Characterization and Analysis of a Likely Khipu from Northern Chile
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Introduction
Fiber-based recording devices, known as khipus (quipus), from the Andean area of South America were used for accounting and recording narrative histories. The piece under consideration here, which was originally catalogued in the Fowler Museum collection as an "unidentified textile," has striking similarities to both the Middle Horizon (600-1000 C.E.) and Inka (1450-1554 C.E.) khipus. The piece is composed of a horizontal, primary cord element with ten pendant cords that are wrapped with threads of varying colors. The extension of the primary horizontal element (on the proper left, in the image at right) was used to wrap khipus during transport. The object is a surface find from the San Miguel de Aucap site in the Aucap valley, a disturbed site associated with burial sites along the coast of Northern Chile.

Significance of Color-Coding and Knotting
The wrapping seen on the Huari khipus and the Fowler khipus are not common in Inka khipus. While Inka khipu systems seem to have relied predominantly on knots (although some color coding was likely used), most of the wrapped, "Huari" khipus seem to contain the majority of their information in the color wrapping systems and cord colors. The piece from the Fowler collection is interesting, as it lacks knots altogether. The object has five distinguishable colors: light tan, dark tan, purple, red, and brown. It is possible that the wrapped ends may have contained knots that were cut following excavation, although accreted dirt (likely from burial) on the ends of some of the pendant elements indicates this is not the case.

Fiber Identification
Fibers were sampled from each of the differentially dyed regions. Cotton, human (head) hair and alpaca hair reference fibers were compared to the unknown khipu fibers, as all have been described as sources for archaeological khipus. It was clear after initial analysis that only animal fibers were used. Samples were mounted with Cargille metachromy (with a refractive index of 1.539). In addition, scale casts were prepared using a Dino-Lite microscope (Dedrick and Koch 2004).

All of the samples were significantly finer than the human head hair, and each had a hair shaft diameter nearly identical to the diameter of the alpaca reference fiber (approximately 25 μm). The scale casts of the unknown samples had intricate mosaic patterning, with approximately 4-5 scales occurring every 50μm, matching closely with the alpaca reference fiber.

Conclusions and Further Research
While the consideration of this object as a khipu explains much of its construction, it is likely that it may have served a different purpose from those commonly seen in the Huari and Inka cultures. The completely camelid-fiber based construction, and other construction details, distinguish the piece from most Huari and Inka khipus. The dating of the piece raises the question as to whether other "intermediate khipus" exist, whose creation falls between the Huari and Inka khipus so commonly encountered and studied in museum collections. More technical examinations of other khipus (or similar pieces that may previously have been overlooked, such as the one seen here) would be an interesting area of future research.

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Sources
AMNH Textile Collection database (available on the internet).