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Complete forensic procedure for shrunken head (tsantsa) authentification

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Method Article

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Abstract

We present here a complete forensic procedure for the analysis of shrunken heads from the Jivaro or Shuar tribes of South America \(tsantsa). This methodology is based on the examination of pieces referred to our forensic laboratory for anthropological expertise, and data from both anthropological and medical literature. A list of 14 original morphological criteria has been developed, based on the global aspect, color, physical deformation, anatomical details, and eventual associated material \(wood, vegetal fibers, sand, charcoals, etc.). Such criteria have been tested on a control sample of 20 tsantsa. Further complementary analyses are described such as CT-scan and microscopic examination.

Introduction

Tsantsas, i.e. shrunken head processed by the Jivaro tribe, living southeastern Ecuador and northern Peru, are a non-negligible part of human artifacts conserved in anthropological and ethnological institutions; they may be involved in such repatriation processes in a short term.

Procedure

Three successive steps of shrunken head authenticity procedure may be separated: 1. morphological analysis and search for any of the 14 criteria \(may be sufficient in a majority of cases); 2. hair microscopic examination \(optional); 3. skin DNA analysis \(optional). List of all 14 macroscopic criteria is: 1 Dark or black or brown skin color due to impregnation with charcoal dust during shrinking 2 Wooden pegs or vegetal fibers retained in the lips \(if absent or removed post-production, sets of vertically aligned corresponding holes are present just behind both the upper and lower lips) 3 Loop of wooden vine or fiber sewn into the neck \(if absent or removed post-production, traces of suturing and/or sawing are present) 4 Important thickness and leathery texture of the edge of the neck opening 5 Oval shape of the neck in cross-section and/or lateral compression of the head 6 From behind, neck and head tissues sewn together with fiber stitches 7 Conserved anatomical details of the ear \(with possibility of a earlobe hole, filled or not by a wooden tube or peg) 8 Both eyes tightly closed \(with possibility of sewing shut from the inside), skin in the surrounding cheek area being smooth with no facial down present 9 Profusion of hairs in the nostrils 10 Long dark hairs \(or hairs which have been cut years after the shrinking process) 11 Long suspension cord overhanging from the top of the head \(or related hole) 12 No facial painting or artistic/ethnic scar 13 No remaining skull fragment 14 Complete filling of internal head cavities by sand and/or charcoals \(may be seen or highlighted at CT-scan examination)

Timing

< 2 hours/sample when only macroscopic examination

Troubleshooting

Hair microscopic examination may be useful for distinguish human and other animals ones, human medulla being physiologically less than one third width of shaft, amorphous and mostly not continuous; due to post-mortem modifications arising during the shrinking of the head, new digital technologies may be particularly useful, such as the use of objective color measurement and image analysis techniques. Routine DNA analysis may also be important for confirming or excluding human origin of the piece. Usual DNA extraction and amplification techniques are then carried out after careful and limited skin sampling: digestion with proteinase K and DTT, extraction with phenol and chloroform, quantification, amplification and electrophoresis.