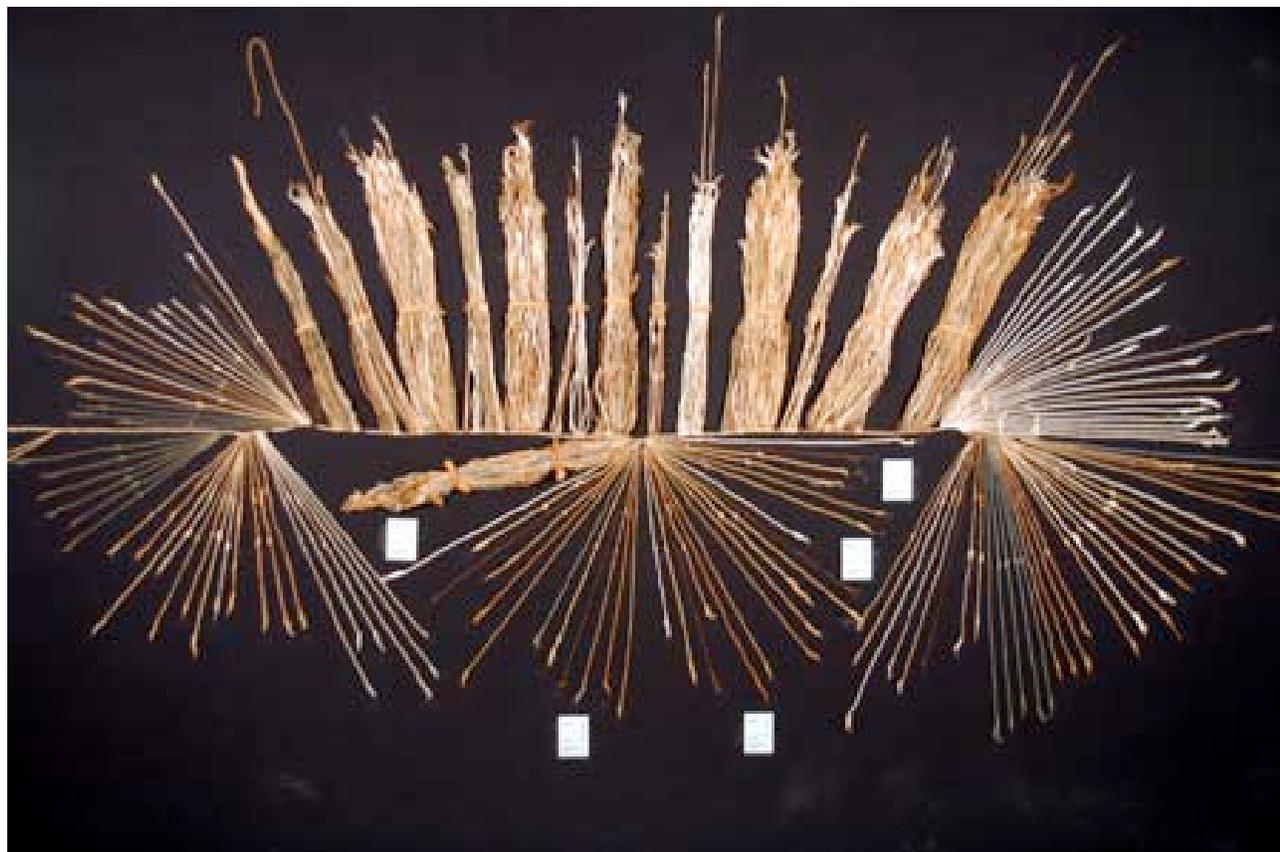


Peru's Ancient Bureaucrats Used Knotted-string Devices As Ledgers

Harvard anthropologists find evidence that 'khipu' were used to track accounting data

Cambridge, Mass. - August 11, 2005 - Anthropologists at Harvard University have found evidence that ancient Inka accountants shared numbers across their sprawling bureaucratic hierarchy using khipu, aggregations of knotted strings that served to record information in the Andean empire. The finding sheds new light on the uses of khipu, used by Inkans in lieu of the two-dimensional writing favored by other ancient civilizations.

The work is described this week by researchers Gary Urton and Carrie J. Brezine, writing in the journal *Science*.



This khipu from the Museum for World Culture in Göteborg, Sweden, has 332 pendant strings and is said to be from Nasca, Peru. (Photo courtesy Gary Urton)

"Every major ancient civilization -- Inka, Chinese, Egyptian, Mayan, Aztec and Mesopotamian -- developed sophisticated means of tracking its sprawling empire," says Urton, Dumbarton Oaks Professor of Pre-Columbian Studies in Harvard's Faculty of Arts and Sciences and a curator at Harvard's Peabody Museum of Archaeology and Ethnology. "This communication was used to

record the information deemed most important to the state, which often included accounting and other data related to censuses, finance and the military. In this regard, the discovery that khipu were used as ledger books reveals a new consonance between the Inka and other ancient cultures."

The researchers used a computer database developed by Brezine to ascertain that khipu, also known as quipu, may have been used as bureaucratic ledgers. This searchable database, which contains data on nearly half the 650 to 700 extant khipu, can locate patterns in the devices' arrays of 2 to 1,500 knotted strings of varying colors and lengths.

Using the database to analyze 21 khipu gathered at a burial site located at the ancient Inkan administrative center of Puruchuco, on the central Peruvian coast about 11 kilometers northeast of modern-day Lima, Urton and Brezine found that seven of the khipu appeared to contain cumulative numerical data, such as that generated as successive officials compiled sums. The values on the khipu appear to sum upward and subdivide downward, suggesting the addition or subtraction of values as the khipu moved up and down the ranks of the Inka bureaucracy.

Such compilation is consistent with the Inka state's enormous labor hierarchy, wherein groups of 10, 50, 100, 500 and more laborers nestled into increasingly large administrative units. The empire levied tributes in the form of a "labor tax," with each worker required to work a specified number of days each year on state projects and each official required to keep careful records.

"This work gives us some sense of how this complex information was compiled, manipulated, shared and archived in the Inka hierarchy," Urton says. "Instructions of higher-level officials for lower-level ones would have moved, via khipu, from the top of the hierarchy down. This information would have been partitive in nature, with assignments made to groups of 1,000 workers broken down into two groups of 500, and so on. In the reverse direction, local accountants would forward information on accomplished tasks upward through the hierarchy, with information at each successive level representing the summation of accounts from the levels below."

While anthropologists lack the ability to decipher khipu precisely, Urton's previous research has led him to argue that the instruments may also have been used as calendars: Ancient Peruvian burial sites have yielded khipu with 730 strings grouped in 24 sets -- exactly equivalent to the number of days and months in two years.

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http://www.fas.harvard.edu/home/news_and_events/releases/khipu_08112005.html