

Digging below the Ash

Discoveries at Fort Rock Cave

STANDING at the water's edge, I wondered how a lake this deep could have formed on the top of a mountain. Geologists believe the story begins long ago when Mount Mazama, a great volcano towering 4,000 masl, formed as part of a chain of volcanoes in the Pacific Northwest that includes Mount Shasta and Mount St. Helens. The peak was built of lava flows, ash, and debris from repeated eruptions. About 7,700 years ago, Mount Mazama erupted in an epochal explosion.

This eruption was 40 times as powerful as the 1980 eruption of Mount St. Helens. After the explosive eruption that removed most of the mountain's peak, Native American legend recalls that what remained of the summit collapsed into the vacated magma chamber with a thunderous roar. A huge smoldering caldera resulted from the geologic event and, over time, filled with water to become Crater Lake, the deepest lake in the U.S.

The explosion pulverized the mountain peak, which released an enormous ash plume, and this is where archaeology comes in. The ash cloud was so intense and sprawling that it covered nearly the entire Pacific Northwest, as far north as Alberta, Canada, and as far east as Nebraska. This ash remains a visible layer of sediment throughout the region, providing archaeologists studying the Northwest a chronological marker for relative dating.

Mazama ash serves as an important stratigraphic marker in central Oregon; its thickness and character make it readily identifiable in the field. When Luther Cressman first excavated Fort Rock Cave in the 1930s, he used the ash layer as a reference to distinguish between assemblages.

The early days

Cressman, having been ordained an Episcopal priest, left the priesthood in 1929, the year he earned his Ph.D. in sociology from Columbia University. His career change proved fortunate for future archaeologists who have built upon his work in the Pacific Northwest. Even his "mistakes" in the field have spurred significant advances in the study of the First Americans.

Cressman, a scientist who refused to run with the pack, argued for very early human presence in the Great Basin. His vision was rewarded in 1938, when his team found several examples of sandals beneath a layer of Mazama ash in Fort



Where once stood Mount Mazama, a volcano 4,000 m high, now lies Crater Lake, the deepest (954 m) in the U.S. The feature in the middle of the lake, Wizard Island, was formed by a later, less-severe eruption.

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Rock Cave. The perfectly preserved sandals, made of shredded sagebrush bark, were later radiocarbon dated to 10,500–9,300 CALYBP, making them the oldest footwear ever discovered in the Americas (MT 24-3. "Walking in their shoes"). Now on display at the University of Oregon Museum of Natural and Cultural History in Eugene, the sandals are known for their "Fort Rock style": flat, with closed toes and twined sole. This sandal style has been identified at other sites as well, such as Cougar Mountain and Catlow Caves.

Although Cressman is best known for his discovery of the sandals, Tom Connolly, director of archaeological research at the University of Oregon Museum of Natural and Cultural History, considers at least as important his work at Paisley Caves, where he claimed to have found evidence for humans associated with extinct Pleistocene megafauna. "Although people dismissed this claim," says Connolly, "this possible discovery prompted

the later work at Paisley Caves that essentially verified his interpretation. His claim of great antiquity for Fort Rock Cave was also dismissed by his colleagues, but he was again shown to be correct with the development of radiocarbon dating.”

As a result of Cressman’s work in the region, Fort Rock Cave was recognized as the site of the earliest evidence for human habitation in Oregon. It retained this distinction for decades, until archaeologists returned to test Cressman’s theories and excavated the Paisley Caves (MT 25-4, 26-1, “Paisley Caves”).

Prehistoric artifacts uncovered by Cressman’s team at Fort Rock Cave included basketry and stone tools. Cressman and his colleague Howel Williams, however, didn’t describe the stratigraphy of Fort Rock Cave in detail, other than declaring that “like the Paisley Caves, Fort Rock Cave failed to show convincing stratigraphy.”

Cressman distinguished only “above pumice” and “below pumice” assemblages. His 1938 catalog lists 541 artifacts, of which 38% appear to be from post-Mazama contexts and 62% from pre-Mazama contexts. “Cressman was dealing with geologic units, not depositional units,” says Connolly. “We’ve since relied on fibers to make sense of stratigraphy.”

When Stephen Bedwell returned to Fort Rock Cave in 1966, he failed to identify intact deposits in the interior. He found that Cressman’s occupation layer was thin and contained no preserved perishable artifacts. The next year he focused on areas outside the mouth of the cave, and in 1973 claimed to have found evidence for an exceptionally early occupation at Fort Rock Cave. Many researchers dismissed his purported discovery.

Learning that the nearby Paisley Caves were first occupied 14,500 CALYBP gave Connolly’s team the impetus to revisit Fort Rock Cave and discover whether it might yield evidence for early visitors, perhaps even pre-Clovis.

Return to Fort Rock Cave in the 21st century

“Our primary goal was to assess the integrity of the remaining deposits and to evaluate the context of Bedwell’s earliest radiocarbon age,” Connolly says. With the support and involvement of the Burns-Paiute, Warm Springs, and Klamath Native

American tribes, his 2015–2016 project aimed to “systematically describe the remaining deposits and determine whether intact deposits remained to evaluate the likelihood of the pre-Clovis occupation.”

His team, following Bedwell’s (1970) stratigraphic descriptions as closely as possible, determined that deposits of only two strata defined by Bedwell remained intact within the interior of the cave, gravel layers associated with Pleistocene high stands of pluvial Fort Rock Lake.

The site chronology prior to Connolly’s work was based on 7 dates

from Cressman’s and Bedwell’s work, and 12 direct AMS ages on sandals and basketry. Based on a review of Bedwell’s and Cressman’s field notes, it appeared that at least some of the reported ages were too old. Bedwell’s dates, for example, were obtained from the Gakushuin Laboratory in Japan, which became notorious for producing unreliable dates. Except for Cressman’s first date reported in 1951, all extant fiber dates that figure in the current site chronology are the result of Connolly’s work.

Connolly’s team determined several trends in site occupation and artifacts:

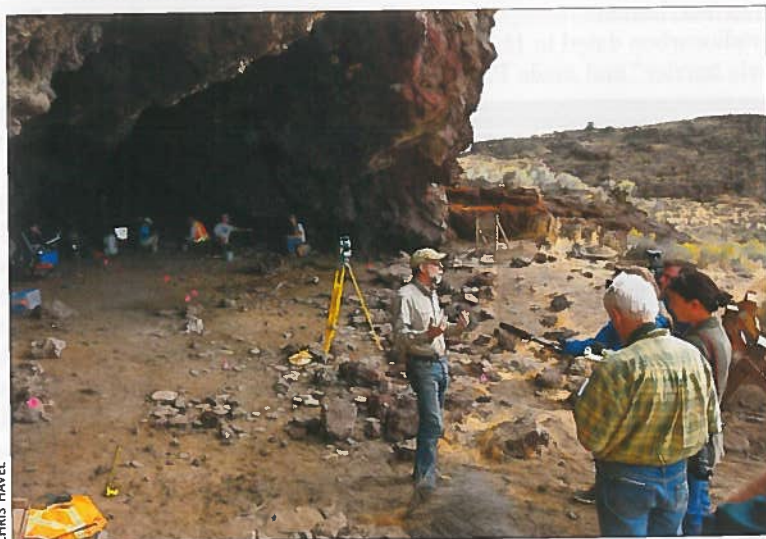
- no evidence was found for occupation before 11,000 CALYBP;
- radiocarbon-dated fiber artifacts confirm substantial occupation 10,550–9200 CALYBP.

Considering Cressman’s artifacts from post- and pre-Mazama contexts and projectile-point types from the site, Connolly’s team concluded that Fort Rock Cave was intermittently occupied during the terminal Pleistocene and early Holocene.

“We recovered a modest sample of lithic artifacts (mostly obsidian),” Connolly tells us, “and a huge volume of animal bones: jackrabbit, marmot, and artiodactyl elements, including some

Connolly addressing reporters in front of Fort Rock Cave.

elk-size bones.” Although well preserved, most bones are highly fragmented and extensively processed. Edge-modified obsidian flakes are the most common tool type recovered, together with some projectile points and point fragments. Most projectile points are foliate or Western Stemmed types. “We also recovered a Northern Side-notched point base and several Rosegate points,” he says. “They show that people used the cave at least intermittently throughout the Holocene.” The abundance of woven fiber sandals suggests that Fort Rock Cave provided welcome shelter at least during the cold winter season.



CHRIS HAVEL

Fort Rock Cave yields to Paisley Caves in antiquity

When Connolly found no evidence that Fort Rock Cave was occupied before 11,000 CALYBP, it became clear that Paisley Caves was the older site.

When Luther Cressman dug below the ash at Paisley Caves, as he did at Fort Rock Cave, he claimed to have found sediments containing a hearth, bones of Pleistocene horse and camel, and artifacts. As in the case of Fort Rock Cave, however, he didn't publish detailed stratigraphic data.

Dennis Jenkins, research archaeologist at the University of Oregon in Eugene, decided in 2002 to test Cressman's claim that humans occupied Paisley Caves when Pleistocene mam-

Fort Rock Cave sandals, made of sagebrush bark with closed twined flat soles and open twined toe covers.



JACK LIU, COURTESY THE UNIVERSITY OF OREGON MUSEUM OF NATURAL & CULTURAL HISTORY

mals roamed the region. His team unearthed strands of thread made of grass fiber beneath the Mazama deposits of cave 5. These fibers yielded an AMS date of 12,750 RCYBP (about 15,200 CALYBP), making them the earliest example of cordage in the Americas. He also recovered coprolites. Tests for protein residue and reconstitution analysis of the four oldest samples confirmed that the coprolites were, in fact, human.

Human DNA from the coprolites radiocarbon dated to 14,300 years ago. The date broke the "Clovis barrier" and made Paisley Caves the best-documented pre-Clovis site in North America. Four years later, aDNA authority Eske Willerslev analyzed the samples. Mass spectrometry analysis on mitochondrial DNA from coprolites determined that people in haplogroups A2 and B2 lived in south central Oregon 12,300

Excavating exploratory units at Fort Rock Cave in 2015: (front-rear) Dennis Jenkins, University of Oregon; Judson Finley, Utah State University; Geoff Smith, University of Nevada, Reno.



TOM CONNOLLY

RCYBP (about 14,200 CALYBP), 1,000 years earlier than the accepted date for the Clovis culture (MT 29-4, "Tracking Paleoamerican migrations with mitogenomes"). This new date of earliest human settlement has become accepted by most archaeologists.

Although Jenkins, or "Dr. Poop," as he became known, obtained astonishing early dates and thereby put Paisley

Caves on the map of archaeological antiquity, his triumph was hard won. On returning to excavate, he found that Cress-

man hadn't backfilled the site and it had consequently been heavily looted. The floor was trashed with basalt blocks that had fallen from the roof, silt, organic matter, animal feces, food, and nesting materials. This is the stuff of an archaeologist's nightmare.

Challenges at Fort Rock Cave

Connolly encountered similar challenges when he returned to excavate at Fort Rock Cave in 2015 and 2016. What surprised him most was the extent of destruction inside the site. "The damage to the deposits inside the cave was extensive," he remembers. Some intact deposits may lie outside the cave or buried deep beneath the massive debris pile in front of the cave, but he found no intact deposits inside the cave. Although Pleistocene gravels are preserved, the lake-level history of the pluvial lake at Fort Rock is neither well understood nor well dated. Connolly suspects that the upper lake-deposited gravels were exposed and only partly covered by eolian silt when people first occupied the cave. "Revisiting previously excavated sites

is usually a challenging endeavor, especially when they were excavated before modern excavation and reporting standards were developed," Connolly explains.

Since 1989, a team that draws members from University of Oregon Museum of Natural and Cultural History, Bureau of Land Management, University of Nevada, Reno, and the Nevada State Museum has been systematically dating fiber artifacts from northern and western Great Basin sites. The record currently numbers at least

475 radiocarbon dates, the majority being AMS dates with a standard error of less than 100 years. The current chronology of Paisley Caves is based on 275 dates on cultural items—artifacts, charcoal, hearths, butchered bone, hide and fur, and human coprolites and hair ranging from 14,600 CALYBP to modern times.

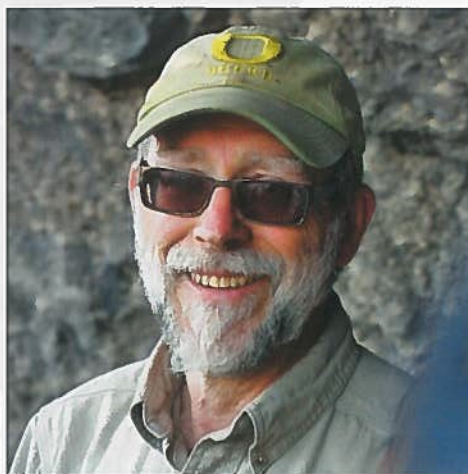
Granted, the stratigraphy and radiocarbon chronology

of Fort Rock Cave don't contribute to our understanding of the peopling of the Americas. The site nonetheless figures prominently in the cultural history of this region. Connolly admits that "it was frustrating for us not to add anything new to that." He is, however, proud of revisiting the site, reevaluating early dates, and building a bigger, more comprehensive history. "Fort Rock Cave is part of that larger history. The bigger picture is what interests me, it's what's most engaging," he says.

Leaving something for later

Fort Rock Cave was declared a National Historic Landmark in 1961 and added to the National Register of Historic Places in 1966. This designation confers a symbolic seal of protection over the site and its materials. Yet over the last 80 years, Fort Rock Cave, once one of the most important archaeological sites in the northern Great Basin, has decayed into a devastated shell. Connolly lays the blame on landowner management and decades of intensive looting. "It's also the product," he says, "of careless archaeology done with little regard for either future work or the conservation ethic."

The materials gathered at Fort Rock Cave are primary resources for understanding and interpreting the past. All archaeological remains, from terrestrial or marine environments, from a variety of inorganic and organic materials including metal,



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stone, ceramic, bone, wood, plant fiber, and skin—the moment these materials are uncovered, they are at risk of rapid *and irreversible* deterioration.

Connolly speaks for archaeologists when he says, "We hope that old sites like Fort Rock Cave will remain important not only because of what was found but also because of the hard lessons learned regarding site preservation and management." His takeaway message for us: "Preservation ethics must take over. Fort Rock Cave is a good lesson. We must leave something for later." 📱

—Katy Dycus

Connolly.

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Suggested Readings

Connolly, T. R., et al. 2017 Return to Fort Rock Cave: Assessing the site's potential to contribute to ongoing debates about how and when humans colonized the Great Basin. *American Antiquity* 82.3:558–73.

Ghost Fossils

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to be wary of its attackers. "You can see this in the trackways," notes Bennett. "The trackways become more tortuous when human tracks are present—[with] twists and sudden changes in direction." There are no such patterns in the sloth tracks where human tracks are absent. The patterning of the profuse human footprints, the multiple flailing circles, and the animal's multiple changes of directions indicate the humans were, in fact, harassing the sloth. Why do so unless they were hunting it? Indeed, some footprints indicate a person approached on tiptoe, as if sneaking up on the beast while its back was turned.

Questions seeking answers

There may be more tracks east of the sloth-human trackway area, which measures approximately 30 m EW by 90–100 m NS; if so, they lay beneath the dunes at the time of the investigatory team's work. If they exist, they may include more direct evidence of the sloth's demise—if, in fact, that was what occurred. "We don't actually say it's a kill site, just the scene of an altercation between a sloth and humans," says Bennett. "We believe that the balance lies with hunting, but are careful with our interpretation.

The likelihood is that if the sloth was hit by a weapon of some sort, it would have fled and been tracked as it bled to death."

Some observers have suggested the human footprints inside the sloth prints were made in a playful way well after the sloth had passed, like a child might try to walk in an adult's tracks at the beach. The child-sized prints recorded could support that. It's also possible that younger people were testing their courage by harassing the beast. But Bennett is convinced otherwise. The tiptoe prints, the tortuous path of the sloth whenever humans approached, the flailing circles all suggest a deadly serious dance between human and megaherbivore.

Further research to be conducted in 2019 may yet determine the sloth's ultimate fate. Stay tuned.

—Floyd Largent

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