabbit-fur robes, twined and looped bags, two- and four-warp wickerwork sandals, and coiled baskets with one-rod, two-rod-and-bundle, and bundle-with-rod-core foundations. Many of these technologies persist in the region throughout the first millennium A.D. (Webster 2007).

The lower Rio Grande Valley of present-day northern Chihuahua, West Texas, and southern New Mexico (also known as the "Hueco area") exhibits a blend of Cochise and Trans-Pecos traditions, suggesting a high degree of population mobility and social interaction during the Late Archaic and Early Agricultural periods (Cosgrove 1947; McBrinn 2002). A mixture of atlatl styles, wickerwork sandals (two- and four-warp, some with fishtail heels), coiled basket techniques (including two-rod-and-bundle foundation and bundle foundation), plaited baskets and mats, and many other perishable artifacts have been recovered from sites in the region. Adovasio (1970:19-23; see also Hyland and Adovasio 2000) considered this area the dispersal point for many Mexican perishable technologies into the Southwest and linked the northward expansion of Trans-Pecos-based technologies, such as plaited baskets and mats, bundle-foundation coiled baskets, and wickerwork sandals with fishtail heels, to the diffusion of agriculture from Mexico. Hyland and Adovasio (2000:158; also, Hyland 1997) interpreted the presence of these artifacts in the southern Jornada Basin as evidence for multiple population migration and hybridization events. Atlatl and sandal distributions in the Hueco and Highland Mogollon regions (Cosgrove 1947:Figure 32; Ferg and Peachey 1998:Figure 8) suggest the presence of a social boundary between these groups.

Perishable data from the Sonoran Desert are extremely limited at present. The little evidence that does exist suggests the Sonoran Desert perishable tradition derives primarily from an admixture of eastern Great Basin and northern Mexican traits (see sandal and atlatl discussions). Differences in coiled basketry and wickerwork sandals from Ventana Cave and early sites in the Mogollon region hint at the presence of a technological and stylistic boundary between the western Sonoran Desert/eastern Great Basin and the Mogollon region by the Early Agricultural period. More data are needed from the western region to test this hypothesis.

Similarities among perishable assemblages from some sites in the Mogollon region and the Kayenta area of the Colorado Plateau suggest a historical relationship between Early Agricultural populations in these regions. The San Juan Basketmaker II perishable tradition shows stronger influences from the Great Basin, such as a greater use of twining, whereas Mogollon traditions incorporate influences from the Trans-Pecos area and northern Mexico, such as two-warp wickerwork sandals. Differences between the Mogollon and Kayenta regions are offset by their many similarities, however, such as the shared use of four-or-more-warp wickerwork sandals and the predominance of two-rod-and-bundle coiled basketry in both regions. This close relationship in perish-

able technologies continues through the prehispanic sequence (Webster 2007).

Assemblages from White Dog Cave and Kinboko Cave 1 in the Kayenta region and McEuen Cave in southeastern Arizona provide a case in point. Commonalities include decorated twined and looped yucca bags, looped human hair leggings, narrow twined bands used to tie fur blankets around inhumations, and plain-weave (wickerwork) sandals with three-or-more warps that lack the fishtail heel. The atlatl from McEuen Cave shares the heart-shaped groove, flush hook or spur, buckskin finger loops, and accessory charm with atlatls from the San Juan region (Ferg and Peachey 1998:189; Guernsey and Kidder 1921:Plate 33f; Moreno 2000:348). The projectile points are also quite similar (Matson 1991). Further, the McEuen assemblage exhibits features not found in the north, such as red pigment on the atlatl and two-warp wickerwork sandals.

Another shared pattern between McEuen Cave and the San Juan region during the Early Agricultural/Basketmaker II is the mortuary practice of interring inhumations in twined bags. Although this was common in the Kayenta area of the Colorado Plateau, it was not the predominant burial pattern in the southern Southwest, where both cremation and inhumation were practiced and various forms of containers were used.

For example, human cremations were interred in coiled baskets at several sites in the southern Southwest, including Cienega Creek in eastern Arizona (Haury 1957) and Pratt Cave (Schroeder 1983:234), Cremation Cave (Mera 1938:41-43), and Burnet Cave (Howard 1935:67-69) in the Guadalupe Mountains of the Hueco area. At Burnet Cave, one cremation was interred with an atlatl in a coiled basket with a two-rod-and-bundle foundation, and another was deposited in a coiled basket with a one-rod foundation. The same two foundation structures were reported for the coiled baskets from Cienega Creek.

Woven bags were also used to hold cremations in the southern Southwest. A cremation in a twined bag is reported from Burnet Cave (Howard 1935:67), and a cremation from Pratt Cave may have been associated with a looped bag (Schroeder 1983). An infant burial at McEuen Cave was also associated with a looped bag (Kelly 1937:35, 38). Therefore, although the McEuen Cave assemblage exhibits strong similarities to some northern Basketmaker II assemblages, it also fits comfortably within the broader patterns of the southern Southwest.

With AMS dates of 761-260 B.C. (atlatl), 790-400 B.C. (cradle), and 400-180 B.C. (twined bag), the McEuen Cave assemblage appears to overlap northern Basketmaker II assemblages with comparable suites of material culture. AMS-dated Basketmaker

II burials from the Kayenta area fall into the range of 500 B.C.-A.D. 1 (Coltrain et al. 2007:Table 1). The direct AMS dating of a large sample of perishable artifacts from McEuen Cave and the Kayenta alcoves would help clarify the time depth of relationships between northern and southern Early Agricultural populations and refine understanding of the directional movement of influences.

Morris and Burgh (1954:75-78) observed several differences in the material culture of the Durango and Kayenta area basketmakers, including: (1) the absence of twined sandals, decorated baskets, plain-woven and looped fabrics, fending sticks, and elaborate hair treatments at Falls Creek Rock Shelters; (2) the absence of (twill-) plaited sandals and tumpbands in the Kayenta area; and (3) an emphasis on different coiled basketry structures in these regions. Despite these differences, a 70 percent correlation in the material culture of these regions was noted. More recently, Matson (1991) has argued for ethnic differences among these groups, suggesting western Basketmaker II populations were primarily composed of San Pedro Cochise populations who migrated from southern Arizona, bringing agriculture, southern projectile point styles, and two-rod-and-bundle basketry, among other attributes, whereas eastern Basketmaker II groups were descended from Colorado Plateau Archaic groups.

The perishable record suggests a more complicated picture for Basketmaker II origins. Although some western Basketmaker II material culture traditions may derive from the south, others, such as twined sandals, decorated coiled baskets, and hide industries, suggest strong influences from the Great Basin, the northern plateau, or California. Matson (1991) has argued that the principal coiled basketry tradition of the western Basketmakers, two-rod-and-bundle coiling, was introduced from southern Arizona or northern Mexico, but there is currently little direct evidence to support that view. This is a relatively unimportant foundation type at Ventana Cave, and examples are lacking from northern Mexico. The direct dating of a large sample of specimens is needed to determine if two-rod-and-bundle coiling is earlier in the southern Mogollon and Jornada Mogollon regions than on the Colorado Plateau.

Adovasio (1971:103-105) has argued that two-rod-and-bundle coiling developed in situ on the Colorado Plateau, but recent AMS dating is revising this. Presently, the earliest directly dated example of two-rod-and-bundle basketry is reported from southern Nevada (Blair and Winslow 2006; Winslow 2007),

where a fragment from Firebrand Cave produced a calibrated date of 1890-1115 B.C. This suggests the eastern Great Basin or southern California as a possible source for the technique, as well as some western Basketmaker II populations. The designs and forms of Basketmaker II two-rod-and-bundle coiled baskets from the Kayenta area also suggest affinities to California (Guernsey and Kidder 1921:62; Kidder and Guernsey 1919:210; see also Washburn and Webster 2006:260). Linguistic evidence further supports a California connection (Matson 1991:319).

As noted by Morris and Burgh (1954:68) and Matson (1991:47), the half-rod-and-bundle coiling technique of the eastern Basketmaker is related to Late Archaic traditions on the Colorado Plateau and the eastern Great Basin, as well as to the later Fremont tradition. However, it may be too simplistic to paint Basketmaker societies at the eastern end of the Colorado Plateau as a purely northern group. The presence of several twill-plaited artifacts at Falls Creek Rock Shelters raises the possibility of connections with the south or southeast.

At least some regional variability in Basketmaker II perishable traditions is undoubtedly attributable to social factors. For example, Basketmaker II textiles and baskets from the Kayenta region (and the central San Juan region as a whole) are more highly decorated and functionally and technologically diverse than those from the Durango area (Webster and Hays-Gilpin 1994). The greater population density in this core region and increased opportunities for social interaction likely promoted a more active role for clothing and baskets in communicating social information through ritual and public display (see Geib 2004:280).

If Basketmaker II culture is not unified, which seems to be the case, perishable studies offer the opportunity to explore Basketmaker origins and influences at multiple levels of analysis. The wide range of Basketmaker perishable artifacts presumably made and used by people of different genders—atlatls and possibly sandals by men, and twined bags, coiled baskets, and aprons by women—provides an avenue to compare Basketmaker II learning networks at various scales. A major study of the technological style of Early Agricultural/Basketmaker II perishables, in conjunction with the direct dating of large numbers of these artifacts, would greatly enhance current understanding of the cultural origins and identities of these populations and the processes of ethnogenesis linked to the adoption and intensification of agriculture.



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