

**TECHNICAL ATTRIBUTES AS CULTURAL CHOICES:
THE TEXTILES ASSOCIATED WITH AN INCA SACRIFICE
AT CERRO ESMERALDA, NORTHERN CHILE**

**A thesis Submitted to the Committee on Graduate Studies
in Partial Fulfilment of the Requirements for the
Degree of Master of Arts
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ABSTRACT

Technical Attributes as Cultural Choices:
The Textiles Associated with an Inca Sacrifice
at Cerro Esmeralda, Northern Chile

E. Marilyn Baker

In this thesis, my primary intent is to demonstrate that technical attributes of textiles are the result of individual choices made within the contexts of cultural traditions. These choices may represent the decisions made by the people who produced the artifacts as well as the preferences of the artifact consumers.

Textile artifacts from the Inca Sacrifice site of Cerro Esmeralda were assessed and interpreted using the system defined by Emery (1980), and were then compared with known Inca textile characteristics as described by Ann Rowe (1995-96) and published artifacts from other sites. By focusing on specific artifact variables such as dimensions, structure, colour, and design; yarn attributes such as diameter, direction of twist, angle of twist and tightness of twist; fibre characteristics such as type of fibre and diameter of fibre; and other factors such as levels of skill, it was possible to distinguish technical differences suggesting both individual producers and the social groups that sponsored them.

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CHAPTER I

Introduction: Status and General Description of the Textile Collection

The textiles on which this thesis is based are located at the Museo Regional de Iquique, in Iquique, northern Chile. I was introduced to the collection in July of 1998 by Mr. William J. Conklin, and was able to execute a preliminary examination of the artifacts at that time. Research was undertaken during six weeks in the following summer.

The site was accidentally discovered in 1976 during the construction of a road leading to the top of Cerro Esmeralda, a 905 metre hill located northeast of Iquique (Checura 1977:125; Figures 1 and 2). The remains of two naturally mummified females, textiles and other artifacts were exposed during blasting operations after having been interred for over 500 years in a 3.5 m. deep tomb on the summit of the hill (Checura 1977:125). The mummies and other contents were somewhat roughly removed from this location by construction personnel and, while much of this material was deposited at the museum, some was apparently also distributed to areas and persons unknown (Checura 1977:133), and retrieved by museum personnel over a period of time (Morales: personal communication 1998). One of the females was a young girl approximately nine years of age, and the other was an adult of approximately eighteen or twenty (Checura 1977:125). The cause of deaths is believed to be strangulation (Checura 1977:127), and the bodies were naturally desiccated in the dry desert environment.

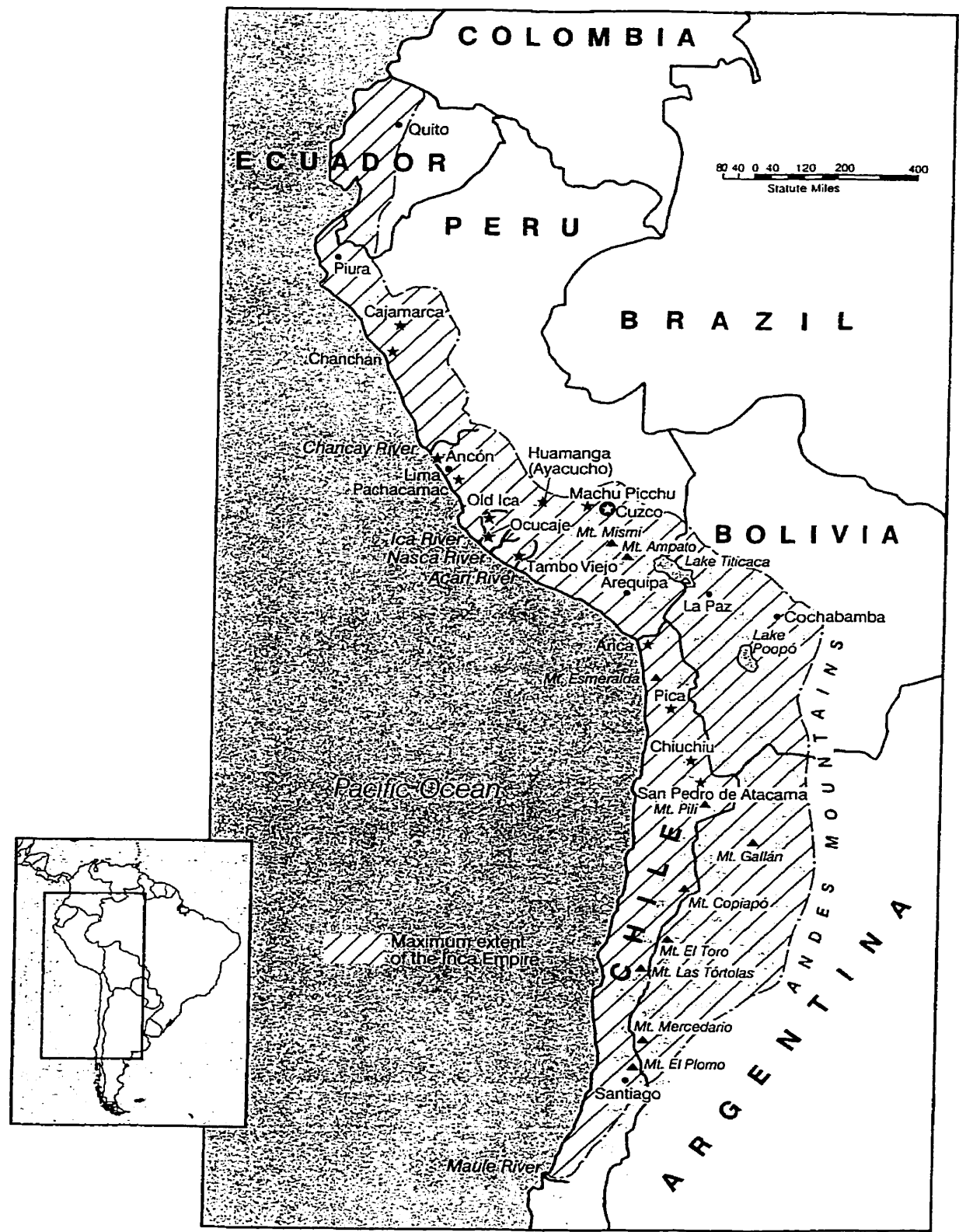


Figure 1: Maximum Extent of the Inca Empire. Adapted from A. Rowe 1995-96:4.

The site and its contents are similar to Inca sacrifice sites in other locations such as El Toro in northern Argentina (Beorchia 1985:224-237; Schobinger 1966), El Plomo in Chile (Beorchia 1985:171-180; Mostny 1957), and Ampato in Peru (Conklin 1996; Reinhard 1996), and other known sites of this type. Cerro Esmeralda, however, is at a much lower elevation than the others (see eg. Beorchia 1985:Table 1), and the grave contents, while similar to the others, are comparatively rich. Speculation regarding the choice of location for this sanctuary site are varied and include fertility/water, sun worship, and Esmeralda's close proximity to Cerro Huantajaya, which reportedly was a rich source of silver (Beorchia 1985:81-83). Checura (1977:125-26) suggests that both females may have been from Cuzco but from different social positions, as while camelid textiles were associated with both adult and child, most artifacts, and particularly the better quality artifacts, were apparently associated with the adult. A small quantity of cinnabar was also associated with the adult. While the textile artifacts are the subject of this investigation, their context within the total artifact assemblage is also meaningful. According to Beorchia (1985:83), the artifacts originally deposited at the museum include:

19 pieces of Inca pottery (plates, aryballos, etc.).

1 22 carat gold bracelet weighing 3 grams.

1 silver bracelet, very broken.

3 broken silver *topos* 30 cm. in length.

various lengths of silver snuff tubes.

7 fragments of silver, mislaid, whose marks are preserved on the mummies and textiles.

2 anthropomorphic figurines of silver and marine shell (probably present -- mislaid).

1 trapezoidal shell plaque 5 cm x 2.2 cm x 1.3 cm, attached to a *topo*, broken.

1 complete pectoral plaque, shell

Spondylus princeps princeps shells, one with two perforations, in the manner of a pectoral;
various organic materials found inside ceramic pots: molle seeds and tamarugo leaves [text says: seeds of leaves of molle and tamarugo].

ground totora.

chuño ashes or "lucta" [sic for llipta?] to use with coca.

two calabashes containing marine shell ashes

10 bags full of coca leaves or ground coca. Two of these bags are covered with feathers; one red and the other green.

1 pyro-engraved cane tube 18 cm in length by 3 cm in diameter used to store hallucinogens.

1 wooden spoon 18 cm in length.

1 miniature basket (capacho) made of alpaca wool, 8.5 x 4 cm, filled with coca leaves and covered with brown [cafe] feathers [may refer to the small grass covered bag].

2 cane fragments.

red cinnabar used as make-up.

various textiles: an alpaca headdress covered with white feathers, with a plume of feathers that project over the centre of the head.

3 red and yellow alpaca wool *llaautos* (?) [sic: the ? is in the original text], 1.27 m in length with tassels 10 cm in length.

1 pubic cover.

1 "royal mantle" with decoration in red, green, white, yellow, and coffee.

5 belts decorated in red and yellow on a black ground.

1 braided small polychrome cord that connects two topos.

1 back stole of coffee coloured alpaca, covered with green feathers.

4 alpaca wool tassels.

cactus spines.

dry laid stones on the summit of the hill.

This initial list was most probably compiled by Jorge Checura who was then director of the museum. Octavio Morales, museum director during the 1980s, also recovered some of the materials (Morales:personal communication 1999), and his textile inventory (Morales 1985:65-67) is provided in Appendices IV and V. The comparison of textiles of the Morales list with current museum holdings (Appendix I), indicates that the contents of the three lists differ.

The Esmeralda textiles have also previously been studied; a 71 page paper by Medvinski Lifchitz et al (1979) is reported by Beorchia (1985:84). Unfortunately it was not possible to obtain a copy of this paper.

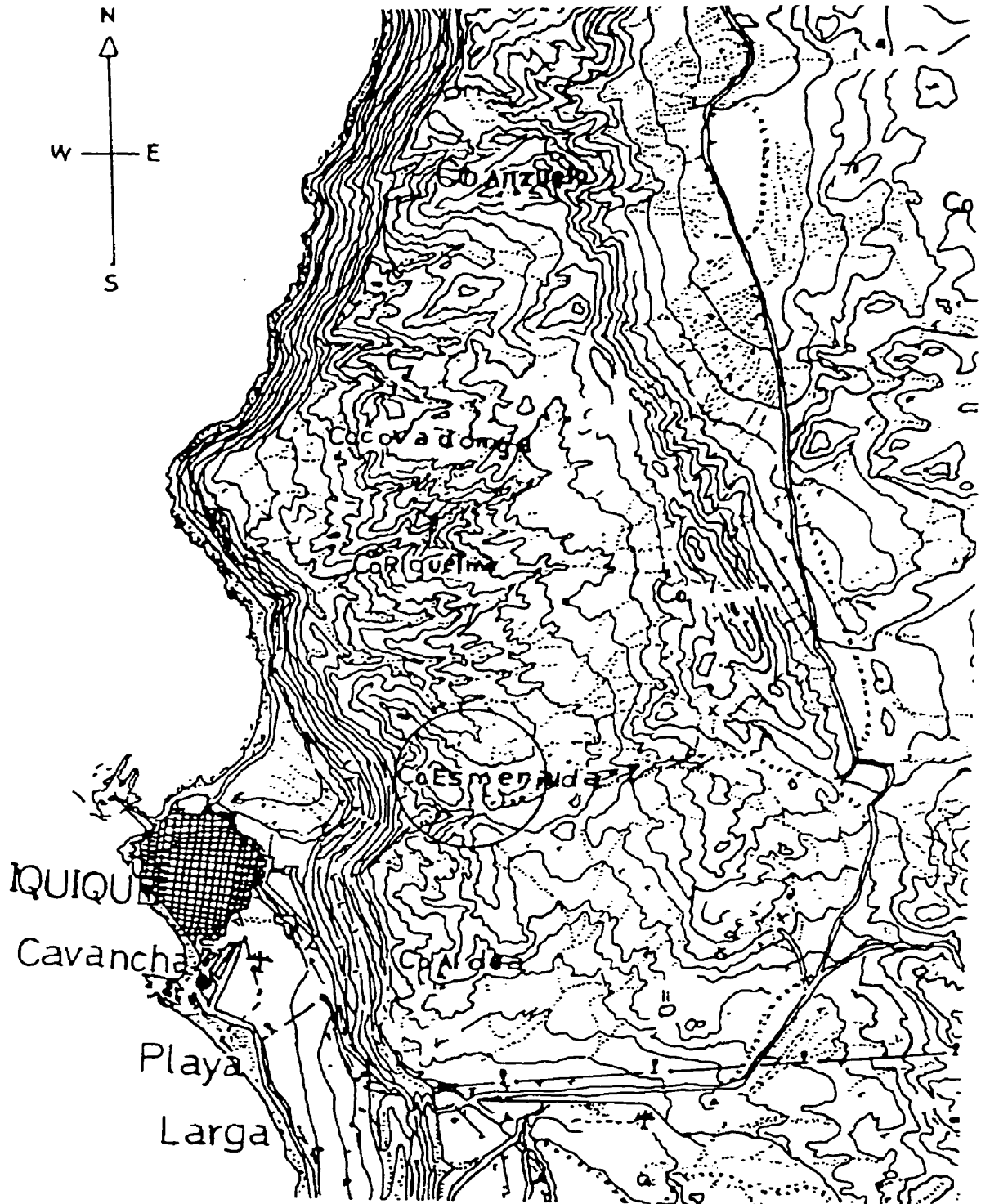


Figure 2: Topographic Map of the Cerro Esmeralda Area: Adapted from Morales 1985:4.

Objectives and Perspectives

This thesis is based on an analysis of the attributes of the approximately fifty-two textiles in this collection. Both my approach to this material in the field and its presentation here have been shaped by two somewhat differing goals: 1) a description of the textiles on the basis of their observed technical features, and 2) an identification of the textiles and evaluation of their features for technical evidence of both their consumers and their producers. The first goal is achieved by the documentation of textile attributes in Appendix I, and the second and primary objective constitutes the main text of this thesis.

The decision to catalogue and describe the artifacts prior to determining the precise direction of inquiry was based on several hypotheses: that Inca social structure was represented in part by complex symbols and that the Inca relied on the exhibition and comprehension of these encoded signs; that many of these symbols are manifest in textile formats; that present day scholars may not yet be aware of many of these symbols or of their significance; and that information recovered from these perishable artifacts may outlast both the artifacts and the perspectives relating to their interpretation. Consequently, detailed description may be the only means of long term preservation.

My goal in writing this thesis is to demonstrate that technical attributes of textiles can serve as primary sources of information about both their consumers and their producers. Consumer identity in this assemblage is immediately apparent as stylistic features of textiles, ceramics, and other artifacts clearly announce Inca sponsorship. Many features of these artifacts are recognizable and distinct, and have been noted at other Inca sites (eg. Reinhard 1992, 1996, 1999; Uhle 1991[1903]). While the cultural identification of the assemblage is not in question, this initial identification represents only part of the information that may be available from these artifacts.

Conspicuous attributes of the Esmeralda textiles are representative of the Inca, and Inca consumers deliberately selected specific textiles from a wide assortment of available articles (eg. Cobo 1979:216[1653]), to be included in this sacrifice context. However, associated social groups also made choices about how these artifacts were to be made and who was to produce them. For the most part these choices were culturally determined, and along with evidence of skill, may make possible the association of specific groups and individuals with facets of artifact production. Stylistic variations representing technical choices (Figure 3) document aspects of textile production networks, and by identifying these choices, elements of social networking may also be suggested.

Methods of interpreting artifact variability or style in archaeological contexts have received considerable attention by archaeologists, (eg. Carr: 1995; Carr and Neitzel 1995; Conkey and Hastorf 1990; Costin 1991, 1993, 1999; Costin and Hagstrum 1995; DeBoer and Moore 1982; Hill 1985; Hill and Evans 1972; Hodder 1990; Lechtman 1977, 1984; Morris 1995; Plog 1995; Sackett 1977, 1982; Schiffer 1999; Schiffer and Skibo 1997; Wiesner 1983, 1984; Wobst 1977, 1999). There are, however, numerous possible approaches to consider.

Many discussions of style focus on consumer oriented attributes, that is, distinctive, recognizable qualities that serve to communicate specific information about social identity and status to particular target groups. This interpretation corresponds with an information-exchange theory of style (eg. Hegmon 1992:521; Weissner 1983; Wobst:1977) and appears to have been employed by the Inca in this instance to communicate what Preucel and Hodder (1996:300) call a "symbolic expression of identit(y)ies".

It is now understood (eg. Hegmon 1992), however, that this approach only emphasizes the *uses* of style and does not fully account for other reasons for artifact variability, such as production, learning of customs, traditions, economics or technology.

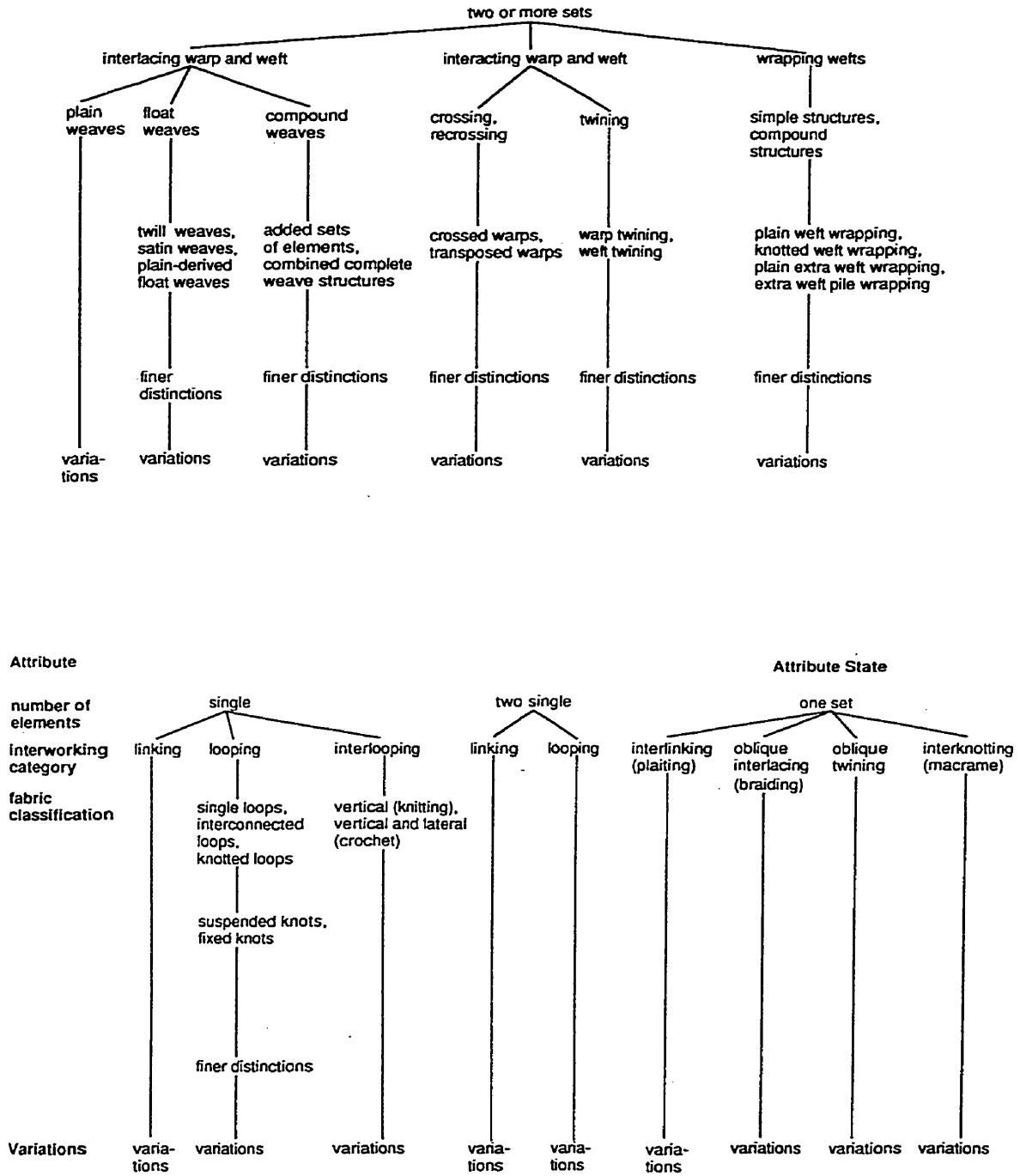


Figure 3. Production choices in textile manufacture. Adapted from Carr and Maslowski 1999:306-307.

These issues, however, can also be addressed by archaeologists: Sackett's (1977) concept of *isochrestic* style, for example, provides an early model that accounts for various factors affecting artifact variability, and Lechtman (eg. 1977:3, 1984) relates technical styles to other aspects of cultures, including ideology. Contextual factors (see eg. Roe 1995:Tables 2.2 and 2.3) do affect how artifacts are produced and can be represented in material form as technical variations. Many of these features are consumer-defined and these may be observed either as prominently displayed characteristics, or in the form of specific standardized traits.

Some attributes, however, are neither functional nor stylistic from a consumer standpoint, as they are not conspicuously obvious or even necessarily visible, so do not appear to have been conceived or crafted with regard to the communication of explicit messages. It is assumed, however, that there is an interrelationship between artifacts and social contexts (eg. Dobres and Hoffman 1999:5; Ingold 1999:ix; Costin 1999), and that some features that were neither required nor endorsed by the Inca may have held some fundamental significance for the producers of the artifacts. Preucel and Hodder (1996:300-301) observe that meanings in material culture are "multiply-coded and multidimensional", and that many utilitarian and social factors affected how an artifact was produced. Citing Dobres (1995), they note (1996:301) that "...variability must be partly understood in terms of the ways in which technical skills were negotiated as part of the jockeying for social position and recognition". Technical variability, then, can be seen to represent all levels of individual-social interaction.

In this thesis, I attempt to associate technical choices used in textile production (see Figure 3) with these levels of individual-societal interaction, with a focus on identifying different individuals and groups within the Inca sphere. I am concerned with recognizing standardized features that indicate state sponsorship, identifying the producers responsible for the textile artifacts in this collection, and also with observing how different producers and

production levels may be represented in material form.

I assume that textile characteristics represent conscious production decisions based on cultural norms and convictions about the most appropriate means of achieving certain tasks. I also suggest that when some knowledge of social dynamics is known, data of a more specific nature, such as textile production, can also be evaluated within the broader principles of what is understood of the social structure and organization. Each individual within the Inca sphere was part of a household, a moiety, an *ayllu*, a region/province, a *suyu*, and *Tahuantinsuyu* (Figure 4). Although many organizational details are unclear, I suggest that with enough comparative data, attribute variables of some of these organizational spheres should be observable in textile artifacts. Stylistic attributes corresponding to six societal levels were sought from the textiles of this collection:

1. *Individual*: Individual spinners and weavers can sometimes be identified (eg. Paul and Niles 1984). Evidence of different skill levels, (eg. of spinning and weaving), can also be prime indicators of individuals (eg. Schiffer and Skibo 1997:33-34; Spier 1976:162-166).
2. *Household*: It is probable that the same textile techniques would have been used by members of the same family, as textile traditions are presumed to have been passed down within family units as they still are today (eg. Frame 1989). Stylistic similarity on a small scale may suggest same household production where a number of variations occur.
3. *Moieties*: It is probable that some variables of textile artifacts served to identify the moieties of an *ayllu*, although this may be difficult to identify as moieties occur at different levels.
4. *Ayllus*: It has been noted by chroniclers that ethnic dress was preserved by the Inca (see eg. Cieza's list of provinces and characteristic headdresses), and this most likely refers to the distinctive dress and head-wear of the maximal *ayllus*, and/or regions, provinces or *suyus*.

5-6. *Region/province/suyu*: Regional/provincial/*suyu* traditions may sometimes be generally observable by the different manners that artifacts were constructed, for example "Provincial Inca" traits, such as Chimú/Inca and Ica/Inca that exhibit both Inca and local characteristics.

7. *Tahuantinsuyu*: Imperial or state characteristics. These traits are the most obvious and are represented by both iconic and technical features (see Chapter III for defining criteria).

Hegmon (1992:517-518) notes that all interpretive strategies of style embrace two main principles: 1) style is a way of doing something, and 2) style involves a choice among various alternatives. In this thesis, I embrace Hegmon's principles and use the term "style" mainly to indicate qualities of artifact variability that reflect specific technical choices, for example "either the content or structure of an artifact: its forms, engineering and other properties (eg. cord twist tightness, colour), relationships among forms or properties, part-whole relationships, syntactic patterns, and Gestalt-perceptual qualities (eg. visual texture)" as defined by Carr (1995:172-173). It is also assumed that the attributes have personal or group meaning at some specific scale, though these meanings may not be explicit or even important, and are not necessarily related to function. It is accepted as Roe (1995:35) suggests, that style is a "hierarchical phenomenon" which requires multidimensional means of analysis. The term is occasionally also used in a more general sense.

My analysis (Chapter III) is based on a comparative assessment of technical choices that were observed in this collection (see Appendix I), and the technical variables were then also compared with ethnohistoric reports and archaeological evidence from other locations. As with most archaeological interpretation, there are limitations to this approach. The Inca are understood primarily through the interpretation of archaeological remains, ethnohistoric chronicles, and oral history, but this interpretation is tempered by the incomplete nature of

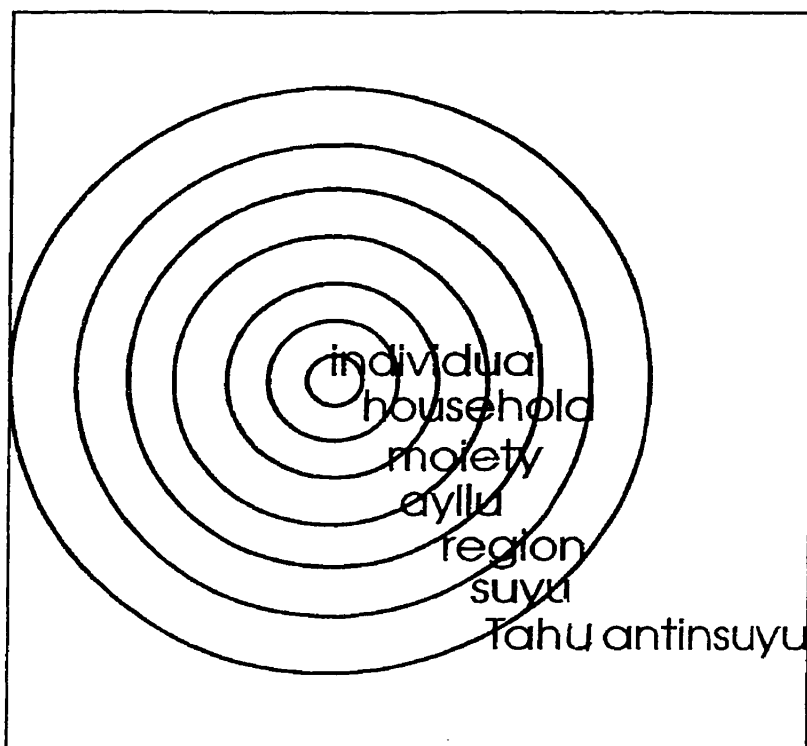


Figure 4. Inca Social Structure.

both archaeological evidence and available texts. Archaeological findings are selective in that they are restricted to what has been preserved, and biases also occur in historical documents. European writers of the time were ordinary men perceiving the Andean world from within a very different cultural context, and the society they were attempting to explain was highly complex. Differing accounts, partially due to the Inca practice of consciously omitting problematic historical material, and partially due to the cyclic, non-linear way the Inca interpreted their past (Patterson 1997:43-44; Rostworowski 1999:vii-xi), compounded the difficulty of subsequent re-interpretation of this material by the Spaniards (Rostworowski 1999:viii-xi). Nevertheless, although we may never *know* as much as we would like about the

Inca, the accretion and interpretation of archaeological data such as this, combined with the reinterpretation of other historical features, serve to contribute to our understanding of this short-lived complex society.

Although without doubt there is other information contained within these textiles relating to Inca world views, *pacha* (the Andean concept of time and space), ritual, sacrifice and religious beliefs, to name a few, these topics are beyond the scope of this thesis. Some aspects of production, such as detailed fibre analysis and dye testing were also not addressed. The textile artifacts discussed here were first grouped by general factors such as cloth shape, and were defined by the terms presented in Appendix I and in this thesis only after completion of comparative analysis.

Methodology

The Museo Regional de Iquique in Iquique, northern Chile, occupies the lower floor of an impressive two-story municipal building, and the artifacts from nearby Cerro Esmeralda are presently housed there. The building, while architecturally striking, is not large, and most of the museum space is allocated to displays. Office and storage space are limited, but the museum director, Cora Moragas W., was able to provide me with a small office for the duration of my stay. When a larger surface area was needed for examining mantles, space was cleared on the one large surface area in the storeroom and I was also given this space on which to work. It was in this storeroom that all but the smallest artifacts were examined.

Most museum displays were being refurbished in the summer of 1999, and were closed to the public. This was fortunate, as it allowed the removal of the Inca materials from display cases, and also enabled examination of the mummies more closely than otherwise would have been possible. This close examination revealed artifacts (one thigh band on the

adult mummy, and hair ties on both mummies) that were not easily noticed in their position in the locked display cases. Other artifacts, such as the feathered headdress, and mantle #47, had been missing since the museum relocated several years ago, and I was given permission to search for them in the storeroom. These artifacts were found associated with unrelated materials where they had most likely been placed during the museum relocation.

During my investigation, the artifacts were handled as little as possible, and when possible, only once. I was able to purchase large bed sheet remnants to place on the work surface, and each artifact was placed on this fabric during my examination, and usually handled with cotton or latex gloves. Unfortunately, the storeroom work surface was located under a pipe that sometimes leaked, so leaving artifacts exposed overnight was not an option. As examination of some artifacts took several days, they were folded within the sheeting each evening, and placed in an area where they could not be damaged if the pipe leaked. All artifacts were examined, photographed, labelled and then stored in acid-free material. The smaller artifacts were placed in acid-free plastic bags following examination (some on acid-free fibreboard), and the large mantles were wrapped in acid free paper.

Several photographs were taken of each artifact, and both digital and slide images were obtained. Smaller artifacts were placed on a small table in the central museum courtyard during the best lighting conditions of the day, and photographed in both media. Photographing larger items was more difficult, as the textiles were too large to open completely on the storeroom work surface (see eg. Plate 3 I), and even then, it was not possible to get close enough to the textile to illustrate details. Fortunately, the museum was closed on Sundays and holidays, and has a large open stairway leading to the second floor. I was, therefore, able to spread large artifacts such as mantles on sheeting on the main floor of the central courtyard on days that the museum was closed, and photograph them from the

mezzanine level of the stairway.

Technical analysis was accomplished by means of attribute measurements and descriptions of noteworthy features and irregularities. Measurements and testing were done for the most part, without preconceived expectations. The outcome of this approach is that some of the information gathered is more useful to the central focus of this thesis than others. One somewhat time consuming study was that of colour. Although it is probably useful to have a record of this material for future reference, as colour is one of the less permanent attributes, only a few comparisons yielded material of immediate use. Other analyses, however, yielded surprising results. For example, the use of cotton and other vegetal fibre in very specific instances suggests conventions that may not have been previously noted.

Although the measurements described here are structurally quantitative, they have been interpreted, for the most part, qualitatively, as the malleable nature of textiles in general, the fragile condition of these particular textiles, and variable means of measurements to some degree affected their evaluation. Also, where yarns were not available in a straightened condition, or where less than one centimetre of yarn was available, it became necessary to estimate values. It is also expected that variables of temperature and humidity may alter dimensions to some degree. Although climatic conditions in northern Chile appear to be stable (mean relative humidity for the area between 1974-1976 fluctuated between 71-79% during all seasons, and mean temperature during the same time period ranged between 14.6°-21° C. [Morales 1985:37]), the dimensions of these artifacts may differ somewhat if examined in a dissimilar geographic area.

The overall appearance and measurement of each artifact were recorded first. In determining the number of sample measurements to take, time was a significant factor, and I finally settled on three overall measurements and six measurements of other details, where

possible. I had hoped to do ten measurements of all attributes, but it soon became apparent that this would take more time than was available.

Overall measurements were usually taken in three generally predetermined areas (top, bottom and centre) and where possible, were taken where there were no breaks in the fabric. A standard measuring tape or ruler was used where practical, and dimensions were estimated to the nearest millimetre. Pattern areas and stripe widths were also usually measured in this manner. Irregular artifacts such as thigh bands, were measured using cotton string which was extended along both interior and exterior edges, and then the string was measured against a measuring tape. These measurements were also taken three times. Braided cordage lengths were also measured with string, from the tip of the artifact to the top rim of the tassel cover. The other irregular measurement was of tassel widths which were measured at the narrowest point near the tassel cover, mid-tassel, and also at the distal end where the tassel flared to its fullest. This method, while not precise, was chosen to best illustrate the shape and fullness of each tassel.

Structural dimensions such as warps and wefts per centimetre were also counted in six generally predetermined locations on the textile, and stitches and loops of single element artifacts were assessed in a similar manner. Locations were usually selected in two areas near the top, centre and bottom of each artifact. Structural elements were defined according to *The Primary Structures of Fabrics* by Irene Emery (1980), which was also the main source for textile terminology (Appendix II).

Colours were assessed using the Munsell Colour System (Appendix III). Other methods such as the Ostwald System which utilizes the addition of precise measurements of gray to quantify hues, and the Reinhold Color Atlas, which is more portable, were also considered. The Munsell system, however, was thought to be more precise as it classifies

colours in relation to each other according to its three dimensions; hue, value, and chroma. Colours were assessed solely on the basis of colour appearance; the strongest colours of artifacts were compared to colour chips from the *Munsell Book of Color* (matte) (Munsell 1976), and *Munsell Soil Color Charts* (Munsell 1975). Because of inconsistent lighting conditions, stains and soiling of artifacts, and my subjective perception, measurements were taken twice where possible. Comparisons were made between colour chips and artifacts in the somewhat dark museum setting, and small sample yarns were again tested at my dining room table on bright days. Variations in the two testings were usually noted, but surprisingly these deviations were usually quite minimal. The more significant inconsistencies are probably attributable to the colour variables that were present in the artifacts themselves; yarn samples that were removed from the artifact and assessed off site were selected more for their availability than for attributes of strong colour.

Frequently, appropriate colour chips were found in the *Munsell Soil Color Charts* that were not available in the *Munsell Color Charts*, and I feel the reason for this is that the colours on the artifacts were from natural sources. In some cases the exact colour on an artifact was not available on a colour chip from either source, and in these instances, the nearest choice of colour chip was recorded. Colorimetry, the identification and matching of colours by precise machines such as spectrophotometers, is beyond the scope of this thesis, but I believe the colours described here provide a reasonably accurate depiction of the colours of these artifacts at this point in time.

Yarns were evaluated in a number of ways. Directions of twist were noted and described using the standard S and Z designations (Figure 5). Directions of original twist, twist of ply, and in the case of cordage, directions of re-plying were noted, with the final twist

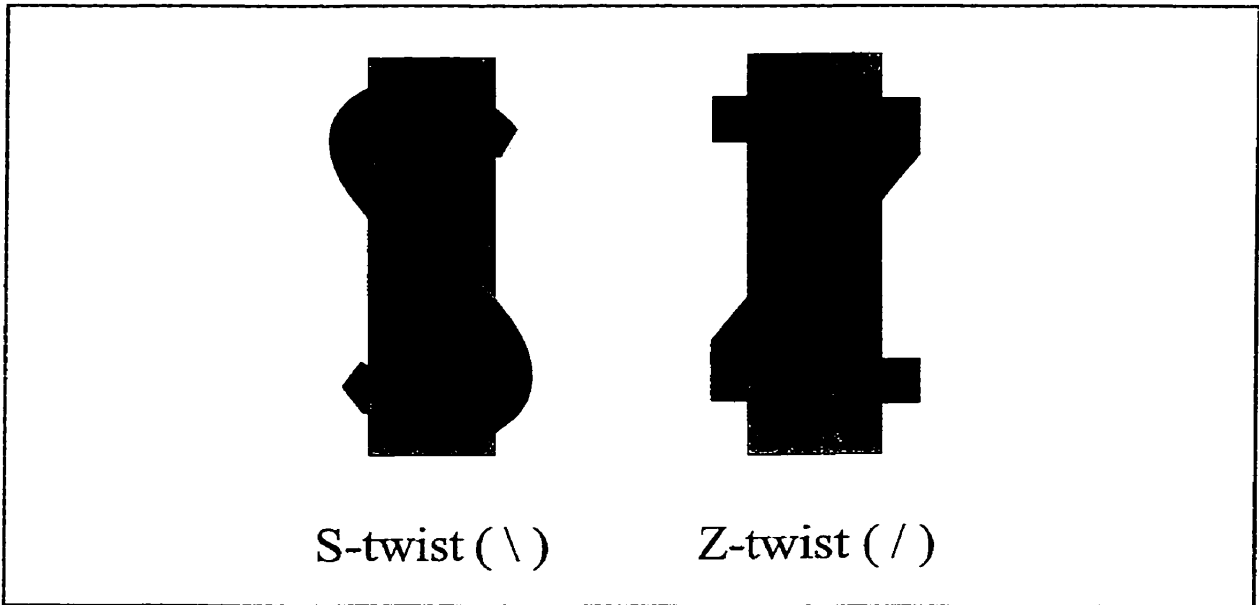


Figure 5. Z and S twists. Redrawn from Emery 1980:11 by M. Hall.

recorded last (eg. Z-spun S-plyed and Z-re-plyed indicates that the final twist is the re-plyed Z-twist). Measurements of yarn diameters were relatively straightforward -- yarns were examined using a lighted 10X magnifying glass and a linen counter calibrated in millimetres, and the diameters were measured for the most part to the nearest 0.25 millimetre (Figure 6).

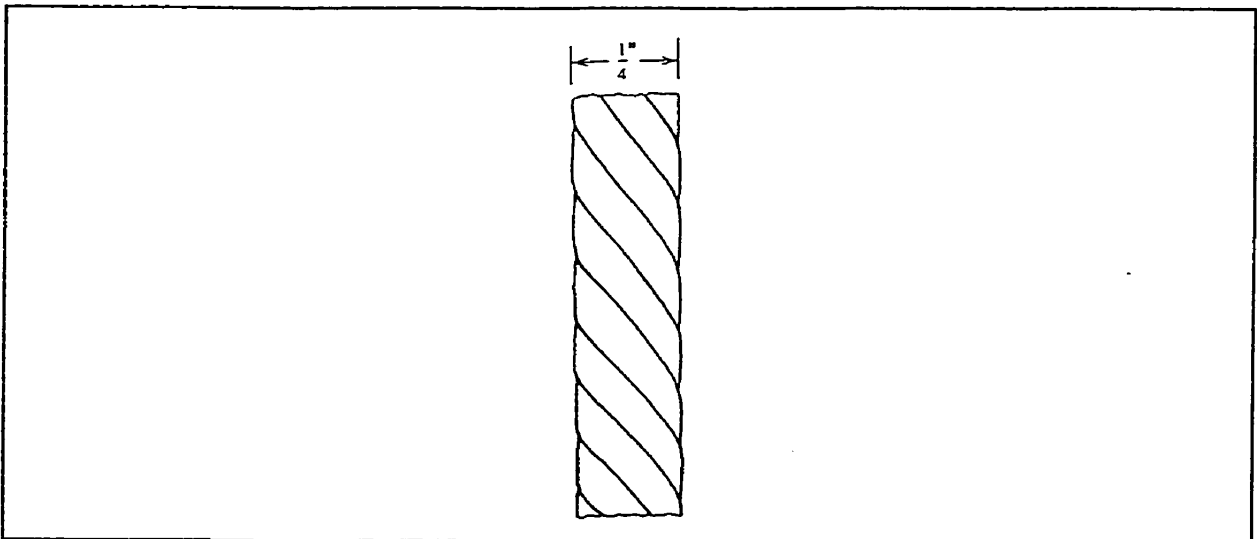


Figure 6. Determination of yarn diameter. Adapted from Emery 1980:12.

Although a ruler with 0.5 millimetre calibrations was available, this proved too difficult to read, so the linen counter was selected, even though interpretation may have been more subjective. Sometimes yarn diameters were clearly nearer to 0.30 millimetre than to 0.25 millimetre, so these results were also reported. Measurements of angles of twist, however, were more challenging. In many cases yarns were fragile so extending them into a "straight" position for evaluation was usually not an option, as they crumbled easily. Small straight sections of yarns were usually found, but it was necessary to search for yarns in which features of diameter, twist, ply and re-ply were definable, which resulted in some yarns being selected against. Yarns that were still stretched within warps, or broken yarns near frayed ends were usually also not selected. Where possible, broken warp yarns in areas nearest the woven article were chosen, as these were thought to be closest to their original state. Hidden weft yarns, while generally straight, were also fragile, so their selection was based entirely on availability. Also unfortunate was that dark coloured yarns were more difficult to "read", and single ply yarns, which were not easily tested, are not well represented.

Figure 8 illustrates how angles of twist were determined, and the same difficulties with yarn selection were noted. My choice of measuring technique was also quite time consuming; each sample of plied yarn was selected and positioned on the 90° measure of a regular protractor, and a ruler was placed on the twist angle which was then measured and recorded. It was then necessary to convert this number to the helix-angle by subtraction from 90. A more straightforward gauge for determining angle of twist was available (Ross 1984), but these dimensions were not considered explicit enough for this study. Angles were evaluated according to standards set by Emery (Figures 7 and 8), who determined that a loose twist is 10° and less, a medium twist is 10° - 25°, and a tight twist is 25° - 45°. To determine twists per centimetre, which also illustrates the tightness of twist, yarns were assessed off-site, and

only one measurement was taken of each yarn sample. Twists were counted using a standard ruler and 10X magnifying glass. Where possible, the twists of two centimetres of yarn were counted and this number divided by two. Frequently, however, and particularly with hidden elements, only a very short length of yarn was available for measurement, and in these instances, the counts were adjusted to represent one centimetre. The analysis of twists per centimetre, angles of twist, and yarn diameters were done separately and on different yarns.

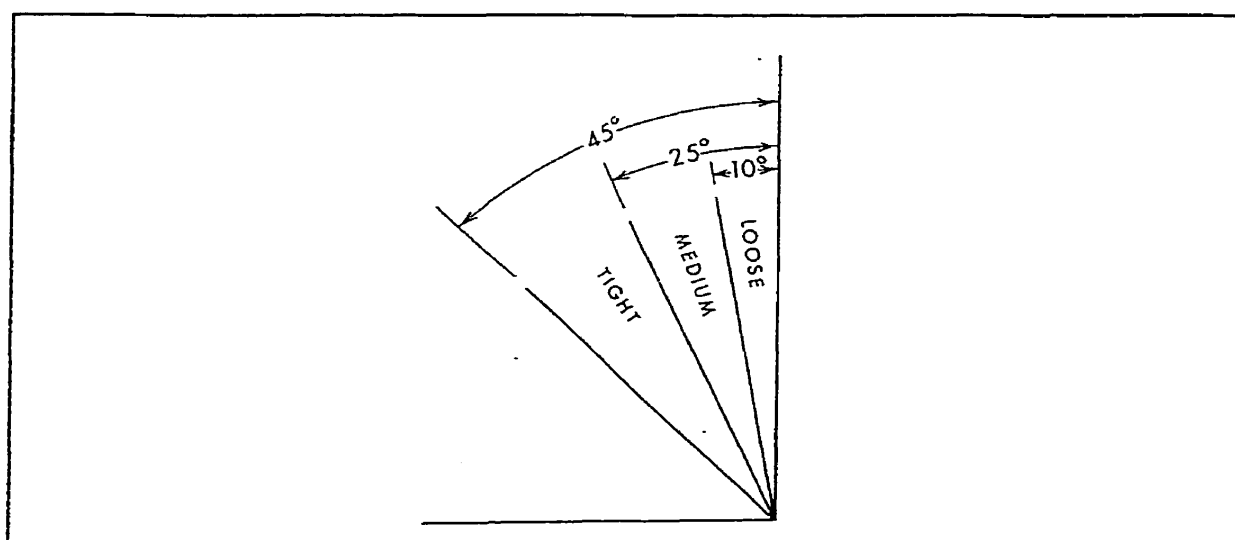


Figure 7. Determination of tightness of twist. Adapted from Emery 1980:12.

Fibres were identified with the use of a lighted 10X magnifying glass, and on occasion, this was also verified off site with the use of a portable 100X illuminated microscope. Almost all yarns of all artifacts were identified as camelid, that is, originating from the domesticated alpaca (*Lama pacos*), llama (*Lama glama*), or from the wild vicuña (*Lama vicugna*) or guanaco (*Lama glama huanacus*). However, while my examination clearly defines the fibres as animal hair, their classification as camelid is based only on the knowledge that sheep or other large wool or hair bearing animals were not present in the pre-contact Andes. While it

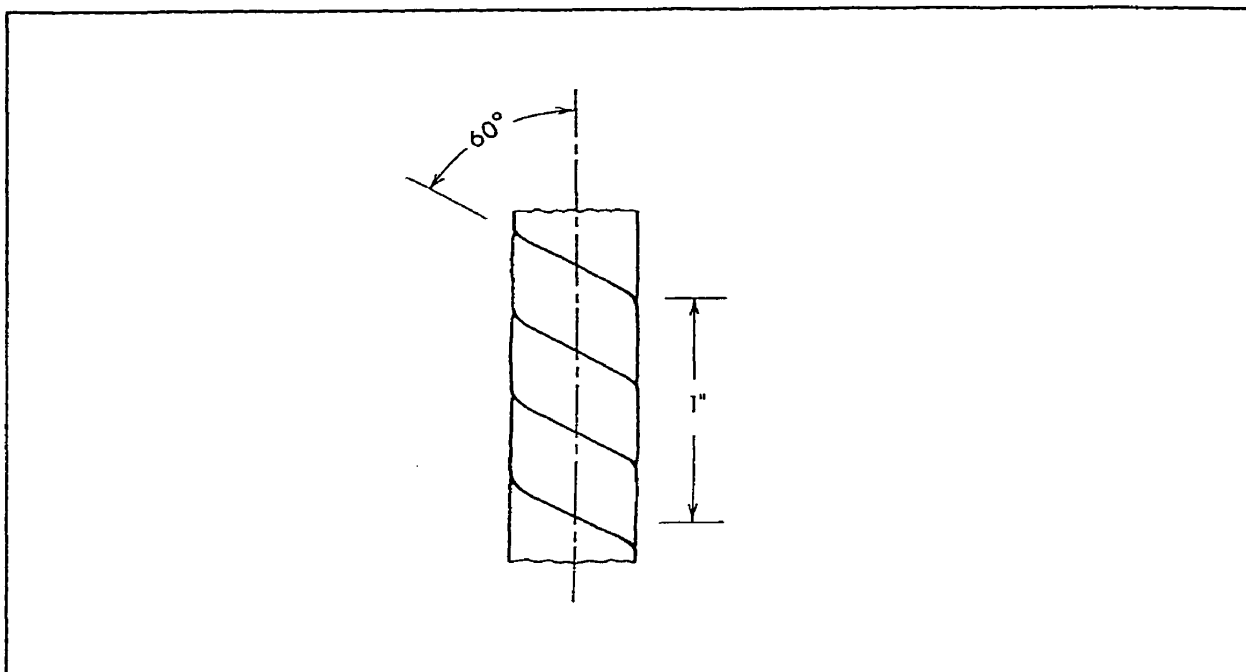


Figure 8. Determination of twist angle and number of twists. Adapted from Emery 1980:11.

is *generally* presumed, based on associating fibre size with animal size, that the coarser fibres are from mature llamas, medium fibres (most of the fibres in this collection) are from alpaca or young llama, and that the finest fibres are from vicuña or young alpaca, this has not been tested. Guanaco fibres may also have been used.

Only two other fibres were represented in the Esmeralda textiles, and both were found in very small quantities. White cotton fibre is presumed to be *Gossypium barbadense*, as it is the only known cotton variety to have been developed in pre-historic South America (Bruhns 1994:80; Vreeland 1999:113; but cf. Bird 1979:14; Verhecken 1994:54). Another vegetal fibre, possibly a variety of *furcraea*, was likewise only found in small amounts. Unfortunately, samples of this fibre were not available for off-site evaluation.

Fibre diameters were assessed by comparison with control samples. Three animal fibre samples (Drysdale sheep wool, alpaca underwool, and muskox [*Ovibos moschatus*])

underwool), were measured using a Cambridge S90 Scanning Electron Microscope, and these fibres were then labelled and laminated. The Drysdale wool (average diameter 110μ) was used as a coarse reference sample, the alpaca hair (average diameter 40μ) was the medium sample, and the muskox underwool (average diameter 24μ) was the fine sample reference. A llama sample was so similar in diameter to the alpaca that it was not used. Fibres from the Esmeralda textiles were compared to these control samples on site.

Orthography

In the year 2001, the term *Quechua* refers to a family of languages now in use in areas of Peru, Bolivia, Ecuador, Chile and Argentina. In the late pre-historic period in western South America, however, Quechua was the state language of the Inca. The Spanish recorded many Quechua terms (eg. Betanzos 1996[1557]; Cobo 1979[1653], 1990[1653]; Garcilaso de la Vega 1970[1609], Holquín 1952[1608], Domingo de Santo Tomás 1951[1560]), but used a variety of spellings which leads to some confusion regarding the definition of terms. As the Quechua language is not the subject of this thesis, and as the more familiar Spanish spellings is more often used, hispanicized forms of Quechua terms have been utilized in this thesis (see Appendix VI).

CHAPTER II

Environmental Setting and Cultural Sequence of Northern Chile

Environmental conditions in north-western Chile are extremely harsh, and do not at first appear suitable for human occupation. Humans, however, have inhabited this area for thousands of years, and archaeologically recovered features and artifacts demonstrate the early development of multi-faceted and complex lifeways. A brief overview of earlier societies of this area is included to illustrate the long-standing interaction between societies of this area. Inca presence in northern Chile was only one short but dynamic cultural phase within a very lengthy, and rich historical framework.

Environment

Four physiographic regions (Figure 9) are identifiable in northern Chile: coastal areas, an intermediate area crossed by valleys, pre-cordillera, and the *altiplano* (Rivera 1977:16, 1991:5). At lower altitudes, the climate of northern Chile is arid, and there has been little change in climatic conditions for the past 10,000 years (L. Ramirez: personal communication 1999).

Coastal areas, for the most part, amount to steep cliffs extending into the sea, without a transitional continental shelf. The steep cliffs, however, are incised periodically by deep valleys and *quebradas* formed either directly by drainage from the Cordillera or indirectly in the form of ancient lake basins (Bird 1943:184) and which sometimes retain fresh water (Rivera 1977:18). *Aguadas* or springs are also sources of fresh water in a number of other locations such as Iquique, and both categories of water source have the capacity to support

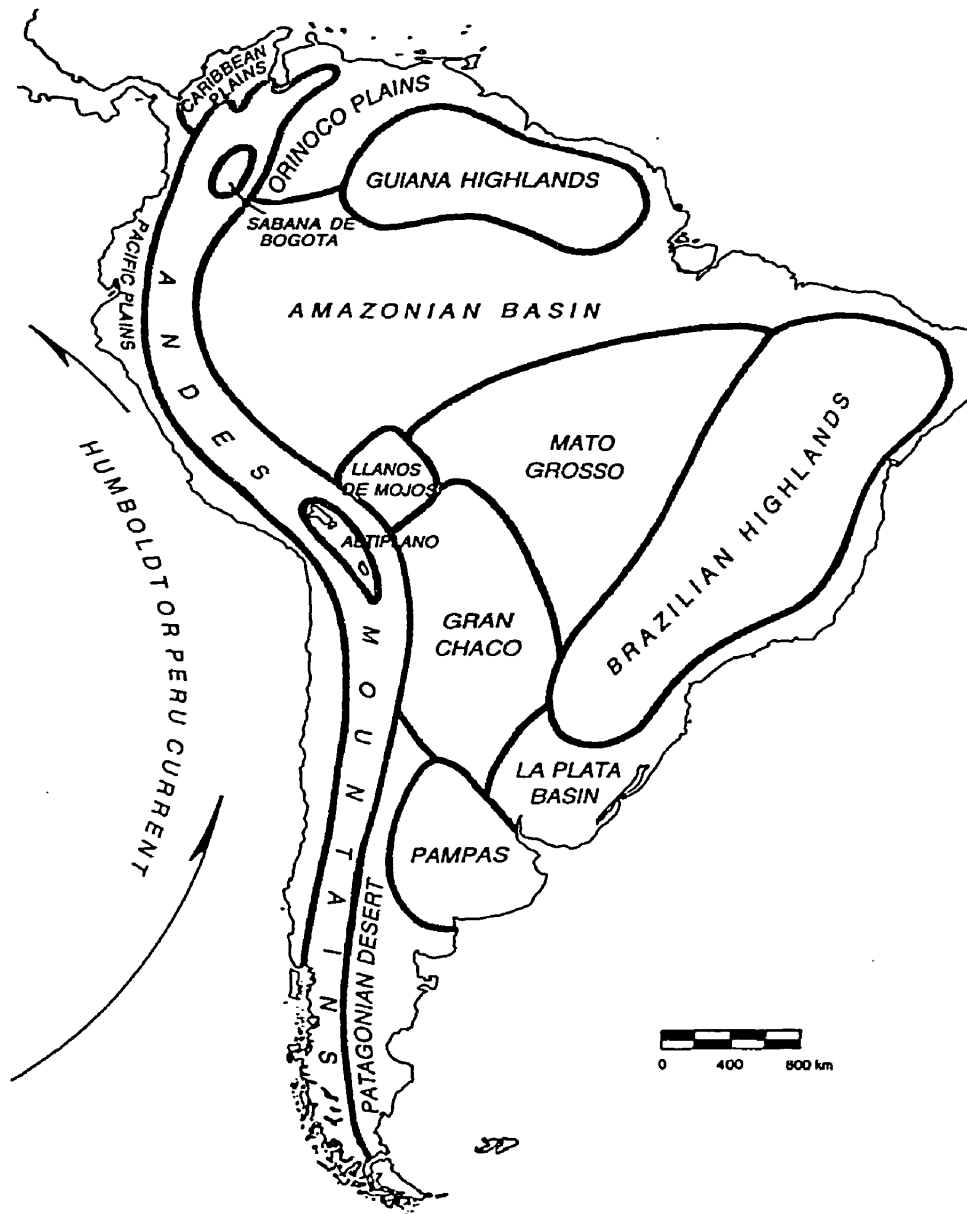


Figure 9. Physiography of South America. Adapted from Bruhns 1994: Figure 3.1.

prehistoric human populations. The *aguadas*, however, would have only contained sufficient water to sustain small groups (Rivera 1977:18).

Temperatures are stable in coastal areas of northern Chile, with annual fluctuations ranging only between 10 -20° C, and the annual precipitation averages less than 2 mm (Rivera

1977:19). Vegetation is very sparse, and mainly comprised of thorny bushes and cacti, but marine resources such as shellfish, several species of fish, and marine mammals are abundant (Rivera 1977:18). Archaeological findings suggest that birds, sea lions, and porpoises were the staple foods of early populations, and that kelp was used for fuel (Bird 1943:185-186).

The intermediate zone, between Arica and Pisagua in the extreme north of Chile, is composed of deep valleys and *quebradas* formed by runoff from the Andes to the east. Adequate supplies of water and favourable soil conditions probably attracted prehistoric populations, as numerous archaeological sites are situated in these areas (Rivera 1977:21). The valleys are separated by *pampas*, or dry plateaus, and the large Pampa del Tamarugal extends south from the Tiliviche river to the Atacama Desert. Desert conditions, including extreme fluctuations in daily temperatures and a complete lack of precipitation predominate, and prehistoric populations chose sites near oases and along river beds (Rivera 1977:21).

The pre-cordillera extends from the pampas to the cordillera at elevations of 2500-3500 m asl (Rivera 1977:22-23). In this area precipitation levels averaging 400 millimetres per annum support the growth of a number of hardy plants, and in prehistoric times, the area was utilized for agriculture and herding (Rivera 1977:22).

The cordillera, above 4000 m asl, consists of the Cordillera Negra and the Cordillera Blanca. Between these ranges lies the *altiplano*, an area of high plateaus that encompass the Titicaca Basin that supports hunting and herding (Rivera 1977:23). The *altiplano* is also closely related to the *puna* and indirectly but closely related to the warmer lower altitudes of the eastern slopes (Rivera 1991:5).

Human populations relied on different subsistence strategies in each of these areas: *Altiplano* and intermediate area societies originally relied on hunting but eventually shifted to herding, and coastal peoples depended mostly on marine resources.

Pre-Inca Cultural Sequence

Early Periods

Debate concerning the initial peopling of South America continues (see eg. Lynch 1999; Nemecek 2000; Parfit 2000), and although Paleoindian sites in northern Chile have been located, they have yet to be securely dated (Rivera 1991:11). Three Archaic stages (Early, Middle and Late), of littoral hunters and gatherers have been identified by Santoro and Nuñez (1987; also see Figure 10; cf. Willey 1971 for a different interpretation). Sites from the Early Archaic (ca. 10,000-7000 BP.), have been found, and the artifact assemblage from the earliest known site dates to 10,820 BP. ± 630 years at Tuina in the Atacama Desert, which suggests a summer hunting camp, as do other sites in the area (Santoro and Nuñez (1987:67). Few Middle Archaic sites (approximately 8000-5,500 BC.) have been discovered and characteristics have yet to be defined (Rivera 1991:12), but Late Archaic (5500-5000 BP.) artifact assemblages which include diverse tools suggest more specialized hunting and gathering activities (Rivera 1991:12). Near the end of the Archaic, there is evidence of ceramics, and the adoption of domesticated camelids, guinea pigs, and plants such as *quinoa*, squash, pumpkin, cotton, and possibly maize, suggesting highland influence (Rivera 1999:740).

The earliest known coastal site is Quebrada Las Conchas (7,730-7,450 BC.) where tool assemblages indicate a fishing economy (Llagostera 1989). The Chinchorro culture, a group of preceramic, premetallurgic sedentary societies with marine-based economies, inhabited the coastal area between Antofagasta, northern Chile to Ilo, southern Peru, from "at least 7,020-1500 BC.", a period of at least 5,520 years (Arriaza 1995:14). According to Arriaza, the Chinchorro differ from the occupants of Las Conchas in that they used various natural and artificial mummification techniques and extended burials. Uhle (1917) was the first

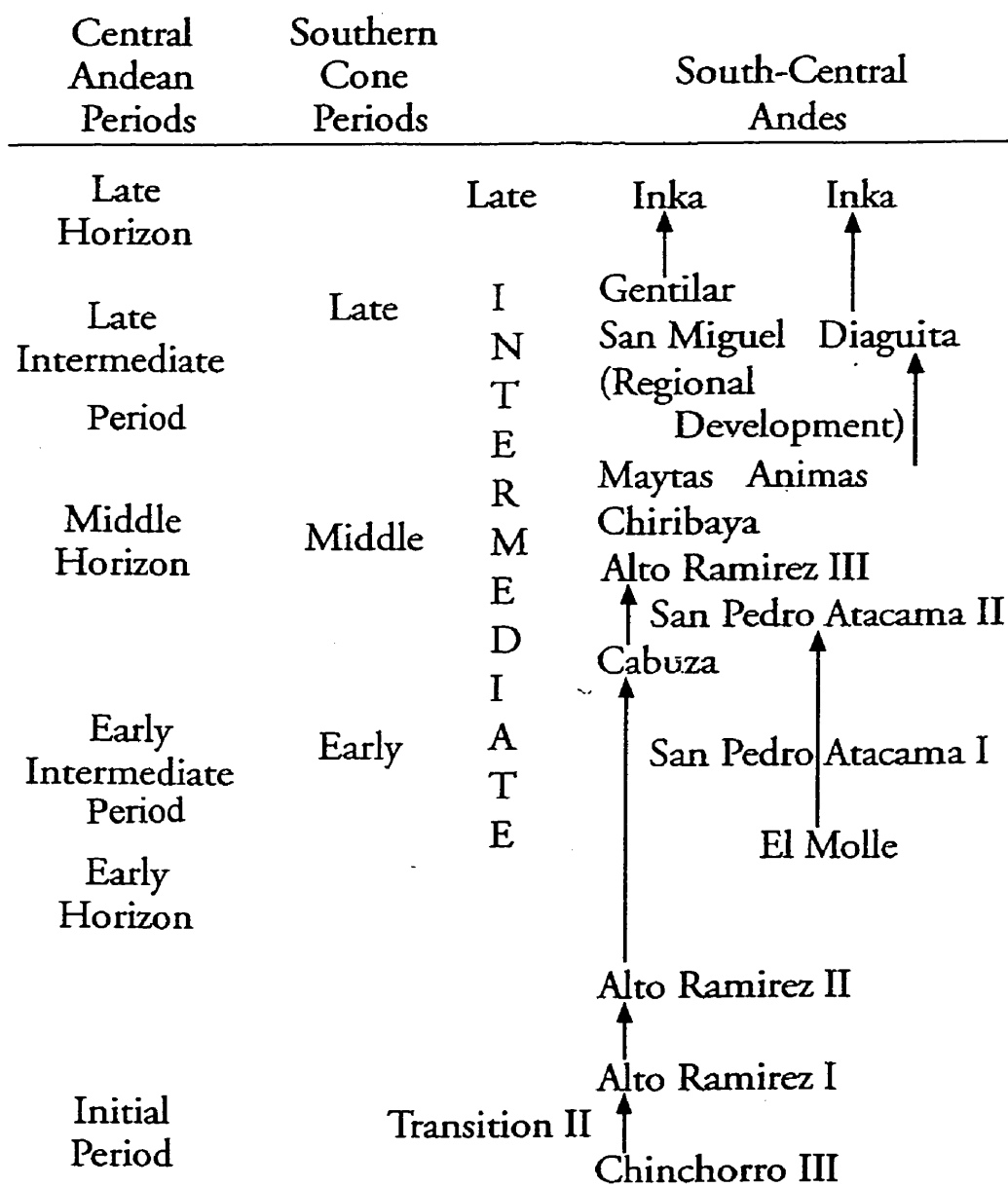


Figure 10. Cultural Sequence of the South Central Andes. Adapted from Rivera 1999:737.

to describe this mortuary tradition, calling the mummies "Los Aborígenes de Arica". Arriaza (1995:125-132) notes five Chinchorro cultural epochs based on differing mummification techniques. Rivera (1977:34-39, 1991:13-20, Table 2), however, also includes later groups that did not use mummification mortuary practises in his definition of a "Chinchorro Tradition". Rivera's classification is based primarily on evidence of marine-based subsistence technology and while this interpretation includes mummification funerary practices, is not limited to them. Shellfish, marine mammals, and deep-sea fishing appear to have been primary sources of food for the Chinchorro, and artifact assemblages include harpoons, shell and cactus fishhooks, fishing weights, lithics, throwing sticks, and basketry materials, and do not include ceramics, textiles or metal artifacts (Arriaza 1995:17).

The Quiani culture, which is included in Rivera's definition of Chinchorro, but not in Arriaza's classification, is one example of the different interpretations. Quiani is represented at sites such as Quiani 7 (Dauelsberg 1974; Arriaza 1995:17-20), and the occupants of this site maintained similar subsistence strategies as did Arriaza's Chinchorro, but did not utilize mummification mortuary practices. Incipient tuber horticulture and the use of elaborate string turbans were also in evidence at this time (Dauelsberg 1974; Arriaza 1995:17-20).

Near the end of the Archaic, according to Rivera (1999:739), the Chilean north shows three major cultural traditions: Pacific littoral hunters and gatherers; Chinchorro, a unique early culture of probable tropical forest or lowland origin; and "Andean" cultures originating on the high plains of Bolivia.

Alto Ramirez

In the western valleys and desert areas of northern Chile, evidence of an "Andean Tradition" became evident sometime after 1000 BC. (Rivera 1991:21, Figure 5). At this time,

interaction between coastal and highland peoples precipitated many changes. Pre-Pukara and pre-Tiahuanaco highland features originating in Bolivia were noted in coastal areas, and the arrival of the Andean, or "Altiplanic" Tradition in desert and coastal areas inaugurated the first stage of the Formative Period. This period is referred to as "Alto Ramirez" in northern Chile (Rivera 1991:21, 1999:740). Technological changes included new tools, metallurgy, particularly gold and silver ornaments, the use of hallucinogenics, and the beginnings of pottery and tapestry weaving, as well as the cultivation of quinoa, *ahí*, cotton, beans, squash and gourds, and possibly maize (Rivera 1991:21, 1999:740). Coastal communities traded surpluses of these products, bird guano, and salt for highland commodities such as camelid meat, fat, leather, and fibre, plus *quinoa* and freeze-dried potatoes (Rivera 1999:740). This interaction, founded on complementarity and surplus production, also generated changes which shaped sociopolitical and economic systems and stimulated population growth and the first villages (Rivera 1999:740).

Chilean Intermediate Period

Rivera (1977:39; 1991:25-26, 1999:741) has termed the time period in northern Chile that parallels the Central Andean Early Intermediate Period (400 BC.-AD. 550), Middle Horizon (AD. 500-900), and Late Intermediate Period (AD. 900-1350) the "Chilean Intermediate Period", in which he distinguishes three phases (see Figure 10). In the "Early" Chilean Intermediate Period, or Alto Ramirez phase (600 BC.- AD. 500), as represented at sites such as Azapa 84, Guatacondo, Conanoxa and Tarapaca-40, Alto Ramirez groups continued to grow. Villages were comprised of agglutinated semicircular houses, and were increasingly found in association with Tiahuanaco settlements (Rivera 1977:39-41). Also during this time period, human sacrifice, the cult of the sacrificer and trophy heads were

introduced to coastal areas, and artifact assemblages included an increase in materials used with hallucinogens (Rivera 1977:41, 1991:21, 1999:740), signifying that a common highland-based ideology was in effect.

Sophisticated geometric and anthropomorphic designs in tapestry woven textiles similar to Pukara ceramics and statuary are noteworthy during this phase, and it is of particular interest within this context that some artifacts were composed of Z-spun S-plyed camelid yarns, (Rivera 1977:43-46). In coastal areas, Tiahuanaco influence was felt in all of the north of Chile, as well as northwest Argentina, and the south of Peru (Rivera 1999:741).

During the Chilean Middle Intermediate Period or Tiahuanaco phase (AD. 500-900) populations increased and Tiahuanaco influence appears to have become more extensive. But while all of northern Chile apparently fell under Tiahuanaco sociopolitical influence, there was also considerable regional variation. In northern valley contexts, for example, what has been called an *Expansive Tiahuanaco* style is characterized by changing Tiahuanaco pottery forms. For instance, in the Azapa Valley, several contemporaneous ceramic styles are noted. Cabuza (and associated Loreto Viejo) ceramics and other artifacts are equated with Tiahuanaco; Maytas and Chiribaya styles are considered to be regional variants (Rivera 1977:56, 1991:31, 1999:741), and Sobraya is thought to be a local variant (Rivera 1977:56). Rivera (1991:31) considers the Cabuza and Loreto Viejo to represent Tiahuanaco elites living in coastal areas, and physiological evidence plus fine Tiahuanaco textiles and other artifacts in these locations support this view. Other areas contained varying blends of local and imperial artifact styles, and Tiahuanaco influence in San Pedro de Atacama was most evident between AD. 600-1000 (Rivera 1991:30).

In the north Chilean "Period of Regional Development" which corresponds with the Andean Late Intermediate Period (AD. 900-1350), a general population shift occurred, which

was characterized by the development of small ethnic communities. These groups, particularly in northern valleys and coastal areas, retained highland ties and a subsistence style based on resource complementarity (Rivera 1999:741). At this time there also appears to have been continuous migrations of highland peoples to lowland valleys and coastal areas, causing communities on the desert and *puna* to erect *pukara* style fortifications (Rivera 1999:741).

Regional polychrome pottery styles such as San Miguel, Gentilar, and Pocoma, all with mixtures of Tiahuanaco and locally developed attributes have been found in the Azapa Valley near Arica, but in the upper western valleys, groups producing black on red ceramics, similar to *altiplano* styles predominate (Rivera 1991:35, 1999:741). The Chilpe style of ceramics, black on red pottery contemporaneous with the Gentilar polychrome style, has been found in western valleys and signifies the southwestern expansion of the Colla, an Aymara speaking polity from the Lake Titicaca area (Rivera 1999:742).

Decorative features of San Miguel phase textiles (AD. 1000) contain both Tiahuanaco and local styles, and include bands, dots, stepped lines, and triangles (Rivera 1971:61; Ulloa 1982a:100). Polychrome Gentilar (AD. 1350) textiles are profusely decorated with anthropomorphic and zoomorphic designs such as felines, birds, stripes, and others (Rivera 1977:61-62; Ulloa 1982a:100).

In summary, the early inhabitants of northern Chile learned to adapt to very challenging environments; resources were scarce and populations, though stable, remained small. Significant population increases only occurred with interaction between highland and coastal areas and the exchange of resources, and by the domestication of plants and animals. In time, a common highland-based world view was accepted by coastal and desert populations alike, and this appears to have continued during the period of regionalization, even after highland political influence had dissipated. By the time the Inca conquered northern Chile, the

inhabitants were well adapted, both to their environments and to highland influence.

Inca

There has been a great deal written about the Inca, and it is not my intention to reiterate information that is more adequately reported elsewhere. A brief contextual overview is included, but for more detailed information, the following references are suggested: concise essays about the Inca are provided by D'Altroy, Stanish, Isbell, Urton, and Kicza in *The Oxford Companion to Archaeology* (1996); and by MacCormack, and Rostworowski and Morris in *The Cambridge History of the Native Peoples of the Americas: South America* (1999). *The Incas and their Ancestors: The Archaeology of Peru* (1993) by M. Moseley, and *Ancient South America* (1994) by K. Bruhns provide general accounts of the Inca in relation to preceding societies. For more detailed historic information, *An Introduction to the Archaeology of Cuzco* (1944), and *Inca Culture at the Time of the Spanish Conquest* (1963[1946]) by J. H. Rowe; *The Archaeology of the Central Andes* (1960), and *Andean Culture History* (1964) by W. Bennett and J. Bird; *History of the Inca Realm* by M. Rostworowski de Diez Canseco (1999); and *The Development of the Inca State* (1992) by B. Bauer, are also useful sources. The notations of Spanish chroniclers provide worthwhile reading and several have been translated into English, including *Narrative of the Incas* (1996 [1557]) by J. Betanzos, *The Incas of Pedro Cieza de León* (1976 [1553 and 1554]) by Cieza de León, *History of the Inca Empire* (1979 [1653]) and *Inca Religion and Customs* (1990 [1653]) by Father B. Cobo, *Royal Commentaries of the Incas and General History of Peru* (1964 [1609]) by Garcilaso de la Vega, *History of the Incas* 1908 [1570-72] by P. Sarmiento de Gamboa, and *The Discovery and Conquest of Peru* (1968 [1556]) by Agustín de Zárate.

General Description, Expansionism and Religion

It is generally accepted (eg. Rostworowski and Morris 1999:769; Patterson 1997:49; J. Rowe 1944) that the Inca in the early fifteenth century were a small group of agriculturists who inhabited the area near present day Cuzco along with other groups with similar lifeways. By 1532, less than one hundred years later, however, the Spanish discovered the largest empire of the new world, a society which had expanded from its base in Cuzco to include virtually all of present day Peru and Ecuador, most of Chile and Bolivia and parts of Colombia, Brazil and Argentina, and encompassed a population of 6,000,000-15,000,000 people (Rostworowski and Morris 1999:771 citing Verano 1992). J. Rowe (1963:185[1943]) estimates the population to have been in the neighbourhood of 6,000,000 people in 1571.

The Inca interpreted their initial arrival in Cuzco through various origin myths. According to one myth (eg. Sarmiento de Gamboa 1999:43-47[1572]; Urton 1990, 1999:45-54), the Inca originated from a cave at Pacarictambo, a town just south of Cuzco, and according to another (eg. Bandelier 1969:294; Salles-Reese 1997:3; Urton 1990:3; Zuidema 1986:8-10), Manco Capac, the founding ancestor came to the Cuzco area from the Island of the Sun in Lake Titicaca. Other reports incorporate variations of these and other legends (eg. Patterson 1997:45-49; Urton 1999:54), and the two areas are still considered sacred (eg. Urton 1999:75-76; Salles-Reese 1997:171).

Conventional interpretation of Inca history allows that in the early fourteenth century, the Inca, led by Manco Capac, appropriated two small kingdoms and organized their community, Cuzco, into two moieties: *Hanan* or "Upper" Cuzco in the north, and *Hurin* or "Lower" Cuzco in the south, which paralleled these two kingdoms. The small group is thought to have continued a traditional lifeway until near the end of the Late Intermediate Period, when the unstable and volatile relationship between the Inca and neighbouring polities

precipitated Inca expansionist behaviour that took place during most of the following century (eg. Betanzos 1996:19-38[1557]; Cobo 1979:113-132[1653]; Sarmiento de Gamboa 1999:43-87[1572]).

In the early 15th century, the prince Cusi Yupanqui (Pachacuti), reportedly saved the Incas from another aggressive group, the Chancas, though as Rostworowski and Morris (1999:776) and Zuidema, as cited in Cook (1996:99), note, no archaeological evidence of this has yet been found. Pachacuti apparently usurped control of the Inca polity from his father Wiracocha Inca and his brother, the chosen heir (Betanzos 1996:23-43[1557]; Cobo 1979:133-137[1653]; Sarmiento de Gamboa 1999:84-97[1572]), then conquered territory in what is now southern Peru and the Titicaca Basin. In about 1463 he began the task of re-organizing the city of Cuzco and his newly acquired territory, and he divided his city and territory into four sections, naming his domain *Tahuantinsuyu*, or land of four quarters (Betanzos 1996:44-74[1557]; Cobo 1979:133-141[1653]; Sarmiento de Gamboa 1999:98-99[1572]). The four areas, each of which was named for a powerful ethnic group (Bauer 1992:19), were *Antisuyu* to the northeast, *Chinchaysuyu* to the northwest, *Cuntisuyu* to the southwest, and *Collasuyu*, which included much of Chile, to the southeast (see eg. Urton 1999:11). The two northern provinces of *Chinchaysuyu* and *Antisuyu* were formed from the original *Hanan* or Upper Cuzco and reportedly included the territory that fell within specific *ceque* lines (lines that organized sacred places in and around Cuzco) that extended from the centre of Cuzco (see eg. Zuidema 1986: Figure 16; Bauer 1998). *Cuntisuyu* and *Collasuyu* were formed from the original *Hurin* or Lower Cuzco, and these territories are also thought to have extended from Cuzco within *ceque* lines. At the time of the Spanish conquest, however, one exception to this system was noted in the valleys between Camaná and Tarapacá, which include several of the most northern valleys in Chile. These areas were not

part of the Inca *suyu* territories, and were governed differently than were other larger coastal communities. The Inca called this area *Colesuyu* (Rostworowski 1986:127-135, 1999:203-204; Covey 2000:119-138), and it is assumed that other unique areas also may have existed.

Pachacuti's son Topa Inca continued the expansionist, organization, and building traditions of his father (eg. Betanzos 1996:141-162[1557]; Cobo 1979:142-151[1653]; Sarmiento de Gamboa 1999:124-154[1572]), and it was during his reign that most Inca territory was acquired. Topa Inca captured most of the rest of Peru and parts of Ecuador, and, around the time of Pachacuti's death in 1473, also conquered most of *Collasuyu*, from Bolivia and northern Argentina to the Maule River in central Chile. The time frame referred to as the "Late Horizon" begins about 1476 with the Inca conquest of Ica (for explanation of absolute chronology see J. Rowe 1945, and also see Figure 10). Topa Inca's son Huayna Capac continued territorial expansion in Ecuador, but was eventually overtaken by smallpox which preceded the arrival of the Spanish. Civil war that evolved as a result of competition for power between Huascar and Atahualpa, two of Huayna Capac's sons, and a smallpox epidemic, ensured the success of Pizarro and the Spanish conquerors in 1532 (eg. Betanzos 1996:163-275[1557]; Cobo 1979:152-171[1653]; Sarmiento de Gamboa 1999:154-194 [1572]).

The Inca were a relatively small but dynamic group in constant transition, and the society that Pizarro and his contemporaries encountered was quite different from that of the first Cuzco inhabitants, or even that of Pachacuti. In general, however, the complex and multi-ethnic four-fold society of Imperial Inca *Tahuantinsuyu*, though neither uniform nor homogenous, was managed from within a "Cuzcocratic" axis (Bauer 1992:34), or as Cobo (1979:185[1653]) phrases, from "the heart in the middle of the body" that was similar in structure to that of other ancient cultures (eg. Perry 1970:51). *Tahuantinsuyu* was organized

in a "radial" fashion, with the boundaries of the four *suyus* extending from the main plaza of Cuzco (Moseley 1993:78). Cuzco itself was not a large community, as only about 40,000 royalty lived there, though up to 200,000 people lived near by, and large communities of artisans and other state workers lived in suburban areas near the city (Moseley 1993:74).

Authority within *Tahuantinsuyu* was strictly hierarchical and the first citizen was the *Sapa* Inca, or "unique" Inca and his (preferably) sister-wife, who reigned over all. The Inca royal lineage, who were also descended from the Sun (Betanzos 1996:15-16[1557]; Cobo 1990:25-28[1653]; Sarmiento de Gamboa 1999:44-46[1572]), also resided in Cuzco. These royal Incas, who were all descended from one of the previous Inca kings, were organized into corporate descent groups called *panacas*, each of which managed the estate of the king from whom they claimed descent in accordance with the Andean practice of ancestor veneration and split inheritance (eg. Patterson 1997:52). Each province was ruled by a governor or *apu* who with his family and staff also resided in Cuzco (Cobo 1979:199[1653]). Other lesser officials governed from provincial capitals (Cobo 1979:198-202[1653]), which usually contained royal palaces, a temple dedicated to the Sun, an *acllawasi*, or house of women, a royal *tambo* (hotel or inn) large storehouses, and the personnel required to manage these assets (Cobo 1979:199[1653]).

The basic economic unit in the Andes was the household (Murra 1989; Hayashida 1999:337) and households were components of variously sized *ayllus*. Although there are different interpretations of the meaning of this term (eg. Burger and Salazar-Burger 1991:291; Isbell 1997; Salomon 1995:320; Schreiber 1993; Moseley 1993:49), it is generally accepted that these were endogamous kin groups who claimed a common ancestor and usually also shared agricultural resources, water management rights and responsibilities. The *ayllus* were managed by hereditary rulers called *curacas*, who supervised resource production and were

also "generous and hospitable" (Moseley 1993:52-53), in return for a relatively disproportionate amount of agricultural and other labour from the commoners within their areas.

The Inca also relied on this asymmetric exchange system on a state level. Mechanisms of redistribution and reciprocity were practiced in the pre-Imperial stages but at that time were informal arrangements that relied on the generosity of the Incas and the willingness of the commoners (Patterson 1997:55). The Inca state, however, taxed households primarily in the form of labour, which was the principal source of state revenue (Murra 1962). While the system was administered from Cuzco, royalty and the upper echelons of government were exempt from this taxation, as were certain craft specialists and the chosen women of the *acllahuasi* (Cobo 1979:209[1653]). In the households of commoners, however, the males were required to provide a specific measure of annual *mit'a* labour service that involved corporate tasks such as military duty, mining, and road and bridge building. Communities were also charged a textile tax, most of which is thought to have been provided by women, and each household was expected to spin yarn and produce cloth and cordage (Cobo 1979:209-210[1653]). Everyone, including children and the elderly, were taxed on the basis of the service they were able to provide. Also, all of the land and livestock was owned by the Inca, but was allocated in three relatively equal parts to the gods, the Inca, and the commoners, who provided the labour for all three categories (Cobo 1979:211-217[1653]).

The Inca preferred to conquer new territories by intimidation rather than bloodshed, and to prevent unrest after conquest, large groups of people or *mitmacs*, were resettled from one place in the kingdom to another, and where possible, to an area with a similar environment, so that the relocated populations would know how to survive (Cobo 1979:189-191[1653]; Sarmiento de Gamboa 1999 :119-121[1572]). They also placed the main idol of

each society in Cuzco along with leaders from these original societies to minister to them, to further ensure peace (Cobo 1979:191[1653]).

One of the main factors for Inca success was their excellent road system that facilitated both communication and the transportation of state goods (eg. Hyslop 1984; Hyslop and Rivera 1984; Lynch 1990). Two "royal" roads ran from one end of the kingdom to the other, one of which passed through Cuzco and connected the four parts of the realm (Cobo 1979 :223-227[1653]; Hyslop 1984). The use of runners who were stationed along these roads allowed the Inca to be in constant touch with all parts of his domain, even during conquest (Cobo 1979:223-230[1653]; Sarmiento de Gamboa 1999:116[1572]).

Inca control hinged upon a state ideology based on astronomical knowledge that associated the Sun and the divine ancestor Viracocha, with the Inca and his right to rule (eg. Cobo 1979:187[1653]; Sarmiento de Gamboa 1999:92,101[1572]). Viracocha was the most important deity, but the Inca claimed to be descended from the Sun, and also considered the moon and stars to be deities, assigning specific meanings to each (Cobo 1990:25-31 [1653]). The thunder, sea, and earth, especially mountains, which were referred to as *apu* (eg. Moseley 1993:55) and other objects such as specific rocks were also considered sacred (Cobo 1990:32-34[1653]; Sarmiento de Gamboa 1999:101[1572]). The acceptance of Inca religion by conquered groups was eased by the Inca incorporation of most of the *huacas* and religions of the people they subdued (Cobo 1979:187[1653]; 1990:3[1653]).

Ancestor veneration, an important aspect of Inca society, stemmed from long standing Andean traditions (eg. Zoubek 1998). Direct ancestors who provided ethnic identity were most important, and took an active part in the lives of their descendants (Moseley 1993:54). The carefully embalmed Inca royal ancestors were cared for by the *panacas* and were paraded before all at major celebrations (Cobo 1990:39-43[1653]; Betanzos 1996:162[1557]), and

were also consulted during major decision making (eg. Isbell 1997:38). While the Inca kept their deceased kings and nobles in palaces and temples, other Inca relatives were usually kept in above ground vaults called *pucullos* (Isbell 1997:41), though provincial customs differed. The dead of *Antisuyu*, for example were not preserved (Isbell 1997:41-44), and in northern Chile, burial mounds from the Late Horizon have been noted (eg. Munizaga 1957:83).

Sacrifice

The only below ground Imperial Inca interments appear to be those in shaft tombs, most of which appear to have been in *Chinchaysuyu*, and many of which also appear associated with sacrifice (Zuidema 1977-78). Human sacrifice had a long tradition in the Andes (Pringle 1999; Uhle 1991:86[1903]; Urton 1999:20), and the only apparent difference during Inca rule was that the Inca retained the sole right to sanction these ceremonies. Urton (1999:14) proposes that one way the Inca solidified Cuzco/territorial affiliations and legitimized Inca rule in the far reaching corners of *Tahuantinsuyu*, was the annual ceremonial *capa cocha* sacrifice ceremony in which chosen provincial victims (frequently children) were sanctified and feted in Cuzco, then returned to their communities for sacrifice. Sacrifices occurred at other times, however, and many items such as domestic animals, rabbits, birds, crops, vegetables, coca, maize brew, and fine garments all of which "they burnt in place of incense and offered as thanksgiving for everything created for man's sustenance" (Garcilasco 1970:86[1609]) were offered to the *huacas* or mountain deities. Uhle (1991:86[1903]) notes that as many as two hundred children are known to have been sacrificed at one time, but adult sacrifice was unusual, and probably only occurred at the most prominent sanctuaries. Citing Molina, Uhle (1991:86[1903]) also notes that "adults were sacrificed after campaigns, both men and women; in the provinces, also at unusual events....occasionally at Cuzco and at

Pachacamac, they sacrificed young women (doncellas) and buried them alive, but this happened a few times only". Uhle (1991:88[1903]) found evidence of strangulation at Pachacamac, and he notes that sacrifice was sometimes performed on occasions such as the wedding of the Inca (Uhle 1991:88 [1903]). Tylor (1960:219) asserts that the value of sacrifice involves "...the giving up of something prized by the worshipper, and a sign of adoration acceptable to the god".

Inca human sacrifice is sometimes referred to as *capa cocha*, but there is still some debate regarding the actual meaning of the term. Betanzos (1996 :46[1557]) speaks of *capa cocha* in reference to young children who were well adorned and buried alive to commemorate the building of the Temple to the Sun, and Cobo (1979:235-238[1653]) in describing child sacrifice, does not use the term. Zuidema (1977-78:138), citing Hernandez Principe considers that the purposes of different *capa cochas* may not be fully understood without full knowledge of the social hierarchy of the specific areas. Whether the term *capa cocha* refers to all sacrifices, only child sacrifices, or specific human sacrifice is not known at this time, though political purpose appears central to all (see eg. Silverblatt 1987:94-100; Zuidema 1977-1978).

The Inca in Northern Chile

Relatively little is known of the Inca in northern Chile, perhaps because populations were small and resources scant, and as Rivera (1991:38) suggests, it was never a critical area for Inca expansion. Though Inca presence in northern Chile is clearly demonstrated, large sites have not been recorded, and it appears that the area was one that the Inca travelled through rather than sought as a destination. While it is believed that the Inca conquered northern Chile sometime after 1471 during the southern expansion led by Topa Inca, Inca

influence was initially felt perhaps as early as 1450 (Rivera (1999:742). Inca presence is known from fortress sites such as Copaquilla, Belen, Lupica, Socoroma, Saxamar, Purisa, and Cailloma, *tambos* such as Chungara, Zapahuira, Inkauta, Cachicoca, Meteorito, Rio Frio, Peine, El Tojo, Turi, Catarpe, Caspana, and Alto Ramirez, highway features such as Socoroma, Zapahuira/Belen, San Pedro, and mines such as Vina del Cerro, and El Salvador, and sanctuary sites such as Paniri, Lincancabur, Pili, Caspana, Mino, Ascotan, Quimal, and Pular (Rivera 1991:40). Sanctuary sites such as Esmeralda, Chiuchiu, Pica, and El Plomo are of particular interest in that they contain burials with textiles (eg. A. Rowe 1995-96:15-16; Mostny 1957), and the Esmeralda sanctuary site is quite unusual, both because of its relatively low elevation and coastal location, and because of its rich artifact assemblage.

Chapter III

Textiles

Cloth and adornment have long been recognized as conveyors of cultural information. Within all levels and classes of many societies, cloth, clothing and articles of adornment have served to legitimize authority, communicate ideology, establish identity and group membership, authenticate rites of passage, and cement social ties when exchanged as gifts or bartered in trade. In the pre-Hispanic Andes, where a writing system did not exist prior to European contact, the use of textiles to communicate cultural information was particularly significant (see eg. Stone-Miller 1995:210-215; Wilson 1991).

Andean Textile Research

Studies of Andean textiles have varied, ranging from the observations of curious Spanish conquerors and early colonists, to sophisticated iconographic interpretations of recent scholars. Early Colonial impressions, in spite of Eurocentric bias and problems relating to interpretation of Andean world views, have contributed important information about the roles of cloth before and during the contact period. Cobo (1979[1653], 1990[1653]), for example, describes modes of dress that delineate nobility from commoners. He also clearly identifies regional and ethnic groups. Drawings by Guaman Poma (1980[1615]) are a particularly useful source of information about the Inca and Early Colonial Period in that styles of dress are represented within their social contexts, and may be interpreted without the influence of text. Observations of early explorers and archaeologists (eg. Boman 1908; Lothrop 1929; Means 1932; Squier 1877; Tello 1959; Uhle 1991[1903]), contribute both artifactual foundations for current anthropological interpretation and crucial contextual information that is now

frequently unavailable.

The appreciation of textiles as repositories of cultural data has escalated in recent years. As Andean textiles are relatively well preserved in coastal areas, researchers have a rich field in which to explore. Some, (eg. Bird 1979; Conklin 1974a, 1974b; Cordy-Collins 1976, 1979; Dwyer 1979; King 1965; O'Neal 1932; O'Neal et al 1949; Paul 1982, 1986, 1990, 1992; Rodman 1992, 1997; A. P. Rowe 1978, 1984b, 1986, 1990-91, 1995-96, 1996; and Van Stan 1961a, 1961b, 1964, 1967, 1979), have directed much of their research towards textile studies, specializing in various aspects of textile analysis. Others, (eg. Pozorski 1976; Topic 1977, 1982, 1990) use textile tools and materials from sites they have excavated to infer prehistoric social organization and activity. Still others (eg. Murra 1962, 1989) synthesize different sources of textile data and relate the material to overall sociopolitical and economic organization, or integrate it with other information to provide a general picture of what is known of prehistoric Andean peoples (eg. Bruhns 1994; Moseley 1993).

The earliest known evidence of textile technology in the Andes was recovered from Guitarrero Cave in the highlands of Peru, and these vegetal fibre artifacts were dated to approximately 8600-8000 BC. (Adovasio and Lynch 1973; Adovasio and Maslowski 1973; Smith 1980:115). Camelid fibre from the wild guanaco (*Lama glama huanacus*) and vicuña (*Lama vicugna*) and the domesticated llama (*Lama glama*) and alpaca (*Lama pacos*) were the most commonly utilized fibres of the Andean highlands, however, and it is possible that llama domestication occurred as early as 4000 BC. (Browman 1989).

Cotton, however, was more common in coastal areas. The earliest known cotton textiles are from Huaca Prieta, a coastal preceramic site near the mouth of the Chicama River, which dates from 3000-2100 BC. (Bird 1985; Skinner 1986). At Huaca Prieta, a large number of cotton artifacts were identified as primitive forms of the South American *Gossypium*

barbadense (Hutchinson 1959 and Stephens 1975 as cited in Bird 1985), suggesting that procurement of fibre by gathering or early incipient agriculture was practiced at this time. Stephens and Moseley (1974) note that by 2500 BC., much of the arable coastal floodplain areas was planted with cotton.

There is also evidence of textile technology during early periods in northern Chile. Cactus fishhooks (which by association would have required cordage for fishing line), have been dated to 7,020 BC. (Muñoz and Chacama (1982:73-78, 1993:39), and Arriaza (1995:88-92) describes Chinchorro fishing lines constructed of plied reeds, camelid hair and human hair, the use of twining technology for mats, interlacing technology for grass skirts, and the spinning and plying of camelid fibre for cordage turbans. True loom weaving was not noted in northern Chile, however, until 800-500 BC. (Arriaza 1995:46).

Even in very early Andean societies there is every indication that cloth was more than utilitarian. Cloth production involves a series of tasks that require many hours of labour, even to produce simple garments. Caring for animals and planting and maintaining crops such as cotton for fibre are time consuming activities in themselves, and the raw materials also require collecting. Preparing fibre for spinning is also labour intensive; camelid fibre needs cleaning, sorting, and straightening, cotton fibre requires separation from seeds and chaff, and also needs to be "fluffed", and other vegetal material requires extensive processing to remove fibre from its matrix (see eg. Teague 1998:16-17).

Spinning in the Andes was done with hand spindles, and A. Rowe (1984b:19) estimates that cotton can be spindle-spun at a rate of approximately one metre per minute, though it is assumed that the spinning of camelid fibre would be somewhat faster. Dyeing requires dyestuffs and mordants, both of which would have been obtained by gathering or trade, and the dye process is also a time consuming procedure. Prior to weaving, warps would

have been wound and, if using backstrap looms (see eg. Harcourt 1962: Figure 3), heddle cords would also have had to be looped around warp threads and heddle rods-- all prior to the weaving process which in itself took many hours. Yet textiles created by early Andean peoples also contain a very wide assortment of intentionally complex and labour intensive techniques (see eg. Paul 1990; A. Rowe 1984b) indicating that cloth was also used to signify aspects of social relevance. Design elements, even in early societies, were used to proclaim state or religious significance, ethnic identity, marital status, age, and gender (eg. Bird 1985; Sawyer, 1967; Cobo 1979[1653], 1990[1653]).

Inca Textiles

Cloth was perhaps *the* most important Inca resource. Murra (1989:293) notes that:

A primary source of state revenues, an annual chore among peasant occupations, a common sacrificial offering, cloth could also serve at different times and occasions as a status symbol or a token of enforced citizenship, as burial furniture, bride wealth, or armistice sealer. No political, military, social, or religious event was complete without textiles volunteered or bestowed, burned, exchanged, or sacrificed.

And Morris (1995:431) goes one step further, asserting that:

[Inca] Textiles were at their summit of stylistic importance. Their utility, portability, and enormous visual flexibility made them the most personal of style bearing objects. They were of such great political and economic importance that it is not a serious oversimplification to say that the state's potential to expand was proportional to the amount and quality of cloth it could mobilize.

Ethnic identity was also perpetuated by means of textiles. Even when the Inca relocated *mitmac* colonists to locations far from their original homes, the groups were required to retain their traditional costume, most particularly, hairstyles and headgear (Cobo 1979:190[1653]).

During the Spanish conquest, Inca state warehouses filled with cloth were destroyed by retreating armies to prevent the enemy from obtaining this valuable resource, though other valuables were left for the conquerors (Murra 1989:288). Indeed, textiles appear to have acted as "a medium for conceptualizing the world and for communicating complex ideas" (Meisch 1997:12, citing Frame and Franquemont), and as chronicles for the storage and accounting of cultural events and beliefs.

Because of the significance of cloth, there must have been numerous Quechua terms for describing specific fabrics and textiles during the Inca Horizon. However, Cobo (1990:225-226[1653]) records only: *abasca*, a plain rough cloth used for domestic purposes; *cumbi*, a finer and elegant fabric; feathered cloth; embroidered cloth; and a very rough *chusi* cloth used for blankets and rugs. There is not, however, an undisputed definition of these terms, which results in conflicting interpretations of textile material. Cobo (1990:125-126[1653]), for example, recognizes several qualities of *cumbi*, and notes that although both *cumbi camaos* and *mamacuna* wove *cumbi*, the finest cloth was produced by *mamacuna* for the emperor Inca. Some scholars (eg. J. Rowe 1963:242, 1979:239[1946]) consider the finest *cumbi* to have been tapestry woven, but Morúa (Desrosiers 1986:235-236) describes a famous belt with warp-faced construction and complementary-warp patterning, as *cumbi*, which implies that the *quality* of weaving or *pattern content* may be the defining feature. It is possible, however that Morúa was referring to *chumbi* or *chumpi*, the Quechua term for a woman's belt. Garcilasco de la Vega (1964:161[1609]) also has a different interpretation, and describes three qualities of woolen materials; *auasca* (*abasca*) used by common people, *compi* (*cumbi*) used by the nobility, and a finer quality of cloth reserved for "nobles of royal blood". Garcilasco (1964:161[1609]) also reports that both *cumbi* and the very fine cloth were woven by men on upright looms. Guaman Poma (1980:48[1615]), however, describes

only *abasca* and *cumbi*, and illustrates women spinning, (1980:196, 198, 200, 273[1615]) and weaving on backstrap looms (1980:191, 193[1615]), but not on upright or staked looms. Betanzos (1996:56, 99[1557]) notes that in addition to wool and cotton garments, the vegetal fibre *cabuya* was used for blankets, cordage, and footwear.

Cobo (1990:226[1653]) generally compares the qualities of *abasca* to Spanish woolens, *cumbi* to silk, *chaquira* to brocades (this association must be in reference to *bordado de chaquira* and indicate beaded cloth or beadwork), feathered cloth to silvercloth, and *chusi* to coarse woolens. Using only Cobo's definitions, it is probable that most of the dyed woven artifacts in the Esmeralda collection fall into lower classes of his *cumbi* category (Table 1), as they are fine, dyed, or of more than one colour, and finished on both sides. They are not, however, the very finest textiles to which only the Inca had access. A very fine tapestry-woven Inca tunic of royal quality, for example was woven on a warp set at 15-19 threads per centimetre and woven with fine weft threads at 98-108 threads per centimetre (A. Rowe and J. Rowe 1996:464), which is much finer than the structure of the Esmeralda artifacts. The natural coloured Esmeralda artifacts, however, probably fall within the *abasca* category. Unfortunately, perishable Inca artifacts such as textiles are scant as they are not well preserved in humid highland areas, and the few artifacts that have been conserved are from coastal areas or mountaintop sacrifice sites.

A number of characteristics typify Imperial Inca textiles. A. Rowe (1995-96:6-11) notes that they are usually constructed of camelid yarns that are either two or three ply, and are Z-spun and S plied (Figure 5). She also observes that the yarns are finely and evenly spun, that all four of the South American camelids were utilized, and that alpaca was probably the most utilized fibre for textiles. Cotton, however, was also used, particularly in coastal areas. Warp yarns were frequently more tightly twisted than weft yarns.

Table 1. Cobo's Textile Categories.

Textile	Fibre	Characteristics	Weavers	Loom
<i>Cumbi</i>	select wool, or lamb's wool or vicuña wool, or viscacha hair, or bat hair,	fine, and dyed, and finished/both sides, and worn by elite	<i>cumbi camaos</i> (men), <i>mamaconas</i> (women) (finest by <i>mamacona</i>)	upright
<i>Abasca</i>	llama wool, coarse alpaca	coarse, and natural coloured, and all one colour; sometimes dyed, and worn by commoners	usually women	staked
Feather-cloth	small feathers sewn to <i>cumbi</i>	fine and most esteemed		
<i>Chaquira</i>	wool? beads (gold/silver)	fine and embroidered		
<i>Chusi</i>	coarse wool	very thick; used for rugs and blankets		

Note: Data from Cobo: 1990:225-226[1653]. Lamb's wool from sheep would not have been available prehistorically, and bat and viscacha hair, though mentioned here, have not been identified in Inca textiles. *Bordado de Chaquira* appears to refer to beadwork rather than what is considered embroidery in modern terms, and although Cobo does not mention backstrap looms, other sources indicate that these were also used in Inca textile manufacture.

Inca textiles are invariably warp-faced with warp yarns covering weft yarns, or weft-faced, with weft yarns covering warp yarns (A. Rowe 1995-96:6-7). Many of these characteristics, however, were also traits of Aymara weaving which succeeded the traditions of Tiahuanaco (see eg. Rodman 1997:20), and some were also noted in pre-Tiahuanaco northern Chile.

The edges of Inca mantles and some bags were embroidered using cross-knit loop stitching and overcasting (A. Rowe 1995-96:6-70). The cross-knit loop stitched edges of Inca mantles (Figure 11) are in the form of facing brackets (Figure 12), and, while it is possible

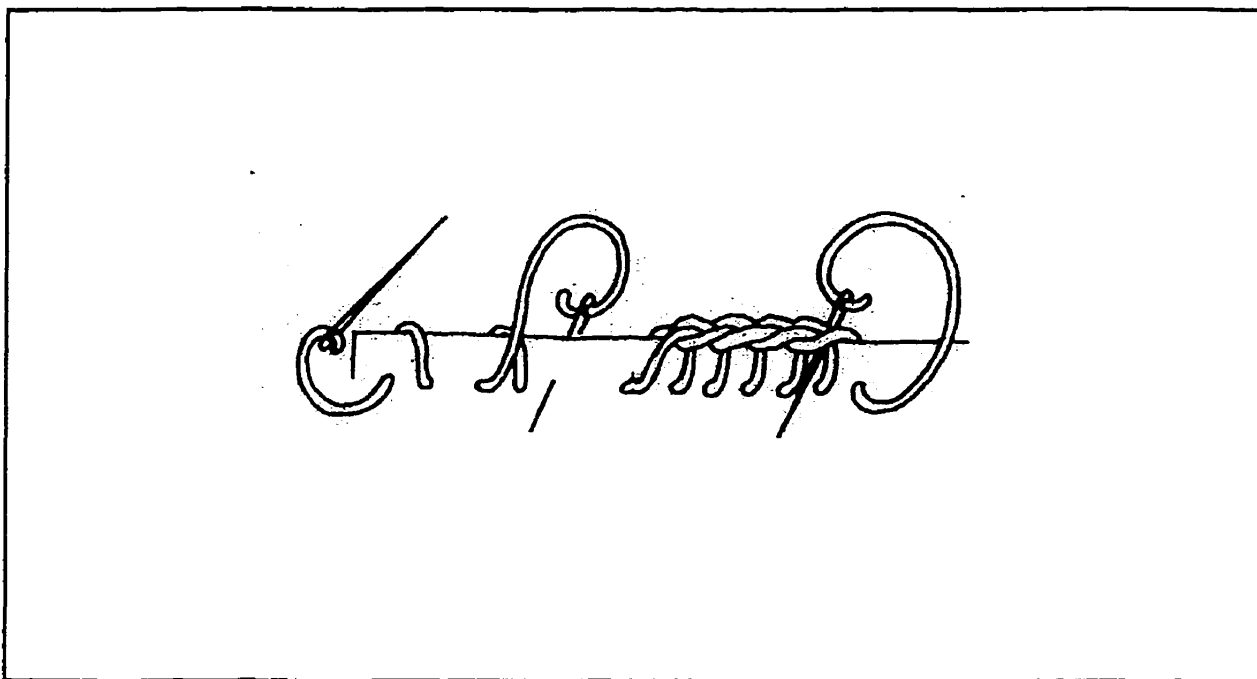


Figure 11. Cross-knit loop stitching. Adapted from Sorber 1994:38.

that these edge finishings contain cultural information, this avenue of investigation is beyond the scope of this thesis.

Also beyond the scope of this thesis is the significance of the stripes and pattern motifs and their positions within the artifacts, although these are considered to be most important (see eg. Wilson 1991; Meisch 1991). The symbolic meanings of the inclusion of these artifacts within this assemblage was also not addressed (but see, eg., Ackerman 1991; A. Rowe 1998 for some current discussion of meanings of textiles in the Andes).

The Inca selected craftspersons from different geographic areas for their own uses. It has been well documented (eg. Rostworowski 1999:205-208) and generally accepted (eg. Moseley 1993:70) that coastal societies long able to sustain themselves with dependable marine resources had fostered the growth of craft specialization. The works of these specialized craftspersons were much admired by the Inca, and Rostworowski (1999:207)

notes that: "The exclusive dedication of each labour group to a single craft is characteristic of coastal society ...The Incas took full advantage of the artisans of the principal coastal valleys, sending them to Cusco to work for the state".

Colour was important to the Inca, but dyed fabrics were also used by Andean societies long before the Inca came to power (eg. Arriaza 1995:Plate 19; Paul 1990; Reiss and Stübel 1998 [1880-1887]; A. P. Rowe 1984b). Dye studies were not carried out on the Esmeralda textiles, but both naturally coloured and dyed yarns were used in the artifacts of this collection. Uhle (1991:90[1903]) notes that green was found in only one artifact from the graves of the sacrificed women at Pachacamac, and the colour green was observed in only two Esmeralda artifacts.

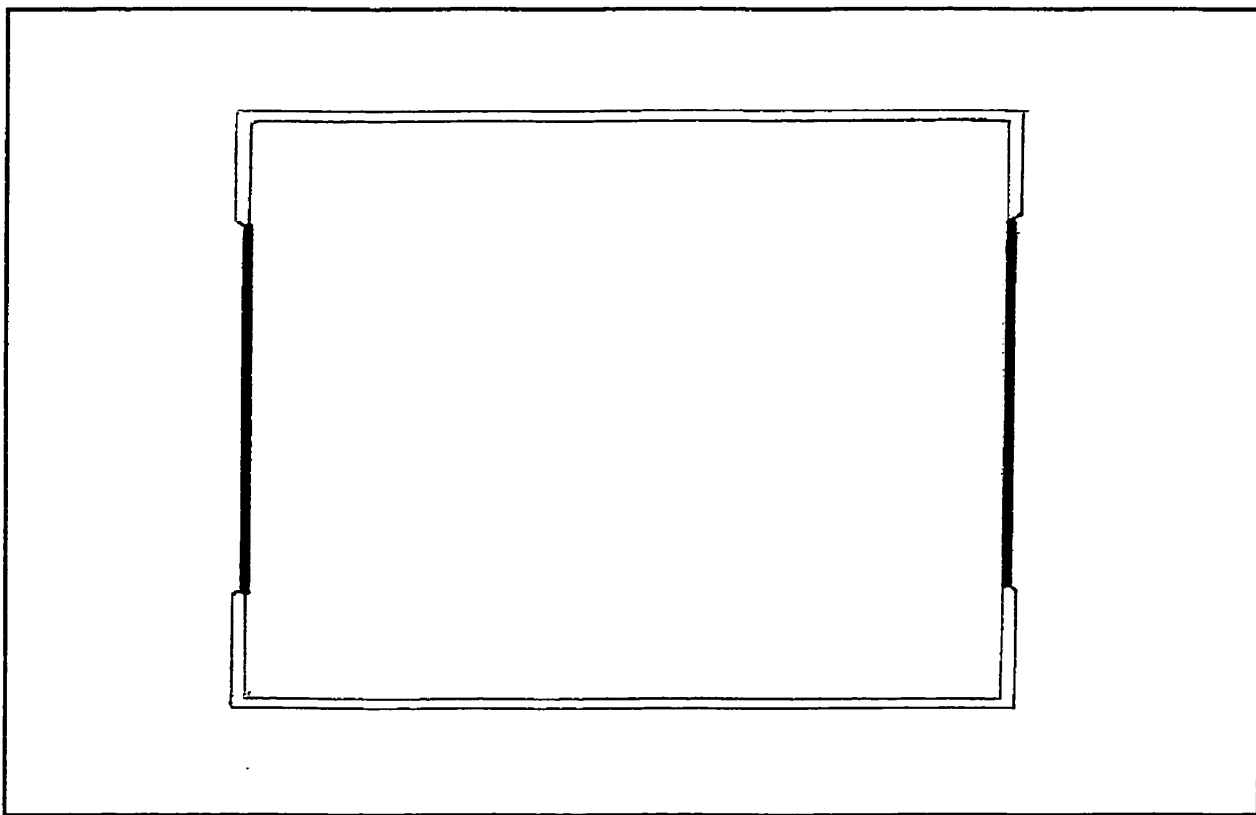


Figure 12. Inca edge finishing proportions.

Dyed yarns require expertise to produce. In the late 16th century, Morúa notes that 'there were Indians whose task was to know the colours which were used to dye clothes. These dyers were known as *cauticamayos*' (Gomez and Bosqued as cited in Verhecken 1994:56). *Cauticamaos*, or dye specialists, used mineral, animal, and vegetal pigments. One example of a mineral pigment is mercury sulphide (cinnabar), and cinnabar was found in powdered form with the Esmeralda textiles (Checura 1977:136; Morales 1985:67). This cinnabar is presumed to have been intended for use as body paint or makeup (eg. Checura 1977:136). Verhecken (1994:57), however, citing P. de Carbajal (1586) and Garcilasco, also notes that the Inca forbade its use as body paint as it was harmful to health. It is plausible, therefore, that the function of cinnabar in an Inca sanctioned sacrifice site was other than as make-up. It may also have been included as a valuable pigment, or because it was a precious substance.

Mordants from mineral bases used in the Andean area include alum and iron salts. Iron mordants, however, are known to be corrosive, and Verhecken (1994:58, 147) describes a "poncho" in which brown and blue threads have disintegrated, probably the result of using iron-based mordants. Two Esmeralda belts (T-25 and T-35) also contain fragile blue yarns that suggest the use of iron mordants.

Much of what we now know of Inca attire is described by A. Rowe (eg. 1995-96, 1996a) and J. Rowe (eg. 1979). Men's dress included a *llauto*, a long braided woolen band which was wrapped around the head, earplugs or *pacu*, sandals or *usuta*, a loincloth or *guara*, a sewn tunic or *uncu*, a mantle or *yacolla*, and they also carried *chuspas* or small bags (eg. A. Rowe 1995-96:25-29; Cobo 1990:185-187[1653]).

Women's clothing, on the other hand, included two "blankets" or mantles, one worn as a wrapped dress or *acsu* which was secured with a thick belt or *chumpi* and two straight

topo pins. The other mantle was worn as a cloak or *lliclla* over the shoulders and was secured with a third pin which was usually smaller. (eg. A. Rowe 1995-96:11-24; Cobo 1990:188 [1653]). While the Spanish usually referred to all pins as *topo*, the more accurate term for the shawl pin is *tipqui* (A. Rowe 1995-96:22).

Esmeralda Textiles

No *llaautos*, *pacu*, *usuta*, *guara*, *uncu* or *yacolla* were found in this collection, and most identified artifacts appear to be of female attire. The articles are described in detail in Appendix I, and are comparatively assessed in this chapter. Some artifact features listed by Morales (Appendices IV and V) are different than those observed by me, so while this information is not considered specific enough for accurate associations, possible correlations have been attempted and are included with individual artifact descriptions in Appendix I. Probable mummy associations based on artifact features such as staining, however, are noted throughout this chapter.

Mantles

There are ten striped mantles in the Esmeralda collection (Plate 3 a, c, e, f, i, k, l, o, s, v), and all are articles of female attire. The few preserved examples of mantles or *yacolla* associated with Inca males are narrow plain white or dark coloured textiles with embroidered edges (eg. A. Rowe 1995-6:Figure 42). Miniature mantles found with male figurines (eg. A. Rowe 1995-6:28, Figures 40 and 41; Reinhard 1999:38; Beorchia 1985:Unnumbered plates: Mt. Pili), and depictions of Inca males on pottery (eg. Fernández Baca Cosío 1989:200, 322), also illustrate males with plain mantles. Guaman Poma's drawings (eg. 1980:69, 76, 78, 80, 82, 84, 86, 88, 90, 95, 130[1615]), drawings in the Biblioteca Angelica (Estenssoro

1994:415-423), present men wearing plain coloured mantles, and Guaman Poma's descriptions of Inca royal dress (1980:66-97[1615]) portray monochrome dyed artifacts.

Women's apparel, however (see eg. A. Rowe 1995-96:11-24), includes two large lengths of cloth, one which was worn as a wrapped dress or *acsu*, and the other worn as a shawl or *lliclla*, both of which are striped. Striped *acsu* and *lliclla* similar to the mantles in this collection are noted on other female mummies and figurines such as those from Mt. Ampato and Mt. Llullaillaco (Conklin 1996; Reinhard 1996:72, 73, 77, 1999:53), Túcume (Heyerdahl et al 1995:109), and from Cerro Gallán, Cerro Mercedario, Cerro el Plomo, and Cerro las Tórtolas (Beorchia 1985:Unnumbered plates). Womens' striped *acsu* and *lliclla* are also illustrated on pottery (eg. Fernando Baca Casio 1989: Figures 311, 312, 321, 323, 324, 325, 326, 327, and 328), in Guaman Poma's drawings (eg. 1980: 100, 104, 108, 110, 112, 116, 152, 198, 216, and 232[1615]), and in a drawing in the Biblioteca Angelica (Estenssoro 1994:417). As will be demonstrated, five of the Esmeralda mantles appear to be *acsu* and five are characteristic of *lliclla*.

Mantle Features

Three of the mantles were woven as single panels; that is they were constructed from single lengths of cloth. Four consist of two matching panels sewn together along weft edges, two mantles each have three panels, and one incomplete mantle is estimated to have been of two panel construction. This last artifact is similar to two and three panel mantles, but appears most similar in proportion and design to the two panelled mantles. Heading cords at warp edges, and the presence of weft selvages on all mantles confirm that only one artifact per warp was woven.

Shape

All mantles are rectangular in shape; the single panelled articles are all longer warp-wise than weft-wise, and the multi-panelled mantles are all longer weft-wise than warp-wise. The square style of *acsu* described by A. Rowe (1995-96:12) and Uhle (1991:37-38[1903]) may not be represented here, although mantle T-34 is not unlike a two panelled square mantle illustrated by A. Rowe (1995-96:Figure 10). There appear to be two general ranges of the warp/weft ratios of these artifacts. The ratios of the nine testable mantles of this collection range between .62 -1.51, with single panelled artifacts in the higher ranges (Table 2).

Table 2. Mantle Features.

Mantle	Warp	Weft	Ratio	Panels	Colours	Pattern
T-3	91.50	143.50	00.63	2	white + dyed**	T
T-29	137.10	167.50	00.82	2	white + dyed**	T+S
T-30	111.67	79.50	01.40	1	natural colours***	no
T-32	116.83	77.50	01.51	1	natural colours	no
T-33	130.33	186.03	00.70	2	white and ?over-dyed	T
T-34	144.30	112.06	01.29	1	natural colours	no
T-40	121.84	175.49	00.69	2	white and dyed**	T+S
T-41	150.70	241.80	00.62	3	white and dyed**	T+S
T-42	157.20	234.35	00.67	3	white, dyed, naturals	no
T-47	102.55*	95.77	-	2?	white and dyed**	T

* = incomplete. ** = browns may be natural or dyed. *** = edge finished with dyed yarns. T= tripartite (triple) pattern stripes. S= Single pattern stripes.

Another important feature is that the panels of each multi-panelled mantle are almost identical to each other in length, with the outer lengths of the seven artifacts differing by only from 0.80 cm - 2.1- cm (see individual descriptions of mantles, Appendix I). There are also similar variances in the lengths of the sides of three single panel mantles, which differ from 0.50 cm-1.60 cm. This suggests that the two or three warps required for the multi-panelled mantels were either wound at the same time, with the use of the same warping structure, or

that an upright or staked loom was utilized (a 4-stake vertical loom is frequently used in Aymara areas of Chile and Bolivia today [A. Rowe personal communication 2001]). If a backstrap loom was used, it is also probable that the warps were made by the same person or team, for if different individuals wound the warps of the two or three panels, even with the application of even tension, slight variations in applied pressure should result in significant differences in warp lengths. The result would be that the sides of the artifacts would be noticeably different. It is also assumed that the shortest length of an artifact represents the beginning of a wound warp, as in winding a warp, the threads wound last would lie on top of previously wound threads, and this build up of yarns on the warping frame would result in the warp threads being slightly longer on one side. In at least one instance, however (T-29), structural differences within the panels suggest that a different weaver may have woven each panel.

Structure

All mantles appear to be warp-faced, and weaving is quite consistent (Table 3). Although the ranges of the warps, wefts and stitches/cm in each artifact appear irregular in some cases, the inconsistencies mostly reflect the structural differences of the individual panels within the artifacts (see individual descriptions of mantles, Appendix I). Warp yarns are intact, for the most part, with most damage occurring in hidden elements. In one instance, however (T-29), there is evidence that red warp yarns may have broken frequently during weaving as short lengths of red yarns are tucked into the weft sheds at frequent intervals along both sides of the white stripe. Weft yarns are also variable; in some artifacts single weft yarns were used and in others (eg. T-41), single yarns and doubled yarns were used in an irregular fashion, possibly reflecting the thickness of yarns. In one artifact, (T-33) a discontinuous interlocked weft was used to incorporate a colour change (eg. Beutlich 1969:

Figure 65). After interlocking, single thrown yarns from both directions were returned along their respective weft sheds, resulting in doubled weft yarns in both sheds (Plate 3 j).

Table 3. Structural Dimensions of Mantles.

Mantle	Warps/cm	Range	Wefts/cm	Range	Edge Stitches/cm	Range
T-3	39.56	38-42	7.00	6.00-8.00	-	-
T-29	34.83	32-40	6.50	6.00-7.00	18.00	18.00
T-30	33.50	28-42	7.20	6.00-8.00	16.50	15-18
T-32	20.67	20-22	4.20	4.00-5.00	10.00	10.00
T-33	41.83	34-46	6.30	6.00-7.00	24.17	18-34
T-34	17.00	12-26	4.20	4.00-5.00	6.00	6.00
T-40	39.00	32-48	6.00	6.00	-	-
T-41	35.30	32-40	7.20	7.00-8.00	21.33	20.24
T-42	39.67	32-54	6.90	6.00-8.00	-	-
T-47	40.67	44-56	6.80	6.00-8.00	25.00	25.00

Patterning

Patterning in all mantles consists of warp stripes, and/or complementary -warp pattern stripes, and in two instances, narrow bands formed by the use of alternating colours of warp yarns are present along weft edges. All pattern stripes were woven with dyed yarns, and all of these consist of segments of Inca zigzag-and-dot designs (eg. Plate 3 b, d, h, n). Weft patterning is not in evidence, and all mantles have warp stripes and/or complementary-warp pattern stripes symmetrically arranged on both sides of a well defined central stripe. Two of the single panelled textiles have a dark centre stripe with lighter coloured stripes on both sides, and the third has a light coloured centre stripe flanked by dark coloured stripes. These three mantles were woven with natural brown and gray coloured yarns.

All of the two-panelled mantles contain wide centre stripes of white, and two of the artifacts (T-29 and T-40), also utilize white in outer stripes. One three-panel mantle (T-41) has a centre panel and outer warp stripes of white and the second (T-42) has a centre panel

of light gray. All of the multiple-panelled mantles contain dyed yarns, and all but one contain complementary-warp pattern features (Table 3). The exception, T-42, was woven with narrow stripes of what appear to be over-dyed yarns, that is, yarns that may have originally contained varying shades of natural or dyed colours that were then re-dyed, resulting in a characteristic multi-hued cast (Plate 3 p). Wide stripes of what appear to be over-dyed yarns were also used in mantle T-33 (Plate 3 h). It is possible that the weavers of these pieces had limited access to white coloured yarns, so utilized more available natural coloured fibre.

Pattern stripes, where present, were all constructed with alternate colours of warp yarns arranged in sequences of red/gold, and red/brown combinations (eg. Plate 3 b, h, n). All pattern stripes were woven, probably utilizing a "pick-up" technique, to produce short segments of "zigzag-and-dot" designs (a term used by A. Rowe 1995-96:9 referring to a description by J. Rowe 1979:245). Although continuous zigzag-and-dot designs have been noted in several bags of this collection, and in miniature mantles from other sites (eg. A. Rowe 1995-6:Figures 13, 14 and 24; Beorchia 1985:Unnumbered plates: Cerro Gallán, Cerro Mercedario, Cerro el Plomo, and Las Tórtolas), continuous zigzag-and-dot patterns were not used in any of the mantles described here.

Pattern segments are of two types: 1) heavy zigzags with enlarged ends arranged with single large "dots" in each of the triangular spaces (Plate 3 n) , and 2) narrow zigzags with enlarged ends with groups of three and four "dots" in the ensuing spaces (Plate 3 b). For discussion purposes, I refer to the heavy zigzag patterns with single dots as "simple" and the narrow zigzag patterns with groups of dots as "complex".

Combinations of these two pattern types have been woven in short lengths with some pattern segments resembling the letter "N" and others resembling the letter "M". For reference purposes, the patterns are referred to as complex M (CM), simple M (SM), complex N (CN),

or simple N (SN) (see Table 4). Some of the segments near warp edges have been notably shortened, and these shorter pattern sections, which were either compressed or cropped, suggest that these are the edges where weaving terminated, as there is no obvious reason for weavers to reduce patterns at the *beginning* of their projects. Compressed or cropped patterns were noticeable on side B of T-29, side B of T-33, side A of T-40 and not noted in T-3, T-41, or the remaining fragments of T-47. In one instance, the cropping of a simple pattern resulted in a design very similar to an "Inca Key" *tocapu* design which supports the view (A. Rowe 1995-96:9) that there is an association between the Inca Key *tocapu* of some tunics worn by elite Inca males, and the zigzag-and-dot design. A similar cropped "Inca key" pattern was also noted in 1999 on the bottom edge of a pattern stripe on a large mainly yellow Inca *acsu* at the site museum at Pachacamac.

Table 4. Mantle Pattern Features.

Mantle	Pattern Stripes	Pattern Types	No. of Pattern Segments
T-3	T	CM, SM	10
T-29	T+S	CM, SM, CN, SN	18
T-30	no	-	-
T-32	no	-	-
T-33	T	CM, SM, CN, SN	15
T-34	no	-	-
T-40	T+S	CM, SM (mostly)	12
T-41	T+S	CN, SN	18
T-42	no	-	-
T-47	T	CN, SN	9*

T= tripartite pattern stripe. S= Single pattern stripe * = incomplete

Triple or tripartite pattern stripes are present in all of the mantles with pattern stripes (eg. Plate 3 a, c, i, l, o, v); each tripartite stripes contains two red/gold, gold/red stripes, and a red/brown, brown/red stripe. In all cases the patterns of the red and gold stripes have been

placed on either side of the brown and red stripe and these are identical in colour, length, and pattern angle. The patterns of the central brown and red stripes are of the same composition and length as the side stripes, but the pattern angles are reversed, and the three pattern stripes together form another group of pattern elements. Single pattern stripes of red/gold, gold/red are also found in T-29, T-40, and T-41 (Plate 3 c, l, o), and the patterns in these stripes correspond with the red and gold patterns of the tripartite stripes in terms of colour, composition, length and pattern angle.

There are, however, numerous variations in pattern arrangements. The same number and arrangement of pattern segments occur on the pattern stripes of both panels of each artifact, but the lengths of the pattern segments vary considerably within the individual panels, and between the two panels (see individual descriptions, Appendix I). The positioning of the panels themselves also vary; in T-29, and T-40, for example, pattern stripes of one panel are mirror-imaged on the opposite panel. That is, the patterns of one side panel are angled in the opposite direction on the other side panel. In T-3, and T-41, however, there are matching patterns on each panel, but they are angled in the same direction so are not mirrored. T-33 is mirrored in terms of pattern and direction of pattern but the colours of the patterns are opposite. Where a red/gold pattern is present on one panel, a gold/red pattern is found on the opposite panel. With T-47, the colours of the patterns of one panel match those of the other panel, but the patterns themselves are opposite; where a complex pattern segment occurs on one panel, a simple pattern segment occurs on the other.

Published full-sized mantles exhibit variable pattern proportions. Pattern segments may be of almost identical lengths (eg. A. Rowe 1995-96:Figures 28 and 29; Uhle 1991: Plate 19:Figure 6[1903]), be irregular in length (eg. A. Rowe 1995-96:Figure 18), or contain orderly variations (eg. A. Rowe 1995-96:Figure 27; Reinhard 1996:72; and see also Conklin

1996:109). The patterns of published miniature mantles, however, usually appear to have uniform lengths (Tables 5 and 6). Clearly, the creators of the mantles with uniform pattern configurations demonstrate prior planning, knowledge of accepted standards, and probably also utilized a measuring device. The makers of artifacts with irregular pattern formations, such as the Esmeralda mantles, indicate that similar standards were not used. One explanation for this discrepancy could be that the mantles with uniform patterns were constructed in tightly supervised settings such as *acllawasi*, while mantles with irregular proportioned patterns were produced in less regulated environments such as households.

Warp striping is the only other woven pattern feature of the Esmeralda mantles, and are present in all ten artifacts. Mantles woven as single panels were constructed of natural coloured stripes, and both T-30 and T-32 also have narrow bands along both weft edges formed by the use of two alternating colours of warp yarns (eg. Plate 3 g). Mantles T-3, T-33, and T-47 are mostly red or reddish brown in colour with centre white stripes and tripartite stripes between narrow stripes of brown which have been arranged in similar positions on each of the textiles. T-29, T-40 and T-41 are also similar, each containing white centre and side stripes, single and tripartite pattern stripes, and red, and brown plain stripes. T-40 and T-41 are similar but also have gold stripes, and T-29 also contains stripes of green. T-42 is unusual in that it is the only multi-panelled mantle without pattern features, and its numerous narrow reddish brown stripes appear to have been over-dyed.

Edges:

The edges of all mantles were finished using the same techniques: cross-knit loop stitched embroidery was utilized along both warp edges, and this finish extends around all four corners and for a short distance along weft edges. The remainder of the weft edges were

Table 5. Miniature Inca Wrapped Dresses.

Source	Pattern Type	Patterns: uniform	Edges: uniform
AB 1985: C. Gallán	continuous zigzag and dot	-	-
AB 1985: C. Mercedario*	discontinuous zigzag and dot	yes	-
AB 1985: C. Mercedario~	discontinuous zigzag and dot	yes	-
AB 1985: C. Gallán (2)	continuous zigzag and dot	-	-
AR 1995-96: Figure 1	discontinuous zigzag and dot	yes	yes
AR 1995-96: Figure 13	continuous zigzag and dot	-	-
AR 1995-96: Figure 14	continuous zigzag and dot	-	no

AB= Antonio Beorchia; AR= Ann Rowe. *= top of page ~ = bottom of page

Table 6. Miniature Inca Shawls.

Source	Pattern Type	Pattern: uniform	Edges: uniform
AB 1985: C. Gallán	continuous zigzag and dot	-	yes
AB 1985:C. Mercedario*	continuous zigzag and dot	-	yes
AB 1985:C. Mercedario~	discontinuous zigzag and dot	yes	yes
AB 1985: C. Gallán (2)	continuous zigzag and dot	-	no
AR 1995-96: Figure 19	striped	-	yes
AR 1995-96: Figure 24	continuous zigzag and dot	-	yes
AR 1995-96: Figure 25	discontinuous zigzag-and dot	yes	yes
AR 1995-96: Figure 26	discontinuous zigzag-and dot	no	yes
JR 1992: 89	striped	-	yes
JR 1996: 73	continuous zigzag and dot	-	no
JR 1996: 77	discontinuous zigzag-and dot	-	yes
JR 1999: 53	? continuous zigzag and dot	-	yes

AB= Antonio Beorchia; AR= Ann Rowe; JR= Johan Reinhard *=top/page; ~ =bottom/page.

1995-96: Figures 19, 24, 25, 26, 27, and 29; Beorchia 1985: Unnumbered plates: miniatures from Cerro Gallán, Cerro Mercedario, Cerro el Plomo, and Las Tórtolas) in which edge finishing is identifiable, illustrate this finishing technique (but cf. Katterman and Riddell 1994), though on weft faced artifacts the arrangement of the two finishes appears to be reversed (A. Rowe 1995-96: Figures 14 and 15) suggesting that the direction of finish may be related to the direction in which the mantle was worn. The cross-knit loop stitched edgings of all mantles extend around all four corners for several centimetres, and then shift to overcast

stitching along the remaining weft edge areas. The lengths of the cross-knit loop stitched edge extensions appear to fall within two ranges, approximately 13-15 cm, and 20-24 cm, and in one instance (T-41) the extended edges of the two panels fall into different ranges (Table 7).

The colours used for both finishing techniques vary considerably. In some mantles, a single colour of yarn was used for both finishes, while in others, two or more colours were used, and still others have multi-coloured striped edges (Table 7). Two of the textiles (T-3 (beige), T-30 (red), have reinforced corners. This method of finishing edges with cross-knit looped embroidery is characteristic of Inca textiles (A. Rowe 1995-96:6), and in this collection, all mantles and some bags were finished with cross-knit loop stitched edges. Inca tunics also may be finished in this manner (see eg. A. Rowe 1978; J. Rowe 1979).

Multi-coloured stripes were utilized in the edge treatments of four of the mantles (Table 7), and several common attributes were noted in all of them: 1) All of the stripe patterns include blocks of five narrow stripes of gold, red, gold, red, gold; 2) All stripe patterns include wide blocks of red; 3) All stripe patterns include wide blocks of two additional colours, situated on either side of the wide red blocks and separated by the narrow red/gold stripes. Beige and dark brown (? black) wide blocks were used on one mantle (and mantle fragment 15b), and beige and brown were used on three mantles. 4) Almost all red blocks are also centred between narrow stripes of the same colours as the other two wide blocks, and these narrow stripes are on opposite sides of the red blocks than are the wide blocks of the same colour (see eg. Plate 3 b, h). Some variations in the order of stripes were noted, and I have attributed these either to difficulty in "reading" heavily stained areas, the need to examine entire lengths of edge treatments in more detail, and/or inclinations of the individual finishers. Individual preferences were noted in the way the colour blocks and stripes of the edges were constructed. In some cases a specific number of yarns were used for each

Table 7. Mantle Edge Features.

Mantle	Mean Length	Colours	Colours
	Extended Edges	Cross-Knit Loop Stitching	Overcasting
T-3	22.50 cm (A)	multicoloured striping	multi-coloured striping
	23.50 cm (B)		
T-29	20.50 cm (A+B)	white	white
T-30	24.00 cm (A+B)	multi-coloured striping red and white	red
T-32	23.50 cm (A)	camel, dark brown	camel
	24.00 cm (B)		
T-33	15.00 cm A+B)	multi-coloured striping, white	brown
T-34	23.75 cm (A)	dark brown	dark brown
	24.00 cm (B)		
T-40	15.00 cm (A)	white	white
	13.50 cm (B)		
T-41	24.00 cm (A)	white	white
	13.75 cm (B)		
T-42	23.50 cm (A+B)	gray	camel
T-47	20.80 cm (A)	multi-coloured striping	multi-coloured segments
	20.50 cm (B)		

colour block and stripe, while in others, variations in both thread counts and sizes of the colour blocks were also noted.

The organization of colours on other edge treatments is also varied. Two mantles that have multi-striped cross-knit loop stitched areas have solid colours in the overcast areas, and one of these has red and white striped edges in the area of the central warp stripe. One mantle with multi-striped cross-knit loop stitched finishing has multi-coloured *segments* in the overcast areas. Three of the mantles were edged entirely with white yarn, and one was edged with brown yarn. The remaining two mantles have bichrome colour combinations; one with gray coloured cross-knit loop stitching and camel coloured overcast stitching, and the other with camel and brown edges corresponding with the colours used in the warp stripes. The

weft edges of some mantles were rolled prior to finishing.

The colours and cross-knit loop stitched edge extension lengths of published mantles are, for the most part, difficult to "read", but those that can be identified (eg. A. Rowe 1995-96: Figures 27 and 29) have extensions that appear to be quite uniform in length and, where present, also exhibit matching stripe arrangements. Published miniature mantles (Tables 5 and 6) also display comparable edge extension lengths with matching stripe patterns. As has been argued with regard to pattern configurations, the creators of the mantles with uniform edges demonstrate prior planning and knowledge of standards, and the makers of mantles with irregular edge attributes indicate that similar standards were not used. Although a complete colour analysis of the edges of the Esmeralda mantles was not done, most edge extensions exhibit relatively uniform lengths (but cf. Table 7:T-41), suggesting that most edges were finished using some form of production standards. It is interesting that the edges of one mantle (T-47) that were rolled prior to finishing had undyed yarns within the finished edge, suggesting that red yarns were quite valuable and were conserved where possible.

Seams:

Two-panelled and three-panelled mantles were all neatly stitched together along weft edges, all but one by utilizing the same figure-eight stitch (Figure 13). The one exception (T-40), was neatly sewn with a simple running stitch. An interesting feature of both three-panel textiles are narrow warp stripes along the inside weft edges of the side panels that were constructed with the same colour of yarns as the centre panels, resulting in the seams occurring at different points in the mantles than do the colour changes, possibly to conceal the seams.

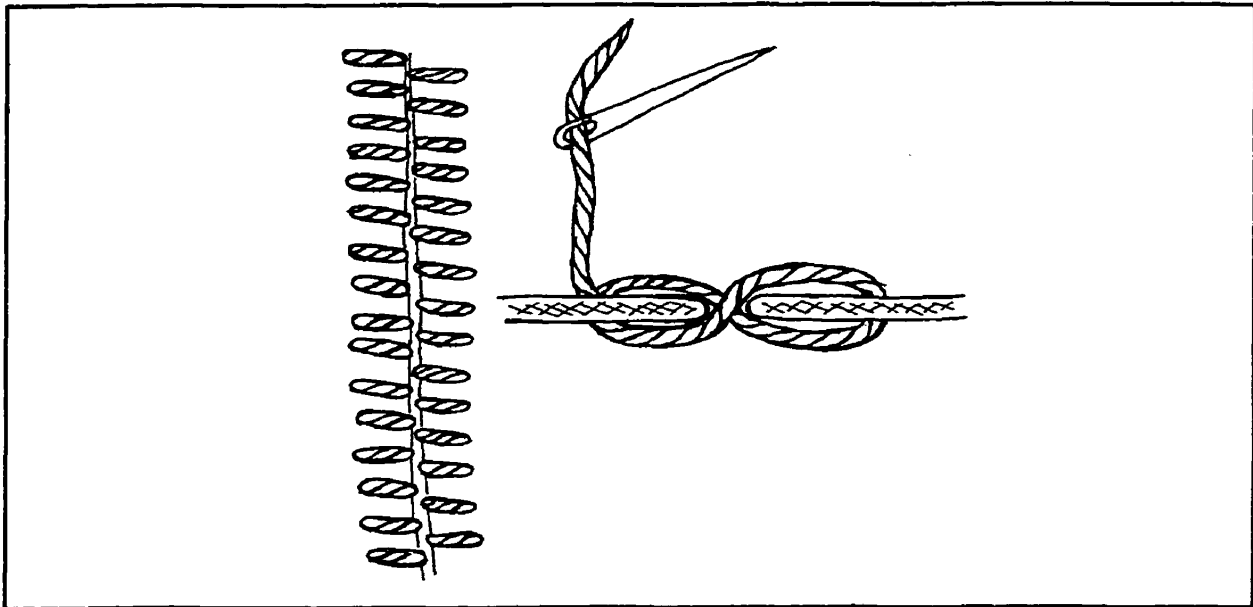


Figure 13. Figure-eight stitch.

Yarns:

The yarns of all mantles were constructed of camelid fibre, and all but one are of 2-ply construction and have been Z-spun and S-plied (Table 8). It has been proposed (A. Rowe 1996a:455) that camelid warp yarns in Inca tunics suggest highland production as cotton was invariably used for tapestry warps on the coast. Cotton was also frequently used for Inca women's mantles (eg. A. Rowe 1995-96:Figures 3, 12, 17, 21, 27, 28, 30, and 31), but the use of only camelid fibre in itself does not necessarily indicate highland production in this instance, as camelid fibre was often used by coastal peoples in northern Chile as early as the Preceramic Period (eg. Bird 1943: 205, 245, 269).

As compared with my control samples, the fibres of most mantles are approximately 40μ in diameter (Table 8). A microscopic study of the fibres of one Esmeralda mantle, however, which is identified as "Manto Real No. 617" (possibly T-41 as small sections of this artifact have been removed) (Morales 1985:50-56), produced results suggesting that the fibres

may be finer than my figures suggest. According to Morales, sample warp fibres in this mantle mostly range from 11.92-15.50 μ , which he considers to be vicuña; weft fibres are approximately 21.76 -32.90 μ in diameter, which he suggests are alpaca or llama; and fibres used in edges are similar to weft fibres and also may be alpaca or llama. A complete microscopic analysis of all textiles would yield the most useful information, but was not addressed here.

Table 8. Mantle Yarn Features.

Mantle Element	Ply	Spin	Diameter	Angle/twist	Twists/cm	Fibre	Fibre Diameter	
T-3:	1a	2	^	0.43 mm	41.67°	11	camelid	40 μ range
	b	2	^	0.51 mm	38.83°	16	camelid	40 μ range
	c	2	^	0.54 mm	40.00°	13	camelid	40 μ range
	d	2	^	0.45 mm	40.50°	24	camelid	40 μ range
	2	2	^	0.50 mm	41.83°	13	camelid	40 μ range
	3a	2	^	0.50 mm	37.83°	-	camelid	40 μ range
	b	2	^	0.50 mm	44.00°	13	camelid	40 μ range
	c	2	^	0.50 mm	40.67°	-	camelid	40 μ range
	d	2	^	0.50 mm	41.17°	20	camelid	40 μ range
	e	2	^	0.30 mm	38.17°	18	camelid	40 μ range
T-29	1a	2	^	0.71 mm	35.00°	9	camelid	40 μ range
	b	2	^	0.54 mm	40.67°	14	camelid	40 μ range
	c	2	^	0.72 mm	34.50°	16	camelid	40 μ range
	d	2	^	0.63 mm	40.67°	10	camelid	40 μ range
	e	2	^	0.40 mm	39.50°	18	camelid	40 μ range
	2	2	^	0.96 mm	29.83°	10	camelid	40 μ range
	3	2	^	0.50 mm	41.83°	12	camelid	< 40 μ
T-30	1a	2	^	0.92 mm	39.50°	16	camelid	40 μ range
	b	2	^	0.58 mm	38.17°	18	camelid	40 μ range
	c	2	^	-	-	-	camelid	40 μ range
	2	2	^	0.79 mm	38.33°	13	camelid	40 μ range
	3a	2	^	0.47 mm	39.33°	9	camelid	40 μ range
	b	2	^	0.51 mm	34.16°	14	camelid	40 μ range
	c	2	^	0.43 mm	38.83°	-	camelid	40 μ range
	d	2	^	0.54 mm	32.83°	-	camelid	40 μ range
T-32	1a	2	^	1.46 mm	42.67°	5	camelid	> 40 μ
	b	2	^	1.58 mm	31.50°	2	camelid	> 40 μ

Table 8 continued.

	2	2	∧	1.00 mm	43.67°	10	camelid	> 40μ
	3a	2	∧	-	-	-	camelid	> 40μ
	b	2	∧	-	-	-	camelid	> 40μ
T-33	1a	2	∧	0.68 mm	41.50°	14	camelid	40μ range
	b	2	∧	0.32 mm	37.00°	12	camelid	< 40μ
	c	2	∧	0.88 mm	40.00°	6	camelid	40μ range
	d	2	∧	0.59 mm	37.00°	10	camelid	40μ range
	e	2	∧	0.66 mm	41.50°	-	camelid	40μ range
	f	2	∧	0.36 mm	53.33°	25	camelid	40μ range
	2a	2	∧	0.30 mm	32.17°	10	camelid	40μ range
	b	2	∧	0.26 mm	41.83°	14	camelid	< 40μ
	3a	4	∧	0.51 mm	39.00°	12	camelid	40μ range
	b	2	∧	0.41 mm	35.50°	16	camelid	40μ range
	c	2	∧	0.30 mm	36.33°	-	camelid	40μ range
	d	2	∧	0.58 mm	30.33°	12	camelid	40μ range
	e	2	∧	0.37 mm	34.16°	12	camelid	40μ range
	f	2	∧	0.25 mm	n/a	18	camelid	< 40μ
	2	2	∧	0.79 mm	38.33°	13	camelid	40μ range
	3a	2	∧	0.47 mm	39.33°	9	camelid	40μ range
	b	2	∧	0.51 mm	34.16°	14	camelid	40μ range
	c	2	∧	0.43 mm	38.83°	-	camelid	40μ range
	d	2	∧	0.54 mm	32.83°	-	camelid	40μ range
T-34	1a	2	∧	1.50 mm	32.83°	3	camelid	40μ range
	b	2	∧	1.92 mm	23.50°	2	camelid	40μ range
	2	2	∧	1.00 mm	41.00°	6	camelid	40μ range
	3	2	∧	1.96 mm	34.83°	7	camelid	40μ range
T-40A	1a	2	∧	0.56 mm	36.83°	16	camelid	40μ range
	b	2	∧	0.88 mm	39.83°	12	camelid	40μ range
	c	2	∧	0.40 mm	37.40°	20	camelid	40μ range
	d	2	∧	0.63 mm	35.00°	17	camelid	40μ range
	2	2	∧	0.58 mm	34.60°	18	camelid	40μ range
	3	2	∧	-	-	-	camelid	40μ range
T-40B	1a	2	∧	0.59 mm	37.83°	11	camelid	40μ range
	b	2	∧	0.60 mm	41.67°	10	camelid	40μ range
	c	2	∧	0.43 mm	45.67°	9	camelid	40μ range
	d	2	∧	0.40 mm	43.17°	12	camelid	40μ range
	2	2	∧	0.63 mm	35.83°	12	camelid	40μ range
	3	2	∧	0.40 mm	35.83°	10	camelid	< 40μ
T-41A	1a	2	∧	0.58 mm	45.33°	10	camelid	< 40μ

Table 8 continued.

	b	2	∧	0.58 mm	38.66°	20	camelid	40μ range
	c	2	∧	0.43 mm	37.00°	12	camelid	40μ range
	d	2	∧	0.52 mm	39.67°	11	camelid	40μ range
	2a	2	∧	0.50 mm	48.33°	7	camelid	40μ range
	3	2	∧	0.43 mm	45.33°	10	camelid	< 40μ
T-41B	1e	2	∧	0.43 mm	45.67°	20	camelid	< 40μ
	2b	2	∧	0.37 mm	39.33°	12	camelid	< 40μ
T-41C	1a	2	∧	0.58 mm	46.33°	-	camelid	< 40μ
	b	2	∧	0.58 mm	45.66°	-	camelid	40μ range
	c	2	∧	0.58 mm	46.37°	-	camelid	40μ range
	d	2	∧	0.52 mm	-	-	camelid	40μ range
	2a	2	∧	0.58 mm	48.00°	20	camelid	40μ range
	3	2	∧	0.50 mm	48.67°	14	camelid	< 40μ
T-42A	1a	2	∧	0.40 mm	41.67°	20	camelid	40μ range
	b	2	∧	0.36 mm	39.33°	-	camelid	40μ range
	c	2	∧	0.50 mm	44.00°	16	camelid	40μ range
	d	2	∧	0.40 mm	39.33°	12	camelid	40μ range
	2	2	∧	0.79 mm	37.50°	16	camelid	40μ range
	3	2	∧	0.29 mm	-	16	camelid	40μ range
T-42B	1d	2	∧	0.79 mm	43.00°	20	camelid	40μ range
	2	2	∧	0.43 mm	38.33°	-	camelid	40μ range
	3	2	∧	0.54 mm	-	-	camelid	40μ range
T-42C	1a	2	∧	0.75 mm	41.50°	-	camelid	40μ range
	b	2	∧	0.28 mm	40.00°	-	camelid	40μ range
	c	2	∧	0.45 mm	34.17°	-	camelid	40μ range
	d	2	∧	0.63 mm	45.33°	-	camelid	40μ range
	2	2	∧	0.40 mm	44.50°	20	camelid	40μ range
	3	2	∧	0.37 mm	-	-	camelid	40μ range
T-47A	1a	2	∧	0.58 mm	45.33°	16	camelid	< 40μ
	b	2	∧	0.58 mm	38.66°	12	camelid	< 40μ
	c	2	∧	0.43 mm	37.00°	10	camelid	< 40μ
	d	2	∧	0.52 mm	39.67°	10	camelid	< 40μ
	2	2	∧	0.50 mm	48.33°	12	camelid	< 40μ
	3a	-	-	-	-	-	camelid	< 40μ
	b	2	∧	-	-	10	camelid	< 40μ
	c	2	∧	-	-	16	camelid	< 40μ
	d	2	∧	0.43 mm	45.33°	12	camelid	< 40μ

T-47B not assessed

/ = Z direction; \ = S direction.

Yarn diameters are variable. Most of the yarns are approximately 0.5 mm in diameter (Tables 8 and 9), which suggests that this was the standard diameter that most spinners attempted to spin. Heavier yarns in some mantles (see entries with asterisks Table 9) are from natural coloured single panel mantles, suggesting that spinning requirements in mantles with natural coloured yarns were usually, but not always, different than those with dyed yarns.

Although most yarn diameters are in the 0.5 mm range or less, very few spinners were able to spin yarn consistently to this standard. As the spinning of yarn is a repetitive and rhythmic action, in which each craftsperson would have a similar but slightly different pattern of movement and slightly different level of expertise, it is probable that several spinners spun the yarns for each mantle. Several yarns were spun consistently at a diameter much finer than 0.5 mm, and a few were relatively irregular. I suggest that the spinners of the finer yarns were the most expert of the community of spinners who may have chosen to display their expertise by spinning yarns finer than were required. The more irregular yarns may represent juvenile spinners, or those who did not excel at yarn construction. A 4-ply yarn found in the warp of one mantle (see Table 8), has a similar diameter to the others and appears to have been constructed to resemble the other yarns in the mantle. Either the yarn was originally spun for another purpose, or the spinner had a personal reason for constructing the yarn this way.

Most angles of twist were found to be between 30-49° (Table 10) which, according to Emery (see Figure 7), are classified as tightly twisted. There is, however, considerable variation in the ranges of angles of twist, both in the individual yarns of an artifact, and between artifacts (see yarn descriptions individual artifacts, Appendix I).

Measurements of the number of twists in a given area is also an indication of how tightly a yarn has been plied (Table 11). Over 51% of the measured samples are in the 10-14 per cm range, and approximately 21% are in the 15-19 cm range. About 15% are below these

Table 9. Mantle Yarn Diameter Measurements.

Mantle	0.25 mm	0.30 mm	0.50 mm	0.75 mm	1.00 mm	1.25 mm	1.50+mm	Total
T-3	2	9	38	4	1	-	-	54
T-29	1	4	20	7	10	-	-	42
*T-30	-	4	24	8	5	1	-	42
*T-32	-	-	-	-	8	4	6	18
T-33	17	26	24	9	8	-	-	84
*T-34	-	-	-	1	6	-	17	24
T-40	15	29	15	15	7	-	-	81
T-41	3	7	23	9	-	-	-	42
T-42	6	25	35	21	3	-	-	90
T-47	1	3	10	4	-	-	-	18
Total	45	107	189	78	48	5	23	495

* = Natural coloured single panelled mantles.

Table 10. Measurements of Angles of Twist in Mantle Yarns.

Mantle	10-19°	29-39 °	30-39°	40-49°	50-59°	60-69 °	Total
T-3	-	1	28	28	3	-	60
T-29	2	2	18	20	-	-	42
T-30	-	1	29	11	1	-	42
T-32	-	1	7	10	-	-	18
T-33	1	4	39	30	3	1	78
T-34	2	2	14	6	-	-	24
T-40	-	1	30	29	3	-	63
T-41	-	-	7	23	9	-	39
T-42	-	3	26	37	6	-	72
T-47	-	-	10	18	8	-	36
Total	5	15	208	212	33	1	474

figures, and about 12% are above. This strongly suggests that the desired twist in the yarns of these mantles is 10-19 twists per cm. Warp yarns appear to have been over-twisted. This overtwisting was probably incorporated to add extra strength to yarns held under tension during weaving, and is characterized by a tangled appearance in loose or broken warp yarns.

Table 11. Number of Twists per Centimetre in Mantle Yarns.

Mantle	<9	10-14	15-19	20-24	25>	Total
T-3	-	4	2	2	-	8
T-29	1	4	2	-	-	7
T-30	1	1	3	-	-	5
T-32	2	1	-	-	-	3
T-33	1	8	2	-	1	12
T-34	4	-	-	-	-	4
T-40	1	6	3	1	-	11
T-41	1	5	-	3	-	9
T-42	-	3	2	2	-	7
T-47	1	8	2	-	1	12
Total	12	40	16	8	2	78

Colour

The most commonly used natural colours in the mantles were browns and white, and red was the dyed colour most often used. In all multi-panelled artifacts, the colours in the warps of both (outer) panels were the same or almost identical to each other, suggesting that the warps were constructed of yarns dyed at the same time. Also in most cases (Table 12), the colours of the edges are the same or similar to the colours used in the warps. The two exceptions (T-30 and T-47) are two of the four mantles with striped edges. The other two mantles with striped edges (T-3 and T-33) do have similar colours in the warp and on edges. This suggests that the edge finishers of most of the mantles used yarns that were dyed at the same time as were the warps. Taking this one step further, it also suggests that in most cases the weavers either finished the textiles themselves, or provided the finishers with matching yarns with which to complete the artifacts. In any case, it is clear that in most cases, the weaver and finisher were closely associated, perhaps within the same household or *ayllu*. Using the same line of analogy, the two mantles with edge colours that are dissimilar to the

warps may have been finished by persons not as closely associated with the weavers.

While it is possible to identify the work of various craftspersons, there may also be other information concealed within these Inca mantle edges. It is understood that striped edges are generally found on shawls, and monochromatic edges are usually found on dresses, but there is considerable variation in the colour arrangements of both. These variations may reflect nothing more than the preferences of individual craftspersons, but may indicate group association or denote corporate signatures, such as the makers' marks used by some earlier brickmakers to distinguish their work. (Moseley 1992:168; Heyerdahl et al 1995:165). The possibility that Inca mantle finishers incorporated cultural information into the edges of their textiles cannot, therefore, be overlooked.

Table 12. Mantle Yarn Colours.

Mantle	Colours: Warp	Colours: Edge	Warp/Edge	Panels
T-3	R,W,G,B	R,W,G,B, Be:	same/similar	same/similar
T-29	R,W,G,B,Gr,Gn	W	-	same/similar
T-30	R/B,Gr,B (dark)	R,G,Be,B	not similar	-
T-32	C, B, B (dark)	C, B (dark)	same/similar	-
T-33	R/B,W,R,G,B,B (dark)	R,G,B,Be,	same/similar	same/similar
T-34	B (dark),Gr,	B (dark)	same/similar	-
T-40	R/B,G,W,B	W	-	same/similar
T-41	W,R,B,G	W	-	same/similar
T-42	C,R,B (dark),Gr	C,Gr	same/similar	same/similar
T-47	R,G,B,W	R,G,B,Be,D(dark)	not similar	same/similar

R= red; W= white; G= gold; B= brown; Be= beige; Gr= gray; Gn=green; C= camel.

Stains, Burns and Folds

There is evidence of staining on several of the mantles (Table 13). Two single panel artifacts, T-30 and T-34, and two multi-panelled mantles, T-40 and T-41, are very heavily stained with what appear to be body fluids, suggesting that they had each been closely associated with one of the interred. Mantle T-3 also has a moderate amount of similar

staining. The third single panelled mantle is badly damaged but exhibits very little staining, as do multi-panelled mantles T-29, T-42, and T-47, which suggests that these articles were not worn by the interred. Mantle T-42, however, does have a large lighter coloured area in the centre of the middle panel (Plate 3 s), which suggests staining by something other than body fluids. As liquids such as *chicha* were sometimes sprinkled on sacrificial offerings, it is possible that the stains exhibited here are the outcome of this rite. Small areas of T-33 also exhibit lighter coloured stains. The grayish outline of long twisted locks of hair was noted on the centre panel of T-41 associated with a small tassel fragment (Plate 3 q) indicating that this artifact had been worn by the adult, who had longer hair.

Table 13. Mantle Stains, Burns, and Folds.

Mantle	Stains	Burns	Folds/Breaks	Damage
T-3	yes	yes	no*	holes
T-29	no	yes	folds and breaks	white areas
T-30	yes	no	irregular	holes
T-32	no	no	irregular creasing	holes
T-33	"bleached" areas	no	folds and breaks	white areas
T-34	yes	no	irregular	few holes and tears
T-40	heavy	yes	centre fold	mostly tears
T-41	heavy	yes	centre fold	holes and tears
T-42	"bleached" areas	yes	yes	holes, missing segments
T-47	fading	yes	yes	white and centre areas, missing segments

* = hole pattern and staining suggests centre fold

Burned areas are also present on some of the textiles (Table 13). T-3 and T-41 each exhibit charred areas on the outer edges of large holes in the centre sections (Plate 3 a, o), and T-29, T-40 and T-47 also have some charred areas. It is not known whether this scorching is the result of burning during the sacrificial rite or was the result of the explosion that exposed the site and its contents, though regular burn patterns suggest planned burning. In

some instances, the burned areas emphasize some of the crease patterns of the textiles that illustrate how the articles were folded in use.

Folds and breaks, however, are irregular (Table 13). T-3 and T-41 each have folds in the centre stripe areas, suggesting that the artifacts had been folded in the centre parallel to the stripes (Plate 3 a, r). T-3 (a shawl) when folded, would have had the central stripe at the top, and the holes appear to have overlapped at the front of the interred, with the area between the holes positioned at the back of the neck. T-41 (a dress) has an off-centre fold, also in the centre white stripe area, also indicating that it had been worn folded in half parallel to the stripes. Folding patterns of unused artifacts are not immediately evident, and most tears, which follow the direction of the warp, appear to be recent.

Shawl and Dress Characteristics

The characteristics of shawls and dresses are somewhat different. Attributes of known full sized and miniature wrapped dresses and shawls have been studied extensively by Ann Rowe (1995-96:5-53), who notes three main features (1995-96:20): " (1) wrapped dresses have monochrome edge binding while shawls have striped edge binding; (2) wrapped dresses have the same color at the ends as in the center, while shawls have red extending to the ends; (3) wrapped dresses have two zones of patterning in each half, while shawls have only one".

Using these standards, we interpret mantles T-29, T-40, and T-41 to be wrapped dresses, and mantles T-3, T-33, and T-47 to be shawls, as they have all of the designated attributes (Table 14). T-40, however, exhibits two irregularities: it was constructed of two-panels and most similar artifacts are constructed of three panels (A. Rowe personal communication 2001); and the centre seam was sewn with an overcast stitch whereas all the other multi-panelled mantles of this collection were sewn using a figure-eight stitch.

One mantle, however has two attributes; two mantles each have only one attribute; and one mantle has none so other criteria must be employed. Mantle T-34 has two dress attributes; it has a monochrome edge binding and also has the same colours at the ends as in the centre. It is unusual in that it is constructed of a single loom panel and is narrower in a weft-wise direction. The end stripes are also very narrow and the centre stripe is very wide, but the features do conform with Rowe's dress criteria. The combined factors of stripe arrangement, edge binding and size define this mantle as a dress, but the single panel construction, unusual stripe proportions and dimensions suggest that it may have been constructed for a child. It is also similar to full sized square two-panel mantles such as are described by A. Rowe (1995-96: Figure 10) and Katterman and Riddell (1994:Figure 2).

Mantle T-30 is finished with multi-coloured striped cross-knit loop stitching and red overcasting which suggests that it is a shawl. It is also woven of natural coloured yarns in three relatively equal stripes, and there are narrow warp pattern bands created by the use of alternate colours of warp threads at both long edges. This artifact is very similar to natural coloured shawls from Pachacamac described and illustrated by A. Rowe (1995-96: Figures 20 and 22), so it is interpreted here as a shawl.

Mantle T-32 contains attributes of both shawls and dresses. It has a monochrome edge binding like those of wrapped dresses, but it is also woven of natural coloured yarns in three relatively equal sized stripes and there are narrow warp pattern bands along the long edges similar to mantle T-30. As it is also similar in size to T-30, it is considered to be a shawl.

Mantle T-42 is without any of the above noted attributes. It is, however, very large, and has been constructed of three panels. It also has a stripe configuration similar to the patterned dresses in this collection (eg. T-29, T-40, T-41) although the ends are different shades of camel (Plate 3 s). It is also similar to unpatterned miniature dresses, (eg. Reinhard

1992:89; Beorchia 1985: Unnumbered plates: two miniature dresses from Cerro Las Tórtolas) so is interpreted as a dress. Five of the Esmeralda mantles are therefore considered to be *acsu*, and the other five as *lliclla* (Table 14).

Table 14: Dress/Shawl Correlations

Mantle	Edges	Colours	Pattern	Dress/shawl
T-3	striped	red at ends	one zone	shawl
T-29	monochrome	centre/ends same	two zones	dress
T-30	striped	-	-	shawl
T-32	bichrome	-	-	shawl
T-33	striped	red at ends	one zone	shawl
T-34	monochrome	centre/ends same	-	dress
T-40	monochrome	centre/ends same	two zones	dress
T-41	monochrome	centre/ends same	two zones	dress
T-42	polychrome	centre/ends different	-	dress
T-47	striped	red at ends	one zone	shawl

Morales (1985:66-67; Appendices IV and V) indicates that some of the mantles were associated with one or the other of the females. Both Morales (1985:74) and Checura (1976:137) also indicate that the most impressive textiles were associated with the adult. Of the eleven full sized mantles that Morales describes, three decorated mantles are unassigned as to a particular mummy, two naturally coloured mantles are unassigned, two decorated mantles are assigned to mummy "a" (probably the child), two decorated mantles are assigned to mummy "b", and two thick mantles are also assigned to mummy "b". As the features of the mantles listed by Morales are quite different than those observed by me, and because his general descriptions are not sufficient in most cases to differentiate them, it was not possible to identify clear mummy association from his list, though correlations were attempted (see individual artifact descriptions Appendix I).

There are several indicators however, that suggest possible use and non-use: 1) The

presence of what appear to be body fluids on some artifacts is a clear indication of close association with the interred. Three dresses (T-34, T-40, and T-41) and two shawls (T-3 and T-30) exhibit this type of staining, and dresses T-40 and T-41 are the most heavily stained artifacts. 2) The sizes of the artifacts differ, and it is expected that smaller artifacts would have been worn by the child, and larger ones worn by the adult. 3) The presence of charred areas most probably indicates ritual burning. Six of the artifacts exhibit charred areas and these areas are found on both stained and unstained artifacts. 4) Lighter "bleached" areas were found on two of the artifacts (shawl T-33 and dress T-42) suggesting that *chicha* or other liquid had been sprinkled on the artifacts in a ritual context. 5) The association of fragments from other artifacts may suggest possible associations. 6) If we assume that most of the best textiles are associated with the adult, the fineness/coarseness of the fabrics may suggest which mummy artifacts may have been associated with.

Even with these indications, mummy association with all but one artifact is speculative, and several combinations are possible: one interpretation is that both T-40 and T-41 was worn by the adult. Both artifacts have been identified as dresses, but both are very heavily stained and were clearly worn by one of the interred. T-41 can be clearly associated with the adult and as it is the largest of the two artifacts was most probably worn as a dress. As noted, this artifact has two unusual features; it is very heavily stained, and there is a central fold with what appears to be nasal discharge in two areas on both sides of the fold; a stain outlining the adult hairstyle is clearly visible near the fold, and a hair tie tassel remnant is adhered to the artifact near the hair stain indicating that this artifact was clearly worn by the adult. Other fragments including a few white feather remnants and small fragments of cotton yarn similar to that used to secure feathers suggest that it was also in contact with the headdress. T-40, however, is also very heavily stained, and although there is no clear evidence

of a central fold, a central tear plus more staining on one patterned side than the other, and its two-panel construction suggest that it may have been folded parallel to the stripes in use, and could have been worn by the adult as a shawl.

T-34, as noted, has smaller proportions than is usual with this style of dress, but it is clearly a dress, and size and staining suggests that it could have been worn by the child. T-30, a shawl, was also in contact with one of the interred, as stain patterns and holes indicate, and its small size suggests that it was worn as a shawl by the child.

There are, however, other possible explanations; T-40 is very heavily stained, is somewhat smaller in size, and is constructed of only two panels suggesting that it may have been constructed for a smaller individual, so could have been worn by the child. T-3 has a clear central fold, light staining and evidence of burning, so may have been worn as a shawl by the adult victim. The heavy staining of T-40 indicates its close association with one or both of the interred, but it may also have been placed around the victims. T-30 and T-34 are not as heavily stained as T-40 and T-41 and there are clear body imprints on both, suggesting that these artifacts may have been placed either under the bodies or around them. The presence of several human hairs near the warp edge of T-30, however, suggests a closer contact with one of the interred, probably the child. It is also possible that some unused artifacts were placed over the interred. T-42 may have been placed over the adult; the presence of a few white feather remnants, small fragments of cotton cordage and a blue/green feather in tightly folded areas of this article supports close association with the adult. T-32 may have been placed over the child; while there is little staining indicating that this artifact was not worn by the interred some staining at one end of the textile suggests some contact with one of the interred.

The shawl T-33 and dress T-42 were clearly not worn, but present interesting

characteristics. Neither of these artifacts exhibit signs of use, both have lighter "bleached" areas, and considerable burning was noted on T-42. A small charred spot was also observed on T-33. The dark stripe areas of both of these artifacts also appear to have been over-dyed, and these are the only artifacts in the collection with this combination of features.

The item that Checura (1977:137) describes as the "royal mantle" contains green stripes, and Morales also describes two mantles with green stripes, one of which appears to be missing. The only remaining mantle with green stripes is T-29, an un-worn dress, suggesting that this is the mantle described by Checura. What Checura describes as "the most important" mantle may be T-41 as it is the only mantle in which stretching was noted, and squared sections have been removed from this artifact. The other five mantles are not stained with bodily fluids so are interpreted as offerings.

It has been noted that the dyed wrapped dresses and shawls of figurines are sometimes produced as "sets" with matching patterns and colours (A. Rowe 1995-96:19), which suggests the possibility of full size matching outfits also having been produced. In examining the colours and designs of the Esmeralda mantles, some likenesses are noted. Shawl T-30 and dress T-34 are similar in colour and also have similar stain patterns, suggesting that the two artifacts may have been worn as an ensemble. Shawl T-3 and dress T-40 both have the same complementary warp design elements, and show evidence of having been worn in the burial context, but the dress has extra coloured warp stripes that do not correspond with the colours or size of the shawl. Shawl T-47 and dress T-41 share the same complementary warp design elements, but the shawl does not exhibit evidence of wear while the dress is heavily stained. The colours are also somewhat dissimilar. The most probable shawl/dress set is shawl T-33 and dress T-42. The red/brown over-dyed colouring of shawl T-33 is generally similar to the multi-hued over-dyed red/brown stripes of dress T-42, but the shawl is patterned and

exquisitely constructed while the dress is not, and the dress has other colours not associated with the shawl. While it does seem probable that shawl T-30 and dress T-34 were worn together, there does not appear to be enough comparative evidence to suggest that full sized matching outfits were specifically designed. It is noted, however, that a patterned shawl and non-patterned but dyed striped dress were worn by the young girl sacrificed on Mt. Ampato (Conklin 1996:108; Reinhard 1996:72-73).

Discussion

Five mantles are clearly *acsu* and five are *lliclla*, suggesting that five sets of clothes may have been included in the Esmeralda collection. Nevertheless, matching sets are not necessarily indicated, and one mantle may be missing (see Appendices I, IV and V) suggesting that the minimum number of outfits may be six or more. It is also probable that artifacts other than those worn by the two females were presented as individual offerings and were not intended as clothing for the interred. T-40 and T-41 may have been worn by the adult and T-30 and T-34 may have been worn by the child. Lighter coloured stains suggest that *chicha* or other liquid had been poured over some of the mantles at the time of interment, and the charred areas, probably represent ritual burning, though also may have been caused by blasting by construction workers. Checura (1977:125) notes that the faces of the two mummies had been covered with a single fine textile, and that what he describes as 'the most important textile', possibly T-41, had been removed.

Six of the seven mantles in which dyed yarns were used appear to fit within Cobo's *cumbi* classification, and two of the three single panelled mantles appear to be of a coarse *abasca* quality. These two artifacts (T-32 and T-34) are constructed of naturally coloured yarns of thick construction and has a much coarser handle than do the others. The third

naturally coloured mantle (T-30) was constructed of finer yarns that are more similar in diameter to the dyed yarns, and was finished with multi-coloured yarns in a stripe pattern. This artifact may be a lower quality of *cumbi*, or a finer quality of *abasca*. T-42 is also unusual in that it contains dyed yarns, but does not contain pattern stripes. This artifact also appears to be a lower quality of *cumbi* or a finer quality of *abasca*. For the moment, I consider both to be a finer quality *abasca* rather than a poor quality of *cumbi*, as it is most similar to most plainly dressed archaeologically recovered figurines. As the artifacts are identified as dresses or shawls, four general artifact types are indicated; *cumbi* dresses (T-29, T-40, T-41), *cumbi* shawls (T-3, T-33, T-47), *abasca* dresses (T-34, T-42), and *abasca* shawls (T-30, T-32). All of the mantles are similar to other known Inca artifacts and are considered to be standard Inca attire with the exception of two artifacts: T-34 has been defined as a dress, and is similar to square dresses, but its single panel construction suggests that it was constructed for a child. T-40 is also unusual in that it was constructed of two panels while other known similar artifacts are constructed of three panels.

Both production standards and production variables are noted in the construction of these artifacts. All yarns were constructed of camelid fibre, most of which are approximately 40μ in diameter; virtually all yarns are 2-ply Z-spun and S-plied, most yarns are approximately 0.5 mm in diameter or less with 10-19 twists per cm.; all artifacts are of well executed warp-faced construction; all edges were finished using the same embroidery techniques, and almost all seams were sewn using the same kind of stitch technique. The pattern stripes of one panel of each artifact contain the same number of pattern elements as does the other, and the pattern stripes are all constructed with complementary warp stripes arranged in a like manner on each of the patterned artifacts. While patterned textiles are of Imperial Inca design, methods of mantle assemblage, sizes of pattern elements, and the colours of finished edges

are quite varied. The weavers of the Esmeralda mantles did produce mantles in the Inca style, but did not employ standardized criterion in all aspects of production, suggesting that they may have been constructed in non-regulated settings such as households.

Other aspects of production are suggested. The warping of each mantle appears to have been completed by a single individual or perhaps a team of individuals, as the panels of each artifact are comparable in length. Weaving style, and the presence of identical or similar colours in each of the panels suggest that weaving was usually completed by a single person. Dyeing and yarn components, however, appear to have been produced by different individuals, as distinct variations in colour and diameter and twist were noted. Yarns of edge trimmings, other than some stripe arrangements, are the same or similar in construction and colours as the warps, suggesting that most mantels were finished by the weavers, or by persons in close association with them. As the colours of some striped edges are different than those of the warp threads, these edges may have been finished by persons not in close association with the weavers.

There are considerable variations in levels of expertise. Although most yarn diameters are similar, few spinners were able to spin yarn consistently at a specific diameter, and evenly spun yarns were usually finely spun. Individual preferences were also noted in the ways pattern segments were woven, some fairly uniform in size, and others irregular. The edges of all mantles were finished using the same techniques, but many colour combinations were noted, and specifically with striped edges, different ways of stitching methods were observed.

Individual preferences were also noted, particularly with respect to hidden elements; for example, some weft yarns were doubled, and in one case, discontinuous interlocking weft yarns were used. One individual also chose to conserve red yarns by using undyed warp yarn in the hidden areas within the finished edges.

Belts

There are five full sized belts in the Esmeralda collection (Plate 2 a, e, f, i, j), and all are articles of female dress. Belts or *chumpi* similar to these have been illustrated and described by Guaman Poma (1980:98-119[1615]), described by other chroniclers (eg. Cobo 1990:188[1653]; Betanzos 1996:13-14[1557]), and a few have been found in archaeological contexts (eg. Beorchia 1985:Unnumbered plates: Mt. Mismi; Conklin 1996:108; Uhle 1991: Figure 106:a-f[1903]). Also, some without provenience are preserved in museum collections (eg. A. Rowe 1995-96:Figure 36; Desrosiers 1986:Figure 10).

Twenty-nine of the fifty-seven belts excavated from the cemetery of the sacrificed Inca women at Pachacamac are double-cloth, and Uhle (1991:90[1903]) indicates that this structure is specific to the wide belts which he calls *mamachumpi* or "mother belts". None of these artifacts, however, appear to contain the same attributes as those from Esmeralda. Patterns are somewhat different, colouring is different, and the methods of attaching cords also vary (Uhle 1991:Plate 19:Figures 1-4[1903]; Wardle 1936: Plates 1-6; A. Rowe 1995-96: Figure 53). The twenty-seven other Pachacamac belts that Uhle (1991:90[1903]), calls *chumpi*, were worn over the *mamachumpi* and differ in that they are much longer and narrower than both the Esmeralda belts and the *mamachumpi* of the Pachacamac collection. The patterning on two of the illustrated narrower belts (Uhle 1991:Figures 106 d, e, f [1903]), however, are not unlike those of Esmeralda. Uhle also excavated Inca belts from the Chincha Valley (Kroeber and Strong 1965:35), but to my knowledge, these have not yet been published. The Pachacamac belts are not indigenous to the Pachacamac area, may be of south highland origin and can be classified as a Provincial Inca style (A. Rowe personal communication 2001). It should also be noted that currently, the term *chumpi* is frequently used in reference to all Inca belts (see eg. A. Rowe 1995-96:23).

Several recovered artifacts similar to the Esmeralda belts are miniatures found with female figurines at sanctuary sites (eg. Beorchia 1985: Unnumbered plates: "secunda estatuilla de plata" Cerro Gallán, Cerro Mercedario; Reinhard 1992:89; A. Rowe 1995-96: Figure 35). Mostny (1957:Figure 10) also provides a line drawing of a miniature belt from Cerro el Plomo that appears to be similar to the above mentioned artifacts. The tiny belts (none of which is included in the Esmeralda assemblage) are not as detailed as are the full sized artifacts, but both pattern and construction appears very similar to full sized belts. The miniatures appear to be in better condition than are the full size artifacts, are usually in place on the figurines, and suggest how Inca sacrificed women may have been dressed. A. Rowe (1995-96:23, citing Palma 1991), describes the manner in which a belt was placed on a carefully reported figurine from Copiapó. She notes that: "... the belt was put on with the centre in front, the ends taken around the back with the left over the right, and brought again to the front, with the left again over the right. The ties were then taken to the back and tied together with a square knot". The belt of the sacrificed girl from Ampato (Reinhard 1996:73) appears to have been placed in this or a comparable position, and it also seems probable that the those worn by the Esmeralda mummies were wrapped in similar fashion.

Esmeralda Belts

All five of the Esmeralda belts were woven as warp-faced double-cloth with plain weave construction; that is, they were constructed of two layers of cloth woven simultaneously in a plain weave, with warp threads of each layer covering weft threads (see eg. A. Rowe 1977:94-98; Cahlander 1985, Tidball 1960; Cyrus-Zetterström 1977:93-101; and Farrar 1985 for more detailed descriptions of double-cloth). The belts were also constructed tubular-fashion with the two layers or "faces" of cloth joined at the side edges,

and patterning was incorporated by the manipulating of warp threads. The two layers are not connected except in areas where the warp threads of the two layers were interchanged during the weaving of patterns. Only the monochrome side edges of the belts have no interchanging of warp yarns. This tubular weave structure was well demonstrated in belts T-25, T-27, and T-35 which have broken areas on side selvages (also see Figure 14). Unlike regular balanced double-cloth, there is no interchange of weft yarns; the weft yarns of double-cloth re-route warp yarns of one layer to the opposite layer but retain their original positions in their specific cloth layers. Weaving of all belts was done from one narrow end to the other. Terminal areas (areas in which patterned weaving was discontinued) are present at one end of each belt indicating that no belts were woven from both ends and finished in the centre.

Belt dimensions are quite variable, ranging from 113.67 x 10.27 cm to 177.06 x 13.60 cm. The width/length (weft/warp) ratio, however, is less variable (Table 15), suggesting that some idealized standards of shape may have been in evidence. The 162 cm x 15.5 cm

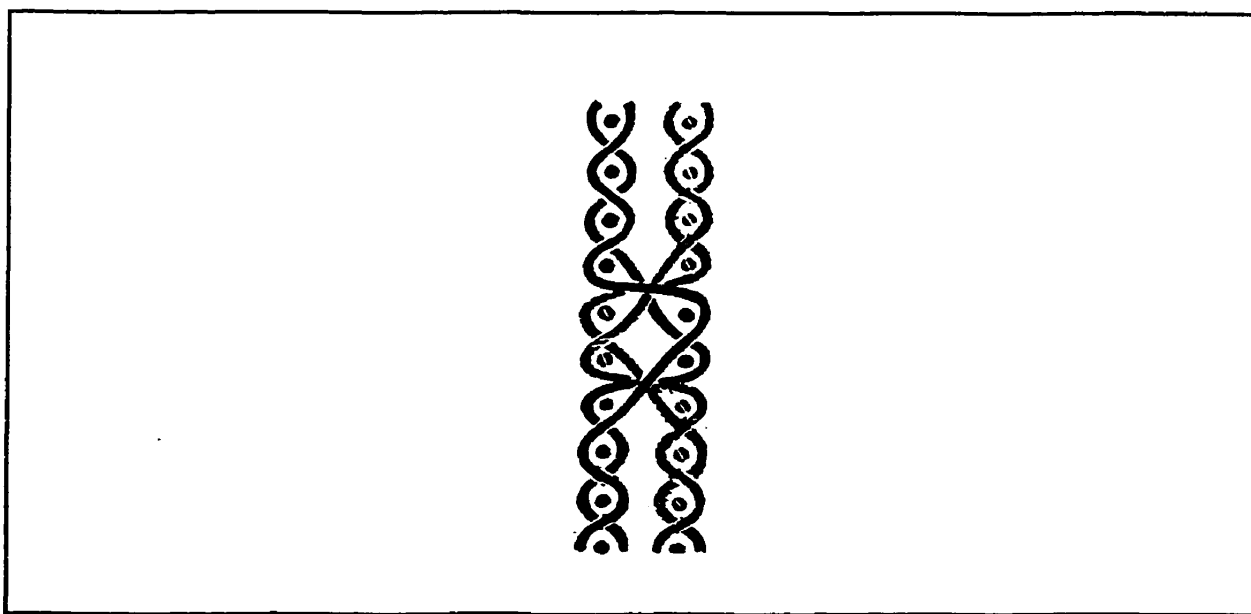


Figure 14. Double-cloth belt structure.

dimensions of the full-sized Inca belt illustrated by A. Rowe (1995-96:25) also has a width/length ratio which is similar to that of the Esmeralda belts (Table 15).

One belt (T-2) has two braided tasselled cords that have been attached at one side of each end by a bichrome plied cord which were each sewn to the belt with vegetal fibre yarn (Plate 2 a). Another belt (T-27) has one cord attached in the same manner, and there are no cords attached to the others. All but one belt, however, have remnants of vegetal fibre yarn stitching in areas where cords were most probably attached (see Table 15), and some also have broken or frayed yarns in these areas, also suggesting that cords were once attached (Plate 2 b, e, i). The large number of cords support this view, but Checura (1977:136) notes that some unattached cords were placed around the head, waist and feet of adult body. It is possible that these cords were removed from the belts to facilitate lowering the young woman into her tomb, which suggests that she had been killed prior to being placed in the grave.

Table 15: Belt Features

Belt	Length	Width	L/W ratio	Cords	Vegetal Fibre	Broken Areas
T-2	113.67 cm	10.27 cm	11.07	2	3 areas	0
T-25	148.80 cm	13.10 cm	11.36	0	1 area	4
T-27	177.06 cm	13.60 cm	13.02	1	4 areas	0
T-35	121.83 cm	11.10 cm	10.98	0	0 areas	1
T-39	132.67 cm	9.13 cm	14.53	0	1 area	?
Mean	138.81 cm	11.44 cm	12.19			

The patterns on all of the Esmeralda belts are distinctively Inca. All belts contain stripes with continuous zigzag-and-dot designs and stripes with geometric patterning. There are a number of general similarities in the attributes of these artifacts. The belts T-27 and T-35 appear to be almost identical, as do T-2 and T-39; they have the same colours and pattern configurations and pattern content, though the geometric motifs may be different or arranged

Table 16. Belt Pattern Arrangements.

Belt	Edge				Centre				Edge	Stripes/Areas		
T-2	1 ZZ				3 zz				5 g	3 zz	1 ZZ	13/5
T-25	1 ZZ				4 zz				5 g	4 zz	1 ZZ	15/5
T-27	1 ZZ	1 d	1 G	1 d	1 ZZ	1 d	1 G	1 d	1 ZZ	9/9		
T-35	1 ZZ	1 d	1 G	1 d	1 ZZ	1 d	1 G	1 d	1 ZZ	9/9		
T-39	1 ZZ				3 zz				5 g	3 z	1 ZZ	13/5
AR	1 G				8 zz				9 g	8 zz	1 G	27/5
SD	1 G				19 g						1 G	21/3

ZZ = wide zigzag and dot stripe; zz = narrow zigzag and dot stripe; G= wide geometric pattern stripe; g= narrow geometric pattern stripe; d = narrow diamond stripe.

in a slightly different order, though this was not thoroughly investigated. Belt T-25 has similar characteristics as T-2 and T-39 but contains more stripe elements.

The basic features of the five Esmeralda belts are comparable (see Tables 16, 17, and 18): 1) The colours are similar; red and gold were used in all belts, and blue was used in all but one artifact; 2) all belts have an uneven number of stripes, and an uneven number of stripe areas; 3) all belts have patterning arranged symmetrically (mirrored) on either side of a single stripe or group of stripes, and the belts are also mirrored front to back; 4) the edges of all belts are solid coloured double-cloth; 5) the first pattern stripes along the edges of all belts are wide stripes containing continuous zigzag designs; 6) stripes with geometric designs are themselves at the centre of the belt (T-2, T-25, T-39), or located on both sides of a central zigzag stripe (T-27, T-35); 7) the belts vary only slightly in structural details and warp/weft ratios are also similar; 8) the presence of vegetal fibre stitching associated with the attachment of braided cords in some artifacts, and in similar areas in other artifacts suggest that cord attachment with vegetal fibre yarn may have been used with all of them.

The belts illustrated by Desrosiers and A. Rowe, however, are somewhat different; they are woven in black, white, and brown colours; they do contain stripes of geometric designs, but do not have zigzag and dot stripes, and the edges appear to be bound. The two

Table 17. Belt Colour Arrangements.

Belt	Edge	Centre										Edge			
T-2	r/r	g/b	r/bl	r/g	r/bl	r/g	r/bl	r/g	r/bl	r/g	r/bl	r/g	r/bl	g/b	r/r
T-25	bl/bl	r/g	r/bl	r/g	r/bl	r/g	r/bl	r/g	r/bl	r/g	r/bl	r/g	r/bl	r/g	bl/bl
T-27	r/r	g/br	g/b	r/br	g/b	r/g	g/b	r/br	g/bl	g/br	r/r				
T-35	bl/bl	r/g	w/bl	r/br	w/bl	r/g	w/bl	r/br	w/bl	r/g	bl/bl				
T-39	r/r	g/b	r/bl	r/g	r/bl	r/g	r/bl	r/g	r/bl	r/g	r/bl	r/g	r/bl	g/b	r/r

r = red; g = gold; b = beige; bl = blue (may also be purple or black); br = brown; dbr = dark brown; n = natural light coloured; w = white.

Table 18. Belt Structural Dimensions.

Belt	Warps/cm	Range	Wefts/cm	Range
T-2	34.00	28.00-44.00	5.00	5.00
T-25	31.00	26.00-32.00	5.50	5.00-6.00
T-27 (plain)	25.33	24.00-28.00	5.33	5.00-6.00
(pattern)	38.67	38.00-40.00	-	-
T-35	34.33	28.00-36.00	4.75	4.00-5.00
T-39	34.00	32.00-38.00	4.17	4.00-5.00
Mean	32.89		4.45	

Note: Structural dimensions are for one face.

museum specimens do, however, have an uneven number of stripes and an uneven number of stripe areas (Table 16). The two belts are more similar to each other than to any of the Esmeralda belts and appear to represent a different prototype.

Yarns

Some uniformity in yarn construction is noted (Table 19). Belt yarns were all constructed of camelid fibre, most of which is approximately 40μ in diameter. All yarns are of 2-ply construction, and all warp yarns are Z-spun and S-plied. Some weft yarns, however are S-spun and Z-plied, and this unusual feature does not appear to correlate with the belts with similar pattern elements (Table 19). There is, however, a wide range of yarn diameters

Table 19. Belt Yarn Features.

Belt	Element	Ply	Spin	Diameter	Angle/Twist	Twists/cm	Fibre	Fibre diameter
T-2	1a	2	Λ	0.33 mm	22.00°	-	camelid	40μ range
	b	2	Λ	0.50 mm	29.00°	-	camelid	40μ range
	c	2	Λ	0.50 mm	20.00°	-	camelid	40μ range
	d	2	Λ	1.00 mm	22.00°	-	camelid	40μ range
	2	2?	∇?	1.46 mm	-	-	camelid	40μ range
	7	2	Λ	0.28 mm	34.00°	-	vegetal	-
T-25	1a	2	Λ	0.50 mm	37.00°	15	camelid	40μ range
	b	2	Λ	1.00 mm	34.67°	14	camelid	40μ range
	c	2	Λ	0.88 mm	37.33°	13	camelid	40μ range
	d	2	Λ	0.79 mm	41.17°	8	camelid	40μ range
	2	2	∇	1.17 mm	26.33°	6	camelid	40μ range
T-27	1a	2	Λ	0.63 mm	44.33°	11	camelid	40μ range
	b	2	Λ	0.75 mm	37.66°	15	camelid	40μ range
	c	2	Λ	0.35 mm	48.33°	15	camelid	40μ range
	d	2	Λ	0.33 mm	51.83°	-	camelid	40μ range
	e	2	Λ	0.75 mm	39.50°	-	camelid	40μ range
	f	2	Λ	-	43.83°	-	camelid	40μ range
	2	2	Λ	1.08 mm	-	2	camelid	40μ range
T-35	1a	2	Λ	0.31 mm	40.33°	12	camelid	40μ range
	b	2	Λ	0.79 mm	39.83°	12	camelid	40μ range
	c	2	Λ	0.79 mm	39.67°	12	camelid	40μ range
	d	2	Λ	0.43 mm	40.17°	10	camelid	40μ range
	e	2	Λ	0.50 mm	44.80°	12	camelid	40μ range
	2	2	∇	1.08 mm	44.17°	12	camelid	< 40μ
T-39	1a	2	Λ	0.58 mm	42.00°	16	camelid	40μ range
	b	2	Λ	0.46 mm	41.67°	10	camelid	40μ range
	c	2	Λ	0.30 mm	41.83°	-	camelid	40μ range
	d	2	Λ	0.43 mm	40.33°	-	camelid	40μ range
	e	2	Λ	0.50 mm	43.17°	-	camelid	40μ range
2	2	Λ	2.00 mm	-	4	camelid	40μ range	

and of the consistency of yarn diameters within each belt (Table 20). In general, weft yarns are notably heavier than warp yarns, but approximately 70% of all yarns are in the 0.50-1.00 mm range. Although some yarns are quite irregular, others are expertly spun with consistent

diameters and are quite fine (see individual artifact descriptions, Appendix I). Tiny knots along the length of one red warp stripe of one artifact (T-39) however, suggests either that the spinner did not construct the yarn with sufficient tensile strength to withstand warp tension during weaving, or that there was a problem with the dye mordanting procedure.

There is also considerable variation in the angles of twist of yarns, though almost 76% of the yarns tested are within the 30–49° range (Table 21). This suggests some degree of yarn standardization. Of the yarns tested, angles of twist in weft yarns are similar to warp yarns in all but one instance (see individual artifact descriptions, Appendix I).

Table 20: Belt Yarn Diameter Measurements.

Belt	0.25 mm	0.30 mm	0.50 mm	0.75 mm	1.00 mm	1.25 mm	1.50+mm	Total
T-2	-	6	11	1	6	2	1	27
T-25	-	-	7	8	10	4	1	30
T-27	3	6	7	13	5	2	-	36
T-35	3	4	15	2	10	2	-	36
T-39	2	8	18	1	1		6	36
Total	8	24	58	25	32	10	8	165

Also supporting the theory of qualities of yarn standardization are tests for twists per centimetre. Of the yarns tested, most yarns (over 55%) are within a single category (Table 22), and the remaining yarns all fall into the two adjacent categories.

Discussion

The Esmeralda belts all demonstrate standard Imperial Inca characteristics, but also differ from those of Pachacamac and the museum piece in both colour and design. The published miniature belts with similar patterning to those of Esmeralda appear to have been

Table 21. Belt Yarn Angles of Twist Measurements.

Belt	10-19	20-29	30-39	40-49	50-59	60-69	Total
T-2	-	-	-	-	-	-	-
T-25	-	8	14	6	2	-	30
T-27	-	-	7	15	14	-	36
T-35	-	-	11	20	5	-	36
T-39	-	1	9	18	2	-	30
Total		9	41	59	23		132

Table 22. Belt Yarn Twists per Centimetre.

Belt	<9	10-14	15-19	20-24	25>	Total
T-2	-	-	-	-	-	-
T-25	2	2	1	-	-	5
T-27	1	1	2	-	-	4
T-35		6	-	-	-	6
T-39	1	1	1	-	-	3
Total	4	10	4			18

woven using mostly natural coloured yarns, and patterns are simplified (but cf. Reinhard 1996:77). The general style of these miniature belts, however, appears to be more similar to the Esmeralda belts than to the others, in that they have zigzag design stripes and braided cords attached in a similar fashion as with the Esmeralda belts. The belts within the collection are all quite similar to each other, with two sets of two belts being almost identical. All belts were produced using the same double-cloth techniques, and similar pattern arrangements, motifs, and colours are found in all. It seems probable that the identical belts were woven by closely affiliated weavers, and that the others were also woven by persons not too far removed from each other. It seems probable that the belts were each woven by a single individual (though could have been warped by another), as dramatic shifts in weaving style were not observed. Yarns, however, appear to have been produced by different individuals,

as in each artifact a number of levels of expertise and proficiency were noted. In T-39, for example, tiny knots along the warp of one stripe indicate that the spinner of this yarn did not incorporate enough strength to withstand the strain of weaving under tension. Dying was also probably done by a number of individuals as in a number of instances (eg. T-2), a number of different shades of a single colour were present within the same warp. It is of particular interest that some of the *hidden* weft yarns were S-spun and Z-plied in contrast to what is known of the normal Inca practice.

The belts T-2, T-25, and T-35 show no sign of use while T-27 and T-39 are both stained, suggesting that they were closely associated with the interred. T-27 is tentatively associated with the adult as it is the largest of the two belts, is very heavily stained, as are the two largest mantles, is similar in dimensions to one described by Checura (1977:138), and a number of white feather fragments are present on the surface of the artifact, indicating that it was once in close contact with the feathered headdress. A fragment of mantle T-30 was found with this artifact which suggests that it may have been associated with the child, but both this association and that of the feather fragments may have been recent. The smaller T-35 was most probably worn by the child as it is less stained, as are the mantles tentatively associated with her. According to Checura (1977:138), most of the belts were placed *with* the interred, and this is supported by the relatively clean condition of three of the artifacts. Checura (1977:137) describes what appears to be T-2 as being held by the young girl.

Braided Cords

There are a total of eleven braided tasselled cords in the Esmeralda collection, three of which are attached to belts. Tasselled cords similar to these have been found in association with belts in other sacrifice locations (see eg. Cahlander 1985:Figure 4-5b; Beorchia 1995:

Unnumbered plates Mt. Mismi; Conklin 1996:108; Reinhard 1996:62), and on miniature belts (eg. Beorchia 1985:Unnumbered plates Cerro Las Tórtolas, Cerro Gallán, Cerro Mercedario; Reinhard 1992:89; A. Rowe 1995-96:Figure 35; Mostny (1957:Figure 10) so there is ample evidence to suggest that these artifacts were designed for attachment to belts. The presence of vegetal fibre stitching on the belts in areas where cords might have been attached supports this view. Checura (1977:136), however, as noted, reports that red and yellow tasselled *llautos* were "annexed" to the body; two connected cords (probably T-10 A and B), were placed under the head, another was located under the waist area and another at the feet. He notes that the connected cords were wrapped around the head of the interred adult three and one half times, with the tassels falling near the right temple area, indicating that in this instance the cords had another use, perhaps to facilitate lowering the young woman into her tomb.

The cords are all identical in construction, and similar in size, though cord lengths vary, ranging from 78.23 -118.5 cm (Table 23), suggesting that either a wide range of lengths were used or, more probably, that cord lengths were adapted to the sizes of the belts for which they were designed. Other measurements demonstrate less variability (Table 23), indicating that ideals may have been maintained.

Although braided cords were constructed using the same technique, the method has not yet been clearly identified. The braids appear similar to the braided cords currently used for the construction of dance slings in the *puna* community of Macusani in southeastern Peru (Zorn 1980-81:Figure 10 Aa). These modern slings are usually produced by men while herding, but appear to be worn in pairs by both men and women at specific celebrations (Zorn 1980-81:44).

The Esmeralda cords appear to have been constructed by folding a set of elements

composed of two colours of yarn (possibly small skeins or thick circlets of single yarns), holding them taut, and then braiding the strands, creating the zigzag patterning with the placement of coloured yarns. Both ends of each cord are finished with no loose ends protruding. The folded ends appear to be located within the tassels (eg. Plate 1 a, b), and the terminal ends secured with plied cords (Plate 1 c), but this cannot be positively determined, and the terminal end may be within the tassels. As the plied cord end is very narrow, it is also possible that the cord was braided, folded at the tassel end, then re-braided and the terminal end secured with the plied cord.

The tassels also appear to have been constructed using similar techniques (Figure 15), other than the manner in which colours were incorporated (Figure 16). Several strands of yarn were wrapped around the braided cord near the terminal end. Lengths of yarn were then attached in groups by tightly sewing with light coloured yarn, forming a tassel "cover" which both secured the tassel yarns and provided a finished appearance. In some instances the tassel yarns appear to have been incorporated prior to formation of the tassel cover.

An interesting feature of three of the braided cords (Plate 1 f, h; Plate 2 h) is a fragment of cordage securely attached by means of a larks' head knot. Two of these extra cords are attached at points nearer to the tasselled end than to the belt end suggesting that the attached cords may have been designed to secure the cords in position. The extra cord fragment on T-10, however, is nearer to the end with the inserted plied cord. All three attached cords are deeply imbedded into the braided cord, and may have been attached during cord construction. Extra cords do appear to extend past the tassels of one of the Pachacamac belts (Uhle 1991:Plate 19: Figure 3[1903]), and some modern dance slings (eg. Zorn 1980-81: Figure 11) have an extra tassel attached by an extra cord.

Table 23. Braided Cord Features.

Cord	Length	Diameter	L/Tassel	D/Tassel	W/Cover	D/ Cover	Attached Cord
T-1	94.60 cm	2.03 cm	10.73 cm	5.50 cm	1.13 cm	-	no
T-2(A)	91.20 cm	1.30 cm	8.23 cm	4.16 cm	1.00 cm	2.50 cm	no
(B)	91.56 cm	1.46 cm	8.96 cm	4.30 cm	1.20 cm	2.80 cm	no
T-7	112.30 cm	2.00 cm	11.20 cm	9.20 cm	2.00 cm	4.20 cm	no
T-9	78.23 cm	1.97 cm	12.50 cm	6.50 cm	1.47 cm	3.03 cm	yes
T-10(A)	118.50 cm	1.60 cm	10.67 cm	4.90 cm	1.80 cm	2.83 cm	no
(B)	116.73 cm	1.53 cm	11.67 cm	5.00 cm	2.10 cm	2.97 cm	yes
T-27	79.40 cm	2.03 cm	12.07 cm	3.67 cm	1.60 cm	3.47 cm	yes
T-36	80.10 cm	1.63 cm	8.00 cm	4.00 cm	1.23 cm	1.57 cm	no
T-37	80.13 cm	1.50 cm	10.00 cm	-	1.13 cm	-	no
T-38	114.37 cm	1.97 cm	12.00 cm	7.50 cm	1.87 cm	4.06 cm	no
Mean	96.10 cm	1.73 cm	10.55 cm	5.48 cm	1.50 cm	3.05 cm	

L = length; D = diameter; W = width.

All of the Esmeralda cords have identically constructed zigzag designs, and all but two cords (T-2 A and B) are red and gold or appear to have been originally red and gold in colour. Some of these, however, are badly discoloured and original colours are not clearly demonstrated. While zigzag designs appear to be typical of the cords of full sized Inca belts (see eg. A. Rowe 1995-96:Figure 53; Uhle 1991:Plate 19: Figure 2[1903]; Reinhard 1989:73; Beorchia 1985:Unnumbered plates: Mt. Mismi), and of miniatures (eg. Reinhard 1992:89; A. Rowe 1995-96:Figure 35; Beorchia 1985:Unnumbered plates: Cerro Gallán, Cerro Mercedario; Mostny 1957: Figure 10), not all Inca belt cords have zigzag designs (eg. Uhle 1991:Plate 19: Figures 1 and 31[1903]).

Bichrome plied cords were inserted through the folded end of each braided cord. These cord insertions are of two types. Plied cords were inserted into one side of the looped end of each braided cord and pulled through to the other side (eg. Plate 1 c). This technique was used for all but one cord. T-9, however, appears to have a plied cord inserted into the

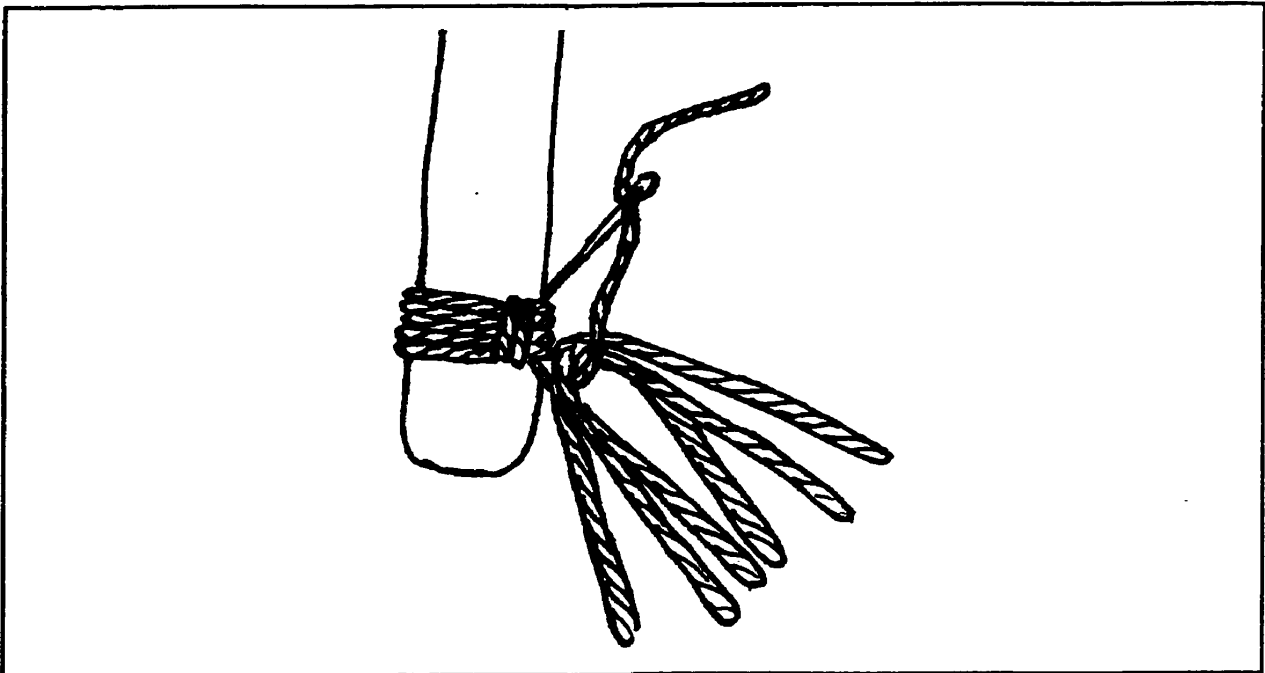


Figure 15. Tassel Construction Method.

folded end, secured around a braid element and then brought back out through the same opening (Plate 1 g). These plied cords appear to have had more than one purpose: to keep the braided cords from unravelling, to secure the braided cords to the belt, and to distribute the pull of the braided cord on the belt. If the plied cord end of the braided cord *was* the starting end, it could have also have been used to wrap the yarns for the braided cord and acted as a kind of handle during the construction process (see eg. Zorn 1980-81:Figure 17).

All Esmeralda braided cords are fully intact with plied cords still in place, and all of the plied cords also appear to have been constructed in the same manner. A bichrome skein was probably constructed by interlacing the two yarn colours at midway points along the skein during the winding process (Figure 17a). This skein would then have been overtwisted and folded, (Figure 17 b, c) then twisted together to form a bichrome skein (Figure 17d).

There is considerable variation in the lengths of these plied cords, although diameters

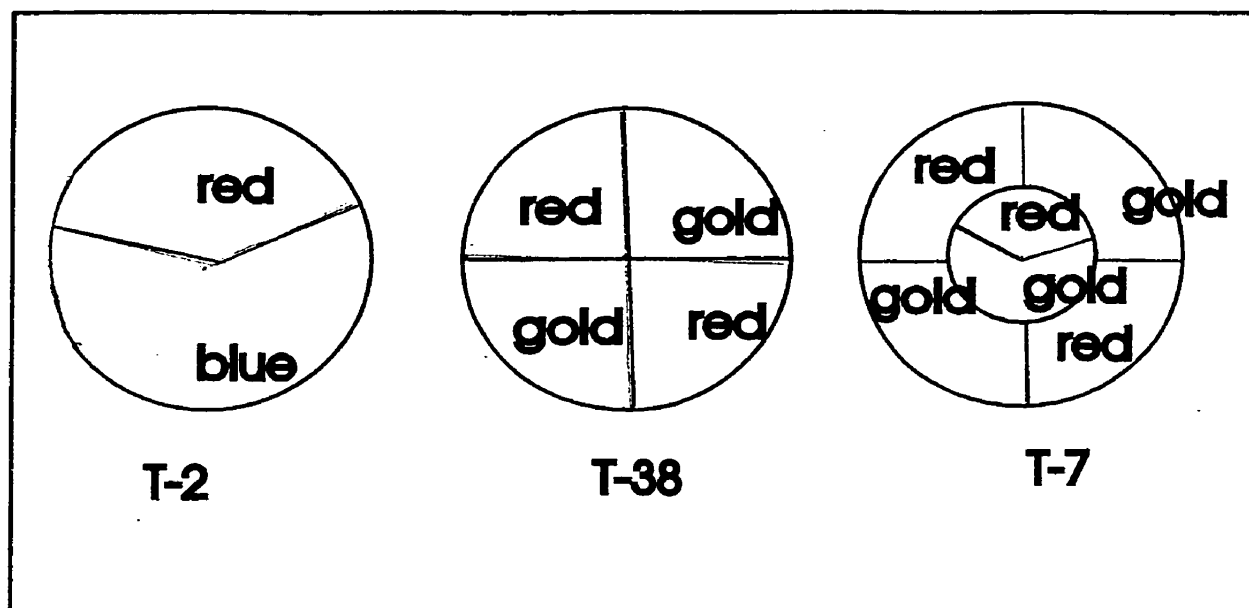


Figure 16. Methods of Incorporating Colour in Tassels.

are relatively consistent (Table 24). All of these cords also appear to have been constructed of the same coloured yarns as the braided cord and tassel (see Munsell Colour Descriptions of individual artifacts, Appendix I).

Each plied cord, attached to a braided cord, appears to have been attached to a belt by sewing with vegetal fibre yarn. Typically, two or more short rows of stitching were sewn on the belt at one side of one end, presumably for anchorage, and the plied cord was then attached by one or more looping stitches through its looped end, followed by more short rows of stitching on the belt to secure it. The other end of the plied cord was presumably attached on the other side in the same manner, and another cord was likewise attached to the other end of the belt (Figure 18).

Similarities in braided cord dimensions (Table 23) suggest that they may have been produced in pairs. The two cords of T-2 are more similar to each other than to other cords in the collection in both colour and structure. The pairs of the two interlocked T-10 cords,

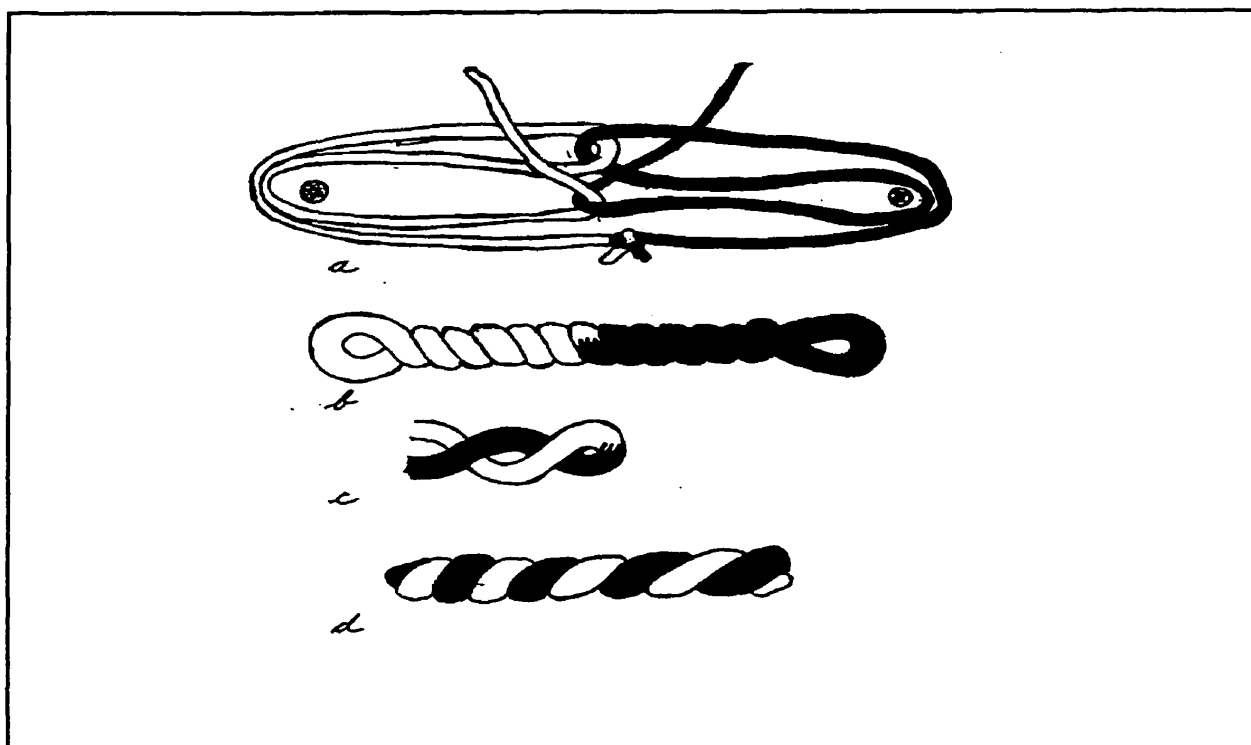


Figure 17. Plied Cord Construction. a = skein formation with interlacement of colours; b = overtwisting of skein; c = folding of overtwisted skein; d = bichrome skein.

T-36 and T-37, T-7 and T-38, T-9 and T-27 also have comparable dimensions, and both T-9 and T-27 have attached cords. A missing artifact may be similar to T-1. The similarities suggest that the paired braided cords were produced by the same individual(s) probably at the same time. The same, however, cannot be said for the plied cords. The dimensions of the plied cords of each pair are variable, suggesting that these artifacts may have been produced at different times, by different individuals, or with different equipment (Table 24). The similarities of the colours of each braided cord, plied cord and tassel, however, suggest that they were constructed of fibre or yarns dyed in the same dye bath. This implies that the production of each set of braided cords, tassels and plied cords (see Figure 18) was by a single person or closely associated persons, as in a household. This collection of braided cords are so alike that either standards of production were maintained, or the cords were produced

Table 24. Plied Cord Features.

Cord	Length	Width
T-1	26.43 cm	0.37 cm
T-2(A)	32.20 cm	0.36 cm
(B)	32.93 cm	0.40 cm
T-7	43.30 cm	0.70 cm
T-9	23.75 cm	0.53 cm
T-10(A)	-	0.50 cm
(B)	-	0.50 cm
T-27	47.87 cm	0.50 cm
T-36	31.17 cm	0.80 cm
T-37	37.33 cm	0.53 cm
T-38	42.53 cm	0.73 cm
Mean	35.28 cm	0.53 cm

by the same group of individuals. The apparent similarity of the cord at Mt. Mismi (Beorchia 1985: Unnumbered plates: Mt. Mismi) and the variations in the cords at Pachacamac (Cahlander 1985: Figures 3-7, 4-5a, and 4-5b; Uhle 1991: Plate 19 Figures 1-5[1903]) suggests that the Esmeralda and Mt. Mismi cords are Imperial Inca in design and those of Pachacamac are Provincial Inca, as are the belts. Variations in colour placements within tassels suggest that this part of the production was completed by different individuals. The presence of an uneven number of braided cords in the Esmeralda collection suggests that at least one other cord may have originally been part of this assemblage.

Yarns

All yarns used in the braided cord composites were constructed of camelid fibre, and the diameters of most fibres are in the 40 μ range. The fibres of the braided cords and tassels, however, are in many cases heavier than those of the other parts of the articles (Table 25) indicating that the producers had different qualities of yarn which they deemed appropriate

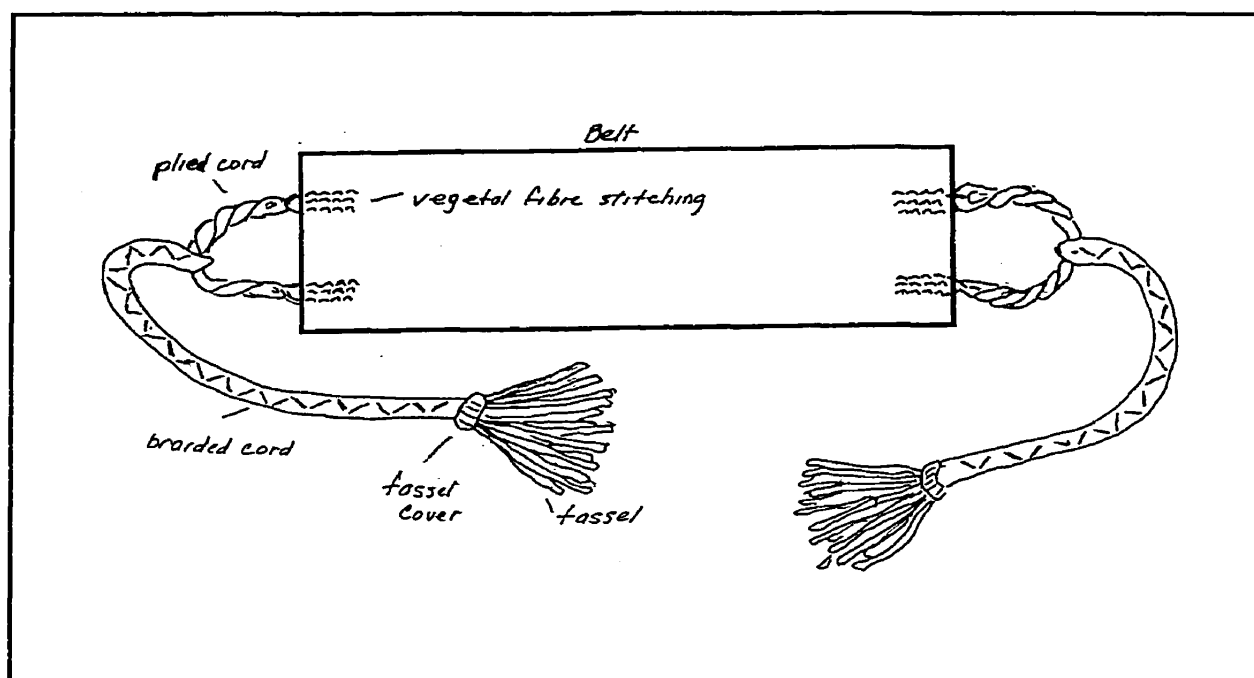


Figure 18. Belt/Cord Configuration.

for specific purposes. As the colours of each cord composite, that is, each braided cord, tassel, and plied cord were identical in most instances (see Munsell colour descriptions of individual artifacts, Appendix I), this appears to have been a conscious effort which would have required prior planning.

Table 25: Cord Yarn Features.

Cord	Element	Ply	Spin	Diameter	Angle/twist	Twists/cm	Fibre	Fibre diameter
T-1 *	1a	-	-	-	-	-	camelid	> 40 μ
	b	-	-	-	-	-	camelid	> 40 μ
	**2a	2	\wedge	1.03 mm	23.83°	-	camelid	40 μ
	b	2	\wedge	0.50 mm	41.33°	-	camelid	40 μ
	***3a	2	\wedge	1.29 mm	29.83°	7.00	camelid	> 40 μ
	b	2	\wedge	1.00 mm	17.50°	3.00	camelid	> 40 μ
	#4	2	\wedge	0.50 mm	31.33°	-	camelid	40 μ
T-2*(A)	3a	2	\wedge	-	-	-	camelid	40 μ
	b	2	\wedge	-	-	-	camelid	40 μ
	*(B) 3a	2	\wedge	-	-	-	camelid	40 μ

Table 25 continued.

b	2	∧	-	-	-	camelid	40μ
** _(A) 4a	2	∧	0.55 mm	40.83°	-	camelid	40μ
b	2	∧	0.63 mm	55.00°	-	camelid	40μ
** _(B) 4a	2	∧	0.55 mm	55.00°	-	camelid	40μ
b	2	∧	0.63 mm	57.67°	-	camelid	40μ
*** _(A) 5a	2	∧	0.35 mm	13.60°	12.00	camelid	40μ
b	2	∧	0.39 mm	8.00°	4.00	camelid	40μ
*** _(B) 5a	2	∧	0.46 mm	13.67°	4.00	camelid	40μ
b	2	∧	1.20 mm	14.00°	3.00	camelid	40μ
# _(A) 6	2	∧	0.50 mm	54.00°	-	camelid	40μ
# _(B) 6	2	∧	0.50 mm	50.83°	-	camelid	40μ
T-7 *1a	-	-	-	-	-	camelid	40μ
b	-	-	-	-	-	camelid	40μ
**2a	2	∧	0.50 mm	41.50°	4.00	camelid	40μ
b	2	∧	0.54 mm	41.80°	-	camelid	40μ
***3a	2	∧	2.59 mm	30.80°	3.00	camelid	40μ
b	2	∧	2.10 mm	25.70°	2.00	camelid	40μ
#4	2	∧	1.00 mm	43.80°	8.00	camelid	40μ
T-9 *1a	-	-	-	-	-	camelid	40μ
b	-	-	-	-	-	camelid	40μ
**2a	2	∧	1.03 mm	39.00°	8.00	camelid	40μ
b	2	∧	0.79 mm	20.83°	9.00	camelid	40μ
##3a	2	∧	0.67 mm	28.67°	8.00	camelid	40μ
b	2	∧	0.67 mm	31.50°	10.00	camelid	40μ
***4a	2	∧	1.88 mm	27.33°	3.50	camelid	40μ
b	2	∧	1.88 mm	27.33°	-	camelid	40μ
# 5	2	∧	0.96 mm	32.60°	6.00	camelid	40μ
T10* _(A) 1a	-	-	-	-	-	camelid	40μ
b	-	-	-	-	-	camelid	40μ
* _(B) 1a	-	-	-	-	-	camelid	40μ
b	-	-	-	-	-	camelid	40μ
** _(A) 2a	-	-	-	-	-	camelid	40μ
b	-	-	-	-	-	camelid	40μ
** _(B) 2a	-	-	-	-	-	camelid	40μ
b	-	-	-	-	-	camelid	40μ
## 3	2	∧	0.92 mm	-	-	camelid	40μ
*** _(A) 4	2	∧	1.29 mm	23.67°	6.00	camelid	40μ
*** _(B) 4	2	∧	1.30 mm	21.80°	3.00	camelid	40μ
# _(A) 5	2	∧	0.37 mm	43.50°	16.00	camelid	40μ
# _(B) 5	2	∧	0.33 mm	44.17°	18.00	camelid	40μ
*T-27 3	-	-	-	-	-	camelid	40μ
***4	2	∧	1.00 mm	25.67°	3.00	camelid	40μ

Table 25 continued.

**5	2	∧	0.56 mm	36.67°	10.00	camelid	40μ
# 6	2	∧	0.54 mm	35.00°	8.00	camelid	40μ
##8	2	∧	0.63 mm	36.67°	8.00	camelid	40μ
T-36* 1a	-	-	-	-	-	camelid	>40μ
b	-	-	-	-	-	camelid	>40μ
**2a	2	∧	1.04 mm	17.50°	6.00	camelid	40μ
b	2	∧	1.00 mm	20.00°	8.00	camelid	40μ
***3	2	∧	2.42 mm	25.83°	3.00	camelid	>40μ
# 4	2	∧	1.12 mm	34.00°	9.00	camelid	40μ
T-37 *1a	-	-	-	-	-	camelid	40μ
b	-	-	-	-	-	camelid	40μ
**2a	2	∧	0.96 mm	25.67°	4.00	camelid	40μ
b	2	∧	0.92 mm	24.83°	7.00	camelid	40μ
***3a	2	∧	2.33 mm	31.83°	3.00	camelid	40μ
b	2	∧	2.54 mm	20.50°	3.00	camelid	40μ
# 4	2	∧	0.79 mm	45.67°	14.00	camelid	40μ
T-38 *1a	-	-	-	-	-	camelid	>40μ
b	-	-	-	-	-	camelid	>40μ
**2a	2	∧	0.50 mm	40.67°	12.00	camelid	40μ
b	2	∧	0.58 mm	41.83°	8.00	camelid	40μ
***3a	2	∧	1.83 mm	35.00°	2.00	camelid	>40μ
b	2	∧	2.00 mm	27.33°	2.00	camelid	>40μ
# 4	2	∧	0.92 mm	42.67°	7.00	camelid	40μ

* = braided cord; ** = plied cord; *** =tassel; # =tassel cover; ## =attached cord.

Yarn features are irregular, although all available yarns appear to be of 2-ply Z-spun S-plyed construction (yarns of braided cords were unavailable for assessment). The yarn diameters, angles of twist, and twists per cm of the plied cords, tassels and tassel covers vary considerably (Table 25), suggesting that different individuals produced at least parts of each article, and also that standards of yarn production were not in evidence.

Discussion

The eleven braided cords in this collection are almost identical in construction. They were produced with the same techniques, and all appear to have zigzag patterning. Similarities in braided cord dimensions suggest that they may have been produced in pairs. Production

and assemblage of added features is also comparable; similarly constructed bichrome plied cords were inserted into the terminal end of each braided cord and the tassels, which were also similarly constructed, were attached to each folded end. Also (see belts) each plied cord, which was attached to a braided cord, appears to also have been attached to a belt by sewing with vegetal fibre yarn. The similarities indicate that production of these artifacts was either closely monitored, or they were produced by the same group of individuals, such as a household or *ayllu*. In any event, local or state standards of production are indicated.

Other technical aspects point to the individuals that produced them. Colours were arranged around tassels in several ways, and the resourcefulness of some tassel-makers allowed them to use slightly less than 50% of the red yarns than is outwardly apparent. One plied cord was inserted in a slightly different manner than were the others; and attached cords are present on some of the belts, either for extra stabilization or as decorative features, perhaps for the attachment of shells or beads.

Several cords were apparently placed under the adult body in the tomb, and as several cords are stained, it is probable that the stained cords were used for this purpose. T-10 (a and b) could be the intertwined cords that Checurea (1977:136) describes as placed around the head; T-9 is also heavily stained but is paired with T-27 which is thought to have been worn by the adult, but both T-7 and T-38 exhibit some staining so may be the artifacts placed under the waist and feet within the tomb.

Feathered Artifacts

The three feathered artifacts in the Esmeralda collection include remnants of a headdress embellished with white feathers, a fringed shawl covered with green feathers thought to be the back panel of the headdress, and a small bag of coca, also covered with

green feathers (see Bags this chapter, and Appendix I:T-44 for discussion of this article). Apparently one other coca bundle with red feathers was also recovered with the Esmeralda artifacts (Beorchia 1985:83; Checura 1977:137).

Feathered cloth was highly valued by Andean societies long before the Inca (see eg. Reid 1986; A. Rowe 1984), and although few artifacts remain, it was also an important decorative feature of Inca ceremonial dress. Cobo (1990:225-226[1653]) describes feathers applied to *cumbi* cloth that was very highly prized, and also reports feathered *pilcocatas* or diadems and other feathered ornaments worn by Inca males (1990:187[1653]), although Holquín does not record the term *pilcocata*. Ceremonial featherwork is still well utilized in Amazonia (eg. Braun 1995).

Headdress

The Esmeralda headdress consists of a cone-shaped looped cap that appears to have once been covered with small white feathers and a cordage ridge into which long white feathers were inserted (see Appendix 1:T46; Plate 5 f, g, h, i.). This ridge of long feathers presumably would have formed a crescent shaped crown similar to the headdress from Lullailaco (Plate 5 j), framing the wearer's head with feathered rays.

Chroniclers did not portray Inca women wearing feathered headdresses; Inca women are usually depicted wearing headbands or *winchas* (eg. Guaman Poma 1980: Figures 173, 215, 217, 219, 221, and 223[1615]; Cobo 1990:188[1653]), and a number of these artifacts were found in the graves of the sacrificed women at Pachacamac (eg. Uhle 1991:Plate 19: Figure 9[1903]; A. Rowe 1995-96: Figure 37). Cobo (1990:188[1653]) also describes the use of another type of head covering: "For their headdress, they wear a piece of rich *cumbi* cloth called *pampacona*, and they do not wear it spread out; they fold it up three or four times in

such a way that it is about one half *tercia* wide. They let one edge drop down over the forehead, and the rest passes on over the head, leaving the other end hanging down the back and the hair uncovered on the sides".

These small cloths are more frequently referred to as *ñañacas*, and were most probably only worn by Inca noble women (A. Rowe 1995-96:24; Guaman Poma 1980: Figures 122-138 and 264[1615]; Pardo 1976:Plate following page 106). Two small "mantles" originally with this collection (see Appendices IV and V) may have been designed for this purpose, and if so it is most unfortunate as *ñañacas* from archaeological settings have not yet been described in detail (A. Rowe 1995-96:24). Feathered headdresses such as the one described here, are also rare, and may only be represented in the archaeological record in ritual settings. These headdresses are associated with females in other mountaintop Inca sacrifice settings, such as with the second mummy from Ampato (Conklin 1996:104; Reinhard 1996:73), and on one mummy from Lullaillo (Plate 5 j). Headdresses on miniatures, however, are more frequently represented, for example, from Lullaillo (Reinhard 1999:53), Copiapó (Reinhard 1992:88-89) Ampato (Reinhard 1996:73), El Plomo (J. Rowe 1996:303; Beorchia (Unnumbered plates: Cerro Gallán, and Cerro las Tórtolas; and Tucumé, a site in northern Peru, (Heyerdahl et al. 1995:109). Others are without provenience (eg. A. Rowe 1995-96: Figure 35).

The Esmeralda headdress appears to have been constructed in a similar, if not identical manner as those from Ampato and Lullaillo. The Ampato headdress was formed by stitching rows of small feathers onto a pre-made cap and inserting large upright feathers into a length of thick cordage that was sewn to the cap (Conklin 1996:104-105). This appears to resemble the construction technique of the Esmeralda headdress (see description, Appendix I:T-47), and the shape of the Lullaillo headdress (Plate 5 j) suggesting that it was also

fabricated in this manner.

Crescent-shaped headdresses are known to have been a north coast tradition (eg. A. Rowe 1984b:121; Heyerdahl et al. 1995:110), and it has been postulated (eg. Conklin 1996:107) that the feather headdresses found in Inca burials may have been adapted from Chimú traditions. Preserved north coast headdresses with back panels (eg. A. Rowe 1984b: Figures 191, 194-197) from the Colonial Period, and earlier crescent-shaped Chimú headdresses representations on knives and textiles (eg. A. Rowe 1984b: Figures 8, 106, 109-115, 117, 119, 128, 130, and Plates 18 and 19) however, differ from the Inca headdresses discussed here, and it seems equally plausible that the style originated in northern Chile. Feathers were used with turbans in northern Chile during the Early Period Faldas del Morro phase (eg. Cañas and Luksic 1993: Photo 2), on a cone-shaped diadem during the Late Intermediate Period (Cañas and Luksic 1993: Photo 14), topping a fez-like cap during the Late Horizon (Cañas and Luksic 1993: Photo 19), and crescent-shaped headdresses were also noted as early as the late Chinchorro Period, (Rivera et al. 1974: 83), and in later periods by such groups as the Diaguites (eg. Thompson 1936:75). A feathered *gorro* or headdress that was found with the sacrificed Inca male on Cerro El Toro (Schobinger 1966:104-107) is also similar in shape to a headdress from the Chinchorro Period (Rivera et al 1974: 82), though the Chinchorro headdress does not have a back panel and, as A. Rowe (personal communication 2001) notes, the time frame may be too chronologically distant for relevant association.

A significant clue to the origin of the headdress style may be in the shape of the cap. Cobo (1990:200-201[1653]) notes that: "The Collas made their heads long and pointed... and they did this because they wore wool caps called *chucos*, like a mortar or a hat with no brim. These caps were very tall and pointed. To make sure the cap would fit better, they moulded

the head to the shape of the headgear rather than making the headgear of the same size as the head". Cone-shaped hats similar in shape to that of the Esmeralda headdress are still found in southern highland areas (eg Schevill 1997:Figures 69 and 140; LeCount 1993:Figures 3.1 and 3.6-3.15) and are now produced and worn by both Aymara and Quechua speaking peoples. Although the *chucos* were worn by Colla men (Rostworowski 1999:225), the early alliance between the Inca and the Colla (Rostworowski 1999:68) may have influenced the style of these artifacts.

Back Panel

The largest feathered item in this collection is a rectangular shawl covered on one side with the remnants of rows of green feathers, and with applied fringes on one narrow end (see Appendix I:T-26 for complete description). Checura (1977:139) describes this piece as a dorsal stole that was sewn to the "royal mantel" at the base of the neck, and was worn extending to mid-thigh. There is no evidence of sewing on the hem of this article though two areas along the top of the hem are broken, suggesting that a cord or stitching may once have been present. Close examination of a photo of the Tucumé miniature back panel (Heyerdahl et al. 1995: Figure 82), suggests that this artifact may also have been separate from the headdress and attached to the *lliclla* as Checura describes. Others appear to have been attached directly to the headdress (eg. A. Rowe 1995-96 Figure 35). It is clear, however, from Checura's description, that the article was worn from the base of the neck and extending down the back. It is assumed that this artifact was once a part of the headdress ensemble, and because the term has previously been employed in reference to the extended panels of other headdresses (A. Rowe 1984b:180), the term "back panel" is used to describe this artifact.

The full-sized headdresses from Llullaillaco (Plate 5 j) and Ampato (Conklin

1996:104-110; Reinhard 1996:73) are not depicted with back panels. Headdresses on figurines, however, have frequently been found with back panels, (see eg. Reinhard 1992:89, 1999:53; Conklin 1996:107; A. Rowe 1995-96:Figure 35; Mostny 1957:49; Heyerdahl et al. 1995:Figures 81 and 82; Beorchia 1985:Unnumbered plates: Cerro Las Tórtolas, Cerro Gallán).

The colours of this back panel do not match those of the headdress. Both the woven panel and fringes of the Esmeralda back panel were constructed of camel-coloured yarns, and the feathers are green, while both the background and feathers of the headdress are white. While all of the figurines appear to have either matching white or red feathers on both headdress and back panel, the colours of the woven backgrounds appear to vary. The Copiapó figurine (Reinhard 1992:89), for example, has a woven background that is camel-coloured with red fringes; the Llullailaco figurine (Reinhard 1999:53) appears to have a dark brown background; and the second Ampato figurine has a white background with blue fringes (Conklin 1996:107). Others illustrated in black and white photos (eg A. Rowe 1995-96: Figure 35; Beorchia 1985:Unnumbered plates: Cerro Gallán) indicate that fringes were of different colours than the woven panels. This suggests that the most usual headdress/backpanel configuration (of figurines) emphasizes the same colour of feathers on both headdress and back panel, but that the woven background colour/s are either less important, or possibly locally determined. It is also possible that the coloured fringes were of some significance. There is not enough evidence, however, to suggest similar criteria for full sized artifacts.

Feathers

In the Andes, feathers were applied to fabrics in a number of ways (see eg Harcourt

1962: Figure 96; A. Rowe 1984b:154; Mostny 1957: Figure 12; Panizo 1990:8). Feathers were applied to the artifacts in this collection using four methods: In the first of these, feathers were pre-strung by folding each feather over a length of yarn then securing with another length of yarn (similar to Figure 19a). These strings of feathers were then sewn in rows to the fabric. This method was used to secure feathers to the small bag and the back panel (Plate 5 a, b, d, e). In the second method, finer feathers were strung simply by tying cotton yarn around individual feathers near their proximal ends at specific intervals without first folding them over another length of yarn, and the feathered strings were then attached to a fabric. This method was used to secure extra feathers between the sewn rows of feathers of the back panel (Plate 5 b). Strings of feathers were secured at each selvedge between rows of sewn feathers and anchored at a single point on a sewn feather row near the centre of the panel, and the strings would have hung loose (Plate 5 b near bottom of photo). In the third method, fine feathers were also strung in the manner just described, but several feathers (approximately three) were placed together within each tie, and the string of feathers was then securely sewn to the surface of the fabric in overlapping rows. This method was used to secure feathers over most of the surface of the headdress (Plate 5 f), probably producing an overall effect resembling the Lulluillaco headdress (Plate 5 j). The fourth method of applying feathers applies to large erect feathers which were first individually well-bound, and inserted into the fabric. This method was used to secure the large feathers to the headdress, and was implemented by inserting them into the thick cordage extending over the cap, possibly by using a method similar to Figure 19b (see also Plate 5 i), and these large feathers do not appear to have been pre-strung.

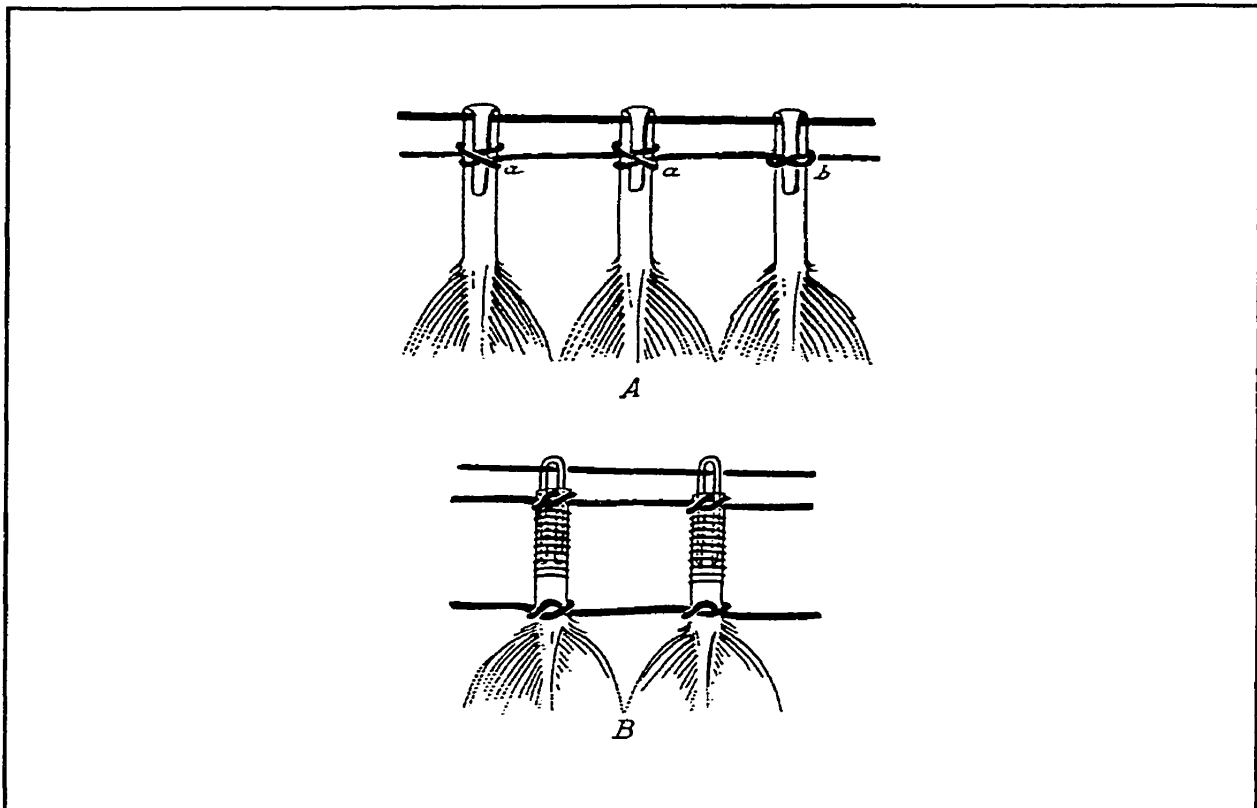


Figure 19. Methods of stringing feathers. Adapted from Harcourt 1962:132.

Both the small bag and the back panel were woven utilizing a warp-faced plain weave construction, and the headdress cap was constructed using single element looping. The artifacts are structurally different (Table 26), but all were constructed of camelid fibre, though yarn diameters are generally too thick to be considered elements of *cumbi* cloth.

Feathers of all artifacts were secured with cotton yarns (Table 27). Camelid yarns (other than cordage) are all 2-ply yarns spun Z and plied S but the cotton yarns are of variable construction (Table 27). In the Late Intermediate Period, cotton at the Chimú capitol of Chan Chan was spun in an S direction (Topic 1977:95), which may suggest a north coast origin of some of the cotton yarns, but the variability in the direction of twist suggests that different sources were utilized. The exclusive use of cotton yarns for feather attachment, however,

Table 26. Structural Dimensions of Feathered Artifacts.

Artifact	Warps/cm	Wefts/cm	Stitches/cm
T-26 back panel	33.33	6.33	-
T-44 bag	19.00	4.00	-
T-46 headdress	-	-	2.34

suggests that this was a standard to which all three producers adhered. It is possible that the feathers were imported in a pre-strung state, but because the strings were also sewn to the artifacts with cotton yarns (possibly also imported), this cannot be securely implied without further investigation.

Table 27. Yarn Features of Feathered Artifacts.

Artifact	Element	Ply	Spin	Diameter	Angle/twist	Twists/cm	Fibre	Fibre Diameter
T-26	1	2	Λ	0.79 mm	38.67°	12	camelid	40μ range
	3	2	Λ	0.50 mm	26.33°	-	camelid	40μ range
	4	2	Λ, V	0.88 mm	36.33°	10	cotton	-
	5	2, 1	V, Λ, \	0.46 mm	46.75°	1	cotton	-
	6	2	Λ	-	-	-	camelid	40μ range
	7	2	Λ	0.95 mm	35.50°	18	camelid	40μ range
	T-44	1	2	Λ	1.08 mm	53.00°	10	camelid
2		2	Λ	1.42 mm	43.00°	6	camelid	>40μ
3		2	Λ	-	-	-	camelid	>40μ
4		2	Λ	1.08 mm	44.00°	10	cotton	-
T-46	1	2	Λ	4.00 mm	-	-	camelid	>40μ
	2	3	Λ	1.75 mm	44.00°	5	camelid	>40μ
	3	2	Λ	0.75 mm	35.00°	12	cotton	-
	4	-	-	-	-	-	vegetal	-
	5	5-6	ΛΛ	-	-	-	camelid	>40μ
	6	-	-	-	-	-	camelid	>40μ

Bags

There are ten bags in the Esmeralda collection (Plate 4 a, b, c). Bags are ubiquitous in the Andes and were in use in northern Chile from at least as early as the Initial Period (see eg. Bird 1943:Figures 9 and 14; Dauelsberg 1974:Foto 34; Rivera 1977:34-44). Guaman Poma (eg. 1980:67, 104, 114, 116, 152[1615]) portrays both Inca men and women with bags and while there are no obvious differences between them, the bags used by men were usually referred to as *chuspas*, while those used by women were most often termed *ystallas* (A. Rowe 1995-96:30). Miniature bags found in sacrifice settings, sometimes referred to as "chuspitas", however, are only known to be associated with male figurines (see eg. A. Rowe 1995-96:30-31, Figures 40 and 41; Beorchia 1985:Unnumbered plates: Mt. Pili, Cerro Gallán). No miniature bags were found with the Esmeralda assemblage.

Esmeralda Bags

While the Esmeralda bags are all rectangular, there is no evidence that ideal standards of shape and size were in use. The finished bags are all longer than they are wide, but the length/width ratios of the eight complete bags range between 1.10 -1.80 (Table 28), which is a fairly significant variance. The surface areas (one surface) of the bags also vary; ranging from 153.92 cm²-890.28 cm² in size. Elements attached for carrying and closure also differ: four bags exhibit remnants of plied cordage straps, but there is no evidence that straps or cords of any kind had ever been attached to six of the bags. Some bags have been sewn closed, some were tied closed, and others appear to have been left open (Table 28). Most bags contain either coca or vegetal materials, and one bag shows no signs of use (Table 29).

Nine bags were produced by weaving and one was weft-twined (Table 29). The woven bags all appear to be warp-faced, and each was woven as a single artifact; heading

Table 28. Bag Features.

Bag	Length	Width	L/W Ratio	Area*	Straps	Closure
T-16	36.00 cm	24.73 cm	01.46	890.28 cm ²	no	none
T-17	31.00 cm	20.00 cm**	-	620.00 cm ²	plied cord	none
T-18	23.50 cm	16.83 cm**	-	395.51 cm ²	plied cord	none
T-19	23.50 cm	19.50 cm	01.21	458.25 cm ²	? plied cord	?tie
T-20	21.56 cm	12.00 cm	01.80	258.72 cm ²	no	?tie
T-21	20.46 cm	18.60 cm	01.10	380.56 cm ²	no	cord tie
T-22	22.77 cm	19.95 cm	01.14	454.26 cm ²	no	cord tie
T-28	23.20 cm	17.03 cm	01.36	395.10 cm ²	no	sewn
T-31	32.16 cm	22.27 cm	01.44	716.20 cm ²	no	none
T-44	15.50 cm	9.93 cm	01.56	153.92 cm ²	plied cord	sewn

* = single surface ** = incomplete

ords at the top edges indicate warp direction and also that only a single item per warp was woven. Woven bags were constructed by doubling the completed length of cloth in the direction of the warp, and then stitching the weft selvages together. The twined bag appears to have been constructed tubular fashion as no side seams are evident, and presumably the bottom seam was then sewn closed to complete the construction process. The bottom selvages of this bag, however, have been embroidered so are not readily available for evaluation.

Various methods of adornment were employed. Three of the bags were constructed of dyed yarns and the rest were produced using natural coloured yarns, some with attached features (Table 30). Seven bags have had decorative attributes incorporated structurally in the form of warp stripes and/or pattern stripes, one has embroidered stitching, and two have details that were added after bags were completed (Table 30). There appear to be three general categories of features: 1) natural coloured stripes; 2) patterned stripes in dyed colours; and 3) added attributes (Tables 29 and 30). The features of categories one and two are structurally incorporated, while the attributes of category three have been added to the

Table 29. Bag Structure and Contents.

Bag	Shape	Construction	Colours	Embellishment	Contents
T-16	rectangular	twined	natural	attached	seeds
T-17	rectangular	woven	natural	structural	?soil
T-18	rectangular	woven	natural	structural	seeds
T-19	rectangular	woven	natural	structural	?peppers
T-20	rectangular	woven	dyed	structural	coca
T-21	rectangular	woven	dyed	structural	coca
T-22	rectangular	woven	dyed	structural	coca
T-28	rectangular	woven	natural+	attached	coca
T-31	rectangular	woven	natural	structural	none evident
T-44	rectangular	woven	natural+	attached	coca

finished products. The four bags of category one (Plate 4 c, f, g, s) and the three bags of category two (Plate 4 j, k, l) all have an irregular number of stripe elements, and in all but one artifact (Plate 4 f) the stripes appear to be arranged symmetrically. Bag T-18, however, has brown stripes placed across the warp in an irregular fashion, suggesting juvenile construction. The three bags of category three are all different; one has had feathers applied to the exterior surface (Plate 5 d); one has been enclosed in fibres and grasses (Plate 4 p), and the third has decorative stitching (Plate 4 a). The three bags, however, all appear to have been completed prior to embellishment.

Different elements also appear on seam edgings. In some instances the side edge stitching of bags is decorative and with others it is mostly functional. In most cases the top edges have been reinforced, and one bag (Plate 4 b) has an additional cord that has been carefully looped into the top edge finish. Some bags, however, have unfinished top edges (Table 30). Edges have been finished in a number of ways; the side edges of four bags were finished with decorative figure-eight stitching (eg. Plate 4 d, f, g, and r), two were sewn and three have been finished with cross-knit loop stitching (Table 30). Top edges also vary; five bags have overcast edges, two are bound with cross-knit loop stitching, and the edges of

three bags have been left unfinished.

Three of the five natural coloured bags are similar (Tables 30 and 31). T-17, T-31 (almost identical), and T-19 each have three double dark brown stripes on a light coloured background. One bag has irregularly placed stripes, and the other natural coloured bag, though weft-twined and without stripes, has dark brown trim which conforms with the colour combinations of the others. All but one of these bags contain material other than coca, and the fifth artifact exhibits no evidence of use. The three patterned bags are also similar. T-20 has three stripes of continuous zigzag-and-dot designs; T-21 and T-22 have design stripes in herringbone and diamond patterns, and all three have edges trimmed with cross-knit looped stitching. All three contain coca, as do the feathered bag and grass covered bag.

Structurally, the woven bags vary considerably in warp sett (Table 32); weavers arranged warps between 19-50 warps/cm, a considerable variance, with a mean of approximately 35.70 warps/cm. There is also considerable variation in the warp setts within individual artifacts, differences ranging between 2 warps/cm (T-44) to 22 warps/cm (T-19). Wefts of the nine woven bags, however, appear to be more regular, with wefts/cm ranging between 4.00 - 9.5 wefts/cm, with a mean of 6.49 wefts/cm (Table 32). There is also a very narrow range of difference of the wefts/cm within individual artifacts, which fluctuate only between 0-2 wefts/cm (see individual artifact descriptions Appendix I).

There is, however, a general consistency in almost all aspects of yarn construction (Table 33). Almost all yarns are constructed of camelid fibre, with the single exception being cotton yarns employed for feather attachment. Most fibres are approximately 40μ in diameter or finer. Almost all yarns are of 2-ply construction, the few exceptions occurring only in cordage, and all yarns are Z-spun and S-plied. Cordage has been re-plied in a Z direction.

Table 30. Decorative Features of Bags.

Bag	Features	Colours	No. of Stripes	Side Edges	Top Edges
T-16	embroidered	natural light/brown	none	embroidered	overcast extra cordage
T-17	warp stripes	natural light/brown	3*	fig. 8 looping (decorative)	overcast
T-18	warp stripes	natural light/brown	5	fig. 8 looping (decorative)	overcast
T-19	warp stripes	natural light/brown	3*	fig. 8 looping (decorative)	overcast
T-20	pattern stripes	maroon base red/gold green/gold	2 1	double cross- knit- looping	double cross- knit-looping
T-21	pattern stripes	dark brown base maroon/black/gold maroon/red/brown	4 3	cross-knit- looping	overcast
T-22	pattern stripes	dark brown base red/beige/white/black red/gold	5 4	?4-sided cross- knit-looping	?4-sided cross- knit-looping
T-28	grass covering	light base	none	sewn	unfinished
T-31	warp stripes	light base/ brown	3*	fig. 8 looping (decorative)	unfinished
T-44	feathers	light brown base	none	sewn	unfinished

* = doubled stripes

There is a wide range of yarn diameters, and of consistency in spinning (Table 34). Approximately 67% of all yarns, however, are in the 0.50-1.00 mm diameter range. The yarns of the twined bag are all quite coarse, but are fairly consistently spun. Some yarns are quite irregular, but others yarns are very fine and expertly spun with consistent diameters in all measurements.

Table 31. Bag Colour Features.

Bag	Warp	Weft	Edge	Top Edge	Straps/Ties
T-16	natural	natural	dark brown	dark brown	dark brown
T-17	natural dark brown	natural	dark brown	natural	natural
T-18	natural light brown	camel/natural	dark brown	dark brown	camel/dark brown
T-19	natural dark brown	natural	dark brown	natural	-
T-20	maroon gold red green	brown	red	red	-
T-21	dark brown maroon white gold	brown	red gold beige brown	dark brown	red/gold
T-22	black red brown white gold beige	brown	red	red	red/gold
T-28	natural	natural		-	-
Y-31	natural dark brown	natural	dark brown	-	-
T-44	natural	natural	natural	-	-

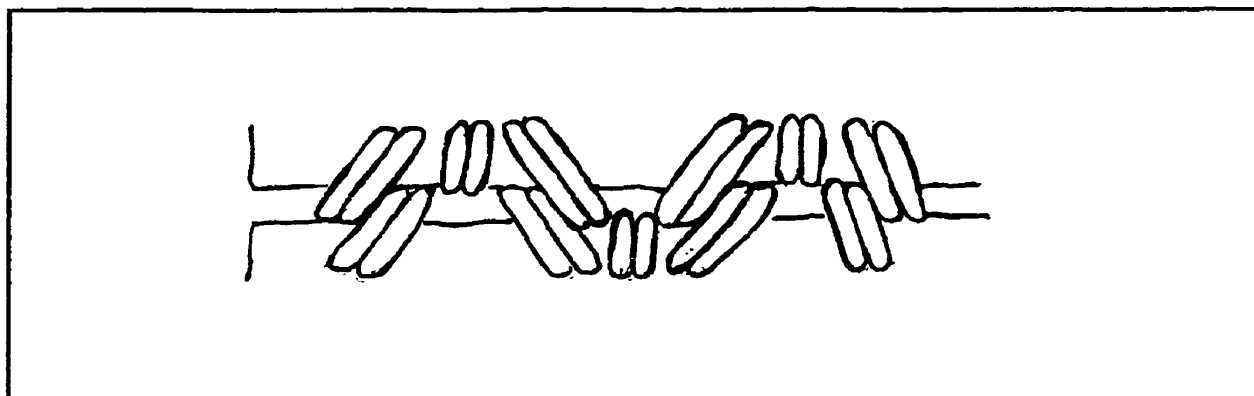


Figure 20. Two thread edge treatment of bags.

Table 32. Structural Elements of Bags.

Bag	Structure	Warps/cm	Range	Wefts/cm	Range
T-16	twined	4.00	4.00	5.50*	5-6
T-17	woven	38.33	36-42	5.92	5-7
T-18	woven	26.33	24-28	6.00	6
T-19	woven	38.33	26-48	6.83	6-8
T-20	woven	46.33	40-56	7.00	6-8
T-21	woven	42.67	40-48	9.50	9-10
T-22	woven	50.00	48-52	9.00	8-10
T-28	woven	31.33	28-36	4.67	4-5
T-31	woven	29.00	24-36	5.50	5-6
T-44	woven	19.00	18-20	4.00	4
Mean		35.70	9.10	6.49	1.33

* = twists/cm

Table 33. Yarn Features of Bags.

Bag	Element	Ply	Spin	Diameter	Angle/twist	Twists/cm	Fibre	Fibre diameter
T-16	1	2	Λ	2.00 mm	40.83°	6	camelid	< 110μ
	2	2	Λ	1.58 mm	-	-	camelid	< 110μ
	3	2	Λ	1.50 mm	-	2	camelid	40μ range
	4	2	Λ	2.25 mm	-	-	camelid	40μ range
	5	3	∨	2.83 mm	-	-	camelid	40μ range
T-17	1a	2	Λ	0.40 mm	35.67°	14	camelid	40μ range
	b	2	Λ	0.40 mm	35.00°	14	camelid	40μ range
	2	2	Λ	0.83 mm	33.83°	11	camelid	40μ range
	3	2	Λ	0.43 mm	35.00°	-	camelid	40μ range
	4	2	Λ	0.43 mm	34.00°	10	camelid	40μ range
T-18	5	2	Λ	4.25 mm	10.67°	2	camelid	<110μ
	1a	2	Λ	0.71 mm	42.16°	25	camelid	> 40μ
	b	2	Λ	0.92 mm	44.50°	7	camelid	> 40μ
	2	2	Λ	1.04 mm	39.50°	8	camelid	> 40μ
	3	2	Λ	1.00 mm	45.67°	-	camelid	40μ range
	4	2	Λ	0.63 mm	-	-	camelid	40μ range
	5a	2/3	∨	1.00 mm	40.00°	-	camelid	40μ range
b	2	∨	-	51.00°	-	camelid	40μ range	
T-19	1a	2	Λ	0.75 mm	36.83°	23	camelid	> 40μ
	b	2	Λ	0.83 mm	39.50°	19	camelid	> 40μ

Table 33 continued.

	2	2	∧	1.13 mm	42.60°	7	camelid	> 40 μ
	3	2	∧	0.88 mm	44.50°	-	camelid	40 μ range
	4	2	∧	0.54 mm	50.33°	-	camelid	40 μ range
T-20	1a	2	∧	0.50 mm	43.50°	16	camelid	40 μ range
	b	2	∧	0.75 mm	35.67°	14	camelid	40 μ range
	c	2	∧	0.71 mm	35.50°	12	camelid	40 μ range
	d	2	∧	0.92 mm	41.67°	13	camelid	40 μ range
	2	2	∧	0.25 mm	27.00°	22	camelid	40 μ range
	3	2	∧	0.63 mm	38.16°	10	camelid	40 μ range
T-21	1a	2	∧	0.50 mm	39.67°	18	camelid	40 μ range
	b	2	∧	0.43 mm	40.67°	24	camelid	40 μ range
	c	2	∧	0.30 mm	40.00°	20	camelid	40 μ range
	d	2	∧	0.63 mm	46.00°	8	camelid	40 μ range
	2	2	∧	0.32 mm	-	25	camelid	40 μ range
	3	2	∧	0.50 mm	39.83°	11	camelid	40 μ range
	4	2	∧	0.47 mm	40.67°	-	camelid	40 μ range
T-22	1a	2	∧	0.50 mm	47.17°	24	camelid	40 μ range
	b	2	∧	0.50 mm	45.00°	18	camelid	40 μ range
	c	2	∧	0.40 mm	49.83°	-	camelid	40 μ range
	d	2	∧	0.40 mm	44.16°	22	camelid	40 μ range
	e	2	∧	0.83 mm	44.00°	-	camelid	40 μ range
	f	2	∧	0.50 mm	45.00°	-	camelid	40 μ range
	2	2	∧	0.30 mm	-	22	camelid	40 μ range
	3	2	∧	-	-	-	camelid	40 μ range
	4	2	∧	-	-	-	camelid	40 μ range
T-28	1	2	∧	0.71 mm	43.50°	8	camelid	40 μ range
	2	2	∧	1.00 mm	-	-	camelid	-
T-31	1a	2	∧	0.47 mm	37.83°	15	camelid	40 μ range
	b	2	∧	0.36 mm	37.33°	10	camelid	40 μ range
	2	2	∧	0.88 mm	43.50°	12	camelid	40 μ range
	3	2	∧	0.40 mm	41.16°	-	camelid	40 μ range
T-44	1	2	∧	1.08 mm	53.00°	10	camelid	>40 μ
	2	2	∧	1.42 mm	43.00°	6	camelid	>40 μ
	3	2	∧	-	-	-	camelid	>40 μ
	4	2	∧	1.08 mm	44.00°	10	cotton	-

There is no indication, however, that yarn diameters for bags were subject to either local or state requirements, as frequently a variety of diameters and expertise are demonstrated within the same artifact (see individual artifact descriptions, Appendix I). There is also a wide range

in angles of twist (Table 35). Approximately 83% are, however, within the 30-49° degree range. Testing twists per cm was somewhat unsatisfactory as this was done off-site and only a few yarns were available for measurement. Results, therefore may not be truly representative (Table 36).

Table 34. Bag Yarn Diameter Measurements.

Bag	0.25 mm	0.30 mm	0.50 mm	0.75 mm	1.00 mm	1.25 mm	1.50+mm	Total
T-16							30	30
T-17		10	16		4		6	36
T-18			4	12	19	1		36
T-19			6	12	9	3		30
T-20	6		13	10	7			36
T-21	2	13	24	2	1			42
T-22	3	8	25	4	2			42
T-28			1	2	9			12
T-31		9	11		3	1		24
T-44					9	5	4	18
Total	11	40	100	42	63	10	40	306

Table 35. Bag Angle of Twist Measurements.

Bag	10-19	20-29	30-39	40-49	50-59	60-69	Total
T-16			3	3			6
T-17	3		30				33
T-18		1	4	19	2	1	27
T-19	1	7	15	7			30
T-20		5	16	13	2		36
T-21		2	9	21	4		36
T-22				29	7		36
T-28				2			2
Y-31			10	14			24
T-44			1	2	6		9
Total	4	15	88	110	21	1	239

Inca Bags

Features of Inca bags include traditional edge treatments, zigzag-and-dot stripe designs, and warp faced or double-woven straps (A. Rowe 1995-96:30, Figures 5 and 47; Cahlander 1985:Plate 10). Some Inca style bags have traditional edge treatments, but do not have zigzag-and-dot stripe designs, (eg. A. Rowe 1995-96: Figures 6 and 47; Royal Ontario Museum piece 931.12.20; Cahlander 1985: Figures 4.1-4.3), or double-woven straps (eg. A. Rowe 1995-96: Figures 4, 6, and 48). Tapestry woven bags are uncommon but do occur, and may be a higher status artifact (A. Rowe 1995-96:31). Some bags have plain woven stripes and for religious offerings and burials, bags of coca were sometimes sewn closed. These sewn bags were usually plain but covered with feathers (eg. A. Rowe 1995-96:Figure 49; Beorchia 1985:Unnumbered plates: Cerro Mercedario, Cerro El Plomo), or wrapped with long narrow leaves (A. Rowe 1995-96:Figure 51; Uhle 1991:Plate 7:Figure 18[1903]).

Table 36. Bag Twists per Centimetre Measurements.

Bag	<9	10-14	15-19	20-24	25>	Total
T-16	2					2
T-17	1	4				5
T-18	2			1		3
T-19	1		1	1		3
T-20		4	1	1		6
T-21	1	1	1	2	1	6
T-22			1	3		4
T-28	1					1
Y-31		2	1			3
T-44	1	2				3
Total	9	13	5	8	1	36

Warp-faced bags with complementary-warp patterning similar to these were produced in Chile prior to the arrival of the Incas (eg. Cahlander 1985:Figures 3-4, 3-5). The design motifs, however, are notably different from those of the Inca.

Discussion

Traditional edge treatments (cross-knit loop stitching) are noted on three of the Esmeralda bags, one bag has a zigzag-and-dot design, and none of the bags have attached bands. Some bags, however, have fragments of thick, loosely constructed plied yarns (cordage) at the corners of the top edges where straps or cords would normally have been located, and which also occur on some Inca bags (eg. A. Rowe 1995-96:Figure 4). These cords are similar to others found in sacrifice contexts (see eg. Reinhard 1999:49). Others, however, do not exhibit evidence of ever having had attached straps or cordage. Four bags have been woven using plain weave stripes, and the twined bag has also been constructed using natural colours.

It is not possible to determine whether all of the Esmeralda bags are specifically Inca in design. The four plain woven natural striped bags may have been produced by any number of groups, perhaps as tribute, though the distinctive edgings on some may eventually provide some indication as to who produced them. The natural coloured twined bag is very unusual, with no known precedents, as is also the grass covered bag (A. Rowe personal communication, 2000). The grass covered bag is described by Checura (1977:135) as a small basket that is not Inca in design, yet it is filled with coca and is sewn closed, so may be an altiplano modification of the leaf covered coca bags.

The feathered bag is similar to other Inca coca bundles (eg. A. Rowe 1995-96:Figure 49; Reinhard 1999:49; Beorchia 1985:Unnumbered plates: Cerro Mercedario, El Plomo). A.

Rowe (personal communication 2000) notes that the three patterned bags are similar to those found in the graves of the sacrificed women at Pachacamac (eg. Uhle 1991:Plate 19:Figure 11[1903]), which she classifies (1995-96:30) as Provincial Inca.

In searching for possible ways that the Inca might have categorized these artifacts, a number of criteria including size, shape, construction techniques, colour, modes of embellishment, and contents are considered. Sizes of the bags are variable, all are rectangular, and all but one are woven. Five are of natural colours, three are woven with dyed yarns and two are unique. Four of the natural coloured bags contain material other than coca and the three dyed bags and unique bags contain coca. The most obvious distinction is that the natural coloured bags contain substances other than coca, and the dyed and specially embellished bags contain coca. It seems probable, therefore, that in this context, the Inca used two categories of bags for offerings: ordinary bags for conventional offerings, and distinctive bags for coca.

Thigh Bands

There are seven artifacts in this collection that I provisionally categorize as thigh bands. To my knowledge, these artifacts have not been reported from other Inca sites, though Uhle may once have referred to what may be a similar artifact as a "garter". Uhle (1991:Plate 6:Figure 12[1903]) illustrates a circular artifact from the Epigone Period but it is not similar to the thigh bands of this collection. Checura (1977:137), describes the circular yarn bands of this collection as *cobertores púnicos* or "pubic covers", and notes that two bands were found on the upper thighs of the adult mummy, and were connected to each other by a thin piece of animal leather which extended across the genital area. This artifact is now, however,

incomplete, with only one band remaining on the mummy (Plate 6 d, e). As there are other circular bands in the collection that are not affiliated with fabric that might represent a pubic cover, the term "pubic cover" does not specifically apply. The term "garter" is equally inappropriate as the closest meaning refers to bands used to hold up stockings or socks (Merriam-Webster 1993: 481) and there is no indication that the Inca wore such articles. The term "thigh band" was selected because the term describes both the fabric structure and location of use. It is assumed, however, that these artifacts are most probably components of pubic covers.

Thigh bands and thigh band fragments are included in the Esmeralda collection (Plate 6 a, b, c, e). Technical features of six artifacts were assessed and the seventh remains in place on the adult mummy. All artifacts were constructed using a single element looping technique, and all artifacts have a row of loops along peripheral edges. The external loops of most artifacts appear to be components of the bands themselves and correspond with the stitches of fabric construction, but the outer loops of T-24 A and C (Plate 6 c) appear to have been added on with a chaining technique after the artifacts were completed. Because the looped stitches of the artifacts were very closely spaced, it was not possible to determine the exact structure of the artifacts, but it is probable that a simple looping technique was used with all. Natural coloured yarns were used in all artifacts; three were constructed of natural light coloured yarns, two with dark brown yarns, and two have a zigzag design using both light and dark brown yarns (plate 6 a). As light and dark zigzag designs were frequently used to decorate the rims of Inca pottery (see eg. Fernández Baca Cosío (1977:Figures 75, 120, 127, 128, and 134, 1989:Figures 75, 87, and 102-108), it is tempting to suggest an Inca association. However, local pottery from earlier periods, eg. Chiribaya (Mostny 1971:89; Hidalgo et al. 1982:84) and Gentilar (eg. Hidalgo et al (1982:86), and from other areas such

as Argentina, (eg. Serrano 1976:Figura 27 and 54) also have zigzag decorative features along pottery edges, suggesting that this was a common and long standing decorative feature of the southern Andes.

Technical Features

Rather than measuring artifact diameters, the lengths of both interior and external edges of each artifact were measured, as shapes are irregular, and some are incomplete. Of the complete artifacts, most artifacts appear to be similar in size, although T-24B is somewhat smaller (Table 37). Checura (1977:137) proposes that this smaller artifact may have been constructed for the child. Artifact widths are similar, looping tension is quite variable, and between ten and thirteen rows were used to construct each band. One artifact (T-23) appears very similar both in colour and structure to the artifact on the adult mummy, and also has a piece of what appears to be leather attached to it, so it is probable that these are two of the matched pair described by Checura. One notes, however, that thigh band T-23 (Plate 6 b), is complete and well preserved, and the left thigh area of the mummy, presumably the original location of T-23, is also fairly well preserved, causing one to speculate how it may have been removed from this location without damage to either the fabric or the mummy. If we employ an M.N.I. theory, four sets of artifacts are suggested: T-4 a and b; T-23+ artifact on mummy; T-24 a and c; and T-24-B plus a missing artifact.

There are also variables in yarn construction (Table 38); all bands were constructed of camelid yarn, but fibre diameters vary considerably. All yarns are spun Z and plied S but some are two-ply and others are three-ply. Angles of twist appear to fall into two ranges, possibly reflecting the preferences of the spinner.

Table 37. Thigh Band Features.

Thigh Band	Inside length	Outside length	Width	Loops/cm	No. Rows*	Colour
T-4 (A)**	15.60 cm	21.60 cm	2.50 cm	4.30	11	brown/natural
(B)**	28.50 cm	39.50 cm	2.60 cm	4.00	10	brown/natural
T-23	34.90 cm	53.00 cm	2.93 cm	2.83	13	brown
T-24 (A)	34.53 cm	52.06 cm	3.00 cm	1.13	13	natural
(B)	23.20 cm	44.90 cm	2.67 cm	2.32	11	natural
(C)**	31.06 cm	43.13 cm	2.77 cm	1.22	13	natural

* = not including loops. ** = incomplete.

Checura (1977:137) classifies these artifacts as *cobertor púbico*, or pubic covers, and describes a section of leather covering the pubic area. As a leather fragment was found still attached to one of the bands, it is presumed that two thigh bands were originally stitched to a leather garment that functioned as a kind of underwear. There is, however, no available information regarding such artifacts in association with women.

Table 38. Thigh Band Yarn Characteristics.

Thigh Band	Ply	Spin	Diameter	Angle/Twist	Fibre	Fibre Diameter
T-4 (A)a	2	Λ	1.41 mm	27.50°	camelid	> 40μ
b	2	Λ	1.29 mm	26.20°	camelid	> 40μ
(B)a	2	Λ	1.66 mm	26.30°	camelid	> 40μ
b	2	Λ	1.46 mm	28.30°	camelid	> 40μ
T-23	2	Λ	2.25 mm	45.33°	camelid	40μ range
T-24(A)	3	Λ	2.05 mm	40.17°	camelid	< 110μ
(B)	3	Λ	2.00 mm	43.00°	camelid	110μ range
(C)	3	Λ	1.83 mm	43.50°	camelid	< 110μ

In addition to *cobertor púbico*, other similar garment types, *guara*, *taparrabos*, and *fadellín(as)* have been recorded by archaeologists. Breechcloths or *guara* are known to have been worn by Inca men after the age of fourteen or fifteen (eg. Cobo 1990:186[1653]; Betanzos 1996:59-64[1557]; A. Rowe 1995-96:27-28). Also the young Inca male sacrificed

on Cerro El Toro (Schobinger 1966:107-108) was found wearing a red and blue warp-faced woven *taparrabo* with an attached waist band. This artifact was constructed of camelid fibre. Diaper-shaped stringed loincloths or *taparrabos* have been recovered from earlier archaeological sites in northern Chile and southern Peru (Rivera et al. 1974:80; Clark 1990:131-137, Figure 4; Ulloa 1982b:113-117, Figure 2), but they too, appear to have been associated with men. Ulloa (1982b:114b) notes that the *taparrabos* of northern Chile differed from pubic covers (eg. Rivera et al. 1974:80; Ulloa 1974:78; Muñoz 1982:136) and string skirts (*fadellín(as)*) of earlier periods (eg. Allison et al. 1984:170, Lamina 7; Arriaza 1995:Figure 25; Muñoz 1982:136) in both form and technique, and were also constructed of wool rather than of vegetal fibres (see eg. Dauelsberg 1974:Fotos 22, 27, 31 for examples of vegetal fibre *taparrabos*). Santoro (1980:52), notes that *cobertor púbico lana* were used by pre-Alto Ramirez societies in the Azapa Valley in approximately 905 BC., indicating that this artifact type had been in use in northern Chile for a long period of time. There does not, however, appear to be a clear definition or description of the item or of its use.

In attempting to determine the purpose of the artifacts, Checura (1977:137) found no evidence that the young woman had been menstruating. It is possible, however, that she was *prepared* for this actuality in the next life. The presence of other similar artifacts suggests that it was either expected that she would have required them over the course of her next life, or that they were offerings in themselves and were, perhaps, reserved for ceremonial use.

The term "thigh band", is used provisionally, as there is at least one other possible explanation for this artifact type. Parts of some moccasin-like shoes have similar characteristics (A. Rowe: personal communication, 2000; and see also Montell 1929:132; Uhle 1991:Plate 7: Figure 12[1903]; Reinhard 1999:39) and it is possible that some of the looped artifacts may be components of footwear. Checura (1977:137), however, clearly

depicts two of the bands as parts of pubic covers, and as the bands are all very similar in structure, it is most probable that they were all produced with a similar function in mind. They are all, therefore, interpreted as thigh bands.

Discussion

This sample of thigh bands is too small to make suggestions regarding standards of production. It does seem probable, however, that the size of the individual wearing the artifact would have some bearing on the size of the artifact. There is also no indication that these artifacts were produced by the Inca, or to Inca standards, as they have not been noted at other Inca sites such as Pachacamac or Ampato. Looping or netting techniques, or *técnica de malla* have long been in use in northern Chile (see eg. Ulloa 1974:75-78; Rivera et al. 1974:98), and there is also a very long standing history of the use of similar artifacts in this area, suggesting that pubic covers may have been a regional convention, and that the Esmeralda thigh bands were locally designed and produced. It is curious that the artifacts were found with females, as similar artifacts are traditionally articles of male attire. Pubic covers, however, appear only to have been noted on archaeological artifact lists, and may eventually be found to have been associated with females.

Miscellaneous Artifacts

A number of articles in the Esmeralda collection are either only represented by a single artifact, or are unidentifiable fragments of artifacts. These items are discussed here.

Topo cord

The three fragments of circular cord (Appendix I: T-45; Plate 7 a) are interpreted as

parts of a single artifact that appear identical in structure to previously reported cords attached to *topo* pins on womens' garments. The cord is constructed mainly of camelid yarns, and two sets of elements with wrapping in the lengthwise direction and tubular in the crosswise direction has been used. The cord ends, however, are of vegetal fibre that Checura (1977:138) identifies as "totora", but appears more similar to a finer fibre such as *furcraea*. Checura (1977:138) also describes the vegetal ends of the cord as designed for insertion into the heads of *topo* pins, and this cord has also been illustrated in correlation with two *topo* pins, what appears to be third *tipqui* pin, and the spondylus pendant by Morales (1985:Unnumbered plate following page 41). The pins have apparently deteriorated over time, but in the Morales photograph the two *topo* pins have fan-shaped heads and are approximately thirty centimetres in length, including heads, which are each approximately five centimetres in depth by six centimetres wide. The *tipqui* pin appears incomplete as the head is not distinguishable in the photo, but the remaining fragment is approximately eighteen centimetres in length. All pins appear to be approximately one half centimetre wide. Checura (1977:138) states that the pins, with the *topo* cord and spondylus pendant were recovered from the folds of the "royal" mantle".

A full sized *topo* cord similar to this was recovered with the mummy "Juanita" at Ampato (Conklin 1996:109), the ends of which were inserted into holes of *topo* pins. Several similar miniature artifacts have also been recovered with figurines (eg. Mostny 1957:52; Reinhard 1992:89, 1996:77, 1999:53; Beorchia 1985:Unnumbered plates: Cerro Mercedario, Cerro Gallán; Heyerdahl et al. 1995:Figure 81). On examination of the photos, the artifacts all appear to contain design elements similar to the Esmeralda cord.

Published miniature *topo* cords (eg. Reinhard 1992:88, 89; 1999:53) also appear to have been constructed mainly of camelid yarns. The cords in photos in which ends of the

artifacts are clearly visible are also similar in appearance to the twisted vegetal fibre yarns of the Esmeralda cord, suggesting that the ends of these cords were also constructed of vegetal fibres. This small sampling suggests that there may have been production standards used in the construction of the cords connecting *topo* pins of Inca sacrificed women and of female figurines.

Similar cords were not, however, found with the sacrificed women at Pachacamac. Uhle (1991:Figures 112 and 113[1903]); A. Rowe (1995-96:Figure 34); Cobo (1990:189 [1653]) do, however, depict shell pendants and necklaces found with these women, and Guaman Poma (1980:Figures 124, 134, 173, 264, and 287[1615]) illustrates what appear to be shell pendants attached to *tipqui* pins attached to the shawls of royal Inca women. Uhle (1965:Plate 15[1934-1937]) also illustrates a similar shell necklace from the Inca Period at Chincha. As most woven artifacts from Pachacamac are of *abasca* quality, and the woven artifacts of Esmeralda are mainly of *cumbi* quality, the use of *topo* cords may have been used only for specific ritual sacrifices. It should also be noted that *topo* cords, both full sized and miniature, have only been recovered from sacrifice settings.

Spondylus Shell Pendant

The spondylus shell pendant (Appendix I:T-48) and other spondylus artifacts in the Esmeralda collection have been identified by Frassinetti as *Spondylus princeps princeps* (Checura 1977:134). The trapezoidal shaped shell pendant (Plate 7 e) is similar to others from Inca sacrifice contexts, and was positioned in a similar location as the supplemental offerings found with Juanita (Conklin 1996:109) in that it was attached directly onto a *topo* pin and not to the circular *topo* cord (Checura 1977:134). The shell pendants of female figurines (eg. Reinhard 1992:89, 1996:77, 1999:53; J. Rowe 1996 :Figure 105; Von Hagen and Morris

1998:Figure 109; and Mostny 1957:Figure13 (same artifact); Beorchia 1985:Unnumbered plates: Cerro Gallán, Mercedario; and probably Heyerdahl et al. 1995:Figure 81, in which red braided cords attached to the *topo* cord are illustrated but the ends of which are below the edge of the photograph), are all attached to *topo* cords.

The Esmeralda pendant was first attached with vegetal fibre yarn to a short, red, camelid fibre braided cord. Some of the above-mentioned figurine pendants also appear to be attached to short red braided cords by means of vegetal fibre yarn (eg. J. Rowe 1996:Figure 105), some pendants are attached directly to the red braided cords (eg.Reinhard 1992:89, 1996:77), and some are attached directly to the cord, probably with vegetal fibre yarn and without red cords (Reinhard 1999:53). All, however, appear to use vegetal fibre to attach the pendants to the *topo* cords, probably with lark's head knots (see eg. Reinhard 1992:89, 1996:77, 1999:53; J. Rowe 1996:Figure 105; Heyerdahl et al. 1995:Figure 81).

The Esmeralda pendant is structurally similar to the pendants of the figurines other than there are two holes for attachment on the Esmeralda pendant (Plate 7 e), while those of the figurines typically have one opening (eg. J. Rowe 1996:Figure 105; J Reinhard 1992:89, 1996:77, 1999:53; Beorchia 1985:Unnumbered plates Cerro Mercederio). The Esmeralda pendant is also similar to those of the figurines in shape and means of attachment. The location of attachment, however, like the supplemental offerings of Juanita, was attached to the *topo* pins, and not to the *topo* cord.

This very limited comparative evidence suggests that it was customary to attach the pendants of figurines to the *topo* cords but that full sized artifacts were attached to *topo* pins. The absence of red braided cords attached to the pendants of some figurines, and the different means of attachment to these cords on the artifacts that do have them, suggests local variations or different producers, but the common use of vegetal fibre yarns to connect the

pendants to the *topo* cord or *topo* pins indicates that this was probably a standardized method of production in the areas where they were used.

Hair Tie Remnant (Tassel)

The artifact described here is similar to the tassels found on the hair ties of both mummies (Plate 7 c). Hair styles such as this (Figure 21, Plate 7 b; and also see Appendix I:T-8 for construction details), however, were not noted by the chroniclers. Cobo (1990:188[1653]) describes Inca women wearing their hair either loose or braided; Guaman Poma's drawings (eg. 1980:215, 287[1615]), and the findings of Uhle (1991:85[1903]) support this. Female mummies in other Inca sacrifice settings wore their hair hanging loose (eg. Reinhard 196:66), parted in the centre with two braids (Reinhard 1999:50), or with many braids (Reinhard 1999:37). The little information that is available on prehistoric local hair styles of the area (see eg. Arriaza et al. 1986:353-375; Fuentes 1965) contains only limited information about Inca preferences, and the hairstyle of the Esmeralda mummies is not illustrated. The style most represented (58%) in a sample population of women of northern Chile (Arica) during the time of the Inca empire was parted in the centre with two braids, a style that was also prominent in the preceding Gentilar regional phase (Arriaza et al. 1986:362). A. Rowe (personal communication 2001), however, notes that this hairstyle is depicted on Inca female figurines (see eg. J. Rowe 1996:Figure 106; Beorchia 1985: Unnumbered Plates:Cerro Mercedario, Cerro Mismi) clearly indicating that this is an Imperial Inca style. A. Rowe also notes that the Esmeralda mummies exhibit the only known examples of actual use of this hairstyle.

While both mummies have their hair arranged in the same manner, there are some differences. The hair of the young girl is clearly parted in the centre, pulled back from her face

and coiled into two twists which turn inward and downward. The two twists are secured with a double-tasselled hair tie approximately ten centimetres beyond the head and extend slightly below the tie (Figure 21). The hair of the adult has become detached from the skull though is still in place on the skull (which is detached from the body), and is in a somewhat disarranged position. Although much of the scalp tissue is missing, the hair is also parted in the centre and coiled into two twists which appear to extend approximately 20 cm beyond the scalp and are secured with a double-tasselled hair tie. Although it was assumed that the hair twists were coiled inward like those of the child, the stains on Mantle T-41 indicate that the hair may have been coiled in an outwards direction. It was not possible to determine either the type of knots or the length of the ties, but as the tie areas were orderly, relatively short ties with simple knots are probable. The tassels of the adult appear to extend slightly below the tie (and appear similar to the hairstyle of figurines), while those of the child appear shorter and seem to sit right on the tie.

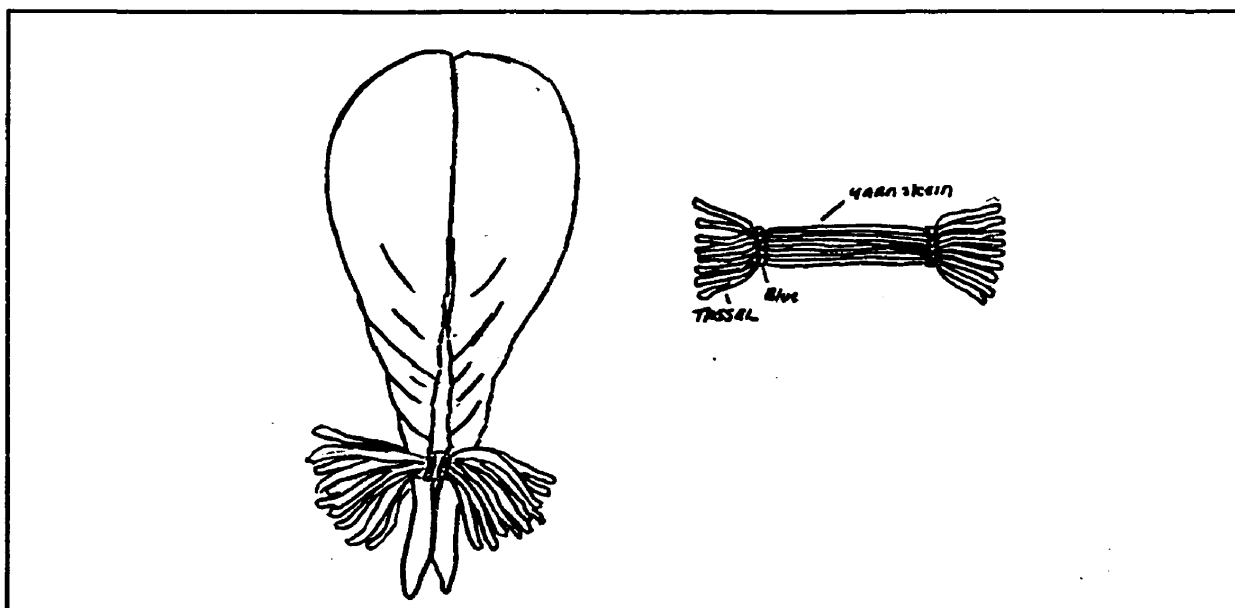


Figure 21. Tasselled hair tie.

Miscellaneous Cordage

There are a number of cordage fragments in the Esmeralda collection. Four of the fragments are plied and are of natural brown camelid fibre (Appendix I:T-5 and T-14A; Plate I k, m), and there is no indication as to how they might have been used. Possibilities include binding of the mummy bundles and pot-holders such as that illustrated by Boman (1908:Figure 180).

Several other cordage fragments (Appendix I:T-11; Plate I l) were constructed of natural light coloured camelid fibre and are of a more complex construction. These cordage fragments are of two different diameters and are of solid structure and rounded form, and appear similar in construction to a sling illustrated by Reinhard (1999:53), and a *llauto* illustrated by Uhle (1991:Plate 7 Figure 11[1903]), and not unlike the more flattened *llauto* illustrated by Reinhard (1999:39). The ends of two of the cords appear to be finished in the same manner as Uhle's *llauto*, but it is also not known how these cords might have been used in this context. Uhle (1991:71[1903]) describes cotton cordage binding the mummies of the cemetery of La Centinela, and equates the use of cotton (probably as compared with rougher vegetal fibre) as indications of wealth.

Bracelets

There are fragments of two bracelets in the Esmeralda collection, one of a silver material and one of a gold material (Appendix I:T-43; Plate 7d). The silver bracelet was found on the left forearm of the adult, and the gold bracelet was found within the textiles of the adult, but oxidation stains were found on the forearms of both mummies (Checura 1985:132). Although bracelets such as this are usually considered to be male attire (eg. Cobo 1990:187[1653]; Mostny 1957:37-38; Reinhard 1999:39), Uhle (1991:95[1903]) notes that

the women of Pachacamac did wear 'personal ornaments' that included bracelets. Uhle (1991:71[1903]) also equates the use of gold and silver in graves as "proof of the high rank of the persons buried there".

Miscellaneous Fragments

There are a few textile and leather fragments in the Esmeralda collection . One textile fragment (see Appendix I:T-6; Plate 8a) is interesting because it appears to be weft-faced and if so, is the only weft-faced example in the collection. The surface yarns of the textile are weaker than the hidden elements and are easily broken, and the one selvedge appears to have been rolled and secured with a knot stitch, suggesting weft-faced construction. Two other small fragments (Appendix I:T-13; Plate 8 d), and a looped fabric of heavy brown and red yarn (Appendix I:T-14D; Plate 8 e) indicate that other artifacts were also once part of this collection. There is no indication as to how the thick leather fragments (Appendix I:T-12; Plate 8c) may have been used, but they appear too thick to have been part of the *cobertor público*. It is possible that they are the remnants of footwear.

CHAPTER IV

Discussion

Most Inca textiles have not survived to this century. Mass destruction of Inca artifacts by the Spanish in the Early Colonial Period plus the inhospitable soil conditions of the highlands have both contributed to the scarceness of remaining perishable Inca artifacts such as textiles. Artifacts such as these are now found only occasionally in coastal areas or mountaintop sacrifice sites, and while we can appreciate these rare artifacts for their beauty and craftsmanship, their primary value lies in the information they contain.

This examination of the technical features of the Esmeralda textiles has contributed to our knowledge of Inca textile artifacts, Inca consumers, Inca sacrifice, and of the peoples who produced these artifacts. The textiles were created and used as ritual offerings for the state, and the evidence presented here adds to what is known of both Inca textiles and of sacrifice contexts. Iconic and technical features predominate, but technical attributes also represent a series of choices made by the spinners, dyers, weavers and others who were responsible for their construction, and of the social groups and individuals that influenced this production. These production choices also represent facets of the cultures and peoples who, though embraced within the Inca sociopolitical umbrella, experienced life situations that were also influenced by other factors. Technical choices, as components of these lives, reflect meaningful information about both the individuals and the social groupings to which they belonged.

Distinctive Imperial Inca features of most artifacts demonstrate both consumer standards and consumer use. Camelid fibre was used almost exclusively in the production of

all Esmeralda artifacts, and this conforms with what is known of Imperial Inca preferences. There are two exceptions to this known camelid fibre preference within the Esmeralda collection; however, these were used in specific circumstances that also suggest production ideals. Cotton was used for all yarns attaching feathers to artifacts, indicating that this was an appropriate choice for feather attachment. The use of camelid yarns in other parts of the feathered artifacts indicates that camelid fibres were most likely also available to the producers of the artifacts, so the use of cotton in this application appears to have been a conscious choice. It is possible that the feathers were imported by the producers already pre-strung on cotton yarn, but as the feathers were also sewn to the artifacts with similar cotton yarns, this is less likely. It is also possible that camelid artifacts were exported to coastal areas specifically for the application of feathers.

The other exception to the use of camelid yarn was the almost exclusive use of vegetal fibre yarn to connect the parts of artifacts, or to connect one artifact to another. In this collection, vegetal fibre yarn was used to connect the braided cords to the belts that did have cords attached, and vegetal fibres were also found in several similar locations suggesting that this yarn type had been used for this purpose on all belts. Vegetal fibre yarn was also found forming the chained ends of the *topo* cord where it is thought to have been inserted into *topo* pins, a practice that appears to have been used with similar cords attached to miniature belts of figurines. A few vegetal fibres were also found on the end of the red braided cord attached to the *spondylus* pendant, suggesting that vegetal fibre yarns were used to connect it to a *topo* pin, as were the pendants of Juanita. Published pendants of figurines also appear to have been connected to *topo* cords with vegetal fibre yarns, suggesting that the exclusive use of vegetal fibre yarns for connecting artifacts of this type may have been because of Inca preferences.

The Inca also apparently employed standards of yarn production. They are thought

to have almost always used yarns that were Z-spun and S-plied, and almost all yarns of the Esmeralda collection are Z-spun and S-plied, and therefore support this view. The cotton yarns, which were spun in irregular fashion (Z-S, S-Z or single spun yarns), suggest multiple imported sources, possibly from areas of the Peruvian coast. The diameters of most of the yarns of mantles, belts and bags of this collection are approximately 0.50 mm in diameter suggesting that this was an Inca standard for these artifacts. The yarns of the natural coloured mantles, feathered artifacts and single element artifacts, however, are all considerably heavier suggesting that there may have been a different criterium for the yarns of these articles.

Warped-face weaving standards appear to have been employed, as all but one woven Esmeralda artifact was of warp-faced construction. Inca weaving was traditionally warp-faced or weft-faced, but these techniques were also employed by other social groups, so by themselves the features are not diagnostic. They are, however, considered usual standards to which the producers of Inca textiles usually adhered. Cross-knit loop stitched finishing, which was found on the edges of all shawls, dresses, and some bags, however, is a diagnostic feature of Inca textiles, suggesting that conventional consumer-oriented methods were used to finish these articles. The seams of all but one two-panelled dress were sewn using the same stitching techniques, also suggesting either an Inca standard, or that most mantles were produced in an area where this sewing technique was considered appropriate.

Pattern elements are the most obvious features of Inca textiles, and the red and gold interrupted zigzag-and-dot pattern stripes are standard features of Imperial Inca shawls and dresses found at ritual sacrifice sites. While there does not appear to be a standard number of pattern elements on these articles, the same number of patterns are found on each side of each artifact in this collection, and the pattern stripes are arranged in a like manner on each of the patterned areas in all of the patterned dresses and shawls.

The features of the Esmeralda dresses and shawls are considered to be standard female Inca attire and similar artifacts have been observed elsewhere. There are, however, two exceptions: the stripe proportions of *abasca* dress T-34 are somewhat different than other known artifacts of this quality, and this factor combined with its smaller size and tentative association with the child, suggests that dresses for children may have been constructed to somewhat different specifications. A *cumbi* dress, T-40, is also unusual in that it was constructed of two panels rather than the usual three, also suggesting possible construction for a child.

The continuous zigzag-and-dot stripes and geometric designs of belts are also diagnostic features. Belts are all of double-cloth construction and all were assembled in exactly the same manner with only pattern elements and size distinguishing them. Both the braided cords and plied cords were also constructed in the same manner, which also suggests Inca standards.

Although most items in this collection are clearly articles of female attire, and most also exhibit diagnostic Imperial Inca characteristics, there are obvious differences in the qualities of some artifacts. Both shawls and dresses are represented in *cumbi* and *abasca* qualities, and there are also two artifacts, a dress and a shawl, that are somewhere "in between". This suggests that *cumbi* and *abasca* are graded qualities rather than absolute categories, which may explain why the Spanish found this concept so difficult to explain.

There are also different qualities of bags, the prime difference being that distinctive dyed or decorated bags contained coca, and naturally coloured plain bags contained more commonplace materials such as food items.

The Esmeralda textiles have also added to our knowledge about Inca-sponsored human sacrifice. The contents of this sacrifice assemblage are similar to those of other

mountaintop sites, but there are significantly more Esmeralda artifacts than at most of the other sites, and the relatively low coastal location is also unusual. Also of particular interest are the tasselled hair ties that adorn the hair of both mummies. The artifacts and hair arrangement closely resembles the hairstyle depicted on female figurines, suggesting that this hairstyle was both Imperial Inca in origin, and that it was also used in real life, at least for some ritual sacrifice occasions. The hairstyle and the richness of the assemblage also suggest that this sacrifice occurred for a very significant reason.

There also appears to be a functional distinction between mountaintop sacrifices and other sacrifices such as Pachacamac. While the mountaintop assemblages appear to consist mainly of similar Imperial Inca artifacts, the assemblage at Pachacamac appears to consist mostly of articles of "Provincial" attire. In comparison, a number of variables are noted: 1) Shawls and dresses similar to those found at Esmeralda appear to have been used at all sacrifice sites including Pachacamac; 2) The belts of Pachacamac differ significantly from those of Esmeralda, Mismi, Ampato, and the figurines in both style and structure; *topo* cords are present at Esmeralda and Ampato and also on figurines, but are not represented at Pachacamac; 3) Spondylus pendants such as the one from Esmeralda are not represented on the mummies from Pachacamac or on the mummies from other known sites, but are notable on most female figurines. The location of attachment of the Esmeralda pendant, however, is identical to that of the supplemental offerings at Ampato, which did not include spondylus pendants. This location of attachment differs from the figurines in that the spondylus pendants of all appear to be attached directly to *topo* cords. This suggests that the use of *topo* cords such as are described here are probably an Imperial Inca tradition, and may only have been used for specific sacrifices, or that some differences represent different standards used for figurines and real attachments. 4) Full sized headdresses are noted at Esmeralda, Lullaillaco

and Ampato, and they all appear similar in structure, although the Esmeralda and Llullaillaco headdresses are covered with white feathers and the Ampato headdress is covered with coloured feathers. A number of headdresses, most with back panels, are noted on figurines from several high altitude sites, but to my knowledge, full sized feathered back panels have not been reported from sites other than Esmeralda. Feathered headdresses were not reported from Pachacamac, which also suggests functional differences between this site and the other sites discussed here.

It is also interesting to note what has *not* been included with the Esmeralda sacrificial offerings. For example spinning and weaving tools were not included, which suggests that the young females were not expected to need these artifacts in their next life.

Evidence of the producers of this textile assemblage is varied, and in some cases somewhat ambiguous. While all social groupings were not immediately distinguishable, it was possible to define some production features that suggest aspects of producer input.

Technical characteristics of individuals were found in all aspects of production. Skill was a primary identifier, and yarn production most clearly demonstrates individuality. Some spinners invariably were able to produce fine even yarns with a consistent diameter, others were quite irregular, and most were somewhere in between. In general, the yarns of the polychrome mantles were expertly produced, while those of the natural coloured mantles were more irregular, suggesting that only experienced spinners may have been given access to costly dyed materials. The yarns of one red warp stripe of a belt, however, and the red yarns of one mantle did not appear strong enough to withstand the tension of the weaving process, and were painstakingly repaired. Variations in yarn consistency of polychrome textiles indicate that several people spun the yarn for each article, as the yarns of each stripe, even very narrow ones, appears to be the work of a different spinner. An interesting example

of individuality in yarn production includes one spinner who contributed a 4-ply red yarn that resembles a 2-ply yarn in diameter and appears to have been used as a 2-ply yarn in the edge treatment of mantle T-33, and the use of S-spun Z-plyed yarns for the hidden elements of belts T-25 and T-35, and possibly T-2. These were the only examples of S-spun Z-plyed yarns in this collection other than some of the cotton yarns which were used for the attachment of feathers.

The work of individual dyers was also visible within these artifacts. In most instances, the opposing panels of a mantle appear identical in colour, suggesting that the fibre or yarns were dyed in the same dye bath. With some, however there are obvious colour differences, suggesting that different dye-baths had been used. One mantle (T-42) was constructed of many narrow stripes of dyed yarns that were similar but not identical in colour, and the opposite panel appears to have been constructed using identical narrow stripes of identical yarns. The colours of narrow warp stripes of belts were likewise variable; in some artifacts the colours were constant throughout the artifact, yet with others, there are notable differences. In one belt, for example (T-2), three different shades of red were employed, indicating that the yarns had been dyed in three different dye-baths.

Each artifact appears to have been woven or otherwise produced by a single person, as there are no dramatic internal shifts in technical styles, and the warps of multi-panelled mantles also appear to have been constructed by the same individual as the panels are very similar in length. There are, however, various pattern arrangements and skill levels noted in the construction of artifacts and in the manner in which they were finished and assembled. Mantles, for example, were produced using Inca patterns and colours, but each artifact was woven, assembled and finished in a slightly different manner. Edge treatments are especially variable with many different colours and arrangements of colours used, though the same

finishing techniques were used for all.

Belts were all constructed using the same techniques, and braided and plied cords of belts are also almost identical, but there is a minor variation in the assemblage of one braided cord that indicates individual choice. Attached cords present on some belt cords (T-9, T-10B, and T-27), also indicate individual or local choice, and may have a purpose that is not presently known. The slight differences in the incorporation of colours in the tassels of braided belt cords (T-2, T-7, T-38) suggest individual or household preferences, and suggest a resourceful conservation of red dyed yarns. The tassels are almost identical in appearance, but the slightly different means of incorporating colour in the hidden areas of tassels, suggest different household or local traditions.

The construction of other artifacts also suggest the work of individuals. For example, the bags of this collection, with one exception (two natural light and brown striped bags are almost identical), are all unique, indicating either that they were imported from different areas, or that there was some latitude in Inca requirements for this artifact class. Two bags, however, are very unusual; a twined bag and a bag covered with fibre and grasses suggest importation from other areas. Different levels of weaving skill are also particularly noted with bag construction, suggesting that bags may have been early projects for novices. The two almost identical bags, for example, exhibit different levels of weaving skill suggesting an expert/novice collaboration. Thigh bands appear to be paired, but subtle differences in skill and production standards of one of a trio of artifacts suggest that it was produced by a less experienced producer, and was possibly also an expert/novice collaboration.

Only one characteristic suggesting regional standards is tentatively suggested. Pubic covers are reported in northern Chile from earlier time periods, and although there is little available information regarding comparative structure or use, the thigh bands represented here

are provisionally interpreted (as parts of pubic covers) as a regional artifact style rather than an Inca style, as there is no evidence that Inca women wore such articles.

An unusual factor also suggests aspects of textile production. Red dyes may have been more valuable or difficult to obtain than others. The way in which colours were incorporated into the bichrome belt tassels with slightly less red yarn than either the yellow or blue coloured yarn, suggests that red dye was a highly valued resource, and the presence of undyed warp yarns within the wrapped edges of mantle T-47 also illustrates this point. Considering the large amount of red dye that must have been used to colour the yarns of the artifacts of this collection, the sacrifice on Cerro Esmeralda must have occurred to commemorate a very significant occasion.

The attributes of this collection of textiles conspicuously demonstrate aspects of state preferences, and also reveal technical choices made by individual producers. These producers belonged to social groups which in turn were components of broader social networks, so the assemblage can be understood as resulting from social interaction on various levels which involve individual producers working cooperatively on a local level to accommodate regional styles and state standards.

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Appendix I: Catalogue of Textiles from Cerro Esmeralda, Northern Chile

Introduction

This catalogue contains technical information about the textile artifacts discussed in this thesis. The collection, as has been noted, is presently housed in the *Museo Regional de Iquique* in Iquique, northern Chile. While a centralized system of artifact registration is no longer in use at the museum, it was once employed when staffing permitted (Cora Moragas, personal communication 1999). Inventory labels from this time period are still associated with many of the textiles, and one or more other identification tags, most likely from various museum displays, are also associated with some artifacts. A few pieces, however, remain unidentified. An inventory of artifacts from Cerro Esmeralda is reported by Octavio Morales Gallegos (see Appendices IV and V), who was an earlier director of the museum and who was also actively involved in collecting many of the materials (Octavio Morales G. personal communication 1999), and this list provides another avenue for artifact identification. For the purposes of this study, however, a separate inventory system has been utilized, although existing identification has been included where present. An attempt has also been made to correlate the artifacts with the Morales inventory list. This correlation is based solely on a general association of dimensions and colours noted in the inventory with my own observations, so in some cases this association is uncertain at best, and in many instances was not possible. This correlation is, however, considered to be meaningful as some of the artifacts have been associated with one or the other of the mummies.

For ease of reference, a simple listing system has been used; letters define the category of artifact, and numbers represent the sequence of examination. Textile artifacts are identified by the letter T; - for example the artifact T-1 was the first textile artifact to be evaluated.

The artifacts are presented individually and have been described first as the viewer would see them, that is with reference to appearance and dimensions. This is followed by details of construction and yarn composition, and concludes with a discussion of the fibres of which the articles were constructed. Appendix II should explain most of the textile terms, however, one explanation does require particular understanding, so is repeated here. Textiles have been interpreted as being composed of *elements* within the system defined by Emery (1980:27):

element: a component part or unit of the structure of an *interworked* fabric. The term refers to yarn, thread, strand, cord, thong, or whatever natural or contrived unit of fibres or filaments is *interworked* to form a fabric. A *set of elements* is a group of such components all used in a like manner, that is, functionally undifferentiated and tending in the same direction. Whenever certain elements are differentiated from others in the same fabric, either in the direction they take or by the purpose they serve in the structure, they constitute a separate set of elements.

In two instances (#14 and 15), a number of textile fragments were packaged together by museum personnel, and all retain the same museum number. It is not known, however, if there was also an association in antiquity. To illustrate this unknown context, associated artifacts have been given the same number sequence, but are also differentiated by a letter added to the catalogue number. In another case, several small bags or *chuspas*, were found packaged together, and retain the same museum identification numbers. These are discussed separately, and have been given different identification numbers.

It was possible for me to examine most of the textile artifacts described in previous reports, although several could not be located. A few articles not specifically mentioned in the Morales list are also discussed here. These fragments are most probably those which were grouped together and not included in the classification of the more complete articles. These fragmented articles however, have been carefully packaged and labelled by museum staff, and are included with the other artifacts of the collection. Other items such as the hair tie and one thigh band are still in place on the mummies, and though the hair ties have been noted in the literature (see eg. Checura 1977:137), they were not included in the original artifact inventory. Two thigh bands were noted by Checura (1977:137) to be in place on the upper thighs of the adult mummy, but the one now in place was not included in the Morales inventory.

**Comparison of Morales' 1985 Inventory
with the Material Presented in this Thesis**

Artifacts	Morales Inventory (1985)	My Inventory (1999)
belts	5	5
braided cords	11	11
mantles	11	10
small cloths	2	0
thigh bands	6	6 (+1 on mummy)
tubular cords	2	2
bags	14	10
feathered cape	1	1
headdress	1	1
hair ties (tassels)	1	1 (+ two on each mummy)
cordage fragments	several	6 (approximate)
cloth fragments	several	11 (approximate)
leather fragments	?	2+1 (on thigh band)

Esmeralda #T-1

Artifact: Braided tasselled cord

Identification labels: none apparent.

Inventory correlation #28

Description: Braided cord with attached tassel (Plate 1a). Red and gold yarns have been braided to form a continuous zigzag pattern along the length of the cord, and a large tassel that appears to have been constructed of the same yarns as the braided cord has been attached to one end (Plate 1 b; and see Figure 15). Red and gold colours have been arranged around the cord in quadrants to form the tassel (Figure 16), and a plied cord (Plate 1 c; and Figure 17) has been inserted through the fold of the other end of the cord.

This artifact is well constructed with a soft handle, and there is evidence of skilled workmanship in almost all aspects of production. Yarns of the braided cord appear, for the most part, evenly spun; and pattern direction and size are also consistent.

Of interest is that although all of the red yarns of the tassel are two ply and quite evenly spun and plied, the gold yarns contain both two ply and single ply yarns, some of which are somewhat irregular. It was also noted that the natural light coloured fibres of the tassel cover are brittle and quite fragile.

This artifact is well preserved and yarns of the cordage proper are all intact, though there is a small stain in one area.

Overall Measurements

Measured area	Measurements			Mean
* Length cord	94.00 cm	95.10 cm	94.70 cm	94.60 cm
Diameter cord	2.10 cm	2.00 cm	2.00 cm	2.03 cm
Length tassel	10.40 cm	11.20 cm	10.60 cm	10.73 cm
** Diameter tassel	4.00 cm	5.50 cm	7.00 cm	5.50 cm
Width tassel cover	0.80 cm	1.10 cm	1.50 cm	1.13 cm
Diameter tassel cover	-	-	-	
Length plied cord	26.80 cm	26.20 cm	26.30 cm	26.43 cm
Diameter plied cord	0.40 cm	0.30 cm	0.40 cm	0.37 cm

* = measured to beginning of tassel ** = approximate

Element Description

This article was produced mainly by utilizing sets of single elements: strands or skeins of yarns used to construct 1) the braided cord and 2) the plied cord. Two accessory elements were also used : 3) yarn lengths that have been grouped together to form the body of the tassel, and 4) sewing elements utilized to stabilize the tassel (there are no actual elements in

this artifact, and its classification is somewhat imprecise. Emery did not address structures such as these in detail, but her term "complex fabric" appears to be the most appropriate. However, as this tasselled cord was once probably attached to a belt, it may also be technically classified as an "accessory object". This cord, regardless of its classification, is also composed of a combination of *other* interrelated accessory structures. There are two sets of strands of yarns, one which has been utilized to construct the braided cord, and another used to construct the smaller plied cord. Yarn lengths that have been grouped together to form the body of the tassel is another category, and yarns utilized to stabilize the tassel are also in a distinct class. For ease of reference, however, my description of this and other braided cords of the collection utilizes the term "element" in reference to components).

braided cord: 1a: red coloured camelid yarn. This is probably a loosely plied 2-ply Z-spun S-plied yarn but this cannot be absolutely determined. Singles are quite consistent and in places do twist together, but not enough to determine plying. It is also possible that the ply twist of original yarns in cords of this type have become un-spun when twisted in the opposite direction during cord construction.

b: gold coloured camelid yarn: braided cord. This is probably a loosely plied 2-ply Z-spun S plied yarn but here too this cannot be absolutely determined.

plied cord: 2a: red coloured 2-ply Z-spun S-plied camelid yarn.

b: gold coloured 2-ply Z-spun S-plied camelid yarn.

tassel 3a: red coloured 2-ply Z-spun S-plied camelid yarn.

b: gold coloured 2-ply Z-spun S-plied camelid yarn.

tassel cover 4: natural light coloured 2-ply Z-spun S-plied camelid yarn utilized to form and stabilize the tassel.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1a	5R 3/8	5R 4/8
b	2.5Y 6/8	2.5Y 6/8
2a	5R 3/8	5R 4/8
b	2.5Y 6/8	2.5Y 6/8
3a	5R 3/8	5Y 3/8
b	2.5Y 6/8	2.5Y 6/8
4	5Y 7/2	-

Yarn Diameter

Element	Diameter						Mean
1a	-						
b	-						
2a	1.00 mm	1.00 mm	1.20 mm	1.00 mm	1.00 mm	1.00 mm	1.03 mm
b	0.50 mm	0.50 mm	0.30 mm	0.50 mm	0.50 mm	0.75 mm	0.50 mm
3a	1.00 mm	1.25 mm	2.00 mm	1.50 mm	1.00 mm	1.00 mm	1.29 mm
b	1.00 mm	1.00 mm	1.00 mm	1.00 mm	1.00 mm	1.00 mm	1.00 mm
*4	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm

* = measured under tension

Angle of Twist in Ply

Element	Angle of Twist						Mean
1a	-						
b	-						
2a	22°	16°	25°	26°	24°	30°	23.83°
b	30°	26°	49°	50°	45°	48°	41.33°
3a	30°	32°	29°	40°	18°	30°	29.83°
b	10°	10°	28°	25°	15°	17°	17.50°
4	30°	40°	32°	22°	28°	36°	31.33°

Twist per Centimetre

Element	Twist per cm
1a	-
b	-
2a	-
b	-
3a	7.0
b	3.0
4	-

Fibre Diameters: The fibres used in the braided cord and tassel appear to be slightly heavier than 40μ in diameter as compared with control samples. The red and gold yarns of the plied cord and tassel cover appear to be approximately 40μ in diameter.

Esmeralda T-2

Artifact: Belt with two attached tasselled cords.

Identification label: CP 57 Museo Iquique (sewn tag).

Inventory correlation: 22, 36, 37.

Description: Narrow belt with attached tasselled cords (Plate 2 a). The belt was woven as double-cloth (Figure 14) with a warp-faced plain weave construction. Warp direction is indicated by the presence of four thick heading yarns at both narrow ends of the fabric. Alternating warp colour sequences of red/red, beige/gold; red/purple; red/gold combinations have been used to create warp-stripped designs which have been symmetrically arranged and are mirror imaged on both sides of the central stripe. Next to the red/red borders, wide stripes of gold/beige in a zigzag-and-dot pattern are prominent. Beside this zigzag-and-dot stripe, three narrow stripes of red/purple, red/gold, red/purple in a continuous geometric zigzag pattern have been placed, and a central panel containing five stripes of alternating gold/red and red/brown colours are patterned with extended geometric motifs (Plate 2c). Weaving is consistent and has been expertly executed.

A tasselled red and blue braided cord has been secured to each end of the woven textile at approximately 2.5 cm from weft edges by means of a smaller red and blue plied cord (the complete tasselled cords are referred to here as "A" or "B"). This plied cord has been inserted through a folded loop in one end of the tasselled cord as in T-1, and secured to the warp ends of the belt by sewing in place with vegetal fibre yarns (Plate 2 b). An area of vegetal fibre stitching in a similar position on one end of the belt suggests another area of attachment or the presence of another cord, and loose warp yarns in a similar position on the other end of the belt suggests the same. One of the plied cords is loosely tied once and the other remains untied.

The braided cords have been well constructed, and have a soft handle. Red and blue yarns have been braided to form a continuous zigzag pattern along the length of the cord. Two fine and tightly twisted 2-ply yarn fragments (approximately 0.2 mm in diameter) extend from braided cord B; a red yarn fragment is present in a red pattern area and a blue yarn fragment is seen in a blue pattern area. The yarns appear to be much too fine to be part of the cord construction, but are quite securely attached .

The tassels have been constructed of blue and red yarns similar to that of the cords and have been attached to one end of each cord. Colours have been arranged in a two colour sequence with approximately one half of the tassel constructed of red yarn and the other half of blue yarn (Figure 16). Tassel construction is similar to that of T-1, except for the colour arrangement of yarns around the central cords.

The plied cords appear to have been constructed of red and blue skeins of yarn which were then over-twisted, doubled and plied (Figure 17).

This artifact is well preserved, and the warp yarns of the belt and cordage proper are all intact. Some weft breakage, however, is evident on the belt and several small stained areas are noted on both cords.

Overall Measurements

Measured area	Measurements			Mean
Length woven belt	113.50 cm	113.80 cm	113.70 cm	113.67 cm
Width woven belt	10.00 cm	10.30 cm	10.50 cm	10.27 cm
* Length cord A	91.00 cm	91.40 cm	91.20 cm	91.20 cm
Diameter cord A	1.30 cm	1.30 cm	1.30 cm	1.30 cm
Length tassel A	8.00 cm	8.50 cm	8.20 cm	8.23 cm
**Diameter tassel A	3.50 cm	4.00 cm	5.00 cm	4.16 cm
Width tassel cover A	0.80 cm	1.00 cm	1.20 cm	1.00 cm
Diameter tassel cover A	2.40 cm	2.50 cm	2.60 cm	2.50 cm
Length plied cord A	31.50 cm	33.00 cm	32.10 cm	32.20 cm
Diameter plied cord A	0.40 cm	0.30 cm	0.40 cm	0.36 cm
Length cord B	91.50 cm	91.50 cm	91.70 cm	91.56 cm
Diameter cord B	1.50 cm	1.40 cm	1.50 cm	1.46 cm
Length tassel B	8.40 cm	9.00 cm	9.50 cm	8.96 cm
**Diameter tassel B	3.50 cm	4.40 cm	5.00 cm	4.30 cm
Width tassel B cover	1.00 cm	1.20 cm	1.40 cm	1.20 cm
Diameter tassel B cover	2.80 cm	2.80 cm	2.80 cm	2.80 cm
Length plied cord B	32.40 cm	32.80 cm	33.60 cm	32.93 cm
Diameter plied cord B	0.50 cm	0.40 cm	0.30 cm	0.40 cm

* = cords measured to beginning of tassel ** = approximate

Structural Dimensions

Dimension	Measurements						Mean
*Warps/cm	36.00	28.00	44.00	28.00	32.00	36.00	34.00
*Wefts/cm	5.00	5.00	5.00	5.00	5.00	5.00	5.00

* = single face

Element Description

Two main sets of elements were used to construct this textile: 1) yarns used as warp and 2) yarns used as weft. Sets of single elements were also utilized using strands or skeins of yarns to construct 3) the braided cord and 4) the plied cord. Accessory elements: 5) yarns that have been grouped together to form the body of the tassel, 6) sewing elements utilized to stabilize the tassel and 7) sewing elements used to sew tasselled cords to the woven belt were also utilized.

warp:

- 1a: red coloured 2-ply Z-spun S-plyed camelid yarn.
- b: gold coloured 2-ply Z-spun S-plyed camelid yarn.
- c: beige coloured 2-ply Z-spun S-plyed camelid yarn.
- d: blue coloured 2-ply Z-spun S-plyed camelid yarn: This yarn is

- noticeably heavier than the other warp yarns.
- weft: 2: dark brown coloured 2-ply camelid weft yarn. Twist and ply were not available as yarn was buried within the textile, but it appears to be a 2-ply yarn with probable S-spun Z-ply construction.
- *braided cord: 3a: red coloured camelid yarn: spin and ply undetermined (see T-1).
b: blue coloured camelid yarn: spin and ply undetermined (see T-1).
- *plied cord: 4a: red coloured 2-ply Z-spun S-ply camelid yarn.
b: blue coloured 2-ply Z-spun S-ply camelid yarn.
- *tassel: 5a: red coloured 2-ply Z-spun S-ply camelid yarn.
b: blue coloured 2-ply Z-spun S-ply camelid yarn.
- *tassel cover: 6: natural light coloured 2-ply Z-spun S-ply camelid yarn utilized to form and stabilize the tassel and forms a "ring" becoming a part of the tassel.
- sewing yarn: 7: natural light coloured 2-ply Z-spun S-ply vegetal yarn.
- * (A)= indicates elements from cord A, and (B)= indicates elements from cord B

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
*1a (selvedge)	5R 3/6	-
(centre stripes)	2.5R 4/10	-
b	2.5Y 7/10	-
c	2.5Y 7/4	-
d	10PB 2.5/2	-
2	10YR 2.5/1	-
3a(A)	2.5R 4/10	-
b	10PB 5/2	-
3a(B)	2.5R 4/10	-
b	10PB 5/2	-
4a(A)	2.5R 4/10	-
b	10PB 5/2	-
4a(B)	2.5R 4/10	-
b	10PB 5/2	-
5a(A)	2.5R 4/10	-
b	10PB 5/2	-
5a(B)	2.5R 4/10	2.5R 4/8
b	10PB 5/2	10RP 2.5/1
6(A)	5Y 7/2	-
6(B)	5Y 7/2	2.5Y 9/2
7	10YR 7/2	-

*Colour is not exact. There are actually three different reds used in this warp; one on the

selvage and two in the centre stripes, though the latter two are quite similar.

Fading of some of the colours was noted, particularly at the ends of the tassels. Colours on the inside of the tassel appear to be identical to those of the cord at the cord-tassel junction, which may indicate that they are from the same yarn/dye sources. Of interest is that most of the warp yarn fibres are quite lustrous, but some, such as the gold yarns, are quite dull.

Yarn Diameter							
Element	Diameters						Mean
1a	0.30 mm	0.30 mm	0.50 mm	0.30 mm	0.30 mm	0.30 mm	0.33 mm
b	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm
c	0.50 mm	0.50 mm	0.50 mm	0.75 mm	0.30 mm	0.50 mm	0.50 mm
d	1.00 mm	1.00 mm	1.00 mm	1.00 mm	1.00 mm	1.00 mm	1.00 mm
2	2.00 mm	1.20 mm	1.20 mm	-	-	-	1.46 mm
3 (all)	-						
4a (A)	0.50 mm	0.30 mm	0.50 mm	0.50 mm	0.75 mm	0.75 mm	0.55 mm
b	0.50 mm	0.75 mm	0.75 mm	0.50 mm	0.50 mm	0.75 mm	0.63 mm
4a (B)	0.50 mm	0.30 mm	0.50 mm	0.50 mm	0.75 mm	0.75 mm	0.55 mm
b	0.50 mm	0.75 mm	0.75 mm	0.50 mm	0.50 mm	0.75 mm	0.63 mm
5a(A)	0.50 mm	0.25 mm	0.30 mm	0.25 mm	0.50 mm	0.30 mm	0.35 mm
b	0.25 mm	0.50 mm	0.30 mm	0.50 mm	0.50 mm	0.30 mm	0.39 mm
5a(B)	0.75 mm	0.50 mm	0.25 mm	0.50 mm	0.25 mm	0.50 mm	0.46 mm
b	1.00 mm	1.00 mm	1.00 mm	1.50 mm	1.20 mm	1.50 mm	1.20 mm
6(A)	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm
(B)	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm
7	0.25 mm	0.25 mm	0.30 mm	0.30 mm	0.25 mm	0.30 mm	0.28 mm

Angle of Twist in Ply

Element	Angle of twist						Mean
1a	22°	-	-	-	-	-	-
b	29°	-	-	-	-	-	-
c	20°	-	-	-	-	-	-
d	22°	-	-	-	-	-	-
2, 3a(A), b, 3a(B), b	-	-	-	-	-	-	-
4a(A)	48°	45°	43°	34°	39°	36°	40.83°
b	54°	58°	50°	56°	50°	62°	55.00°
4a(B)	50°	40°	45°	32°	39°	42°	55.00°
b	45°	54°	64°	67°	64°	52°	57.67°
5a(A)	16°	15°	10°	14°	13°	14°	13.60°
b	22°	06°	04°	08°	06°	02°	8.00°
5a(B)	04°	09°	22°	17°	14°	16°	13.67°
b	16°	12°	14°	15°	12°	15°	14.00°
6(A)	56°	54°	52°	50°	56°	56°	54.00°
(B)	52°	50°	52°	50°	52°	49°	50.83°
7	36°	32°	34°	32°	36°	34°	34.00°

Twist per Centimetre

Element	Twist per cm
5a(A)	12
b	4
5a(B)	4
b	3

all others n/a

Fibre Diameter

All fibres in this artifact appear to be approximately 40μ in diameter as compared with control samples.

Esmeralda T-3

Artifact: Mantle (shawl)

Identification labels:

- 1) Rh-Ce 113b Cerro Esmeralda
- 2) CP 51 Museo regional de Iquique

Inventory correlation: no corresponding size is listed, but may be 71.

Description: This rectangular mantle was woven in two matching panels which were sewn together side to side along weft edges forming a centre seam (Plate 3 a). The textile appears to have been woven using a warp-faced plain weave construction ; warp/weft direction is indicated by the presence of two heading cords on each of two opposite selvages, visible weft selvages, and deterioration of hidden yarns. Decorative features are in the form of warp stripes and complementary-warp patterning. Each panel contains a wide red warp stripe, a narrow red warp stripe, a white warp stripe and a patterned warp stripe produced by the manipulation of complementary-warp yarns. All four selvages have been finished.

This artifact is fairly well preserved, although it is badly stained in some areas and there are two large holes with charred edges in the central white area. Patterning of the burns and stains suggest that the article had been folded in the centre of the white stripe, and may have been worn by one of the interred during the blast that exposed the mummies and their artifacts.

Maroon and white cotton broadcloth has been hand-sewn to one side of this article as a backing.

Overall Measurements

Measured area	Measurements			Mean
Length article	91.20 cm	91.20 cm	92.00 cm	91.50 cm
Width article	144.50 cm	142.00 cm	144.00 cm	143.50 cm
Length white stripe	90.80 cm	91.00 cm	91.80 cm	91.20 cm
Width white stripe	25.00 cm	23.50 cm	23.80 cm	24.10 cm
Length pattern stripes	90.00 cm	90.10 cm	90.00 cm	90.00 cm
Width pattern A	6.70 cm	5.70 cm	5.40 cm	5.90 cm
Width pattern B	6.70 cm	6.20 cm	5.70 cm	6.20 cm
Depth finished edge	0.50 cm			
*Width wide red A	44.00 cm			
*Width wide red B	43.80 cm			
*Width narrow red A	9.90 cm			
*Width narrow red B	9.40 cm			

* = Measurements estimated using a photograph with scale.

Pattern

The most prominent feature of this textile is its red colour which incorporates approximately 74.7% of the textile. What appears to be natural white has been used on approximately 16.8% of the article and about 8.5% is patterned, (and which also includes red). The individual stripes of this triple-stripe patterning are in short lengths of a zigzag-and-dot design. The two outer pattern segments are identical in colour, composition and direction, while with the centre stripe, red and brown colour combinations are used and these patterns are always angled in the opposite direction. Pattern segments are usually in an "N" or "M" configuration and are associated with either several large "dots" or many smaller "dots". For convenience, I refer to this triple stripe patterning as a "tripartite" pattern stripe, to the pattern segments with large dots as "simple" (Plate 3 d), and the pattern segments with smaller dots as "complex" (Plate 3 b).

There are ten pattern segments in the tripartite stripes of both panels. The "zigzags" of the four outside red and gold stripes, are angled in the same direction and the inside brown and red stripe is angled in the opposite direction. The tripartite patterns of the panels are not mirrored but are angled in the same direction, and are all in an "M" configuration (Plate 3 b). The pattern sections are described using the following symbols: C =complex; S =simple; G =gold; R =red. Numbers refer to centimetres. For example "9.5 CGM" refers to a "complex" pattern segment 9.5 centimetres in length of two gold with red and one red with brown "M"s. Side A: 9.5 CGM; 9.3 CRM; 8 SGM; 9 SRM; 10.4 CGM; 10 CRM; 8 SGM; 7.1 SRM; 9 CGM; 7.6 CRM. Side B: 9.5 CGM; 8.5 CRM; 7.3 SGM; 7.3 SRM; 8.7 CGM; 8.5 CRM; 9 SGM; 8.5 SRM; 11 CGM; 8.5 CRM.

Finishing

The edges have been finished using two techniques: both warp edges have been finished using multi-coloured yarns in a cross-knit-loop stitch binding (Plate 3 b). This finishing also extends around all four corners along weft edges for 22.5-23.5 cm. The remaining external weft edge areas, approximately 97.5 cm along each side, are finished with densely packed overcast stitching. Edges have been finished using multi-coloured yarns arranged in a specific order, as follows:

4 gold 4 red 4 gold 4 red 4 gold 3 brown 22 red
 8 gold 4 red 4 gold 4 red 4 gold 18 brown
 4 gold 4 red 4 gold 4 red 4 gold 4 beige 16 red
 3 brown 4 gold 4 red 4 gold 4 red 4 gold 20 beige

This colour arrangement with minor variations appears to have been repeated along all four edges in both finishing techniques. Exceptions to this arrangement are the four corners of the textile, each of which have been finished with beige coloured yarns for approximately one centimetre in both directions, and the natural white warp edges of the central panel which have been finished using matching white yarn.

The two panels have been sewn together with doubled yarn along weft selvages using a figure-8 looping stitch (Figure 13).

Structural Dimensions

Dimension	Measurements			Mean
Warps/cm red A	40	40	42	40.67
Warps/cm red B	40	40	38	39.33
Warps/cm white A	40	38	42	40.00
Warps/cm white B	40	38	36	38.00
Warps/cm pattern A	40	40	38	39.33
Warps/cm pattern B	40	40	40	40.00
Wefts/cm A	6	7	7	6.66
Wefts/cm B	8	7	7	7.33

Element Description

Two principal sets of elements were used in the construction of this textile: 1) yarns used for warp, and 2) yarns used as weft. Two categories of functional accessory stitches were also used: 3) yarns used for edge finishing and 4) yarns used to join seams.

warp: 1a: red coloured 2-ply Z-spun-S-plied camelid yarn.

b: white (light) coloured 2-ply Z-spun S-plied camelid yarn.

c: gold coloured 2-ply Z-spun S-plied camelid yarn.

d: brown coloured 2-ply Z-spun s-plied camelid yarn.

weft: 2: dark brown coloured 2-ply Z-spun S-plied camelid yarn.

edge: 3a: red coloured 2-ply Z-spun S-plied camelid yarn.

b: gold coloured 2-ply Z-spun S-plied camelid yarn.

c: beige coloured 2-ply Z-spun S-plied camelid yarn.

d: dark brown coloured 2-ply Z-spun S-plied camelid yarn.

e: white (light) coloured 2-ply Z-spun S-plied camelid yarn.

Seams: 4: light coloured 2-ply Z-spun S-plied camelid yarn (n/a for close assessment).

Munsell Colour Description

Element	Strongest Colour: in field	Strongest Colour: off site
1a	5R 3/2	5R 3/6
b	10YR 6/4	10YR 7/4
c	7.5Y 6/8	7.5YR 4/6
d	2.5YR 3/1	2.5YR 3/2
2	2.5YR 3/2	2.5YR 3/4
3a	5R 3/6	5R 3/6

Munsell Colour Description continued.

b	10YR 5/3	10YR 6/6
c	7.5YR 3/4	7.5YR 3/4
d	2.5YR 3/2	2.5YR 2.5/2
e	10YR 5/6	-

Yarn Diameter

Element	Diameter						Mean
1a	0.50 mm	0.30 mm	0.50 mm	0.50 mm	0.50 mm	0.30 mm	0.43 mm
b	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.30 mm	0.75 mm	0.51 mm
c	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.75 mm	0.50 mm	0.46 mm
d	0.50 mm	0.25 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.45 mm
2	0.50 mm	0.25 mm	0.75 mm	1.00 mm	0.75 mm	0.50 mm	0.50 mm
3a	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm
b	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm
c	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm
d	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm
e	0.30 mm	0.30 mm	0.30 mm	0.30 mm	0.30 mm	0.30 mm	0.30 mm

Angle of Twist in Ply

Element	Angle of twist						Mean
1a	36°	46°	35°	44°	46°	43°	41.67°
b	31°	42°	38°	36°	49°	37°	38.83°
c	38°	42°	38°	45°	40°	47°	40.00°
d	46°	42°	38°	39°	39°	39°	40.50°
2	42°	43°	40°	42°	41°	43°	41.83°
3a	37°	30°	40°	36°	41°	43°	37.83°
b	44°	43°	35°	48°	43°	51°	44.00°
c	48°	34°	40°	28°	48°	46°	40.67°
d	31°	40°	36°	40°	50°	50°	41.17°
e	43°	32°	40°	46°	32°	36°	38.17°

Twists per Centimetre

Element	Twist Per cm		
1a	11	b	16
c	13	d	24
2	13		
3a	-	b	13
c	-	d	20
e	18		

Fibre Diameters: All fibres in this article appear to be approximately 40 μ in diameter as compared with control samples.

Esmeralda T-4

Artifact: thigh band fragments (2)

Identification label: Rh:2. Ce.1.98

Inventory correlation: possibly 39, 40

Description: Two fragments of circular leg bands produced with a single element looping technique (Plate 6 a). Two colours, dark brown and natural light coloured yarns were used to create zigzag patterning. For reference purposes, the smallest fragment at the bottom of the photo in Plate 6 a is referred to as "A" and the larger fragment at the top of the photo is referred to as "B". Tiny particles of unidentified material (probably leather) are present in some of the loops of both artifacts. Artifact B is illustrated in Morales (1985:61) along with the three bands listed in this catalogue as T-24 A, B, and C, but fragment A was not included in this photo. B was somewhat more circular in shape in the 1985 photo leading to uncertainty as to whether the fragments represented here were from a single artifact or from a pair. Technical variability between the two fragments, plus the estimation of the size of artifact B as similar to the Morales photo, led to the interpretation of the fragments as being from different artifacts, probably a pair. Both fragments are somewhat brittle, particularly in areas in which light coloured yarns were used.

Overall Measurements

Measured area	Measurements			Mean
Inside length: A	15.50 cm	15.80 cm	15.50 cm	15.60 cm
Inside length: B	28.50 cm	28.50 cm	28.60 cm	28.53 cm
Outside length A	21.50 cm	22.00 cm	21.30 cm	21.60 cm
Outside length B	39.00 cm	39.60 cm	40.00 cm	39.53 cm
*Width A	2.50 cm	2.50 cm	2.50 cm	2.50 cm
*Width B	2.50 cm	2.70 cm	2.60 cm	2.60 cm

* = includes "loops"

Structural Dimensions

Measured area	Measurements			Mean
Loops/cm A	5.00	3.00	3.00	3.67
Loops/cm B	4.00	4.00	4.00	4.00

Pattern

Pattern creation in both artifacts has been executed by the use of colour change.

Artifact A was constructed of eleven rows:

5 rows: brown

1 row: repeats of 5 brown, 1 light

1 row: repeats of 4 brown, 2 light

1 row: repeats of 3 brown, 3 light

1 row: repeats of 2 brown, 4 light

1 row: repeats of 1 brown, 5 light

1 row: light

The same pattern was used with artifact B except that only four rows of solid brown were noted.

Element Descriptions:

These articles were produced by the use of single element construction: a single length of yarn was repeatedly crossed over itself and looped into preceding loops to form a fabric.

1a(A): beige coloured 2-ply Z-spun S-plied camelid yarn.

b: dark brown coloured 2-ply Z-spun S-plied camelid yarn.

1a(B): beige coloured 2-ply Z-spun S-plied camelid yarn.

b: dark brown coloured 2-ply Z-spun S-plied camelid yarn.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1a(A)	5YR-2.5/1	-
b	5YR-5/4	-
1a(B)	5YR-2.5/1	-
b	5YR-5/4	-

Yarn Diameters

Element	Diameter						Mean
1a(A)	1.50 mm	1.75 mm	1.25 mm	1.50 mm	1.25 mm	1.25 mm	1.41 mm
b	1.00 mm	1.25 mm	1.00 mm	1.50 mm	2.00 mm	1.00 mm	1.29 mm
1a(B)	1.25 mm	2.00 mm	2.00 mm	1.00 mm	1.75 mm	2.00 mm	1.66 mm
b	2.00 mm	1.50 mm	1.00 mm	1.50 mm	1.25 mm	1.50 mm	1.46 mm

Angle of Twist in Ply

Element	Angle of Twist						Mean
1a(A)	25°	24°	32°	26°	28°	30°	27.50°
b	25°	32°	24°	22°	28°	26°	26.20°
1a(B)	29°	30°	27°	20°	22°	30°	26.30°
b	30°	28°	22°	32°	30°	28°	28.30°

Twist per Centimetre: not available

Fibre Diameters: The fibres used in the construction of this article appear slightly greater in diameter than 40μ as compared with control samples.

Esmeralda T-5

Artifact: knotted cordage

Identification labels: Rh.2. Ce 1.95

Inventory correlation: none apparent.

Description: Two short lengths of dark brown two strand cordage have been knotted together forming a single piece (Plate 1 k). The fragments are fragile, brittle, and contain considerable dirt and debris.

Overall Measurements

Measured area	Measurements			Mean
Length (total) 61.00 cm	62.20 cm	61.40 cm	61.50 cm	61.50 cm
Diameter 0.80 cm	1.50 cm	1.00 cm	1.10 cm	1.10 cm

Element Description

This article has been produced utilizing groups of yarns and, in itself could categorically be considered to be a single element. Each of the two strands are composed of approximately five Z-spun single ply camelid yarns which have been plied in an S direction to form the cordage.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest Colour: off site
1	7.5YR 2.5/2	5YR 3/2

Yarn diameter

element	Diameter						Mean
1(single ply)	2.00 mm	2.00 mm	1.50 mm	2.00 mm	1.50 mm	3.00 mm	2.00 mm

Angle of Twist in Ply

Element	Angle of Twist						Mean
cordage	40°	40°	60°	40°	40°	40°	43.30°

Twist per Centimetre: not available

Fibre diameter: All fibres in this article appear to be approximately 40 μ in diameter as compared with control samples.

Esmeralda T-6

Artifact: textile fragment

Identification: Rh.2. Ce. 1.101

Inventory correlation: none apparent

Description: This very tattered textile fragment (Plate 8 a) appears to have been woven using a weft-faced plain weave construction technique, which is indicated by an area of weft selvedge. There are also remnants of finishing on parts of this selvedge. The natural light coloured warp fibres are particularly brittle, and broken fibres are present in abundance. The construction of the weft yarns, however, appears to be the main factor for the deteriorated state of this textile, as breakage is mostly of weft yarns. It was found that these yarns were quite loosely spun and plied. The spinning and plying of warp yarns is more consistent than of the weft yarns. Weaving has been done with proficiency, however, and finishing is even and well executed.

Overall Measurements

Measured area (irregular)		Measurements			Mean
Length	65.00 cm	48.00 cm	35.00 cm		49.30 cm
Width	27.00 cm	24.00 cm	24.00 cm		25.00 cm

Structural Dimensions

Dimension	Measurements						Mean
Warps/cm	4	4	4	4	4	4	4.00
Wefts/cm	20	22	20	16	24	24	21.00

Finishing: The weft selvedge edge has been finished using a cross knit loop stitch binding technique (Figure 11); in this instance, the rolled edge was first secured with what Vanstan (1967: Figure 18 b) describes as a knot stitch. A cross-knit loop stitch extending around two warp threads (6-7 mm), was then looped around this stitching before passing around the other side of the cloth.

Element Description

Two principal sets of elements were used in the construction of this textile: 1) yarns used as warp threads, and 2) yarns used as weft threads. One functional accessory stitch 3) yarns used for edge finishing was also employed.

warp: 1: light coloured 2-ply Z-spun S-plyed camelid yarn.

weft: 2: dark brown 2-ply Z-spun S-plyed camelid yarn.

edge: 3: dark brown 2-ply Z-spun S-plyed camelid yarn (same colour as weft yarn; very fragile).

Munsell Colour Description

Element	Strongest Colour: in field	Strongest Colour: off site
1	7.5YR 7/6	7.5YR 5/4
2 (a)	5YR 3/2	5YR 3/4
(b)	2.5YR 2.5/2	2.5YR 3/2

There are two distinct colours of weft yarn used in this article, most probably the result of different fibre sources. Approximately 10 cm of what remains of this artifact has been woven with a gray-brown hued yarn while the remaining area (approximately 13-14 cm) has been woven with a reddish hued yarn.

Yarn Diameters

Element	Yarn diameters						Mean
1	1.00 mm	1.00 mm	0.75 mm	0.75 mm	1.00 mm	1.00 mm	0.90 mm
2	1.00 mm	2.00 mm	1.00 mm	1.50 mm	1.00 mm	1.50 mm	1.30 mm
3	-						

Angle of Twist in Ply

Element	Angle of Twist						Mean
1	44°	42°	40°	30°	34°	35°	37.50°
2	22°	22°	04°	13°	12°	02°	12.50°
3	-						

Twists per Centimetre

1	6
2	3
3	-

Fibre Diameter: Most fibres of the warp appear to be slightly greater than 40μ in diameter as compared with control samples. The fibres of weft yarns are heavier than warp yarns and are considerably greater in diameter than 40μ , but less than 110μ .

Esmeralda T-7

Artifact: Braided tasselled cord

Identification labels: Rh 2 Ce 1.129

Inventory correlation: non specific: 27-35

Description: Braided cord with tassel (Plate 1 d).

Red and gold yarns have been braided to form a continuous zigzag pattern along the length of the cord, and a large tassel that appears to have been constructed of the same yarns as the cord has been attached to one end. The tassel yarns have been arranged in two sections around the cord with red and gold yarns arranged in four areas around the outside, and in two areas in the interior (Figure 16), and is similar to the T-1 tassel other than the colour arrangement around the cord. A smaller two strand plied cord (Figure 17) has been looped through the other rounded end. This textile is fairly well preserved, although colours are faded and stained. One broken area was noted in the cordage proper, and the natural coloured fibres of the tassel cover are brittle and quite fragile.

There is evidence of expertise in all aspects of the production of this artifact. Yarns of the cord appear to be, for the most part, evenly spun; and pattern size and direction are also consistent. The cord, though well constructed, has a somewhat stiff handle, possibly the result of staining. It was also noted that this artifact is most similar in size and proportion to T-38.

Overall Measurements

Measured area	Measurements			Mean
* Length cord	111.70 cm	112.50 cm	112.50 cm	112.30 cm
Diameter cord	2.00 cm	2.00 cm	2.00 cm	2.00 cm
Length tassel	11.00 cm	11.10 cm	11.50 cm	11.20 cm
** Diameter tassel	6.50 cm	9.00 cm	12.00 cm	9.20 cm
Width tassel cover	1.50 cm	2.20 cm	2.40 cm	2.00 cm
Diameter tassel cover	4.50 cm	4.00 cm	4.00 cm	4.20 cm
Length plied cord	42.50 cm	43.50 cm	44.00 cm	43.30 cm
Diameter plied cord	0.70 cm	0.70 cm	0.80 cm	0.70 cm

* = measured to beginning of tassel ** = approximate

Structural Dimensions

Measured area	Measurements						Mean
Length braid loop	2.00 cm	2.00 cm	1.70 cm	2.00 cm	2.00 cm	2.00 cm	1.95 cm
Width braid loop	0.70 cm	1.00 cm	0.60 cm	1.00 cm	1.00 cm	1.00 cm	0.88 cm

Element Description

The article has been produced mainly with sets of single elements: strands of yarns which have been utilized to construct 1) the braided cord and, 2) the smaller plied cord; and 3) yarn lengths that have been grouped together to form the body of the tassel. A fourth element, yarns utilized to stabilize the tassel are classified as sewing elements.

braided cord: 1a: red coloured camelid yarn; undetermined spin and ply.
 b: gold coloured camelid yarn; undetermined spin and ply .
 plied cord: 2a: red coloured 2-ply Z-spun S-plied camelid yarn.
 b: gold coloured 2-ply Z-spun S-plied camelid yarn.
 tassel 3a: red coloured 2-ply Z-spun S-plied camelid yarn.
 b: gold coloured 2-ply Z-spun S-plied camelid yarn.
 tassel cover: 4: natural light coloured 2-ply Z-spun S-plied camelid yarn.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1a	7.5R 4/6	7.5R 3/6
b	2.5Y 7/6	10YR 5/6
2a	7.5R 3/6	7.5R 3/6
b	2.5Y 7/8	-
3a	7.5R 5/6	-
b	2.5Y 7/8	-
4	10YR 8/2	10YR 8/4

Yarn Diameter

Element	Diameter						Mean
1a	-						
b	-						
2a	0.50 mm	0.50 mm	0.30 mm	0.50 mm	0.75 mm	0.50 mm	0.50 mm
b	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.75 mm	0.54 mm
3a	2.00 mm	2.00 mm	3.00 mm	3.00 mm	2.50 mm	3.00 mm	2.59 mm
b	2.00 mm	3.00 mm	1.50 mm(s)	1.30 mm(s)	2.30 mm	2.50 mm	2.10 mm
*4	1.00 mm	1.00 mm	1.00 mm	1.30 mm	0.75 mm	1.00 mm.	1.00 mm

*= measured under tension. (s)= single un-plied yarn.

Angle of Twist in Ply

Element	Angle of Twist						Mean
1a	-						
b	-						
2a	39°	43°	42°	42°	43°	40°	41.50°
b	45°	40°	43°	41°	40°	42°	41.80°
3a	50°	25°	21°	24°	24°	41°	30.80°
b	21°	22°	47°	18°	27°	19°	25.70°
4	47°	42°	49°	46°	40°	39°	43.80°

Twist per Centimetre

1a	-
b	-
2a	4
b	-
3a	3
b	2
4	8

Fibre Diameters: The fibres used in this article appear to be approximately 40μ in diameter as compared with control samples.

Esmeralda T-8

Artifact: Tassel fragment from hair tie

Identification label: Rh 2 Ce 1.96

Inventory correlation: none apparent

Description: Dark brown fragment of a tassel comparable in both structure and colour to those of hair ties of both mummies (Plate 7 b; Figure 21). The article appears to have been constructed by utilizing an untwisted skein of yarn as a central cord and attaching tassels such as this one to both of its ends. Many yarn fragments that appear to have once been a small untwisted skein of yarn extend from the "top" of a central blue binding from which coiled yarn fringes extend. The binding appears to be constructed of a strand of approximately four blue coloured yarns which was used to secure many small skeins of yarn which extend "below" the binding as a tassel. The top of the binding has a braided appearance so was probably constructed using a cross-knit loop stitching technique. Each small skein of the tassel was composed of approximately eight over-twisted two-ply yarns, which double back on themselves each forming a thick fringe element.

There is evidence of skilled workmanship in the production of this artifact. Yarns are evenly and consistently spun; and the article has been assembled with proficiency.

Of interest is that the hair ties of both mummies appear intact.

Overall Measurements

Measured area	Measurements			Mean
Length (total)	15.00 cm	14.00 cm	14.50 cm	14.50 cm
Length fringe	13.00 cm	12.50 cm	13.50 cm	13.00 cm
Width	4.00 cm	3.00 cm	5.00 cm	4.00 cm
Width binding	0.50 cm	0.50 cm	0.50 cm	0.50 cm
Depth binding stitch	0.50 cm	0.50 cm	0.50 cm	0.50 cm
Depth binding	1.00 cm	1.00 cm	1.00 cm	1.00 cm
*Depth yarn "core"	4.00 cm			

* = approximate.

Element Description

This article has been produced mainly with sets of single elements: 1) strands or small skeins of yarn each of which was utilized as a fringe element, and 2) a large strand or skein of yarn forming a central core. The construction of the blue chain-stitched binder 3) was produced with a single element.

fringe: 1: dark brown 2-ply Z-spun S-plied camelid yarn utilized probably as small skeins as the "fringes" of the tassel.

central core: 2: dark brown 2-ply Z-spun S-plied camelid yarn apparently utilized in untwisted skein form as a central "cord".

binder: 3: blue 2-ply Z-spun S-plied camelid yarn, used to incorporate the fringe components of the tassel.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1	5YR 2.5/1	5YR 3/1
2	5YR 2.5/1	5YR 3/1
3	5B 3/4	5B 3/4

Yarn Diameter

Element	Diameter						Mean
1	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm
2	0.50 mm	0.30 mm	0.40 mm	0.40 mm	0.50 mm	0.40 mm	0.42 mm
3	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm

Angle of Twist in Ply

Element	Angle of Twist						Mean
1	42°	40°	33°	47°	33°	30°	37.50°
2	50°	45°	46°	44°	50°	45°	36.67°
3	37°	38°	40°	39°	38°	40°	38.67°

Twist per Centimetre

1	20
2	-
3	6

Fibre Diameters: The fibres used in this article appear to be approximately 40 μ in diameter as compared with control samples.

Esmeralda T-9

Artifact: Braided tasselled cord

Identification labels: Rh 2.6.1. 130
(tag attached to tassel)

Inventory correlation: possibly 27

Description: Braided cord with attached tassel (plate 1e).

Two different coloured yarns, now brownish in colour but probably originally red and gold, have been braided to form a continuous zigzag pattern along the length of the cord (this is more obvious in photos than it was on site) and a large tassel that appears to have been constructed of the same yarns as the cord has been attached to one end. A smaller two strand plied cord has been looped through the other rounded end in a manner that is different from other cords of this collection (plate 1g; compare with Plate 1c).

The braided cord was first constructed and the plied cord and tassel added later (see description T-1). The plied cord was constructed of a bichrome skein (Figure 17), which would then have been over-twisted, doubled, and plied. An extra plied cord of which a fragment remains, has been attached with a lark's head knot to the braided cord approximately 24.5 cm from the tassel ring and 51 cm from the non-tasselled end (Plate 1f).

This artifact is well constructed with a very soft handle, and there is evidence of skilled workmanship in almost all aspects of the production of this artifact. Yarns are, for the most part, evenly and consistently spun; and pattern direction and size is also consistent. Some of the yarns, however, appear to vary in regards to source; for example yarns of one part of the plied cord have an obvious sheen as compared with some of the others. It was also noted that the natural coloured fibres of the tassel cover are somewhat brittle. This artifact is well preserved, and yarns of the cordage proper are all intact, though discoloured. It was also noted that this artifact is most similar in size and proportion to T-27.

Overall Measurements

Measured area	Measurements			Mean
*Length cord	78.20 cm	78.00 cm	78.50 cm	78.23 cm
Diameter cord	1.80 cm	2.00 cm	2.10 cm	1.97 cm
Length tassel	12.00 cm	12.80 cm	12.70 cm	12.50 cm
**Diameter tassel	4.50 cm	7.00 cm	8.00 cm	6.50 cm
Width tassel cover	1.30 cm	1.30 cm	1.80 cm	1.47 cm
Diameter tassel cover	4.00 cm	2.60 cm	2.50 cm	3.03 cm
Length plied cord	22.00 cm	23.50 cm	23.75 cm	23.75 cm
Diameter plied cord	0.50 cm	0.50 cm	0.60 cm	0.53 cm
Length attached cord	6.20 cm	6.00 cm	6.00 cm	6.06 cm
Width attached cord	0.50 cm	0.50 cm	0.50 cm	0.50 cm

* = measured to beginning of tassel. ** = approximate.

Structural Dimensions

Measured area	Measurements						Mean
Length braid loop	1.60 cm	1.50 cm	1.50 cm	1.80 cm	1.80 cm	1.80 cm	1.67 cm
Width braid loop	1.00 cm	1.00 cm	1.20 cm	1.20 cm	0.80 cm	0.80 cm	1.00 cm

Element Description

This article was produced mainly with sets of single elements: 1) strands of yarns utilized to construct the braided cord, 2) smaller plied cord, and 3) attached cord; and 4) yarn lengths that have been grouped together to form the body of the tassel. Yarns utilized to stabilize the tassel 5) are classified to be sewing elements.

- braided cord: 1a: reddish brown coloured camelid yarn: spin and ply undetermined
b: gold coloured camelid yarn: spin and ply undetermined (see T-1).
- plied cord: 2a: reddish brown coloured 2-ply Z-spun S-plied camelid yarn.
b: gold coloured 2-ply Z-spun S-plied camelid yarn.
- attached cord: 3a: red coloured 2-ply Z-spun S-plied camelid yarn.
b: gold coloured 2-ply Z-spun S-plied camelid yarn.
- tassel: 4a: reddish brown coloured 2-ply Z-spun S-plied camelid yarn.
b: gold coloured 2-ply Z-spun S-plied camelid yarn.
- tassel cover: 5: natural light coloured 2-ply Z-spun S-plied camelid yarn: looped stitches of this yarn have been utilized to form and stabilize the tassel.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1a	10YR 5/8	7.5YR 4/6
b	2.5Y 8/10	-
2a	10YR 5/8	5YR 4/4
b	5YR 4/6	-
3a	7.5R 4/6	10R 3/4
b	10YR 5/8	7.5YR 4/4
4a	10YR 4/4	5YR 4/4
b	-	-
5	2.5Y 7/4	10YR 6/6

Yarn Diameter

Element	Diameter						Mean
1a	-						
b	-						
2a	1.00 mm	1.00 mm	1.20 mm	1.00 mm	1.00 mm	1.00 mm	1.03 mm
b	1.00 mm	1.00 mm	0.75 mm	0.50 mm	0.75 mm	0.75 mm	0.79 mm
3a	0.50 mm	0.50 mm	0.75 mm	1.00 mm	0.75 mm	0.75 mm	0.67 mm
b	1.00 mm	0.50 mm	0.75 mm	0.75 mm	0.50 mm	1.00 mm	0.67 mm
4a	2.00 mm	2.00 mm	2.00 mm	2.00 mm	1.25 mm	2.00 mm	1.88 mm
b	(included with #4a)						
*5	1.00 mm	1.00 mm	0.50 mm	1.00 mm	0.50 mm	0.75 mm	0.96 mm

* = measured under tension

Angle of Twist in Ply

Element	Angle of Twist						Mean
1a	-						
b	-						
2a	45°	36°	39°	40°	37°	40°	39.00°
b	10°	24°	30°	22°	19°	20°	20.83°
3a	21°	29°	19°	25°	31°	47°	28.67°
b	33°	24°	35°	24°	36°	37°	31.50°
4a	40°	22°	17°	29°	26°	30°	27.33°
b	(included with #4a)						
5	45°	32°	34°	27°	27°	31°	32.60°

Twist per Centimetre

1a	-
b	-
2a	8
b	9
3a	8
b	10
4a	3.5
b	-
5	6

Fibre Diameters: The fibres used in this article appear to be approximately 40 μ in diameter as compared with control samples.

Esmeralda T-10

Artifact: Braided tasselled cords (2)

Identification label: Rh 2 Ce 1.94

Inventory correlation: non specific: two of 27-35

Description: Two braided cords with attached tassels that have been twisted together with a square knot. Red and gold yarns have been braided to form a continuous zigzag pattern along the lengths of both cords (Plate 1 h), and large tassels that appear to have been constructed of the same yarns have been attached to one end of each (Figure 15). There is no obvious colour arrangement of tassel yarns. Two strand bichrome plied cords (Figure 17) have been passed through what appear to be loops in the other rounded ends. A small extra cord of gold yarn has been attached to one cord (identified here as B) by a lark's head knot approximately 9 cm from the plied cord end. The ends of the plied cords have attached fibres suggest attachment to a belt. It is not known if the cords were tied together in this manner in antiquity. These artifacts have a somewhat stiff handle, but there is evidence of skilled workmanship in almost all aspects of production. Yarns of the cords are evenly and consistently spun; pattern direction and size is also consistent in both cords. Yarns of tassel A are more consistent than in B, however, and some yarns in tassel B are single ply. The light coloured yarns used to construct tassel covers are very skilfully spun. These artifacts are most similar in size and proportion to each other, so are most probably a pair.

Overall Measurements

Measured area	Measurements			Mean
** Length (total)	103.00 cm	104.50 cm	103.00 cm	103.50 cm
* Length cord A	119.00 cm	118.50 cm	118.00 cm	118.50 cm
* Length cord B	116.50 cm	116.70 cm	117.00 cm	116.73 cm
Diameter cord A	1.60 cm	1.70 cm	1.50 cm	1.60 cm
Diameter cord B	1.30 cm	1.80 cm	1.50 cm	1.53 cm
Length tassel A	10.00 cm	11.00 cm	11.00 cm	10.67 cm
Length tassel B	11.50 cm	12.00 cm	11.50 cm	11.67 cm
** Diameter tassel A	3.20 cm	4.50 cm	7.00 cm	4.90 cm
** Diameter tassel B	3.00 cm	5.00 cm	7.00 cm	5.00 cm
Width tassel cover A	1.80 cm	1.80 cm	1.80 cm	1.80 cm
Width tassel cover B	2.00 cm	2.50 cm	1.80 cm	2.10 cm
Diameter tassel cover A	3.00 cm	2.50 cm	3.00 cm	2.83 cm
Diameter tassel cover B	3.50 cm	2.00 cm	3.40 cm	2.97 cm
Length plied cord A	-			
Length plied cord B	-			

Overall Measurements continued.

Diameter plied cord A	0.40 cm	0.50 cm	0.60 cm	0.50 cm
Diameter plied cord B	0.40 cm	0.50 cm	0.60 cm	0.50 cm

* = measured to beginning of tassel. ** = approximate.

Element Description

These cords have been produced mainly with the use of sets of single elements: 1) strands of yarns utilized to construct the braided cords 2) smaller plied cords, 3) attached cord; and 4) yarn lengths that have been grouped together to form the bodies of the tassels. Accessory yarns utilized to stabilize the tassels 5) are classified as sewing elements.

braided cord: 1a (A): dark reddish coloured camelid yarn: spin and ply undetermined but appears to be a loosely plied 2-ply Z-spun S-plied yarn.

b: gold coloured camelid yarn: spin and ply undetermined but appears to be a loosely plied 2-ply Z-spun S plied yarn.

1a (B): dark reddish coloured camelid yarn: spin and ply undetermined but appears to be a loosely plied 2-ply Z-spun S-plied yarn.

b: gold coloured camelid yarn: spin and ply undetermined but appears to be a loosely plied 2-ply Z-spun S plied yarn.

plied cord: 2a & b (A): red and gold 2-ply Z-spun S-plied camelid yarn.

2a & b (B): red and gold 2-ply Z-spun S-plied camelid yarn.

attached cord: 3 (B): gold coloured 2-ply Z-spun S-plied camelid yarn.

*tassel: 4(A): 2-ply Z-spun S-plied camelid yarn.

(B): 2-ply Z-spun S-plied camelid yarn.

tassel cover: 5(A): natural light coloured 2-ply Z-spun S-plied camelid yarn.

(B): natural light coloured 2-ply Z-spun S-plied camelid yarn.

*accurate colour differentiation was not possible on site.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1a (A)	2.5Y 6/8	10YR 4/6
b	2.5Y 7/8	2.5Y 6/6
1a (B)	2.5Y 8/8	10YR 5/6
b	2.5Y 8/8	10YR 6/8
2 a&b (A)(dark)	2.5Y 6/6	-
2 a&b (B)	2.5Y 7/8	-
4 (A)	5YR 4/4	10YR 4/4
4 (B)	10R 3/4	5YR 6/8
5 (A)	10YR 6/3	10YR 6/4
5 (B)	10YR 6/3	10YR 6/4

Yarn Diameter

Element	Diameter						Mean
1a (A)	-						
b	-						
1a (B)	-						
b	-						
*2 (A)	-						
*2 (B)	-						
3 (B)	1.00 mm	1.00 mm	1.00 mm	0.75 mm	1.00 mm	0.75 mm	0.92 mm
4 (A)	1.25 mm	1.25 mm	1.50 mm	1.00 mm	1.25 mm	1.50 mm	1.29 mm
4 (B)	1.00 mm	2.00 mm	1.50 mm	1.00 mm	1.50 mm	1.00 mm	1.30 mm
5 (A)	0.05 mm	0.30 mm	0.30 mm	0.50 mm	0.30 mm	0.30 mm	0.37 mm
5 (B)	0.30 mm	0.30 mm	0.30 mm	0.30 mm	0.30 mm	0.50 mm	0.33 mm

* = yarns of plied cords similar to the yarns in braided cords.

Angle of Twist in Ply

Element	Angle of Twist						Mean
1a (A)	-						
b	-						
1a (B)	-						
b	-						
2 (A), 2 (B), 3 (B):	-						
4 (A)	16°	22°	19°	24°	35°	26°	23.67°
4 (B)	29°	25°	14°	30°	17°	16°	21.80°
5 (A)	42°	44°	44°	45°	42°	44°	43.50°
5 (B)	43°	43°	44°	46°	45°	44°	44.17°

Twist per Centimetre

1a (A)	-	b	-
1a (B)	-	b	-
2 (A)	9	b	5
3 (B)	-		
4a (A)	6	b	3
4a (B)	3	b	3
5 (A)	16		
5 (B)	18		

Fibre Diameters: The fibres used in this article appear to be approximately 40 μ in diameter as compared with control samples.

Esmeralda T-11

Artifact: Cordage fragments

Identification label: Rh. 2 Ce. 1.93

Inventory correlation: none apparent

Description: Two sizes of natural coloured cordage, each size in several pieces (Plate 1 l). There are five small pieces of thick cordage and one tied bundle of similar but narrower cordage. All have been constructed using a technique that looks similar to a nine strand braid technique as illustrated by Seiler-Baldinger (1994:40). One end of both cords has been braided and also is bound with dark brown yarn using what appears to be a Soumak stitch variation. It is not absolutely clear whether the bundled cordage was assembled in this manner in antiquity.

Both cords have been expertly constructed. The dark brown fibres of cordage A are particularly fragile though the natural coloured fibres of both cords are also easily broken.

Overall Measurements

Measured area	Measurements			Mean
Length A-1	81.00 cm	82.00 cm	81.00 cm	81.30 cm
Length A-2	27.50 cm	27.00 cm	27.60 cm	27.37 cm
Length A-3	28.00 cm	29.00 cm	29.20 cm	28.73 cm
Length A-4	27.00 cm	28.00 cm	28.00 cm	27.67 cm
Length A-5	42.00 cm	43.50 cm	42.50 cm	42.67 cm
Width A	1.00 cm	1.20 cm	1.50 cm	1.23 cm
Length B	-			
Width B	1.00 cm	1.00 cm	1.00 cm	1.00 cm

Note: The fragments of cordage described here have been divided into two groups: A) includes the five thicker cordage fragments pictured on the left of the photo (Plate 1 l), and B) represents the several pieces of narrow cordage bundled together on the right in the photo.

Element Description

These articles may categorically be considered to be elements themselves, but are described here as composed of single sets of elements: 1) yarns braided to form cordage. A functional accessory stitch, 2) Soumak, was used to finish the endings of two of the fragments.

braid: 1 (A): natural light coloured 2-ply Z-spun S-plied camelid yarn.

1 (B): natural light coloured 2-ply Z-spun S-plied camelid yarn.

finish: 2 (A): dark brown 2-ply Z-spun S-plied camelid yarn.

2 (B): dark brown 2-ply Z-spun S-plied camelid yarn.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1 (A)	10YR 7/4	2.5Y 6/4
1 (B)	10YR 7/2	2.5Y 8/2
2 (A)	2.5YR 2.5/4	5YR 3/4
2 (B)	2.5YR 2.5/4	2.5YR 2.5/4 (closest)

Yarn Diameter

Element	Diameter						Mean
1 (A)	2.00 mm	2.00 mm	2.00 mm	2.00 mm	2.00 mm	2.00 mm	2.00 mm
1 (B)	2.00 mm	2.00 mm	1.50 mm	2.00 mm	2.00 mm	2.00 mm	1.92 mm
2 (A)	2.00 mm	2.00 mm	2.00 mm	2.00 mm	2.00 mm	2.00 mm	2.00 mm
2 (B)	2.00 mm	2.00 mm	2.00 mm	2.00 mm	2.00 mm	2.00 mm	2.00 mm

Angle of Twist in Ply

Element	Angle of Twist						Mean
1 (A)	37°	32°	27°	29°	31°	35°	31.83°
1 (B)	24°	36°	34°	31°	30°	32°	31.16°
2 (A)	29°	34°	22°	-	-	-	28.33°
2 (B)	-	-	-	-	-	-	-

Twist per Centimetre: not available.

Fibre Diameters: The fibres used in both A and B braided cords appear to be approximately midway between 40 and 110 μ in diameter. The dark brown yarns used to finish the ends of both cords appear to be approximately 40 μ in diameter, all as compared with control samples.

Esmeralda T-12**Artifact:** leather fragments**Identification labels:** Rh 2 Ce 11.111**Inventory correlation:** none apparent**Description:** Two small fragments of brown organic material that have been identified as leather (Plate 8 c).**Overall Measurements**

Measured area	Measurements			Mean
Length A	6.30 cm	7.50 cm	5.60 cm	6.46 cm
Length B	6.00 cm	4.20 cm	4.00 cm	4.73 cm
Width A	3.00 cm	3.00 cm	2.40 cm	2.80 cm
Width B	2.50 cm	3.80 cm	3.80 cm	3.37 cm

Note: The two fragments have been differentiated by labelling the larger of the two "A" and the smaller one "B".

Munsell Colour Description

Artifact	Strongest Colour: in field	Strongest colour: off site
A	7.5YR 3/2	7.5YR 3/2
B	7.5YR 3/2	7.5YR 3/2

Note: These colours are approximate: several other hues are also present in both fragments.

Esmeralda T-13

Artifact: textile fragments

Identification label: Rh2 Ce 1.105

Inventory correlation: none apparent

Description: Two small woven fragments that appear to be from the same article (Plate 8 d). Both fragments are "faced", that is the yarns woven in one direction for the most part cover the yarns in the other direction. The concealed yarns are medium brown and softly spun while surface yarns are light coloured and quite over-twisted. Because of the over-twisting of the surface yarns, I suspect this to be a warp-faced fabric, but as no selvages remain, this is not conclusive. For the most part the yarns are consistent in spin and diameter, and weaving has been competently executed. The fragments appear to be from the same artifact.

Overall Measurements

Measured area	Measurements			Mean
Length A	9.00 cm	6.40 cm	4.00 cm	6.47 cm
Length B	6.00 cm	6.20 cm	4.60 cm	5.60 cm
Width A	7.30 cm	5.00 cm	2.30 cm	4.87 cm
Width B	7.00 cm	7.50 cm	4.50 cm	6.33 cm

Note: The two artifacts have been identified alphabetically, with "A" representing the slightly larger irregular segment and "B" indicating the smaller of the two.

Structural Dimensions

Measured area	Measurements						Mean
Warps/cm A	16	16	18	18	18	18	17.33
Warps/cm B	18	16	16	18	18	18	17.33
Wefts/cm A	6	5	6.5	6	6	6	5.92
Wefts/cm B	5	6	6	6	6	6	5.83

Element Description

There are two sets of elements used in the construction of these textile fragments: 1) yarns used as warp, and 2) yarns used as weft. As warp/weft direction has not been absolutely determined, surface yarns are considered to be warp threads, and concealed yarns are considered to be weft threads.

warp: 1 (A): natural light coloured 2-ply Z-spun S-plied camelid yarn.

(B): natural light coloured 2-ply Z-spun S-plied camelid yarn.

weft: 2 (A): medium brown 2-ply Z-spun S-plied camelid yarn.

(B): medium brown 2-ply Z-spun S-plied camelid yarn.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1 (A)	10YR 6/4	10YR 5/4
1 (B)	10YR 6/4	10YR 5/4
2 (A)	5YR 6/6	5YR 5/6
2 (B)	5YR 6/6	5YR 5/6

Yarn Diameter

Element	Diameter						Mean
1 (A)	1.00 mm	1.00 mm	1.00 mm	1.00 mm	1.00 mm	1.00 mm	1.00 mm
1 (B)	1.00 mm	1.00 mm	1.00 mm	1.00 mm	1.00 mm	1.00 mm	1.00 mm
2 (A)	1.00 mm	1.00 mm	1.25 mm	1.25 mm	1.50 mm	1.00 mm	1.17 mm
2 (B)	1.50 mm	1.00 mm	1.00 mm	1.00 mm	1.50 mm	1.00 mm	1.17 mm

Angle of Twist in Ply

Element	Angle of Twist						Mean
1 (A)	45°	31°	43°	42°	42°	35°	39.67°
1 (B)	35°	43°	42°	30°	45°	44°	39.83°
2 (A)	13°	10°	22°	31°	18°	15°	18.17°
2 (B)	12°	13°	18°	30°	19°	12°	17.33°

Twist per Centimetre

1 (A)	8
1(B)	-
2 (A)	3
2(B)	-

Fibre Diameters: The fibres used to construct these articles appear to be slightly heavier than 40μ in diameter as compared with control samples.

Esmeralda T-14A

Artifact: Cordage fragments (3)

Identification labels: Rh.2. Ce 1.100

Inventory correlation: none apparent

Description: Three short lengths of dark brown three strand plied cordage (Plate 1 m), all somewhat fragile and brittle. Each fragment is of three-ply construction. For reference purposes, fragments have been labelled alphabetically "A" referring to the topmost artifact in photo, "B" to centrally positioned artifact, and "C" to the fragment at the bottom of the photo. The construction of "C" appears more uniform than that of the others, and artifacts A and B have a softer handle than that of C.

Overall Measurements

Measured area	Measurements			Mean
Length A	16.00 cm	16.00 cm	16.00 cm	16.00 cm
Length B	13.50 cm	13.20 cm	13.00 cm	13.23 cm
Length C	20.00 cm	20.00 cm	21.00 cm	20.33 cm
Diameter A	0.80 cm	1.00 cm	1.00 cm	0.93 cm
Diameter B	1.00 cm	0.80 cm	1.00 cm	0.93 cm
Diameter C	0.70 cm	0.70 cm	0.50 cm	0.63 cm

Element Description

These artifacts have been produced using single sets of elements: 1) yarns spun and plied to form cordage.

- cordage:
- 1 (A): three strands each containing four single ply Z-spun yarns have each been S-plied and then Z-replied to form cordage.
 - 1 (B): three strands each containing four single ply Z-spun yarns have each been S-plied then Z-replied to form cordage.
 - 1 (C): three strands, one containing three single ply Z-spun yarns and two each containing two single ply Z-spun yarns have each been S-plied then Z-replied to form cordage.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest Colour: off site
1 (A)	2.5YR 2.5/4	5YR 3/2
1 (B)	2.5YR 2.5/4	7.5YR 3/2
1 (C)	2.5YR 2.5/4	5YR 3/2

Yarn diameter							
Element	Diameter						Mean
1(A): single ply strand	0.50 cm	0.60 cm	0.50 cm	0.50 cm	0.60 cm	0.50 cm	0.53 cm
	1.50 cm	1.20 cm	1.50 cm	1.50 cm	2.00 cm	2.00 cm	1.62 cm
1(B): single ply strand	0.40 cm	0.50 cm	0.60 cm	0.50 cm	0.60 cm	0.60 cm	0.53 cm
	1.50 cm	2.00 cm	2.00 cm	1.50 cm	1.00 cm	1.50 cm	1.60 cm
1(C): single ply strand	0.30 cm	0.40 cm	0.40 cm	0.30 cm	0.40 cm	0.40 cm	0.37 cm
	-						

Angle of Twist in Ply and Twist per Centimetre : not available.

Fibre diameter: The fibres in this article appear to be approximately 40μ in diameter as compared with control samples.

Esmeralda T-14B

Artifact: textile fragments (2)

Identification labels: Rh 2. Ce 1.100

Inventory correlation: none apparent

Description: Two textile fragments (Plate 3 w) which have been woven using a warp-faced plain weave construction; warp direction is indicated by the presence of two thick dark brown heading cords within finished selvages. The fragments are a rich red in colour, and edge finishing has been done with multi-coloured yarns. All production aspects of both of these articles have been expertly executed. Weft yarns are very brittle and deteriorated with handling, so were unavailable for most testing. These artifacts were originally packaged with 14A, 14C, and 14D, and the white cloth fragments woven in a similar manner to 14C were found closely associated with these artifacts suggesting that they may have originally been part of the same article, perhaps mantle T-47. For reference purposes, these two fragments have been labelled alphabetically, "A" referring to the artifact on the left of the photo and "B" to the one on the right.

Overall Measurements

*Measured area	Measurements			Mean
Length A	22.00 cm	21.50 cm	22.00 cm	21.83 cm
Length B	17.00 cm	17.00 cm	17.00 cm	17.00 cm
Width A	10.00 cm	9.20 cm	9.50 cm	9.570 cm
Width B	6.00 cm	6.0 cm	6.00 cm	6.00 cm

* = Measured at maximum points; accuracy has also been affected by breaks in fabric.

Edge finishing

The edges have been finished using multi-colour yarns in a cross-knit loop stitch binding (figure 11). The colour sequence of this edging is as follows:

4 gold 4 red 4 gold 4 red 4 gold 22 brown

4 gold 4 red 4 gold 4 red 4 gold 4 beige 23 red 4 dark brown

This colour arrangement with minor variations seems to have been used with both fragments (colours difficult to differentiate due to staining). This and the similarity in stitch gauge suggests the two fragments were once part of the same article.

Structural Dimensions

Measured area	Measurements						Mean
Warps/cm A	44	42	36	40	36	44	40.33
Warps/cm B	48	44	52	42	40	38	44.00
Wefts/cm A	8	8	9	7	9	8	8.17
Wefts/cm B	8	7	10	8	8	7	8.00
Stitches/cm A	20	22	22	22	22	22	21.67
Stitches/cm B	22	22	22	22	22	22	22.00

Element Description

Two principal sets of elements were used in the construction of these textile fragments: 1) yarns used as warp and 2) yarns used as weft. One functional accessory stitch 3) yarns used for edge finishing was also employed.

warp:	1 (A): red coloured 2-ply Z-spun S-plied camelid yarn. (B): red coloured 2-ply Z-spun S-plied camelid yarn.
weft	2 (A): brown coloured 2-ply Z-spun S-plied camelid yarn. (B): brown coloured 2-ply Z-spun S-plied camelid yarn.
edges	3a (A): gold 2-ply Z-spun S-plied camelid yarn. b: brown 2-ply Z-spun S-plied camelid yarn. c: maroon 2-ply Z-spun S-plied camelid yarn. 3a (B): gold 2-ply Z-spun S-plied camelid yarn. b: brown 2-ply Z-spun S-plied camelid yarn. c: maroon 2-ply Z-spun S-plied camelid yarn.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1(A)	5R 3/6	7.5R 3/6
1(B)	5R 3/6	7.5R 3/6
2(A)	2.5YR 2.5/4	-
2(B)	-	-
3a (A)	10YR 5/5	-
b	10YR 2/2	2.5YR 2/2
c	5R 2/2	7.5YR 3/4
3a (B)	10YR 5/5	-
b	10YR 2/2	2.5YR 2/2
c	5R 2/2	5YR 3/3

Yarn Diameter

Element	Diameter						Mean
1(A)	0.30 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.47 mm
1(B)	0.30 mm	0.50 mm	0.50 mm	0.30 mm	0.50 mm	0.30 mm	0.40 mm
2(A)	-						
2(B)	-						
*3(A)	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.30 mm	0.50 mm	0.47 mm
*3(B)	0.50 mm	0.50 mm	0.30 mm	0.50 mm	0.50 mm	0.50 mm	0.47 mm

* = measured as a group.

Angle of Twist in Ply

Element	Angle of Twist						Mean
1 (A)	28°	41°	27°	29°	28°	36°	31.50 °
1(B)	40°	42°	27°	20°	26°	26°	30.16°
2(A)	-						
2(B)	-						
*3(A)	45°	43°	22°	26°	28°	39°	33.83°
*3(B)	47°	42°	30°	20°	33°	40°	35.33°

Twist per Centimetre

1 (A)	15
2(A)	-
3(A)	10
1 (B)	14
2(B)	-
3(B)	7

Fibre Diameters: The fibres used in the production of these articles appear to vary between approximately 24 and 40 μ in diameter as compared with control samples.

Esmeralda T-14C

Artifact: textile fragments

Identification labels: Rh 2 Ce. 1.100

Inventory correlation: none apparent

Description: small fragments of natural white coloured textile (plate 3 x), which have been woven using a warp-faced plain weave construction; warp direction is indicated by the presence of weft selvages. Edge finishing has been executed with similar white coloured yarns. All production aspects of these articles have been expertly executed. The light coloured fibres of these artifacts are extremely brittle, and deteriorate with handling. These artifacts were originally packaged with 14A, 14B, and 14D.

The three largest fragments are discussed here. For reference purposes, they have been labelled alphabetically, "A" referring to the artifact on the top of the photo, "B" to the fragment in the centre, and "C" to the one at the bottom of the photo. For the most part, however, the fragments have been considered together.

Overall Measurements

Measured area	Measurements			Mean
Length A (maximum)	25.0 cm	24.6 cm	24.8 cm	24.8 cm
Length B (maximum)	9.5 cm	10.0 cm	10.0 cm	9.83 cm
Length C	9.0 cm	9.0 cm	9.2 cm	9.06 cm
Width A	1.5 cm	2.0 cm	1.5 cm	1.67 cm
Width B	1.0 cm	1.5 cm	1.0 cm	1.17 cm
Width C	7.0 cm	6.0 cm	6.0 cm	6.33 cm

Structural Dimensions

Measured area	Measurements						Mean
Warps/cm	34	34	35	34	35	34	34.33
Wefts/cm	6	6	7	6	7	6	6.33

Note: The three fragments are considered to have been part of the same artifact and the above measurements are a composite of the three.

Edge finishing: The edges have been finished using an overcast stitch. Approximately 18 stitches/cm have been stitched around approximately 20 rolled warp threads resulting in a smooth rounded edge approximately 0.5 cm in diameter.

Element Description

Two principal sets of elements were used in the construction of this textile: 1) yarns used as warp, and 2) yarns used as weft. Functional accessory stitches 3) yarns used for edge finishing, were also employed.

warp: 1 (A,B,C): natural white coloured 2-ply Z-spun S-plyed camelid yarn.
 weft: 2 (A,B,C): dark brown coloured 2-ply Z-spun S-plyed camelid yarn.
 edge: 3: natural white coloured 2-ply Z-spun S-plyed camelid yarn.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1	2.5Y 7/4	2.5Y 8/4
2	2.5YR 3/2	2.5YR 3/2
3	10YR 8/4	10YR 8/4

Yarn Diameter

Element	Diameter						Mean
1	0.50 mm	0.50 mm	0.30 mm	0.50 mm	0.50 mm	0.30 mm	0.43 mm
2	1.00 mm	1.00 mm	0.75 mm	0.50 mm	0.75 mm	1.00 mm	0.83 mm
3	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.30 mm	0.50 mm	0.47 mm

Angle of Twist in Ply

Element	Angle of Twist						Mean
1	45°	32°	40°	36°	40°	37°	38.33°
2	20°	23°	27°	29°	32°	29°	26.67°
3	37°	30°	42°	37°	29°	30°	34.17°

Twist per Centimetre

1	15
2	12
3	15

Fibre Diameters: The fibres used in the production of this article all appear to be approximately 40 μ in diameter as compared with control samples.

Esmeralda T-14D

Artifact: textile fragment

Identification labels: Rh 2 Ce. 1.100

Inventory correlation: none apparent

Description: triangular shaped red and dark brown textile fragment which has been produced using a single element looping technique (Plate 8 e). The top edge on the right side and edge along lower left side have shaped edges that appear to have been formed by increasing or decreasing stitches.

For reference purposes, the fragment edges have been labelled alphabetically, "A" referring to the top red edge, (the lighter coloured area along the top in photo); "B" to the left edge; and "C" to the right edge.

Overall Measurements

Measured area	Measurements			Mean
Length red edge A	8.0 cm	8.0 cm	8.0 cm	8.00 cm
Length edge B	8.5 cm	8.4 cm	8.5 cm	8.47 cm
Length edge C	8.0 cm	8.0 cm	8.2 cm	8.07 cm

Structural Dimensions

Measured area	Measurements						Mean
Stitches/cm	2.5	3.0	3.0	3.0	2.5	2.5	2.75

Element Description

This article has been produced entirely with the use of single elements: yarns used in simple looping stitches.

single element:

1a: red coloured 3-ply Z-spun S-plied camelid yarn.

b: dark brown coloured 3-ply Z-spun S-plied camelid yarn.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1a	2.5R 3/6	2.5R 3/6
b	2.5YR 2.5/4	5YR 3/2

Yarn Diameter							
Element	Diameter						Mean
1a	3.0 mm	3.0 mm	3.0 mm	3.0 mm	2.0 mm	3.0 mm	2.83 mm
b	4.0 mm	4.0 mm	3.0 mm	3.0 mm	4.0 mm	3.0 mm	3.50 mm

Angle of Twist in Ply: not available.

Twist per Centimetre	
1a	4
b	-

Fibre Diameters: The fibres used in the production of this article appear to be approximately 40μ in diameter as compared with control samples.

Esmeralda T-15**Artifact:** textile fragments (2)**Identification labels:** Rh 2. Ce 1.100**Inventory correlation:** none apparent

Description: Two textile fragments which have been woven using a warp-faced plain weave construction (plate 3 y and Plate 8 f). Warp direction is indicated by the presence of two thick dark brown heading cords within finished selvages. The fragments are both a rich red in colour, and edge finishing has been done with polychrome yarns. All production aspects of these articles have been expertly executed. Weft yarns are very brittle and deteriorated with handling, so were unavailable for testing. White cloth fragments and loose yarns (see Plate 3 x) were found in close association with these artifacts suggesting that they may have originally been part of the same article, most probably a mantle (possibly T-47).

For reference purposes, the two fragments have been labelled alphabetically, "A" referring to Plate 3 y, and "B" refers to Plate 8 f.. The white areas on "B" are from insect infestation; there were numerous larvae casings present (possibly silverfish) but no actual evidence of damage to the textile was noted (this artifact was, however isolated in a sealed zip-lock bag). "B" was not assessed for all details.

Overall Measurements

Measured area	Measurements			Mean
Length A	33.0 cm	32.9 cm	33.0 cm	32.97 cm
Width A	6.0 cm	6.0 cm	6.0 cm	6.00 cm

Structural Dimensions

Measured area	Measurements						Mean
Warps/cm A	42	44	44	48	40	42	43.33
Wefts/cm A	8	7	8	7	7	7	7.33
Stitches/cm A	22	22	22	22	22	22	22.00
Stitches/cm B	22	22	22	22	22	22	22.00

Edge finishing: The edges of both fragments have been finished with polychrome yarns using cross-knit-looping (figure 10). The colour sequence of this stitching is as follows:

A: 16 yellow; 3 gold; 3 red; 3 gold; 4 brown;

24 red; 4 yellow;

16 red; 4 gold; 4 red; 4 gold

18 brown; 2 gold; 4 red; 4 gold; 4 red; 4 gold; 4 yellow

B: 20 dark brown; 3 gold; 3 red; 2 gold; 2 red; 4 gold; 3 yellow;
 20 red; 3 brown; 3 gold; 3 red; 3 gold; 3 red; 4 gold;
 18 yellow; 3 gold; 3 red; 3 gold; 3 red; 4 gold; 3 brown;
 18 red 4 yellow; 3 gold; 3 red; 2 gold; 4 red; 3 gold;

Element Description

Two main sets of elements have been utilized to construct these articles: 1) yarns used as warp, and 2) yarns used as weft. Functional accessory elements 3) yarns utilized for edge finishing, were also employed.

warp: 1(A): red coloured 2-ply Z-spun S-plyed camelid yarn.
 1(B): red coloured 2-ply Z-spun S-plyed camelid yarn.
 weft 2(A): brown coloured 2-ply Z-spun S-plyed camelid yarn.
 2(B): brown coloured 2-ply Z-spun S-plyed camelid yarn.
 edge: 3 a(A&B) gold 2-ply Z-spun S-plyed camelid yarns.
 b (A&B) brown 2-ply Z-spun S-plyed camelid yarns.
 c (A&B) yellow 2-ply Z-spun S-plyed camelid yarns.
 d (A&B) red 2-ply Z-spun S-plyed camelid yarns.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1(A)	7.5R 3/6	7.5R 3/6
2(A)	2.5YR 3/2 (closest)	-
3 a(A)	10YR 7/8	-
b(A)	10YR 3/2	-
c(A)	10YR 4/4	10YR 4/6
d(A)	7.5R 3/6	7.5R 3/6

Yarn Diameter

Element	Diameter						Mean
1(A)	0.3 mm	0.5 mm	0.5 mm	0.3 mm	0.3 mm	0.3 mm	0.37 mm
2(A)	-						
3(all)	0.3 mm	0.3 mm	0.3 mm	0.3 mm	0.3 mm	0.3 mm	0.30 mm

Angle of Twist in Ply

Element	Angle of Twist						Mean
1(A)	35	44°	36°	35°	30°	28°	34.83°
2(A)	-						
3(all)	33	32°	22°	30°	40°	38°	32.50°

Twist per Centimetre

1(A)	17
2(A)	-
3(all)	14

Fibre Diameters: The fibres used in the construction of this article appear to be between 24 and 40 μ in diameter as compared with control samples.

Esmeralda T-16

Artifact: twined bag

Identification label: Rh 2. Ce. 1.92

Inventory correlation: #49

Description: Thick, tightly twisted weft-twined bag (plate 4 a and b). The warp threads have deteriorated and are broken in so many places that the artifact is now in two fragments. Twining has been executed in a Z direction, and side seams are not evident which suggests that the bag has been twined tubular fashion. The bottom edge was unavailable for inspection as it was finished with heavy embroidered stitching. The top bag edge appears to be a warp selvedge, as it is thicker and has the appearance of heading yarns under a rather crudely executed overcast stitch (Plate 4 b). A length of dark brown cordage has been attached to the top edge, and both top and bottom edges appear to have been finished with the same calibre of yarns. Superior craftsmanship is demonstrated in the spinning and twining of this article, but the execution of the finishing of the article was much less proficient. Of interest is that weft-wise "bands" of slightly different colour hues were noted, yet yarns appear to have been all spun and twined in the same direction. The most plausible explanation is the use of yarns or fibres from different sources that may have been slightly different in colour.

Also of interest is the presence of a quantity of what appear to be small cone-shaped seeds approximately 3-4 mm in diameter in the interior of the bag.

For reference purposes, the smaller bag fragment has been identified as "A" and the larger fragment, which consists of most of the artifact has been identified as "B".

Overall Measurements

Measured area	Measurements			Mean
Length A	32.10 cm	30.50 cm	29.80 cm	30.80 cm
Length B	4.80 cm	5.80 cm	5.00 cm	5.20 cm
Total length				36.00 cm
Width A	25.20 cm	25.30 cm	25.70 cm	25.40 cm
Width B	24.20 cm	24.00 cm	24.00 cm	24.06 cm
Mean width				24.73 cm
Depth top edge	0.60 cm	0.50 cm	0.60 cm	0.56 cm
Depth bottom edge	2.50 cm	3.00 cm	3.00 cm	2.83 cm
Bottom edge(back)	2.00 cm	2.00 cm	6.00 cm	3.33 cm
Depth side stitching	5.50 cm	5.60 cm	5.50 cm	5.53 cm
Side stitching (back)	5.50 cm	6.00 cm	5.70 cm	5.73 cm

Structural Dimensions

Measured area	Measurements						Mean
Warps/cm	4	4	4	4	4	4	4.00
Twists/cm	5	6	5	6	5	6	5.50

Finishing: Finishing of the bottom of the bag has been achieved with several rows of chain stitch embroidery. Overcast stitching of the bag top has been executed by looping approximately three stitches between each warp thread. This edge is quite irregular but there are approximately 6-7 stitches per centimetre. All four corners have been finished using a thick herringbone stitch .

The cordage has been attached by looping it under the overcast edge then up through the cord centre. Loops are approximately 2.5-3 cm. apart (Plate 4 b).

Element Description

Two main sets of elements were used to construct this article: 1) yarns used for warp and 2) yarns used for twined weft. In addition to these, 3) decorative accessory elements have been used to decorate the bag, and 4) functional accessory elements have been utilized to finished the top edge. A fifth category, cordage, has been employed as an added structure.

warp: 1: natural coloured 2-ply Z-spun S-plyed camelid yarn.
 weft: 2: natural coloured 2-ply Z-spun S-plyed camelid yarn.
 edge: 3: dark brown 2-ply Z-spun S-plyed camelid yarn.
 top edge 4: dark brown 2-ply Z-spun S-plyed camelid yarn.
 attached cordage: 5: dark brown 2-strand cordage each constructed of 3-ply Z-spun S-plyed Z-replied camelid yarn.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1	10YR 5/4	2.5Y 7/4
2	10YR 7/4	2.5Y 6/4
3	10YR 2/2	5YR 3/2
4	10YR 2/2	5YR 3/2
5	10YR 2/2	5YR 3/2

Yarn Diameter

Element	Diameter						Mean
1	2.00 mm	2.00 mm	2.00 mm	2.00 mm	2.00 mm	2.00 mm	2.00 mm
2	1.50 mm	2.00 mm	1.50 mm	1.50 mm	1.50 mm	1.50 mm	1.58 mm
3	1.50 mm	1.50 mm	1.50 mm	1.50 mm	1.50 mm	1.50 mm	1.50 mm
4	2.50 mm	2.50 mm	2.00 mm	2.00 mm	2.50 mm	2.00 mm	2.25 mm
5	3.00 mm	3.00 mm	3.00 mm	2.50 mm	3.00 mm	2.50 mm	2.83 mm

Angle of Twist in Ply

Element	Angle of Twist						Mean
1	39	40	36	38	48	44	40.83
2	- (yarn twist distorted by twining)						
3	-						
4	-						
5	-						

Twist per Centimetre

1	6
2	-
3	2
4	-
5	-

Fibre Diameters: Most of the fibres used in the warp and weft of this article appear to be similar to, but less than 110μ in diameter. Fibres utilized in yarns of the trim and cordage appear closest to 40μ in diameter, all as compared with control samples.

Esmeralda T-17

Artifact: small bag

Identification label: Rh 2 Ce. 1.91

Inventory correlation: 55

Description: Small fragmented cream and brown coloured woven bag (Plate 4 c and d). This artifact has been woven using a warp-faced plain weave construction and utilizing three units of two narrow dark brown warp stripes (6 ends each) as pattern features which have been evenly spaced across the warp. Two heading cords within the bound edge, and visible weft edges confirm warp/weft direction. Side seams have been finished, and top edge has been reinforced with overcast stitching. A length of cream coloured cordage has been attached and loosely looped along the top edge. Spinning, weaving and finishing have all been beautifully executed. This bag is heavily stained and fragmented, and small specks of dirt are attached to both interior and exterior surfaces. Fibres are very brittle, except in an unstained area near the top of the bag which is quite soft.

Overall Measurements

Measured area	Measurements			Mean
Length	31.00 cm	31.00 cm	31.00 cm	31.00 cm
Width (incomplete)	20.00 cm	21.00 cm	19.00 cm	20.00 cm
Width brown stipes	0.15 cm	0.15 cm	0.15 cm	0.15 cm
Width brown stripe units	0.50 cm	0.50 cm	0.50 cm	0.50 cm
Width natural stripes	6.00 cm	6.00 cm	6.00 cm	6.00 cm
Width bound edge	0.30 cm	0.30 cm	0.30 cm	0.30 cm

Finishing: The top edge has been reinforced with overcast stitching around the two heading yarns, and side seams have been finished with figure-eight stitching arranged in a three thread zigzag design (similar to Figure 20). A loosely plied light coloured cordage has been attached to the top corner edge of a side seam with a lark's head knot, and then joined to the top edge by looping under the overcasting and then back through the centre of the cordage. These loops were placed at approximately three cm intervals.

Structural Dimensions

Measured area	Measurements						Mean
Warps/cm	36.0	38.0	42.0	36.0	38.0	40.0	38.33
Wefts/cm	5.0	5.5	6.0	7.0	7.0	5.0	5.92

Element Description

Two main sets of elements were used to construct this article: 1) yarns used for warp and 2) yarns used for weft. In addition 3) functional accessory elements have been used to join side seams, and 4) to finished the top edge. Cordage 5), has been employed as an accessory structure.

warp:	1a: natural coloured 2-ply Z-spun S-plyed camelid yarn. b: dark brown coloured 2-ply Z-spun S-plyed camelid yarn.
weft:	2: natural coloured 2-ply Z-spun S-plyed camelid yarn.
side edge:	3: dark brown 2-ply Z-spun S-plyed camelid yarn.
top edge:	4: natural coloured 2-ply Z-spun S-plyed camelid yarn.
cordage:	5: natural coloured 2-ply Z-spun S-plyed camelid yarn

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1a	10YR 7/4	2.5Y 7/4
b	10YR 2/1	10YR 2.5/1
2	10YR 7/4	2.5Y 7/4
3	10YR 2/1	10YR 2.5/1
4	2.5Y 8/4	2.5Y 8/4
5	10YR 7/4	2.5Y 7/4

Yarn Diameter

Element	Diameter						Mean
1a	0.50 mm	0.30 mm	0.30 mm	0.50 mm	0.30 mm	0.50 mm	0.40 mm
b	0.50 mm	0.30 mm	0.30 mm	0.30 mm	0.50 mm	0.50 mm	0.40 mm
2	1.00 mm	1.00 mm	1.00 mm	0.50 mm	0.50 mm	1.00 mm	0.83 mm
3	0.50 mm	0.50 mm	0.30 mm	0.50 mm	0.30 mm	0.50 mm	0.43 mm
4	0.50 mm	0.30 mm	0.50 mm	0.50 mm	0.30 mm	0.50 mm	0.43 mm
5	5.00 mm	5.00 mm	4.00 mm	4.00 mm	3.50 mm	4.00 mm	4.25 mm

Angle of Twist in Ply

Element	Angle of Twist						Mean
1a	37°	35°	38°	33°	35°	36°	35.67°
b	38°	32°	35°	36°	35°	34°	35.00°
2	30°	35°	36°	34°	32°	36°	33.83°
3	38°	32°	35°	36°	35°	34°	35.00°
4	32°	34°	35°	35°	36°	32°	34.00°
5	10°	12°	10°	-			10.67°

Twist per Centimetre

1a	14
b	14
2	11
3	-
4	10
5	2

Fibre Diameters: The fibres used in the warp, weft and accessory yarns of this article appear to be approximately 40μ in diameter, and fibres in the attached cord appear to be slightly less than 110μ , all as compared with control samples.

Element Description

Two main sets of elements were used to construct this article: 1) yarns used for warp and 2) yarns used for weft. In addition 3) functional accessory elements have been used to join side seams, and 4) to finished the top edge. Cordage 5), has been employed as an accessory structure.

- warp: 1a: natural coloured 2-ply Z-spun S-plied camelid yarn.
 b: light brown 2-ply Z-spun S-plied camelid yarn.
- weft: 2: camel/natural bi-chrome 2-ply Z-spun S-plied camelid yarn (singles are different colours).
- side edge: 3: dark brown 2-ply Z-spun S-plied camelid yarn.
- top edge: 4: dark brown 2-ply Z-spun S-plied camelid yarn.
- cordage: 5a: 2 strand cordage constructed of one strand of one 2-ply Z-spun S-plied camel coloured camelid yarn, and one strand of three dark brown 2-ply Z-spun S-plied camelid yarn, replied in a Z direction.
 b: 2 strand cordage constructed of one strand of four 2-ply Z-spun S-plied camel coloured camelid yarn, and one strand of one dark brown coloured 2-ply Z-spun S-plied camelid yarn and one dark brown coloured 3-ply Z-spun S-plied camelid yarn, replied in a Z direction.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1a	10YR 7/4	2.5Y 8/4
b	7.5YR 6/4	10YR 6/4
2a	10YR 8/4	2.5Y 8.5/4
*and	10YR 6/4	10YR 6/6
3	5YR 2.5/1	7.5YR 4/2
4	5YR 2.5/1	7.5YR 4/2
5a	5YR 2.5/1	7.5YR 2.5/1
*and	7.5YR 4/4	7.5YR 4/4
b	5YR 2.5/1	-
*and	7.5YR 5/6	-

* = bichrome yarns.

Yarn Diameter

Element	Diameter						Mean
1a	0.75 mm	0.75 mm	0.50 mm	0.75 mm	0.75 mm	0.75 mm	0.71 mm
b	1.00 mm	1.00 mm	1.00 mm	0.75 mm	0.75 mm	1.00 mm	0.92 mm
2	1.00 mm	1.00 mm	1.25 mm	0.75 mm	0.75 mm	1.00 mm	1.04 mm
3	1.00 mm	1.00 mm	1.00 mm	1.00 mm	1.00 mm	1.00 mm	1.00 mm
4	0.75 mm	0.75 mm	0.50 mm	0.50 mm	0.50 mm	0.75 mm	0.63 mm
5a	1.00 mm	1.00 mm	1.00 mm	1.00 mm	1.00 mm	1.00 mm	1.00 mm
b	-						

Angle of Twist in Ply

Element	Angle of Twist						Mean
1a	35°	43°	42°	49°	42°	42°	42.16°
b	38°	42°	48°	46°	45°	48°	44.50°
2	25°	44°	38°	44°	42°	44°	39.50°
3	38°	46°	50°	42°	50°	48°	45.67°
4	-						
5a (camel)	40°	-	-	-	-	-	40.00°
(dark)	40°	62°	-	-	-	-	51.00°
b	-						

Twist per Centimetre

1a	25
b	7
2	8
3-5	-

Fibre Diameters: The fibres used in the warp and weft yarns of this article appear to be similar to, but greater than 40μ in diameter, and fibres of the side finishing, top finished edge and cordage all appear to be approximately 40μ in diameter, all as compared with control samples.

Esmeralda T-19

Artifact: small bag

Identification label: Rh 2 Ce. 1.104

Inventory correlation: 48?

Description: Small, fairly complete cream and brown coloured woven bag (Plate 4 g). This artifact has been woven using a warp-faced plain weave construction; two heading cords within the bound edge at the top of the bag confirm warp/weft direction. Three evenly spaced double brown warp stripes are the only pattern features. Side seams have been finished with dark brown yarns, and the top edge has been reinforced with light coloured yarns. Fragments of dark brown yarn (different from edge finishings) may be seen at both top corners, suggesting that a cord was once present. The bag has also been bunched together near the top edge suggesting that it had originally been secured with a cord of some kind.

Spinning and weaving have been fairly well executed, although a number of warp threads were "missed" during the weaving process. Finishing is uniform and well done. This bag is stained and has deteriorated along one side as weft yarns have disintegrated. Particles of coarse hardened dirt and two small fragments of dark heavy woven fabric are adhered to the surface of this artifact. The bag contains a large quantity of organic material (Plate 4 h), and if inventory correlation is correct, they have been identified as peppers.

Overall Measurements

Measured area	Measurements			Mean
Length	24.00 cm	23.50 cm	23.00 cm	23.50 cm
Length to gather	20.00 cm	18.00 cm	20.50 cm	19.50 cm
Length gather to top	4.00 cm	4.00 cm	4.00 cm	4.00 cm
Width	20.50 cm	20.00 cm	21.00 cm	20.50 cm
Width at gather	10.00 cm	10.00 cm	10.00 cm	10.00 cm
Width single stripe	0.60 cm	0.50 cm	0.40 cm	0.50 cm
Width double stripe unit	1.50 cm	1.70 cm	1.80 cm	1.67 cm
Width natural stripes	3.90 cm	4.70 cm	4.20 cm	4.27 cm

Finishing: Side seams have been finished with figure-eight stitching in a three thread zigzag design . There are approximately nine stitches per centimetre, and the edge finishing is approximately 0.6 cm in width (similar to Figure 12).

Overcast stitching of the top edge has been executed by looping stitches around the two heading yarns. These stitches have been regularly positioned, with two stitches looped neatly around headers between every warp thread.

There is no attached cordage with this artifact, but fragments of a different coloured dark brown yarn were found at the top edge of both side seams, suggesting that a cord had once been attached. Fragments of vegetal material in gathered areas suggests that either a

two-strand vegetal cord, or a two-ply vegetal yarn wound around twice had been used to secure the bag and its contents.

Structural Dimensions

Measured area	Measurements						Mean
Warps/cm	40	36	48	26	44	36	38.33
Wefts/cm	7	6	8	7	6	7	6.83

Element Description

Two main sets of elements were used to construct this article: 1) yarns used for warp and 2) yarns used for weft. In addition 3) functional accessory elements have been used to finish side seams, and 4) to reinforce the top edge.

warp:	1a: natural coloured 2-ply Z-spun S-plyed camelid yarn. b: dark brown coloured 2-ply Z-spun S-plyed camelid yarn.
weft:	2: natural coloured 2-ply Z-spun S-plyed camelid yarn.
side edges:	3: dark brown 2-ply Z-spun S-plyed camelid yarn.
top edge:	4: natural coloured 2-ply Z-spun S-plyed camelid yarn.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1a	10YR 6/4	10YR 5/4
b	5YR 3/2	5YR 3/2
2	10YR 8/4	10YR 7/4
3	10YR 2/1	5YR 2.5/1
4	10YR 6/4	10YR 5/4

Yarn Diameter

Element	Diameter						Mean
1a	0.50 mm	0.75 mm	0.75 mm	0.75 mm	1.00 mm	0.75 mm	0.75 mm
b	0.75 mm	0.75 mm	0.75 mm	1.00 mm	0.75 mm	1.00 mm	0.83 mm
2	1.00 mm	1.25 mm	1.25 mm	1.25 mm	1.00 mm	1.00 mm	1.13 mm
3	0.75 mm	0.75 mm	1.00 mm	1.00 mm	1.00 mm	0.75 mm	0.88 mm
4	0.50 mm	0.75 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.54 mm

Angle of Twist in Ply

Element	Angle of Twist						Mean
1a	42°	32°	36°	29°	32°	50°	36.83°
b	36°	32°	46°	36°	42°	45°	39.50°
2	40°	44°	42°	48°	40°	42°	42.60°
3	44°	51°	36°	43°	49°	44°	44.50°
4	49°	50°	52°	50°	51°	50°	50.33°

Twist per Centimetre

1a	23
b	19
2	7
3-4	-

Fibre Diameters: The fibres used in the warp and weft yarns of this article appear to be similar to, but greater than 40μ in diameter, and fibres of the side finishing, top finished edge and cordage all appear to be approximately 40μ in diameter, all as compared with control samples.

Esmeralda T-20

Artifact: small bag

Identification labels: Rh 2 Ce. 1.112

Inventory correlation: 53?

Description: small patterned bag (Plate 4 i and j). This small bag was woven using a warp-faced plain weave construction and complementary-warp patterning; two dark brown tightly twisted heading cords at the top edge of the bag top confirm warp/weft direction. The bag is mostly maroon in colour, and has three patterned warp stripes; two outer stripes in red and gold, and a centre stripe of green and gold were produced by the manipulation of complementary-warp yarns. The top edge and side seams extending around both bottom corners have been finished. Spinning, weaving, and finishing have all been expertly executed, although there are a few weaving errors in pattern areas. The artifact is tattered and incomplete along one side, apparently due to weft disintegration.

A few leaf fragments, probably coca, were found in the interior of this bag.

Overall Measurements

Measured area	Measurements			Mean
Length	22.00 cm	21.50 cm	21.20 cm	21.56 cm
Width (incomplete)	11.50 cm	12.00 cm	12.50 cm	12.00 cm
Width red/gold	0.70 cm	0.80 cm	0.70 cm	0.73 cm
Width green/gold	1.00 cm	1.10 cm	1.00 cm	1.00 cm
Width plain areas	2.10 cm	2.30 cm	1.70 cm	2.03 cm
Depth edge finish	0.40 cm	0.40 cm	0.30 cm	0.36 cm

Pattern: The wider centre stripe of gold and green and two side stripes of red and gold have all been woven in a continuous "simple" zigzag-and-dot patterning. Each pattern segment is approximately 1.5 cm in length in the red and gold stripes, and approximately 1.7 cm in length in the green and gold stripe (Plate 4 i).

Finishing: Edge finishing has been executed using a double cross-knit loop stitched binding, with (now faded) red yarns. Bottom corners have been finished using gold coloured yarns.

Structural Dimensions

Measured area	Measurements						Mean
Warps/cm	52	56	40	42	40	48	46.33
Warps/cm (pattern)	36	44	40	40	36	40	39.33
Wefts/cm	7	8	7	6	7	7	7.00
Stitches/cm	26	28	28	24	22	22	25.00

Element Description

Two main sets of elements were used to construct this article: 1) yarns used for warp and 2) yarns used for weft. In addition 3) functional accessory elements have been used to join and finish side seams and finish top seams.

warp: 1a: maroon coloured 2-ply Z-spun S-plyed camelid yarn.

b: gold 2-ply Z-spun S-plyed camelid yarn.

c: red 2-ply Z-spun S-plyed camelid yarn.

d: green 2-ply Z-spun S-plyed camelid yarn.

weft: 2: brown 2-ply Z-spun S-plyed camelid yarn (used doubled).

seams: 3: red 2-ply Z-spun S-plyed camelid yarn.

top edge: 4: red 2-ply Z-spun S-plyed camelid yarn.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1a	7.5R 2.5/4	7.5R 2.5/2
b (with red)	10YR 6/8	5YR 5/8
b (with green)	10YR 6/6	-
c	5R 4/8	10R 4/4
d	7.5Y 5/2	2.5Y 3/2
2	5YR 4/3	5YR 3/2
3/4	5R 4/8	7.5R 3/6

Yarn Diameter

Element	Diameter						Mean
1a	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm
b	0.50 mm	1.00 mm	0.75 mm	0.75 mm	0.50 mm	1.00 mm	0.75 mm
c	0.75 mm	0.75 mm	0.50 mm	0.75 mm	0.50 mm	1.00 mm	0.71 mm
d	1.00 mm	1.00 mm	1.00 mm	0.75 mm	1.00 mm	0.75 mm	0.92 mm
2	0.25 mm	0.25 mm	0.25 mm	0.25 mm	0.25 mm	0.25 mm	0.25 mm
*3/4	0.50 mm	0.75 mm	0.50 mm	0.75 mm	0.75 mm	0.50 mm	0.63 mm

* = under tension.

Angle of Twist in Ply

Element	Angle of Twist						Mean
1a	32°	54°	46°	45°	42°	42°	43.50°
b	42°	30°	40°	28°	32°	42°	35.67°
c	41°	36°	35°	35°	35°	31°	35.50°
d	38°	40°	41°	34°	55°	42°	41.67°
2	30°	30°	26°	22°	28°	26°	27.00°
3/4	38°	35°	42°	45°	35°	34°	38.16°

Twist per Centimetre

1a	16
b	14
c	12
d	13
2	22
3/4	10

Fibre Diameters: The fibres used in the construction of this article appear to be approximately 40μ in diameter as compared with control samples.

Esmeralda T-21

Artifact: small bag

Identification labels: none: included with Rh 2 Ce. 1.112

Inventory correlation: 50 or 51

Description: Small dark brown and maroon patterned bag (Plate 4 k and l). This artifact has been woven using a warp-faced plain weave construction and utilizing complementary warp-patterning. Two heading cords within the bound edge, and a terminal warp area at the bottom of the bag (Plate 4 l) confirm warp/weft direction. Side seams have been finished and embellished with multi-coloured yarns, and the top edge has also been finished. A single cord has been knotted to the inside of the bag at the top corner of one side. Spinning, weaving, and finishing have all been expertly executed.

This bag is badly deteriorated, mainly due to weft breakage, yet it still contains a large amount of what has been identified as coca leaves.

Pattern

Design features of this textile are in the form of plain warp stripes and patterned warp stripes produced by the manipulation of complementary-warp yarns. Eight plain dark brown stripes separate seven pattern stripes. Four of these pattern stripes have a maroon base with a centre stripe of black/gold, and red/brown woven in a vertical twill pattern. There are approximately two patterns/cm of this design. Three other maroon based stripes each have a centre stripe of gold/red and brown/red woven in a diamond design. There is approximately one pattern/cm of this design. It is also possible that there are more design elements than are reported here, as they were difficult to identify. Digital photos, however, indicate that the "plain" brown warp stripes may be more complex than originally thought, and may either be patterned or be of more than one shade of brown.

Finishing

The side edges have been finished with cross-knit loop stitching (Figure 11). This edge also extends around the bottom corners, and colours have been arranged as follows:

16 red 6 gold 2 red 3 gold 2 red 3 gold
 12 brown 4 gold 3 red 3 gold 3 red 6 gold
 12 red 2 brown 3 gold 3 red 3 gold 3 red
 18 gold 3 red 3 gold 3 red 3 gold
 2 beige 3 gold 3 red 3 gold 3 red

This colour arrangement with minor variations has been repeated along both side edges. The only exceptions are the bottom corners which have been finished with gold coloured yarns.

Overcast stitching of the top edge has been executed by looping stitches around the two heading yarns. Stitches are tightly packed giving a smooth appearance, and stitching was worked with doubled yarns.

A red and gold four-sided braided cord has been inserted into one side of the top edge of the bag and knotted on the inside, presumably to be used as a closure.

Overall Measurements

Measured area	Measurements			Mean
Length	20.50 cm	20.40 cm	20.50 cm	20.48 cm
Width	19.80 cm	18.00 cm	18.00 cm	18.60 cm
Length cord	19.00 cm	19.00 cm	19.40 cm	19.13 cm
Width cord	0.20 cm	0.20 cm	0.20 cm	0.20 cm
Width side edges	0.70 cm	0.50 cm	0.60 cm	0.60 cm
Width top edge	0.30 cm	0.30 cm	0.30 cm	0.30 cm
*Width lighter stripe	1.40 cm	1.00 cm	1.80 cm	1.40 cm
*Width darker stripe	1.40 cm	1.50 cm	1.50 cm	1.43 cm
Width brown	1.40 cm	1.20 cm	1.04 cm	1.33 cm

* = patterned.

Structural Dimensions

Measured area	Measurements						Mean
Warps/cm	40	40	40	44	44	48	42.67
Warps/cm (pattern)	40	38	38	40	40	40	39.33
Wefts/cm	9	9	10	10	9	10	9.50
Stitches/cm (side)	18	22	20	19	18	20	19.50
Stitches/cm (top)	22	18	22	18	19	18	19.50

Element Description

Two main sets of elements were used to construct this article: 1) yarns used for warp and 2) yarns used for weft. In addition, functional accessory elements have been utilized 3) to join side seams, and 4) to finished the top edge. A fifth category, cordage, has been employed as an accessory structure.

- | | | |
|-----------|-----|---|
| warp: | 1a: | dark brown 2-ply Z-spun S-plied camelid yarn. |
| | b: | maroon 2-ply Z-spun S-plied camelid yarn. |
| | c: | white 2-ply Z-spun S-plied camelid yarn. |
| | d: | gold 2-ply Z-spun S-plied camelid yarn. |
| weft | 2: | brown 2-ply Z-spun S-plied camelid yarn. |
| seams: | 3: | red, gold, beige, and brown 2-ply Z-spun S-plied camelid yarn. |
| top edge: | 4: | dark brown 2-ply Z-spun S-plied camelid yarn: top edge finishing. |
| cordage: | 5: | red and gold braided cordage. |

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1a	2.5YR 3/2	2.5YR 2.5/2
b	5R 3/8	7.5R 3/4
c	7.5YR 8/4	10YR 7/4
d	10YR 5/6	10YR 4/6
2	2.5YR 3/2	5YR 3/2
3(gold)	10YR 5/6	-
(red)	5R 3/6	-
(beige)	10YR 4/2	-
(dark brown)	-	-
4	5R 3/2	5R 3/2
5	-	-

Yarn Diameter

Element	Diameter						Mean
1a	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm
b	0.30 mm	0.50 mm	0.50 mm	0.50 mm	0.30 mm	0.50 mm	0.43 mm
c	0.30 mm	0.30 mm	0.30 mm	0.30 mm	0.30 mm	0.30 mm	0.30 mm
d	1.00 mm	0.75 mm	0.50 mm	0.50 mm	0.30 mm	0.75 mm	0.63 mm
2	0.30 mm	0.25 mm	0.25 mm	0.30 mm	0.50 mm	0.30 mm	0.32 mm
3	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm
4	0.50 mm	0.50 mm	0.30 mm	0.50 mm	0.50 mm	0.50 mm	0.47 mm
5	-	-	-	-	-	-	-

Angle of Twist in Ply

Element	Angle of Twist						Mean
1a	55°	35°	35°	41°	41°	31°	39.67°
b	30°	27°	40°	48°	49°	50°	40.67°
c	23°	48°	40°	44°	44°	41°	40.00°
d	45°	40°	54°	54°	40°	43°	46.00°
2	-	-	-	-	-	-	-
3	35°	37°	46°	45°	36°	40°	39.83°
4	45°	43°	35°	42°	40°	39°	40.67°
5	-	-	-	-	-	-	-

Twist per Centimetre

1a	18
b	24
c	20
d	8
2	25
3	11
4	-
5	-

Fibre Diameters: The fibres used in the construction of this article are approximately 40μ in diameter as compared with control samples.

Esmeralda T-22

Artifact: small bag

Identification labels: none, but with Rh 2 Ce. 1.112 (three bags packaged together)

Inventory correlation: 50 or 51

Description: This small patterned bag (Plate 4 m-o) has been woven probably using a warp-faced plain weave construction. Warp/weft direction cannot be absolutely determined here, as bag edges are complete and unavailable for analysis, but it appears similar in construction to others in the collection. The use of fine, weak and doubled concealed yarns also support warp-faced construction, so it is considered warp-faced in this description.

Patterning appears to have been achieved by the use of nine complementary-warp pattern stripes alternated between ten plain brown stripes (Plate 4 n). Top and side seams have been finished, and the bag was found bunched at the top and tied with an unattached cord (Plate 4 m and o). Spinning, weaving and finishing have all been expertly executed. Of interest is that the weft is composed of two very fine yarns which have been neatly set side by side between warp yarns, with no occurrence of twisting. This suggests that the two weft yarns may not have been wound doubled on the shuttle, but each thrown separately, which would have taken more time to weave.

This bag is in a tattered condition seemingly due to weak and brittle weft yarns. Black and white warp yarns are also particularly brittle.

A few particles of organic material identified as coca leaves are still contained within this artifact.

Pattern

The design of this textile was created by the use of warp stripes and complementary-warp patterning. Ten plain dark brown stripes separate nine pattern stripes: five pattern stripes have outside borders of red and beige and contain a centre stripe of alternating white and black twill woven "V"s. The other four pattern stripes have been woven with a reddish background with gold yarns used to create a diamond pattern. These are quite faded and pattern elements are more visible on digital photos than they were on site (Plate 4 m).

Finishing:

Both top edges and side seams have been finished with red yarns in what appears to be a four-sided cross-knit loop stitching. There are two exceptions to the red edging; all four corners have been finished with gold coloured yarns, and near the midway point along both top edges and side edges, stitch colour changes occur. A single short segment each containing 2 blue, 2 white, 2 blue, 1 red, 2 blue, 2 white, and 2 blue stitches have been included on each edge surface (Plate 4 m).

A braided cord was found twisted around the top of the bag three times with one end secured under the lowest twist. This red and gold cordage with a zigzag design, has been constructed in what appears to be an eight strand sennit braid. The last seven centimetres of this cord have been twisted into two strands, plied in a Z direction and knotted at the end.

Overall Measurements

Measured area	Measurements			Mean
Length	22.50 cm	23.50 cm	22.30 cm	22.77 cm
Width	19.40 cm	20.00 cm	20.50 cm	19.95 cm
Width narrow pattern	0.60 cm	0.70 cm	0.60 cm	0.67 cm
Width wide pattern	1.00 cm	1.00 cm	1.00 cm	1.00 cm
Width plain brown	1.00 cm	1.00 cm	1.00 cm	1.00 cm
Depth side seam	0.30 cm	0.30 cm	0.30 cm	0.30 cm
Depth top edge	0.20 cm	0.20 cm	0.20 cm	0.20 cm
*Length cord	38.50 cm	36.40 cm	37.00 cm	37.30 cm
Width cord	0.30 cm	0.30 cm	0.30 cm	0.30 cm

*= measured from photo.

Structural Dimensions

Measured area	Measurements						Mean
Warps/cm	48	50	50	52	50	50	50.00
Warps/cm (pattern)	36	36	36	36	36	36	36.00
Wefts/cm	9	9	10	9	8	9	9.00
Stitches/cm (side edge)	14	14	13	15	15	14	14.17
Stitches/cm (top edge)	14	15	15	14	14	14	14.33

Element Description

Two main sets of elements were used to construct this article: 1) yarns used for warp and 2) yarns used for weft. In addition 3) functional accessory elements have been used to join and embellish side seams, and 4) to finished the top edge. A fifth category, 5) cordage, has been employed as an accessory structure.

Warp: 1a: black coloured 2-ply Z-spun S-plied camelid yarn.
 b: red coloured 2-ply Z-spun S-plied camelid yarn.
 c: brown coloured 2-ply Z-spun S-plied camelid yarn.
 d: white coloured 2-ply Z-spun S-plied camelid yarn.
 e: gold coloured 2-ply Z-spun S-plied camelid yarn.
 f: beige coloured 2-ply Z-spun S-plied camelid yarn.

Weft: 2: brown coloured 2-ply Z-spun S-plied camelid yarn (used doubled).

Side seams: 3: red 2-ply Z-spun S-plied camelid yarn.

Top edge: 4: red 2-ply Z-spun S-plied camelid yarn.

Cordage: 5: red and gold braided cord constructed of 2-ply Z-spun S-plied camel coloured camelid yarns.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1a	2.5YR 2.5/2	10R 2.5/2
b	5R 5/6	10R 4/4
c	5YR 3/1	5YR 3/1
d	2.5Y 7/2	2.5Y 7/4
e	2.5Y 6/8	2.5YR 3/4
f	5YR 5/4	10YR 5/4
2	5YR 3/2	2.5YR 2.5/2
3	7.5R 5/6	-
4	7.5R 5/6	-
5(red)	7.5R 5/6	2.5R 4/4
(gold)	2.5Y 6/8	10YR 4/2

Yarn Diameter

Element	Diameter						Mean
1a	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm
b	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm
c	0.50 mm	0.50 mm	0.30 mm	0.30 mm	0.50 mm	0.30 mm	0.40 mm
d	0.30 mm	0.30 mm	0.50 mm	0.50 mm	0.30 mm	0.50 mm	0.40 mm
e	0.75 mm	0.75 mm	0.75 mm	1.00 mm	0.75 mm	1.00 mm	0.83 mm
f	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm
2	0.25 mm	0.25 mm	0.50 mm	0.25 mm	0.30 mm	0.30 mm	0.30 mm
3-5	-	-	-	-	-	-	-

Angle of Twist in Ply

Element	Angle of Twist						Mean
1a	40°	47°	49°	54°	45°	48°	47.17°
b	49°	45°	40°	40°	44°	52°	45.00°
c	46°	47°	54°	52°	50°	50°	49.83°
d	40°	41°	47°	45°	42°	50°	44.16°
e	40°	42°	48°	49°	43°	42°	44.00°
f	49°	45°	42°	42°	44°	48°	45.00°
2-5	-	-	-	-	-	-	-

Twist per Centimetre

1a	24
b	18
c	-
d	22
e-f	-
2	22
3-5	-

Fibre Diameters: The fibres used in the construction of this article appear to be approximately 40μ in diameter as compared with control samples.

Esmeralda T-23

Artifact: thigh band

Identification label: Rh:2.Ce.1.97

Inventory correlation: nonspecific: 38-43

Description: dark brown circular band with attached leather fragment (Plate 6 b). This article was constructed with a single element looping technique. Thirteen rows of stitches plus one row of loops are present. A fairly large fragment of what is probably leather is still in place, and is secured to the band by approximately five of the looped stitches. Particles of what appear to be leather were also noted on the interior surface of some of the other loops. The article has been well constructed, and is well preserved with no structural breakage. It is badly soiled, however, and there is evidence of tension having been applied to the loops, suggesting use.

I observed a similar artifact, unrecorded in the artifact assemblage, on the upper right femur of the adult mummy (Plate 6 d and e). This artifact was not removed from the mummy for evaluation but is similar in colour and construction to the artifact described here.

Overall Measurements

Measured area	Measurements			Mean
*External circumference:	53.50 cm	53.00 cm	52.50 cm	53.00 cm
Internal circumference	35.00 cm	34.50 cm	35.20 cm	34.90 cm
**Width	2.80 cm	3.00 cm	3.00 cm	2.93 cm
Depth loops	0.40 cm	0.50 cm	0.50 cm	0.46 cm
Length leather	8.60 cm	8.70 cm	8.60 cm	8.63 cm
Width leather	5.00 cm	5.00 cm	5.00 cm	5.00 cm

* = with loops. ** = without loops.

Structural Dimensions

Measurements	Measured area						Mean
Stitches/cm	3	3	3	3	3	3	3.00
*Loops/cm	3	3	2.5	3	3	2.5	2.83

* = external edge.

Element Descriptions:

This article has been constructed with the use of a single element: 1) yarn used in looping.

looping: 1: dark brown 2-ply Z-spun S-plied camelid yarn.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1	5Y 2.5/1	-

Yarn Diameters

Element	Diameter						Mean
1	2.5 mm	2.0 mm	2.0 mm	2.0 mm	2.0 mm	3.0 mm	2.25 mm

Angle of Twist in Ply

Element	Angle of Twist						Mean
1	37°	47°	50°	40°	54°	44°	45.33°

Twist per Centimetre: not available.

Fibre Diameters: The fibres used to construct this article appear to be approximately 40 μ in diameter as compared with control samples.

Esmeralda T-24

Artifact: thigh bands (3)

Identification label: Rh:2.Ce.1.99

Inventory correlation: non-specific: 38-43

Description: natural cream coloured circular leg bands similar to T-4 and T-23 in construction (Plate 6 c). These articles were been constructed with a single element looping technique. For reference purposes the artifacts have been labelled "A", "B", and "C" from left to right on the photo plate. Two of the artifacts, "A" and "B", are almost complete, and the third may be missing a section but appears almost intact. They are all well preserved and appear to be little changed from the Morales (1985:61) illustration, although A and C are cracked and broken in places and the fibres from B are quite brittle. Artifacts A and C were constructed of thirteen rows of stitches plus one row of loops, and B has eleven rows of stitches plus one row of loops. The loops of A and C appear to have been superficially added, but the loops of B, which are comparable to others in this collection, appear to have been constructed at the same time as the rest of the article. A and C are quite similar and may have been produced as a pair. All three of these bands are relatively clean, and show no evidence of use.

Artifacts A and C, appear to have been produced with skill, but the tension is a little irregular in fragment B, and in B the yarn is also a little heavy in relation to the number of stitches per centimetre.

Overall Measurements

Measured area	Measurements			Mean
*External circumference: A	52.50 cm	51.70 cm	52.00 cm	52.06 cm
*External circumference: B	45.70 cm	44.50 cm	44.50 cm	44.90 cm
*External edge: C	43.00 cm	43.30 cm	43.10 cm	43.13 cm
Internal circumference: A	34.20 cm	34.60 cm	34.80 cm	34.53 cm
Internal circumference: B	23.00 cm	22.80 cm	23.80 cm	23.20 cm
Internal edge: C	30.80 cm	31.40 cm	31.00 cm	31.06 cm
**Width: A	3.00 cm	3.00 cm	3.00 cm	3.00 cm
**Width: B	2.80 cm	2.70 cm	2.50 cm	2.67 cm
**Width: C	3.00 cm	2.60 cm	2.70 cm	2.77 cm
Depth loops: A	0.30 cm	0.30 cm	0.30 cm	0.30 cm
Depth loops: B	0.40 cm	0.40 cm	0.40 cm	0.40 cm
Depth loops: C	0.30 cm	0.30 cm	0.30 cm	0.30 cm
Width loops: A	0.60 cm	0.60 cm	0.60 cm	0.60 cm
Width loops: B	0.40 cm	0.40 cm	0.40 cm	0.40 cm
Width loops: C	0.60 cm	0.60 cm	0.60 cm	0.60 cm

* = with loops ** = without loops.

Structural Dimensions

Measurements	Measured area						Mean
Stitches/cm: A, B, C	-						
Loops/cm: A	1.20	1.20	1.00	1.20	1.00	1.20	1.13
Loops/cm: B	2.00	2.50	2.20	2.50	2.50	2.20	2.32
Loops/cm: C	1.00	1.20	1.00	1.40	1.50	1.20	1.22

Element Descriptions:

These articles have each been constructed with the use of 1) single elements.

looping: 1(A): natural cream coloured 3-ply Z-spun S-plyed camelid yarn.
 1(B): natural cream coloured 3-ply Z-spun S-plyed camelid yarn.
 1(C): natural cream coloured 3-ply Z-spun S-plyed camelid yarn.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1	10YR 7/6	-
2	10YR 7/6	-
3	10YR 7/6	-

Yarn Diameters

Element	Diameter						Mean
1	2.00 mm	2.00 mm	2.00 mm	2.20 mm	2.00 mm	2.10 mm	2.05 mm
2	2.00 mm	2.00 mm	2.00 mm	2.00 mm	2.00 mm	2.00 mm	2.00 mm
3	2.00 mm	1.50 mm	2.00 mm	2.00 mm	1.50 mm	2.00 mm	1.83 mm

Angle of Twist in Ply

Element	Angle of Twist						Mean
1	38°	37°	38°	48°	44°	36°	40.17°
2	38°	50°	44°	41°	42°	n/a	43.00°
3	45°	47°	45°	48°	42°	34°	43.50°

Twist per Centimetre: not available.

Fibre Diameters: The fibres used in A and C appear to have diameters slightly less than 110μ , and the fibre diameters of B, a little heavier, are in the 110μ range, all as compared with control samples.

Esmeralda T-25

Artifact: Belt

Identification labels: Rh. 2 Ce. 1.87;
Rh. 2 C 1.1:2; #41

Inventory correlation: 24

Description: double-cloth belt with a warp-faced plain weave construction (Plate 2 d and e). Warp/weft direction is indicated by the presence of thicker heading yarns at both narrow ends of the fabric, and a terminal warp area at one end. Alternating warp colour sequences of blue/blue; red/gold; and red/purple combinations have been used to create designs which have been arranged symmetrically around a central stripe, and are mirror imaged. Next to the blue/blue border, a wide stripe of red/gold in a simple zigzag-and-dot pattern is prominent. Beside this, there are three narrower stripes of red/gold, red/purple, and red/gold, also in a simple zigzag-and-dot design. The two gold zigzags are angled in the same direction as the wide stripes, and the centre red/purple stripe is angled in the opposite direction. The centre area consists of two stripes of gold/red and three of red/purple which are patterned with extended geometric designs (Plate 2 d).

A few vegetal fibres were noted in the second narrow zigzag stripe on one end of the belt, and there is a frayed area in the same area on the opposite terminal end of the belt, suggesting that a cord had once been attached. All aspects of production of this artifact have been expertly executed. The artifact is relatively intact, except for considerable warp thread breakage, specifically of blue yarns, and two large holes. These holes, combined with fold patterns and lack of significant staining (Plate 2 e), suggest that the article had been folded and placed with the interred, and was not worn. It is probable that the blue yarn breakage was the result of fibre weakening during the dye process.

Overall Measurements

Measured area	Measurements			Mean
Length	149.50 cm	149.00 cm	148.80 cm	149.10 cm
Width	14.00 cm	13.90 cm	13.10 cm	13.67 cm

Element Description

Two sets of elements were used to construct this textile: 1) yarns used in warp, and 2) yarns used as weft.

- warp: 1a: blue coloured 2-ply Z-spun S-plyed camelid yarn.
 b: red coloured 2-ply Z-spun S-plyed camelid yarn.
 c: gold coloured 2-ply Z-spun S-plyed camelid yarn.
 d: purple coloured 2-ply Z-spun S-plyed camelid yarn.
- weft: 2: dark brown coloured 2-ply S-spun Z-plyed camelid yarn.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1a	7.5B 2.5/2	7.5B 2.5/2
b	5R 3/8	7.5R 3/4
c	2.5Y 6/8	2.5Y 5/6
d	5R 2.5/1	-
2	7.5Y 3/2	5YR 3/2

Structural Dimensions

Dimension	Measurements						Mean
*Warps/cm	32	28	36	26	32	32	31.00
*Wefts/cm	6	6	5	5	6	5	5.50

* = single face.

Yarn Diameter

Element	Diameters						Mean
1a	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm
b	1.00 mm	0.75 mm	1.25 mm	1.00 mm	1.00 mm	1.00 mm	1.00 mm
c	0.75 mm	0.75 mm	1.00 mm	1.25 mm	0.75 mm	0.75 mm	0.88 mm
d	0.75 mm	0.75 mm	0.50 mm	1.00 mm	1.00 mm	0.75 mm	0.79 mm
2	1.25 mm	1.25 mm	1.00 mm	1.00 mm	1.00 mm	1.50 mm	1.17 mm

Angle of Twist in Ply

Element	Angle of twist						Mean
1a	38°	42°	35°	38°	34°	35°	37.00°
b	38°	34°	33°	29°	46°	28°	34.67°
c	25°	35°	46°	44°	38°	36°	37.33°
d	36°	36°	35°	42°	50°	48°	41.17°
2	50°	22°	22°	22°	21°	21°	26.33°

Twist per Centimetre

1a	15	b	14
c	13	d	8
2	6		

Fibre Diameter: The fibres in this artifact appear to be approximately 40 μ in diameter as compared with control samples.

Esmeralda T-26

Artifact: feathered shawl (back panel of headdress)

Identification labels: 1) Rh 2.6 Ce. 133

2) Rh 2.6 1. 133 (tag)

Inventory correlation: 59

Description: This rectangular shawl (Plate 5 a- c) was woven with a warp-faced plain weave construction. Warp/weft direction was established by the presence of two heading yarns at each narrow end of the artifact plus visible weft selvages. The top selvedge has been folded over and stitched as for a hem, and the bottom selvedge has an attached fringe (plate 5: figure c). Rows of feathers have been sewn on across the textile weft selvedge to weft selvedge, and probably completely covered the textile at one time. There are also remnants of extra strings of feathers loosely attached between these rows (Plate 5 b).

All aspects of construction of this fabric have been skilfully executed other than the spinning of cotton yarns which are somewhat irregular. The woven textile is almost intact except for small holes in the hem where warp threads have been broken, and two broken areas on the top edge 9.5 cm from one side and 4.8 cm from the other side that suggests a cord may have been attached. Most of the feathers are missing and those that remain are in a broken and tattered state. There is some irregular staining closest to the hemmed end, and there is a small remnant of a dark brown fringe adhered to the underside of this textile similar to those of hair tassels, which suggests that the textile was once in close association with either the back of the head of one of the mummies or with the extra tassel.

Decorative features

The most prominent feature of this textile is the feathers which presumably once covered the entire surface of the textile, and which have been fastened in two ways: Large green feathers have been strung (Figure 19a) and attached to the textile in rows. These "row" feathers have been set at approximately 1.5 feathers per cm. Strings of tied feathers were also loosely tacked down between the rows of sewn feathers. These "tied" feathers have been set at approximately 1.8 feathers per cm. The one remaining string of tied feathers has been affixed to both weft selvages, and is also attached to an adjacent sewn row of feathers at a single point near the centre of the row.

The following measurements have been taken at the selvedge edges of both of these methods of attachment, and indicate their position as related to the top of the hemmed edge. In some areas, remnants of both the cotton yarn and feathers are present, but in others only a cotton thread remains. In one instance only a well defined hole (h) indicates a point of attachment.

Feather Attachment

Selvedge	Measurements (in cm) from top of hem										
Left row	5.0	13.1	19.9	27.4	34.6	41.2	50.0	57.0	65.0	73.0	80.8
Right row	4.8	12.0	19.3	28.0	35.0	42.2	51.5	59.4	68.0	75.5	84.0
Left tied	-	-	18.3(h)	-	40.3	47.2	54.6	63.3	71.5	78.7	85.7
Right tied	-	-	-	-	-	-	-	-	73.8	79.8	90.0

Also significant is the row of sixty-four fringes adorning the bottom edge (Plate 5 c). Each fringe appears to be a small skein of approximately eight strands of 2-ply Z-spun, S-plied camelid yarn which has been over-twisted causing the skein of yarn to twist back on itself, each skein forming a fringe detail of approximately sixteen threads. These fringes have been secured to the bottom edge of the textile by an extra heading cord that has been looped through one end of each skein at regular points all along the fabric edge.

Finishing

The top (non-fringed) warp selvedge has been folded forward and secured to the anterior surface of the textile with three fine 2-ply Z-spun S-plied camelid yarns using a loose whipping stitch. The first row of feathers has been attached along this edge. The top edge of the fold has been sewn down with four strands of yarn, and the sides of the hem have been sewn in the same manner using six strands of yarn. There is a remnant of a slightly darker multi-strand cord in one area of this hem.

Overall Measurements

Measured area	Measurements			Mean
*Length	92.8 cm	90.2 cm	90.2 cm	91.06 cm
Width	35.5 cm	35.0 cm	33.2 cm	34.57 cm
Depth hem	4.2 cm	4.1 cm	4.0 cm	4.10 cm
Length fringes	24.5 cm	25.0 cm	26.0 cm	25.16 cm

* = without fringes.

Structural Dimensions

Measured area	Measurements						Mean
Warps/cm	36	34	32	32	32	34	33.33
Wefts/cm	7	7	6	6	6	6	6.33

Element Description

Two principal sets of elements were used to construct the woven textile: 1) yarns used as warp, and 2) yarns used as weft. There were also four functional accessory stitches utilized: 3) yarn used to sew the hem, 4) yarn used to secure and sew rows of feathers, 5) yarn

used to string and tie extra feathers, and 6) yarn used to attach fringes. One set of single elements 7) yarns used as fringes are considered to be accessory fabrics, and the feathers are classified as accessory objects.

warp: 1: brown coloured 2-ply Z-spun-S-plied camelid yarn.

weft: 2: brown coloured 2-ply Z-spun S-plied camelid yarn.

hem: 3: brown coloured 2-ply Z-spun S-plied camelid yarn.

row feathers: 4: natural light coloured cotton most of which is 2-ply Z-spun S-plied; some, however, is 2-ply S-spun Z-plied.

string feathers: 5: natural light coloured cotton most of which is 2-ply S-spun Z-plied; some, however, is 2-ply Z-spun S-plied, and single ply S-spun yarn was used in at least one area.

fringe sewing 6: brown coloured 2-ply Z-spun-S-plied camelid yarn.

fringes: 7: brown coloured 2-ply Z-spun S-plied camelid yarn.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest Colour: off site
1	10YR 4/4	7.5YR 3/4
2	10YR 4/4	7.5YR 4/4
3	10YR 4/4	-
4	10YR 8/4	-
5	10YR 7/4	-
6	5R 3/6	7.5YR 3/4
7	7.5YR 4/4	7.5YR 4/4

Yarn Diameter

Element	Diameter						Mean
1	0.50 mm	0.50 mm	0.75 mm	1.00 mm	1.00 mm	0.50 mm	0.71 mm
2	0.75 mm	1.00 mm	1.00 mm	0.50 mm	0.75 mm	0.75 mm	0.79 mm
3	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm
4	1.00 mm	0.75 mm	0.75 mm	1.00 mm	1.00 mm	0.75 mm	0.88 mm
5	0.30 mm	0.50 mm	0.75 mm	0.30 mm	-	-	0.46 mm
6	-						
7	1.00 mm	0.75 mm	0.75 mm	1.00 mm	1.25 mm	1.00 mm	0.95 mm

Angle of Twist in Ply

Element	Angle of twist						Mean
1	45°	54°	45°	52°	47°	48°	48.50°
2	34°	30°	32°	37°	57°	42°	38.67°
3	27°	27°	26°	26°	25°	27°	26.33°
4	48°	28°	30°	28°	39°	45°	36.33°
5	46°	45°	45°	51°	-	-	46.75°
6	-						
7	31°	24°	36°	41°	36°	45°	35.50°

Twists per Centimetre

1	10
2	12
3	-
4	10
5	16
6	-
7	18

Fibre Diameters: All camelid fibres used to construct this article appear to be approximately 40 μ in diameter as compared with control samples. Cotton fibres were not assessed.

Esmeralda T-27

Artifact: Belt with attached braided cord

Identification labels: Rh2 Ce. 1.128

Inventory correlation: 26 and either 32 or 33

Description: double-cloth belt with a warp-faced plain weave construction (Plate 2 f). Warp/weft direction is indicated by the presence of thicker heading yarns at both narrow ends of the fabric, and eighteen rows of a terminal area at one narrow end. Alternating warp colour sequences of red/red, gold/brown, gold/beige, red/brown, gold/beige and red/gold have been used to create warp-stripped designs which have been symmetrically arranged and are mirror imaged on both sides of the central stripe. Next to the red/red border, a wide stripe of brown/gold in a simple zigzag-and-dot pattern is prominent. Next, there is a narrower stripe in a diamond design, and a wide stripe in brown and red with extended geometric patterns. This is followed by another narrow diamond patterned stripe and the central wide stripe which is in a simple zigzag-and-dot design in red and gold. The patterns are repeated on the other side of the central stripe, and the three zigzag-and-dot pattern stripes are all angled in the same direction (Plate 2 g).

The single braided cord has been constructed by braiding two colours of yarn which forms a continuous zigzag pattern along the length of the cord. A plied cord has been inserted through a folded loop in one end of the braided cord in the same manner as most others in this collection, and secures the braided cord to the terminal end of the belt. It has been attached to the belt in the area of the third stripe with vegetal fibre yarn. A few vegetal fibres have also been noted in the third stripe on the other side of the same end, and in two similar places at the other end of the belt, suggesting that three other similar cords were once attached. A remnant of an attached cord that has been tied with a lark's head knot to the main cord is still in place (Plate 2 h). It was also noted that this artifact is quite similar in size and proportion to T-9.

The tassel has been constructed in a similar manner as the others in this collection, though it is difficult to differentiate colours. The body of the tassel appears somewhat thin, possibly due to insect infestation.

The plied cords, like all of the others, appear to have been constructed of two different coloured skeins of yarn which were then over-twisted, doubled and plied (Figure 17).

Most aspects of production of this artifact have been proficiently executed, though there are some areas in which warp threads were 'missed' during the weaving process. The braided cord has been well constructed, and has a soft but somewhat flimsy handle; as though some yarns may have deteriorated.

There is evidence of insect infestation in this artifact but it is, however, fairly well preserved, and the warp yarns of the belt and cordage proper appear mostly intact. Some weft breakage, however, is evident on the belt and discoloration is quite pronounced on the braided cord and other cords. There is evidence of staining suggesting use and there are many small white feather fragments on the surface of both the belt and cord, suggesting that this artifact

was once in close contact with the headdress.

Overall Measurements

Measured area	Measurements			Mean
Length belt	176.00 cm	178.00 cm	177.20 cm	177.06 cm
* Length cord	79.00 cm	79.20 cm	80.00 cm	79.40 cm
Length tassel	12.00 cm	12.00 cm	12.20 cm	12.07 cm
Length tassel ring	1.60 cm	1.40 cm	1.80 cm	1.60 cm
Length plied cord	48.00 cm	47.40 cm	48.20 cm	47.87 cm
**Length attached cord	30.00 cm	30.00 cm	30.00 cm	30.00 cm
Width belt	13.60 cm	13.40 cm	13.80 cm	13.60 cm
Width tassel cover	1.60 cm	1.40 cm	1.80 cm	1.60 cm
Diameter cord	1.80 cm	2.00 cm	2.30 cm	2.03 cm
**Diameter tassel	3.50 cm	3.50 cm	4.00 cm	3.67 cm
Diameter tassel cover	4.00 cm	3.00 cm	3.40 cm	3.47 cm
Diameter plied cord	0.50 cm	0.50 cm	0.50 cm	0.50 cm
Diameter attached cord	0.50 cm	0.50 cm	0.50 cm	0.50 cm

* = cord measured to beginning of tassel. ** = approximate.

Structural Dimensions

Dimension	Measurements						Mean
*Warps/cm (plain)	24	26	28	24	26	24	25.33
*Warps/cm (pattern)	40	38	38	40	38	38	38.67
*Wefts/cm	5	5	6	6	5	5	5.33

*Single face

Element Description

There are two sets of elements used to create the textile segment of this fabric complex: 1) yarns used as warp and 2) yarns used as weft. In addition to this, accessory fabrics such as 3) the braided cord, 4) tassel, and 5) plied cord have been added. Two sewing elements; 6) yarn utilized to stabilize the tassels, and 7) yarn used to secure the plied cords to the belt, have also been utilized. The attached cord (8) may be looked upon as an accessory structure.

warp:

- a: red coloured 2-ply Z-spun S-plied camelid yarn.
- b: gold coloured 2-ply Z-spun S-plied camelid yarn.
- c: brown coloured 2-ply Z-spun S-plied camelid yarn.
- d: white coloured 2-ply Z-spun S-plied camelid yarn.
- e: beige coloured 2-ply Z-spun S-plied camelid yarn.
- f: purple coloured 2-ply Z-spun S-plied camelid yarn.

- weft: 2: black coloured 2-ply Z-spun S-plyed camelid yarn.
- braided cord: 3: brown coloured camelid yarn. This is possibly a loosely twisted 2-ply Z-spun S-plyed yarn.
- tassel: 4: brown coloured 2-ply Z-spun S-plyed camelid yarn.
- plied cord: 5: brown coloured 2-ply Z-spun S-plyed camelid yarn.
- tassel cover: 6: light coloured 2-ply Z-spun S-plyed camelid yarn.
- sewing yarn: 7: light coloured 2-ply Z-spun S-plyed vegetal fibre yarn.
- attached cord 8: brown coloured 2-ply Z-spun S-plyed camelid yarn.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1a	5R 3/8	5R 3/6
b	2.5Y 6/8	-
c	5YR 3/2	7.5YR 4/6
d	10YR 8/2	-
e	-	-
f	-	-
*2	2.5Y 2/0	-
3a	10YR 5/8	7.5YR 4/4
b	7.5YR 3/4	7.5YR 4/4
4a	10YR 5/8	7.5YR 4/4
b	7.5YR 3/4	7.5YR 4/4
5a	10YR 5/8	-
b	7.5YR 3/4	7.5YR 4/4
6	10YR 6/4	10YR 6/4
7	-	-
8a	7.5YR 3/4	5YR 4/4
b	5R 5/8	10R 4/4

Note: *The fibres in this yarn are quite lustrous as compared with others, and look not unlike fine human hair. Also, the red in the centre stripe is finer and of a different colour than other reds of the textile.

Yarn Diameter							
Element	Diameters						Mean
1a	0.50 mm	0.75 mm	0.75 mm	0.75 mm	0.50 mm	0.50 mm	0.63 mm
b	0.75 mm	0.75 mm	0.75 mm	0.75 mm	0.75 mm	0.75 mm	0.75 mm
c	0.50 mm	0.25 mm	0.50 mm	0.30 mm	0.25 mm	0.30 mm	0.35 mm
d	0.30 mm	0.30 mm	0.30 mm	0.25 mm	0.50 mm	0.30 mm	0.33 mm
e	0.75 mm	0.75 mm	0.50 mm	1.00 mm	0.75 mm	0.75 mm	0.75 mm
f	-						
2	1.00 mm	1.00 mm	1.25 mm	1.00 mm	1.25 mm	1.00 mm	1.08 mm
3	-						
4	1.25 mm	1.50 mm	1.00 mm	0.75 mm	0.75 mm	0.75 mm	1.00 mm
5	0.30 mm	0.50 mm	0.75 mm	0.30 mm	0.75 mm	0.75 mm	0.56 mm
6	0.50 mm	0.50 mm	0.75 mm	0.50 mm	0.50 mm	0.50 mm	0.54 mm
7	-						
8	0.50 mm	0.50 mm	0.75 mm	0.50 mm	0.75 mm	0.75 mm	0.63 mm

Angle of Twist in Ply								
Element	Angle of twist						Mean	
1a		42°	52°	42°	35°	45°	49°	44.33°
b		50°	51°	38°	51°	36°	37°	37.66°
c		49°	52°	35°	52°	50°	52°	48.33°
d		50°	50°	51°	53°	54°	53°	51.83°
e		35°	40°	42°	40°	42°	38°	39.50°
f		46°	42°	41°	42°	46°	46°	43.83°
2		-						
3		26°	42°	44°	20°	40°	38°	35.00°
4		34°	24°	31°	08°	32°	25°	25.67°
5		28°	28°	32°	40°	44°	48°	36.67°
6		35°	40°	26°	37°	40°	30°	35.00°
7		-						
8		36°	34°	35°	38°	32°	45°	36.67°

Twist per Centimetre			
1a	11	b	15
c	15	d	-
e	-	f	-
2	2	3	-
4	3	5	10
6	8	7	-
8	8		

Fibre Diameter: All camelid fibres in this artifact appear to be approximately 40 μ in diameter as compared with control samples.

Esmeralda T-28**Artifact:** small bag**Identification label:** Rh 2 Ce. 1.131**Inventory correlation:** 46

Description: Small natural cream coloured bag covered with layers of vegetal material (Plate 4 p). This artifact has been woven using a warp-faced plain weave construction; a heading cord at a visible warp edge, and a small area of visible weft edge confirms warp/weft direction. Side seams have been neatly sewn, but these were not readily available for close examination. The bag appears to have been woven in one piece, folded lengthwise and sewn at both sides as were the other bags of this collection, but the vegetal coverings prevented close examination. The bag has been sewn closed. Three layers of material cover this bag: the inner layer is of a fibrous material, possibly a furcraea. This layer appears to have been simply placed around the bag as there is no obvious means of attachment (although it is adhered). The middle layer, which has been braided along the bag bottom is composed of a fine grassy material. The braid protrudes just over the sewn edges (Plate 4 q). The outer layer is composed of a coarse grassy material which cover the other layers quite completely.

The article is well spun and woven, and contains organic material which has been identified by Morales (see Appendices IV and V) as coca.

Overall Measurements

Measured area	Measurements			Mean
Length	23.0 cm	22.6 cm	24.0 cm	23.20 cm
Width	17.0 cm	17.5 cm	16.6 cm	17.03 cm

Structural Dimensions

Measured area	Measurements						Mean
Warps/cm	28	32	36	30	30	32	31.33
Wefts/cm	5	4	4	5	5	5	4.67

Element Description

Two main sets of elements were used to construct this article: 1) yarns used for warp and 2) yarns used for weft. The three fibrous layers are also a part of this artifact, and are considered to be accessory objects.

warp: 1: natural light coloured 2-ply Z-spun S-plyed camelid yarn.

weft: 2: natural light coloured 2-ply Z-spun S-plyed vegetal yarn.

* The heading cord, which was not available for close examination, is composed of 3-ply vegetal material.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1	10YR 6/4	7.5YR 6/4
2	-	

Yarn Diameter

Element	Diameter						Mean
1	1.00 mm	1.00 mm	0.75 mm	0.50 mm	1.00 mm	0.75 mm	0.71 mm
2	1.00 mm	1.00 mm	1.00 mm	1.00 mm	1.00 mm	1.00 mm	1.00 mm

Angle of Twist in Ply

Element	Angle of Twist						Mean
1	45°	42°	-	-	-	-	43.5°
2	-						

Twist per Centimetre

1	8
2	-

Fibre Diameters: The fibres used in the warp yarns of this article appear to be approximately 40μ in diameter as compared with control samples. Weft yarns were unavailable.

Esmeralda T-29**Artifact:** Mantle (dress)**Identification labels:** none apparent**Inventory correlation:** 67

Description: This large rectangular mantle (Plate 3 c) was woven in two identical panels and then sewn together side to side along weft edges forming a centre seam. A warp-faced plain weave construction technique appears to have been utilized; warp/weft direction is indicated by the presence of two heading cords on each of two opposite selvages, and deterioration of concealed yarns. Each of the side panels incorporates coloured warp stripes and patterned warp stripes achieved by the manipulation of complementary-warp yarns. All four selvages have been finished.

All aspects of production of this article have been expertly executed. Section "A", however, appears to have been woven with more proficiency than was section "B" (for reference purposes, the panels have been identified in this manner). This suggests that either different people wove the two segments of this article or a single person wove both panels at different times. Of interest is that where red stripes adjoin white stripes, there are short lengths of red yarns inserted into the weft sheds along both sides of the stripe.

Much of this mantle is in tatters, with most of the severely damaged and missing areas from sections in which white coloured yarns were used, particularly at one end of the artifact. The white fibres, are, for the most part, brittle and easily broken, although in some areas the white fabric also has a very soft handle. Coloured areas of the side panels are relatively intact and the colours remain strong. There is very little stain discolouration other than in charred areas which have been burned. This factor, combined with the presence of several areas of cloth breakage along ancient creases, suggests that this artifact had been folded at the time of excavation, and not in direct contact with the interred females. Of interest is that in one area, the red colouring is much brighter and has the appearance of something (chicha?) having been spilled or splashed on it.

Overall Measurements

Measured area	Measurements			Mean
Length	137.20 cm	135.9 cm	138.2 cm	137.10 cm
Width (actual)	167.00 cm	167.5 cm	168.0 cm	167.50 cm
Full width (estimated)	180.00 cm	178.6 cm	179.4 cm	179.30 cm
Width outside white	15.00 cm			
Width red	3.50 cm			
Width brown	3.50 cm			
Width green	3.50 cm			
Width single pattern	3.00 cm			
Width red	21.00 cm			
Width brown	5.00 cm			
Width tripartite pattern	6.00 cm			
Width red	2.50 cm			
Width brown	1.50 cm			
Width red	1.50 cm			
Width white	22.00 cm			

Note: single measures are approximate dimensions of one panel measured from the outside selvedge to the centre seam.

Pattern

This was once a very beautiful textile, with its most prominent feature being its bright colouring. White would have been used for approximately 42% of the textile, red used for approximately 33.3%, and about 11.3% is brown. The green stripes represent approximately 4%, and pattern stripes (tripartite and single), a combination of red, gold and brown, comprise approximately 10.3%.

There are eighteen pattern segments in each of the tripartite stripes and single pattern stripes (Plate 3 d). In each panel, the "zigzags" of the two outer red and gold patterns are angled in the same direction and the inside brown and red pattern is angled in the opposite direction. The single pattern stripe is angled in the same direction as the red and gold patterns of the tripartite stripe on the same side. The pattern directions of one panel are mirrored on the opposite panel with zigzag patterns angled in the opposite direction. Zigzags are in "M", and "Z" shapes and are both simple and complex in design. The pattern sections are described here using the following symbols: C =complex; S =simple; G =gold; R =red. The numerical reference is to centimetres in length. It is also noted that pattern colours are reversed on the back.

Side A: 6.0 CRN; 7.5 CGN; 5.7 SRN; 6.3 SGM; 7.8 CRN; 7.0 CGN; 7.5 SRM; 7.5 SGM; 8.0 CRN; 7.5 CGN; 6.3 SRM; 8.0 SGM; 6.7 CRN; 7.2 CGN; 7.6 SRM; 7.5 SGM; 8.0 CRN; 8.0 CGN;

Side B; 9.1 CRN; 9.4 CGN; 8.6 SRN; 7.5 SGM; 8.4 CRN; 8.0 CGN; 8.0 SRM; 8.3 SGM; 8.0 CRN; 8.0 CGN; 7.3 SRM; 7.0 SGM; 7.4 CRN; 7.6 CGN; 5.2 SRM; 6.5 SGN; 5.0 CRN; 4.0 CGN.

Finishing

The edges have been finished entirely with white yarns and using two techniques: both warp edges have been edged using cross-knit loop stitching (Figure 11). This edge is also estimated to extend around all four corners and along weft edges for approximately 20.5 cm (only one corner area remains), with remaining weft edge areas on both sides of the mantle finished by overcasting. These overcast edges are estimated to have extended for approximately 96 cm along each side.

The two panels have been sewn together with doubled yarn along weft selvages using a figure-eight stitch (Figure 13). There are approximately 14 stitches/cm.

Structural Dimensions

Dimension	Measurements			Mean
Warps/cm plain side A	40	40	40	40.00
Warps/cm plain side B	36	32	38	35.33
Warps/cm pattern side A	32	32	32	32.00
Warps/cm pattern side B	32	32	32	32.00
Wefts/cm A	7	7	7	7.00
Wefts/cm B	6	6	6	6.00
Stitches/cm cross-knit looping	18	18	18	18.00
Stitches/cm overcasting	18	18	18	18.00

Element Description

There are two principal sets of elements used to construct this textile: 1) yarns used for warp, and 2) yarns used for weft. There are also two functional categories of accessory stitches used: 3) yarns used for edge finishing and 4) yarns used to join seams.

- warp: 1a: red coloured 2-ply Z-spun-S-plyed camelid yarn.
 b: gold coloured 2-ply Z-spun-S-plyed camelid yarn.
 c: green coloured 2-ply Z-spun-S-plyed camelid yarn.
 d: brown coloured 2-ply Z-spun-S-plyed camelid yarn.
 e: white coloured 2-ply Z-spun-S-plyed camelid yarn.
- weft: 2 : brown coloured 2-ply Z-spun-S-plyed camelid yarn.
- edge: 3 : white coloured 2-ply Z-spun-S-plyed camelid yarn.
- seams: 4 : white coloured 2-ply Z-spun-S-plyed camelid yarn.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest Colour: off site
1a	5R 3/8	5R 3/8
b	10YR 5/8	10YR 5/8
c	10GY 3/1	10GY 3/1
d	10YR 3/3	10YR 3/3
e	2.5YR 3/2	2.5YR 3/2
2	5R 3/6	5R 3/6
3	2.5 Y 7/4	10YR 8/4
4	2.5 Y 7/4	10YR 8/4

Yarn Diameter

Element	Diameter						Mean
1a	0.50 mm	0.75 mm	0.75 mm	1.00 mm	0.75 mm	0.5 mm	0.71 mm
b	0.50 mm	0.50 mm	0.50 mm	0.75 mm	0.50 mm	0.50 mm	0.54 mm
c	1.00 mm	1.00 mm	0.50 mm	1.00 mm	0.30 mm	0.50 mm	0.72 mm
d	1.00 mm	0.50 mm	0.75 mm	0.50 mm	0.75 mm	0.25 mm	0.63 mm
e	0.50 mm	0.50 mm	0.30 mm	0.50 mm	0.30 mm	0.30 mm	0.40 mm
2	1.00 mm	0.75 mm	1.00 mm	1.00 mm	1.00 mm	1.00 mm	0.96 mm
3	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm
4	-						

Angle of Twist in Ply

Element	Angle of twist						Mean
1a	39°	16°	38°	40°	35°	42°	35.00°
b	45°	40°	40°	37°	46°	36°	40.67°
c	40°	34°	32°	31°	34°	36°	34.50°
d	45°	42°	35°	44°	30°	48°	40.67°
e	35°	44°	41°	40°	42°	35°	39.50°
2	27°	18°	22°	31°	49°	32°	29.83°
3	49°	39°	45°	46°	31°	41°	41.83°
4	-						

Twists per Centimetre

1a	9
b	14
c	16
d	10
e	18
2	10
3	12
4	-

Fibre Diameters: Most fibres in this article appear to be approximately 40μ in diameter as compared with control samples. The white fibres used in edge finishing yarns, however, are considerably finer.

Esmeralda T-30

Artifact: Mantle (shawl)

Identification labels: none apparent

Inventory correlation: possibly 63? (the colours are similar to this artifact, but dimensions are different).

Description: This mantle was woven in a single panel. A warp-faced plain weave construction technique was most likely utilized, as two heading cords are present at each of two opposite selvages, weft edges are visible, and hidden elements have broken in a quite a number of areas (Plate 3 e). Patterning is in the form of wide warp stripes and there are narrow bands along each weft edge. All four selvages have been finished.

Spinning and weaving were competently executed, though the colours are somewhat irregular; brown fibres of the wide bands may have been overdyed with red, and the grey area has a "tweedy" appearance due to the mixture of grey and white fibres in spun yarn.

Much of this mantle is severely damaged, particularly the centre panel, and especially at one end. The textile is also badly stained, more so on one side than the other, and there are areas of cloth breakage along ancient creases. It also appears as though the mantle has been folded. These factors plus the presence of several human hairs noted in the gray area, approximately 30 cm from a warp edge, suggests close contact with one of the interred. A fragment of this textile was found with textile T-27.

Pattern

This mantle was woven in a bichrome colour arrangement of two wide brown warp stripes and a centre wide gray warp stripe. Narrow banded stripes at both weft edges were produced by the placement of two alternating colours of warp yarns. Each of these bands is approximately three centimetres in width, and it is of interest that the brown warp yarns in these narrow banded areas are somewhat darker in colour than the brown of the wide bands. Approximately 64% of the textile is brown and approximately 36% is gray.

Finishing

The edges have been finished using two techniques: both warp edges have been edged using multi-coloured yarns in a cross-knit loop stitch. This edge also extends around all four corners along weft edges for approximately 24 centimetres. The central weft edge areas, approximately 64 cm, have been finished utilizing red yarns and overcast stitching. The cross-knit loop stitched edges have been finished using multi-coloured yarns arranged in a specific order:

3 brown 4 gold 4 red 4 gold 4 red 4 gold

20 beige 4 red 4 gold 4 red 4 gold

24 brown 4 gold 4 red 4 gold 4 red 4 gold 4 beige

16 red 3 brown 4 gold 4 red 4 gold 4 red 4 gold

18 beige 4 gold 4 red 4 gold 4 red 4 gold 3 brown

16 red 4 beige 4 gold 4 red 4 gold 4 red 24 brown

This colour arrangement with minor variations has been repeated to the overcast weft edges bound with red yarns. The other exception to this arrangement are the four corners of the textile, each of which have been finished with red coloured yarns for approximately one centimetre in each direction.

Overall Measurements

Measured area	Measurements			Mean
Length	111.5 cm	111.5 cm	112.0 cm	111.67 cm
*Width	79.5 cm	-	-	79.50 cm
**Width brown A	26.0 cm	25.0 cm	26.1 cm	25.67 cm
*Width centre stripe	28.5 cm	-	-	28.50 cm
**Width brown B	25.0 cm	25.5 cm	25.5 cm	25.34 cm

* = measurements taken where intact.

** = includes complementary warp band (approximately 3.0 cm wide) and finished edge.

Structural Dimensions

Dimension	Measurements						Mean
Warps/cm brown	28	30	32	32	32	42	32.67
Warps/cm gray	32	38	34	32	36	34	34.33
Wefts/cm	8	7	7	8	6	7	7.17
Stitches/cm	15	16	18	16	18	16	16.50

Element Description

Two principal sets of elements were used to construct this textile: 1) yarns used for warp, and 2) yarns used for weft. One functional accessory stitch was also employed: 3) yarns used for edge finishing.

warp: 1a: brownish red coloured 2-ply Z-spun-S-plied camelid yarn.

b: gray coloured 2-ply Z-spun-S-plied camelid yarn.

c: dark brown coloured 2-ply Z-spun-S-plied camelid yarn (band).

weft: 2: brown coloured 2-ply Z-spun-S-plied camelid yarn.

edge: 3a: red coloured 2-ply Z-spun-S-plied camelid yarn: edge finishing.

b: gold coloured 2-ply Z-spun-S-plied camelid yarn: edge finishing.

c: beige coloured 2-ply Z-spun-S-plied camelid yarn: edge finishing.

d: brown coloured 2-ply Z-spun-S-plied camelid yarn: edge finishing.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest Colour: off site
1a	7.5YR 3/2	2.5YR 3/2
b	2.5Y 5/2	10YR 4/2
c	2.5YR 2.5/2	-
2	7.5YR 3/2	10R 3/2
3a	2.5 Y 7/4	10YR 8/4
b	2.5Y 6/8	10YR 4/6
c	10YR 5/4	10YR 5/2
d	5YR 2.5/1	-

Yarn Diameter

Element	Diameter						Mean
1a	1.00 mm	1.00 mm	0.75 mm	1.25 mm	1.00 mm	0.50 mm	0.92 mm
b	0.50 mm	0.50 mm	0.75 mm	0.50 mm	0.75 mm	0.50 mm	0.58 mm
c	-						
2	0.50 mm	0.75 mm	0.75 mm	0.75 mm	1.00 mm	1.00 mm	0.79 mm
3a	0.50 mm	0.50 mm	0.50 mm	0.30 mm	0.50 mm	0.50 mm	0.47 mm
b	0.50 mm	0.50 mm	0.75 mm	0.50 mm	0.50 mm	0.30 mm	0.51 mm
c	0.50 mm	0.50 mm	0.50 mm	0.30 mm	0.30 mm	0.50 mm	0.43 mm
d	0.75 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.54 mm

Angle of Twist in Ply

Element	Angle of twist						Mean
1a	35°	42°	35°	47°	43°	35°	39.5°
b	36°	47°	22°	44°	35°	45°	38.17°
c	-						
2	33°	38°	42°	35°	35°	47°	38.33°
3a	39°	45°	46°	39°	31°	36°	39.33°
b	32°	30°	32°	37°	35°	39°	34.16°
c	39°	31°	45°	33°	52°	30°	38.33°
d	31°	32°	30°	33°	35°	36°	32.83°

Twists per Centimetre

1a	16
b	18
c	-
2	13
3a	9
b	14
c	-
d	-

Fibre Diameters: The fibres in this article all appear to be approximately 40 μ in diameter as compared with control samples.

Esmeralda #T-31**Artifact:** small bag**Identification labels:** Rh 2 Ce. 1.88**Inventory correlation:** 54

Description: Small cream and brown coloured woven bag (plate 4 s). This artifact has been woven using a warp-faced plain weave construction; two heading cords on both sides of the top edge confirm warp/weft direction. Three units of two narrow dark brown warp stripes (6 ends each) have been used as pattern features, and are evenly spaced across the warp. Side seams have been finished, and top edges have been left unfinished. Yarn is even and well spun, but many warp threads were "missed" during the weaving process. The bag is well preserved with only few small holes and areas of weft breakage, and shows no evidence of use. This artifact is very similar to T-21.

Finishing

Side seams have been finished with figure-eight stitching arranged in a three thread zigzag design (Plate 4 r; and see also Figure 20). Each side is approximately 0.2 cm in depth and there are approximately three "patterns" per centimetre.

Overall Measurements

Measured area	Measurements			Mean
Length	32.00 cm	32.50 cm	32.00 cm	32.17 cm
Width	22.50 cm	22.50 cm	21.80 cm	22.27 cm
Width brown stripes	0.10 cm	0.10 cm	0.10 cm	0.10 cm
Width stripe units	0.50 cm	0.50 cm	0.50 cm	0.50 cm
Width natural stripes	5.80 cm	5.80 cm	-	5.80 cm
Depth bound edge	0.40 cm	0.40 cm	0.40 cm	0.40 cm

Structural Dimensions

Measured area	Measurements						Mean
Warps/cm	36	26	24	30	28	30	29.00
Wefts/cm	5	6	5	6	6	5	5.50

Element Description

Two main sets of elements were used to construct this article: 1) yarns used for warp and 2) yarns used as weft. In addition 3) functional accessory elements have been used to join and decorate side seams.

warp: 1a: natural cream coloured 2-ply Z-spun S-plyed camelid yarn.
 b: dark brown coloured 2-ply Z-spun S-plyed camelid yarn.
 weft: 2: natural cream coloured 2-ply Z-spun S-plyed camelid yarn.
 side seams: 3: dark brown 2-ply Z-spun S-plyed camelid yarn.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1a	10YR 7/3	2.5Y 8/4
b	5YR 3/2	2.5YR 3/2 (closest)
2	10YR 7/3	2.5Y 8.5/4
3	5YR 3/2	5YR 3/1

Yarn Diameter

Element	Diameter						Mean
1a	0.30 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.47 mm
b	0.30 mm	0.30 mm	0.50 mm	0.50 mm	0.30 mm	0.30 mm	0.36 mm
2	1.00 mm	1.00 mm	1.00 mm	0.50 mm	0.50 mm	1.25 mm	0.88 mm
3	0.30 mm	0.30 mm	0.50 mm	0.30 mm	0.30 mm	0.50 mm	0.40 mm

Angle of Twist in Ply

Element	Angle of Twist						Mean
1a	36°	34°	38°	38°	39°	42°	37.83°
b	39°	40°	30°	34°	36°	45°	37.33°
2	45°	40°	40°	49°	43°	44°	43.50°
3	42°	41°	42°	46°	40°	36°	41.16°

Twist per Centimetre

1a	15
b	10
2	12
3	

Fibre Diameters: The fibres used to construct this article appear to be approximately 40 μ in diameter as compared with control samples.

Esmeralda T-32

Artifact: Mantle (shawl)

Identification label: Rh 2 Ce 1.115

Inventory correlation: 74

Description: This mantle was woven as a single panel (Plate 3 f). In spite of loosely spun surface yarns, it is believed that a warp-faced plain weave construction technique was utilized, as two heading cords were present at one warp selvedge, and an area of clearly visible selvedge parallel to stripes appear to be a weft selvedge. There is also more damage to hidden yarns than to surface yarns (Plate 3 g), suggesting that the surface yarns are the warp. Patterning is in the form of wide warp stripes and narrow warp bands along each selvedge (Plate 3 g). All four selvedges have been finished. Much of this mantle is damaged or missing, particularly in the outer stripe areas. There is little staining, suggesting that this artifact was not worn by the interred, but there is some staining at one end, particularly in the central stripe area.

Pattern

This mantle was woven with a colour arrangement of three wide warp stripes and narrow bands formed by alternating two colours of warp yarns along both weft edges. The outer wide stripes were woven using camel coloured warp yarns and the centre stripe was woven using dark brown yarns. The narrow bands were woven by alternating these two yarn colours. Approximately 61.5% of the complete textile is camel coloured and approximately 38.5% is dark brown.

Finishing

The edges have been finished using two techniques: both warp edges were finished using camel and dark brown yarns in a cross-knit loop stitching. This edge also extends around all four corners along weft edges for approximately 23.5 cm. Camel coloured warp stripe areas were finished with camel coloured yarns, and dark brown warp stripe areas were edged in dark brown. The remaining weft edge areas, approximately 70 cm on each side, were finished with camel coloured yarns with overcast stitching. Finished edges are approximately 0.8 cm in depth along warp edges and 0.5 cm in depth along central weft edges, and have been worked with doubled yarns (Plate 3 g).

Overall Measurements

Measured area	Measurements			Mean
*Length	77.00 cm	77.50 cm	78.00 cm	77.50 cm
*Width	117.00 cm	116.50 cm	117.00 cm	116.83 cm
Width camel band A	23.60 cm	23.60 cm	24.00 cm	23.73 cm
Width centre band	30.00 cm	29.50 cm	30.00 cm	29.83 cm
*Width camel band B	24.10 cm	23.60 cm	24.00 cm	23.90 cm
Width banded stripes	0.80 cm	0.80 cm	0.80 cm	0.80 cm

* = measurements taken where intact.

Structural Dimensions

Dimension	Measurements						Mean
Warps/cm	4	4	5	4	4	4	4.17
Wefts/cm	20	22	20	22	20	20	20.67
*Stitches/cm	10	10	10	10	10	10	10.00

* = individual yarns.

Element Description

Two principal sets of elements were used to construct this textile: 1) yarns used for warp, and 2) yarns used for weft. A functional accessory stitch 3) yarns used for edge finishing, was also used.

warp: 1: dark brown coloured 2-ply Z-spun-S-plied camelid yarn.
 weft: 2a: camel coloured 2-ply Z-spun-S-plied camelid yarn.
 b: dark brown coloured 2-ply Z-spun-S-plied camelid yarn.
 edge: 3a: camel coloured 2-ply Z-spun-S-plied camelid yarn.
 b: dark brown coloured 2-ply Z-spun-S-plied camelid yarn.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest Colour: off site
1	2.5YR 2.5/2	2.5YR 2.5/2
2a	7.5YR 5/4	7.5YR 5/4 (closest)
b	10YR 2/1	5YR 2.5/1 (closest)
3a	7.5YR 5/4	7.5YR 5/4 (closest)
b	10YR 2/1	5YR 2.5/1 (closest)

Yarn Diameter

Element	Diameter						Mean
1	1.00 mm	1.00 mm	1.00 mm	1.00 mm	1.00 mm	1.00 mm	1.00 mm
2a	1.25 mm	1.00 mm	2.00 mm	1.25 mm	1.25 mm	2.00 mm	1.46 mm
b	1.25 mm	2.00 mm	1.00 mm	1.75 mm	1.50 mm	2.00 mm	1.58 mm
3a	-						
b	-						

Angle of Twist in Ply

Element	Angle of twist						Mean
1	40°	45°	45°	49°	38°	45°	43.67°
2a	45°	32°	45°	47°	42°	45°	42.67°
b	32°	30°	28°	33°	34°	32°	31.50°
3a	-						
b	-						

Twists per Centimetre

1	10
2a	5
b	2
3a	-
b	-

Fibre Diameters: The fibres used in the production of this article all appear to be slightly greater than 40μ in diameter as compared with control samples.

Esmeralda T-33

Artifact: Mantle (shawl)

Identification labels: none apparent

Inventory correlation: possibly 69

Description: This large rectangular mantle was woven in two panels and sewn together side to side along weft edges forming a centre seam (Plate 3 i). A warp-faced plain weave construction technique was utilized; warp/weft direction is indicated by the presence of two heading cords on each of two opposite selvages, visible weft selvages along the centre seam, destruction of hidden elements, and the irregular interlocking of weft yarns. Each of the matching panels incorporates coloured warp stripes and patterned warp stripes achieved by the manipulation of complementary-warp yarns (Plate 3 h). All four selvages have been finished, and all aspects of production of this article have been *expertly* executed.

There are a number of unusual features in the construction of this artifact. White weft yarns were used in the white stripes and brown weft yarns were used in the other areas, except for approximately four rows at one end of the textile and approximately twelve rows at the other end where brown weft threads were utilized across the whole textile. Also, two yarns were used for each weft pick, but discontinuous interlocking wefts were used; single brown yarns were thrown from each end and interlocked with white yarns then each was thrown back along the same shed. In some areas, this interlocking took place at specific points: three rows were joined on the white side then the next three rows were joined on the coloured side (Plate 3 j). This interlocking technique was used along the entire length of both white edges, but the joins were not always situated at regular intervals.

Colour differences were also noted (see Munsell colour description). The large red/brown stripe in panel A incorporates several subtle but different shades of colour which may be the result of using two different shades of yarn and mixing them equally throughout the warp (Plate 3 h). This two-tone effect was not noted in the opposite panel. Also in the narrow red/brown stripe of panel B, defined stripes of colour variation were noted. The brown in the central pattern stripe is different than the nearby plain brown warp stripe.

Much of this mantle is in tatters, with most of the missing areas from one end of the central white section. Multi-coloured stripes of the side panels are fragmented, mostly due to weft breakage, but most warp threads remain intact and colours are still strong. There is very little staining other than an irregular lighter spotted area on the central white segment that appears bleached in appearance (*chicha?*). The clean condition of this article, combined with several areas of cloth breakage along ancient creases, suggests that this artifact had been folded, and not in direct contact with the interred females.

Pattern

Colour is an important feature of this textile. White, though only approximately 18.5% of the textile, predominates. Red/brown covers approximately 66% of the textile and about 7.5% is brown. The tripartite pattern stripes, a combination of red, gold and brown, comprise

approximately 8% of the textile.

There are fifteen pattern segments in each of the tripartite stripes (Plate 3 h). In each panel, the zigzag-and-dot patterns of the outer red and gold stripes are angled in the same direction and those of the inside brown and red stripe are angled in the opposite direction. The pattern directions of one panel are mirrored on the opposite panel and patterns are angled in the opposite direction. Zigzags are in simple "M" and complex "N" shapes. Of interest is that the patterns of one side are also opposite in colour to the other side. For example a pattern in red and gold on one panel is gold with red on the opposite panel. Although the panels may have been woven in the same manner, it appears as though they were sewn together in a "back to front" arrangement. The pattern sections are described here using the following symbols: C =complex; S =simple; G =gold; R =red. The numerical reference is to centimetres in length. It is also noted that pattern colours are reversed on the back side of the artifact.

Side A: 11.5 SRM; 12.5 CGN; 7.5 CRN; 9.0 SGM; 9.0 SRM; 8.5 CGN; 8.5 CRN; 8.3 SGM; 8.5 SRM; 8.3 CGN; 8.0 CRN; 8.0 SGM; 8.0 SRM; 7.6 CGN; 8.2 CRN.

Side B: 9.2 SGM; 9.0 CRN; 9.5 CGN; 10.0 SRM; 8.8 SGM; 8.8 CRN; 8.4 CGN; 8.0 SRM; 8.0 SGM; 8.2 CRN; 8.2 CGN; 8.0 SRM; 9.0 SGM; 9.2 CRN; 3.2 CGN.

Finishing

The edges have been finished using two techniques: both warp edges have been finished using multi-coloured yarns in cross-knit loop stitching. This edge also extends around all four corners along weft edges for approximately 15 cm. The remaining weft edge areas, approximately 100 cm along each side, have been finished in plain brown with overcast stitching. The cross-knit loop stitched edges have been finished using multi-coloured yarns arranged in a specific order (Plate 3 h):

24 red 4 gold 5 red 4 gold 5 red 4 gold
 20 beige 5 gold 5 red 5 gold 5 red 5 gold
 22 brown 5 gold 5 red 5 gold 5 red 5 gold 4 beige
 22 red 4 brown 4 gold 4 red 4 gold 4 red 4 gold
 24 gold 5 gold 5 red 5 gold 5 red 5 gold
 4 dark brown 5 gold 5 red 5 gold 5 red 5 gold 4 beige

The exceptions to this colour arrangement of the cross-knit loop stitched edge are the warp edges of the central white stripe which have been finished with cross-knit loop stitching with white yarns.

The two panels have been sewn together with tripled yarn along weft selvages using a figure-eight stitch with approximately fourteen stitches per cm.

Overall Measurements

Measured area	Measurements			Mean
Length	130.00 cm	130.00 cm	131.00 cm	130.33 cm
*Width	186.00 cm	186.10 cm	186.00 cm	186.03 cm
Width panel A	93.50 cm	93.10 cm	93.00 cm	93.20 cm
Width panel B	92.50 cm	93.00 cm	93.00 cm	92.83 cm
*Width white stripe A	18.00 cm	17.80 cm	18.00 cm	17.93 cm
* Width white stripe B	18.60 cm	18.60 cm	18.60 cm	18.60 cm
Width red/brown A	13.50 cm	13.70 cm	13.50 cm	13.57 cm
Width red/brown B	12.80 cm	12.80 cm	14.20 cm	13.27 cm
Width narrow brown A	8.00 cm	7.00 cm	8.00 cm	7.67 cm
Width narrow brown B	7.00 cm	7.00 cm	7.00 cm	7.00 cm
Width pattern stripe A	7.60 cm	8.50 cm	8.00 cm	8.03 cm
Width pattern stripe B	7.20 cm	7.70 cm	7.40 cm	7.43 cm
Width red/brown A	52.00 cm	50.70 cm	51.50 cm	51.40 cm
Width red/brown B	49.50 cm	53.00 cm	55.00 cm	52.50 cm

* = approximate.

Structural Dimensions

Dimension	Measurements						Mean
Warps/cm plain side A	44		42		40		42.00
Warps/cm plain side B	42		46		48		45.33
Warps/cm pattern side A	44		46		36		42.00
Warps/cm pattern side B	34		40		40		38.00
*Wefts/cm A	6		6		7		6.33
*Wefts/cm B	6		7		6		6.33
Stitches/cm cross-knit	22	20	20	18	23	21	20.67
Stitches/cm overcast	34	26	28	24	28	26	27.67

* = doubled.

Element Description

There are two principal sets of elements used in the construction of this textile: 1) yarns used for warp, and 2) yarns used as weft. Two functional categories of accessory stitches were also used: 3) yarns used for edge finishing and 4) yarns used to join seams.

warp: 1a: red/brown coloured 2-ply Z-spun-S-plied camelid yarn.
 b: white coloured 2-ply Z-spun-S-plied camelid yarn.
 c: red coloured 2-ply Z-spun-S-plied camelid yarn.
 d: gold coloured 2-ply Z-spun-S-plied camelid yarn.
 e: brown coloured 2-ply Z-spun-S-plied camelid yarn.

- f: dark brown coloured 2-ply Z-spun-S-plied camelid yarn.
- weft: 2a: brown coloured 2-ply Z-spun-S-plied camelid yarn.
b: white coloured 2-ply Z-spun-S-plied camelid yarn (used doubled).
- edge: 3a: red coloured 4-ply Z-spun-S-plied camelid yarn.
b: gold coloured 2-ply Z-spun-S-plied camelid yarn
c: brown coloured 2-ply Z-spun-S-plied camelid yarn.
d: beige coloured 2-ply Z-spun-S-plied camelid yarn.
e: brown coloured 2-ply Z-spun-S-plied camelid yarn (overcast area).
f: white coloured 2-ply Z-spun-S-plied camelid yarn
- seam: 4: white coloured 2-ply Z-spun-S-plied camelid yarn.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest Colour: off site
1a	10R 2.5/2	7.5R 2.5/4
b	2.5Y 8.5/4 (closest)	2.5Y 8.5/4 (closest)
c	2.5R 4/12	7.5R 3/8 (closest)
d	2.5Y 7/8	2.5Y 7/6
e	5YR 3/2	5YR 3/2 (closest)
f	10YR 2/2	2.5YR 2.5/2 (closest)
2a	5YR 4/2	5R 3/6 (closest)
b	2.5Y 8.5/4	2.5Y 8.5/4
3a	2.5R 4/12	7.5R 3/8 (closest)
b	2.5Y 7/8	2.5Y 7/6
c	5YR 3/2	5YR 3/2 (closest)
d	2.5 YR 5/6	2.5YR 3/2
e	10R 3/2	2.5 YR 3/2
f	2.5Y 8.5/4	2.5Y 8.5/4
4	2.5Y 8.5/4	2.5Y 8.5/4

Yarn Diameter

Element	Diameter						Mean
1a	0.75 mm	0.50 mm	0.30 mm	1.00 mm	0.50 mm	1.00 mm	0.68 mm
b	0.30 mm	0.50 mm	0.50 mm	0.30 mm	0.25 mm	0.25 mm	0.32 mm
c	1.00 mm	1.00 mm	0.50 mm	1.00 mm	1.00 mm	0.75 mm	0.88 mm
d	0.50 mm	0.50 mm	0.75 mm	1.00 mm	0.30 mm	0.50 mm	0.59 mm
e	1.00 mm	0.50 mm	0.75 mm	0.50 mm	0.75 mm	0.50 mm	0.66 mm
f	0.30 mm	0.30 mm	0.30 mm	0.50 mm	0.50 mm	0.30 mm	0.36 mm
2a	0.25 mm	0.25 mm	0.25 mm	0.30 mm	0.50 mm	0.25 mm	0.30 mm
b	0.25 mm	0.25 mm	0.25 mm	0.25 mm	0.30 mm	0.25 mm	0.26 mm
3a	0.50 mm	0.50 mm	0.30 mm	0.75 mm	0.50 mm	0.50 mm	0.51 mm
b	0.50 mm	0.50 mm	0.30 mm	0.75 mm	0.30 mm	0.30 mm	0.41 mm
c	0.30 mm	0.30 mm	0.30 mm	0.30 mm	0.30 mm	0.30 mm	0.30 mm
d	0.75 mm	0.50 mm	0.50 mm	0.50 mm	0.75 mm	0.50 mm	0.58 mm
e	0.30 mm	0.30 mm	0.30 mm	0.30 mm	0.50 mm	0.50 mm	0.37 mm
f	0.25 mm	0.25 mm	0.25 mm	0.25 mm	0.25 mm	0.25 mm	0.25 mm
4	-						

Angle of Twist in Ply

Element	Angle of twist						Mean
1a	36°	45°	45°	40°	43°	40°	41.50°
b	36°	40°	32°	32°	42°	40°	37.00°
c	42°	45°	41°	41°	30°	41°	40.00°
d	43°	40°	38°	37°	35°	29°	37.00°
e	40°	49°	44°	37°	41°	38°	41.50°
f	48°	47°	60°	57°	56°	52°	53.33°
2a	36°	18°	34°	33°	36°	35°	32.17°
b	44°	36°	36°	42°	47°	46°	41.83°
3a	33°	42°	44°	37°	38	40°	39.00°
b	39°	38°	38°	30°	35°	33°	35.50°
c	40°	34°	38°	35°	36°	35°	36.33°
d	37°	26°	26°	36°	24°	33°	30.33°
e	30°	33°	35°	32°	41°	34°	34.16°
f	-						
4	-						

Twists per Centimetre

1a	14
b	12
c	6
d	10
e	-
f	25
2a	10
b	14
3a	12
b	16
c	-
d	12
e	12
f	18
4	-

Fibre Diameters: Most fibres in this article appear to be approximately 40μ in diameter as compared with control samples. White fibres are somewhat finer.

Esmeralda T-34

Artifact: Mantle (dress)

Identification label: Rh I 1-75

Inventory correlation: 63

Description: This thick mantle was woven in a single panel. A warp-faced plain weave construction technique was utilized with warp/weft direction indicated by the presence of two heading cords at one warp selvedge and a single heading cord at the other. An area of weft edge is also clearly visible. The mantle was woven in a bichrome colour arrangement, and all four selvedges were finished (Plate 3 k).

Variable levels of expertise are demonstrated in the construction of this article; warp yarns are irregular in diameter and have been softly spun. Juvenile participation is suggested. Weft yarns, on the other hand have been more consistently spun and are stronger. Also, although the warp sett is uneven, the weaving itself has been done with consistency. The gray yarns of the warp have been spun of mixed gray and white fibres so are variegated in colour.

Although this artifact is relatively intact, much of it is heavily stained. Most of this staining is in the central area extending to one corner, and most of the damage is at one end. A few threads of red yarns from another artifact are adhered to the central brown stripe in the area of staining.

Pattern

This mantle was woven in a colour arrangement of two narrow and two wide warp stripes on either side of a central panel. The centre and outer stripes have been woven in dark brown yarns, and the side stripes has been done in gray. Approximately 66% of the complete textile is brown and approximately 34% is gray.

Finishing

The edges have been finished using two techniques: both warp edges have been finished in cross-knit loop stitching using dark brown yarns. This edge also extends around all four corners along weft edges for 23.5 -24 cm. The remaining weft edge areas, approximately 97 cm on each side, have been finished in overcast stitching with dark brown coloured yarns. Finished edges appear to have been worked with doubled yarns.

Overall Measurements

Measured area	Measurements			Mean
Length	144.50 cm	145.00 cm	143.40 cm	144.30 cm
Width	114.00 cm	111.20 cm	111.00 cm	112.06 cm
Width brown stripe A	4.70 cm	4.20 cm	4.70 cm	4.53 cm
Width brown stripe B	5.00 cm	4.50 cm	5.00 cm	4.83 cm
Width gray stripe A	19.00 cm	18.20 cm	19.00 cm	18.73 cm
Width gray stripe B	19.00 cm	19.00 cm	19.80 cm	19.00 cm
Width centre brown	63.60 cm	63.00 cm	64.80 cm	63.80 cm

Structural Dimensions

Dimension	Measurements						Mean
Warps/cm brown A	14		18		12		14.67
Warps/cm brown B	14		14		16		14.67
Warps/cm gray A	22		24		26		23.33
Warps/cm gray B	14		16		16		15.33
Wefts/cm A	4		4		5		4.34
Wefts/cm B	4		4		4		4.00
Stitches/cm	6	6	6	6	6	6	6.00

Element Description

Two principal sets of elements were used to construct this textile: 1) yarns used for warp, and 2) yarns used for weft. A functional category of accessory stitching 3) yarns used for edge finishing was also used.

warp: 1a: dark brown coloured 2-ply Z-spun-S-plied camelid yarn.

b: gray coloured 2-ply Z-spun-S-plied camelid yarn.

weft: 2: brown coloured 2-ply Z-spun-S-plied camelid yarn.

edge 3: dark brown coloured 2-ply Z-spun-S-plied camelid yarn.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest Colour: off site
1a	5YR 2.5/1	5YR 2.5/1
b (bichrome)	10YR 5/1	2.5Y 5/2 (closest)
2	5Y 2.5/1	10YR 2.5/1
3	10YR 2.5/1	10YR 2.5/1

Yarn Diameter

Element	Diameter						Mean
1a	1.50 mm	2.00 mm	1.50 mm	1.00 mm	1.50 mm	1.50 mm	1.50 mm
b	2.00 mm	2.00 mm	1.50 mm	2.00 mm	2.00 mm	2.00 mm	1.92 mm
2	1.00 mm	1.00 mm	0.75 mm	1.00 mm	1.00 mm	1.00 mm	1.00 mm
3	2.00 mm	2.00 mm	2.25 mm	1.50 mm	2.00 mm	2.00 mm	1.96 mm

Angle of Twist in Ply

Element	Angle of twist						Mean
1a	32°	35°	34°	34°	30°	32°	32.83°
b	15°	12°	32°	34°	28°	20°	23.50°
2	45°	44°	42°	40°	40°	35°	41.00°
3	30°	32°	35°	37°	32°	40°	34.33°

Twists per Centimetre

1a	3
b	2
2	6
3	7

Fibre Diameters: The fibres used to produce this artifact appear to be approximately 40μ in diameter as compared with control samples.

Esmeralda T-35

Artifact: Belt

Identification label: Ce. 1.123

Inventory correlation: 23

Description: narrow double-cloth belt with a warp-faced plain weave construction (Plate 2 i). Warp/weft direction is indicated by the presence of thicker heading yarns at both narrow ends of the fabric, and a terminal area at one end. Alternating warp colour sequences of blue/blue, red/gold, white/blue, red/brown and red/gold combinations have been used to create warp-striped designs which have been symmetrically arranged and are mirror imaged on both sides of the central stripe. Three stripes in red and gold zigzag-and-dot designs and two brown and red stripes with geometric patterning are separated by narrow stripes woven in a white and blue diamond pattern, and side edges are blue. The stripes are arranged symmetrically around a central stripe, and are mirror imaged. All aspects of production of this artifact have been expertly executed. The artifact is relatively intact, but there is considerable weft breakage, and selective warp breakage, specifically of the blue yarns at the belt edges is evident, possibly the result of fibre weakening during the dye process. The warp selvages are frayed in a manner that suggests that cords might have once been attached. There is a noticeable lack of significant staining, suggesting that the article was not in direct contact with the interred females.

Pattern

The centre zigzag-and-dot stripe of this belt has been woven with 36 patterns while the side stripes incorporate only 31.5 patterns. In all three of these stripes the pattern angles are in the same direction. Also interesting is that the centre stripe patterns have been woven with approximately fourteen weft picks, while in the outer stripes a sixteen row pattern was used. The two pattern rows are composed of extended geometric designs, each approximately 3 cm in length, and both stripes have been woven with the same patterns.

Overall Measurements

Measured area	Measurements			Mean
Length	122.50 cm	122.00 cm	121.00 cm	121.83 cm
Width	11.00 cm	11.50 cm	10.80 cm	11.10 cm
Width outside zigzags	2.00 cm	2.00 cm	2.00 cm	2.00 cm
Width centre zigzag	1.50 cm	1.60 cm	1.50 cm	1.53 cm
Width geometric stripes	1.70 cm	1.70 cm	1.50 cm	1.63 cm
Width blue edges	1.00 cm	1.00 cm	1.00 cm	1.00 cm
Width narrow stripes	0.30 cm	0.50 cm	0.40 cm	0.40 cm
Length terminal area	6.00 cm	6.00 cm	5.90 cm	5.97 cm

Structural Dimensions

Dimension	Measurements						Mean
*Warps/cm	36	36	32	38	28	36	34.33
*Wefts/cm	5	4.5	5	4	5	5	4.75

* = single face.

Element Description

Two sets of elements were used to construct this textile: 1) yarns used in warp, and 2) yarns used as weft.

warp:	1a: blue coloured 2-ply Z-spun S-plied camelid yarn.
	b: red coloured 2-ply Z-spun S-plied camelid yarn.
	c: gold coloured 2-ply Z-spun S-plied camelid yarn.
	d: white coloured 2-ply Z-spun S-plied camelid yarn.
	e: brown coloured 2-ply Z-spun S-plied camelid yarn.
weft:	2: brown coloured 2-ply S-spun Z-plied camelid yarn.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1a	10BG 2.5/2	10BG 2.5/2
b	7.5R 3/4	7.5R 3/4
c	2.5Y 6/8	10YR 6/8
d	2.5Y 7/4	10YR 7/4
e	2.5YR 2.5/2	7.5YR 3/2
2	5YR 3/2	5YR 3/2

Yarn Diameter

Element	Diameters						Mean
1a	0.50 mm	0.25 mm	0.25 mm	0.30 mm	0.30 mm	0.25 mm	0.31 mm
b	1.00 mm	0.50 mm	1.00 mm	0.75 mm	0.50 mm	1.00 mm	0.79 mm
c	1.00 mm	1.00 mm	0.75 mm	0.50 mm	1.00 mm	0.50 mm	0.79 mm
d	0.50 mm	0.50 mm	0.50 mm	0.30 mm	0.30 mm	0.50 mm	0.43 mm
e	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm
2	1.00 mm	1.00 mm	1.25 mm	1.00 mm	1.25 mm	1.00 mm	1.08 mm

Angle of Twist in Ply

Element	Angle of twist						Mean
1a	51°	41°	42°	36°	32°	40°	40.33°
b	44°	32°	43°	40°	35°	45°	39.83°
c	32°	40°	35°	36°	51°	44°	39.67°
d	40°	30°	44°	51°	37°	39°	40.17°
e	47°	34°	51°	45°	50°	42°	44.80°
2	41°	42°	40°	48°	47°	47°	44.17°

Twist per Centimetre

1a	12
b	12
c	12
d	10
e	12
2	12

Fibre Diameter: The fibres used in the warp of this artifact appear to be approximately 40μ in diameter as compared with control samples. Fibres used in weft yarns are somewhat finer.

Esmeralda T-36

Artifact: Braided tasselled cord

Identification labels: Ce 125

Inventory correlation: non specific: 27-35

Description: Braided cord with attached tassel (Plate 1 i). The cords of this artifact are well constructed and have a soft handle, but the tassel construction is somewhat irregular. Red and gold coloured yarns have been braided to form a continuous zigzag pattern along the length of the braided cord. A rather skimpy tassel that appears to have been constructed of the same gold yarns as the cord has been attached to one end, and a smaller two strand plied cord has been looped through the other rounded end. There is no evidence of an extra plied cord having been attached to the body of the cord as with several others in this collection. This artifact is fairly well preserved, although the cord surface has an abraded texture, possibly due to insect infestation, and the tassel fringes are sparse in number.

The cord has been braided in the same manner as the others of this collection, and the tassel added later (Figure 15). The plied cord was constructed of a bichrome skein (Figure 17), which would have been over-twisted, doubled, and plied.

There is evidence of skilled workmanship in the production of the cords of this textile. For the most part, yarns appear to be evenly and consistently spun; and pattern direction and size in the braided cord is also consistent. Some of the tassel yarns, however, are varied in diameter, and a few attached red fibres suggest that red yarns were also once part of the tassel. It was also noted that this artifact is quite similar in size and proportion to T-37.

Overall Measurements

Measured area	Measurements			Mean
* Length cord	80.00 cm	80.30 cm	80.00 cm	80.10 cm
Length plied cord	31.00 cm	31.50 cm	31.00 cm	31.17 cm
Length tassel	8.00 cm	8.00 cm	8.00 cm	8.00 cm
Width tassel cover	1.20 cm	1.50 cm	1.00 cm	1.23 cm
Diameter cord	1.80 cm	1.50 cm	1.60 cm	1.63 cm
Diameter plied cord	0.80 cm	0.80 cm	0.80 cm	0.80 cm
** Diameter tassel	4.00 cm	4.00 cm	4.00 cm	4.00 cm
Diameter tassel cover	1.70 cm	1.50 cm	1.50 cm	1.57 cm

* = measured to beginning of tassel. ** = approximate.

Structural Dimensions

Measured area	Measurements						Mean
Length braid loop	1.40 cm	1.20 cm	1.20 cm	1.60 cm	1.80 cm	1.60 cm	1.47 cm
Width braid loop	0.90 cm	0.50 cm	0.50 cm	0.80 cm	0.70 cm	0.80 cm	0.70 cm

Element Description

This article has been produced mainly utilizing sets of single elements: strands of yarns which have been utilized to construct 1) the braided cord and 2) the plied cord. Accessory elements: 3) yarn lengths that have been grouped together to form the body of the tassel, and 4) sewing elements utilized to stabilize the tassel, have also been utilized.

braided cord: 1a: red coloured camelid yarn. This is probably a loosely plied 2-ply Z-spun S-plied yarn but this cannot be absolutely determined.

b: gold coloured camelid yarn: This is probably a loosely plied 2-ply Z-spun S-plied yarn but here too this cannot be absolutely determined.

plied cord: 2 a: red coloured 2-ply Z-spun S-plied camelid yarn.

b: gold coloured 2-ply Z-spun S-plied camelid yarn.

tassel 3 a: red coloured 2-ply Z-spun S-plied camelid yarn.

b: gold coloured 2-ply Z-spun S-plied camelid yarn.

tassel cover 4: natural light coloured 2-ply Z-spun S-plied camelid yarn utilized to stabilize the tassel, becoming part of the tassel structure.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1a	7.5R 3/6	5R 4/6
b	2.5Y 6/8	10YR 6/8
2a	7.5R 4/8	7.5R 4/12
b	2.5Y 6/6	10YR 6/8
3	2.5Y 5/6	10YR 8/4
4	2.5 Y 7/2	5YR 4/4

Yarn Diameter

Element	Diameter						Mean
1a	-						
b	-						
2a	1.00 mm	1.00 mm	2.25 mm	1.00 mm	1.00 mm	1.00 mm	1.20 mm
b	1.00 mm	1.00 mm	0.75 mm	1.25 mm	1.00 mm	1.00 mm	1.00 mm
3	2.00 mm	2.00 mm	3.00 mm	2.00 mm	3.00 mm	2.50 mm	2.42 mm
4	1.00 mm	1.00 mm	1.50 mm	1.00 mm	1.20 mm	1.00 mm	1.12 mm

Angle of Twist in Ply

Element	Angle of Twist						Mean
1a	-						
b	-						
2a	25°	10°	-	-	-	-	17.50°
b	10°	26°	12°	20°	30°	22°	20.00°
3	35°	28°	16°	28°	20°	28°	25.83°
4	34°	30°	34°	39°	34°	33°	34.00°

Twist per Centimetre

1a	-
b	-
2a	6
b	8
3	3
4	9

Fibre Diameters: The fibres used in the braided cord and tassel appear to be slightly heavier than 40μ in diameter. Those of the plied cord and tassel ring appear to be approximately 40μ in diameter, all as compared with control samples.

Esmeralda T-37

Artifact: Braided tasselled cord

Identification labels: Ce 126

Inventory correlation: non specific: 27-35

Description: Braided cord with attached tassel (Plate 1 i). The cords of this artifact are well constructed with a soft handle, but the tassel construction is somewhat irregular. Red and gold coloured yarns have been braided to form a continuous zigzag pattern along the length of the braided cord, and a rather skimpy and deteriorated tassel that appears to have been constructed of some of the same red and gold yarns as the cord (plus others) has been attached to one end. A smaller two strand plied cord has been looped through the other rounded end. There is no evidence of an extra plied cord. This artifact is fairly well preserved, although the cord surface has an abraded texture, possibly due to insect action, and the tassel fringes are sparse in number.

The cord has been braided, and the tassel added later (Figure 15). The plied cord was constructed of a bi-chrome skein (Figure 17), which would have been over-twisted, doubled, and plied.

There is evidence of skilled workmanship in almost all aspects of the production of this textile. Yarns appear to be, for the most part, evenly and consistently spun; and pattern direction and size in the braided cord is also consistent. Some of the tassel yarns, however, are varied in regards to colour and diameter, suggesting the use of leftover scraps of yarn here. It was also noted that this artifact is quite similar both in length and proportion to T-36.

Overall Measurements

Measured area	Measurements			Mean
* Length cord	80.00 cm	80.20 cm	80.20 cm	80.13 cm
Length plied cord	36.50 cm	38.00 cm	37.50 cm	37.33 cm
Length tassel	10.00 cm	10.00 cm	10.00 cm	10.00 cm
Width tassel cover	1.00 cm	1.20 cm	1.20 cm	1.13 cm
Diameter cord	1.50 cm	1.50 cm	1.50 cm	1.50 cm
Diameter plied cord	0.50 cm	0.60 cm	0.50 cm	0.53 cm
Diameter tassel	-			
Diameter tassel cover	-			

* = measured to beginning of tassel.

Structural Dimensions

Measured area	Measurements						Mean
Length braid loop	1.30 cm	1.10 cm	1.50 cm	1.50 cm	1.40 cm	1.20 cm	1.33 cm
Width braid loop	0.70 cm	0.80 cm	0.60 cm	0.60 cm	0.70 cm	0.60 cm	0.67 cm

Element Description

This article has been produced mainly utilizing sets of single elements: strands of yarns which have been utilized to construct 1) the braided cord and 2) the plied cord. Accessory elements: 3) yarn lengths that have been grouped together to form the body of the tassel, and 4) sewing elements utilized to stabilize the tassel, have also been utilized.

braided cord: 1a: red coloured camelid yarn. This is probably a loosely plied 2-ply Z-spun S-plied yarn but this cannot be absolutely determined.

b: gold coloured camelid yarn: This is probably a loosely plied 2-ply Z-spun S plied yarn but here too this cannot be absolutely determined.

plied cord: 2a: red coloured 2-ply Z-spun S-plied camelid yarn.

b: gold coloured 2-ply Z-spun S-plied camelid yarn.

tassel 3a: red coloured 2-ply Z-spun S-plied camelid yarn.

b: gold coloured 2-ply Z-spun S-plied camelid yarn.

tassel cover 4: natural light coloured 2-ply Z-spun S-plied camelid yarn utilized to form and stabilize the tassel, becoming a part of the tassel structure.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1a	7.5R 4/8	7.5R 4/8
b	2.5Y 6/8	-
2a	7.5R 3/6	7.5R 3/6
b	2.5Y 6/8	10YR 5/8
3a	7.5R 4/8	7.5R 4/8
b	2.5Y 6/8	2.5Y 6/8
4	2.5 Y 7/2	2.5Y 8.5/4

Yarn Diameter

Element	Diameter						Mean
1a	-						
b	-						
2a	1.00 mm	1.00 mm	1.00 mm	1.00 mm	0.75 mm	1.00 mm	0.96 mm
b	1.25 mm	1.00 mm	0.75 mm	0.50 mm	1.00 mm	0.50 mm	0.92 mm
3a	2.00 mm	3.00 mm	1.50 mm	3.50 mm	1.05 mm	2.50 mm	2.33 mm
b	2.50 mm	2.00 mm	2.00 mm	4.25 mm	3.00 mm	1.50 mm	2.54 mm
4	0.75 mm	0.75 mm	0.75 mm	1.00 mm	0.75 mm	0.75 mm	0.79 mm

Angle of Twist in Ply

Element	Angle of Twist						Mean
1a	-						
b	-						
2a	42°	33°	05°	22°	30°	22°	25.67°
b	19°	30°	22°	22°	22°	34°	24.83°
*3a	20°	46°	20°	34°	43°	28°	31.83°
b	12°	22°	13°	24°	22°	30°	20.50°
4	46°	55°	42°	48°	47°	36°	45.67°

* = different sources: two colours of red.

Twist per Centimetre

1a	-
b	-
2a	4
b	7
3a	3
b	3
4	13

Fibre Diameters: All fibres used in the construction of this artifact appear to be approximately 40 μ diameter as compared with control samples.

Esmeralda T-38

Artifact: Braided tasselled cord

Identification labels: none apparent

Inventory correlation: possibly 35

Description: Braided cord with attached tassel (Plate 1 j). This artifact is well constructed with a soft handle. Red and gold coloured yarns have been braided to form a continuous zigzag pattern along the length of the braided cord, and a full tassel that appears *not* to have been constructed of the same yarns as the cord has been attached to one end. A smaller two strand plied cord has been looped through the other rounded end. There is no evidence of an extra plied cord having been attached to the body of the cord. This artifact is fairly well preserved, although areas of the cord surface has an abraded texture, possibly due to insect action.

The cord has been braided, and the tassel added later (Figure 15). The plied cord was constructed of a bichrome skein (Figure 17), which would have been over-twisted, doubled, and plied.

There is evidence of skilled workmanship in almost all aspects of the production of this textile. Yarns appear to be, for the most part, evenly and consistently spun; and pattern direction and size in the braided cord is also consistent. The tassel yarns, however, are varied in regards to colour and diameter, suggesting the use of leftover scraps of yarn. It was also noted that this artifact is quite similar both in length and proportion to T-7.

Overall Measurements

Measured area	Measurements			Mean
* Length cord	114.60 cm	114.20 cm	114.30 cm	114.37 cm
Length plied cord	42.00 cm	42.80 cm	42.50 cm	42.53 cm
Length tassel	13.00 cm	12.00 cm	11.00 cm	12.00 cm
Width tassel cover	2.00 cm	1.80 cm	1.80 cm	1.87 cm
Diameter cord	2.00 cm	2.00 cm	1.90 cm	1.97 cm
Diameter plied cord	0.70 cm	0.70 cm	0.80 cm	0.73 cm
Diameter tassel	4.50 cm	7.50 cm	10.50 cm	7.50 cm
Diameter tassel cover	4.00 cm	4.00 cm	4.20 cm	4.06 cm

* = measured to beginning of tassel cover.

Structural Dimensions

Measured area	Measurements						Mean
Length braid loop	2.00 cm	1.40 cm	2.00 cm	1.80 cm	2.00 cm	1.50 cm	1.78 cm
Width braid loop	1.00 cm	0.60 cm	0.70 cm	0.50 cm	0.70 cm	0.60 cm	0.68 cm

Element Description

This article has been produced mainly utilizing sets of single elements: strands of yarns utilized to construct 1) the braided cord and 2) the plied cord. Accessory elements: 3) yarn lengths that have been grouped together to form the body of the tassel, and 4) sewing elements utilized to stabilize the tassel, have also been utilized.

braided cord: 1a: red coloured camelid yarn. This is probably a loosely plied 2-ply Z-spun S-plied yarn but this cannot be absolutely determined.

b: gold coloured camelid yarn: This is probably a loosely plied 2-ply Z-spun S-plied yarn but here too this cannot be absolutely determined.

plied cord: 2a: red coloured 2-ply Z-spun S-plied camelid yarn.

b: gold coloured 2-ply Z-spun S-plied camelid yarn.

tassel 3a: red coloured 2-ply Z-spun S-plied camelid yarn.

b: gold coloured 2-ply Z-spun S-plied camelid yarn.

tassel cover 4: natural light coloured 2-ply Z-spun S-plied camelid yarn.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1a	7.5R 3/6	7.5R 4/6
b	2.5Y 6/8	2.5Y 6/8
2a	7.5R 3/6	7.5R 4/6
b	2.5Y 6/8	2.5Y 6/8
3a	7.5R 3/6	7.5R 3/6
*b	2.5Y 6/8	2.5Y 6/8
	10YR 5/4	10YR 5/6
4	2.5 Y 7/4	2.5Y 8.5/4

* = two shades of gold used.

Yarn Diameter

Element	Diameter						Mean
1a	-	-	-	-	-	-	-
b	-	-	-	-	-	-	-
2a	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm
b	0.50 mm	0.50 mm	0.50 mm	1.00 mm	0.50 mm	0.50 mm	0.58 mm
3a	2.00 mm	2.00 mm	2.00 mm	1.50 mm	2.00 mm	1.50 mm	1.83 mm
b	3.00 mm	1.50 mm	2.00 mm	2.50 mm	2.00 mm	1.00 mm	2.00 mm
4	1.00 mm	0.75 mm	1.00 mm	0.75 mm	1.00 mm	1.00 mm	0.92 mm

Angle of Twist in Ply

Element	Angle of Twist						Mean
1a	-						
b	-						
2a	45°	36°	36°	42°	39°	46°	40.67°
b	36°	37°	42°	45°	41°	50°	41.83°
3a	35°	40°	44°	20°	37°	34°	35.00°
*b	20°	30°	33°	30°	27°	24°	27.33°
4	42°	45°	43°	41°	40°	45°	42.67°

* = irregular; singles also used.

Twist per Centimetre

1a	-
b	-
2a	12
b	8
3a	2
b	2
4	7

Fibre Diameters: All fibres used in the construction of the plied cord and tassel cover appear to be approximately 40 μ in diameter as compared with control samples. Fibres of the braided cord and tassel are somewhat heavier.

Esmeralda #T-39**Artifact:** Belt**Identification label:** none apparent**Inventory correlation:** 25

Description: Narrow double-cloth belt with a warp-faced plain weave construction (Plate 2 j). Warp/weft direction is indicated by the presence of three thicker heading yarns at both narrow ends of the fabric, and twenty-four rows of a terminal area at one of these ends (Plate 2 l). Alternating warp colour sequences of red/red, gold/beige, red/blue, red/gold, and red/blue combinations have been used to create warp-striped designs which have been symmetrically arranged and are mirror imaged on both sides of the central stripe. Wide stripes in gold and beige zigzag-and-dot patterning, and narrow red, gold and blue diamond-and-dot patterned stripes frame a central field of three red and gold stripes alternating with two blue and red stripes, all with geometric patterning (Plate 2 k). Belt edges are red. The yarns of this article have been expertly spun, and weaving, for the most part has also been expertly executed. It is interesting, however, that there are tiny knots all along the surface of a single red warp stripe, suggesting that the warp yarns of this stripe were not strong enough to tolerate tension during the weaving process.

This artifact is relatively intact, and colours remain strong, although there is considerable staining. The warp selvages are frayed in a manner that suggest that cords might once have been attached. This view is supported by the presence of a few vegetal fibres in the third stripe of the beginning warp edge of the belt, with a frayed area in the same location at the terminal warp end (Plate 2 l).

Pattern

There are 23 "patterns" in the zigzag-and-dot stripes with 22 rows of weft used per pattern. The five pattern rows of the central panel are composed of extended geometric designs, and all stripes have been woven with the same patterns.

Overall Measurements

Measured area	Measurements			Mean
Length	132.50 cm	133.00 cm	132.50 cm	132.67 cm
Width	9.00 cm	9.20 cm	9.20 cm	9.13 cm
Width zigzag/dots "A"	1.00 cm	1.20 cm	1.20 cm	1.13 cm
Width zigzag/dots "B"	1.40 cm	1.40 cm	1.30 cm	1.36 cm
Width diamond/dots	1.30 cm	1.30 cm	1.30 cm	1.30 cm
Width total centre panel	2.00 cm	2.00 cm	2.00 cm	2.00 cm
Width individual stripes	0.40 cm	0.40 cm	0.40 cm	0.40 cm
Width red edges	0.80 cm	0.80 cm	0.90 cm	0.83 cm

Angle of Twist in Ply

Element	Angle of twist						Mean
1a	25°	34°	44°	46°	54°	49°	42.00°
b	48°	32°	40°	37°	48°	45°	41.67°
c	39°	42°	39°	42°	42°	40°	41.83°
d	45°	34°	34°	40°	42°	47°	40.33°
e	35°	47°	50°	44°	35°	48°	43.17°
2	-						

Twist per Centimetre

1a	16
b	10
c	-
d	-
e	-
2	4

Fibre diameter: All fibres used in the construction of this artifact appear to be approximately 40μ in diameter as compared with control samples.

Esmeralda T-40

Artifact: Mantle (dress)

Identification labels: Rh 2 Ce 1.113

Inventory correlation: not obvious

Description: This large rectangular mantle was woven in two panels and then sewn together side to side along weft edges. A warp-faced plain weave construction technique was utilized; warp/weft direction is indicated by the presence of two heading cords on each of two opposite selvages, and visible weft selvages along the centre seam. Each of the matching side panels incorporates coloured warp stripes and patterned warp stripes achieved by the manipulation of complementary-warp yarns (Plate 3 l). All four selvages have been finished, and all aspects of production of this article have been expertly executed.

This artifact is mostly complete, although there is a very large tear near the centre, and a number of areas are fragmented mainly due to weft breakage. Most warp threads remain intact, however, and colours are still strong. The article is heavily stained, suggesting that this artifact had been in direct contact with one of the interred females. Charred areas are also present. Slight differences in yarn diameters and colours (particularly red and gold), suggest different yarn sources were used for constructing the warp.

Pattern

In spite of heavy staining, it is apparent that this textile was once quite beautiful. Approximately 41% of the textile is white, 32% red, 11% brown, and 5% gold. The tripartite pattern stripes, a combination of red, gold and brown, comprise approximately 11% of the textile.

There are twelve pattern segments in each of the tripartite stripes. In each panel, the zigzag-and-dot patterns of the outer red and gold stripes are angled in the same direction, and those of the inside brown and red stripe are angled in the opposite direction (Plate 3 m). The angle of the single pattern stripes are angled in the same direction as the red and gold stripes of the tripartite stripes, and the pattern directions of one panel are mirrored on the opposite panel, that is the patterns are angled in the opposite direction. Zigzags are (except where indicated) in simple "M" and complex "M" shapes. The pattern sections are described here using the following symbols: C =complex; S =simple; G =gold; R =red. The numerical reference is to centimetres in length. It is also noted here that pattern colours are reversed on the under side of the artifact.

Side A: 4.2 SRV*; 9.6 SGM; 12.6 CGM; 11.4 CRM; 9.0 SGM; 9.2 SRM; 11.1 CGM; 12.2 CRM; 8.2 SGM; 8.2 SRM; 11.2 CGM; 11.0 CRM.

Side B: 7.0 SGN*; 7.0 SRM; 12.8 CGM; 12.8 CRM; 10.8 SGM; 9.4 SRM; 12.2 CGM; 12.2 CRM; 11.2 CGM 11.0 CRM; 11.5 CGM; 11.2 CRM.

Note: *These are approximate dimensions. In "reading" pattern sequences, different stripes had to be used as staining obliterated details in more than one area.

Finishing

The edges were finished using two techniques: both warp edges were finished using white coloured yarns in a cross-knit loop stitched binding. This edge also extends around all four corners along weft edges for 13.5 -15 cm. The remaining weft edge areas, approximately 93 cm along each side, were finished with a densely packed overcast stitching also with white yarns.

The two panels were sewn together with doubled yarn along weft selvages using overcast stitching with approximately four stitches per centimetre.

Overall Measurements

Measured area	Measurements			Mean
Length panel A	122.50 cm	122.00 cm	122.50 cm	122.33 cm
Length panel B	121.00 cm	121.50 cm	121.50 cm	121.35 cm
*Total length				121.84 cm
Width panel A	87.50 cm	87.00 cm	89.00 cm	87.83 cm
Width panel B	87.50 cm	87.50 cm	88.00 cm	87.66 cm
*Total width				175.49 cm
Width centre white A	22.00 cm	21.60 cm	23.30 cm	22.30 cm
Width centre white B	23.00 cm	23.00 cm	23.50 cm	23.16 cm
Width red stripe A	1.20 cm	1.30 cm	1.50 cm	1.33 cm
Width red stripe B	1.20 cm	1.20 cm	1.20 cm	1.20 cm
Width brown stripe A	1.10 cm	1.10 cm	1.10 cm	1.10 cm
Width brown stripe B	1.50 cm	1.20 cm	1.20 cm	1.30 cm
Width red stripe A	2.00 cm	2.50 cm	2.50 cm	2.30 cm
Width red stripe B	-	2.80 cm	-	2.80 cm
Width tripartite A	7.00 cm	7.50 cm	7.20 cm	7.23 cm
Width tripartite B	6.00 cm	6.50 cm	6.50 cm	6.33 cm
Width brown stripe A	5.00 cm	5.00 cm	5.00 cm	5.00 cm
Width brown stripe B	5.20 cm	5.00 cm	-	5.10 cm
Width red stripe A	24.00 cm	20.00 cm	21.20 cm	21.73 cm
Width red stripe B	21.20 cm	20.80 cm	20.80 cm	20.93 cm
Width single pattern A	2.30 cm	2.60 cm	3.00 cm	2.63 cm
Width single pattern B	2.30 cm	2.50 cm	2.50 cm	2.43 cm
Width gold stripe A	4.00 cm	4.40 cm	4.20 cm	4.20 cm
Width gold stripe B	-	-	4.20 cm	4.20 cm
Width brown stripe A	3.30 cm	3.30 cm	3.20 cm	3.26 cm
Width brown stripe B	3.70 cm	3.60 cm	3.00 cm	3.42 cm

Overall Measurements continued.

Width red stripe A	4.00 cm	3.60 cm	4.00 cm	3.87 cm
Width red stripe B	3.80 cm	3.80 cm	3.90 cm	3.83 cm
Width white stripe A	15.00 cm	15.10 cm	14.50 cm	14.86 cm
Width white stripe B	-	13.50 cm	13.00 cm	13.25 cm

* = sum of panels A and B.

Structural Dimensions

Dimension	Measurements						Mean
Warps/cm A	34	32	44	42	44	32	38.00
Warps/cm B	38	44	36	48	40	34	40.00
Wefts/cm A	6	6	6	6	6	6	6.00
Wefts/cm B	6	6	6	6	6	6	6.00

Element Description

Two principal sets of elements were used to construct this textile: 1) yarns used for warp, and 2) yarns used as weft. Two functional categories of accessory stitches were also used: 3) yarns used for edge finishing and 4) yarns used to join seams.

warp:	1a: red/brown coloured 2-ply Z-spun-S-plyed camelid yarn.
	b: gold coloured 2-ply Z-spun-S-plyed camelid yarn.
	c: white coloured 2-ply Z-spun-S-plyed camelid yarn.
	d: brown coloured 2-ply Z-spun-S-plyed camelid yarn.
weft:	2: brown coloured 2-ply Z-spun-S-plyed camelid yarn.
edge:	3: white coloured 2-ply Z-spun-S-plyed camelid yarn.
seam:	4: white coloured 2-ply Z-spun-S-plyed camelid yarn (not assessed).

Munsell Colour Description: Panel A

Element	Strongest Colour: in field	Strongest Colour: off site
1 a	7.5R 3/6	5R 3/6
	7.5R 3/4	7.5R 3/8
	5R 3/8	5R 3/6
b	10YR 6/10	10YR 4/4
c	2.5Y 7/4	10YR 7/4
d	10YR 2/2	-
2	7.5YR 3/2	5YR 3/1
3	2.5Y 7/4	10 YR 7/4

Munsell Colour Description: Panel B

Element	Strongest Colour: in field	Strongest Colour: off site
1 a	7.5R 3/4	5R 3/6
	7.5R 3/4	7.5R 3/8
	5R 3/8	5R 3/6
b	10YR 6/10	10YR 5/6
c	2.5Y 7/4	10YR 7/4
d	10YR 2/2	10YR 2.5/1
2	7.5YR 3/2	5YR 3/2
3	2.5Y 7/4	10 YR 7/4

Yarn Diameter: Panel A

Element	Diameter						Mean
1 a	0.75 mm	0.50 mm	0.30 mm	0.30 mm	0.50 mm	1.00 mm	0.56 mm
b	0.75 mm	0.75 mm	0.75 mm	1.00 mm	1.00 mm	1.00 mm	0.88 mm
c	0.50 mm	0.50 mm	0.30 mm	0.50 mm	0.50 mm	0.30 mm	0.40 mm
d	0.50 mm	0.50 mm	0.75 mm	0.75 mm	0.50 mm	0.75 mm	0.63 mm
2	0.75 mm	0.50 mm	0.75 mm	0.50 mm	0.50 mm	0.50 mm	0.58 mm
3	-						

Yarn Diameter: Panel B

Element	Diameter						Mean
1 a	0.30 mm	0.50 mm	0.50 mm	0.75 mm	1.00 mm	0.50 mm	0.59 mm
b	1.00 mm	0.30 mm	0.30 mm	0.50 mm	0.75 mm	0.75 mm	0.60 mm
c	0.50 mm	0.50 mm	0.30 mm	0.50 mm	0.30 mm	0.50 mm	0.43 mm
d	0.50 mm	0.50 mm	0.30 mm	0.50 mm	0.30 mm	0.30 mm	0.40 mm
2	0.75 mm	0.75 mm	0.50 mm	0.50 mm	0.75 mm	0.50 mm	0.63 mm
3	0.50 mm	0.30 mm	0.50 mm	0.30 mm	0.30 mm	0.50 mm	0.40 mm

Angle of Twist in Ply: Panel A

Element	Angle of twist						Mean
1 a	40°	42°	32°	32°	35°	40°	36.83°
b	40°	45°	40°	34°	42°	38°	39.83°
c	34°	30°	45°	44°	34°	n/a	37.40°
d	40°	37°	36°	35°	30°	n/a°	35.00°
2	35°	30°	39°	40°	29°	n/a°	34.60°
3	-						

Angle of Twist in Ply: Panel B

Element	Angle of twist						Mean
1 a	38°	31°	44°	45°	36°	33°	37.83°
b	30°	37°	48°	40°	50°	45°	41.67°
c	45°	48°	36°	47°	50°	48°	45.67°
d	40°	42°	42°	52°	40°	43°	43.17°
2	30°	29°	36°	42°	39°	40°	35.83°
3	31°	31°	40°	43°	38°	32°	35.83°

Twists per Centimetre Panel A

1 a	16
b	12
c	20
d	17
2	18
3	-

Twists per Centimetre Panel B

1 a	11
b	10
c	9
d	12
2	12
3	10

Fibre Diameters: Most fibres in this article appear to be approximately 40 μ in diameter as compared with control samples.

Esmeralda T-41

Artifact: Mantle (dress)

Identification label: Rh I.117

Inventory correlation: not clear

Description: This large rectangular mantle was woven in three panels and then sewn together side to side along weft edges (Plate 3 o). A warp-faced plain weave construction technique was utilized; warp/weft direction is indicated by the presence of two heading cords on each of two opposite selvages, visible weft selvages along centre seams, and rolled weft selvages along outer edges. Each of the side panels incorporates coloured warp stripes and patterned warp stripes produced by the manipulation of complementary-warp yarns (Plate 3 n), and the centre panel is white. All four selvages have been finished, and all aspects of production of this article have been *expertly* executed.

Although much of this artifact has been preserved, it is badly damaged mainly due to weft breakage. Most warp threads remain intact and colours, though stained, are still strong. A large section of one white edge stripe is missing and several large holes with charred edges mainly in the centre white panel suggest damage from burning. The article is also dirty and heavily stained, which suggests close contact with one of the interred.

Of interest is that several fragments from hair tassels were found adhered to the central white area of this artifact near what is almost certainly a stain in the shape of hair twists (Plate 3 q). The length of the hair in the stain corresponds with that of the adult (the hair of the child is much shorter), which indicates that this artifact was in close contact with this female. The shape of other stains along both sides of a fold in the central white panel (Plate 3 r), suggests nasal discharge, indicating that the face was in close contact with the textile in this area.

Other unusual details were noted with this textile. There is evidence of stretching noted, particularly near one edge of panel "A" suggesting that this area had been tightly extended at the time of interment. Also, the weft yarns of all panels were frequently, but not always doubled. This was quite irregular and seems to correspond with the use of finer yarns. It was also noted that small segments of this artifact have been removed; one, for example, measured 3.5 x 5 cm.

Small fragments of other textiles were found attached or associated with this artifact:

- 1) a single fringe apparently from a hair tassel (as noted)
- 2) a few white feather remnants
- 3) small fragments of cotton yarn similar to that used to secure feathers
- 4) small particles of what appears to be leather
- 5) a rectangular fragment of a heavier reddish brown camelid woven textile

Pattern

In spite of considerable staining, this textile was once quite beautiful. Approximately 50% of the textile is white, 32% red, 4% brown, and 4 % gold. The tripartite pattern stripes,

a combination of red, gold and brown, comprise approximately 10% of the textile.

There are eighteen pattern segments in each of the tripartite stripes. In each panel, the zigzag-and-dot patterns of the outer red and gold stripes are angled in the same direction, and those of the inside brown and red stripe is angled in the opposite direction. The patterns of the single pattern stripes are angled in the same direction as the red and gold stripes of the tripartite stripes, and the pattern directions of one panel are not mirrored on the opposite panel (the patterns are angled in the same direction). Colours are also opposite although patterns do correspond. Zigzags are in simple "N" and complex "N" shapes. The pattern sections are described here using the following symbols: C =complex; S =simple; G =gold; R =red. The numerical reference is to centimetres in length. It is also noted here that pattern colours are reversed on the under side of the artifact.

*Side A: 8.0 CGN; 8.0 CRN; 7.5 SGN; 7.8 SRN; 9.8 CGN; 9.5 CRN; 7.3 SGN; 7.4 SRN; 8.2 CGN; 8.4 CRN; 7.3 SGN; 7.4 SRN; 10.0 CGN; 9.0 CRN; 7.4 SGN; 7.5 SRN; 8.5 CGN; 8.2 CRN.

*Side B: 8.0 CRN; 9.8 CGN; 6.4 SRN; 7.0 SGN; 8.5 CRN; 8.8 CGN; 7.4 SRN; 7.0 SGN; 9.0 CRN; 9.2 CGN; 8.5 SRN; 7.5 SRN; 8.5 CGN; 7.0 CRN; 7.8 SGN; 7.2 SRN; 8.5 CRN; 8.0 CGN.

**Note:* These are approximate dimensions. In "reading" pattern sequences, different stripes had to be used as staining obliterated details in more than one area.

Finishing

The edges were finished using two techniques: both warp edges were finished using white coloured yarns in a cross-knit loop stitched binding. This edge also extends around all four corners along weft edges for 13.5 and 14.0 cm along one side and 24 cm along the one edge of the other side. The fourth corner area is missing. The remaining weft edge areas extend approximately 123 cm along one side, and are estimated to extend 102 cm along the other side. Weft edges were finished with a densely packed overcast stitching also with white yarns.

The three panels were sewn together with tripled white yarn along weft selvages with figure-eight stitching (Figure 13) utilizing approximately ten stitches per centimetre.

Overall Measurements

Measured area	Measurements			Mean
Length	150.00 cm	152.10 cm	150.00 cm	150.70 cm
Width panel A	82.50 cm	84.00 cm	82.50 cm	83.00 cm
Width panel B (white)	75.00 cm	77.60 cm	79.00 cm	77.20 cm
Width panel C	83.50 cm	82.50 cm	78.80 cm	81.60 cm
Total width				241.80 cm
Width outside white A	23.00 cm	21.60 cm	23.30 cm	22.20 cm
Width red stripe A	4.00 cm	4.20 cm	4.50 cm	4.23 cm
Width brown stripe A	4.20 cm	4.00 cm	4.00 cm	4.07 cm
Width gold stripe A	4.00 cm	4.00 cm	4.10 cm	4.03 cm
Width single pattern A	3.00 cm	3.00 cm	3.0 cm	3.00 cm
Width red stripe A	33.20 cm	33.00 cm	33.00 cm	33.0 cm
Width tripartite A	8.50 cm	8.20 cm	9.50 cm	8.73 cm
Width red stripe A	1.50 cm	1.30 cm	1.30 cm	1.36 cm
Width brown stripe A	1.00 cm	1.00 cm	1.10 cm	1.03 cm
Width red stripe A	0.80 cm	0.80 cm	0.90 cm	0.83 cm
Width white stripe A	0.80 cm	0.80 cm	0.80 cm	0.80 cm

Structural Dimensions

Dimension	Measurements						Mean
Warps/cm A	34	34	32				33.30
Warps/cm B	40	40	32				37.33
Warps/cm C	32	34	40				35.33
Wefts/cm A	7	7	7				7.00
Wefts/cm B	7	8	7				7.33
Wefts/cm C	7	8	7				7.33
Stitches/cm	20	20	22	24	22	20	21.33

Element Description

Two principal sets of elements were used in the construction of this textile: 1) yarns used for warp, and 2) yarns used as weft. Two functional accessory stitches were also employed: 3) yarns used for edge finishing and 4) yarns used to join seams.

warp:

- 1a: white coloured 2-ply Z-spun-S-plyed camelid yarn.
- b: red coloured 2-ply Z-spun-S-plyed camelid yarn.
- c: brown coloured 2-ply Z-spun-S-plyed camelid yarn.
- d: gold coloured 2-ply Z-spun-S-plyed camelid yarn.

weft: e: white coloured 2-ply Z-spun-S-plied camelid yarn (centre panel)
 2a: brown coloured 2-ply Z-spun-S-plied camelid yarn
 b: white coloured 2-ply Z-spun-S-plied camelid yarn
 edge: 3: white coloured 2-ply Z-spun-S-plied camelid yarn.
 seam: 4: white coloured 2-ply Z-spun-S-plied camelid yarn (not assessed).

Munsell Colour Description: Panel A

Element	Strongest Colour: in field	Strongest Colour: off site
1 a	10YR 5/6	10YR 5/6
b	7.5R 3/4	7.5YR 3/4
c	2.5YR 3/2	2.5YR 3/2
2a	10R 3/4	5YR 3/2
3	10YR 5/6	10YR 6/6

Munsell Colour Description: Panel B

Element	Strongest Colour: in field	Strongest Colour: off site
1a	10YR 5/6	10YR 8/4
2b	10YR 5/6	10YR 6/4
3	-	

Munsell Colour Description: Panel C

Element	Strongest Colour: in field	Strongest Colour: off site
1 a	10YR 5/6	10YR 5/6
b	7.5R 3/4	7.5YR 3/4
c	2.5YR 3/2	2.5YR 3/2
2a	2.5YR 3/2	2.5YR 2.5/2
3	10YR 5/6	10YR 6/6

Yarn Diameter: Panel A

Element	Diameter			Mean
1 a	0.75 mm	0.50 mm	0.50 mm	0.58 mm
b	0.75 mm	0.50 mm	0.50 mm	0.58 mm
c	0.50 mm	0.50 mm	0.30 mm	0.43 mm
d	0.75 mm	0.50 mm	0.30 mm	0.52 mm
2a	0.50 mm	0.75 mm	0.25 mm	0.50 mm
3	0.50 mm	0.50 mm	0.30 mm	0.43 mm

Yarn Diameter: Panel B

Element	Diameter			Mean
1e	0.50 mm	0.50 mm	0.30 mm	0.43 mm
2b	0.30 mm	0.30 mm	0.50 mm	0.37 mm

Yarn Diameter: Panel C

Element	Diameter			Mean
1a	0.75 mm	0.50 mm	0.50 mm	0.58 mm
b	0.75 mm	0.50 mm	0.50 mm	0.58 mm
c	0.75 mm	0.50 mm	0.50 mm	0.58 mm
d	0.30 mm	0.75 mm	0.50 mm	0.52 mm
2a	0.75 mm	0.25 mm	0.25 mm	0.58 mm
3	0.50 mm	0.50 mm	0.50 mm	0.50 mm

Angle of Twist in Ply: Panel A

Element	Angle of twist			Mean
1 a	48°	42°	46°	45.33°
b	41°	34°	41°	38.66°
c	33°	47°	31°	37.00°
d	52°	35°	32°	39.67°
2	52°	50°	43°	48.33°
3	50°	40°	46°	45.33°

Angle of Twist in Ply: Panel B

Element	Angle of twist			Mean
1 e	40°	42°	55°	45.67°
2 b	40°	43°	35°	39.33°

Angle of Twist in Ply: Panel C

Element	Angle of twist			Mean
1 a	36°	48°	55°	46.33°
b	42°	48°	47°	45.66°
c	42°	52°	45°	46.37°
d	-			
2 a	47°	53°	44°	48.00°
3	53°	47°	46°	48.67°

Twists per Centimetre: Panels A and C

1a	10	b	20
c	12	d	11
2(A)	7		
(C)	20		
3	14		

Twists per Centimetre Panel B

1e	20
2b	12

Fibre Diameters: Most fibres in this article appear to be approximately 40 μ in diameter as compared with control samples; white fibres appear slightly finer.

Esmeralda T-42

Artifact: Mantle (dress)

Identification label: Rh 2 Ce 1.114

Inventory correlation: not clear

Description: This large rectangular mantle (Plate 3 s) was woven in three panels and then sewn together side to side along weft edges. A warp-faced plain weave construction technique was utilized; warp/weft direction is indicated by the presence of two heading cords on each of two opposite selvages and visible weft selvages along centre seams. Each of the side panels incorporates warp stripes of camel and dark red/brown colours, and the centre panel is gray. A narrow grey stripe along the inner aspect of each side panel blends with the central gray panel. All selvages have been finished, and all aspects of production of this article have been expertly executed.

Although much of this artifact has been preserved, it is very badly damaged mainly due to weft breakage, and there are many missing segments. Although there is very little staining, there are several small charred areas in the central panel that suggest burning. The shape and position of these charred areas, breakage of fabric along ancient creases, plus lack of staining suggest that this article had been folded and not in direct contact with the interred females. In some areas of the camel and gray stripes, lighter areas (plate 3: figure t) in a splash patterning are noted (*chicha?*). In some of these lighter areas the fabric is also very thin, possibly from the unknown liquid or from insect action. Brown stripes are in fact composites of many narrow stripes of dark reds and browns (Plate 3 p). These stripes are arranged in the same order on both side panels and are mirror imaged (see Munsel Colour Description).

It is also noted that the gray fibres are quite fragile and are easily broken, and the camel coloured fibres are also somewhat brittle. The camel colours of panel A and B are notably different, suggesting different fibre sources.

A few white feather remnants, small fragments of cotton cordage and a blue/green feather were found in tightly folded areas of this article.

Pattern

Patterning of this article was achieved solely with warp stripes. Approximately 51% of the textile is red/brown, 29% is gray, and 20 % is camel coloured.

Finishing

The edges have been finished using two techniques: both warp edges have been finished using a cross-knit loop stitched binding. This edge treatment also extends around all four corners and along weft edges for approximately 23.5 cm. in one minimally undamaged corner. If the other corners were constructed in a similar manner, the remaining weft edge areas would extend for approximately 123 cm along each side. These edges have been

finished using a densely packed overcast stitching. The edges of the central gray panel have been finished with matching gray yarns, and the camel and dark brown edges have all been finished using camel coloured yarns.

The three panels have been sewn together with doubled gray yarns along weft selvages with figure-eight stitching using approximately seven stitches per centimetre.

Overall Measurements

Measured area	Measurements			Mean
Length	156.60 cm	156.50 cm	158.50 cm	157.20 cm
Width panel A	85.00 cm	*83.50 cm	-	84.25 cm
Width panel B (gray)	66.30 cm	65.50 cm	65.00 cm	65.60 cm
Width panel C	84.50 cm	-	-	84.50 cm
Total width				234.35 cm
Width camel stripe A	24.40 cm	23.90 cm	24.20 cm	24.17 cm
Width camel stripe C	24.20 cm	24.00 cm	23.50 cm	23.90 cm
**Width brown stripe A	59.80 cm	60.10 cm	59.90 cm	59.93 cm
**Width brown stripe C	60.00 cm	60.20 cm	60.02 cm	60.13 cm
Width gray stripe A	1.00 cm	1.00 cm	1.00 cm	1.00 cm
Width gray stripe C	1.00 cm	1.00 cm	1.00 cm	1.00 cm

* = approximate. ** = composed of many narrow stripes of dark reds and browns.

Structural Dimensions

Dimension	Measurements						Mean
Warps/cm A	36	44	52	54	40	36	43.67
Warps/cm B	32	32	36	32	36	32	33.33
Warps/cm C	40	42	42	44	42	42	42.00
Wefts/cm A	7	7	7	7	7	7	7.00
Wefts/cm B	6	7	6	7	6	8	6.67
Wefts/cm C	7	7	7	7	8	7	7.17

Element Description

Two principal sets of elements were used in the construction of this textile: 1) yarns used for warp, and 2) yarns used as weft. Two functional accessory stitches were also employed: 3) yarns used for edge finishing and 4) yarns used to join seams.

warp:

1a: camel coloured 2-ply Z-spun-S-plied camelid yarn.

b: dark red coloured 2-ply Z-spun-S-plied camelid yarn.

c: dark brown coloured 2-ply Z-spun-S-plied camelid yarn.

d: grey coloured 2-ply Z-spun-S-plied camelid yarn.

weft: 2: brown coloured 2-ply Z-spun-S-plied camelid yarn.
 edge: 3a: camel coloured 2-ply Z-spun-S-plied camelid yarn.
 b: gray coloured 2-ply Z-spun-S-plied camelid yarn.
 seam: 4: gray coloured 2-ply Z-spun-S-plied camelid yarn (not assessed).

Munsell Colour Description: Panel A

Element	Strongest Colour: in field	Strongest Colour: off site
1 a	7.5YR 4/4	7.5YR 6/4
b/c 3.5 cm	7.5R 3/4	7.5YR 3/4
2.0 cm	10R 3/2	-
5.0 cm	5YR 3/2 (variegated)	-
7.0 cm	10R 3/2	-
7.0 cm	7.5R 3/3	-
6.1 cm	7.5R 3/4	-
2.3 cm	7.5R 3/3	-
9.0 cm	2.5YR 2.5/2	-
5.0 cm	7.5R 3/3	-
2.0 cm	7.5R 3/4	-
6.0 cm	5YR 3/2	-
2.2 cm	10R 3/3	-
2.0 cm	5YR 3/3	-
1.5 cm	5YR 3/2	-
d	10YR 5/1 (variegated)	-
2	2.5YR 2.5/4	-
3	7.5YR 4/4	-

Munsell Colour Description: Panel B

Element	Strongest Colour: in field	Strongest Colour: off site
1d	10YR 5/1	10YR 6/2 (closest)
*2	5Y2.5/1	-
3	10YR 5/1	-
4	-	-

* *Note:* this yarn appears to have been coated with some substance.

Munsell Colour Description: Panel C

Element	Strongest Colour: in field	Strongest Colour: off site
1 a	7.5YR 4/4	7.5YR 6/4
b/c 3.5 cm	7.5R 3/4	7.5YR 3/4
2.0 cm	10R 3/2	-
5.0 cm	5YR 3/2 (variegated)	-
7.0 cm	10R 3/2	-
7.0 cm	7.5R 3/3	-
6.1 cm	7.5R 3/4	-
2.3 cm	7.5R 3/3	-
9.0 cm	2.5YR 2.5/2	-
5.0 cm	7.5R 3/3	-
2.0 cm	7.5R 3/4	-
6.0 cm	5YR 3/2	-
2.2 cm	10R 3/3	-
2.0 cm	5YR 3/3	-
1.5 cm	5YR 3/2	-
d	10YR 5/1 (variegated)	-
2	7.5YR 3/2	-
3	7.5YR 5/4	-

Yarn Diameter: Panel A

Element	Diameter						Mean
1a	0.30 mm	0.30 mm	0.50 mm	0.50 mm	0.50 mm	0.30 mm	0.40 mm
b	0.50 mm	0.30 mm	0.30 mm	0.50 mm	0.30 mm	0.30 mm	0.36 mm
c	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.30 mm	0.50 mm
d	0.75 mm	0.75 mm	1.00 mm	0.50 mm	0.75 mm	0.75 mm	0.40 mm
2a	0.75 mm	0.50 mm	0.50 mm	0.75 mm	0.75 mm	0.75 mm	0.79 mm
3	0.30 mm	0.30 mm	0.30 mm	0.25 mm	0.30 mm	0.30 mm	0.29 mm

Yarn Diameter: Panel B

Element	Diameter						Mean
1d	0.75 mm	0.75 mm	1.00 mm	0.50 mm	0.75 mm	0.75 mm	0.79 mm
2a	0.50 mm	0.50 mm	0.30 mm	0.30 mm	0.50 mm	0.50 mm	0.43 mm
3	0.50 mm	0.50 mm	0.75 mm	0.50 mm	0.50 mm	0.50 mm	0.54 mm

Yarn Diameter: Panel C

Element	Diameter						Mean
1a	1.00 mm	0.75 mm	0.50 mm	0.75 mm	0.75 mm	0.75 mm	0.75 mm
b	0.30 mm	0.25 mm	0.25 mm	0.30 mm	0.25 mm	0.30 mm	0.28 mm
c	0.25 mm	0.50 mm	0.25 mm	0.50 mm	0.50 mm	0.75 mm	0.45 mm
d	0.50 mm	0.75 mm	0.75 mm	0.75 mm	0.50 mm	0.50 mm	0.63 mm
2a	0.50 mm	0.30 mm	0.30 mm	0.30 mm	0.50 mm	0.50 mm	0.40 mm
3	0.30 mm	0.30 mm	0.50 mm	0.30 mm	0.50 mm	0.30 mm	0.37 mm

Angle of Twist in Ply: Panel A

Element	Angle of twist						Mean
1 a	44°	48°	36°	38°	46°	38°	41.67°
b	46°	39°	37°	40°	32°	42°	39.33°
c	46°	38°	45°	40°	46°	49°	44.00°
d	28°	43°	42°	39°	32°	52°	39.33°
2	42°	42°	30°	33°	37°	41°	37.50°
3	-						

Angle of Twist in Ply: Panel B

Element	Angle of twist						Mean
1 d	43°	40°	42°	38°	45°	50°	43.00°
2	44°	34°	40°	36°	34°	45°	38.83°
3	-						

Angle of Twist in Ply: Panel C

Element	Angle of twist						Mean
1 a	27°	48°	38°	50°	32°	54°	41.50°
b	40°	45°	30°	44°	44°	37°	40.00°
c	37°	31°	35°	29°	38°	35°	34.17°
d	46°	46°	44°	52°	48°	36°	45.33°
2	50°	47°	46°	42°	44°	38°	44.50°
3	-						

Twists per Centimetre : Panels A, B, and C

1a	20
b	-
c	16
d	12
2(A)	16
(C)	20
3a	12
b	10

Fibre Diameters: Most fibres in this article appear to be approximately 40 μ in diameter as compared with control samples.

Esmeralda T-43 (a and b)**Artifact:** bracelet remnants**Identification label:** none noted**Inventory correlation:** 92 and 91

Description: remnants of two very fragile metal bracelets. These have been included here for two reasons: 1) they are articles of adornment; and 2) T-43a has a small length of yarn inserted through a pre-existing hole in the metal (Plate 7 d). Presumably this yarn would have been used to secure the bracelet to the arm of the wearer.

T-43a has been constructed of very thin gold coloured metal, and for T-43b silver coloured metal was used.

Overall Measurements

Measured area		Measurements			mean
Length	T-43a	6.20 cm	5.70 cm	4.90 cm	5.60 cm
Width	T-43a	7.60 cm	8.00 cm	8.00 cm	7.86 cm
Length	T-43b	6.60 cm	6.60 cm	2.80 cm	5.33 cm
Width	T-43b	8.80 cm	8.80 cm	2.30 cm	6.63 cm

The cordage attached to T-43a is composed of two 2-ply camelid yarns that were S-spun Z-plied and S-replied.

Esmeralda T-44

Artifact: small feathered bag

Identification labels: none apparent

Inventory correlation: 57

Description: Small natural light brown coloured woven bag embellished with rows of florescent blue/green coloured feathers (Plate 5 d). This artifact has been woven using a warp-faced plain weave construction; two heading cords at both top edges confirm warp/weft direction. The bag has been sewn together along both side edges, and the top edges have been left unfinished, though are sewn closed. It appears as though feathers were applied to the finished product as rows of feathers cover the side seams. A fragment of 2-ply Z-spun S-plyed camelid yarn remains looped through the top edge, and the bag still contains a large quantity of what has been identified as coca leaves (see Appendices V and VI).

This artifact is well constructed and is also fairly well preserved, although an upper corner has deteriorated and many feathers are either missing or broken. The artifact is also quite brittle.

Feathers

Large blue/green feathers have been affixed to this textile in sewn rows. The following measurements have been taken at one selvedge edge, and indicate the position of rows of feathers as related to the top of the bag.

Top of bag	Measurements (in centimetres)							
Top -	1.5 cm	3.0 cm	4.8 cm	6.1 cm	7.6 cm	9.6 cm	12.4 cm	13.9 cm

The approximate distance between rows of feathers are as follows:

Top of bag -row 1:	1.5 cm
Row 1-row 2	1.5 cm
Row 2- row 3	1.8 cm
Row 3- row 4	1.3 cm
Row 4- row 5	1.5 cm
Row 5- row 6	2.0 cm
Row 6- row 7	2.8 cm
Row 7- row 8	1.5 cm
Row 8- bag bottom	1.6 cm

Feathers were pre-strung on cotton yarn (method similar to Figure 19a) and secured to the bag also with cotton yarns.

Finishing

Side seams have been joined with tripled yarns using figure-eight stitching (Figure 13) utilizing approximately eight stitches per cm.

Overall Measurements

Measured area	Measurements			Mean
Length	15.50 cm	15.80 cm	15.20 cm	15.50 cm
Width	10.50 cm	10.30 cm	9.00 cm	9.93 cm

Structural Dimensions

Measured area	Measurements						Mean
Warps/cm	20	18	20	20	18	18	19.00
Wefts/cm	4	4	4	4	4	4	4.00

Element Description

Two main sets of elements were used to construct this article: 1) yarns used for warp and 2) yarns used as weft. In addition 3) functional accessory elements have been used to join side seams, and 4) to secure feathers.

warp:	1: natural coloured 2-ply Z-spun S-plied camelid yarn.
weft:	2: natural coloured 2-ply Z-spun S-plied camelid yarn.
seams	3: natural coloured 2-ply Z-spun S-plied camelid yarn.
feathers	4: natural cream coloured 2-ply Z-spun S-plied cotton yarn.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1	10YR 5/4	10YR 5/4
2	10YR 5/4	10YR 4/4
3	-	
4	10YR 6/4	10YR 6/4

Yarn Diameter

Element	Diameter						Mean
1	1.00 mm	1.00 mm	1.25 mm	1.00 mm	1.00 mm	1.25 mm	1.08 mm
2	1.25 mm	1.50 mm	1.50 mm	1.50 mm	1.25 mm	1.50 mm	1.42 mm
3	-						
4	1.00 mm	1.00 mm	1.00 mm	1.00 mm	1.50 mm	1.00 mm	1.08 mm

Angle of Twist in Ply

Element	Angle of Twist						Mean
1	56°	50°	-	-	-	-	53.00°
2	43°	-	-	-	-	-	43.00°
3	-						
4	37°	51°	44°	-	-	-	44.00°

* *Note:* This article is brittle and tends to deteriorate with handling so complete measurements were not taken.

Twist per Centimetre

1	10
2	6
3	-
4	10

Fibre Diameters: Most fibres in this article appear to be somewhat heavier than 40 μ in diameter as compared with control samples. Cotton fibres were not assessed.

Esmeralda T-45

Artifact: tubular cord(s) (topo cord)

Identification labels: Rh 2.6. 1.137

Inventory correlation: 44 and 45

Description: Narrow tubular cord(s) in three pieces (Plate 7 a). On the surface this artifact appears to have been constructed in a manner similar to what Emery (1980:54-55) calls horizontal wrapping or vertical stem stitch, Cahlander (1994:15: tube 5) terms tubular crossed-warp band technique, and A. Rowe (1996b:339, 3rd from left) calls rectangular braiding. It most closely resembles a structure illustrated by Harcourt (1962:Figure 93) which he defines as a "stem stitch used as a cord covering". It is considered here to contain two sets of elements with wrapping in the lengthwise direction and tubular in the crosswise direction, using what appears to be a Soumak wrapping technique (see Emery 1980:54-55 for further description). I am fairly certain that this stitching was executed with the use of a needle as suggested by Harcourt (1962:128-129).

For reference purposes, the three fragments have been labelled "A", "B", and "C". Segments of diamond and zigzag patterns each approximately 1.5-2 cm in length in red, gold and black colours have been incorporated along the length of the cords. At what may be the initial point of construction, a length of twisted vegetal yarns leads into a cordage segment of approximately 1.5 cm also constructed of vegetal fibre (A). Another segment of vegetal material is noted at the rounded end of the largest fragment (B), which also appears to be an initial or terminal point. All other surface areas have been constructed of camelid yarns. The third and shortest segment (C), is badly discoloured.

It is not known whether one or more cords are represented here, but the similarity of construction and design suggests a single artifact, and it is considered so here. This artifact has been expertly crafted and is for the most part well preserved, although is quite brittle, and colours are somewhat faded, possibly due to burning.

Patterning:

This artifact is in three pieces. 1) a "tailed" segment (A) in which most pattern elements are visible, but an area at one end is unavailable due to discolouration; 2) a long length (B) in which most patterning is available except for both ends which have been burned or stained; and 3) a very short length that has been burned or stained and patterning is unavailable. A sequence of known pattern elements is provided below:

1) tailed segment :A

- 1- 2-ply cordage and a 1.5 cm area of plain vegetal fibre.
- 2- 2 cm: red and gold diamond pattern on black.
- 3- 2 cm: gold and red diamond pattern on red.
- 4- 2 cm: red and gold diamond pattern on gold.
- 5- 1.5 cm: gold zigzag pattern on red.
- 6- 1.5 cm: gold zigzag pattern on black.

7- 2 cm: gold and red diamond pattern on red (see #3).
 8- 2 cm: red and gold diamond pattern on faded background.
 remainder of artifact is unavailable.

2) long segment: B

- 1- burned or stained area.
- 2- 2 cm: gold and red diamond pattern on black.
- 3- 2 cm: gold and red diamond pattern on red.
- 4- 2 cm: red and gold diamond pattern on gold.
- 5- 1.5 cm: gold zigzag pattern on red.
- 6- 1.5 cm: gold zigzag pattern on black.
- 7- 1.5 cm red gold and black diamond pattern on gold.
- 8- 2 cm: gold and red diamond pattern on red.
- 9- 2 cm: gold and red diamond pattern on black.
- 10- 1.5 cm: gold and red diamond pattern on red.
- 11- 1.5 cm: red zigzag pattern on gold.
- 12- 1.5 cm: gold zigzag pattern on red.
- 13- 2 cm: gold and red diamond pattern on red.
- 14- 1.5 cm: red and gold diamond pattern on gold.
- 15- 2 cm: gold and red diamond pattern on red.
- 16- 1.5 cm: red and gold zigzag pattern on black.
- 17- 1.5 cm: gold zigzag pattern on red.
- 18- 2 cm: red and gold diamond pattern on gold.
- 19- 2 cm: gold and red diamond pattern on red.
- 20- 2 cm: gold and red diamond pattern on black.

3: Short segment: C: discoloured; pattern unavailable.

Overall Measurements

Measured area	Measurements			Mean
*Length A	18.30 cm.	18.20 cm	18.40 cm	18.30 cm
Length B	48.90 cm	48.90 cm	48.70 cm	48.83 cm
Length C	4.20 cm	4.30 cm	4.30 cm	4.27 cm
Length twisted cord	18.20 cm	18.20 cm	18.10 cm	18.06 cm
Total length				89.46 cm
Diameter	0.30 cm	0.30 cm	0.15 cm	0.26 cm

* = without twisted cord.

Element Description

Two sets of elements were used to construct this artifact 1) yarns considered to be warp and 2) yarns considered to be weft. A third group of yarns used as a core 3), are regarded as foundation elements.

warp: 1: dark brown coloured 2-ply Z-spun S-plied camelid yarn
 weft: 2a: red coloured 2-ply Z-spun S-plied camelid yarn.
 b: gold coloured 2-ply Z-spun S-plied camelid yarn.
 c: black coloured 2-ply Z-spun S-plied camelid yarn.
 d: natural light brown coloured 2-ply Z-spun S-plied vegetal yarn which
 in one segment narrows to a 2-ply Z-spun S-plied cord.
 core: 3: dark brown coloured 2-ply Z-spun S-plied assumed to be camelid yarn

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
1	-	
2a	5R 4/6	-
b	2.5Y 7/6	7.5YR 4/4
c	10YR 3/1	7.5YR 3/2
d	10YR 4/3	-
3	-	

Yarn Diameter

*Element	Diameter						Mean
1	0.50 mm	0.30 mm	0.75 mm	0.75 mm	0.75 mm	0.75 mm	0.59 mm
*2	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm	0.50 mm
**3	-						

* = not readily available so assessed as a single group.

** = Assessment of internal content and construction was done at the burned detached ends, and it was difficult to determine fibre content with accuracy. It is also noted that yarns were all measured under tension.

Angle of Twist in Ply and Twist per Centimetre: n/a.

Fibre Diameters: Most fibres in this article appear to be approximately 40 μ in diameter as compared with control samples.

Esmeralda T-46**Artifact:** feathered headdress**Identification label:** Rh 2. Ce 1.83**Inventory correlation:** 60

Description: two fragments of a crescent or dome shaped feathered headdress (Plate 5 f). This artifact was constructed as a cap with feathers applied to the finished artifact, and as no seams are detectable, it appears to have been produced as a single piece. A single element looping technique was utilized, and when examined from the inside, it appears that the article was constructed from the top down in circular rows (Plate 5 h). What appears to have been a single length of thick cordage was sewn to the exterior of the hat from one bottom edge and across the top to the other side. This cord extends beyond the bottom edges on both sides, presumably to be used as ties to secure the hat to the head (Plate 5 i). There are remnants of large white feathers inserted into this cordage approximately one centimetre apart (Plate 5 i), and it is assumed that their placement around and over the head would have presented a striking "rayed" appearance. The large feathers have each been bound at the base with vegetal fibre or yarn, and appear to have been placed within the cordage at the time it was sewn to the cap (Plate 5 i). Groups of small white feathers (approximately three) have been bound and sewn in rows to the body of the headdress, and it appears as though the headdress was once thickly covered with feathers. A cordage grommet which may have been used to secure the free ends of the cordage under the chin, (though is notably unstained) was also found with this artifact (Plate 5 g). This article was expertly constructed but is now badly decomposed and fragile to touch. A few small remnants of blue/green feathers were found on the surface of this artifact, suggesting close contact with the feathered shawl..

Overall Measurements

Measured area	Measurements			Mean
Length side A	33.50 cm	31.30 cm	32.00 cm	32.30 cm
Maximum length side B	24.00 cm	23.50 cm	23.80 cm	23.77 cm
Minimum length side B	15.00 cm	14.60 cm	14.60 cm	14.73 cm
Width side A	16.50 cm	16.50 cm	16.50 cm	16.50 cm
Width side B	45.00 cm	45.00 cm	45.00 cm	45.00 cm
Length cord A	49.00 cm	49.80 cm	50.30 cm	49.70 cm
Length cord B	22.08 cm	23.00 cm	23.00 cm	22.93 cm
Diameter cord A	0.90 cm	0.70 cm	0.70 cm	0.76 cm
Diameter cord B	0.90 cm	0.60 cm	0.40 cm	0.63 cm
Length grommet	32.00 cm	31.50 cm	31.70 cm	31.73 cm
Diameter grommet	0.70 cm	0.70 cm	0.80 cm	0.73 cm

Note: the two fragments of this artifact are identified here as "A" and "B", with the smaller fragment on the right of the photo represented as "A" and the larger fragment as "B".

Structural Dimensions

Measured area	Measurements						Mean
Loops/cm side A	2	2	3	3	3	3	2.67
Loops/cm side B	2	2	2	2	2	2	2.00

Element Description

This article was produced using a single main element, 1) yarns used for looping. In addition, functional accessory elements have been used 2) to sew cordage to cap, 3) to secure and sew small feathers, and 4) to bind large feathers. Accessory fabrics, 5) thick cordage sewn to the cap and 6) the grommet, are considered to be accessory fabrics.

looping:	1: natural light coloured 2-ply Z-spun S-plied camelid yarn.
sewing yarn: cordage	2: natural light coloured 3-ply Z-spun S-plied camelid yarn.
sewing yarn: small feathers	3: natural light coloured 2-ply Z-spun S-plied cotton yarn.
binding yarn: large feathers	4: natural light coloured vegetal fibre or yarn.
thick cordage	5: natural light coloured 5-6 ply Z-spun S-plied camelid yarn, which has been Z-re-plied in strands of 3-4 yarns, and S-re-plied in 2 strands, and sewn to the cap.
grommet:	6: natural light coloured camelid yarn which has been braided in a 4-sided technique and tied together to form a circlet and which most likely was used as a grommet. Spin and ply particulars are unavailable, but yarn used to tie this braid into a circlet is composed of 2-ply Z-spun S-plied yarn.

Munsell Colour Description

Element	Strongest Colour: in field	Strongest colour: off site
All yarns	5Y 8/2	2.5Y 8/2
Feathers	5Y 8/2 (with variations)	2.5Y 8/2

Yarn Diameter

Element	Diameter						Mean
1	4.00 mm	4.00 mm	4.00 mm	4.00 mm	4.00 mm	4.00 mm	4.00 mm
2	1.75 mm	-	-	-	-	-	-
3	0.75 mm	-	-	-	-	-	-
4-6	-	-	-	-	-	-	-

Angle of Twist in Ply

Element	Angle of Twist in Ply	Mean
1	-	
2	44.00°	
3	35.00°	
4	-	
5	-	
6	-	

Twist per Centimetre

1	-
2	5
3	12
4	-
5	-
6	-

Fibre Diameters: Most camelid fibres in this article appear to be somewhat heavier than 40 μ in diameter as compared with control samples. Cotton fibres were not assessed.

Esmeralda T-47

Artifact: Mantle (shawl)

Identification labels: Rh 2.6.1.136

Ce 136

Mommia B No. 71

Inventory correlation: 71

Description: Two fragments of the outer panels of a small mantle (Plate 3 v). There is a small remnant of white remaining on the inside edge of one of the panels, which suggests that it was woven in two (or three) panels and then sewn together side to side along weft edges; other mantles in this collection with white centre stripes all have at least a narrow stripe of white on the inside selvages. Although there is not enough evidence to determine whether this mantle was woven in two panels or three, because of its smaller size, and because it is a shawl, two panels is most probable.

A warp-faced plain weave construction technique was utilized; warp/weft direction is indicated by the presence of two heading cords on each of two opposite selvages, and visible weft selvages. Both fragments are mostly red with patterned warp stripes produced by the manipulation of complementary-warp yarns. All four selvages have been finished, and all aspects of production of this article have been expertly executed.

Although much of this artifact has been well preserved, a large central section is missing and there is some damage to the remaining textile, mainly due to weft breakage. Most warp threads are intact and colours are quite strong, although one end is considerably faded, possibly from being on display. The article is relatively clean, and this factor combined with colour and fold patterns, suggests that it was not in close contact with the interred females. The dimensions of this mantle have been recorded as 90 cm x 75 cm, most likely due to the different way the two pieces had been positioned in relation to each other. Colours and fold patterns indicate that the position illustrated here is the probable arrangement, and so different dimensions are also noted. It was also observed that mantle fragments T-14 and T-15 are similar to this mantle. Fading is most probably recent.

Pattern

The vibrant red colouring accented by what must have been a brilliant white centre stripe and the intricate patterning of the tripartite stripe and edging suggests that this was a beautiful garment. Because of the missing central segment, however, it is not possible to determine colour percentages.

There are nine pattern segments in each of the tripartite stripes. Assuming that the two pieces are assembled correctly, the patterns of one panel do not correspond with those on the opposite panel in that where a complex pattern occurs on one panel, a simple pattern occurs on the opposite side. Colouring of the pattern sequence does, however, correspond, and patterns are angled in the same direction, that is they are not mirror imaged. On each panel, the zigzag-and-dot patterns of the red and gold stripes are angled in the same direction, and

those of the inside brown and red stripe are angled in the opposite direction. Zigzags are in simple "N" and complex "N" shapes. The pattern sections are described here using the following symbols: C =complex; S =simple; G =gold; R =red. The numerical reference is to centimetres in length. It is also noted here that pattern colours are reversed on the under side of the artifact.

Side A: 6.0 CGN; 6.4 CRN; 5.2 SGN; 5.2 SRN; 6.0 CGN; 6.7 CRN; 5.4 SGN; 5.2 SRN; 6.5 SGN.

Side B: 5.5 SGN; 5.7 SRN; 6.6 CGN; 7.3 CRN; 6.0 SGN; 6.0 SRN; 7.2 CGN; 7.4 CRN; 6.0 SGN.

Finishing

The edges have been finished using two techniques: both warp edges have been finished using multi coloured yarns in a cross-knit loop stitched binding. This edge also extends around all four corners along weft edges for 21.0 and 20.6 cm along one side and 20.5 cm along both ends of the other side. The remaining external weft edge areas extend approximately 60 cm along one side, and 62 cm along the other, and have been finished with a densely packed overcast stitching.

Colour sequence of cross-knit looped edge finishing is as follows:

5 dark brown, 4 gold, 4 red, 4 gold, 4 red, 4 gold,
 18 beige, 4 gold, 4 red, 4 gold, 4 red, 4 gold, 4 dark brown,
 26 red, 3 beige, 4 gold, 4 red, 4 gold, 4 red, 4 gold,
 28 dark brown, 4 gold 4 red, 4 gold, 4 red, 4 gold, 4 beige,
 25 red, 4 dark brown, 4 gold, 4 red, 4 gold, 4 red, 4 gold.

Colour sequence of overcast edge finishing is as follows:

6 cm red, 7 cm gold, 5 cm brown, 6 cm beige, 6 cm dark brown/black.
 All four corner areas have been finished with beige coloured yarns.

It is interesting that the warp threads at weft selvages of this article that have been rolled within the edge bindings are of undyed white yarns. This suggests that dyed yarns were quite valuable, and the weaver conserved her/his supply by using undyed yarns in the area where it would not be seen.

Overall Measurements

Measured area	Measurements			Mean
Length panel A	102.00 cm	101.50 cm	102.00 cm	101.83 cm
Length panel B	104.00 cm	103.30 cm	102.50 cm	103.26 cm
Width panel A	49.50 cm	49.70 cm	50.10 cm	49.77 cm
*Width panel B	46.00 cm	-	-	46.00 cm
Width large red A	36.90 cm	37.40 cm	36.90 cm	37.06 cm
Width large red B	-			
Width tripartite A	5.50 cm	5.30 cm	5.60 cm	5.47 cm
Width tripartite B	4.50 cm	4.20 cm	4.30 cm	4.33 cm
Width brown stripe A	0.50 cm	0.50 cm	0.50 cm	0.50 cm
Width brown stripe B	0.40 cm	0.40 cm	0.40 cm	0.40 cm
Width small red A	6.00 cm	5.80 cm	5.30 cm	5.70 cm
*Width small red B	-			

* = incomplete.

Structural Dimensions

Dimension	Measurements			Mean
Warps/cm A	44	56	50	50.00
Warps/cm B	44	56	54	31.33
Wefts/cm A	6	8	8	7.33
Wefts/cm B	6	6	7	6.33
Stitches/cm A	25	25	25	25.00
Stitches/cm B	25	25	25	25.00

Element Description

Two principal sets of elements were used in the construction of this textile: 1) yarns used for warp, and 2) yarns used as weft. Two functional accessory stitches were also employed: 3) yarns used for edge finishing. 4) yarns assumed to have been used to join centre seam are unavailable.

- warp:
- 1a: red coloured 2-ply Z-spun-S-plyed camelid yarn.
 - b: gold coloured 2-ply Z-spun-S-plyed camelid yarn.
 - c: brown coloured 2-ply Z-spun-S-plyed camelid yarn.
 - d: white coloured 2-ply Z-spun-S-plyed camelid yarn.
- weft:
- 2: brown coloured 2-ply Z-spun-S-plyed camelid yarn.
- edge:
- 3a: red coloured 2-ply Z-spun-S-plyed camelid yarn.
 - b: gold coloured 2-ply Z-spun-S-plyed camelid yarn.
 - c: brown coloured 2-ply Z-spun-S-plyed camelid yarn.

- d: beige coloured 2-ply Z-spun-S-plied camelid yarn.
 e: dark brown coloured 2-ply Z-spun-S-plied camelid yarn.

Munsell Colour Description: Panel A

Element	Strongest Colour: in field	Strongest Colour: off site
1 a	5R 4/8	-
b	2.5Y 6/8	-
c	10YR 5/4	10YR 3/3
d	10YR 8/4	-
2	2.5YR 3/2	2.5YR 3/2
3 a	7.5R 4/6	-
b	10YR 5/8	-
c	5YR 4/2	-

Munsell Colour Description: Panel B

Element	Strongest Colour: in field	Strongest Colour: off site
1 a	5R 3/8	-
b	2.5Y 6/8	-
c	10YR 4/3	-
d	-	-
2	2.5YR 3/2	2.5YR 3/2
3 a	7.5R 4/6	-
b	10YR 5/8	-
c	5YR 4/2	-

Yarn Diameter: Panel A

Element	Diameter			Mean
1a	0.75 mm	0.50 mm	0.50 mm	0.58 mm
b	0.75 mm	0.50 mm	0.50 mm	0.58 mm
c	0.50 mm	0.50 mm	0.30 mm	0.43 mm
d	0.75 mm	0.50 mm	0.30 mm	0.52 mm
2	0.50 mm	0.75 mm	0.25 mm	0.50 mm
3(a)	0.50 mm	0.50 mm	0.30 mm	0.43 mm
others	-	-	-	-

Yarn Diameter: Panel B

Element	Diameter			Mean
1 a	0.75 mm	0.50 mm	0.50 mm	0.58 mm
b	0.75 mm	0.50 mm	0.50 mm	0.58 mm
c	0.50 mm	0.50 mm	0.30 mm	0.43 mm
d	0.75 mm	0.50 mm	0.30 mm	0.52 mm
2	0.50 mm	0.75 mm	0.25 mm	0.50 mm
3a	0.50 mm	0.50 mm	0.30 mm	0.43 mm
others:	-			

Angle of Twist in Ply: Panel A

Element	Angle of twist			Mean
1 a	48°	42°	46°	45.33°
b	41°	34°	41°	38.66°
c	33°	47°	31°	37.00°
d	52°	35°	32°	39.67°
2	52°	50°	43°	48.33°
3d	50°	40°	46°	45.33°
others	-			

Angle of Twist in Ply: Panel B

Element	Angle of twist			Mean
1 a	48°	42°	46°	45.33°
b	41°	34°	41°	38.66°
c	33°	47°	31°	37.00°
d	52°	35°	32°	39.67°
2	52°	50°	43°	48.33°
3d	50°	40°	46°	45.33°
others	-			

Twists per Centimetre: Panel A

1a	16	b	12
c	10	d	10
2	12		
3a	12	b	10
c	16	others	-

Twists per Centimetre: Panel B

1a	26	b	12
c	8	d	-
2	10		
3	see panel A		

Fibre Diameters: Most fibres in this article appear to be somewhat less than 40 μ in diameter as compared with control samples.

Esmeralda T-48

Artifact: Spondylus shell pendant

Identification labels: Rh.2 Ce 1.3.1 Iquique

Inventory Correlation: 76

Description: spondylus shell pendant identified by Focassi (Morales 1985:45) as *Spondylus princeps princeps*. The pendant is narrower at the top end which has two perforations, each of which accommodates three vegetal fibre stitches attaching the pendant to a short section of red braided cord. The pendant is quite smooth on one side, and on the lower edge of the other side where it is red coloured. There are white deposits on several areas of the cord similar to those found on other artifacts.

Overall Measurements

Measured area	Measurements
Length pendant	5.50 cm 5.60 cm
Width top	1.50 cm
Width bottom	2.30 cm
Length cord	8.50 cm
Width cord	0.70 cm

Element Description

A single set of elements was used to construct the cordage: 1) yarns used for braiding, and one functional accessory stitch 2) yarns used for sewing, was also employed.

braid 1) red coloured 2-ply Z-spun S-plied camelid yarn.

sewing 2) natural light coloured 2-ply Z-spun S-plied vegetal yarn.

The strongest colour of the cordage yarns are 5R 3/6. Yarns are 0.50 mm in diameter or less, and are evenly spun and plied. One angle of twist was measured at 50°. The sewing yarn is approximately 1.00 mm in diameter.

Appendix II: Glossary of Textile Terms

Textiles have been produced in virtually every area of the globe for many thousands of years, so it is not surprising that a very rich and diverse assortment of technical terms have come to be associated with yarn and cloth production. This has resulted in considerable variability in the intended *meanings* of terms, and has caused research in the textile field to be particularly challenging (see eg. Emery 1980: xi). This obstacle has been addressed most effectively by a number of scholars who have produced working explanations of textile terms. Even so, interpretive variation continues, so a precise explanation of terminology as used in the context of this thesis is considered to be essential.

The explanations of most textile terms utilized in this study are from sources usually recognized by archaeologists. Irene Emery's *The Primary Structures of Fabrics* (1980) is the principal reference utilized by most, so is *the* key source for textile explanation as utilized in this thesis. Definitions by others, including my own, have also been employed, however, and the most appropriate explanation for use here has been selected. Where possible, definitions and explanations have been copied word for word from sources, but where explanations are lengthy, they have been paraphrased with every attempt to retain precise original meanings.

List of Abbreviations

(IE) = Irene Emery 1980

(GL) = George Linton 1954

(AR) = Ann Rowe 1996b

(MW) = Merriam Webster 1993

accessory stitches: composed of sewing elements that may have functional or decorative purposes. Functional accessory stitches include those used for edge finishing, sewing seams, or fabric repair. Decorative accessory stitches are those used for the embellishment of fabrics by means of needleworking (IE: 232-233).

balanced yarn: that which will not kink, curl, or recede upon itself (GL:42). A balanced skein of yarn will hang straight without twisting.

braiding: a technique for working a set of elements fixed at one end by deflecting the free ends (AR: 467).

complementary-warp (or -weft) weave: weave in which two or more sets of warp (or weft), generally of contrasting colours, having the same direction in a fabric and are co-equal in the fabric structure. Usually refers to a weave in which both sets of complementary elements are regularly floated, one on one face of the fabric and the other on the opposite face. Each face of the fabric is thus a different colour, and the two colours can be interchanged to form colour patterns (AR: 467).

cordage: there is much confusion surrounding this term (see eg. Emery 1980:13-14, and cf. definition of yarn, this appendix), but in this instance, I refer to tightly twisted and/or strong

elements used either alone, or added to a fabric and utilized because of its properties of strength (author's definition).

cross-knit loop stitch: an embroidered structure, derived from cross-knit looping in which the thread is worked into the ground structure as well as around the cross of a previous stitch. It can be used to fill in solid areas or as an edge binding (AR: 467).

cross-knit looping: A single element technique in which the element is carried around the crossing of a loop in the previous row. In the resulting structure, the loops are aligned vertically, producing vertical ribbing on one side of the fabric (AR: 467).

double-cloth: If one set of warps is interlaced by one set of wefts to form one fabric structure while separate sets of warp and weft are being interlaced to form another, two distinct layers of fabric are produced simultaneously. The movement of the correlated warp and weft sets from one face to the other also serves to bind the two *simple* structures into one *compound* fabric, making it incontrovertibly *double-cloth* (IE: 156-157) The two simple structures, or layers of cloth are connected at both edges as weft threads are thrown from one side to the other in the shed of one layer of cloth, turned and thrown in the other direction in the shed of the other layer of cloth and woven as a closed tube.

element: a component part or unit of the structure of an *interworked* fabric. The term refers to yarn, thread, strand, cord, thong, or whatever natural or contrived unit of fibres or filaments is *interworked* to form a fabric. A *set of elements* is a group of such components all used in a like manner, that is, functionally undifferentiated and trending in the same direction. Whenever certain elements are differentiated from others in the same fabric, either in the direction they take or by the purpose they serve in the structure, they constitute a separate set of elements (IE: 27).

fabric: a generic term use to describe all fibrous constructions (cf. definition of textile, this appendix), including both felted and interworked materials (IE: 17).

figure-eight stitch: a flat stitch employed [here] to fasten two fabrics together. They are worked alternately into one fabric edge and then the other to form a flat interworked junction which sometimes serves the double function of finishing and joining edges (an 'insertion' type of stitchery often greatly elaborated) (Emery:233 describes accessory stitches in general terms, and this precise term has previously been used by Ann Rowe (personal communication 2001).

foundation element: a yarn or group of yarns used as a relatively passive foundation or support, round or through which stitches are formed (IE: 52).

heading: The weft yarns placed at the beginning of a weaving. In Peruvian textiles they are usually distinguished by being thicker than the rest of the weft yarns, or by being made up of multiple yarns (AR: 468).

handle: The reaction of the sense of touch when fabrics are held in the hand. There are many factors which give "character or individuality" to a material observed through handling. A correct judgement may thus be made concerning its capabilities in content, working

properties, drapability, feel, elasticity, fineness and softness, etc. (GL: 325).

heddle: In Pre-Columbian weaving, a cord which was looped under selected warp yarns (eg. every other yarn) and also around a heddle rod. The weaver lifted the heddle rod with the selected warp yarns, and was able to pass weft yarn under the lifted yarns through the resulting space or shed. This method of "heddle weaving" is much faster than lifting each thread individually (author's definition).

herringbone stitch: a straight flat stitch arranged in a double series slanted alternately up to the right and to the left to produce a 'herringbone' or 'fishbone' pattern (IE: 238).

interlocking: the linking of wefts of adjacent areas with each other each time they meet. The wefts usually link between warps, and the term 'interlocking' is construed as *single interlocking between warps* unless otherwise stated (IE: 80).

lark's head knot: a knot composed of two contiguous simple loops or half hitches over the same mesh loop (IE: 36-37).

loop: a doubling of a cord or thread back on itself so as to leave an opening between the parts through which another thread or cord may pass. A complete loop is formed (and will be retained in the fabric) if the element crosses over itself as it moves on to form the next loop (IE: 31).

mordant: any substance which, by combining with a dyestuff to form an insoluble compound, serves to produce a fixed color in a textile fiber. Most mordants are metallic salts, although some are acidic in nature such as tannic acid (GL:439).

overcast: a running stitch adapted to the finishing of a raw edge (IE: 236). Here it refers to (usually) tightly packed loop stitches that encircle fabric edges providing both strength and embellishment.

over-twist: occurs when there is more twist in the ply of a yarn than in the original spin, resulting in a kinky yarn that curls back on itself in the opposite direction to the ply. For example a Z-spun S-plyed yarn will overtwist in a Z direction (author's definition).

plain weave: the simplest possible interlacing of warp and weft; the principle of which is unvarying alternation. Each weft unit passes alternately over and under successive warp units and each reverses the procedure of the one before it. If the warp elements hide the weft elements completely, the weft will affect the fabric only by its presence, not by its appearance, and the fabric is said to be **warp-faced**. If, on the other hand, the relationship between the warp and weft is reversed and the weft threads cover the warps, the fabric is **weft faced** (IE: 76-77).

ply: the number of individual yarns twisted together to make a composite yarn. (GL: 505).

sennit: usually defined as 'braided cordage' or 'flat braided cordage', and may also refer to warp-weft woven 'tapes'. The term is only used to refer to narrow constructions (IE: 68).

sett or set: there are a number of associated meanings affiliated with this term, most of which refer to weaving with foot-powered looms or associated with present day commercial cloth manufacture. Here the term is used solely in reference to the associated arrangement,

evenness, and number of warp ends per centimetre (author's definition).

sewing elements: structural components of all accessory stitches whether functional or decorative; they have their own material content and makeup (IE: 232).

shed: a temporary opening between two planes of warp threads selectively separated for passage of the weft (IE: 75).

Soumak stitch: a weft wrapping technique (IE: 218-219).

square knot: a fixed and symmetrical knot; frequently referred to as a *reef knot* (IE: 37).

strand: a group of yarns (may be single and/or plied) that are twisted together and utilized as a single structure. Strands are frequently over-twisted and plied to form cordage (author's definition).

tassel: a dangling ornament made by laying parallel a group of cords or threads of even length and fastening them at one end (MW:1207).

terminal area: the discontinuation of pattern construction at a specific point in the weaving of an article. This is indicated by the replacement of pattern elements with simple weft bands. This may occur when the weaver finds the open shed too narrow to weave intricate patterns and so finishes the article with plain weaving. The presence of a terminal area indicates that this was the finishing point of weaving (author's definition).

textile: refers specifically to woven (i.e. *interlaced warp-weft*) fabrics. A textile, then, is a specific category of fabric (IE: xvi). In a broader sense, however, eg. a "textile collection", the term "textile" is also understood to include non-woven fabrics.

thread: term used interchangeably with 'yarn' in this thesis. In other applications it may refer to a structure that is very fine and tightly spun (author's definition).

twill weave: a float weave characterized by a diagonal alignment of floats for which a minimum of three warp groupings is essential (four for warp and weft floats of equal span). Adjacent wefts never float over or under the same group of warps, and for each successive passage of the weft, the warp grouping is stopped one warp beyond the previous grouping (IE: 92).

twining: a fabric structure characterized by the turning of two or more groups of elements of the same set about each other to enclose successive elements of the opposite set. When the warp threads are the elements that twine, it is referred to as 'warp twining', and when it is the weft threads, it is called 'weft twining' (IE: 206).

warp: essentially parallel elements that run longitudinally in a loom or fabric, crossed at more or less right angles and interworked by transverse elements (note that in four selvedge fabrics, the long dimension is not necessarily in the warp direction) (IE: 74).

weft: the transverse elements in a fabric (generally parallel to each other and to the terminal edges or ends of the fabric) which cross and interwork with the *warp* elements at more or less right angles (also called woof or filling) (IE:74).

whipping stitch: a type of overcasting stitch taken over the edge of a fabric and used to secure an edge or binding. It is classified as a functional accessory stitch (IE: 232-236).

yarn: the general term for any assemblage of fibres or filaments which has been put together in a continuous strand suitable for weaving, knitting and other fabric construction (also see thread)(IE: 10).

Appendix III: The Munsell System of Color Notation

(As described in *The Munsell Book of Colour*)

The Munsell color-order system is a way of precisely specifying colors and showing the relationships among colors. Every color has three qualities or attributes: hue, value and chroma. Munsell established numerical scales with visually uniform steps for each of these attributes. The Munsell Book of Color displays a collection of colored chips arranged according to these scales. Each chip is identified numerically using these scales. The color of any surface can be identified by comparing it to the chips, under proper illumination and viewing conditions. The color is then identified by its hue, value and chroma. These attributes are given the symbols H, V, and C and are written in a form H V/C, which is called the Munsell notation.

Utilizing Munsell notations, each color has a logical relationship to all other colors. This opens up endless creative possibilities in color choices, as well as the ability to communicate those color choices precisely.

Hue

Hue is that attribute of a color by which we distinguish red from green, blue from yellow, etc. There is a natural order of hues: red, yellow, green, blue, purple. One can mix paints of adjacent colors in this series and obtain a continuous variation from one color to the other. For example, red and yellow may be mixed in any proportion to obtain all the hues from red through orange to yellow. The same may be said of yellow and green, green and blue, blue and purple, and purple and red. This series returns to the starting point, so it can be arranged in a circle. Munsell called red, yellow, green, blue, and purple principal hues and placed them at equal intervals around this circle. He inserted five intermediate hues: yellow-red, green-yellow, blue-green, purple-blue and red-purple, making ten hues in all. For simplicity, he used the initials as symbols to designate the ten hue sectors: R, YR, Y, GY, G, BG, B, PB, P and RP. Munsell arbitrarily divided the hue circle into 100 steps, of equal visual change in hue, with the zero point at the beginning of the red sector. Hue may be identified by a number from 0 to 100. This may be useful for statistical records, cataloging and computer programming. However, the meaning is more obvious when the hue is identified by the hue sector and a step, based on a scale of ten, within that sector. For example, the hue in the middle of the red sector is called five red, and is written 5R. (The zero step is not used, so there is a 10R hue, but no 0 YR.)

Value

Value indicates the lightness of a color. The scale of value ranges from 0 for pure black to 10 for pure white. Black, white and the grays between them are called neutral colors. They have no hue. Colors that have a hue are called chromatic colors. The value scale applies to chromatic as well as neutral colors.

Chroma

Chroma is the degree of departure of a color from the neutral color of the same value. Colors of low chroma are sometimes called weak, while those of high chroma are said to be highly saturated, strong or vivid. Imagine mixing a vivid yellow paint, a little at a time, with a gray paint of the same value. If you started with gray and gradually added yellow until the vivid yellow color was obtained, you would develop a series of gradually changing colors that increase in chroma. The scaling of chroma is intended to be visually uniform and is very nearly so. The units are arbitrary. The scale starts at zero, for neutral colors, but there is no arbitrary end to the scale. As new pigments have become available, Munsell color chips of higher chroma have been made for many hues and values. The chroma scale for normal reflecting materials extends beyond 20 in some cases. Fluorescent materials may have chromas as high as 30.

Munsell Notation

The complete Munsell notation for a chromatic color is written symbolically: H V/C. For a vivid red having a hue of 5R, a value of 6 and a chroma of 14, the complete notation is 5R 6/14. When a finer division is needed for any of the attributes, decimals are used. For example, 5.3R 6.1/14.4. The notation for a neutral color is written: N V/. (The chroma of a neutral color is zero, but it is customary to omit the zero in the notation.) The notation N 1/ denotes a black, a very dark neutral, while N 9/ denotes a white, a very light neutral. The notation for a middle gray is N 5/.

Munsell Color Space

Munsell hue, value and chroma can be varied independently so all colors can be arranged according to the three attributes in a three-dimensional space. The neutral colors are placed along a vertical line, called the neutral axis with black at the bottom, white at the top and all grays in between. The different hues are displayed at various angles around the neutral axis. The chroma scale is perpendicular to the axis, increasing outward. This three-dimensional arrangement of colors is called the Munsell color space. All colors lie within a specific region of Munsell color space called the Munsell color solid. Hue is limited to one turn of around the circle. The scale of value is limited on the lower end by pure black, which is as dark a color can be, and on the top by pure white, which is as light as a color can be. For a given value, there is a limit to the chroma that is possible, even with theoretically ideal coloring agents. Real coloring agents, with less than ideal characteristics, impose further limitations on physical representations of the color solid. The Munsell color-order system itself is applicable to all possible colors. The highest chroma yellow colors have rather high values, while the highest chroma blue colors have lower values. Thus the Munsell color solid has the irregular shape.

Development of the Munsell System

Professor A.H. Munsell, an artist and art teacher, developed the basic principles of the system and published them in a small book, *A Color Notation*, in 1905. In 1915, he published *The Munsell Atlas of Color*, displaying colored specimens of a range of values and chromas for ten hues. He formed the Munsell Color Company to produce color standards in 1918, but died the same year. His son sponsored studies at the National Bureau of Standards and in the Munsell Color Laboratory, which led to the improved color scales in the 1929 edition of *The Munsell Book of Color*, which displayed 20 hues.

A subcommittee of the Optical Society of America studied the visual spacing of the scales and published recommended changes in 1943. Those recommendations are called the Munsell renotation. The recommended spacing was specified by the system of color measurement standardized by the International Commission on Illumination (identified by the initials, CIE, of its name in French), using CIE Illuminant C and CIE 1931 (2 degree) Standard Observer. The renotation provides a method of converting color measurement data to Munsell notations and provides the specifications for producing Munsell color standards. The Munsell renotation was standardized by the American Society for Testing and Materials in D 1535 Standard Test Method for Specifying Color by the Munsell System.

About 1950, the number of hues in *The Munsell Book of Color* was doubled, from 20 to 40 hues. In the early editions of *The Munsell Book of Color*, the chips had a matte surface. In 1958, a glossy version was introduced, to improve the reliability of comparisons of the standards to paints, plastics and other materials with glossy surfaces. Both matte and glossy versions are in widespread use today. The Nearly Neutrals Collection, introduced in 1990, provides a number of pale colors often used for cosmetics, interior design and computer hardware.

The Munsell color-order system has gained international acceptance. It is described in unabridged dictionaries and encyclopedias as well as in specialized publications on art, design, color photography, television, printing, paint, textiles and plastics. It is recognized as a standard system of color specification in standard Z138.2 of the American National Standards Institute, Japanese Industrial Standard for Color JIS Z 8721, the German Standard Color System, DIN 6164 and several British national standards. The Munsell color-order system has been widely used in many fields of color science, most notably as a model of uniformity for colorimetric spaces and has, itself, been the subject of many scientific studies.

Appendix IV: Museo Regional de Iquique List of Textile Artifacts

The following is an inventory of textile artifacts from the site of Cerro Esmeralda as listed by Morales (1985: 65-67).

- 22.- 1 faja decorada figuras geométricas 1,12 mts. x 10 cms.
23. -1 faja decorada figura geométrica (582) 1,24 mts. x 10 cms.
24. 1 faja decorada figuras geométricas (583) 1,54 mts. x 14 cms.
25. -1 faja decorada figuras geométricas (585) 1,37 mts. x 8.5 cms.
26. -1 faja decorada figuras geométricas (584) 1,75 mts. x 13 cms.
27. -1 cordón trenzado amarillo y rojo 1,05 mts. x 1,5 cms.
28. -1 cordón trenzado amarillo y rojo 1,05 mts. x 1,8 cms.
29. -1 cordón trenzado amarillo y rojo 1,50 mts. x 2,3 cms.
30. -1 cordón trenzado amarillo y rojo 1,45 mts. x 2,2 cms.
31. -1 cordón trenzado amarillo y rojo 1,16 mts. x 2,3 cms
32. -1 cordón trenzado amarillo y rojo 1,14 mts. x 2,0 cms.
33. -1 cordón trenzado amarillo y rojo 1,14 mts x 2,0 cms.
34. -1 cordón trenzado amarillo y rojo 1,14 mts. x 1,5 cms.
35. -1 cordón trenzado amarillo y rojo 1,14 mts. x 1,5 cms.
36. -1 cordón trenzado rojo y negro 1,20 mts. x 1,2 cms.
37. -1 cordón trenzado rojo y negro 1,20 mts. x 1,2 cms.
38. -1 argolla tejida cubre genital Diámetro 13 cms.
39. -1 argolla tejida cubre genital Diámetro 15 cms.
40. -1 argolla tejida cubre genital Diámetro 15 cms.
41. -1 argolla tejida cubre genital Diámetro 17 cms.
42. -1 argolla tejida cubre genital Diámetro 16 cms.
43. -1 argolla tejida cubre genital Diámetro 16 cms.
44. -1 soguilla hilado circular decoración romboidal 0,90 cms. x 5 mm.
45. -1 soguilla hilado circular decoración romboidal 0,67 cms. x 5 mm.
46. -1 chuspa con coca forrada con paja brava 0,20 mts. x 0,16 mts.
47. -1 chuspa con coca forrada con paja brava 0,20 mts. x 0,14 mts.
48. -1 talega tejido grueso color crema y café, conteniendo pimienta 0,36 x 0,25 mts.
49. -1 talega tejido grueso color crema y café, 0,36 x 0,25 mts.
50. -1 chuspa con coca decorada y cordón de amarra para la boca ,19 x 0,19 mts.
51. -1 chuspa con coca decorada y cordón de amarra para la boca 0,19 x 0,19.
52. -1 chuspa con material terrozo (negro) decorada 0,21 x 0,21 mts.
53. -1 chuspa con coca decorada 0,20 x 0,20 mts.
54. -1 chuspa color crema con rayas café 0,32 x 0,20 mts.
55. -1 chuspa color crema con rayas café 0,31 x 0,20 mts.
56. -1 chuspa color crema y café 0,23 x 0,16 mts.
57. -1 chuspa con hojas de coca forrada con plumas verdes 15,5 x 10 cms.
58. -1 chuspa con hojas de coca forrada con plumas color naranja 18,5 x 12,5 cms.
59. -1 tapado café forrado en plumas color verde 1,12 x 0,33 mts.
60. -1 tocado crema forma semi-circular con plumas blancas 0,50 x 0,23 mts.

61. -Manto con decoración 1,30 x 0,90 mts.
62. -Manto decorado sobresale franja color verde 1,30 x 1,80 mt.
63. -Manto tejido grueso color café y plomo 1,45 x 1,05 mt.
64. -Manto tejido grueso violáceo, plomo y café 2,00 x 1,45 mt.
65. -Manto pequeño cubre rostro 0,75 x 1,05 mt. (momia b).
66. -Manto pequeño cubre rostro 0,75 x 1,05 mt. (momia a).
67. - Manto buen estado conservación decorado 1,80 x 1,27 mt. (momia a).
68. -Manto color rojo, amarillo y negro 1,65 x 1,05 mt. (momia a).
69. -Manto decorado colores fugitivos 2,00 x 1,45 mt. (momia b).
70. -Resto prenda de vestir, tejido grueso color café, borde rojo 0,67 x 0,10 mt.
71. -Manto decorado rojo y amarillo 0,90 x 0,75 mt.
72. -Manto grueso crema y café 0,95 x 0,85 mt. (momia b).
73. -Manto decorado 1,20 x 0,80 mt. (momia b).
74. -Manto colores café claro y café oscuro tejido grueso 1,15 mt. x 74 cms. (momia b).
78. - 1 fragmenta de objeto de concha de spondylus con perforación y cordón tejido 2,5 x 1,5 cm.
79. - 1 objeto forma trapezoidal, de spondylus con dos perforaciones cordón tejido.
88. - 1 pequeño capacho de lana con coca 8,5 cm x 4,0 cm.
91. - 1 brazalete plata con hebra de lana (10 cms) faltan fragmentos.
92. - 1 brazalete oro con hebra de lana.
99. - 1 cordón tejido circular con óxido de plata.
100. - 1 borla color negro con 86 hebras de lana.
101. - Piezas incompletas café claro y café oscura (solo existen fragmentas).
102. - 1 chuspa decorada figura geométrica (fragmentos) largo 20 cms.
103. - 1 cordón anudado de lana café (fragmento) 0,60 mt. x 1 cms.
104. - 5 fragmentos cordón crema anudado 7 mm. x 1/3 cm.

Appendix V: Museo Regional de Iquique list of textile artifacts (English translation)

The following is an inventory of textile artifacts from the site of Cerro Esmeralda as listed by Morales (1985:65-67).

22. -1 belt (or girdle) with geometric patterning: 1.12 mt. x 10 cm.
23. -1 belt (or girdle) with geometric patterning (582): 1.24 mt. x 10 cm.
24. -1 belt (or girdle) with geometric patterning (583): 1.54 mt. x 14 cm.
25. -1 belt (or girdle) with geometric patterning (585): 1.37 mt. x 8.5 cm.
26. -1 belt (or girdle) with geometric patterning (584): 1.75 mt. x 13 cm.
27. -1 braided yellow and red cord: 1.05 mt x 1.5 cm.
28. -1 braided yellow and red cord: 1.05 mt. x 1.8 cm.
29. -1 braided yellow and red cord: 1.50 mt. x 2.3 cm.
30. -1 braided yellow and red cord: 1.45 mt. x 2.2 cm.
31. -1 braided yellow and red cord: 1.16 mt. x 2.3 cm.
32. -1 braided yellow and red cord: 1.14 mt. x 2.0 cm.
33. -1 braided yellow and red cord: 1.14 mt x 2.0 cm.
34. -1 braided yellow and red cord: 1.14 mt. x 1.5 cm.
35. -1 braided yellow and red cord: 1.14 mt. x 1.5 cm.
36. -1 braided red and black cord: 1.20 mt. x 1.2 cm.
37. -1 braided red and black cord: 1.20 mt. x 1.2 cm.
38. -1 knitted circular band from pubic cover: diameter 13 cm.
39. -1 knitted circular band from pubic cover: diameter 15 cm.
40. -1 knitted circular band from pubic cover: diameter 15 cm.
41. -1 knitted circular band from pubic cover: diameter 17 cm.
42. -1 knitted circular band from pubic cover: diameter 16 cm.
43. -1 knitted circular band from pubic cover: diameter 16 cm.
44. -1 twisted yarn band with tubular shape and circular patterning: 0.90 cm. x 5 mm.
45. -1 twisted yarn band with tubular shape and circular patterning: 0.67 cm. x 5 mm.
46. -1 bag covered with long altiplano grass and containing coca: 0.20 mt. x 0.16 mt.
47. -1 bag covered with long altiplano grass and containing coca: 0.20 mt. x 0.14 mt.
48. -1 long thick woven sack, cream and brown in colour, containing peppers: 0.36 x 0.25 mt.
49. -1 long thick woven sack, cream and brown in colour: 0.36 x 0.25 mt.
50. -1 decorated bag containing coca with a cord used to tie the opening: .19 x 0.19 mt.
51. -1 decorated bag containing coca with a cord used to tie the opening: 0.19 x 0.19.
52. -1 decorated bag with soil material (black): 0.21 x 0.21 mt.
53. -1 decorated bag with coca: 0.20 x 0.20 mt.
54. -1 cream coloured bag with brown stripes: 0.32 x 0.20 mt.
55. -1 cream coloured bag with brown stripes: 0.31 x 0.20 mt.
56. -1 cream and brown coloured bag: 0.23 x 0.16 mt.
57. -1 bag covered with green coloured feathers and containing coca leaves: 15.5 x 10 cm.
58. -1 bag covered with orange coloured feathers and containing coca leaves: 18.5 x 12.5 cm.

59. -1 (woman's) brown shawl covered with green coloured feathers: 1.12 x 0.33 mt.
60. -1 semi-circular shaped headdress; cream coloured with white feathers: 0.50 x 0.23 mt.
61. - decorated mantel: 1.30 x 0.90 mt.
62. - mantel decorated with extending fringes; green in colour: 1.30 x 1.80 mt.
63. - thick woven mantel; brown and lead-grey coloured: 1.45 x 1.05 mt.
64. - thick woven mantle; violet, lead -grey, and coffee coloured: 2.00 x 1.45 mt.
65. - small cloth used as face covering: 0.75 x 1.05 mt. (mummy b).
66. - small cloth used as face covering: 0.75 x 1.05 mt. (mummy a).
67. - decorated mantel; well preserved: 1.80 x 1.27 mt. (mummy a).
68. - mantel; red, yellow and black in colour: 1.65 x 1.05 mt. (mummy a).
69. - decorated mantel with fugitive colours: 2.00 x 1.45 mt. (mummy b).
70. - fragments of thickly woven fabric, brown in colour with a red border: 0.67 x 0.10 mt.
71. - decorated mantel; red and yellow in colour: 0.90 x 0.75 mt.
72. - thick mantel; cream and coffee coloured: 0.95 x 0.85 mt. (mummy b).
73. - decorated mantel: 1.20 x 0.80 mt. (mummy b).
74. - thickly woven mantel: light brown and dark brown in colour: 1.15 mt. x 74 cms. (mummy b).
- ...
78. - 1 fragment of a spondylus object with perforations and a 2.5 x 1.5 cm braided cord .
79. - 1 trapezoidal shaped object of spondylus with two perforations and a braided cord.
88. - 1 small wool basket with coca; 8.5 cm x 4.0 cm.
91. - 1 silver bracelet with a strand of wool (10 cm) with missing fragments.
92. - 1 gold bracelet with a strand of wool.
99. - 1 circular braided cord with silver oxide.
100. - 1 black tassel with 86 wool fringes.
101. - Incomplete brown and dark brown pieces (only broken fragments remain).
102. - 1 chuspa decorated with geometric figures (fragments) 20 cm long.
103. - 1 knotted cord of brown wool broken into fragments) 0.60 m x 1 cm.
104. - 5 fragments of cream coloured braided cord: 7 mm x 1/3 cm.

Appendix VI: Glossary of non-English terms

abasca: (Q) plain cloth used for domestic purposes

aclla: (Q) chosen women: representatives of the Inca selected *acllas* from all areas of the realm when they were about eight or nine years of age.

acllahuasi: (Q) house of chosen women.

acsu: (Q) woman's wrapped dress; wrapped around the body from under the arms to the feet, and secured over the shoulders with two *tupo* pins.

alpaca or *paco*: (Q) domesticated South American camelid primarily used for meat and fibre.

Most medium fibres of this collection are thought to be alpaca fibre.

altiplano: (S) high Titicaca basin.

apu: (Q) powerful mountain spirits

ayllu: (Q) extended kin group or lineage believed to have a common ancestor.

borla: (S) fringe

cabuya: (T) vegetal fibre from the agave and similar plants; used to make coarse work blankets, footwear, and cordage.

capa: (Q) rich or royal.

capa cocha: (Q) human sacrifice (usually of children) sanctioned by the Inca.

colla: wife of the Inca.

cumbi: (Q) fine cloth.

chaquira: (Q) cloth embroidered with gold or silver beads.

chicha: beer; made by the fermentation of maize, manioc, or other seeds or fruits.

chipana: gold or silver bracelets.

chumpi: (Q) woman's belt (sometimes referred to as a sash or girdle).

chusi: (Q?) coarse cloth used for blankets and rugs.

chuspa: (Q) small bag.

guanaco: (Q) wild South American camelid used for meat and fibre. Guanaco fibre was used in prehistoric times when available, but generally only in small amounts.

guara: (Q) loincloth.

hanan: (Q) upper moiety of an ayllu or community (eg. Cuzco).

huaca (Q) sacred place or thing.

hurin: (Q) lower moiety of an ayllu or community (eg. Cuzco).

Inca: (Q) emperor or king; also refers to the royal lineage, and to an elite class of "Inca by privilege".

Inti: (Q) sun deity.

lomas: (S) pockets of the Peruvian and north Chilean coast in which heavy fog provides enough moisture to sustain plant growth.

llama: domesticated South American camelid. This is the largest camelid and was used as a pack animal, for meat, and for fibre. Llama fibre is the coarsest of the camelids, and was used for coarser materials and cordage.

llauto: (Q) long braided wollen cord used as a headband by Inca men..

lliclla: (Q) woman's shawl

mamacuna: (Q) cloistered women who served the Inca deities. These women also trained chosen young girls or *aclla* to spin, weave, cook, etc.

ñañaca: (Q) noblewoman's headcloth; worn folded several times.

ojotas: (S?) sandals or shoes.

orejone (S) male member of the Inca class

pacu: (Q) earplugs.

puna: (Q) high grasslands of the Andes suited more to herding than agriculture.

quebrada: (S) arroyo or gorge.

quipu: (Q) mnemonic device constructed of sets of knotted yarns or cords, and used by the Inca for accounting and other purposes.

selva: (S) lush green slopes of the eastern Andes.

Tahuantinsuyu: Inca "land of the four quarters".

tipqui (Q) long straight pin used to secure the shawl of Inca women. *Tipqui* are generally smaller than *topo* pins but are sometimes classified with the others (eg. as three *topo* pins).

tocapu: (Q) woven rows of squares, each of which contains a geometric pattern; usually associated with Inca men's tapestry-woven tunics.

topo: (Q) long straight pins used to secure the dress (2) of Inca women.

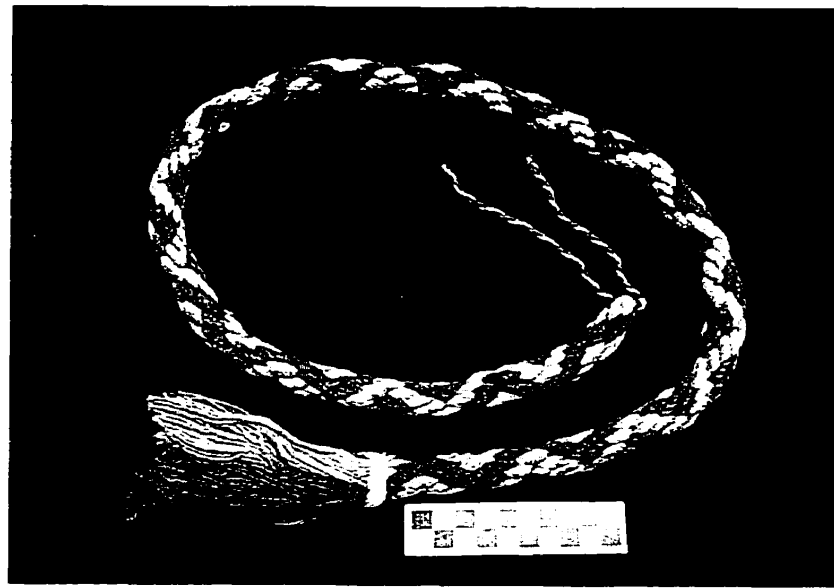
uncu: (Q) sleeveless tunic worn by Inca men.

usuta; (Q) sandals.

vicuña: (Q) wild South American camelid. The vicuña is the smallest of the camelids, and when available, was used mainly for fibre. The fibre is the finest of all camelid fibres and was regarded as a precious material.

vincha: (Q) woman's headband

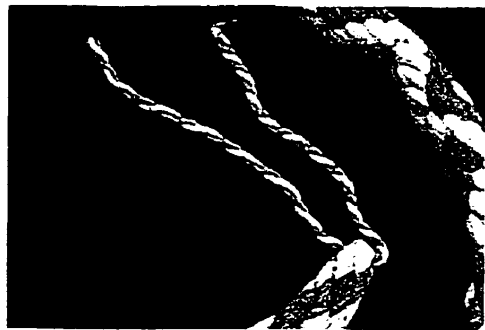
yacolla: (Q) mantle worn by Inca men.



a



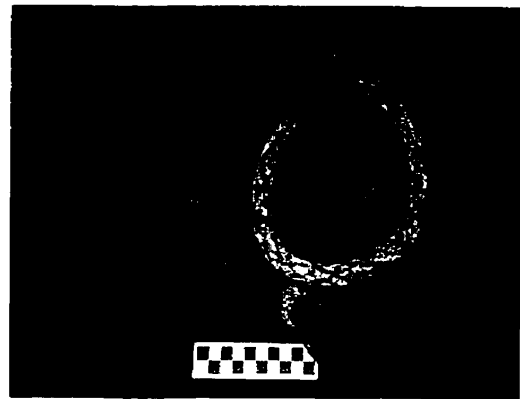
b



c

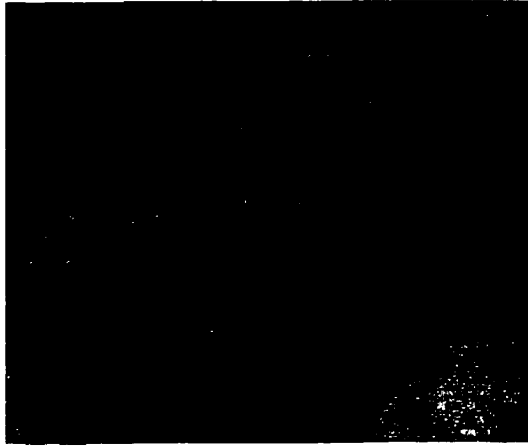


d



e

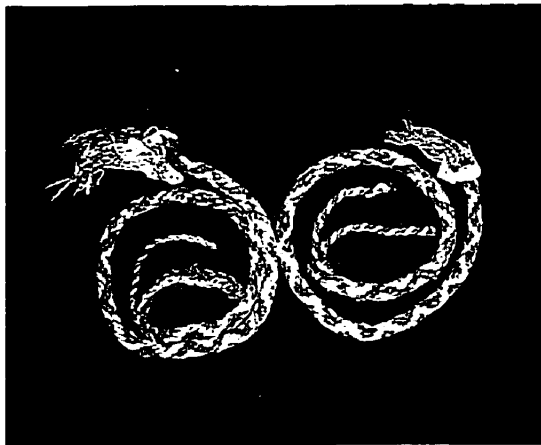
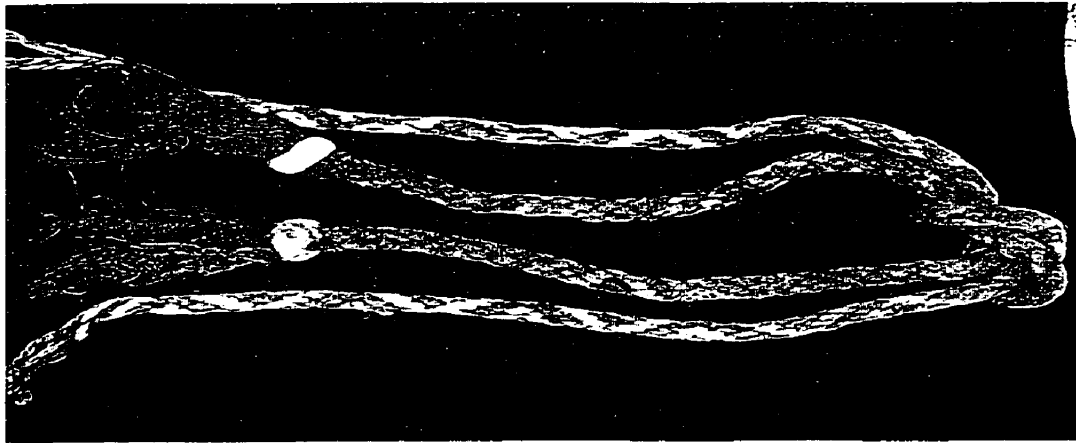
Plate 1: Cordage. a: T-1; b: T-1 tassel detail; c: T-1 cord insertion detail; d: T-7; e: T-9



f



g



i

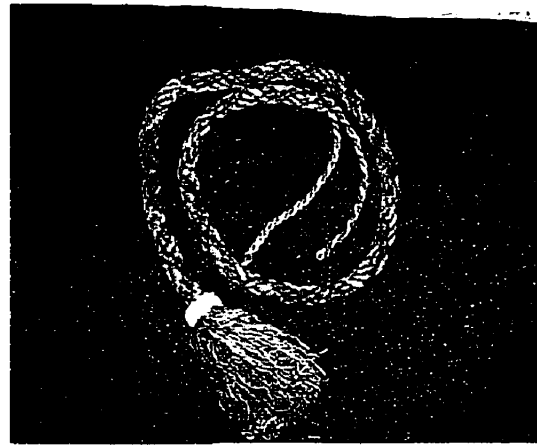
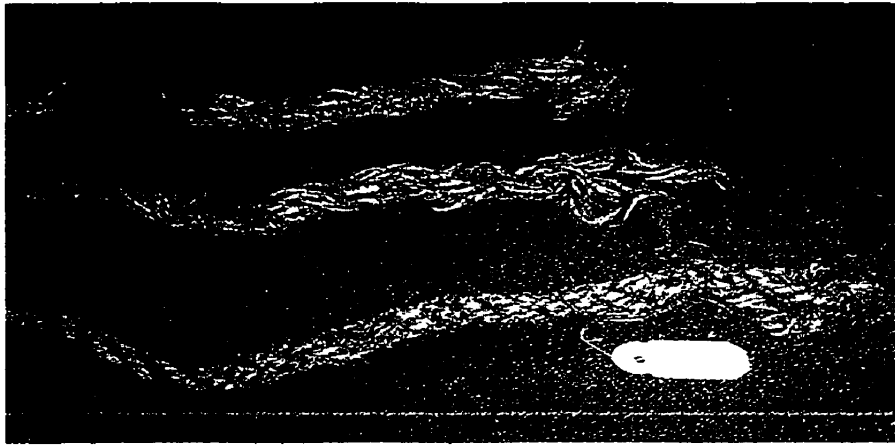
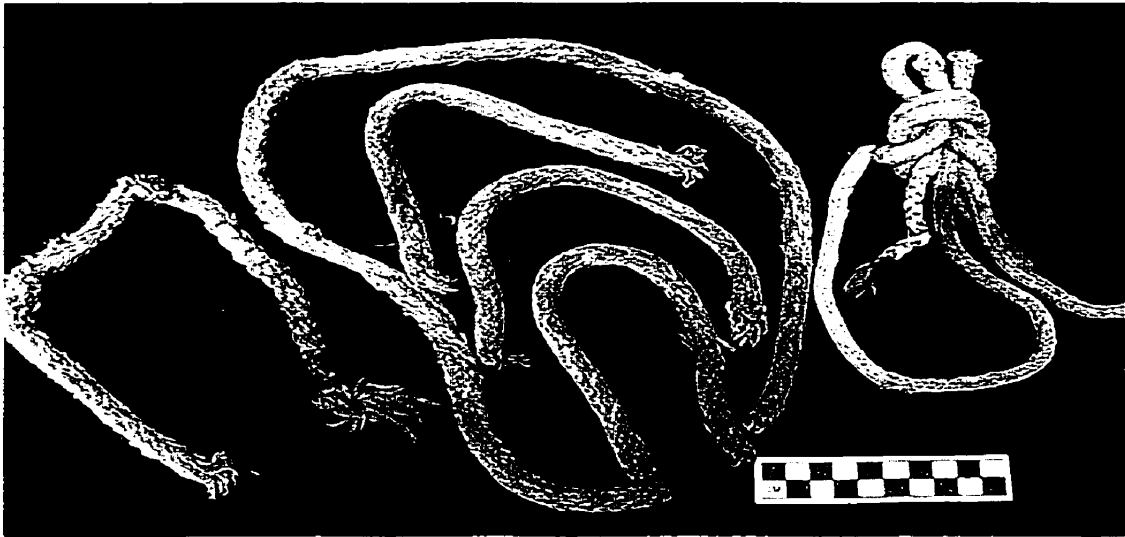
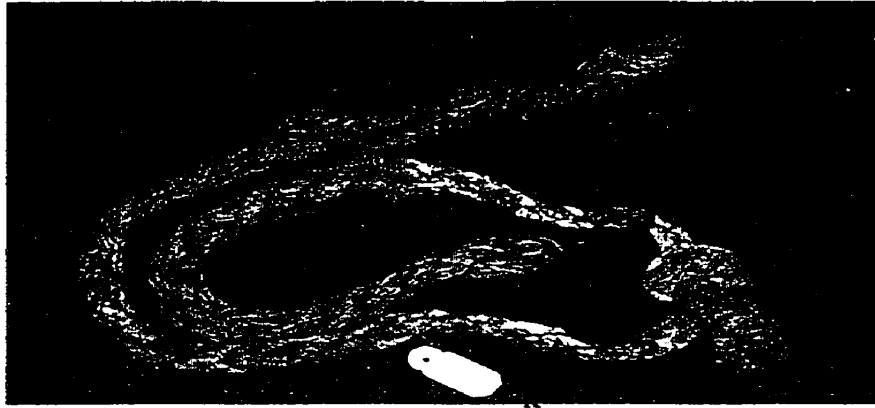


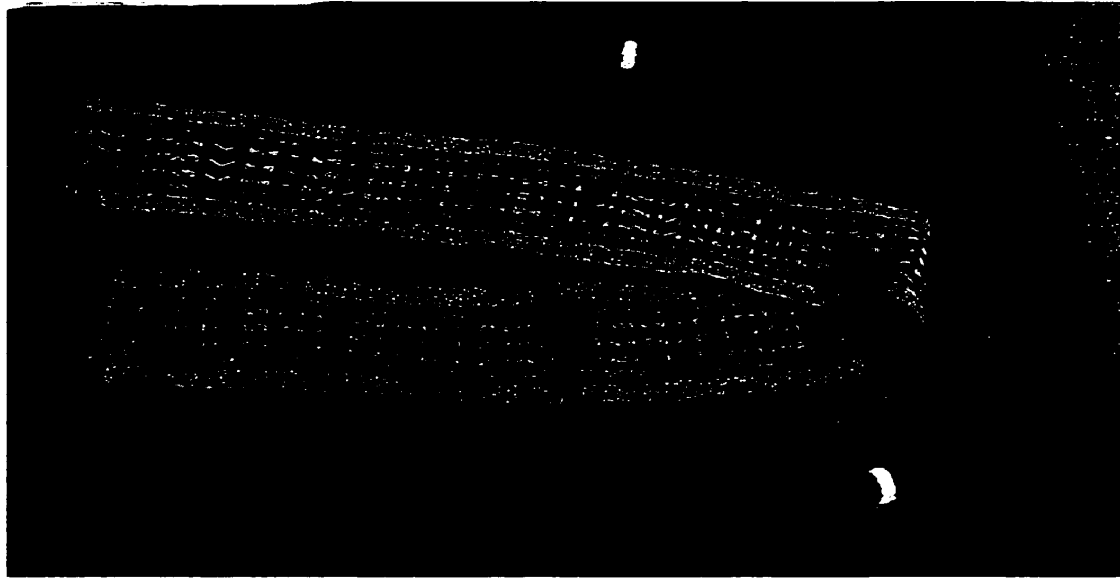
Plate 1 cont.: f: T-9 attached cord detail; g:T-9 plied cord insertion detail; h: T-10
i: T-36-37; j: T-38.



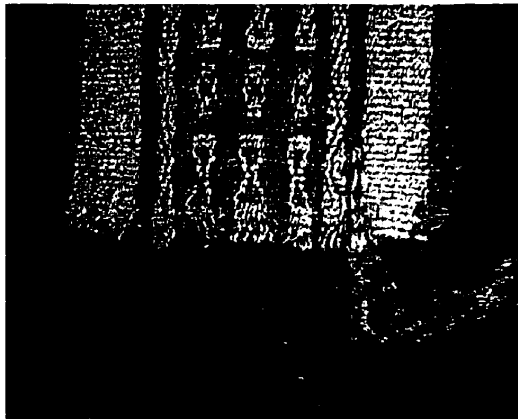
l

m

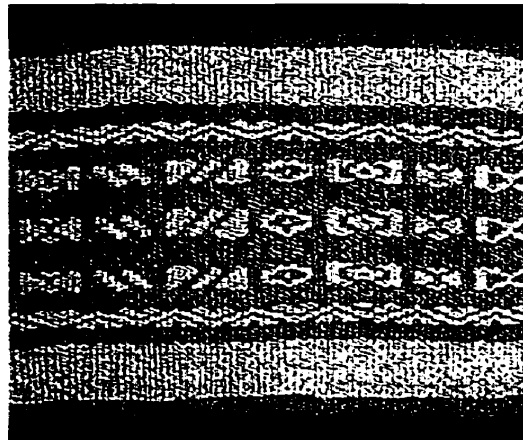
Plate 1 cont.: k: T-5; l: T-11; m: T-14A



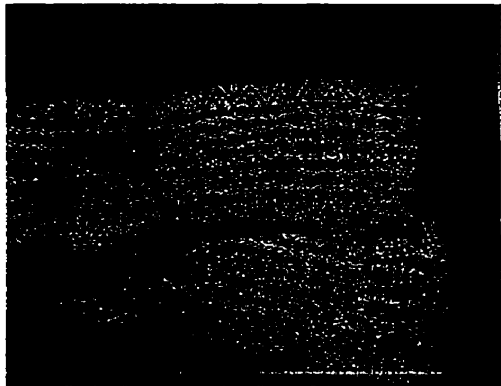
a



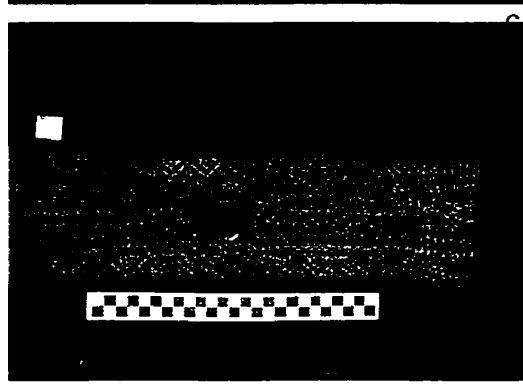
b



c



d

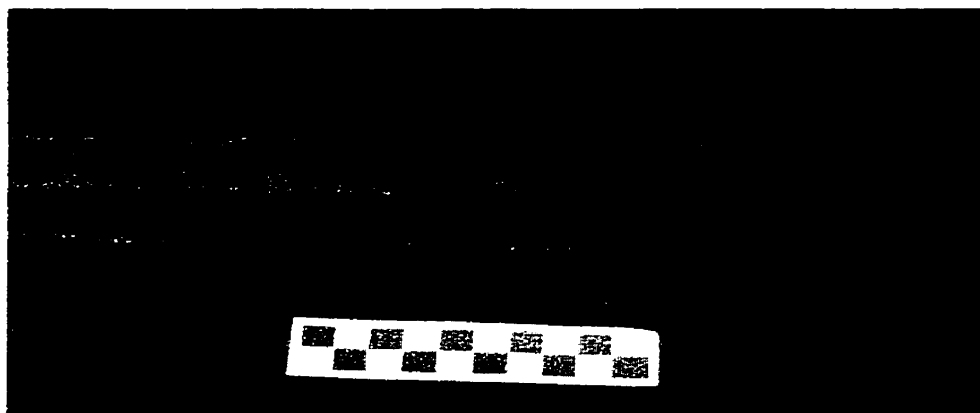


e

Plate 2 Belts: a: T-2; belt with attached cords; b: T-2 cord attachment detail; c: T-2 pattern detail; d: T-25 pattern detail; e: T-25 edge detail.

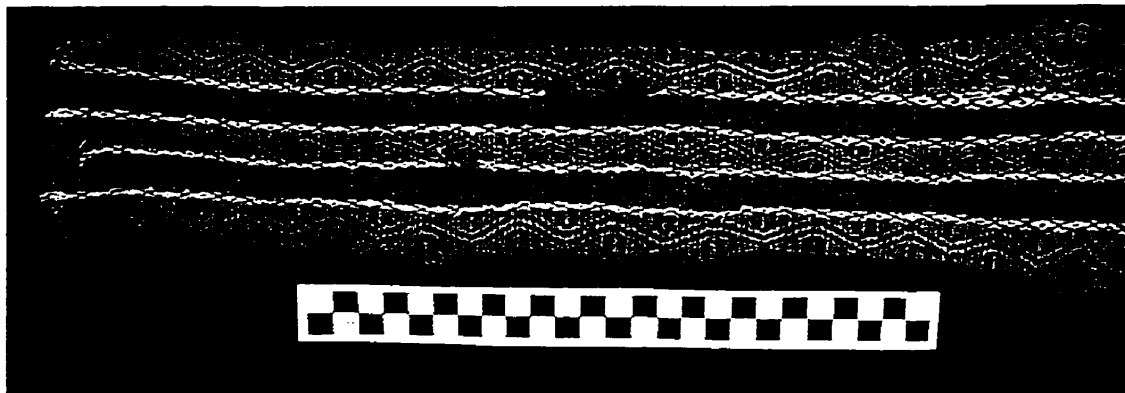


f

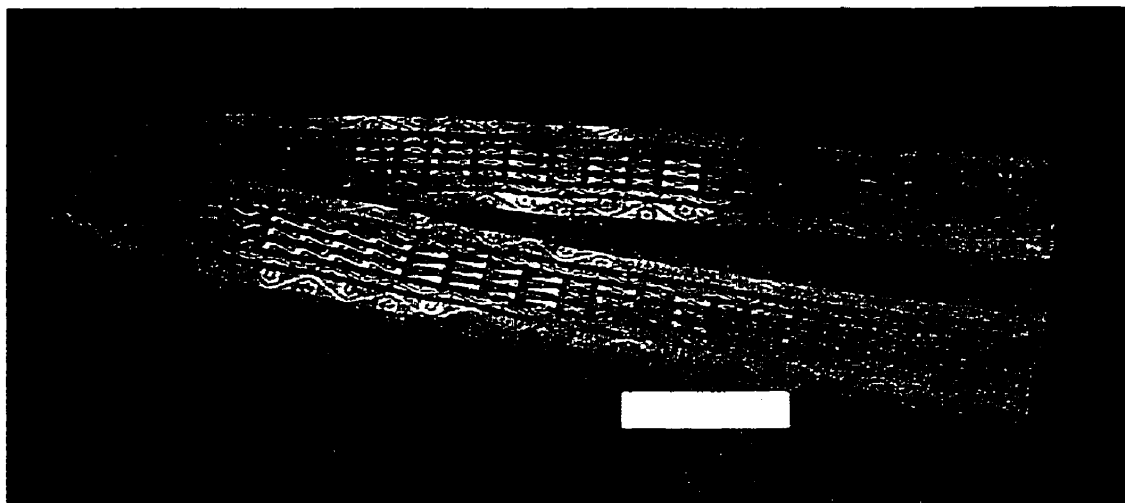


h

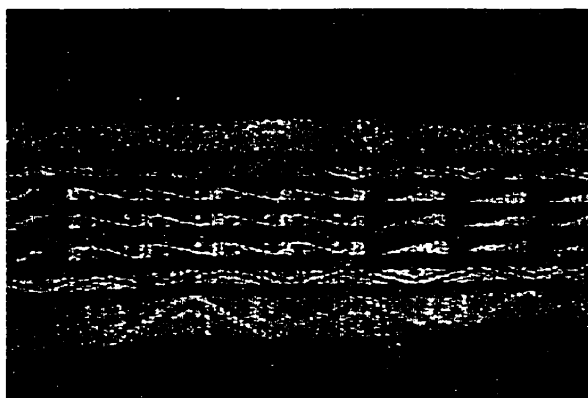
Plate 2 cont.: f: T-27; g: T-27 pattern detail; h: T-27 attached cord detail



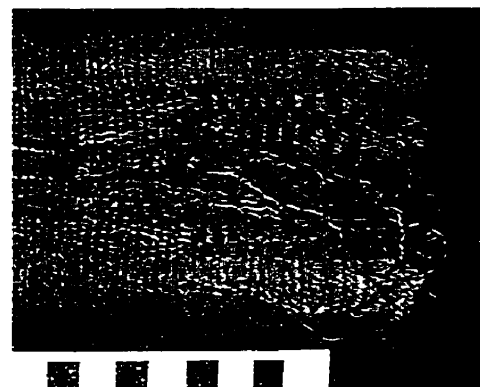
i



j



k



l

Plate 2 cont: i: T-35; j: T-39; k: T-39 pattern detail; l: T-39 edge detail.



a

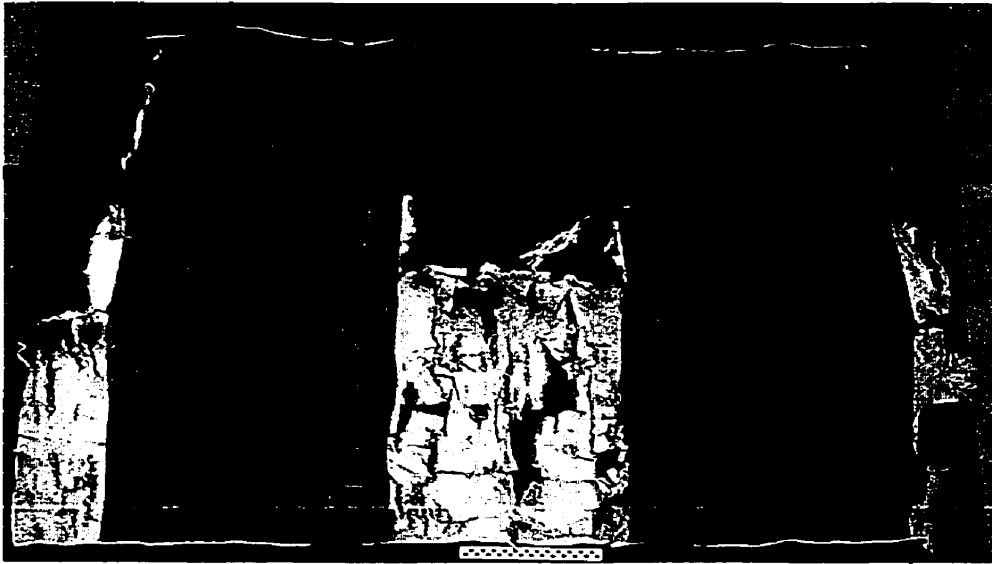
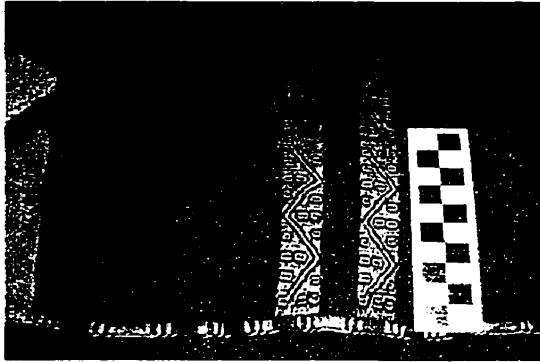
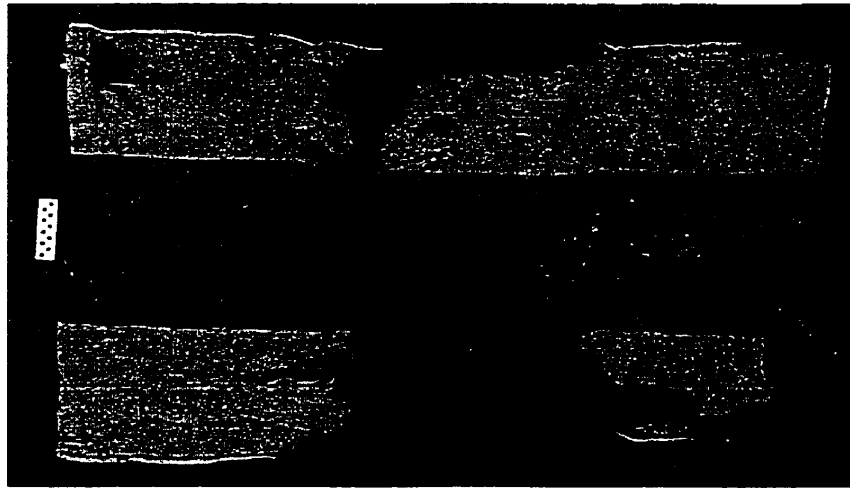


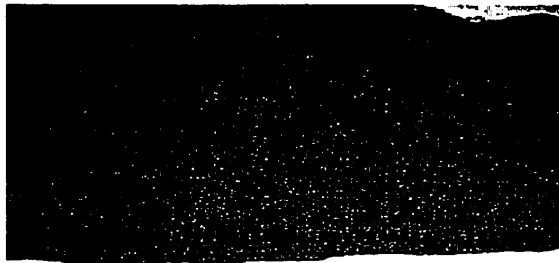
Plate 3 Mantles: a: T-3; b: T-3 pattern and edge detail; c:T-29
d: T-29 pattern and edge detail.



e



f

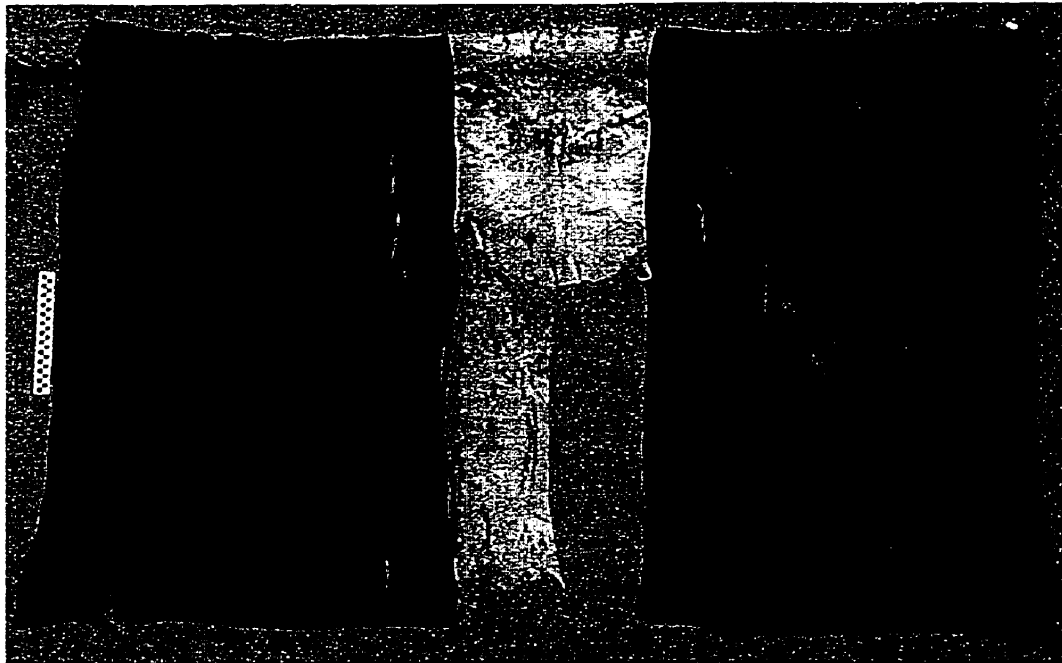


g



h

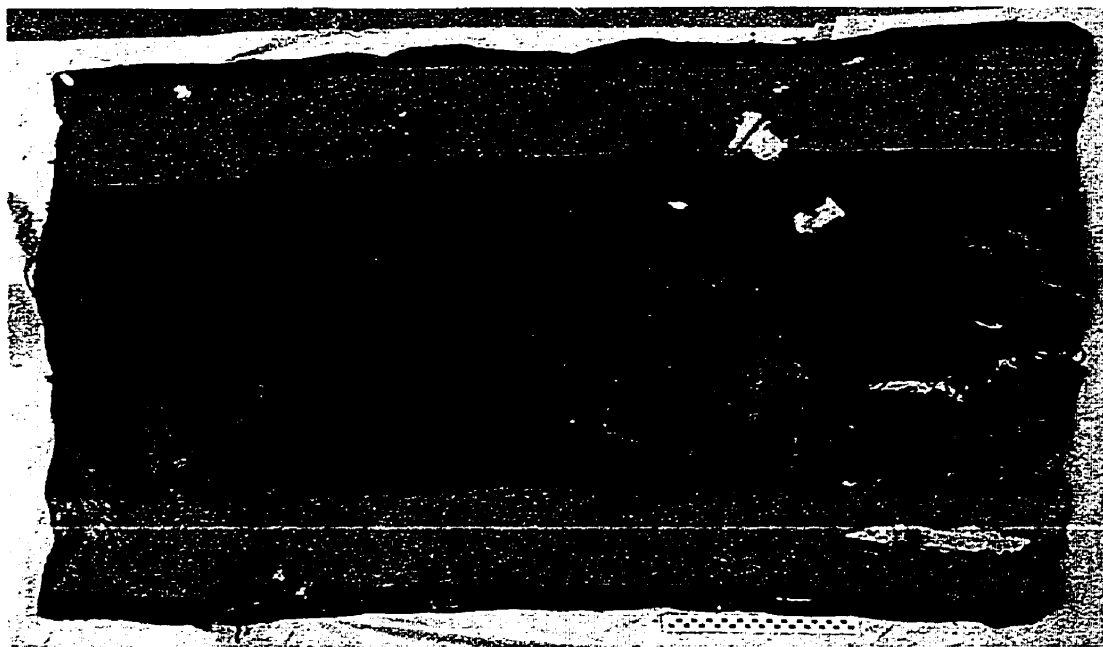
Plate 3 cont.: e: T-30; f: T-32; g: T-32 edge detail; h: T-33 pattern and edge detail.



i

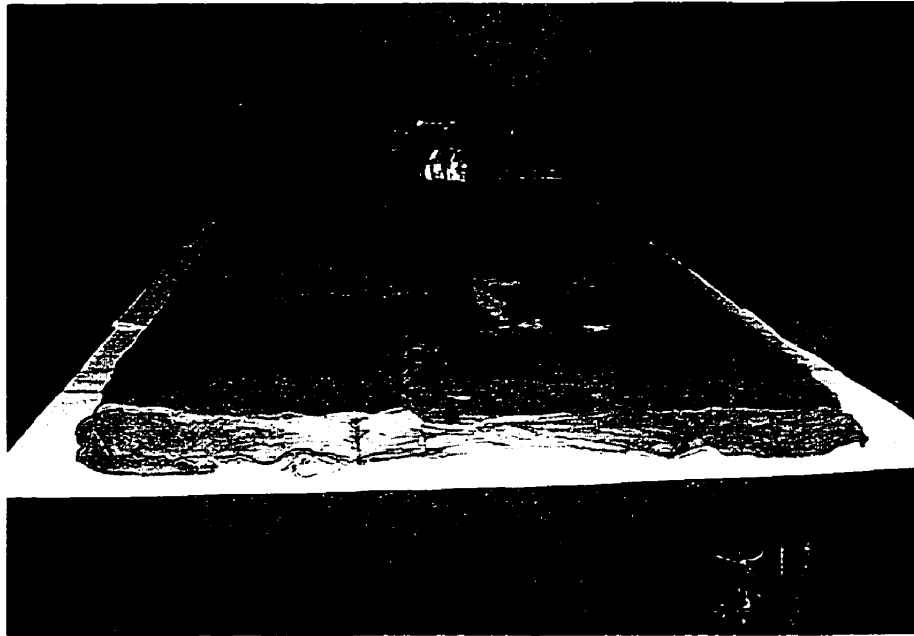


j

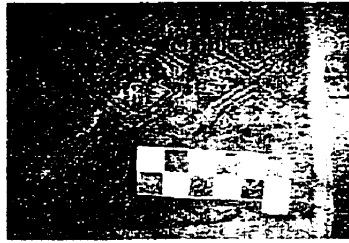


k

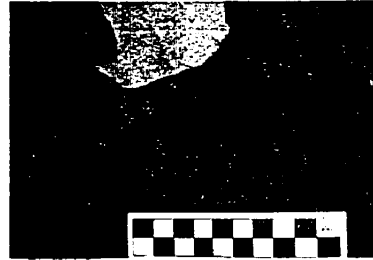
Plate 3 cont.: i: T-33; j: T-33 weft interlocking detail; k: T-34.



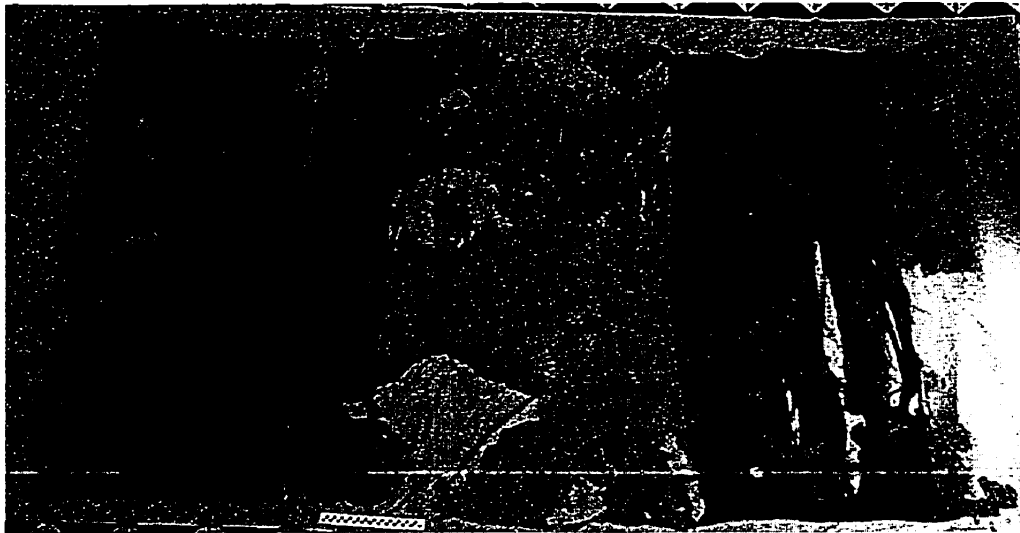
l



m

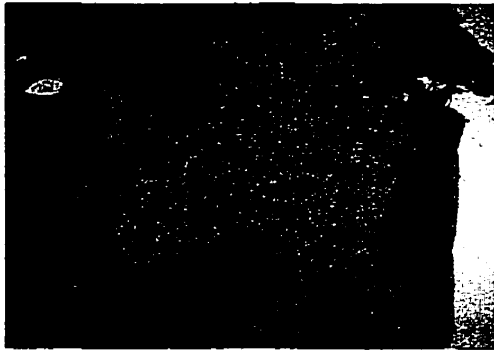


n



o

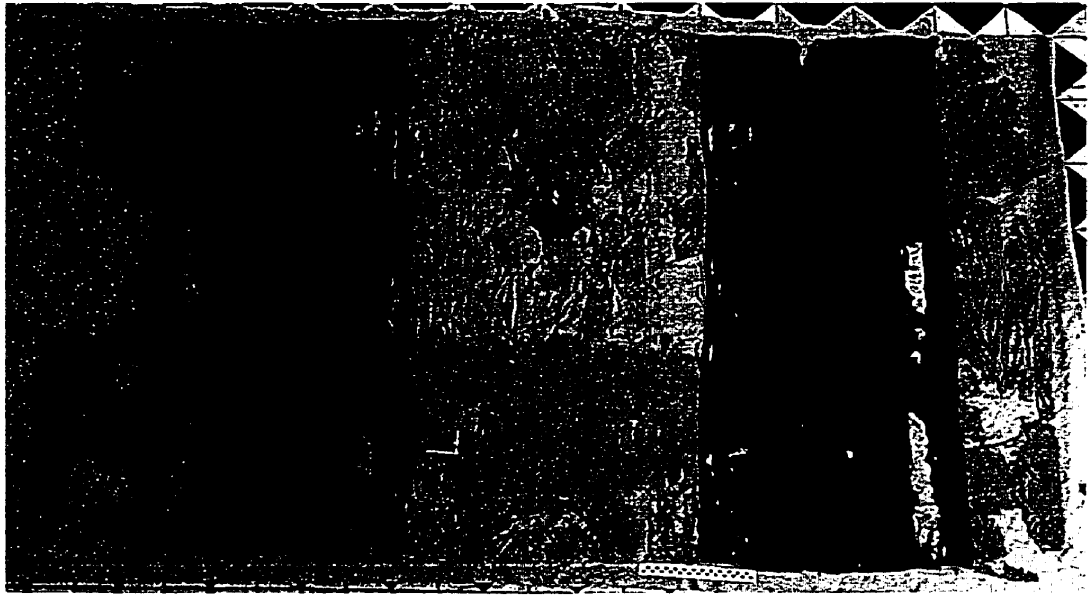
Plate 3 cont.: l: T-40; m: T-40 pattern and edge details; n: T-41 pattern detail
o: T-41.



q



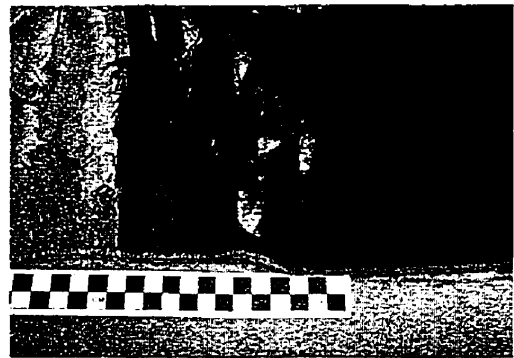
r



s

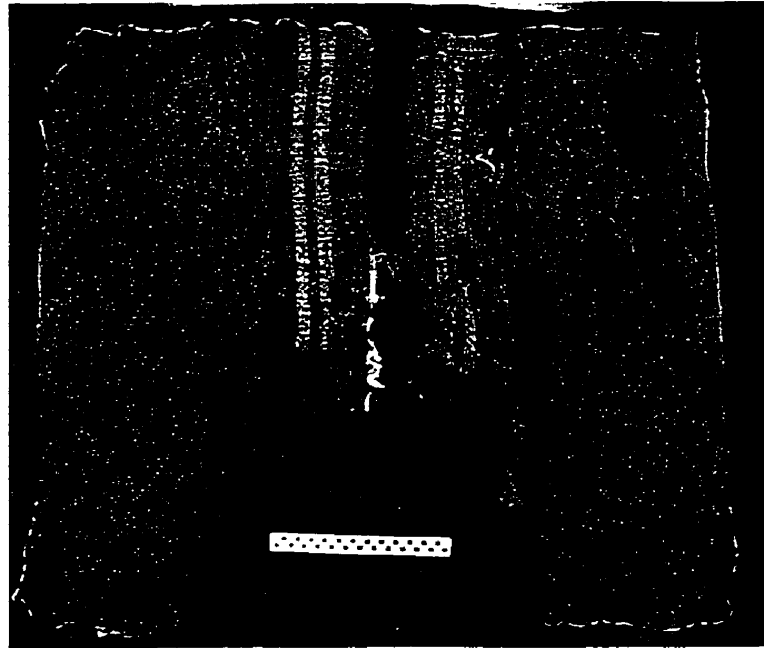


t

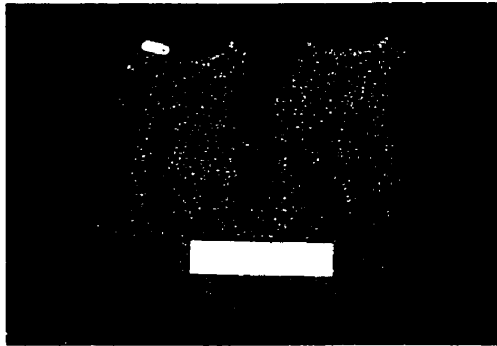


u

Plate 3 cont.: q: T-41 hair stain and tassel remnant; r: T-41 stain detail; s: T-42;
t: T-42 colour detail; u: T-42 stripe and edge detail.



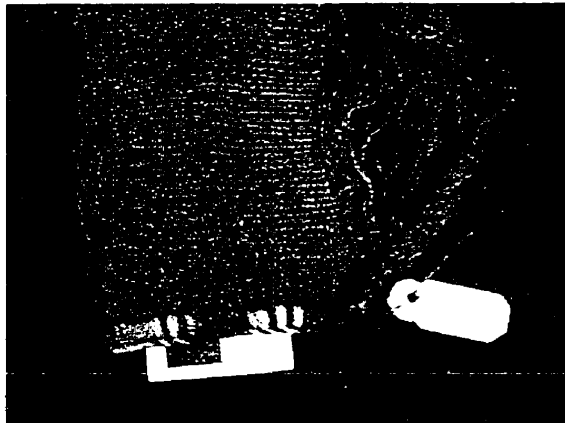
v



w

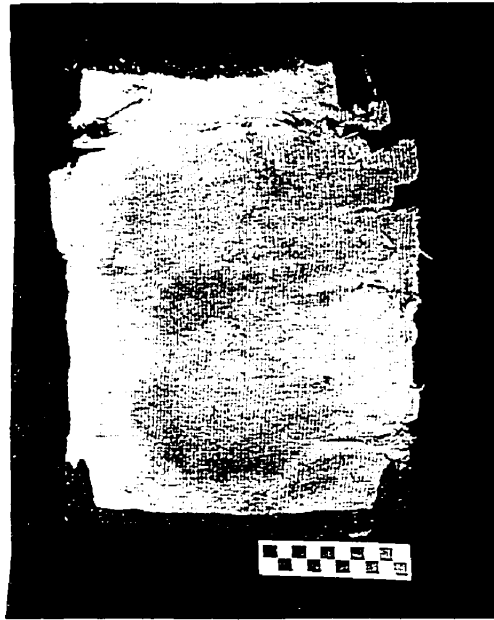


x

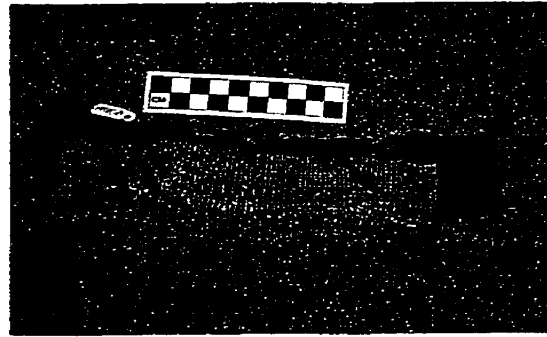


y

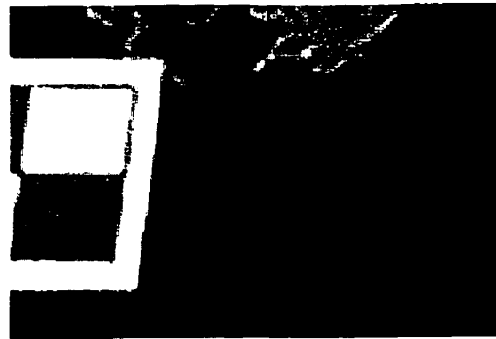
Plate 3 cont.: v: T-47; w: T-14B mantle fragments; x: T-14c mantle fragments;
y: T-15A mantle fragments.



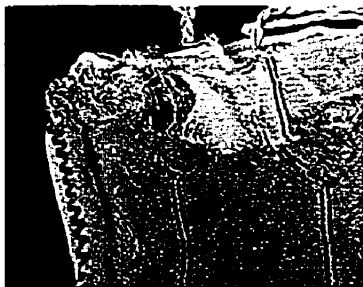
a



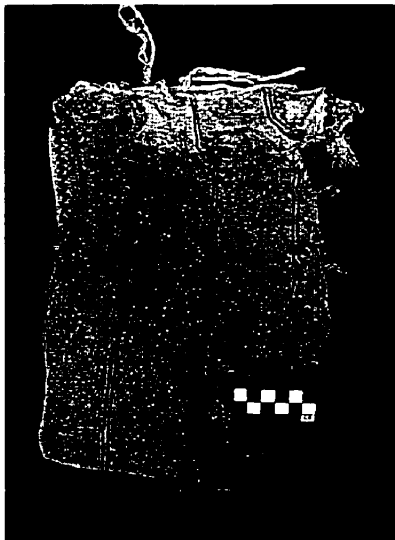
b



c



d

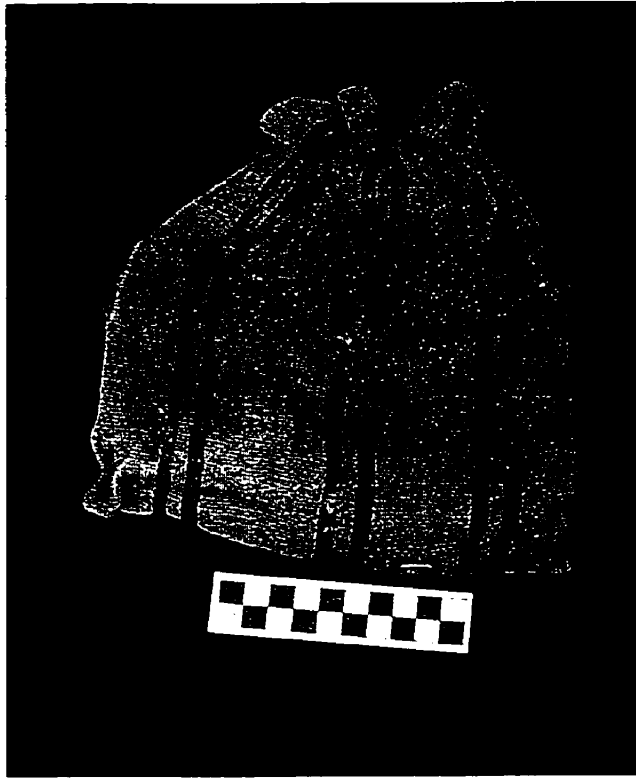


e

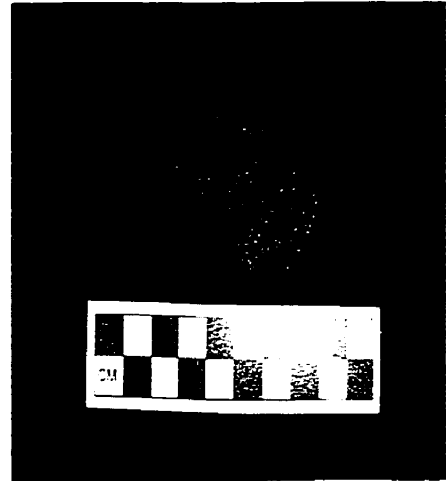


f

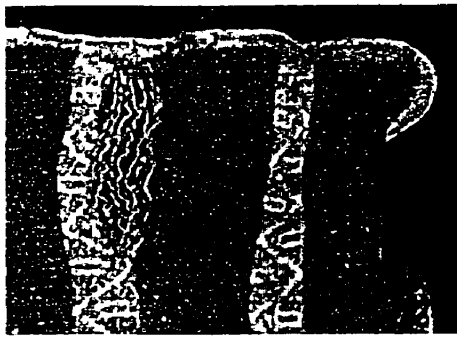
Plate 4 Bags: a: T-16; b: T-16 top edge detail; c: T-17; d: T-17 edge detail; e: T-18 seed detail ; f: T-18.



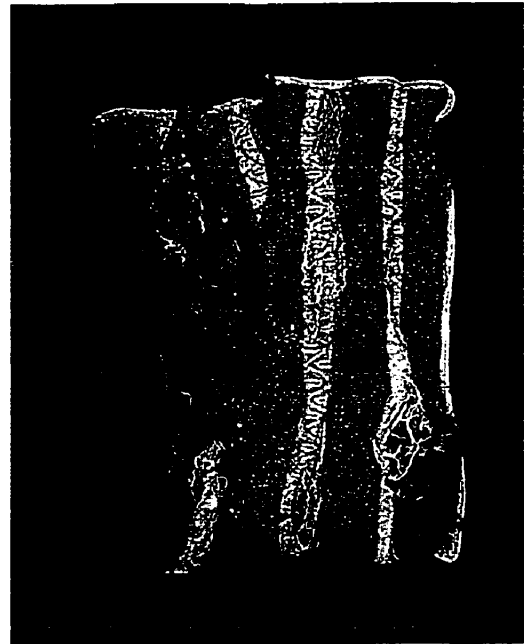
g



h

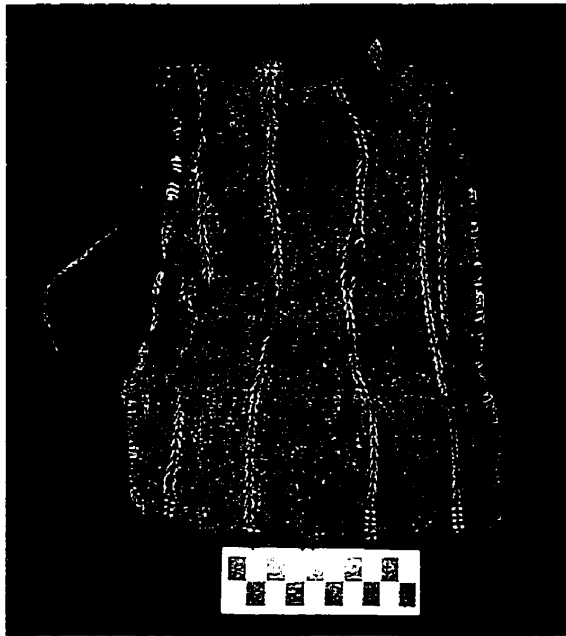


i

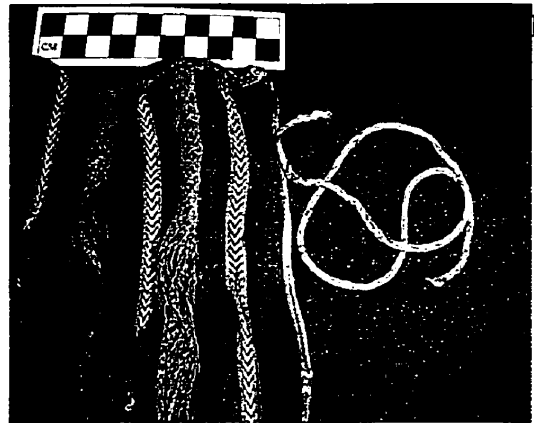
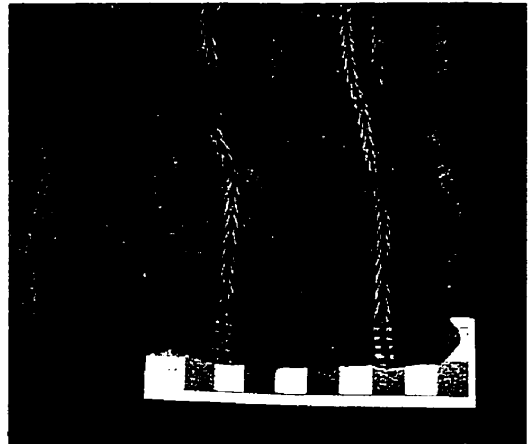


j

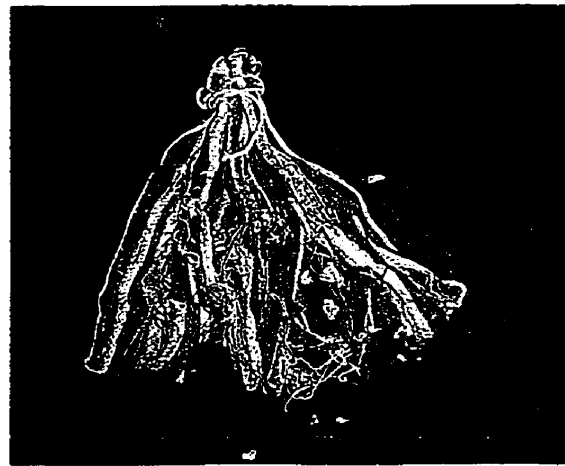
Plate 4 cont.: g: T-19; h: T-19 vegetal material; i: T-20 pattern and edge detail
j: T-20.



k



n



m

o

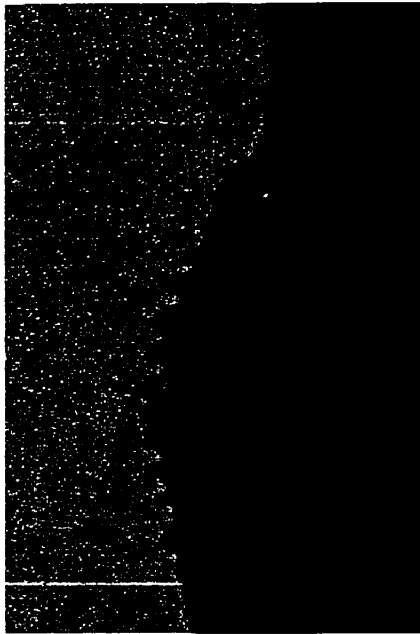
Plate 4 cont.: k: T-21; l: T-21 pattern and edge detail; m: T-22 pattern, edge and cord detail; n: T-22; o: T-22 original position.



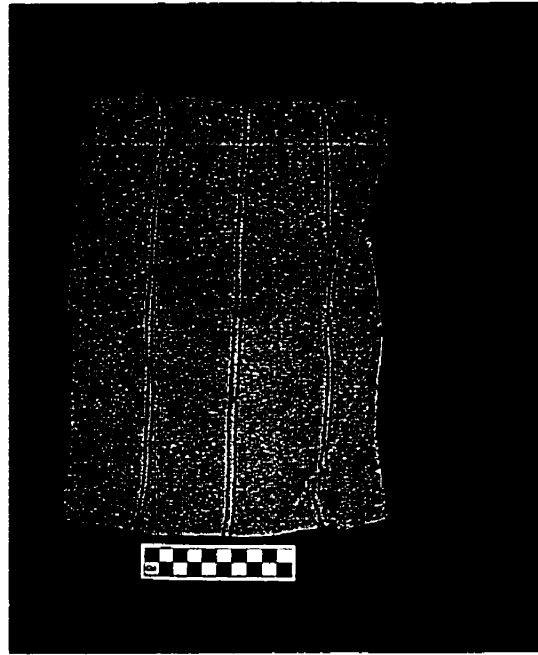
p



q

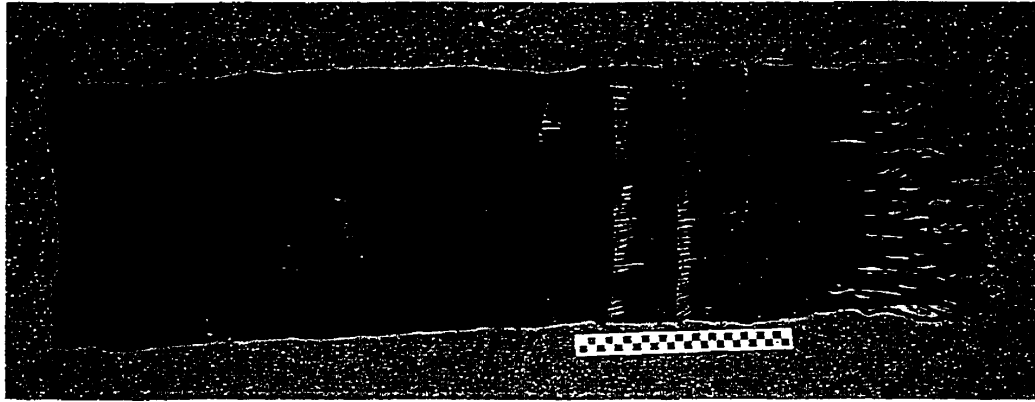


r

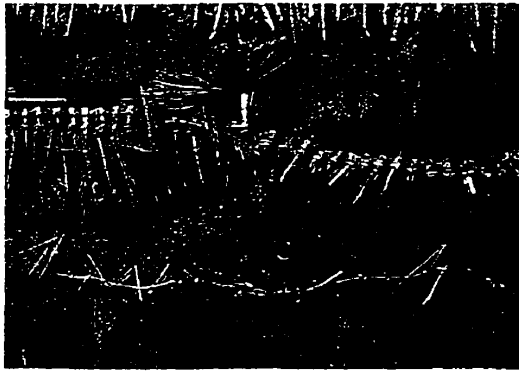


s

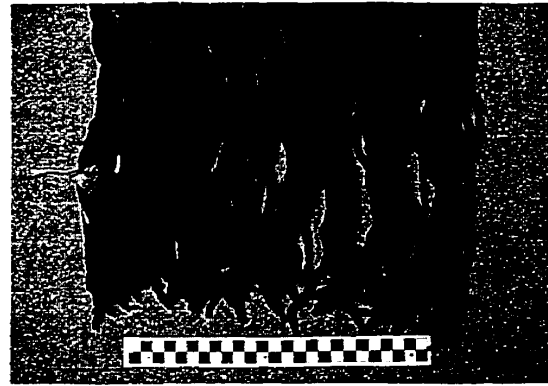
Plate 4 cont.: p: T-28; q: T-28 braided edge detail; r: T-31 edge detail; s: T-31.



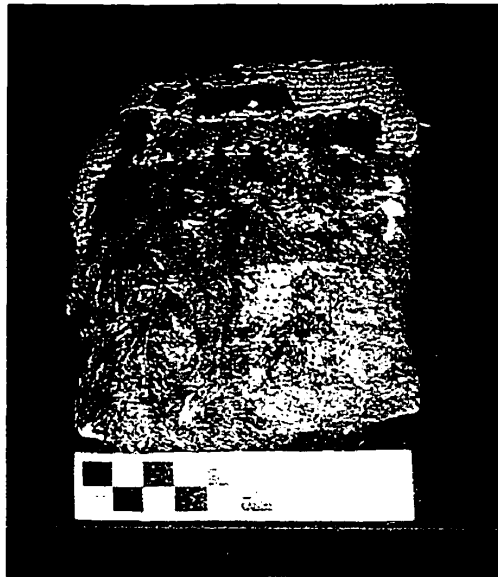
a



b



c



d



e

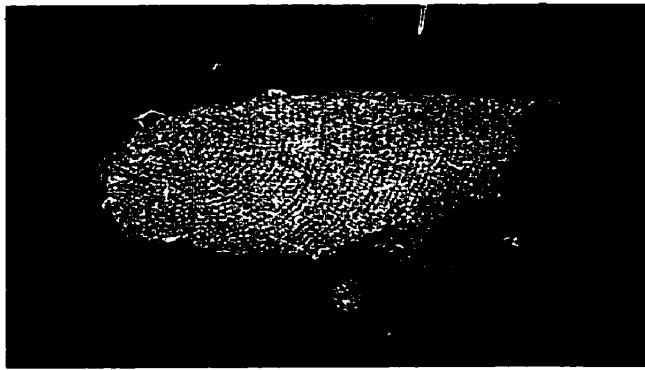
Plate 5 Feathered Artifacts: a: T-26; b: T-26 feather detail; c: T-26 fringe detail; d: T-44; e: T-44 feather detail.



f



g



h

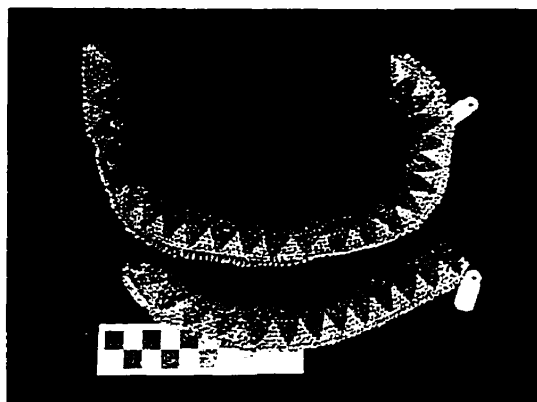


i

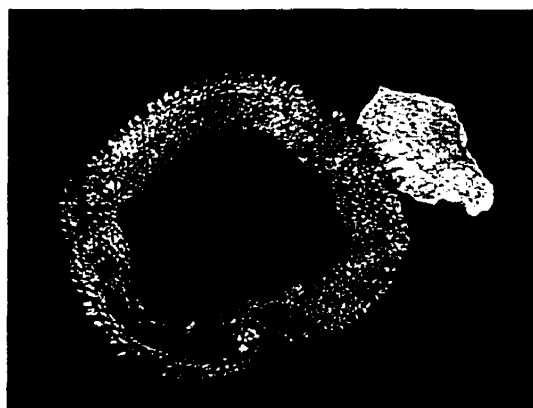


j

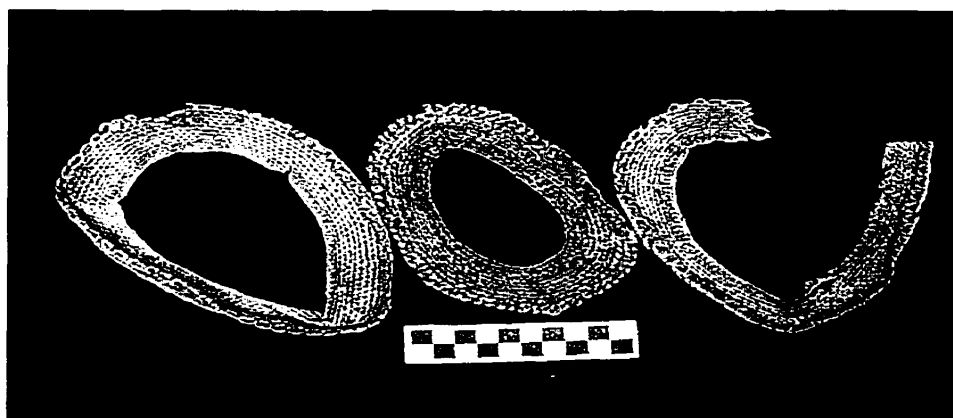
Plate 5 cont.: f: T-46 headdress with grommet; g: T-46 unfolded; h: T-46 interior aspect; i: T-46 feather detail; j: Lullaillaco headdress: courtesy of J. Reinhard.



a



b



c

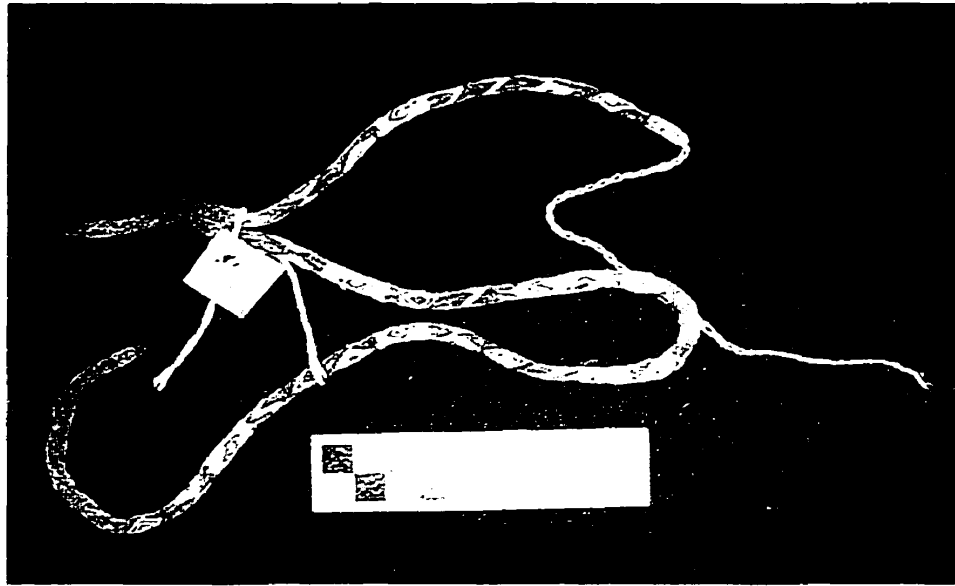


d



e

Plate 6: Thigh Bands: a: T-4; b: T-23; c: T-24; d: adult mummy with thigh band in place; e: close up of thigh band on rt. femur of adult mummy..



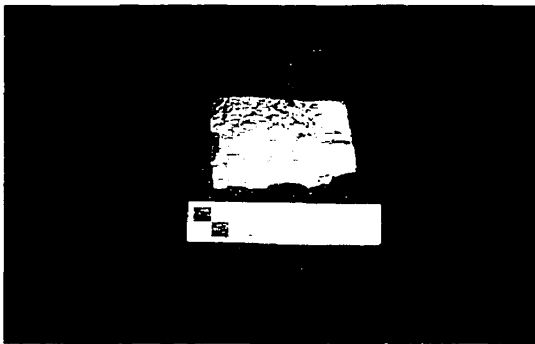
a



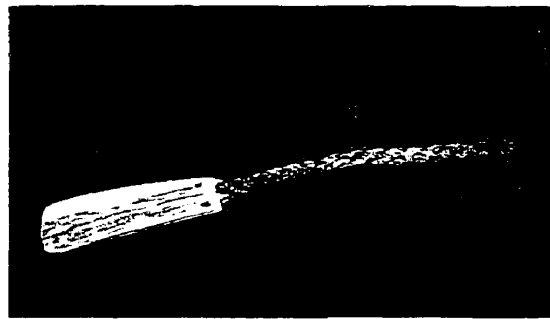
b



c



d



e

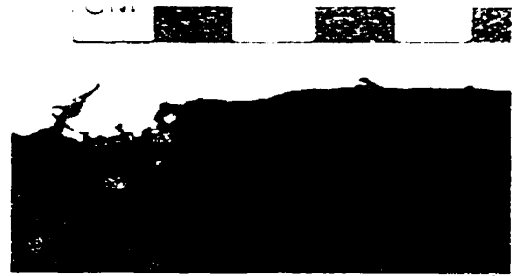
Plate 7 Miscellaneous Artifacts: a: T-45; b: T-8; c: Hair ornament on place on adult mummy; d: T-43A; e: T-48.



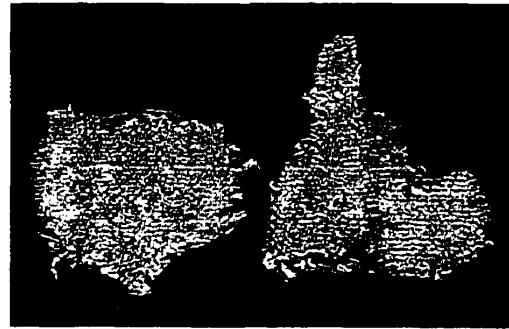
a



c



b



d



e



f

Plate 8: Miscellaneous Artifact Fragments: a: T-6; b: T-6 edge detail; c: T-12; d: T-13; e: T-14D; f: T-15B.