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Magnetic fields used to date Indian artifacts

Associated Press

REPUBLIC COUNTY - You might be surprised what you can learn from a campfire. A campfire that has been cold for, say, 300 years.

Stacey Lengyel hopes she can tell, within 30 years or so, when it was used.

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Lengyel, a research associate in anthropology at the Illinois State Museum, is the country's leading authority on archeomagnetic dating, a process built around two phenomena: when heated, magnetic particles reorient themselves to magnetic north; and over time, magnetic north is, literally, all over the map.

"They call it a 'drunken wander,'" said Lengyel. "Around 1600, it was real close to Earth's rotational axis. Now, it is around 75 degrees latitude."

Lengyel is one of scores -- mostly volunteers, but also some highly credentialed professionals -- who were enlisted this summer to help uncover new information about a Pawnee Indian settlement in northwest Republic County.

"One of the things we're really hoping to learn is the actual age of the village," said Richard Gould, administrator of the Pawnee Indian Museum.

The museum encloses the floor of an 1820s earth lodge. It is surrounded by the remnants of many other structures. The earth has settled where each of the lodges once existed.

"We have 22 lodge depressions within the fenced area," Gould said. "What we really want to do is pinpoint when it was lived in."

The group also wants to learn more about this Pawnee Nation band's lifestyle.

The Kikehahki band was one of four Pawnee Nation bands. It also was dubbed the Republican band by French traders, who were impressed by the Pawnee's collaborative culture. The Republican name then was adopted for the river and the county.

Band members were hunter-gatherers, Gould said, but they were moving into a farming lifestyle. They planted crops in the spring, went hunting for buffalo in the summer, harvested in the fall, and then left to hunt buffalo again in the winter.

The two-week archaeological dig is a project of the Kansas Archaeology Training Program, a venture in its 33rd year that involves the Kansas Historical Society, the Kansas Anthropological Association, the University of Kansas and Kansas State University.

Donna Roper, research associate professor at the University of Kansas, is one of the principal investigators.

"Almost everyone here is a volunteer," Roper said, pointing to dozens of people -- young and old, scraping and sifting, pouring and lifting -- swarming around intersecting trenches.

More than 150 volunteers, some of them students enrolled in KU's Kansas Archaeological Field School, participated in the two-week dig.

Whenever potentially significant fragments were uncovered, their location would be charted before they were moved. Dirt shaved from the floor was bagged and then shaken through a series of increasingly fine meshes.

The team was looking for any telltale objects, such as seeds, tools or building materials, that offered insights into the band's daily lives.

In archeomagnetic dating, once potential samples have been identified, their location and orientation are precisely measured, Lengyel said. About a dozen 1-inch cubes are then excised, encased to preserve them, then taken to a lab.

The chunks are then progressively demagnetized until their natural remnant magnetism can be measured, she said. The objects may have been partially magnetized by nearby lightning strikes, for example, or if they were stored near objects with strong magnetic

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The chunks are then progressively demagnetized until their natural remnant magnetism can be measured, she said. The objects may have been partially magnetized by nearby lightning strikes, for example, or if they were stored near objects with strong magnetic fields. These weaker magnetic fields must be removed.

First their magnetic fingerprint is taken, and then they are slightly demagnetized. The process is repeated several times; eventually all that is left is the baseline magnetic signal, she said. If the material is fired to about 500 degrees Celsius or more, the magnetic field will point to where magnetic north was located at the time.

"The best dates we can get are within a 30-year time period," Lengyel said.