

# ***WALKING THE LINE: A PRELIMINARY SANDAL CHRONOLOGY FROM COAHUILA AND SOUTHWESTERN TEXAS***

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## ***Abstract***

The excellent preservation afforded by dry caves in the Cuatro Ciénegas basin of Coahuila and the Lower Pecos and Big Bend regions of Texas permitted the development of basic sandal typologies appropriate to each region. The chronological sequence, when considered at all, was based on stratigraphic relationships and subjective interpretations until 1988 when a series of radiocarbon dates obtained from Coahuila cave excavations was published. More recent radiocarbon assays of specimens from small shelter excavations and private collections help bridge the gap between the Coahuila sequence and the relative chronology assumed for the Lower and Trans-Pecos regions. Plaited two-warp sandals are the most common type in all regions where they were produced en masse throughout the dated sequence. Two dates place the V-weft variation on the plaited type at the early end of that range. Checkerpad sandals, considered to be of considerable antiquity in the Lower Pecos region, are more recent in Coahuila where they overlap the most modern type of the three - braided sandals. Plaited sandals are ubiquitous, checkerpads are less common, and the braided style has been found primarily in Coahuila with outliers in Big Bend and the Lower Pecos regions. Although highly preliminary, the temporal and spatial parameters suggested by the correlation of radiocarbon assays and provenience indicate that sandals are sensitive markers of time and place whose potential has not been fully exploited.

## ***Introduction***

Although considerable attention has been paid to sandal typology, especially in the Cuatro Ciénegas region of Coahuila and the Lower Pecos region of Texas, the spatial and temporal distributions of the various styles are still poorly known (Butler 1948; King n.d.; Maslowski 1978, Schuetz 1956, Taylor 1988, Thomas 1933, Williams-Dean n.d.; see also Smith 1933 for Big Bend). Sandals excavated or collected from dry caves in northern Coahuila bridge the gap between the two regions (Figure 1) and provide some basis for evaluating postulated technical continuities in the fiber industry (see Adovasio 1980; Andrews and Adovasio 1980). The bulk of the radiocarbon assays demonstrably related to sandals and sandal types are from Coahuila. Adovasio submitted a series of artifacts from Taylor's 1940s excavations in the Cuatro Ciénegas basin to the Smithsonian Radiocarbon Laboratory in the early 1970s (Taylor 1988: Appendix B). Twenty of those specimens were sandals (Table 1). These dates are now augmented by three from Cueva Encantada and five from the Sierra el Fuste near Ocampo (Turpin and Carpenter 1994a).

The Lower Pecos analyses generally concentrated on typology with age estimates based more on stratigraphic associations than on the actual assay of sandals or their immediate context. Although some sandals, such as those in the fiber level at Bonfire Shelter (Dibble and Lorrain 1968), can be reasonably assigned to a narrow time period based on general associations, only one sandal from Moorehead Cave (Maslowski 1978) and three from Wroe Ranch (Turpin 1998) have been dated radiometrically and the results published. The many sandals from the Big Bend region have been only cursorily reported but the overlap in the assemblages suggests that important information resides in museum collections.

## ***The Intermediate Sites***

The radiocarbon assays from the Sierra el Fuste collection and Wroe Ranch were previously reported in detail (Turpin and Carpenter 1994a; Turpin 1998). To recapitulate, in 1994, 57 sandals unsystematically collected from dry caves in the Sierra el Fuste, a small mountain range north of Cuatro Ciénegas and southwest of the Sierra de Encantada, were typed and one fragmentary specimen was assayed (see Table 1). A basket fragment from the same collection but not the same site produced a date only two centuries older than that of the sandal, suggesting that the entire assemblage may be roughly contemporaneous. Subsequently, four sandals – two checkerpad and two braided specimens – were dated to further define the age of those types (see Table 1). They too fell into the range between 1000 and 1500 radiocarbon years ago.

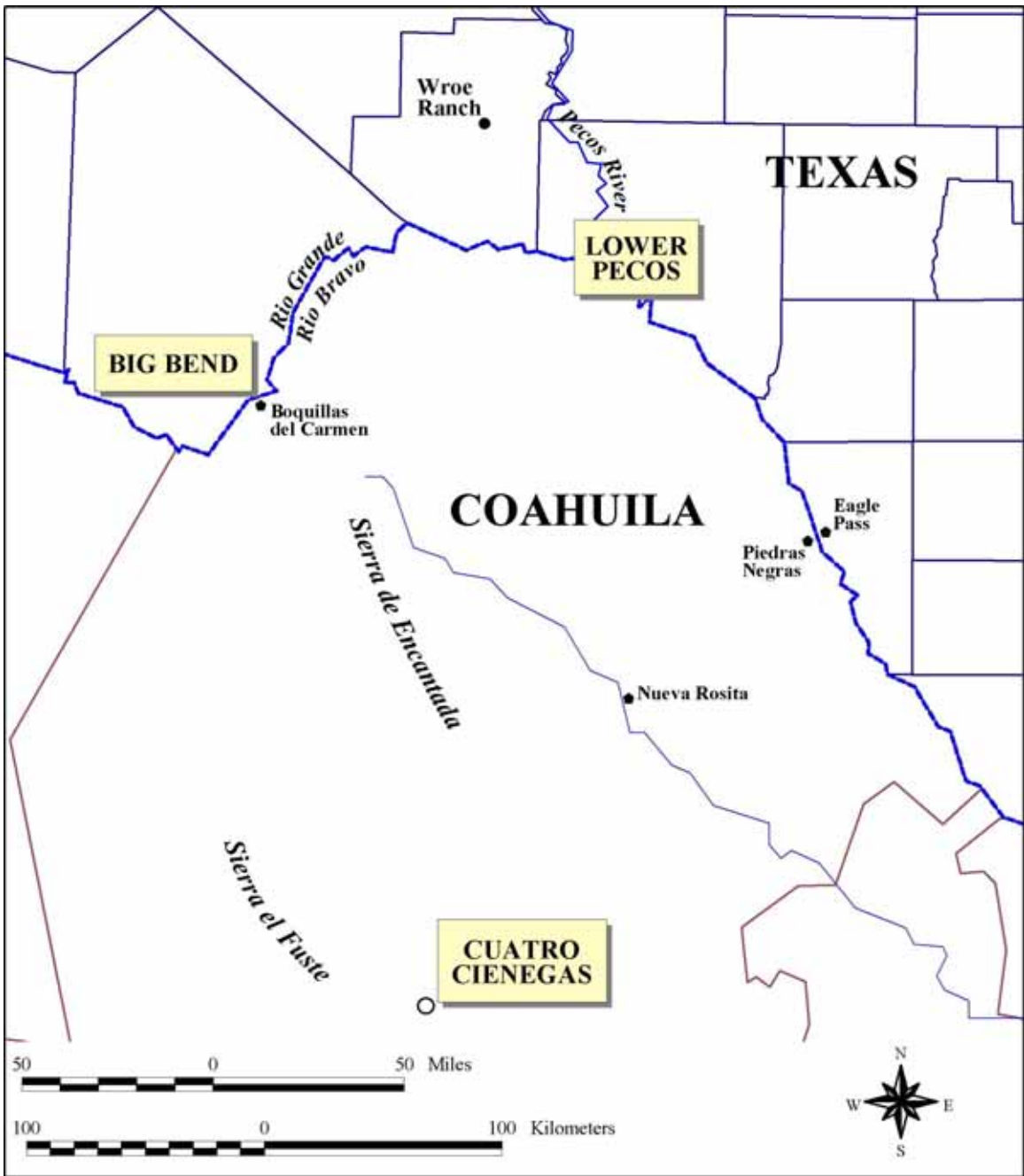


Figure 1. Location of places mentioned in text.

Table 1. Radiocarbon Dates and Sandal Types				
14C*	Site	ID	Item Dated	Reference
<b>Braided</b>				
1110 <sub>+60</sub>	El Fuste	TX7814	sandal	Turpin & Carpenter 1994
1230 <sub>+50</sub>	Encantada	TX9242	Feature C2	
1620 <sub>+40</sub>	Encantada	TX9243	Feature C8	
<b>Checkerpad</b>				
1230 <sub>+50</sub>	Encantada	TX9242	Feature C2	
1620 <sub>+40</sub>	Encantada	TX9243	Feature C8	
1750 <sub>+50</sub>	Encantada	TX8467	Feature A3	
<b>Plaited 2-warp</b>				
1660 <sub>+50</sub>	Frightful	SI1071	sandal	Taylor 1988
1700 <sub>+70</sub>	Moorehead	SI1131	sandal	Maslowski 1978
1710 <sub>+40</sub>	Wroe Ranch	TX9120	Feature 2	Turpin 1998
1955 <sub>+75</sub>	Frightful	SI1059	sandal	Taylor 1988
2210 <sub>+45</sub>	Frightful	SI1060	sandal	Taylor 1988
2495 <sub>+75</sub>	Frightful	SI1063	sandal	Taylor 1988
2945 <sub>+55</sub>	Frightful	SI1068	sandal	Taylor 1988
3495 <sub>+60</sub>	Frightful	SI1065	sandal	Taylor 1988
3590 <sub>+50</sub>	Frightful	SI1062	sandal	Taylor 1988
3610 <sub>+60</sub>	Frightful	SI1064	sandal	Taylor 1988
3780 <sub>+50</sub>	Frightful	SI1058	sandal	Taylor 1988
3840 <sub>+80</sub>	Frightful	SI1072	sandal	Taylor 1988
3930 <sub>+55</sub>	Nopal/Burro	SI1074	sandal	Taylor 1988
4225 <sub>+75</sub>	Frightful	SI1061	sandal	Taylor 1988
4380 <sub>+85</sub>	Frightful	SI1069	sandal	Taylor 1988
4600 <sub>+65</sub>	Frightful	SI1067	sandal	Taylor 1988
4665 <sub>+55</sub>	Frightful	SI1070	sandal	Taylor 1988
4755 <sub>+90</sub>	Nopal/Burro	SI1075	sandal	Taylor 1988
5245 <sub>+85</sub>	Nopal/Burro	SI1073	sandal	Taylor 1988
6130 <sub>+105</sub>	Frightful	SI1066	sandal	Taylor 1988
<b>V-weft</b>				
5730 <sub>+70</sub>	Wroe Ranch	TX9180	Feature 21	Turpin 1998
6400 <sub>+180</sub>	Wroe Ranch	TX9104	Feature 21	Turpin 1998
<b>Sewn<sup>^</sup></b>				
1430 <sub>+50</sub>	Nopal/Burro	SI1077	sandal	Taylor 1988
1875 <sub>+80</sub>	Nopal/Burro	SI1078	sandal	Taylor 1988
* corrected using 12C/13C ratios estimated based on material type				
Nopal/Burro - Taylor lists same series for both caves				
<sup>^</sup> 2 sewn sandals from Coyote Cave, Coahuila (Taylor 1968) are omitted				

Only seven sandals were recovered from Wroe Ranch, 41TE307, a small rock shelter near the confluence of Independence Creek and the Pecos River in Terrell County (Turpin 1998). Twelve radiocarbon assays dated various thermal and fiber features to the range between 700 and 6600 years B.P. Two features contained plaited sandals, including two of the newly defined V-weft style, both of which dated to the earliest end of that scale.

Another private collection from northern Coahuila, this time from the Sierra de Encantada, midway between the Sierra el Fuste and the Rio Grande, contained 14 sandals that were analyzed and reported in 1994 (Turpin and Carpenter 1994b). This collection, which also contained lithic, wood, and other fiber artifacts, led to the systematic excavation of the site under the authority of a permit issued by the Instituto Nacional de Antropología e Historia (INAH) to Dr. H.H. Eling, Jr. The 1998-1999 excavations recovered 28 well-provenienced sandals and a second private collection of 12 specimens came to light in 2002, bringing the total inventory to 54. Only specific aspects of the material culture of Cueva Encantada have been reported in English (Turpin 1997; Zubieta 1999) so a brief description of the site and its chronology are excerpted from the forthcoming final report.

### ***Description of Cueva Encantada***

The Sierra de Encantada is an outlier of the Sierra Madre Oriental that rises sharply west of the Valle de la Babia, midway between Muzquiz, the regional economic and social center, and the Rio Grande, south of the border crossing at Boquillas (see Figure 1). The sheer walls of the Sierra enclose a high montane valley that is divided by smaller ranges into the northern Valle Encantada and the southern Valle Colombia. Cueva Encantada is a small cave adjacent to a long, shallow overhang that overlooks the southern valley from the southeastern side of the divide, the Sierra Buena Vista. At an altitude of approximately 1600 m above mean sea level, the site is midslope between the high mixed pine-hardwood forest of the ridges and the extensive grasslands of the valley below. Pictographs, cut marks, deep mortar holes, and a talus of burned rock and artifacts testify to long occupation of the 25-meter-long overhang but perishable materials only survived in the cave, an area about 70 square meters in size and the source of the artifacts in the private collections.

Despite some profound vandalism, excavations in three areas of the cave produced intact hearths, fiber nests, and numerous artifacts of bone, stone, shell, and fiber (see Turpin 1997; Zubieta 1999). Eleven radiocarbon assays demonstrated that the well-preserved deposits ranged

in age from about 650 to 4500 B.P. (Table 2) with deeper deposits producing only stone tools, implying that perishable items from the earlier periods did not survive. Area A, near the front right lateral of the cave, contained a series of superimposed intact fiber features dating between 1070 and 2730 years old; Area B in the far rear was functionally distinct and produced older radiocarbon dates between 1870 to 4500 B.P.; Area C, on the front left wall, also contained a sequence of fiber features, some truncated by relic hunters, but all dating within the last 1500 years. A travertine level in Area A beneath the zone of intact perishables suggests that water passing through conduits in the limestone during a more mesic period resulted in the destruction of older fiber features and artifacts. Thus, preservation dictates that all of the sandals, including those in the private collections, were discarded some time since 4500 B.P. or about 2500 B.C.

Table 2. Radiocarbon Dates - Cueva Encantada

TX-	Date	cal. BP*	cal BC-AD*	13C (ppm)	Feature	Feature Type
8383	700 $\pm$ 40	650-670	A.D. 1280-1300	-24	A, F6	hearth
9242	1230 $\pm$ 50	1070-1180	A.D. 770-880	-15.9	C, C2	grass-lined basin
8382	1310 $\pm$ 50	1170-1290	A.D. 670-780	-22.8	A, F1A	hearth
8386	1500 $\pm$ 60	1320-1410	A.D. 540-640	-22.2	A, F2	hearth
9243	1620 $\pm$ 40	1420-1540	A.D. 410-530	-12.5	C, C8	grass-lined basin
8467	1750 $\pm$ 50	1570-1720	A.D. 230-390	-13.4	A, F3	grass-lined basin
8443	1870 $\pm$ 60	1715-1870	A.D. 80-235	-24.6	B, F13	agave, baby nest
8385	2440 $\pm$ 50	2380-2460	430-510 B.C.	-22.5	A, F11	hearth
8384	2500 $\pm$ 50	2570-2730	560-760 B.C.	-23.2	A, F3B	hearth
8508	3340 $\pm$ 50	3470-3630	1520-1680 B.C.	-20.1	B, F10	sotol padding
8442	3870 $\pm$ 190	3990-4530	2040-2580 B.C.	-24.6	B, F10	sedge mat
* Stuiver and Reimer 1993: Method A						

Ten of the 26 features designated during excavations were dated by radiocarbon assay of charcoal or plant parts. The samples were taken from five hearths or ash pits and five fiber lenses or nests (see Table 2). Most of the latter, whatever their function, were purposefully constructed of a prickly pear base cushioned by various plant parts and discarded fiber artifacts, including several waste sandals. Features A3a-c, A5, A12, B8, C1, C2, and C8 either contained or incorporated sandals of various types.

### ***Comparative Collections, Typologies and the Encantada Assemblage***

Cueva Encantada is the only habitation site that has been systematically excavated for 100 miles in any direction but it bridges the

gap between areas where excavations have produced inventories large enough to provide a sounder basis for classification systems. Taylor's (1988) typology was derived from over 1000 sandals from dry rock shelters in the Cuatro Ciénegas basin in southern Coahuila. A different nomenclature evolved from the study of a number of smaller samples accumulated from several sites in the Lower Pecos River region of southwest Texas (Butler 1948, King n.d., Maslowski 1978, Schuetz 1956, Thomas 1933, Williams-Dean n.d.). The prime criterion in all of these typologies is technique with variations introduced by characteristics such as frame configuration. Three broad categories - braided, checkered, and plaited - transcend regional differences. Only the latter, the most common of the three, has been subdivided into classes that vary depending on the typologist. At this preliminary stage of chronology building, the broader patterns are the most relevant so lumping will prevail over the splitting that has resulted in a proliferation of subtypes.

Although a number of individual specimens have been retrieved by vandals from dry caves in Coahuila (see Turpin and Carpenter 1994a, 1994b, Cárdenas 1978, 1990), Taylor's huge collection from Cuatro Ciénegas is the only one that was scientifically excavated according to the standards of the time and was later thoroughly analyzed. Taylor devised types based on manufacturing technique which he designated by a letter-number series, prefaced by F (presumably for fiber). His largest and most enduring group, F1a with subtypes F1ai (two warp) and F1aia (three warp), consisted of plaited sandals, although technically speaking the process is more akin to twining than plaiting (Adovasio 1977). Three Lower Pecos types can be subsumed under Taylor's plaited category (see Thomas 1933, Butler 1948, Schuetz 1956, and all subsequent analyses). Now commonly known as Schuetz' types A, B, and D, all are built upon two parallel exterior warps and differentiated only by the manner in which they meet at the toe.

Taylor's categories, F1b, twill padded, and F1d, sewn, were not represented at Cueva Encantada or El Fuste and only a few of the latter have been noted in the Lower Pecos assemblage (King n.d., Maslowski 1978). Four radiocarbon dates obtained on sewn sandals from Coyote, Nopal and /or Burro caves are not listed in Table 1 nor discussed here since the comparative sample is so small and the assays were not coherent (Taylor 1968, 1988).

Taylor's F1c or checkered type is roughly equivalent to Schuetz' Type C which is also called checker weave in the Big Bend region (Smith 1933: 57, 60). Braiding, Taylor's F1e type, was apparently not a technique favored by Lower Pecos shoemakers and is not a category in any of the published typologies. To add to the confusion, Smith (1933)

placed the braided sandals in his collection from the Big Bend into a category he called Type III: Plaited. Since the purpose here is to discern broad trends, both spatially and temporally, only the types that can be reliably related to radiocarbon assays at this time will be further discussed. However, it appears that variability within the checkerpad and plaited categories might be quantifiable given a larger suite of dates and better provenienced collections.

### **Braided Sandals**

Taylor (1988:103) described his type F1e, braided sandals, as "footgear made of two bundles of fiber doubled over each other and braided from toe to heel, where they are turned over and woven back up the sandal to form the padding." His description was based on six specimens, making this type one of the rarest in the huge inventory from the Cuatro Ciénegas caves. In 1966, Taylor (1966: Figure 17) illustrated braided sandals as part of the trait list for his late Coahuila, Jora, or Mayran complexes which would loosely be temporally equivalent to the Late Archaic and Late Prehistoric periods in Texas. The five braided sandals in Frightful Cave were in Taylor's (1988:Table AB-1) Top Level which dates from about A.D. 200 to 1890 B.C. based on 18 radiocarbon assays of other material types. An unspecified number of specimens "composed of several strands of yucca fibre braided together so as to form a compact flat pad for the foot" comprised Smith's (1933:61) Big Bend Type III: Plaited category. The only mention of braided sandals in the Lower Pecos region is in an unpublished inventory of the Witte Museum collection that describes two specimens from Shumla Cave (Lipkin and Muir 1999:4).

The largest collection of braided sandals on record is from the Sierra el Fuste, between Cuatro Ciénegas and the Encantada Valley (Figure 2). Unsystematic digging in adjacent caves produced 31 braided sandals, 54.4% of the total inventory (n=57) from those sites (Turpin and Carpenter 1994a: Table 1). Four of the specimens were slightly more elaborate in that the braided fabric had been folded in half and stitched together. Radiocarbon assay of a braided sandal fragment from El Fuste produced a stable carbon isotope-corrected age of  $1110 \pm 60$  B.P. ( $^{13}\text{C}$  - 11.0; Tx-7814) which calibrates to the range between 960 to 1080 years ago or A.D. 870 to 990. A decade later, two more braided sandal fragments from the same collection rendered corrected dates of  $1000 \pm 60$  B.P. ( $^{13}\text{C}$ -13.8; Beta 180968) and  $1320 \pm 70$  B.P. ( $^{13}\text{C}$ -13.4; Beta 180967). The one-sigma calibration of the youngest assay is 1180 to 1300 B.P. or A.D. 650 to 770 and of the oldest 910 to 955 B.P. or A.D. 995 to 1040.



*Figure 2. Braided sandal from the Sierra el Fuste, illustrating the technique. Ties missing.*

Five braided sandals, four of which were reduced to fragments, were recovered from Cueva Encantada; none were in the private collections or in Area A. The most intact specimen unfortunately was in the loose discard pile in Area B, against the back wall of the cave. A charred fragment from Area B was not associated with any other artifacts or dateable material. Three sandals, one of which was in two pieces, came from Area C. One was part of a grass lens (C2) that produced a radiocarbon date of  $1230 \pm 50$  B.P. (TX-9242) and another was associated with a date of  $1620 \pm 40$  B.P. (TX-9243) from Feature C8 which rested on bedrock (see Table 2). The two fragments from Feature C4, probably parts of the same piece of footwear, are stratigraphically intermediate between C2 and C8.

Taylor (1988: 103) noted that braided sandals as a whole are sturdy, well made, and often in fairly good condition when discarded, an observation that was born out in the El Fuste collection but not at Cueva Encantada. Although its tie strings are gone, the specimen retrieved from the discard pile in Area B is intact and barely used but the rest are fragmentary or completely worn out.

Braided sandals represent a fundamental change in sandal technology from the dominant two-warp plaited styles (Taylor 1988:103). By definition, plaited sandals are made in two separate operations - the stationary or passive warps provide a frame for the active weft elements that form the pad or body. Braided sandals consist solely of active

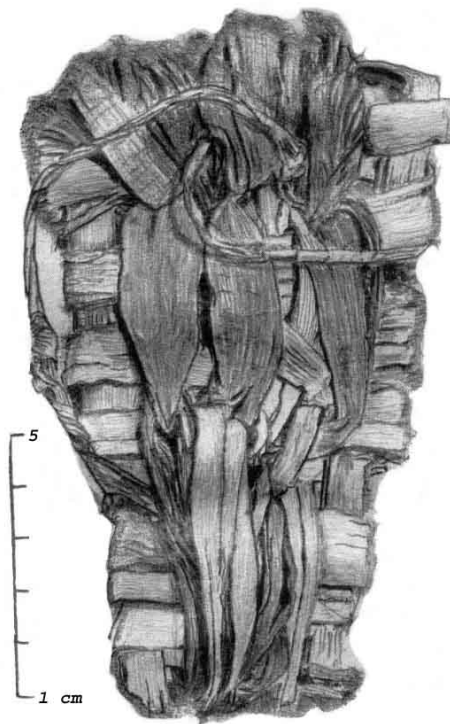
elements that form both body and padding; there are no warps. Thus, the two technologies are in fact different conceptualizations of the manufacturing process rather than variations on a standard template. Taylor also notes that there is no plausible way that braiding could have evolved from plaiting, implying a cultural discontinuity late in the occupation of Frightful Cave. The radiocarbon dates from El Fuste and Encantada confirm the recency of this manufacturing technique, bracketing the period between 960 and 1540 calibrated radiocarbon years ago or roughly A.D. 400 to 1000. This same time period sees other innovations, such as the adoption of the bow and arrow, and is in general considered a time of flux in northern Coahuila and the Lower Pecos region (Taylor 1966).

### **Checkerpad Sandals**

Although there are several discrepancies between Taylor's (1988) description of his type FiC checkerpad sandals, Schuetz' (1956) Type C, and Smith's (1933) Type IIc: checker weave, the basic design is similar to that used in the production of simple matting. Schuetz (1956:130) described her Type C in theory as: "a double frame in which lecheguilla strips are loosely woven back and forth. When completed the sandal is folded in half at the toe. The two halves are held together by tie strings." This text is not easily visualized but her illustration of the type shows its resemblance to the other sandals classified as checkerpad or checker weave in which the fabric of the sandal is like one-over-one matting, the wefts passing over and under the warps with no discernable frame or rigid warps (Figure 3).

Taylor's (1988: 96, Plate 54) FiC checkerpad sandals are "footgear made by sewing reinforcing and padding elements through the sides and across the ground side of a checker-plaited fabric." His illustration shows that the fabric is often patterned on a diagonal as well as the perpendicular alignment seen in Schuetz' Type C and he makes no mention of folding and fastening with tie strings. Diagonally patterned checkerpad sandals are represented in the Witte's Shumla Caves collection so the technique is not unique to Coahuila. Smith's (1933:60-61) single specimen from the Big Bend was described as "woven in flat checker technique" similar to matting. Apparently the fabric was not reinforced and so lightweight that it was considered a "house shoe" unfit for rough terrain. The collection of Big Bend sandals at Sul Ross State University contains a few specimens of this type. Both diagonal and perpendicular checkerweaves are represented in adult and child-size specimens; one of the diagonal specimens fits Smith's description in that

it is only one layer thick (Figure 4) but the other two are doubled over and quite sturdy.



*Figure 3. Checkerpad sandal from Cueva Encantada, Area B. Note crossed toe ties*

The ten Encantada specimens are one-over-one checkerboard fabric, folded over, and reinforced by padding that is laced through the body of the sandal. Two checkerpad sandals were recognized in the original private collection and eight more were recovered in stratigraphic contexts. Five of the latter were retrieved from Area A; two of these were in Feature 3, a grass-lined basin that was radiocarbon dated to 1750±50 B.P. (TX-8467) which calibrates to the range from 1570 to 1720 years ago or A.D. 230-390 (see Table 2). One was found in Feature 8 and another in Feature 12 which also held a two-warp plaited specimen. The fifth, a fragment, was found in the relic hunter back dirt. One checkerpad sandal was retrieved from Area B, in the loose discard pile at the back of the cave. Another was in Feature C2 which was radiocarbon dated to 1230±50 B.P. or 1070-1180 years ago (TX-9242; see Table 2). The eighth specimen is also from Area C, at the base of that unit on bedrock in Feature C8 with an age of 1620±40 radiocarbon years (TX-9243). The two Area C specimens came from features that also held braided sandals, indicating that the types are coeval.

Taylor's sample of checkerpad sandals from Cuatro Ciénegas consisted of only seven specimens from Frightful Cave, some of which appear to be unlike Schuetz' Type C (see Taylor 1966: Plate 54). He

considered the technique to be a direct offshoot of his larger twill-pad category but still relatively early in the history of the cave's occupation, contrary to the evidence from Encantada.



*Figure 4. left) Diagonal weave checkerpads sandal from the Big Bend region conforms to Smith's description of a light weight house slipper. Specimen is 17 cm long (Sul Ross State University). right) folded checkerweave from Witte Museum collection.*



Sixteen of 57 sandals in the El Fuste collection were checkerpads according to Taylor's description and two were considered more similar to Schuetz' Type C (Turpin and Carpenter 1994a: Table 2). Both perpendicular and diagonal weaves were represented although the latter were more common. Two fragmentary specimens of the diagonal weave subtype produced corrected dates of  $1300 \pm 60$  B.P. ( $^{13}\text{C}$ -10.4, Beta 180970) and  $1410 \pm 80$  B.P. ( $^{13}\text{C}$  -11.5; Beta 180969), placing them within the range obtained at Cueva Encantada and overlapping that of the braided type.

In the Lower Pecos region, Type C checkerpads sandals have been found in very small numbers in much older contexts at Fate Bell Shelter (Parsons 1965:68), Baker Cave (Word and Douglas 1970:100) and Hinds Cave (King n.d: 6.), leading King to suggest it was one of the earliest designs adopted locally. One explanation often offered to account for the low frequency of Type C sandals throughout the Lower Pecos, and for that matter, in Cuatro Ciénegas, has been that their great age allowed for deterioration and reduced representation. Such is not the case at Cueva

Encantada or El Fuste where the checkerpad technique contributes over 20 percent of the sample from each site. At Encantada and El Fuste, the dates definitely associated with checkerpad sandals bracket the period from 1070 to 1720 years ago or A.D. 230 to 880. Since no perishable materials older than about 4500 radiocarbon years ago survived in Cueva Encantada and the entire assemblage from El Fuste seems to be contemporaneous, greater antiquity for the style cannot be ruled out, but the generalized technique was apparently still in vogue long after it had died out at Frightful and Hinds caves.

## **Plaited Sandals**

By far the majority of the sandals in all of the collections except El Fuste conform to Taylor's (1988:40) definition of plaited sandals, which he named Type F1a:

footgear constructed of coarse fibers that serve as lateral warps and were bent inward and crossed at the toe-end, then plaited in figure eights over-and-under, under-and-over the lateral warp-frame back toward the heel to form the wefts. These wefts were tucked under, not knotted, and ended at various places in the body of the sandal. Padding was added both longitudinally and transversely to form the foot-pad and ties were installed to complete the construction.

His subtype F1ai accommodates plaited sandals with two parallel warps (Taylor 1988:44); three-warp sandals were designated as subtype F1aii (Taylor 1988:76) and considered to be a late innovation. The 18 two-warp plaited specimens from the Frightful Cave collection roughly span the period from 1600 to 6200 uncalibrated radiocarbon years ago, thus indicating that plaited sandals were made for about 5000 years in Coahuila.

Schuetz (1956:130-131) divided plaited, two-warp sandals into three sub-types depending upon the configuration of the frame. In her Type A, the two warps converge at the toes and are bent inward and downward to form a third central warp, a technique Taylor (1988:76) singled out as Type F1aii. The frames of Type B consist of one element that is bent into a horseshoe with the curve at the front of the foot, a technique not described by Taylor. In Type D, which is Taylor's sub-type F1ai, the warps cross at the toe, becoming wefts that are woven in figure-8s the length of the sandal. King (n.d.:3) noted however that the figure-8 configuration attributed to Type D was in reality an over-one, under-one lacing, similar to shoe lacing. The radiocarbon-assayed plaited sandals from the Lower Pecos – a Type A from Moorehead Cave (Maslowski

1978:245) and a Type D from Wroe Ranch (Turpin 1998:29) – date to within 10 years of one another (see Table 1).

Smith (1933) too relied upon the number and configuration of warps in his Big Bend typology. His Type I: Two Opposing Warps was further divided into five subcategories and his Type II: Multiple Warp had three subdivisions, one of which was checker weave similar to Schuetz' Type C. A new subtype was defined in the original Encantada collection and named V-weft by Turpin and Carpenter (1994b) for the pattern created by twisting the wefts (see below).

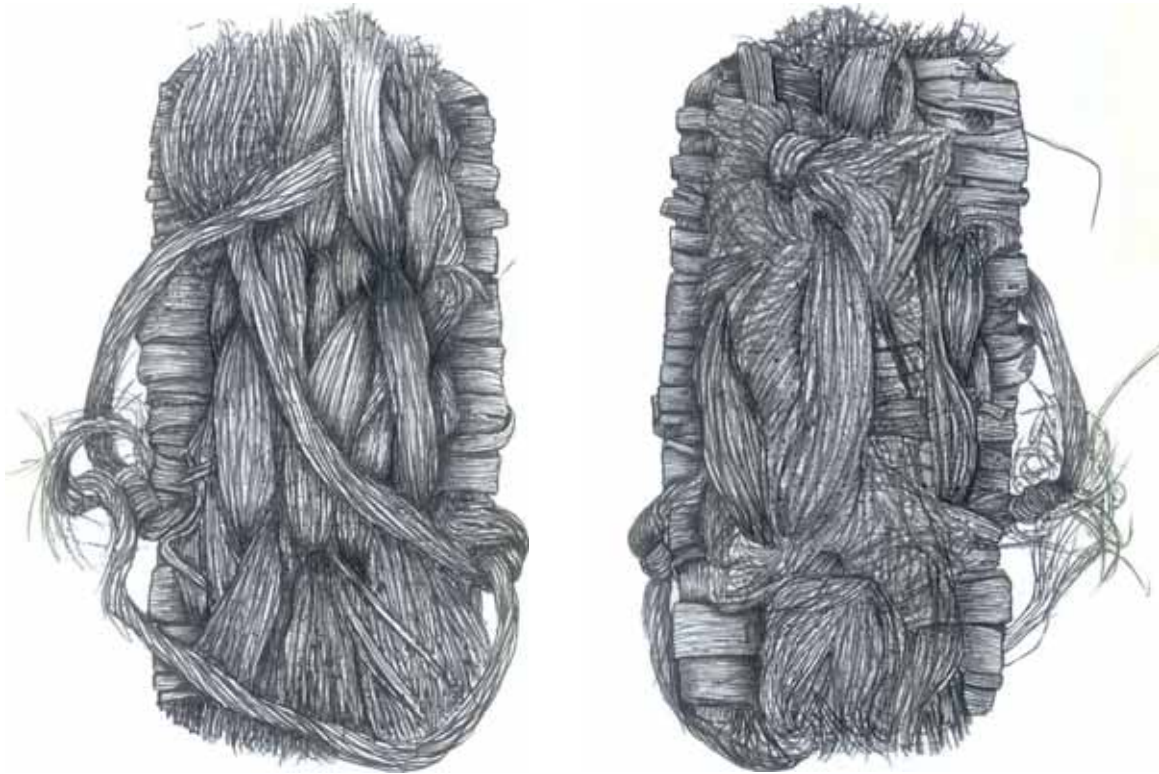
Thirty-seven of 54 or 68.5% of the sandals from Cueva Encantada are plaited. All but two of the 26 specimens in private hands are plaited, including at least five child-sized sandals in the 2002 collection (Figure 5). Of the 13 with known provenience, eight came from Area A, four from Area B, and one from Area C. Inferentially, all of these sandals date between 650 and 4530 years ago, during the post-travertine period of excellent fiber preservation. Eighteen of the 37 plaited sandals are either too worn and fragmentary or too densely padded to differentiate between frame types. One of the remaining 19 may be an example of a three-warp frame, Taylor's F1a<sub>ii</sub> or Schuetz' Type A. This specimen was recovered from just below the surface in Area C, adjacent to Feature C1, hence more recent than C2 which dated to 1230±50 radiocarbon years ago (see Table 2). Eleven sandals can be attributed to Schuetz' Type D and Taylor's type F1a<sub>i</sub>; seven of these were in the private collection and unprovenienced. Two specimens were recovered from each of Areas A and B but only one of these was in a datable context - Feature 3 with its radiocarbon age of 1750±50 years ago.

## **V-Weft Sandals**

A subset of the two-warp plaited sandal category was first identified in the original private collection from Cueva Encantada (Turpin and Carpenter 1994b). None of the sandals recovered by stratigraphic excavations exhibit the characteristic twisted wefts that distinguish the V-weft variety from other two-warp categories but two additional specimens were added by the second collection attributed to the site. One of those was child-sized; the other belonged to an adult (Figure 6):

their basic structure is a two-warp frame of parallel elements that are turned in at the toe. The warp elements are split at the toe end and one-half of each element contributes to the toe loop while the other half lays across the top of the sandal, perhaps as padding for the ball of the foot. The body is formed by weaving the wefts over and under, back and forth

along the warps. The most distinctive attribute of this sandal is the way in which the weft elements are twisted 180 degrees at the latitudinal midpoint of the body and turned at a 30 to 45 degree angle to create a V-shaped pattern, opening towards the toe (Turpin and Carpenter 1994b:10).

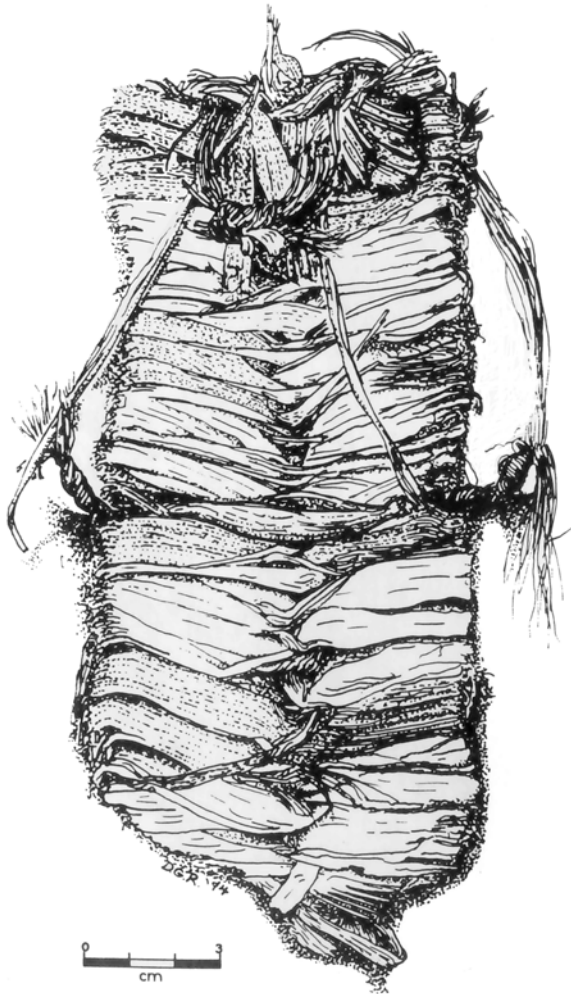


*Figure 5. Child's 2-warp Type F1a or Type D plaited sandal from Cueva Encantada, 15.5 cm long; note typical crossed toe ties.*

In many ways, the V-weft type is a hybrid variety that combines characteristics of the fish-tail sandals that dominate in far west Texas and the common plaited sandals of Coahuila and the Lower Pecos. The fish-tail type is named for its morphology but the twisted wefts are often very similar to those discussed here. The critical difference is the lack of the characteristic heel morphology that gives the fish-tails their name.

The six specimens in the two private collections from Cueva Encantada remain the only examples of this highly distinctive style yet reported in Coahuila. In fact, a child-sized sandal from the second collection is identical to an adult specimen from the first, even down to the detail of the toe strap which is in itself unusual. The similarities are so great that it may well imply that both were made by the same person.

Excavation of Wroe Ranch, a small rock shelter in Terrell County, Texas, produced three examples (Turpin 1998:31), one of which was contained within a pit that was radiocarbon-dated to the uncalibrated range between 6490 and 7270 B.P. (Turpin 1998: Table 3). None of the perishable materials in Cueva Encantada even approach this antiquity and a sample universe of nine is too small for reliable cross-cultural comparisons.



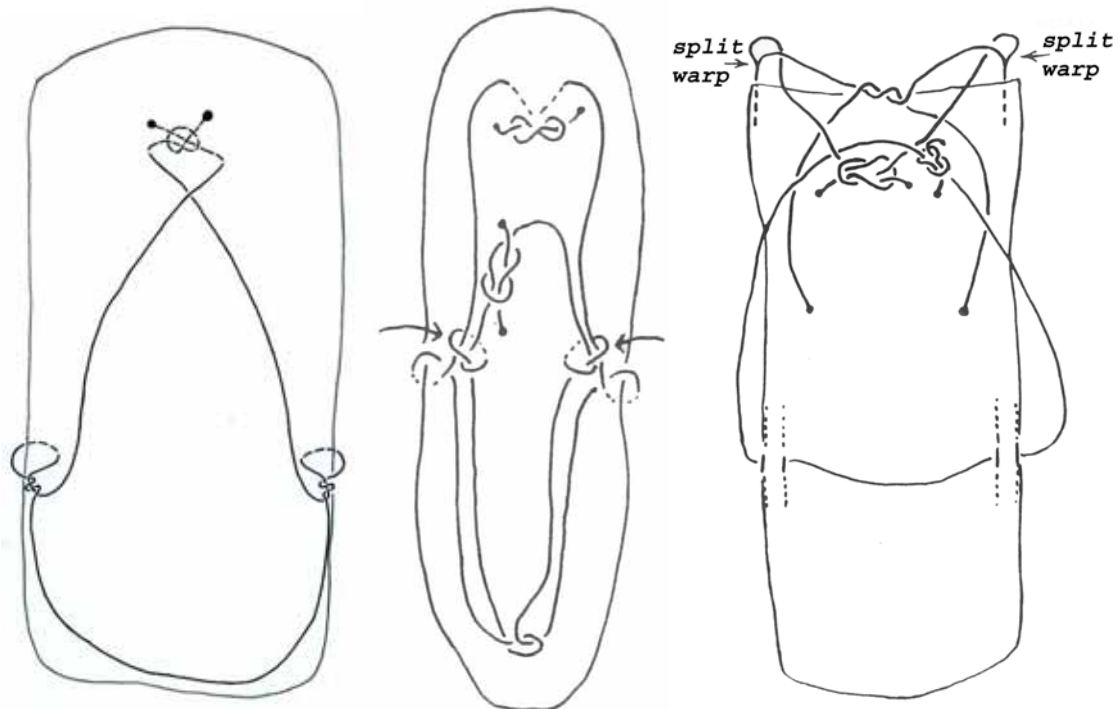
*Figure 6. V-weft plaited sandal from Cueva Encantada, adult size. Note unusual toe loop*

## **Tie Strings**

Tie strings are much more susceptible to innovation and variability than are sandal bodies. Typologies have been devised from both the Cuatro Ciénegas and Lower Pecos collections, based on the methods used to construct toe, heel, and ankle loops. Taylor (1988) made the point that all ties are formed by looping a single element through the toe end of the pad and manipulating the two movable ends. From then on through the process, variability can be introduced anywhere from toe

loop to ankle tie. Ties are sometimes repaired or sandals refurbished by adding new ties or sections thereof, thus altering the original configuration. There are many more sandals than there are ties since they tend to break and seem to be attractive rodent fodder. Therefore, attempts to create types to accommodate every combination and variation end up defeating the purpose of classification because the data are not reduced to meaningful units. However, it is clear that many of the ties on the Encantada sandals follow a different template than that used in the Lower Pecos and much of Cuatro Ciénegas and the difference is primarily in the treatment of the toe strap.

Taylor thought the critical characteristic defining sandal tie types was the number of elements, differentiating between one and three. However, only one of his seven types had three elements and that type was not recognized in any of the other typologies. Five of his remaining six types were similar in that the ties emerged at the toe and crossed (Figure 7, left); in the sixth, his Type C, a large proportion of the moving ends did not cross at the toe. The correlation between uncrossed toe straps and three-warp sandals was complete.



*Figure 7. Schematic representations of various tie strings left) typical crossed toe straps; center) uncrossed toe ties found on braided and three-warp sandals; right) V-weft toe loops*

This was not the case in the Lower Pecos where none of the typologies addressed uncrossed toe straps. All but one of the Lower Pecos ties, and, by extension, all of the categories developed from them, have toe loops that emerge from the sole and cross to the opposite side where they are fastened to the warp (Schuetz 1956; Williams-Dean n.d.). Williams-Dean (n.d. 30) assigned the sole specimen with uncrossed toe straps to her Type II (Schuetz' Type A), which is much like Taylor's three-warp sandals with the same tie configuration.

Although the samples are small, combining the information from the various sites shows that the most distinctive sandal types – braided and V-weft – also deviate the most consistently from the standard tie templates. None of Taylor's braided specimens had ties so he of course could not associate them with specific methods of tie construction. Neither of the sandals in the Witte Collection retain their ties so they did not figure in either Schuetz' or Williams Dean's analyses. However, in the collections from El Fuste and Encantada, all of the braided sandals with remnant ties indicate that the norm consisted of innovative heel and ankle loops that join at the toe where they are tied off but do not cross (Figure 7, center). In addition, the only checkerpad sandal with complete ties also belonged to the uncrossed variety.

All of the V-weft plaited sandals that retain any portion of their ties are similar in that the warps are split to form toe loops that are knotted atop the foot, then fastened to the warp midway down the each side of the sandal (Figure 7, right). This toe ring is another characteristic reminiscent of the fishtail sandals of more westerly origin (Williams-Dean n.d.: 28).

### ***Summary – The Time-Space Continuum***

In their analyses of large sandal collections, Taylor (1988) and Williams-Dean (n.d.) emphasized the need for more detailed metric and descriptive recording of sandals. These recommendations were undoubtedly fostered by the large numbers of very similar specimens in their samples, for example, the overwhelming domination of two-warp plaited sandals. Certainly, detailed recording is a prerequisite to more refined studies but at present the overwhelming need is for a typology broad enough to define the spatial distribution of basic manufacturing techniques and a systematic program of radiocarbon dating actual specimens or their immediate context so that the types can be placed in time as well as space. Seriating the mass of data about plaited sandals would be a daunting task but the resolution of ambiguities about what constitutes the checker weave or checkerpad type - and the implications of variations within the type - is probably more feasible given the smaller

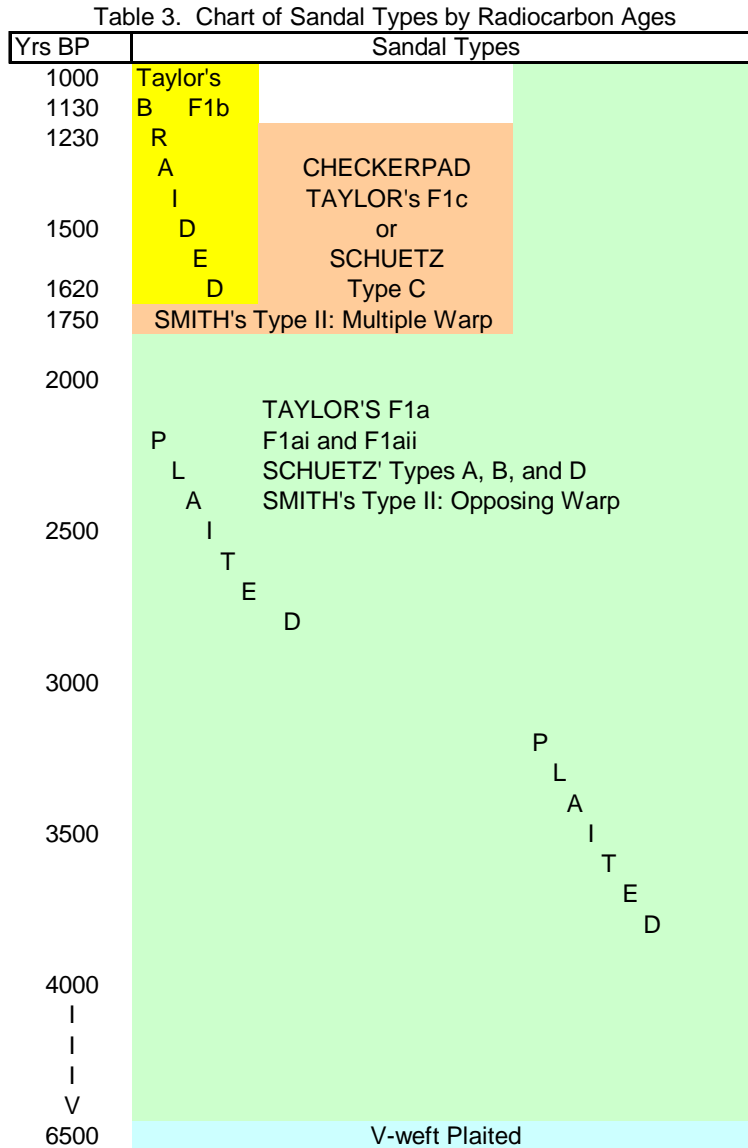
sample size. Minor types, such as the checkerpad, braided, and V-weft categories, present a greater opportunity to assess cultural continuities and change over time and space since they are distinct deviations from the norm represented by two-warp plaiting.

## Temporality

By far the majority of the sandals in the collections from Coahuila and the Lower Pecos are plaited or twined with two, three and occasionally more parallel warps interwoven with moving wefts. The numerous radiocarbon dates from Frightful Cave and age estimates based on stratigraphic associations elsewhere demonstrate that this technique dominated the fiber industry for at least five millennia and probably longer (Table 3). Two-warp plaited sandals, Taylor's F1a and Schuetz' Type D, seem to have been in vogue throughout the entire span of the Archaic period. Taylor concluded that the three-warp variety, his F1a<sub>ii</sub> and by extension then Schuetz' A, was a more recent variation on the time-honored technique. He saw a sharp increase in their popularity in the upper levels of Frightful Cave but corroborative data are not forthcoming from the Lower Pecos or Big Bend regions since so few specimens have been dated. The spatial dimensions of the V-weft variety are still limited to a very small area, barring their affinity to the western fishtail type, but the available dates suggest considerable antiquity. The overwhelming numbers of plaited sandals in all collections should indicate that they offer the best opportunity for seriating variations within a given type to gain some chronological grasp of stylistic trends but this potential is either fictive or has not been exploited. Given the large collections of sandals resident in regional museums, systematic radiocarbon dating of various types from under-represented regions would resolve many of the issues discussed here.

The checkerpad or checkerweave type presents a conundrum that can not be resolved with the data at hand. Based on stratigraphy, in both the Lower Pecos (King n.d.:6, Parsons 1965:68, Word and Douglas 1970:100) and at Frightful Cave (Taylor 1966:Plate 54), this style was popular very early in the sequence and its rarity attributed in part to its great age. The five specimens from Encantada and El Fuste, however, span a little over 500 years from about 1230 to 1750 radiocarbon years ago – old, but certainly not ancient in the Archaic context of the industry as a whole. The variability within this category, such as between diagonal and perpendicular weaving or single versus double layering, suggests a stronger definition of type and subtype might help resolve this issue. However, since the basic technology existed for a very long period in the form of checkerweave matting, the sandal type may prove to be equally

long-lived simply as a matter of expediency and familiarity with the technique with idiosyncratic specimens resulting from independent invention (or adaptation). Some support for the influence of expediency comes from an El Fuste sandal and two unprovenanced specimens from Coahuila that consist of checkerweave superimposed on plaited sandals and fastened to the pad with stitches and tie strings (Figure 8).



Braided sandals, on the other hand, are relatively recent, meeting expectations generated by their stratigraphic position at Frightful Cave (Taylor 1988). Five assays place this style between 1000 and 1620 radiocarbon years ago, or within the same range as the dated checkerweaves (see Table 3). These specimens are also younger than any of the dated sandals from Frightful Cave, extending the sequence by about 500 years. The conundrum that remains is the total absence of

specimens of any type dating to the last 1000 years – is this sampling error - a very likely possibility given the small number of radiocarbon assays - or does it reflect a technological shift?



*Figure 8. Checkerweave superimposed on a plaited sandal pad.*

## **The Spatial Dimension**

To date, braided sandals have been recognized in El Fuste (n=31), Cueva Encantada (n=6), the Big Bend (n unknown), the Lower Pecos (n=2) and in proportionately low numbers in Cuatro Ciénegas (n=6). This distribution suggests that braiding was a late Coahuilan innovation that barely reached as far east as the Lower Pecos and only infringed on the Cuatro Ciénegas fiber industry. Checkerpad sandals contribute a consistent but small percentage of almost all inventories despite the

considerable ambiguity about the age and internal consistency of this type. The rarity of V-weft plaited sandals suggests a restricted distribution in and around the Encantada Valley and extending north into the Eastern Trans-Pecos region of Texas where some relationship to the characteristic Southwestern fish-tail type may be demonstrated eventually. The ubiquity of two-warp plaited sandals as a whole testifies to a strong preference that endured for millennia throughout Coahuila and southwest Texas.

It is clear that sandals have been the focus of typological rather than chronological studies, perhaps because the funds for radiocarbon assay were often limited and better used to resolve larger issues than the age of mundane footwear. Typology took precedence because the large collections amenable to the development of classificatory systems were available in museums and repositories but their provenience was often too vague for accurate estimates of their relative ages. Only the Frightful Cave collection benefited from a systematic approach, backed by support sufficient to enable the dating of a substantial sample, including but not limited to sandals. This project was undertaken decades after the excavations and the objective may well have been to date the strata in Frightful Cave via a suite of similar artifacts – in this case two-warp sandals - thus insuring comparability. The radiocarbon dates from El Fuste, Wroe Ranch, and Cueva Encantada were originally intended to determine the chronology of site occupation, not to establish the age of any particular artifact type. Only later were specific specimens selected to obtain a more secure age range for braided and checkerweave types. However, taken in composite, the dates listed here provide a starting point for a chronological sequence of types that will in turn help delineate spatial relationships. When combined, the elements of time and space have the potential to trace the distribution of shared technologies and, by extension, the movements and relationships between the artisans who made these most humble of perishable artifacts.

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