

Ethno-Anthropological Study of a Pre-columbian Peruvian Mummy, Using Radiological and Physico-Chemical Analyses

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Introduction

Knowledge of the pre-Columbian civilizations of the Americas is based mainly on archaeological studies of the numerous residential, religious and funerary complexes discovered during excavations, on the recovered cultural materials and on documentation by Spanish observers (Von Hagen, 1993; Kauffmann Doig, 1996; Alva, 2002; Reinhard, 2002; Solis, 2004). Another valuable contribution has come from the study of numerous specimens brought back to Italy by explorers and scholars during their voyages and expeditions in the XIX century. Many of these specimens are on display or stored in Italian museums, but they are often exposed to the risk of irremediable deterioration. Often collected not for scientific purposes but as objects to be exhibited or sold, these specimens constitute valuable testimony about distant civilizations, whose information can be revealed via a multidisciplinary approach using the sophisticated analytical and diagnostic techniques available today (Grilletto, 1996, Piazza et al., 1999, Pringle, 2001). This is the general context of our research project dealing with the scientific investigation and museum exploitation of an Andean mummy housed in the Civic Museum of Reggio Emilia. In this note, we report on the investigations conducted thus far, including reconstruction of the specimen's history, i.e. identification of its origin and its dating, and biological, radiological and physico-chemical analyses.

Research material

The specimen is a mummy from Peru housed in the Civic Museum of Reggio Emilia, but transferred temporarily to the Anthropology Laboratory, Department of Cultural Heritage Conservation, University of Bologna (Ravenna Campus) for the sake of the research. The mummy is in a poor state of preservation (Fig. 1), with serious damage to the thoraco-abdominal region. Both lower limbs and the right upper limb (no longer attached to the trunk) are maintained approximately in their original position by string, which prevents complete disarticulation. The brown



Fig. 1 - Photo of the mummy in the condition in which it reached us.

mummified soft tissues are very fragile, so that their preservation is compromised; in fact, some of them, especially in the abdomen and proximal segments of the limbs, have already been lost and the underlying bones are visible.

Results

History and origin of the mummy

The mummy was rediscovered during an inventory of the ethnographic material housed in the Civic Museum of Reggio Emilia. Subsequent museum research revealed that this specimen and other ethnographic materials were brought to Italy from Peru by Ernesto Mazzei in 1893. Mazzei was an explorer who put together the Mazzei collection of ethnological materials deriving from various parts of the world and now housed in the Museums of Reggio Emilia, Modena, Rome and Florence (Ciruzzi, 1989). In 1893, his brother, Francesco Mazzei, sold the entire collection to the Pigorini Museum of Rome, which in March 1897 donated it to the Archaeological Museum of Parma. In 1969, the material was transferred to the Civic Museum of Reggio Emilia for storage. The consulted documentation

revealed that the mummy derives from the necropolis of Ancón, on the central-southern coast of Peru. The city-necropolis of Ancón was established in the III millennium BC, when the area was beginning to be inhabited and developed.

The specimens coming from the necropolis derive mainly from the more superficial and less rich layers dating to the VIII-XVI century AD. At the time of the discoveries, it was uncommon to conduct very careful excavations and thus very valuable objects are rare. Therefore, it seems reasonable, in the absence of associated funerary equipment, to attribute the mummy to the period between the VIII and XVI century AD.

Anthroposcopic observations

The mummy is no longer in its original position because of the disarticulation of the lower limbs and the total deterioration of the abdomen. However, we can infer an initial fetal position of the body, with the lower limbs flexed to the trunk and the hands covering the face. The head retains nearly all the soft tissues and hair. The skull appears remarkably wide and short with very obvious frontal bosses; indeed, it seems that the skull was subjected to *tabula erecta* artificial deformation. The left half of the face is partially covered by the left hand. As far as can be seen, the face is low and wide at the zygomatic level. Although partially covered by mummified soft tissues and the left upper limb, the nasal opening appears high and narrow with a pronounced nasal spine. The soft tissue in the maxillary region has been lost, exposing the dentition, which seems to be complete and consisting entirely of permanent teeth. The anterior part of the thorax is nearly completely conserved, showing the covering of soft tissues as far as the epigastric region, where there is a deep hollow. On the right flank, a wide gash opens into the thoraco-abdominal cavity, filled with yarns and other vegetable material. Removal of the material filling the thoraco-abdominal cavity revealed the vertebral column, complete until the 5th thoracic vertebra, and the thoracic cage with 9 complete ribs on the right and 6 ribs visible on the left.

The abdominal region, completely lacking soft tissues, is reduced to the bones of the pelvic girdle, which are no longer in anatomical connection. The coxal bones of both sides are remarkably small and gracile, with diagnostic sex and age characters indicating a very young female. The sacrum has a wide-based triangular shape typical of females, with sacralization of the 5th lumbar vertebra. The left upper limb is connected at the scapulo-humeral joint and is covered with mummified soft tissues except for a large eroded area on the proximal end of the humerus. The arm and forearm are in a completely flexed position, with the hand open and palm resting on the left half of the face. The right upper limb, also with flexed forearm, has the hand bent radially, although originally it must have been resting on the face. The limb is completely covered with soft tissues except for the proximal end of the humerus, which is completely exposed due to loss of the peri-articular tissues. Both limbs are short and gracile, and the right humeral head (the only one visible) has signs of

incomplete epiphyseal-diaphyseal fusion, indicative of the young age of the subject.

The lower limbs have all skeletal segments in anatomical connection, but are disarticulated from the trunk. Both limbs have hyperflexed legs. They are covered with mummified soft tissues except for the proximal ends of the femora, which are completely bare and still show the epiphyseal-diaphyseal line of fusion. Both feet are connected to the legs; they are covered with soft tissues on the tarsus, but are lacking some of the metatarsals and phalanges.

Radiological examination

X-ray analyses were carried out to reveal elements that were not directly observable. They allowed us to estimate a skeletal age at death of 14-15 years, according to the tables of Greulich & Pyle (1959). With reference to Mainardi and Troise (1948) and with the limits imposed by the young age of the subject, we estimated her height as 144-150 cm on the basis of the lengths of the long bones, especially the femora.

Calculation of the cranial and facial indices, using dimensions taken from the X-ray images, indicated a probable *deformatio fronto occipitalis erecta* of the skull with antero-posterior pressure. This cranial deformation is known to have been practised on children of the populations of the central coast of Peru and was reserved for the highest social classes.

The CT images revealed radio-opaque formations inside

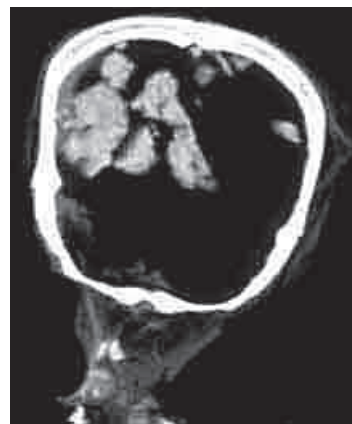


Fig. 2 - CT sections showing remains of the brain.

the skull, presumably remains of the brain (Fig. 2). This suggests that the body underwent natural mummification, since artificial mummification involved extraction of the brain. Otherwise, it could be related to a funerary ritual involving human sacrifice, similar to the Incan Capacocha (Previgliano et al., 2003).

A radio-opaque mass was also observed on the external side of the left parietal, referable to calcification of the soft tissues of the region. This was probably due to an injury suffered during life, but which did not involve damage to the skull. However, we are unable to determine if the injury was the immediate cause of death or led to death after a short period (Reinhard 1992, 1999) (Fig. 3).

The CT scan also revealed the presence of metallic objects inside the oral cavity. Indeed, a piece of metal slightly



Fig. 3 - CT sections showing the calcification of soft tissues.

protrudes from the right dental hemi-arcade. This practice was usually associated with the insertion of a small metal tube inside the mouth (Fig. 4), whose purpose was to allow the deceased's soul to leave the body.

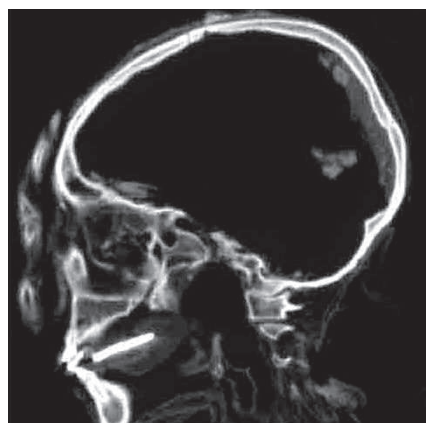


Fig. 4 - CT sections showing the metallic objects.

Finally, the CT scan revealed the presence of a screw in the thoracic vertebral column, probably used to fix the mummy to a wooden support when it was shipped to Italy or possibly during the frequent transfers among the Italian museums.

Physico-chemical analyses of the objects in the oral cavity

X-ray fluorescence spectroscopy of the object protruding from the mummy's mouth, conducted *in situ*, demonstrated that it is composed mainly of copper, but also of silver, iron and traces of chrome and lead. Due to the particular features of the spectroscope, it was not possible to ascertain whether there are traces of gold. Therefore, different methods must be used in future, including the removal of a sample of the metal (Tab. 1). Metalcraft was different from all other forms of art because it was used to emphasize and celebrate the ruling class. Indeed, studies by Kauffmann Doig (1997) showed that the use of metals was closely related to the emperor and a restricted noble class.

Traces of funerary fabrics and materials filling the thoraco-abdominal cavity

There are visible traces of the fabric of a *fardo*, the typical Andean funerary covering, on various parts of the

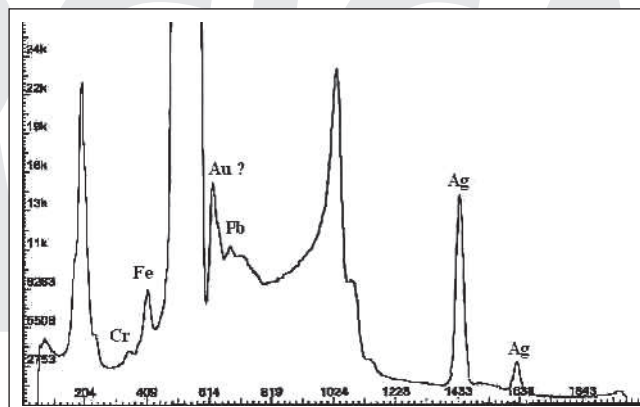


Table 1 - XRF spectrum of the object protruding from the mouth of the mummy.

mummy's body. Indeed, a small fragment under the chin is perfectly preserved. It is made of crude burlap, originally of a natural colour, whose particular Z-spinning allows us to identify its geographical origin as the Ancón area. As indicated previously, the coastal populations usually used S-spinning; in this area, only the Chimú and the Chancay used Z-spinning, or if the yarn had two heads they spun them to S and then retwisted them to Z. All this confirms the previous hypotheses about the geographical provenience and historical period of the mummy.

The material used to fill the thoracic area consists of skeins of yarn and vegetable residues, among which was found a calendar page written in Spanish and bearing the date 28 August 1871. This indicates, if not the day, the year in which the material was placed in the abdomen of the mummy, thus before its shipment to Italy.

Examination of the vegetable matter showed that it was very heterogeneous material, probably consisting of waste products extemporaneously collected *in loco*. In addition to blackish-brown lumps (thus far unidentified), there are leaves of plants which, although very degraded and defibred, can be attributed to sugar cane (*Saccharum officinarum*) or to a marsh cane (*Arundo donax*). A silkworm cocoon was also found among this material.

Conclusions

The analyses conducted thus far on the mummy indicate that it was a female who died at the age of approximately 14-15 years. During childhood, she had been subjected to intentional cranial deformation (albeit of modest degree), an ancient Peruvian practice limited to the noble class. The presence of residual brain matter in the skull, the fragments of metal inserted in the oral cavity (referable to ritual objects), the age of the individual and the area of origin suggest that we are dealing with a natural mummy, probably the object of a human sacrifice similar to the Capacocha of the Incas. This is also suggested by the evidence of a cranial trauma involving the left parietal area. In this regard, one of the most important ceremonial centres of Peru, Pachacamac, was located just south of Ancón, the necropolis where the mummy was discovered. Excavations led by Uhle (2001) near

the Temple of the Sun God, revealed a group of young women who had been strangled and buried along with cultural objects. Therefore, we should not consider human sacrifices as limited to the Andean environment, as they seem to have occurred also in the coastal desert zones, an environment with climatic conditions favourable to the preservation of mummified bodies.

The typical fetal position and the fragments of cotton fabric (remains of the original funerary covering) further support this hypothesis. This agrees with the exclusive nature of the culture and the religious beliefs of these populations. One such belief was that the advantages of belonging to a high social class were accompanied by certain duties, including the sacrifice of one's children to the gods.

The body of this sacrificed girl was preserved thanks to the arid climate of the Peruvian coast, almost fulfilling the miracle of immortality that may have been the aim of that ancient dramatic event. Immortality until 1884, when the mummy was collected by Ernesto Mazzei, who then brought it to Italy in 1893. It was then sold to the Pigorini Museum of Rome and later donated to the Museum of Parma and stored in the Civic Museum of Reggio Emilia. These movements led not only to deterioration of the specimen but also to the loss of information and lack of interest in the mummy.

The preliminary results of our study of this Andean mummy testify to the richness and importance of the scientific information incorporated in this type of specimen, which is very useful for the reconstruction of important aspects of the pre-Columbian civilizations of the Americas.

Further elements could still be revealed by our ongoing investigations, including micromorphological, histological, microbiological, pollen, toxicological and molecular analyses. This research is motivated not only by the scientific importance of this mummy but also by our desire to rescue it from oblivion and irreversible deterioration, so as to maximize its research and educational uses.

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