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Mesoamerican Archaeological Textiles: An Overview of Materials, Techniques, and Contexts

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Mesoamerican Archaeological Textiles: An Overview of Materials, Techniques, and Contexts

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Abstract

In Mesoamerica, unlike the Andean area, there are few instances when climatic conditions allow the preservation of the organic raw materials constituting ancient fabrics. Examples of such textiles conserved in Mexican museums are quite limited, thus even the tiniest fragments recovered in archaeological contexts greatly augment our understanding of ancient weaving technologies and their use in Mesoamerican societies. Most of the surviving fabrics come from dry caves in northern Mexico, but in recent days the exploration of relatively inaccessible rock shelters in southern Mexico has led to the recovery of additional textiles from early times that are associated with funerary contexts and has expanded the corpus of fabrics woven on backstrap as well as horizontal and stationary looms. The tradition of cremating the dead occasioned the carbonization of clothing during rituals prior to inhumation, and painstaking conservation processes begun after excavation have enabled the analysis of manufacturing techniques and the various weaves employed. Written sources from the fifteenth and sixteenth centuries reveal the iconographic and chromatic richness of the fabrics produced around the time that the Spaniards first arrived and the great variety of pigments and dyes used to color them. The development of several archaeometric analytical techniques that require only miniscule samples have enabled us to confirm the use of indigo (*Indigofera suffitoria*), cochineal (*Dactylopius coccus*) or *achiote* (*Bixa orellana*), in archaeological fabrics. This paper will examine the techniques and materials employed by Mesoamerican peoples in examples conserved in the collections of Mexico's Instituto Nacional de Antropología e Historia, which come from various contexts such as dry caves, flooded soils, and ritual cremations.

Textiles arqueológicos mesoamericanos: Una visión panorámica sobre materiales, técnicas y contextos

Resumen

En Mesoamérica, a diferencia del área andina, son muy pocas las ocasiones en que las condiciones climáticas permiten la preservación de los materiales orgánicos que constituyen la materia prima base de los tejidos antiguos. El muestrario de textiles arqueológicos que se conserva en los museos mexicanos es realmente limitado y, por ello, cada mínimo fragmento recuperado del contexto arqueológico tiene gran importancia para el conocimiento de las tecnologías antiguas del tejido y para el uso que tenían entre las sociedades mesoamericanas. La mayor parte de los tejidos se han conservado en cuevas secas del norte de México, pero en últimas fechas la exploración de abrigos rocosos de difícil acceso en sur del país ha permitido el rescate de nuevos textiles asociados a contextos funerarios y rituales de épocas tempranas; ampliando el corpus de lienzos tejidos en telar de cintura, pero también en telar de estacas. La tradición de cremar a los difuntos permitió la carbonización de la indumentaria durante el ritual previo a su inhumación; los cuidadosos procesos de conservación emprendidos tras su excavación han hecho posible el análisis de la técnica de manufactura y los ligamentos empleados durante su creación. Las fuentes escritas de los siglos XV y XVI, dan fe de la riqueza iconográfica y cromática de los tejidos que se producían a la llegada de los españoles y de la gran variedad de tintes y colorantes que eran empleados para teñir y pintar los lienzos. Gracias al desarrollo de distintas técnicas arqueométricas de análisis, que requieren de mínimas cantidades de muestra, se ha podido corroborar el uso del Índigo (*Indigofera suffitoria*), la grana cochinilla (*Dactylopius coccus*) o el achiote (*Bixa orellana*) en los tejidos arqueológicos. En el presente trabajo, haremos un recorrido de las técnicas y materiales utilizados por los pueblos mesoamericanos, en los ejemplares conservados en los acervos del Instituto Nacional de Antropología e Historia de México, que provienen de contextos tan diversos como las cuevas secas, los suelos anegados o los conjuntos rituales cremados.

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1 Introduction

Mesoamerica, unlike the Andean area, offers very few instances of climatic conditions that allow for the preservation of the organic raw materials in ancient fabrics. Examples of such textiles conserved in Mexican museums are quite limited, thus even the tiniest fragments recovered in archaeological contexts greatly augment our understanding of ancient weaving technologies and their use in Mesoamerican societies.

The vast territory that constitutes present-day Mexico is characterized by exceptional cultural diversity and a biodiversity in which soils, ecosystems, climates, and elevations greatly differ between the northern and southern areas. Although the development of flora and fauna is determined by ecological variables, textile production depends on the management of resources, which among other activities involves the gathering and cultivation of plants. The Mesoamerican area and northern Mexico contain various native plants whose fibers can be used to make textiles. The agaves and yuccas of the Agavoideae family have a wide distribution throughout Mexico (García Mendoza 1998); the varieties employed in textile production include *Agave sisalana*, *Agave lechuguilla*, *Agave zapupe*, *Yucca carnerosana*, *Yucca treculeana*, and *Samuela carnerosana* (Sayer 1985; Vargas Ramos 2011), along with the use of some grass fibers (e.g., *Panicum* aff. *bulbosum*, cf. Vargas Ramos 2011:80).¹ In addition, three species of cotton were cultivated in Mesoamerican territory, including white (*Gossypium hirsutum*), and brown (*Gossypium mexicanum*).

Many indirect sources reveal that fabrics of various quality, texture, and appearance were made in ancient Mexico, including gauzes and lightweight fabrics in the Maya area, and brocaded, painted, and woven textiles in Central Mexico.² We also know the kinds of male and female garments that were in vogue in different regions and times. We have even seen garments made

with complex techniques such as curved weaving, where the yarns are manipulated on a backstrap loom to create curved ends or borders (figs. 1 and 2). This effect is achieved by using part of the warp as a weft, and when the two webs are joined they produce a gentle curve (Stresser-Péan 2012). This technique, apparently unknown outside Mesoamerica, is still used today by indigenous communities in Hidalgo, Puebla, and Veracruz (Stresser-Péan 2012) (fig. 3). Sources from the fifteenth and sixteenth centuries also inform us about the chromatic richness of the fabrics produced around the time the Spaniards first arrived, as well as the great variety of pigments and dyes used to color them (see, for example, the *Codex Mendoza*, *Codex Azcatitlan*, *Codex Ixtlilxochitl*, the *Florentine Codex*, and the *Lienzo de Tlaxcala*).

The organic material remains of pre-Hispanic Mesoamerican textile production, however, are extremely rare. The amount of extant archaeological textiles is minimal and only in exceptional cases are complete pieces found. Most of the surviving fabrics come from dry caves in northern Mexico (Mastache 2006:86), but the recent exploration of relatively inaccessible rock shelters in southern Mexico has led to the recovery of additional textiles from early times. Unfortunately, these contexts are quite fragile and have continuously fallen prey to looting, thus the recovered textiles often lack data for situating them culturally and chronologically (Mastache 1971; 1996:18 and 2005:86).

Another conservation issue stems from the funerary practices that led to their deposition. Most of the recovered textiles were associated with such contexts, because clothing was an important part of the paraphernalia accompanying the deceased and in the ritual preparation of the body. The tradition of cremating the dead occasioned the carbonization of clothing during mortuary rituals prior to inhumation, in which not only the deceased was burned, but also all of the items that would serve him or her in the afterlife.

1. O'Neale (1948:113) noted the identification of Indian hemp (*Apocynum cannabinum* L.) in a collection of textiles from Chihuahua at the University of California, Berkeley; also, Mirambell and Sánchez Martínez (1986) mention another kind of hemp (*Cannabis sativa*), Mastache (2006:86) the use of *tzitzicaztli* (*Urtica caracasana*), and Rodríguez Vallejo (1976) the so-called tree cotton.

2. In this regard, the large corpus of figurines from Isla de Jaina, Campeche, have allowed the identification of various types of fabrics and garments worn by women and men of the Classic period, while the frescoes in Building 1 of the North Acropolis at Calakmul are an exceptional testament of the use of colorful lightweight textiles in female clothing in the Early Classic period around 400 BC. Pictographs in the *Codex Mendoza* (1992) reveal a large variety of profusely decorated fabrics and textiles that circulated throughout the Mexica empire during the sixteenth century, while the accompanying Spanish glosses supply information about their quality, for example, if they were made of fine white cotton, brown cotton, or even some kind of agave fiber (Anawalt 1990; Berdan and Anawalt 1997).

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Figs. 1–2. Clay figurines from Xochitécatl, Tlaxcala. Epiclassic period (650–900 AD). Photos: Archivo Digital de las Colecciones del Museo Nacional de Antropología, underwritten by the Instituto Nacional de Antropología e Historia and the Canon Corporation. Courtesy of MNA-INAH.

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Figs. 3a–3b. *Quechquemitl* manufactured on a backstrap loom using the "curved weave" technique. Santa Ana Hueytlalpan, Hidalgo. Collection: Claude Stresser Péan. Photo: Archivo Digital de las Colecciones del Museo Nacional de Antropología, underwritten by the Instituto Nacional de Antropología e Historia and the Canon Corporation. Courtesy of MNA-INAH.

Fig. 4. Archaeological textile adorned with small copper bells. Sala de las Culturas de Occidente de México, MNA. Photo: Archivo Digital de las Colecciones del Museo Nacional de Antropología, underwritten by the Instituto Nacional de Antropología e Historia and the Canon Corporation. Courtesy MNA-INAH.

In some cases, however, these same cultural practices have led to the conservation of fabrics. For example, the Sacred Cenote of Chichén Itzá, a large karst sink-hole filled with water, has yielded six hundred or more fragments with several combinations of techniques, including plain weave, brocade, gauzes, warp float, tapestry, twill, openwork, supplementary wefts, and embroidery, which were subjected to low intensity pyrolysis that led to their carbonization (Mahler 1992). Textiles associated with copper also were preserved because this element inhibited the growth of microorganisms (Cronyn 2001; Mastache 2006:86) (fig. 4).

A map (fig. 5) first published by Guadalupe Mastache (1996) shows the sites where most of the archaeological textiles within the present territory of Mexico have been found. Dry caves predominate, followed by contexts in which copper is present, but cases of conservation also

have been recorded in aqueous environments or because of pseudomorphic replacement (Mastache 1996). In what follows, this essay will examine the techniques and materials employed by pre-Hispanic peoples in examples conserved in the collections of Mexico's Instituto Nacional de Antropología e Historia (National Institute of Anthropology and History, INAH), which come from contexts such as dry caves, inundated soils, and ritual cremations.

INAH's Museo Nacional de Antropología (National Museum of Anthropology, MNA) in Mexico City has around seventy-two thousand artifacts from throughout Mexico dating from approximately two thousand years before Christ to the sixteenth century of our era. About ten percent of these pieces are on permanent exhibition and the rest are in storage. The number of textiles exhibited in the national museum, however, is less than twenty, and are displayed in five of its halls.³ The corpus in storage

3. These halls include the Sala del Preclásico en el Altiplano Central (Preclassic Central Highlands), Sala Mexica, Sala de las Culturas de Occidente (Cultures of Western Mexico), Sala Maya, and Sala de las Culturas del Norte (Cultures of Northern Mexico); also, some textiles dating from the colonial period are found in the Sala de las Culturas de Oaxaca (Cultures of Oaxaca).

Fig. 6. Archeological textile from Cueva El Gallo, Morelos. Sala del Preclásico en el Altiplano Central. Photo: Archivo Digital de las Colecciones del Museo Nacional de Antropología, underwritten by the Instituto Nacional de Antropología e Historia and the Canon Corporation. Courtesy of MNA-INAH.

is also not very large with about 110 specimens, bringing the total to around 130 pre-Hispanic examples conserved at the museum.⁴ This is not surprising when you consider some of the difficulties of preservation outlined above. Until ten years ago, the museum was the destination *par excellence* of archaeological materials recovered from throughout the country, thus the textiles in its charge continue to be of primary importance.

In order to show the diversity of materials and technologies used during the pre-Hispanic period for making textiles, this essay shall examine several examples in terms of their place of origin, date, constituent elements, and manufacturing techniques. These will include textiles in the MNA, as well as some in research collections and fragments that may eventually come under the museum's care (fig. 6). Wherever possible, information about the context in which they were found shall also be

provided. This study, however, will not address the rich pre-Hispanic textiles from the Mixtec-Zapotec,⁵ Maya,⁶ and Zoque-speaking areas, such as those from Cueva del Lazo, Chiapas, which Domenici and Sánchez Valenzuela magnificently have presented elsewhere in this volume.

2 The Corpus of Pre-Hispanic Textiles in the Collections of Mexico's Instituto Nacional de Antropología e Historia

The oldest textiles in the MNA come from cultures that inhabited the Central Highlands during the Preclassic period. In her chapter in this volume, Patricia Ochoa Castillo, curator of the Sala del Preclásico en el Altiplano Central (Hall of the Preclassic Central Highlands), discusses an exceptional early example recovered at Cueva El Gallo, which was produced using a simple weave with interlocked warp

4. Of the roughly seventy-two thousand pre-Hispanic artifacts in the MNA's collection, 7,860 are on permanent display. Among the textiles, only twenty are exhibited, while about 110 are kept in storage (personal communication, Miguel Zinden Montalvo, MNA Technical Subdirector, May 2016).

5. In the present-day state of Oaxaca, textiles have been recovered from Cueva de la Sierra Mixteca, Cueva de Ejutla (see fig. 5 and Lozano Vega 1999), and archaeological sites such as Monte Albán, Yagul, Zaachila, and Guiengola (Mastache 1996:23; King 1979:268; see also the map in fig. 5, this chapter). Unfortunately, we do not know the provenance of a set of miniature garments (two huipiles and a quechqueme) from three caves in the Mixteca Alta (Johnson 1966–1967).

6. The largest collection of textiles from the Maya area comes from the Sacred Cenote at Chichén Itzá, Yucatán. Textile fragments have also been found in Mayapán, Yucatán, which were preserved by the presence of copper in the archaeological context (Mastache 1996:23; see also the map in fig. 5, this chapter), including one with warp floats (Mahler 1962).

Figs. 7a–8b. Textile fragments from the *Cueva El Gallo* (no. 208b-292). Plain weave taffeta with a warp bands alternating different shades of ocre and supplementary yarns dyed blue. Photo: courtesy José Luis Alvarado, SLAA-CAN-INAH.

technique, and, red and brown shade yarns (fig. 7) (Ochoa Castillo and Román Torres, this volume). I, in turn, shall mention two other fragments from the same site, which employ blue yarns. Excavation in the dry cave known in the Ticumán-Morelos region as *Cueva El Gallo* began in 1992 (Sánchez Martínez and Alvarado n.d.a, n.d.b; Sánchez Martínez *et al.* 2005) (Map/fig. 5). The system of three large galleries and seven chambers had a surprising accumulation of organic materials in a magnificent state of conservation, including a funerary bundle containing the remains of an infant, pitchers, feathers, maize, and seeds, along with mats, sandals, cords, and baskets made of hard fibers (Sánchez Martínez and Alvarado n.d.c), and around fifty-five textile fragments, ranging between 10 centimeters and 1 meter long (García Lascurain *et al.* 1993; Filloy Nadal 1994; Miranda Ham and Sánchez Valenzuela 1996; Ocampo Plasencia 2004; Sánchez Martínez *et al.* 2005:6; Govea Martínez 2005; Santillán Bueyes 2010; Vargas Ramos 2011). The site dates from the Middle Preclassic (455 BC–AD 355) (Vargas Ramos 2011). During exploratory work, a very stable microclimate was observed with temperatures at around 19 degrees Celsius and between 55 and 65 percent relative humidity, in addition to an environment of total darkness with a slight exchange of outside air (García Lascurain *et al.* 1993; Román Torres 1992)

and a pH of around 7.5 (Martínez and Hatchondo 1992). This combination of conditions promoted the preservation of the organic material.

The textiles were made from several local plant materials, including fibers from agaves, bark, and leaves, in addition to cotton. Most of the *El Gallo* textiles consist of a plain weave taffeta with a warp face (plain weave warp-faced fabric, see Emery 1966:76), although there are isolated cases of basket and mat weaves (paired warps and wefts; see Emery 1966: 87) (Vargas Ramos 2011; Muerza Avendaño 2003; Govea Martínez 2005; Villanueva Camarena 2006; López Arguelles 2006).⁷ Some fragments in the corpus have designs, such as warp bands made with alternating ocher, brown, and blue tones (García Lascurain *et al.* 1993; Filloy Nadal 1994; Ocampo Plasencia 2004; Sánchez Martínez *et al.* 2005:24; Cruz Flores and Noval Vidal, 2005). Only three of the fabrics have a more complex decoration in which a brocade technique was used.⁸ In these cases, designs were woven on a back-strap loom by introducing additional weft yarns that “float” over two, three, or more warp yarns. The supplementary yarns were dyed blue or red (Filloy Nadal 1994; Ocampo Plasencia 2004). This elaborate type of fabric reveals the early use of a complex textile technology in Central Mexico from the Preclassic period.

7. 76% of the textile corpus was made with plain weave taffeta with a warp face; 9% taletón 2:1; 6% brocade and 9% with decoration (Sánchez Martínez *et al.* 2005:16).

8. One more fragment (no. 483-496) combines a plain weave with small holes to create the decoration (Sánchez Martínez *et al.* 2005:24 and 28).

Figs. 8a, 8b–9. Textile fragments from Cueva de la Candelaria, Coahuila (fourteenth–fifteenth century). Sala de las Culturas del Norte, MNA. Photos: Archivo Digital de las Colecciones del Museo Nacional de Antropología, underwritten by the Instituto Nacional de Antropología e Historia and the Canon Corporation. Courtesy of MNA–INAH.

Textiles from northern Mexico are the largest group in the Mexican archaeological corpus.⁹ They all come from caves located north of the Tropic of Cancer where the climate is very dry with little precipitation. The largest collection in the museum is from Cueva de la Candelaria, Coahuila, a deposit explored during the mid twentieth century in the famous Laguna Region (Map/fig. 5). This system of caves yielded one hundred individuals, many of whom were wrapped in fabrics forming mortuary bundles, along with organic materials such as seeds, feathers, durable fiber objects, and numerous textiles (Johnson 1977). Apparently, Cueva de la Candelaria had a long occupation of nearly two hundred years, from the thirteenth to the fifteenth century of our era.

The abundance of textiles salvaged from the cave and their magnificent state of conservation make this discovery one of the most important for understanding the cultures of northern Mexico. As for the fibers used to make the fabrics, only one textile fragment was made with cotton fiber, while the rest were manufactured from various yucca and agave species (Johnson 1977). In both cases, the fibers were hand-spun on the thigh without any other implement. Most are simple weaves, including a knotless netting technique using several colored yarns (probably vegetable dyed) to create a large variety of patterns and effects (figs. 8a–8b, and 9). The Candelaria textile group was magnificently studied in a publication by Irmgard Weitlaner-Johnson in 1977, which

9. Textiles have been also recovered in archeological deposits from Casas Grandes-Paquimé, Chihuahua (made with cotton, Miranda and Sánchez, 1992), Cueva de la Sierra de Chihuahua (Mastache 1996:23); Cueva del Romero, Tamaulipas (agave fibers, Sánchez Gándara, 2001); Cueva Sonora (Mastache 1996:23); Cueva de la Paila (García-Alonso Alba n.d.), Cueva Espantosa, Cueva Coyote and Cerro San Lorenzo all of them at Cuahuila (Mastache 1996:23); to mention some.

Fig. 10. Archaeological textile. Probably from the Laguna Region, Mexico. ENCRYM-INAH. Photo: Archivo Digital de las Colecciones del Museo Nacional de Antropología, underwritten by the Instituto Nacional de Antropología e Historia and the Canon Corporation. Courtesy of MNA-INAH).

enriched our view about the nomadic groups that inhabited northern Mexico.

Let us now turn to another textile that comes from the same Laguna Region (fig. 10). In this case, we have no contextual information because it is an example of a looted piece that was later recovered. It is a large textile, 93 by 97 centimeters, made up of four long pieces of cloth joined together with a running stitch (García-Alonso and González Hurtado 2005:5–6). Because of its design and dimensions, it could not have been woven

on a backstrap loom, rather it must have been done on a horizontal ground or fixed loom, similar to what the Rarámuri or Tarahumara use today (fig. 11). We know from the material associated with it that the cloth was manufactured in pre-Hispanic times. Thick double yarns made of fibers from a *Yucca* species and *Agave lechuguilla* dyed in yellow to orange hues with carotenoids were used (García-Alonso and González Hurtado 2005:14, 16). The warp yarns (two S-plied ends with a Z-twist) are a cream color, orange, and dark brown. The weft yarns (single-ply

Fig. 11. *Paisaje del Norte de México* (Northern Mexico Landscape), 1964. Mural by Adolfo Mexiac. Museo Nacional de Antropología. Photo by Paola Ruisánchez and Arturo Egea, Proyecto de Conservación y Restauración de Obra Moderna y Contemporánea del MNA-INAH.

Z-twist) are thinner and reddish in color. It has an intertwined weave that forms a geometric, rhombus pattern design.

The fabric must have been made by lifting the warp yarns, by hand, in order to thread the weft yarns (García-Alonso and González Hurtado 2005:18). In INAH's Escuela Nacional de Conservación, Restauración y Museografía "Manuel del Castillo Negrete" (National School of Conservation, Restoration, and Museography, ENCRYM) a replica of the textile was made in order to understand the technique, in which the warp was prepared in alternating red and white bands. The rhombus motifs were achieved by diagonally intertwining the warps. To maintain the direction of the yarn, secondary sticks were used to orient each of the warp bands, then the weave was generated by running the weft yarn to the height of the intersections (García-Alonso and González Hurtado 2005:18). To date, this is the only Mexican textile found that uses this complex weaving technique.

The next example probably was recovered in the so-called Cueva de la Ánimas, in Durango, in the southern part of the Laguna Region, and was donated to the museum in 1996 (fig. 12 and Map/fig. 5).¹⁰ It is the best known example of weft-wrap openwork, a technique

that apparently originated in pre-Hispanic Mesoamerica and combines a plain weave with small holes to form the decoration (fig. 13). These small holes, however, are not made by unraveling the fabric; rather, one or more weft yarns are wrapped around a group of warp yarns to create openings in the cloth. This technique demands great skill and finger manipulation from the weaver.

The Ánimas textile was studied in a publication by Irmgard Weitlaner Johnson in 1976 and restored in the Conservation section of the MNA. It consists of two rectangular pieces of cloth that were woven on a backstrap loom, constructed on a plain-weave ground, and sewn together lengthwise with a running stitch, yielding a total width of about 43 centimeters. The textile is incomplete and its maximum dimension is 82 centimeters. The fabric is woven from single-ply Z-twist cotton yarns. It is a magnificent example of weft-wrap openwork where the looped edges show a series of four yarns, or shots, working together as a unit and then continue in a plain weave. In this case the wrapping of the weft was done entirely with finger work. It has four variants of the weft-wrap technique, which are combined with the plain weave to produce the openwork geometric designs. The design elements include narrow lines of consecutive holes, which

10. Also in Durango, pre-Hispanic textiles have been recovered at Cueva del Maguey (Muerza Avendaño 2015) and Cueva Zape Chico (see map in fig. 5, this chapter).

Fig. 12. Replica of the textile from the Laguna Region made by students, ENCRYM-INAH. Photo courtesy of Amaranta González Hurtado.

form zigzags, vertical or horizontal parallel lines, and frets. More than half of the Ánimas textile's surface is covered by patterning (figs. 13–18). The four variants are: 1) a plain hole pattern based on a unit of four wefts, utilized to make the long horizontal lines and the horizontal zigzag lines; 2) a hole pattern with a double warp, used for making the long vertical and zigzag lines; 3) a long slit hole, only present on the left piece of cloth and slightly larger than the previous two variants; and 4) an allover hole pattern, only present in the left piece of cloth, used for the stepped diagonals, rectangles, and hooked crosses. This archeological textile has an unusual finish along one of the selvages (fig. 17a). Each web has a series of tabs, which are separately woven and then stitched to the border, but form an integral part of the fabric (Johnson 1976; Ritter Miravete 2015a).

The last example to be examined from northern Mexico was associated with a mummified child from Cueva

de la Ventana in Chihuahua (Mansilla *et al.* 2008). The cave is located in the Sierra Madre Occidental, a mountain range that crosses northern Mexico. The terrain is steep, which causes the temperature to vary according to altitude and latitude, although a warm dry climate prevails. The interior of the caves is usually very stable. The mummified body was partially covered by a textile with a braided feather (fig. 19). The base yarn is composed of two ends with a half Z-twist, apparently of a leaf fiber whose analysis is ongoing (Ritter Miravete 2015b). It is a mesh or simple linking weave. For the decoration, two kinds of feathers were used. A layer of down surely for warmth was covered with slightly iridescent larger feathers as a decorative element (fig. 20). The feathers were wrapped by coiling the *calamus* on the thread, but also a looping technique was used in which the feather was bent over itself to create a loop around the passive thread (figs. 21a and 21b).

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Fig. 13. The looted textile said to be from Cueva de la Ánimas, Durango, Laguna Region, delivered to the MNA in 1996. Photo: Archivo Digital de las Colecciones del Museo Nacional de Antropología, underwritten by the Instituto Nacional de Antropología e Historia and the Canon Corporation. Courtesy of MNA-INAH).

Figs. 14–19. The so-called Ánimas textile. Photo: Archivo Digital de las Colecciones del Museo Nacional de Antropología, underwritten by the Instituto Nacional de Antropología e Historia and the Canon Corporation. Courtesy of MNA-INAH). Drawings by Karla Gabriela Palacios, Laboratorio de Conservación, MNA.

Fig. 14.

Although the use of feather-covered clothing is well documented in sixteenth-century pictographic sources (see, for example, Nezahualcoyotl dressed as a warrior in the

Codex Ixtlixochitl 1976:106r), the textile accompanying the mummified child is the only example that has survived to this day.

Fig. 15.

Fig. 16.

Long slit hole

Fig. 17.

The MNA's Sala de las Culturas de Occidente (Hall of Cultures of Western Mexico) exhibits one of the most richly colored examples in the museum's collection. It is a fragment from the Chilapa area in Guerrero found during the archaeological excavations of 1968 (figs. 22

and 5) (dated AD 1200-1400).¹¹ It is probably a woman's blouse made on a backstrap loom with cotton yarn spun with a spindle. It consists of two pieces of cloth measuring 46 by 106 centimeters, although it is incomplete. The huipil combines three techniques: 1) the body

11. Other archaeological textiles have been recovered in the Guerrero area from caves at Campo Morado, Cueva de Oxtotitlan, and Cueva Atzcala (King 1979:273; Sánchez Ruvalcaba 2009; see also Elizabeth Jiménez, this volume).

Long slit hole

Fig. 18.

All-over hole pattern

Fig. 19.

Fig. 20. Mummy no. IV. Dirección de Antropología Física del INAH (DAF-INAH) collection. Photo: Archivo Digital de las Colecciones del Museo Nacional de Antropología, underwritten by the Instituto Nacional de Antropología e Historia and the Canon Corporation. Courtesy of MNA-INAH.

of the fabric is made with a *taleton* weave (plain weave with paired warp yarns and single weft yarn) combined with bands of gauze composed of hematite-painted cotton (fig. 23);¹² 2) the lower polychrome band was woven separately and joined to the body with a running stitch (fig. 24); and 3) it is a supplementary weft brocade on a plain weave in the form of a step-fret, and has hare or rabbit hair spun separately with a cotton thread interwoven into the fabric (Johnson 1967; Franco 1967:174). Johnson (1967:161) noted that the blue yarn was dyed with indigo.¹³

The lower section of the Chilapa textile is similar to the border on two magnificent colonial examples: a

fragment (HUI0513) in the Madeline Humm Collection at the Museo Textil de Oaxaca (Textile Museum of Oaxaca) (fig. 25), and a garment misnamed the “Huipil de La Malinche” (fig. 26). All of them employed the brocade technique, supplementary wefts, and braided rabbit hair and down feathers.¹⁴ White and brown cotton yarns were used, along with delicate *Agave lechuguilla* fibers.

Let us now turn to the textiles manufactured during the Postclassic period in Central Mexico. In the MNA's Sala Mexica (Mexica Hall), two types of textiles predominate. The first group consists of fabrics that have been preserved by the process of carbonization that occurred during a funerary ritual (fig. 27). I will not go into

12. Apparently the fabric was painted with a red (iron oxide) pigment after the cloth was finished, as the insides of the yarns are still white (Johnson 1967:154–155).

13. Specific studies in order to characterize it, however, have not been conducted.

14. See the work of Renée Riedler (2015:333–334), which carefully explains the technique employed by the Mexica artisans to knot the feather. Héctor Meneses Lozano (2008), in turn, has discussed various aspects of the techniques used in New Spain to attach feathers. See also Román Torres and García-Alonso 2014.

Fig. 21. Detail. Layer of down covered with slightly iridescent larger feathers as a decorative element. Mummy no. IV. DAF-INAH collection. Photo: Archivo Digital de las Colecciones del Museo Nacional de Antropología, underwritten by the Instituto Nacional de Antropología e Historia and the Canon Corporation. Courtesy of MNA-INAH.

Figs. 22a–22b. Looping technique, where the feather was bent over itself to create a loop around the passive thread. Mummy no. IV. DAF-
INAH collection. Photo: María Olvido Moreno Guzmán, Proyecto de Tecnología Antigua, Laboratorio de Conservación, MNA-INAH. Cour-
tesy MNA-INAH.

Fig. 23. Textile fragment from the Chilapa area in Guerrero. Sala de las Culturas de Occidente, MNA. Photo: Archivo Digital de las Colecciones del Museo Nacional de Antropología, underwritten by the Instituto Nacional de Antropología e Historia and the Canon Corporation. Courtesy of MNA-INAH.

Figs. 24–25. Detail. Textile fragment from the Chilapa area in Guerrero. Sala de las Culturas de Occidente, MNA. Photo: Archivo Digital de las Colecciones del Museo Nacional de Antropología, underwritten by the Instituto Nacional de Antropología e Historia and the Canon Corporation. Courtesy of MNA-INAH.

detail about these simple or brocade fabrics, similar to the pieces discussed by Leonardo López Luján and Salvador Guillerm Arroyo in this volume. The second type involves plain weaves with decorations painted on the finished fabric, illustrated by the following two examples. The first, in the MNA collection, is a square piece of unbalanced plain weave fabric with wrapped coiling border work and a simple fringe made by twisting the warp yarns (fig. 28). The motif on this bi-colored textile was painted after weaving, as there is differential staining on the yarns, and the penetration of the colorant, which is a black carbon pigment whose binder has not been identified, is not homogenous.¹⁵

The second textile was discovered within the Aztec sacred precinct in Offering 102 at the bottom of the stairway of the Templo Mayor, and is now in the Templo Mayor Museum. The deposit dates from 1486 and was found inside a stone box perfectly sealed with a thick layer of a lime and sand mixture, which impeded the passage of light and air into the offering (Gallardo Parrodi 2006:558, 560; González González 2010). The context was very stable with a high moisture content from groundwater seepage, and a temperature of around 17 degrees Celsius; while copper artifacts also present surely had an antifungal effect. This small deposit yielded seeds, wood, countless bark paper objects, and four textiles (Barrera *et al.* 2001), including a magnificent *xicolli*, a fringed sleeveless male jacket tied at the front, with two pieces of cloth joined at the sides with a longitudinal seam along the back (fig.29).

The jacket was woven with cotton yarn and the border was made with a very thin agave fiber (Gallardo Parrodi 2011). Like the previous case, it was painted with a black carbon pigment with an unidentified binder. The complex design was produced symmetrically on the two pieces of cloth, thus a stencil possibly was used to replicate the free-hand motifs. Also recovered was a mantle with a balanced plain weave made of white cotton yarns, whose border has alternating sections dyed green (Gallardo Parrodi 2011).

15. Johnson (1970, in King 1979:274) mentions that this textile could have come from Tenancingo, Estado de México.

Fig. 25.

Fig. 26. “Madeline’s” Tlāmachtēntli (huipil fragment), seventeenth–eighteenth century. Col. Madeline Humm de Mollet / Donation: Francisco Toledo to the Museo Textil de Oaxaca. Photo: Jorge López, courtesy Museo Textil de Oaxaca.

The body of the textile is sewn with thick agave yarns where we see a series of knots (fig. 30), each of which likely held a feather. This system was commonly used to attach feathers on Aztec shields (Riedler 2015) (fig. 31). Although the microenvironmental conditions of Offering

102 were adequate for preserving cellulose structures, they were not for the keratin of the feathers.

The final Aztec example (Textile C-158-8) to be described here was also found in the center of Mexico City, apparently during the excavations of the Ciudadela

Fig. 27. The so-called Huipil de La Malinche. Nahua, from the Puebla-Tlaxcala region, eighteenth century. Subdirección de Etnografía, MNA. Photo: Archivo Digital de las Colecciones del Museo Nacional de Antropología, underwritten by the Instituto Nacional de Antropología e Historia and the Canon Corporation. Courtesy of MNA-INAH.

Group (Poncelis 2016). It appeared during an archaeological salvage operation, thus we do not have any information about the context in which it was found. It likely was buried in a waterlogged environment or with abundant water in a clayish soil, typical of a lacustrine context. Accelerator Mass Spectroscopy (AMS) yielded a date of around 1470 (Poncelis 2016:12 and 87). It consists of two rectangular pieces of cloth joined on one side with a vertical running stitch of thin agave fiber (fig.32). It is a plain weave taffeta (1 warp yarn for each weft yarn; or balanced plain weave, see Emery 1966:76) made on a backstrap loom using hand-spun cotton yarn. One of the pieces of cloth was dyed separately using the plangi or resist dyeing technique—the only known example of this found thus far in the Basin of Mexico. The brown background has white rhombus and circle designs with a heterogeneous brown spot at the center, while the general design forms diagonal lines. The use of rabbit hair as a decoration on the cloth was identified with an optical microscope (Poncelis 2016).

The chromatography of the thin layer revealed the use of a colorant rich in tannins, probably extracted from the bark of a tree (Poncelis 2016). For example, a similar dye is produced by soaking mahogany bark. In this case, the dyeing occurs through photooxidation without having to use mordants, and was done after the pieces of cloth were completely finished. The sections not wished to be dyed are tied before immersing the fabric in the dye bath. The penetration of the colorant in each area is unique, which produces differential dyeing.

This fabric is very interesting, for only one other example of the plangi technique has been found in Mesoamerica, at Cueva de don Bonfilio in the Tehuacan Region of Puebla (Mastache 1974) (Map/fig. 5). This textile was made with a *taletón* weave (paired warp yarns and single weft yarns) using white cotton yarn (Mastache 1974:253). It consists of eight woven bands dyed separately and sewn together lengthwise with a brown thread. The bands were dyed with indigo in two shades of green and blue; the tie-dyed motifs are

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Fig. 28. Fragment of charred textile recovered in Mexico City. Sala Mexica, MNA. Photo: Archivo Digital de las Colecciones del Museo Nacional de Antropología, underwritten by the Instituto Nacional de Antropología e Historia and the Canon Corporation. Courtesy of MNA-INAH.

irregular white circles with a spot in the center that stands out against the blue and green background (Mas-tache 1974:251, 256, 261). The resist dyeing technique seems to have been in vogue in the fifteenth century among the Mexica and Mixtec nobility, for depictions of blue mantles with a pattern similar to the Ciudadela fragment are common.¹⁶ Again, the combination and

magnitude of deterioration agents in Mesoamerica has limited the preservation of fabrics whose use is well documented in indirect sources.

Finally, three isolated cases also merit attention, for they are extraordinary examples of the pre-Hispanic use of painted decoration. The first is a small huipil or child's blouse from Cueva del Buen Abrigo in Coahuila, in

16. In the 1930s, the plangi technique was still being used by Otomí weavers in Hidalgo to make shawls (Davis 1991:14).

Fig. 29. *Servilleta*-type textile. Balanced weave with freehand decoration. Sala Mexica, MNA. Photo: Archivo Digital de las Colecciones del Museo Nacional de Antropología, underwritten by the Instituto Nacional de Antropología e Historia and the Canon Corporation. Courtesy of MNA-INAH.

Fig. 30. A *Xicolli*, or ceremonial *chaleco* jacket, recovered in Offering 102 at the Templo Mayor. Cotton textile. Courtesy of Lourdes Gallardo Parrodi. Photo by Estudio Zabé.

Fig. 31. *Mantle*, from Offering 102 at the Templo Mayor. Balanced weave with agave fiber. Courtesy of Lourdes Gallardo Parrodi. Photo by Estudio Zabé.

Fig. 32. Detail. Feather rim, net of threads intertwined and knotted with feathers. *Chimalli* shield, sixteenth century. Museo Nacional de Historia, INAH. Photo by Omar Dumaine.

Fig. 33. Cotton textile employing the plangi or resist dyeing technique. Basin of Mexico, Postclassic period. INAH. Photo: Archivo Digital de las Colecciones del Museo Nacional de Antropología, underwritten by the Instituto Nacional de Antropología e Historia and the Canon Corporation. Courtesy of MNA-INAH.

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Fig. 34. Child's blouse from Cueva del Buen Abrigo, Coahuila, Laguna Region. Sala de las Culturas del Norte, MNA. Photo: Archivo Digital de las Colecciones del Museo Nacional de Antropología, underwritten by the Instituto Nacional de Antropología e Historia and the Canon Corporation. Courtesy of MNA-INAH.

the aforementioned Laguna Region (fig.33). It is a plain weave with *Agave lechuguilla* yarn of varying width. The motifs were painted freehand after the cloth was finished, with black carbon and red hematite pigments whose binders have not been identified. The second comes from Cueva de Chiptic in Chiapas and consists of three fragments of taffeta weave (balanced plain weave, see Emery 1966:76) joined together with long stitches

(Johnson 1954) (Map/fig. 5, photo, upper right-hand corner).¹⁷ One of the most important aspects of this fabric was the use of two techniques to create the designs. Apparently, batik, another resist dyeing technique, was used along with freehand painting (Johnson 1954:140). In this case, animal based dyes were used, namely, red cochineal from the insect *Dactylopius coccus* and purple from the sea snail *Plicopurpura pansa*, along with plant

17. It is interesting to note that the fragments recovered in the 1940s from a cave near Rancho Cieneguilla, Chiapas, also were woven in taffeta. The sheets, made on a backstrap loom, were joined together with a whipping stitch (O'Neale 1942).

dyes for the black, brown, yellow, and blue motifs (Johnson 1954:141–144).

The third example corresponds to the textiles recovered from Cueva de la Garrafa, located in the municipality of Siltepec, Chiapas (Landa Abrego *et al.* 1988) (Map/fig. 5, photo, lower right-hand corner). The corpus consists of four small pieces of white cotton fabric (*taletón* weave), three pieces of brown cotton fabric (*taletón* weave, (paired warp yarns and single weft yarns), a child's huipil with traces of blue yarn (made on a back-strap loom with gauze, taffeta (balance plain weave, see Emery 1966:76), *taletón* (paired warp yarns and single weft yarns), and semi-basket weaves (plane weave with paired warps or wefts, see Emery 1966:77, and three polychrome pieces (Herrera Gutiérrez *et al.* 1988), including two cotton fabrics (*taletón* weave (paired warp yarns and single weft yarns), decorated with bands. Prominent in the corpus are two garments whose hand-painted decoration is complex (fig. 5): a spectacular cotton shirt (*taletón* weave, (paired warp yarns and single weft yarns), painted green, ocher, blue, dark brown, and black hues (Herrera Gutiérrez *et al.* 1988:35), and a sheet (named in nahuatl *tilma*) of white cotton (*taletón* weave, (paired warp yarns and single weft yarns)), painted free-hand with a palette dominated by brown, ocher, green, blue, red, and yellow.¹⁸

3 Conclusions

Based on the preceding examples and brief pass through the INAH collections, the following basic conclusions may be formulated:

- 1) Within the territory of present-day Mexico, instances of climatic conditions adequate for the preservation of organic materials are rare and limited to contexts such as dry caves, or burial matrices that contain copper or a high water content.
- 2) Cultural practices such as cremation was a factor in the deterioration or disappearance of fabrics, but also allowed their preservation when charred (paradigmatic cases include the Sacred Cenote at Chichén Itzá, the Casa de las Águilas of Tenochtitlan, and the Templo Mayor of Tlatelolco).
- 3) Based on this corpus, we can say that the fibers used for weaving in Mesoamerica and northern Mexico are all of plant origin. Three types of cotton and various

Fibers used for weaving in Mesoamerica and the North of Mexico

Leaf fibers (epiphytes)	Leaf fibers (agaves)	Leaf fibers (yucca)	Seed fibers (cotton)	Bark fibers	Stem fibers (graminea)
<i>Tilandsia sp</i>	<i>Agave agustifolia</i>	<i>Yucca carnerosana</i>	<i>Gossypium sp</i>	<i>Guazuma ulmifolia</i>	<i>Panicum sp</i>
	<i>Agave inaquidens</i>	<i>Yucca treculeana</i>	<i>Gossypium hirsutum</i>		<i>Panicum affbulbosum</i>
	<i>Agave lechugilla</i>	<i>Yucca samuela</i>	<i>Gossypium mexicanum</i>		
	<i>Agave dasyliroides</i>				
	<i>Agave funkiana</i>				
	<i>Agave sisalana</i>				
	<i>Agave zapupe</i>				

Fig. 34. Table. Principal fibers used for waving in Mesoamerica and the North of Mexico (archaeometric data from textiles mentioned by: García Mendoza, 1989; Muerza Avendaño, 2003; Govea Martínez, 2005; Cruz Flores and Noval Vidal, 2005; García Alonso Alba and Gonzalez Hurtado, 2005; Villanueva Camarena, 2006; López Arguelles, 2006; García Lascrain, *et. al*; Vargas Ramos, 2011; Gallardo Parrodi, 2011; Poncelis, 2016; García Alonso Alba, N. d.).

kinds of agaves and yuccas have been identified, which yielded yarns or threads of different qualities, textures, and colors ranging from white to brown. Albeit to a lesser degree, the use of leaf (epiphytes), grass, and even bark fibers (fig.34) has been identified through biological microscopy, enlarging the catalogue of materials used in the production of textiles in pre-Hispanic times.

- 4) Generally, the yarns or threads were made with a spindle and wheel, but also some leaf fibers were hand-spun on the thigh.
- 5) In the manufacture of yarns, one type of fiber or a mixture of various species could be used. The use of cotton and agave yarns to make textiles was recorded in sixteenth-century pictographic and ethnohistorical documents. Likewise, textiles manufactured with either fiber have been recovered at several archaeological sites. In recent days, cotton and agave yarns have been detected in a single fabric (for example, at Cueva El Gallo in Morelos and Cueva El Lazo in Chiapas), which provides new insights into the textile technology of Mesoamerican peoples from the Middle Preclassic period in Central Mexico and the Early Classic period in the Zoque area.

18. At list five more cotton textiles from Cueva de la Garrafa are conserved at the Regional Museum-INAH, Tuxtla Gutiérrez, Chiapas (Rojas Muñoz 2001; Ruiz Hernández 2002).

TÉCNICAS DEL TEJIDO PREHISPÁNICO

Ligamento de tafetán o tejido sencillo.

Ligamento de taletón o tejido sencillo desigual.

Ligamento de esterilla.

Ligamento de tapicería con ranura tipo kilim.

Ligamento de urdimbre enlazada en los extremos.

Ligamento de gasa combinado con tafetán.

Ligamento de enlazado.

Ligamento de tramas envolventes.

Ligamento de sarga simple.

Ligamento de confite o tejido de terciopelo.

Ligamento de tela doble.
En el corte se aprecian las dos series de urdimbre y el punto en que se unen.

Bordado y brocado sobre una base de tejido de tafetán.

Fig. 35. Pre-Hispanic weaving techniques. Illustration by Magda Juárez, with information from Guadalupe Mastache (1996:24). Courtesy of *Arqueología Mexicana* and Editorial Raíces.

- 6) Most of the fabrics were made on a backstrap loom, but we also have an archaeological example that we assume was made on a horizontal ground or fixed loom.
- 7) In Mesoamerica and northern Mexico there is archaeological evidence of at least fifteen different weaving techniques (Mastache 2005:87) (some of them shown in fig. 35).¹⁹ Plain weaves predominate, but more sophisticated techniques such as gauzes, brocades, and wrapped wefts have also been recorded (fig. 36). The lower frequency of more elaborate weaves may be due to their use in the production of more exclusive garments.
- 8) In most of the cases, dyeing was done after weaving, but supplementary wefts and floats of different colored yarns were also used to create brocade designs. Decorations were also embroidered.
- 9) At least three techniques were used to add decorative color once the cloth was finished: freehand painting with liquid media, and two types of resist dyeing—plangi and batik.
- 10) With regard to colorants, archaeometric analysis has identified pigments made from iron or carbon, plant extracts such as carotenoids (most likely *axiote*, *Bixa orellana*),²⁰ tannins, and indigo (*Indigofera suffitica*),²¹ and from the animals cochineal (*Dactylopius coccus*) and a purple sea snail (*Plicopurpura pansa*).
- 11) Feathers and rabbit hair have been identified as ornamental elements.

Thus we have reached the end of this brief account of textiles recovered in different archaeological contexts and manufactured over the course of three thousand years in the vast territory of present-day Mexico. All of the examples presented here are under the care of Mexico's Instituto Nacional de Antropología e Historia.

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Fig. 36. Graphic showing the principal weaving techniques identified in the archaeological textiles from the Instituto Nacional de Antropología e Historia de México collection. Mariana López Filloy.

Moreno Guzmán, Vannesa Fonseca and the digitization team at the Museo Nacional de Antropología (INAH); Enrique Vela and *Arqueología Mexicana*; Héctor Meneses and the Museo Textil de Oaxaca; Lourdes Gallardo and Estudio Zabé; Verónica Kuhliger and Omar Dumaine of the Museo Nacional de Historia (INAH); Julia Ponce-lis and Lilián García-Alonso Alba of ENCRYM; José Luis Alvarado of SLAA-INAH. Mariana López Filloy for organizing the information in the graphics; and Scott Sessions for translating this essay into English.

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19. Some of the techniques recorded for pre-Hispanic Mesoamerica include plain weave ("warp oriented" taffeta), taletón, semi-basket weave, basket weave, twill, brocade, tapestry, gauze (simple and complex), weft-wrap openwork, warp or weft float patterning, knotless netting, and double weave.

20. See Domenici and Sánchez Valenzuela in this volume.

21. Since the 1940s it has been possible to identify the use of indigo in textiles from Mesoamerica and Northern Mexico (see, for example, Kasha 1948).

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