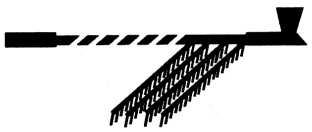
CALUMET



Newsletter of the Indian Peaks Chapter of the Colorado Archaeological Society
December, 2010

CALENDAR OF EVENTS

Presentation (lecture) meetings are held in the University of Colorado Museum, Dinosaur Room on the Second Thursday of most Months, at 7:00 PM. **The public is always welcome**.
Web Site: WWW.INDIANPEAKSARCHAEOLOGY.ORG

December 1 Boulder PAAC, Colorado Archaeology (session 6)
December 2 PAAC Lowry Lab, 8:30AM-4:30PM, see Page 2
December 2 IPCAS Executive Board Meeting, 7:30PM
December 7 PAAC Lowry Lab, 8:30AM-4:30PM, see Page 2
December 8 Boulder PAAC, Colorado Archaeology (end, session 7)
December 9 **IPCAS Christmas Party**, 6PM St. Andrews Presbyterian Church, 2700 Baseline Road, Boulder. White Mammoth Gift Exchange- Bring a wrapped used gift for the White Mammoth Gift Exchange. See page 2 for additional information.
December 15, 17, 18, 21, 22 PAAC Lowry Lab, 8:30AM-4:30PM, see Page 2

January 11,12 PAAC Lowry Lab, 8:30AM-4:30PM, see Page 2
January 13 **IPCAS Presentation Meeting**, 7PM. Laurie White. Topic: TBA.
January 14, 15, 19, 20, 25, 26 PAAC Lowry Lab, 8:30AM-4:30PM, see Page 2
January 27 **Archaeology Discussion Group**, 7:00PM. Meeting Location: Boulder Library Meeting Room
This month's Topic: The Anasazi - anything you wish on the topic of the Anasazi. We will also pick the March meetings topic.

February 10 **IPCAS Presentation Meeting**, 7PM. Caitlin Sommer, Masters Candidate, CU-Boulder. Her topic is "Research on Feathered Artifacts in the Mantle's Cave Collection at the CU Museum". Caitlin received a 2010 Alice Hamilton Scholarship to obtain one AMS date for a sample of one of the feathered artifacts.

March 10 **IPCAS Presentation Meeting**, 7PM. David T. Williams, Masters Candidate, CU-Boulder. David's topic is "Research on Lithic Assemblages within the Lower Rio Verde River Valley region of Oaxaca, Mexico". David received a 2010 Alice Hamilton Scholarship for living expenses and to obtain sourcing analysis of obsidian artifacts at the University of Missouri Research Reactor (MURR) using X-Ray Fluorescence Spectrometry (XRF).
March 24 **Archaeology Discussion Group,** 7:00PM. Meeting Location: TBD

April 14 **IPCAS Presentation Meeting,** 7PM, Dinosaur Room, Dr. Robert Brunswig. Topic is the Dearfield Project (there will be volunteer opportunities in June/July).

June 9 **1st Annual IPCAS Picnic Potluck Picnic**, Thursday, June 9 at 6:00PM at Betasso Preserve, Boulder County Open Space - Bring a dish to share.

Inside This CALUMET

Hi Folks,

Just a short message to let you know there is LOTS of space available for virtually all dates in December and January on the lab training project at our Lowry facility;
see http://coloradohistory-oahp.org/programareas/paac/certreq/labcreditb.htm for details. Although January 15 has been the most popular choice, no dates have completely filled. It's first-come, first served with lab space, so do let me know if you'd like to attend, two days minimum [need not be consecutive].

The lab work is usually held at the Colorado Historical Society's Museum Support Center in east Denver (MSCD), on intermittent days in December and January, 8:30AM-4:30PM. The specific dates for the lab this coming winter are December 2, December 7, December 15, December 17, December 18, December 21, & December 22, 2010; and January 11, January 12, January 14, January 15, January 19, January 20, January 25, January 26. Prospective volunteers should contact the State Training Coordinator to participate. All supervised hours spent with specific materials in the collections apply toward the 40 hours of lab time required for certification. While the collection includes a variety of prehistoric and historical materials, a large majority is lithic (flaked stone and ground stone artifacts).

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Requesting additional IPCAS board members for 2011

2011 IPCAS Officers
President - Anne Robinson
Vice- President - Karen Kinnear
Treasurer - Carolyn Camell-Coppin
Professional Adviser Dr. Robert Brunswig
PAAC Coordinator - Dave Hawley
Archivist/ Librarian - Kris Holien
Board member - Cheryl Damon
Board Member - Kris Holien
Board Member - Joanne Turner

Open positions:
Newsletter editor, Web administrator, Membership Chair, CAS Representative, Field Trip Chair, Outreach coordinator, and Secretary. Please consider volunteering for the board and, possibly, one of the open positions.

Annual Christmas Party

The IPCAS Christmas Party will begin at 6:00 PM Thursday, December 9, in the basement Dining Hall at St. Andrew's Church, located at 3700 Baseline Road in Boulder. Our Christmas Party is a potluck dinner and fun get-together. The club provides the table service, utensils, and the beverages. Each person (or couple) attending brings one main dish and one salad/dessert to share. Bring your spouse or a friend, please. Plan on 25 people attending.

We also feature the White Mammoth Exchange. Each person brings a wrapped gift for exchange. Gifts should be something that you no longer need, no longer want, and are tired of looking at. Not-so-great gifts are the norm. The White Mammoth Exchange is very exciting and a fun end to our program year.

Laser Beams Penetrating Thick Canopy Detect Thousands of New Structures, Show Maya Adept at 'Building Green'

ScienceDaily (May 12, 2010) — A flyover of Belize's thick jungles has revolutionized archaeology worldwide and vividly illustrated the complex urban centers developed by one of the most-studied ancient civilizations -- the Maya. UCF anthropology professors Arlen and Diane Chase have directed archaeological excavations at Caracol for more than 25 years. The hard work of machete-wielding research scientists and students has resulted in the mapping of some 23 square kilometers (9 square miles) of ancient settlement.

University of Central Florida researchers led a NASA-funded research project in April 2009 that collected the equivalent of 25 years worth of data in four days. Aboard a Cessna 337, LiDAR (Light Detection and Ranging) equipment bounced laser beams to sensors on the ground, penetrating the thick tree canopy and producing images of the ancient settlement and environmental modifications made by the inhabitants of the Maya city of Caracol within 200 square kilometers (77 square miles). The NASA technology aboard the Cessna saw beyond the rainforest and detected thousands of new structures, 11 new causeways, tens of thousands of agricultural terraces and many hidden caves -- results beyond anyone's imagination. The data also confirm the size of the city (spread over 177 square kilometers or 68 square miles) and corroborate the Chases' previous estimates for the size of the population (at least 115,000 people in A.D. 650).

Until now, Maya archeologists have been limited in exploring large sites and understanding the full nature of ancient Maya landscape modifications because most of those features are hidden within heavily forested and hilly terrain and are difficult to record. LiDAR effectively removes these obstacles. "It's very exciting," said Arlen Chase. "The images not only reveal topography and built features, but also demonstrate the integration of residential groups, monumental architecture, roadways and agricultural terraces, vividly illustrating a complete communication, transportation and subsistence system."

UCF Biology Professor John Weishampel designed the unique LiDAR approach. He has been using lasers to study forests and other vegetation for years, but this was the first time this specific technology fully recorded an archeological ruin under a tropical rainforest. "Further applications of airborne LiDAR undoubtedly will vastly improve our understanding of ancient Maya settlement patterns and landscape use, as well as effectively render obsolete traditional methods of surveying," Chase said.

The images taken at the end of the dry season in Belize last April took about 24 hours of flight time to capture and then three weeks to analyze by remote sensing experts from the University of Florida. Now Caracol's entire landscape can be viewed in 3-D, and that already offers new clues that promise to expand current understanding of how the Maya were able to build such a huge empire and what may have caused its destruction. "The ancient Maya designed and maintained sustainable cities long before 'building green' became a modern term," said Diane Chase, who has worked as co-director of the Caracol Archaeological Project beside her husband for the past 25 years. Her conclusion is based on the extensive agricultural terracing LiDAR revealed.

In addition to the UCF researchers, partners include Jason Drake with the U.S. Forest Service in Tallahassee and an adjunct professor at UCF; Ramesh Shrestha, K. Slatton and William Carter of the National Center for Airborne Laser Mapping; and Jaime Awe, director of the Institute of Archaeology in Belize.

Much more powerful information is anticipated from the data collected. UCF's Weishampel said rainforests play an important role in understanding and managing global warming today. The team's results also give him a snapshot of forest vegetation in that part of the world and how it was influenced by land-use practices 1,000 years ago. This may help scientists understand past human-environment interactions and changes that should be made today.

More information about the Caracol Archaeological Project can be found at: http://www.caracol.org/

Maya Intensively Cultivated Manioc 1,400 Years Ago

ScienceDaily (June 17, 2009) — A University of Colorado at Boulder team has uncovered an ancient and previously unknown Maya agricultural system -- a large manioc field intensively cultivated as a staple crop that was buried and exquisitely preserved under a blanket of ash by a volcanic eruption in present-day El Salvador 1,400 years ago. Evidence shows the manioc field -- at least one-third the size of a football field -- was harvested just days before the eruption of the Loma Caldera volcano near San Salvador in roughly A.D. 600, said CU-Boulder anthropology Professor Payson Sheets [IPCAS Member], who is directing excavations at the ancient village of Ceren. The cultivated field of manioc was discovered adjacent to Ceren, which was buried under 17 feet of ash and is considered the best preserved ancient farming village in all of Latin America.

The ancient planting beds of the carbohydrate-rich tuber are the first and only evidence of an intensive manioc cultivation system at any New World archaeology site, said Sheets. While two isolated portions of the manioc field were discovered in 2007 following radar work and limited excavation, 18 large test pits dug in spring 2009 -- each measuring about 10 feet by 10 feet -- allowed the archaeologists to estimate the size of the field and assess the related agricultural activity that went on there. Sheets said manioc pollen has been found at archaeological sites in Belize, Mexico and Panama, but it is not known whether it was cultivated as a major crop or was just remnants of a few garden plants. "This is the first time we have been able to see how ancient Maya grew and harvested manioc," said Sheets, who discovered Ceren in 1978.

Ash hollows in the manioc planting beds at Ceren left by decomposed plant material were cast in dental plaster by the team to preserve their shape and size, said Sheets. Evidence showed the field was harvested and then replanted with manioc stalk cuttings just a few days before the eruption of the volcano.

A few anthropologists have suspected that manioc tubers -- which can be more than three feet long and as thick as a man's arm -- were a dietary salvation for ancient, indigenous societies living in large cities in tropical Latin America. Corn, beans and squash have long been known to be staples of the ancient Maya, but they are sensitive to drought and require fertile soils, said Sheets. "As 'high anxiety' crops, they received a lot of attention, including major roles in religious and cosmological activities of the Maya," said Sheets. "But manioc, which grows well in poor soils and is highly drought resistant did not. I like to think of manioc like an old Chevy gathering dust in the garage that doesn't get much attention, but it starts right up every time when the need arises."

Calculations by Sheets indicate the Ceren planting fields would have produced roughly 10 metric tons of manioc annually for the 100 to 200 villagers believed to have lived there. "The question now is what these people in the village were doing with all that manioc that was harvested all at once," he said. "Even if they were gorging themselves, they could not have consumed that much." The CU-Boulder team also found the shapes and sizes of individual manioc planting ridges and walkways varied widely. "This indicates the individual farmers at Ceren had control over their families' fields and cultivated them they way they wanted, without an external higher authority telling them what to do and how to do it," he said.

The team also found that the manioc fields and adjacent cornfields at Ceren were oriented 30 degrees east of magnetic north -- the same orientation as the village buildings and the public town center, said Sheets. "The villagers laid out the agricultural fields and the town structures with the same orientation as the nearby river, showing the importance and reverence the Maya had for water," he said.

The volcano at Ceren shrouded adobe structures, thatched roofs, house beams, woven baskets, sleeping mats, garden tools and grain caches. The height of the corn stalks and other evidence indicate the eruption occurred early on an August evening, he said. Because it is unlikely that the people of Ceren were alone in their intensive cultivation of manioc, Sheets and his colleagues are now investigating chemical and microscopic botanical evidence at other Maya archaeological sites that may be indicators of manioc cultivation and processing. Sheets said Maya villagers living in the region today have a long tradition of cutting manioc roots into small chunks, drying them eight days, then grinding the chunks into a fine, flour-like powder known as almidón. almidón can be stored almost indefinitely, and traditionally was used by indigenous people in the region for making tamales and tortillas and as a thickening agent for stews, he said.

Since indigenous peoples in tropical South America use manioc today to brew alcoholic beverages, including beer, the CU-Boulder team will be testing ceramic vessels recovered from various structures at Ceren for traces of manioc. To date, 12 structures have been excavated, and others detected by ground-penetrating radar remain buried, he said.

Sheets is particularly interested in vessels from a religious building at Ceren excavated in 1991. The structure contained such items as a deer headdress painted red, blue and white; a large, alligator-shaped painted pot; the bones of butchered deer; and evidence that large quantities of food items like meat, corn, beans and squash were prepared on-site and dispensed to villagers from the structure, said Sheets. Ceren's residents apparently were participating in a spiritual ceremony in the building when the volcano erupted, and did not return to their adobe homes, which excavations showed were void of people and tied shut from the outside. "I think there may have been an emergency evacuation from the ceremonial building when the volcano erupted," he said. To date, no human remains have been found at Ceren.

The research team also included CU-Boulder doctoral student Christine Dixon, Professor David Letz and graduate student Angie Hood from the University of Cincinnati, University of Costa Rica graduate student George Maloof and University of Central Florida graduate student Andrew Tetlow. The research was funded by the National Science Foundation.

Mayan Plumbing More Than a Pipe Dream

Analysis by Emily Laut
Thu May 6, 2010 10:37 PM ET

The New World's earliest known example of engineered water pressure was discovered by two Penn State archaeologists in the Mayan city of Palenque, Mexico.

"Water pressure systems were previously thought to have entered the New World with the arrival of the Spanish," the researchers wrote in a recent issue of the *Journal of Archeological Science.* But this water feature predates the arrival of Europeans.

The city of Palenque was built around the year 100 in a constricted area with little land to build on and spread out to. By the time the city's population hit its zenith during the Classic Maya period from 250-600, Mayans had saved precious urban space by routing streams beneath plazas using aqueduct-like structures.

The pressurized water feature is called Piedras Bolas Aqueduct, a spring-fed channel on steep terrain.

From the tunnel's entrance to its outlet 200 feet downhill, the elevation drops about 20 feet and its diameter decreases from 10 feet near the spring to about a half a foot where the water emerges. This combination of a downhill flow and sudden channel restriction pressurized the water, shooting it from the opening to an estimated height of 20 feet.

The researchers don't know for sure how the Maya used the pressurized water, but they have a couple of ideas. One possibility is they used it to lift water into the nearby residential area for wastewater disposal. Another possibility, and the idea the researchers used as their model, was as a fountain.

A similar feature was found in the city's palace.

Ancient Maya Buried Relatives, Artifacts Under Homes

http://news.discovery.com/archaeology/maya-burial-homes-histories.html

By Rossella Lorenzi | Tue Apr 20, 2010

THE GIST:
Ancient, illiterate Mayans buried their family and items under their homes.
Archaeologists believe this was the people's way of recording their histories.
Every 20-30 years, families destroyed and rebuilt their homes with new burials.

Illiterate Maya people recorded their history by burying their domestic universe under their floors, according to excavations of modest Maya homes in central Belize. Analysis of objects and human remains embedded beneath these ordinary Maya houses from the Classic period (250-900 A.D.) revealed that farmers and servants cached objects and buried relatives within their residences. "Commoners may not have had the written word, but they had the means to record their own history under their feet, within walls and under their roof," Lisa Lucero, anthropology professor at the University of Illinois, wrote in the *Journal of Social Archaeology.*

Lucero examined the arrangement, color and condition of several Maya artifacts excavated at two commoner residences in a small Maya center called Saturday Creek, in central Belize. Occupied from about 450 to 1150 A.D., the two homes revealed about a dozen human remains of men, women and children with artifacts arranged around and on top of the bodies. According to the researcher, those who were domestically interred were family members who died closest to calendrical rites every 40 or 52 years or at the time, every 20-30 years, in which houses needed to be re-roofed.

Indeed, burial in the home was a major event. "After the funeral rites, the house and what it contained were destroyed and burned. The ceremonial destruction provided the basis for the new house," Lucero said. To provide ballast for a new plaster floor, the Maya used broken and whole vessels, colorful ceramic fragments, animal bones and rocks. All items were symbolically arranged. "The Maya deposited items that had a particular history with the family. Once placed and buried, the objects disappeared from sight, not memory," Lucero said.

In order to enter the domestic underground museum, things that were used in life had to be "de-animated." The Maya would render these items useless by breaking them. In this way the artifacts could enter the next stage of their life history. The archaeologists found several vessels and jars which underwent de-animation rites, as they lacked bases or necks and had their rims broken off. Other vessels were de-animated with a "kill hole" drilled through their bottoms. Lucero also found bowls and jars that were buried in perfect condition. They were specifically manufactured to represent "re-animation" rites for the new house built over the old. Some artifacts -- including groups of obsidian or chert rocks -- represented the Maya belief in the nine levels of the underworld and the 13 levels of heaven.

Lucero found that colors such as red and orange, which symbolized sunrise and life, were commonly used in burials. Black represented death and the underworld, but no black objects were found in or near a burial. "Perhaps the Maya only wanted to use colors that were associated with the realm of living," Lucero said.

Cynthia Robin, an anthropological archaeologist at Northwestern University, Illinois, agrees with Lucero's conclusions. "Although ancient Maya commoners didn't write anything down, they 'wrote' their history in many other ways. The burial of ancestors is a history of the families that lived there. In a sense you could compare this to a written deed or census," Robin, who specializes in the study of ancient, everyday Maya society, told Discovery News.

"In a similar vein, objects buried in homes often recorded religious ideas: rather than reading a religious text, you can 'read' the meaning of the objects buried in houses," Robin said.

Earliest Evidence Of Domesticated Maize Discovered: Dates Back 8,700 Years

ScienceDaily (Mar. 25, 2009) — Maize was domesticated from its wild ancestor more than 8700 years according to biological evidence uncovered by researchers in the Mexico's Central Balsas River Valley. This is the earliest dated evidence -- by 1200 years -- for the presence and use of domesticated maize.

According to Ranere, recent studies have confirmed that maize derived from teosinte, a large wild grass that has five species growing in Mexico, Guatemala and Nicaragua. The teosinte species that is closest to maize is Balsas teosinte, which is native to Mexico's Central Balsas River Valley.

"We went to the area where the closest relative to maize grows, looked for the earliest maize and found it," said Ranere. "That wasn't surprising since molecular biologists had determined that Balsas teosinte was the ancestral species to maize. So it made sense that this was where we would find the earliest domestication of maize."

The study began with Piperno, a Temple University anthropology alumna, finding evidence in the form of pollen and charcoal in lake sediments that forests were being cut down and burned in the Central Balsas River Valley to create agricultural plots by 7000 years ago. She also found maize and squash phytoliths -- rigid microscopic bodies found in many plants -- in lakeside sediments.

Ranere, an archaeologist, joined in the study to find rock shelters or caves where people lived in that region thousands of years ago. His team carried out excavations in four of the 15 caves and rock shelters visited in the region, but only one of them yielded evidence for the early domestication of maize and squash.

Ranere excavated the site and recovered numerous grinding tools. Radiocarbon dating showed that the tools dated back at least 8700 years. Although grinding tools were found beneath the 8700-year level, the researchers were not able to obtain a radiocarbon date for the earliest deposits. Previously, the earliest evidence for the cultivation of maize came from Ranere and Piperno's earlier research in Panama where maize starch and phytoliths dated back 7600 years.
Ranere said that maize starch, which is different from teosinte starch, was found in crevices of many of the tools that were unearthed.

"We found maize starch in almost every tool that we analyzed, all the way down to the bottom of our site excavations," Ranere said. "We also found phytoliths that comes from maize or corn cobs, and since teosinte doesn't have cobs, we knew we had something that had changed from its wild form."

Ranere said that their findings also supported the premise that maize was domesticated in a lowland seasonal forest context, as opposed to being domesticated in the arid highlands, as many researchers had once believed.

"For a long time, I though it strange that researchers argued about the location and age of maize domestication yet never looked in the Central Balsas River Valley, the homeland for the wild ancestor," said Ranere. "Dolores was the first one to do it.'

In addition to Ranere and Piperno, other researchers in the study included Irene Holst of the Smithsonian Tropical Research Institute, Ruth Dickau of Temple, and Jose Iriarte of the University of Exeter. The study was funded by the National Science Foundation, National Geographic Society, Wenner-Gren Foundation, Smithsonian National Museum of Natural History, Smithsonian Tropical Research Institute and the Temple University College of Liberal Arts.

Maize Was Passed from Group to Group of Southwestern Hunter-Gatherers

ScienceDaily (Dec. 8, 2009) — An international group of anthropologists offers a new theory about the diffusion of maize to the Southwestern United States and the impact it had.

Published the week of Dec. 7 in the *Proceedings of the National Academy of Sciences*, the study, co-authored by Gayle Fritz, Ph.D., professor of anthropology in Arts & Sciences at Washington University in St. Louis, and colleagues, suggests that maize was passed from group to group of Southwestern hunter-gatherers.

These people took advantage of improved moisture conditions by integrating a storable and potentially high-yielding crop into their broad-spectrum subsistence strategy.

"For decades, there have been two competing scenarios for the spread of maize and other crops into what is now the U.S. Southwest," Fritz said. According to the first, groups of farmers migrated northward from central Mexico into northwest Mexico and from there into the Southwest, bringing their crops and associated lifeways with them.

In the second scenario, maize moved northward from central Mexico to the Southwest by being passed from one hunter-gatherer band to the next, who incorporated the crop into their subsistence economies and eventually became farmers themselves.

"The case for long-distance northward migration of Mexican farming societies received a boost about 12 years ago when British archaeologist Peter Bellwood, joined a few years later by geographer Jared Diamond and linguist Jane Hill, included the Southwest in a grand global model in which long-distance migration of agriculturalists explains the spread of many of the world's major language families," Fritz said. "In the Southwest case, Uto-Aztecan-speaking peoples, ancestors of people who speak modern languages, like Comanche and Hopi, would have been responsible for the diffusion."

In this paper, the researchers summarize the most recent archaeological evidence, and integrate what is currently known about early maize in the Southwest with genetic, paleoecological, and historical linguistic studies.

Corn from five sites in Arizona and New Mexico now predates 2,000 B.C., which makes it too early to be explained by diffusion of settled Mexican villagers, said Fritz.

"No artifacts or features of any type point to in-migrating Mesoamerican farmers; in fact, continuity of local traditions is manifested, with independent invention of low-fired ceramics and with the construction of irrigation features in the Tucson Basin dating earlier than any known south of the border," she said. "We interpret the linguistic evidence as favoring a very early (beginning shortly after 7,000 B.C.), north-to-south movement of Proto-Uto-Aztecan hunter-gatherers and subsequent division into northern and southern Uto-Aztecan-speaking groups. " These two groups do not share words and meanings for maize because, according to the researchers' scenario, farming post-dates their separation.

"We think the Southwest stands as a region in which indigenous foragers adopted crops and made the transition to agriculture locally rather than having been joined or displaced by in-migrating farming societies," Fritz said. "Peter Bellwood may well be correct that long-distance movements account for some examples of the expansion of languages and farming technologies, but cases like that of the Southwest are very important in demonstrating that this pattern did not apply universally."

Lead authors of this study are William L. Merrill of the National Museum of Natural History and Robert J. Hard of University of Texas at San Antonio. Co-authors are Fritz, Karen R. Adams of Crow Canyon Archaeological Center, John R. Roney of Colinas Cultural Resource Consulting and A.C. MacWilliams of University of Calgary.

Full text of the study is available at http://www.pnas.org/content/early/2009/12/03/0906075106

Earliest Signs Of Corn As Staple Food Found After Spreading South

ScienceDaily (Mar. 25, 2008) — Corn has long been known as the primary food crop in prehistoric North and Central America. Now it appears it may have been an important part of the South American diet for much longer than previously thought, according to new research by University of Calgary archaeologists who are cobbling [cute pun] together the ancient history of plant domestication in the New World.

In a paper published in the Proceedings of the National Academy of Sciences, U of C PhD student Sonia Zarrillo and archaeology professor Dr. Scott Raymond report that a new technique for examining ancient cooking pots has produced the earliest directly dated examples of domesticated corn (maize) being consumed on the South American continent. Their discovery shows the spread of maize out of Mexico more than 9,000 years ago occurred much faster than previously believed and provides evidence that corn was likely a vital food crop for villages in tropical Ecuador at least 5,000 years ago.

"The domestication and dispersal of maize has been a hot topic in archaeology for decades and these are the earliest indisputable dates for its presence in South America," Raymond said. "It has long been thought that maize may have been used south of Panama at this time for ritual purposes but this shows it was also being consumed as food."

Raymond led the excavation of tropical village sites in western Ecuador in the early 1980s, which are the oldest known villages in the Americas. Using pottery fragments recovered from the sites, Zarrillo obtained the charred remnants of prehistoric meals and found they contained starch granules from domesticated corn.

"Plant material typically does not preserve very well in tropical sites but it turns out that microscopic starch grains do survive very well over the years and can be used to identify exact species of plants," Zarrillo said. "Analyzing starch from charred food residues is a new technique in archaeology and it is exciting because it will stimulate research around the world when people realize they can recover starch from cooking pots and use it to date and identify what people were using as food."

Starch analysis was also used by Zarrillo and Raymond for a study published in Science last year that traced the domestication and spread of chili peppers throughout South America, Central America and the Caribbean more than 6,000 years ago.

The paper "Directly dated starch residues document early formative maize (Zea mays L.) in tropical Ecuador" by Sonia Zarrillo, Deborah M. Pearsall (University of Missouri), J. Scott Raymond, Mary Ann Tisdale (Canadian Heritage, Government of Canada) and Dugane Quon (Canadian Food Inspection Agency) will be available in the March 24 online early edition of the Proceedings of the National Academy of Sciences.

Practice Of Farming Reaches Back Farther Than Thought

ScienceDaily (Feb. 20, 2007) — Ancient people living in Panama were processing and eating domesticated species of plants like maize, manioc, and arrowroot at least as far back as 7,800 years ago -- much earlier than previously thought -- according to new research by a University of Calgary archaeologist.

One of the most hotly debated issues in the discipline of archaeology is how and why certain human societies switched from hunting and gathering to producing their own food through agriculture. Dr. Ruth Dickau, a post-doctoral researcher in the U of C's department of archaeology, has used a new technique called starch grain analysis to recover microscopic residues of plants directly off the stone tools that people were using in Panama 3,000 to 7,800 years ago.

"These results add to the growing evidence that the earliest beginnings of farming were not centered in arid highland regions like central Mexico and the Peruvian Andes as once believed, but in the lowland areas and humid forests of the American tropics," Dickau says.

"What is particularly interesting is that these crops were originally domesticated outside of Panama; maize was domesticated in Mexico, and manioc and arrowroot in South America. Panama, as a relatively narrow land-bridge between the two American continents, was an important route for the human spread of food crops, and clearly a region where agriculture was practiced very early in history."

Dickau is the lead author of a paper appearing next week in the online early edition of the Proceedings of the National Academy of Sciences, an internationally respected academic publication. The paper is titled "Starch Grain Evidence for the Preceramic Dispersals of Maize and Root Crops into Tropical Dry and Humid Forests of Panama."

Dry, arid areas favor archaeological preservation, whereas tropical regions typically don't -- especially when it comes to foodstuffs. But with starch grain analysis, researchers are able to isolate residue from microcrevices in both ground stone and flaked stone tools and identify preserved starch grains under a microscope.

"The ability of starch grain analysis to identify plant taxa in the unfavorable preservation environments of western and central Panama confirms the importance of this method for establishing the presence of particular plant species, both domesticated and wild, in the subsistence practices of early inhabitants of tropical forests," the authors write.

Much of Dickau's research was conducted as part of her graduate studies at Temple University in Philadelphia. The second and third authors are Anthony J. Ranere (Temple University), and Richard G. Cooke (Smithsonian Tropical Research Inst., Panama).

Mass Extinction: Why Did Half of North America's Large Mammals Disappear 40,000 to 10,000 Years Ago?

ScienceDaily (Nov. 27, 2009) — Years of scientific debate over the extinction of ancient species in North America have yielded many theories. However, new findings from J. Tyler Faith, GW Ph.D. candidate in the hominid paleobiology doctoral program, and Todd Surovell, associate professor of anthropology at the University of Wyoming, reveal that a mass extinction occurred in a geological instant.

During the late Pleistocene, 40,000 to 10,000 years ago, North America lost over 50 percent of its large mammal species. These species include mammoths, mastodons, and giant ground sloths, among many others. In total, 35 different genera (groups of species) disappeared, all of different habitat preferences and feeding habits.

What event or factor could cause such a mass extinction? The many hypotheses that have been developed over the years include: abrupt change in climate, the result of comet impact, human overkill and disease. Some researchers believe that it may be a combination of these factors, one of them, or none.

A particular issue that has also contributed to this debate focuses on the chronology of extinctions. The existing fossil record is incomplete, making it more difficult to tell whether or not the extinctions occurred in a gradual process, or took place as a synchronous event. In addition, it was previously unclear whether species are missing from the terminal Pleistocene because they had already gone extinct or because they simply have not been found yet.

However, new findings from Faith indicate that the extinction is best characterized as a sudden event that took place between 13.8 and 11.4 thousand years ago. Faith's findings support the idea that this mass extinction was due to human overkill, comet impact or other rapid events rather than a slow attrition.

"The massive extinction coincides precisely with human arrival on the continent, abrupt climate change, and a possible extraterrestrial impact event" said Faith. "It remains possible that any one of these or all, contributed to the sudden extinctions. We now have a better understanding of when the extinctions took place and the next step is to figure out why."

Earth's Biggest Tree Rings Tell Fiery Tales

By Larry O'Hanlon | Mon Mar 29, 2010, *Hemera/ThinkStock*

THE GIST:
Giant sequoias were hacked up to get a 3,000-year fire history of their grove.
The trees used were dead and fallen, and had fire scars.
From 800 to 1300 A.D. there was a very dry, fiery period, according to the sequoias.

Fifty-two giant fallen giant sequoias reveal a 3,000-year-old history of fire and drought after giant chainsaws expose their rings. Using huge chainsaws and strong backs, the largest trees in the world are finally giving up their 3,000-year record of fires and droughts.

No trees, however, were harmed in the making of this fire history. "We only used dead trees," emphasized tree ring researcher Thomas Swetnam of the University of Arizona. Swetnam led the study that was reported in a recent issue of the journal *Fire Ecology.* "We spent multiple years collecting the wood and hauling it back to Tucson."

The giant sequoias in California's Sequoia National Park are far too thick to be cored for the extraction of the pencil-thin cores typically used by tree ring researchers. So the authors of a new report on tree ring evidence of past droughts and fires used all sorts of other tools to slice and dice 52 giant dead and fallen sequoias, lug the pieces back to roads by hand.

Then they spent years piecing together the valuable history in their laboratories.

Among the things they found in the ring record was a very dry and fiery period from 800 to 1300 A.D. That corresponds to a controversial climate interval called the Medieval Warm Period. That period was very dry," said Swetnam. "But we're not so clear how warm it was."

Modern temperatures already exceed those of the Medieval Warm Period, said Swetnam. So if heat has anything to do with fire frequency, we could expect more fires. "What makes this work unique is that it goes so far back in time," said U.S. Geological Survey research ecologist Nathan Stephenson, who has spent a lot of years studying sequoias.

Usually if you are working with pines you get centuries. With these you get multi-millennial annual resolution records." But unlike a tree-ring history that's based on just rings, this one is based cross dating rings between various trees the dating of fire scars. These scars happen during natural fires when debris close to the tree bakes and burns the trunk, which is otherwise fire resistant. The trees can grow over a lot of these scars, but in cross sections, that can be easily spotted and dated.

"That way were able to establish a fire chronology," Swetnam told Discovery News. Of course, there have been other fire chronologies. Some are based, for instance, on charcoal layers found in mountain lakes. But nothing has quite the resolution of tree rings.

"The punch line from all of this," said Stephenson, "Is that over at least 2,000 years the most severe (sequoia) reproduction reduction has been in the last 100 years. Human land use changes have had greater effect than the preceding 2,000 years of changing fire regimes."

The problem, said Stephenson, is fire suppression. Excluding fires from the sequoia groves, makes it very difficult for sequoia seeds to germinate or have enough space for saplings to get started.

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