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Investigation of a Colonial Latin American Textile

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Introduction

Museum collections often contain works of art of uncertain provenance. Additionally, hybrid works attributed to Colonial cultures reflect the composite nature of a cross-cultural society integrating native and foreign traditions. An interdisciplinary technical study often is needed to identify such an object, including where it was made, when and by whom. The following paper presents the results to date, of a collaborative investigation from art historical, scientific, and conservation perspectives, of a textile belonging to the Cooper-Hewitt National Design Museum. (fig. 1).

Figure 1. Tapestry Band. Cooper-Hewitt Design Museum, Smithsonian Institution. Accession number 1902-1-374-a, Gift of John Pierpont Morgan. Photo: Bruce Schwarz.

Catalogued as Colonial Peruvian, the textile was considered for inclusion in the Metropolitan Museum’s *Colonial Andes: Tapestries and Silverwork 1520-1820*, an exhibition that took place in the fall of 2004. However, because of the textile’s unusual physical characteristics, its Andean provenance was questioned. Knowing that further extensive research would be required, it was not included in the show. Aspects of this research are now in progress, including investigation into the fibers, fiber-processing techniques, dyes and weaving techniques, along with dating and the examination of related objects. The aim of this investigation is to clarify the origin of the object. On a broader scale, the project addresses the larger issues of the impact of technical research on curatorial suppositions and whether material techniques used to construct works of art can be used as cultural markers or cultural identifiers.

The textile was accessioned into the Cooper-Hewitt collection in 1902, as part of a gift purchased in Spain though a well-known donor, J. P. Morgan. The gift was comprised of nearly 1000 other pieces, including several other important Colonial Andean textiles, notably a silk tapestry woman’s mantle.

The design of the textile consists of repeating white quatrefoil floral elements inscribed within diamond-shaped bands. The design, while not particularly Andean in character, is

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2 The Cooper-Hewitt, National Design Museum was founded as the Cooper Union Museum in 1897 by Peter Cooper’s granddaughters, the Hewitt sisters. John Pierpont Morgan was a friend of the Hewitt family and offered to purchase textiles for the newly formed museum while on one of his frequent collecting trips in Europe. Morgan purchased the Badía collection of Barcelona, the Vivés Collection of Madrid and the Stanislas Baron collection of Paris for the museum. Both the Francisco Miquel y Badía collection and the Antonio Vivés y Escudero collection, which entered the Museum's collection in 1902, contained small groups of Peruvian material. Two very fine Colonial Peruvian mantles were included in the Vivés collection. There is conflicting information on which of the Spanish collections included the tapestry band. (from the archives of the Cooper-Hewitt).
reminiscent of Mudejar tilework found in southern Spain and can be related to Spanish textiles of the 15th-16th century.3

**Description of the Textile**

The textile is a tapestry-woven band 35” high by 6” wide. Its form suggests it may have been used in an ecclesiastical setting, possibly as a narrow cloth for an altar, commissioned by Church officials.4

The entire band consists of a long, selvage-to-selvage strip of fabric, with separately woven narrow borders applied to all four edges. The borders have been cut in sections and have a crenellated design, while sharing the palette of the main band. At one end of the central panel, there is an interwoven section of the border design indicating that the design of the separately woven bands had also been originally integrally woven into the end of the long panel, probably at both ends, forming a border top and bottom.

The textile’s overall size and shape has been altered. It is in a somewhat ragged state, composed of several cut pieces and patched with fragments of the same fabric.5 From first glance, the Cooper-Hewitt textile appears as a simple, rather unremarkable fragmentary object. But upon closer examination, the extraordinary nature of its material components can be seen.

**Examination of the Textile**

Woven in slit tapestry weave on cotton warps, the polychrome wefts are composed of two types of yarns (fig. 2). The unusual white yarn consists of downy feathers and cotton spun together in a two-ply yarn. The feather was identified as goose down by Carla Dove, Research Scientist, Smithsonian Institution (fig. 3).6 The other weft yarns, including a red, yellow, greenish-yellow, faun gray, a greenish gray and a dark green are clearly composed of a very fine animal hair. The identification of this animal hair was an interesting challenge.

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3 See, for example fig.123 in F. May Silk Textiles of Spain, NY, Hispanic Society 1957.
4 A considerable amount of wax is present on the back. This is often seen, though not conclusive evidence, in textiles used as altar cloths.
5 It was also patched with a small, unrelated tapestry fragment. The fragment (1902-1-374b) used to patch the band is also an interesting textile made of tapestry weave with rabbit hair yarns.
6 She noted in her report that if the feather came from Peru, then it was likely to have come from the Andean Goose (Chloephaga melanoptera) although not enough of the feather structure was present to make that determination (e-mail communication from Carla Dove to Lucy Commoner, June 6, 2001, copied to Elena Phipps).
The textile had been catalogued as Peruvian, so the expected animal hair fiber would be one of the finer species of the camelids—such as alpaca or vicuna. Merino sheep’s wool, introduced by the Spanish, was not considered a possibility, as it was not common in fine tapestries from the early Colonial period. Upon further examination, camelid was eliminated as the possible fiber type, due to the extreme fineness of the hairs. The next hypothesis was that the fiber could be viscacha, a more rare type of animal hair. Viscacha, \((\text{Langidium viscaccia and Langostomus maximus})\) a rodent in the chinchilla family that lives in the very high altiplano region of the Andes, was prized for its silky fine hair, and was one of the unusual animal hairs known to have been used in Peru for special textiles.

**Fiber Identification**

Fiber samples from the textile were examined under 400x magnification, and in order to see the outer scales of the fiber, cellulose acetate scale casts were made. The segmented sections of the central medulla of the fiber were distinctive, as was the scale pattern. This confirmed that the samples were neither sheep’s wool nor camelid hair (fig. 4).

![Figure 4. Rabbit hair from Cooper Hewitt textile. Microscopic image 400x. Photo: L. Commoner/S. Sardjono.](image)

Using reference samples from animal pelts belonging to the American Museum of Natural History, New York\(^7\) microscopic examination showed that, while apparently related through some of its physical characteristics, the fiber was not viscacha, but rather, rabbit hair\(^8\). Further, Alfred Gardner, (senior mammalogist, USGS Patuxent Wildlife Research Center, National Museum of Natural History, Smithsonian,) identified that the sample was from a European hare (domesticated rabbit, genus Oryctolagus) rather than a native rabbit, genus *Sylvilagus*\(^9\).

To confirm the initial findings, so critical to the study, Suzanne C. Peurach, (USGS Patuxent Wildlife Research Center) conducted further analyses using a wide range of related reference samples, including chinchilla, viscacha and guinea pig.\(^{10}\)

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\(^7\) Thanks to Chris Norris Dept of Mammalogy, American Museum of Natural History (in 2001) who provided viscacha pelt hair samples.

\(^8\) Lucy Commoner and Sandra Sardjono made the first identification of the fiber as rabbit hair.

\(^9\) Email communication from Alfred Gardner to Lucy Commoner Oct 4, 2001 (forwarded to Elena Phipps)

\(^{10}\) The identification of rabbit hair was additionally confirmed at the AMNH in 2006, thanks to Neil Duncan, Dept of Mammalogy, AMNH who also examined and confirmed Langodorf (rabbit).
A Question of Interpretation

Had the fiber been viscacha, an animal only found in the Andean region, there would have been no question as to the origin of the textile. However, with rabbit hair, commonly found throughout the Americas, in both its wild and domesticated types, and goose feathers, also somewhat generic, the question of provenance could not be answered on the basis of the materials alone. While rabbits and geese did populate the Andes in the 16th and 17th centuries, their use together does not represent known Andean textile traditions. It is, however, documented in the Mexican textile tradition, and this led to an examination of the historic use of feathers and animal hairs, in the context of the textile traditions of both regions.

Andean Featherwork Traditions

Hundreds of thousands of textiles have been preserved primarily along the dry desert coast of Peru and Chile. This vast resource of archaeological materials provides a basis for our knowledge of the Andean textile arts. Featherwork forms a subgroup of these textile arts, and in the Andes was an especially important part of ritual life. The use of feathers in Andean textiles from all periods of history, however, conforms to a particular method of production:

Whole feathers were individually attached to a string (generally cotton) through a series of loops and/or knots. The length of string, with its feathers attached, would then be stitched onto a woven cloth. The feathered string appliquéd to the surface could be laid out row-by-row, covering the ground cloth. Of the tens of thousands of featherwork items preserved, almost all are composed in this way. None have been reported to have been composed of spun feathers.

Exotic Animal Fibers in the Andes

In South America, the camelids provided a wide range of quality for animal hair yarns, and these were used extensively throughout Andean history to create fine luxury textiles. Exotic animal hairs, such as the hair from the wild guanaco, bat, viscacha and others were noted by Spanish Chroniclers in the 16th century, who remarked on the surprisingly silk-like qualities of these fibers. Few examples survive, however, that have been clearly identified as being composed of these special fibers. One possible example is an Inca-period bag belonging to the American Museum of Natural History.

The viscacha, an almost mythical animal, was depicted in many Colonial era textiles, especially in tapestries from the 16th-17th centuries. It was often shown in a blue color, indicating that it may have other cultural associations which have yet to be documented.

Sometimes used as an amulet, today, in the highlands the tradition continues, where a single yarn

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11 See, for example, the feathered headdresses of the Inca capacocha burials, of both the sacrificed children, and the miniature dressed figurines (e.g. J. Reinhard Peru’s Ice Maidens. National Geographic, 2005.)
13 Another technique, referred to as feather mosaic, was used where whole or cut feathers were applied with an adhesive to a surface, for example in some Tihuanaco period headdresses. (See MMA, acc no. 1987.394.655 for example).
15 The bag AMNH B3810 was brought to the attention of E. Phipps by Vuka Rousakkis, AMNH, who also provided a fiber sample for review.
16 See, for example, discussion, p. 217, and cat. nos. 53, 70, 93, in Phipps, Hechts and Esteras The Colonial Andes, 2004.
spun of viscacha hair is worn around the wrist. These single yarns are spun in the left or Z direction, called lloque, which indicates further magical associations.\textsuperscript{17} The viscacha is one of the few mammals that survive in the salt fields of the southern altiplano, and perhaps it is this ability to live under such harsh and inhospitable conditions that contributes to its mythical stature.

Rabbit hair, a fiber less commonly used in Andean textiles has been, at least since the late 19\textsuperscript{th} century, spun and knitted into pointed caps called gorros.\textsuperscript{18} There are several of these caps in various collections, some of which may be made of viscacha rather than rabbit hair.\textsuperscript{19} The soft, silky quality of rabbit hair, is quite similar to that of the viscacha, and it may be that these hairs were used interchangeably, serving the same purpose.

The only example, to date uncovered by this project, of feather spinning in the Andes in a museum collection, is a knitted hat in the form of a full head covering with an opening for the face\textsuperscript{20}. The hat was collected by archaeologist A. Posnansky in Hanko Haque in the Desaguadero River, and given to the Ethnological Museum in Berlin in the late 19\textsuperscript{th} or early 20\textsuperscript{th} century. He noted at the time that it was made from the feathers of a diving bird.\textsuperscript{21} A visual and microscopic examination revealed that it was, indeed composed of a yarn that included soft duck feathers spun with a mixture of animal hairs, identified as sheep’s wool and possibly dog hair.\textsuperscript{22}

\textbf{Featherwork in Mexico}

In contrast, there is an abundance of documentation in Mexico regarding the use of feathers and feather spinning. Tens of thousands of feathers, feather mantles and other special textiles and garments were given as tribute to local and regional lords annually, during Aztec times. Early Colonial records of these pieces are found in the 16\textsuperscript{th} century Matriculata de Tributos.\textsuperscript{23} Unfortunately, none of the actual textiles have been preserved.

From these documents, it is clear that Aztec featherworkers in the capitol city of Tenochtitlan were highly regarded specialized craftspeople, who were called Amanteaca, after the district where they worked. The works created there were primarily the so-called feathered mosaic paintings, which found their way to European treasuries churches and royal collections, as highly prized objects and curiosities. The mosaic paintings were constructed of whole feathers glued to a ground material and the process was meticulously documented by Fray Bernabe Sahagun, the Spanish friar who stewarted an extensive documentation project of native culture in Mexico in the 1530s.

\textsuperscript{17} Personal communication Cesar Callisaya to E. Phipps, Tihuanaco, Bolivia, May 2006.
\textsuperscript{18} One such cap belongs to the De Young Museum, San Francisco, Acc no. 1992.102.187. It was published as rabbit or viscacha (Cat 140 in L. Meisch, ed. \textit{Traditional Textiles of the Andes: Life and Cloth in the Highlands}, Jeffrey Appleby Collection of Andean Textiles, 1997, pp 104-05.) In conjunction with this project, the fiber identification of rabbit was made by S. Peruach.
\textsuperscript{19} Another such fuzzy soft knitted cap is in a private collection and was initially identified as being chinchilla-related (by E. Phipps in 1998) but may in fact be rabbit.
\textsuperscript{20} Ethnologisches Museum Berlin VA34574
\textsuperscript{21} He further noted that it was very old, probably Colonial, and had been used during a time when “the people of the region wore textiles with feathers for warmth.”
\textsuperscript{22} Peruach was given samples to identify the animal hairs which she indicated were either dog hair or other carnivore. (Email communication from Suzanne Peruach to E. Phipps, July 2006.) Carla Dove identified the feather component as duck feather (email communication to E. Phipps, 9/2006).
\textsuperscript{23} F. Berdan and J. Durand-Forest, \textit{Matriculata de Tributos} 1980 Graz.
Mexican Feather Spinning

Sahagun also specifically described the spinning of feathers (called *yvitlatzavalj*). In Book 10 Chapter 25, he wrote:

*The feather seller [is] a bird owner. She raises birds; she plucks them. She plucks feathers; she treats them with chalk. She plucks feathers from the back and the breast; she peels downy feathers. She spins split ones. She spins feathers—spins them into an even thread, trims them. She spins them loosely, she spins them firmly; she uses the spindle, turns them loosely about the spindle, turns them firmly about the spindle.*

*She sells soft, spun [feathers]; long, even thread, trimmed, loose, loosely woven; white feathers tail feathers, chick feathers, back and breast feathers, darkened ones, brown ones; goose feathers, domestic duck feathers, Peru duck feathers, wild duck feathers, turkey feathers—black, white, yellow, bright red tawny, carmine colored.*

Sahagun also provides a description of the equipment used by women for spinning, including a basket and earthen bowl for storing feathers during spinning and mentions using “the shallow spindle whorl when they spun with feathers”. These specialized spindle whorls have been preserved in archaeological sites. McCafferty and McCafferty in their excavation in the Post-Classic site of Cholula have identified a group that they consider to have been used for feather spinning, and interestingly, many of them also contain designs of birds and/or feathers etched onto their surfaces.

In his letter to the Queen of Spain in 1519, Cortes, the conqueror of Mexico, described the large quantity of textiles and garments with feathers and rabbit fur that were given to him. In 1581 a local administrator also noted that women wore “… *huipils* similar to a sleeveless surplice with its hems or borders embroidered in colored cotton with a fringe of rabbit fur and embellished with duck feathers for effect.”

The famous *huipil*, referred to as the *Malinche huipil*, because it was said to be the dress worn by the native consort of Cortes, is an example of this type of dress (fig. 5). Recent Carbon-14 testing of the garment indicates that it may be an 18th century product rather than its reported 16th century date. Nevertheless, the *huipil*, woven of three strips of native brown-colored cotton cloth, is characteristically of Mexican origin, decorated with brocaded wefts composed of silk, a fine wool and cotton yarns. Areas of the decorated sections at the neck and lower edges were also embellished with yarns of spun feather with cotton. A related textile is

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30 Irmgard Weitlander Johnson, the foremost expert in Mexican textile history, in her important article Telas Emplumadas en la Epoca Virreinal, in *Arte de Plumas* Teresa CastelloYturibide, Fomento Cultural Banamex, Mexico,1993 pp 79-102 discusses many of these documentary sources and was the first to publish these feather-spun textiles.

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found in the Museo Pigorini, in Rome, woven with similar brocading techniques and is embellished with spun feather yarns.\textsuperscript{31}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{huipil.jpg}
\caption{Huipil (Woman’s dress.) Cotton, spun feathers, animal hair, silk. Museo Nacional de Antropología, México. (after I. Johnson, 1993, p. 87).}
\end{figure}

Another extraordinary textile with spun feathers comes from the Valley of Toluca. Referred to by Irmgard Johnson, noted scholar of Mexican textiles, as the Mantle of San Miguel Zinacantepec, it is woven with cotton wefts spun with feathers and has designs composed of appliquéd cords, dyed in bright blue, red and yellow. It is made up of three \textit{lienzos} or lengths of fabric, sewn together, and was used for ceremonial or religious purposes.\textsuperscript{32}

\textbf{Rabbit Hair in Mexican Textiles}

Many Colonial documents indicate that rabbit hair was also used in abundance in Mexico, and was often associated with textiles made with spun feathers. Rabbit may have been one of the few hair-bearing animals accessible to the artisans of Mexico for their weavings. Cotton and maguey fiber were the most commonly used, and the inclusion of the rabbit hair, often dyed in colors, indicated that the textile was of the highest of status. Unlike the plant fibers, the animal fibers such as rabbit and silk could be dyed more easily, and were often used as colorful embellishments.\textsuperscript{33}

\begin{itemize}
\item \textsuperscript{31} See photos in Johnson, 1993, pp. 90-91.
\item \textsuperscript{32} I. Johnson, 1993, p.85: Mantle of San Miguel Zinacantepec, Vally of Toluca. Museo Mexiquense de las Culturas, Toluca. 183 x 87 cm. Its dyes have been identified as: Blue (indigo), Red (cochineal), Yellow (zacatlaxcalli?).
\item \textsuperscript{33} It is interesting that when Sahagun, when he describes the seller of merchant of rabbit hair, it is associated with dyed colors. He says the following: Tochomitl (rabbit fur or dyed fur) “The seller of rabbit hair [material] is a dyer, a user of dyes, a dyer [of material] in many colors. [Sometimes he is] a user of faded colors, who dresses [the material] with ashes. He sells the good rabbit hair [material]- well prepared, harmonious, not dulled with ashes. He sells it in red, yellow, sky blue, light green, dark blue, tawny, dark green, flower yellow, blue green [carmine],
\end{itemize}
To summarize: while there are no archaeological examples or Colonial historical information on the use of spun feathers in the Andes, there is a 19th century example documenting the remnant of a tradition that may have continued into the 20th century. On the other hand, there is an abundance of documentary and Colonial evidence of feather spinning in Mexico, along with some examples from the 16th – 20th century. And while the evidence may weigh more to the Mexican side of the equation, there are other features to examine, including the particular weaving techniques and the use of dyes.

1) Weaving technique

The Cooper-Hewitt textile is woven in tapestry with slit joins. The Inca special weavers, in contrast, used a different method of single-interlocking joins for all royal tapestry garments, referred to as cumbi.34 High quality tapestry woven garments and hangings produced soon after the Conquest continued the use of cumbi, however, slit tapestry was used in Pre-conquest and Colonial times in other regions, so this is not necessarily an eliminating factor.

Examples of Mexican tapestry weaving of the period are barely known, and have not been examined, however, as noted by Johnson narrow tapestry-woven edges are depicted in codices and a related edge design in the Malinche huipil appears to be formed in slit tapestry. 35

2) Dyes

The testing of dyestuffs is being conducted with High Performance Liquid Chromatography (HPLC) by N. Shibayama, Department of Scientific Research, Metropolitan Museum of Art.36 This testing is in-process and is currently focusing on the unusually bright yellow colorant. Andean yellows come from a variety of plant sources. Two major Mexican yellow dye sources are known from Colonial documents. One of them, Cuscuta species Zacatlaxcalli is a parasitic plant and the other, is the flower Cosmos Sulfura called Xochipalli (probably referred to by Sahagun as ‘flower yellow’ used to dye rabbit hair).37 Testing to-date indicates that the yellow colorant used to dye the rabbit hair in the Cooper Hewitt textile is from Zacatlaxcalli or a related species.38 The red dye, as expected, is cochineal, Dactylopius coccus Costa--found in both Mexico and Peru.39

3) Dating

In order to confirm the date of the textile, samples were tested through Carbon-14 dating, at the Institute of Particle Physics Laboratory in Switzerland. The radiocarbon analysis resulted in a C-14 age of 240+/−40 BP. The calibration of this age (2 sigma range) results in calendar intervals from which the interval of 1480-1680 AD is the most probable one (85%) and two rose, brown. [With these] he dyes, he provides the colors.” Book 10, 21st chptr (pg 77). (Sometimes even the feathers were dyed, and there are many references to this practice, as well.)

34 See Phipps 2004, Garments and Identity in the Colonial Andes in Phipps, Hecht, Esteras Colonial Andes, p. 21-25 for extensive discussion of the meaning of cumbi.
36 Dye Analysis was performed by high performance liquid chromatography coupled to a photodiode array detector using reference materials belonging to the Textile Conservation Department, MMA.
38 A sample of yarn dyed with Cuscuta Zacatlaxcalli, was provided by Lorena Roman, from the Escuela Nacional de Conservation Restoracion, Mexico.
39 Shibayama also found braslien in the dark green, likely from Caesalpina species. N. Shibayama, unpublished report, 2006.
younger intervals of 1760AD to 1800AD (8.2%) and 1940AD to 1960AD (2.1%). The most probably date for the piece is late 15th to mid-17th c. This confirms the stylistic attribution that the textile was produced during the early period of Colonial rule of the Americas and reflects the Spanish aesthetic of the 15th-16th century.

Conclusions

The on-going investigation of this fascinating textile points out the importance of testing stylistic, historical and experimental impressions of complex objects with interdisciplinary technical research. At this point of the study, and in consideration of the various strands of ongoing research, the textile from the Cooper-Hewitt appears to be the product of Mexican artisans. This theory is based not only on the materials used in its construction, but on the high standards of craftsmanship representing years, and perhaps generations of artists developing and perfecting the selection and cultivation of fibers, the expertise in the uniform fine spinning, the fine and intense dyeing of even and deep color, found in the textile.

This assessment would make the textile a unique example of centuries-old craft traditions, so well documented in the Colonial record, but rarely, if ever manifested in actual textiles preserved from the period. As a hybrid work of the early Colonial era, it is one that truly integrates the artistic skills and values of the native people of Mexico with the aesthetic interests of the Spanish colonial world.40

40 The authors would like to thank all the colleagues who contributed their knowledge and expertise in this collaborative research project.