Paleoindian
or Paleoarchaic?

Great Basin Human Ecology at the
Pleistocene/Holocene Transition

Edited by

Kelly E. Graf and Dave N. Schmitt

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Distribution and Dating of Cultural and Paleontological Remains at the Paisley Five Mile Point Caves in the Northern Great Basin

An Early Assessment

Dennis L. Jenkins

THE PAISLEY FIVE MILE POINT CAVES (35LK3400) ARE LOCATED AT the southeast end of the Summer Lake basin near the town of Paisley in south-central Oregon (Figure 4.1). Accompanied by Ernst Antevs, Luther Cressman was taken to the site in 1937 by Walter Perry, a local resident who had been alerted to its existence by a woman who had been digging in the caves for artifacts. Upon seeing the evidence for cultural materials predating the eruption of Mount Mazama, Antevs and Cressman recognized the extreme importance of the locality to northern Great Basin prehistory and began making plans for its excavation the following year (Cressman 1988). Cressman returned with a field crew to excavate exploratory trenches in Caves 1, 2, and 3 in 1938 (Figure 4.2). Returning in 1939, he removed the majority of deposits from the main chambers of these same caves. He briefly returned a third time in 1940 to broaden the excavated area in Cave 3 where he had discovered Pleistocene faunal remains together with obsidian artifacts the year before (Cressman 1940).

Initially, Cressman's greatest interest in the excavation of the Paisley Caves was to establish proof of pre-Mazama (6850 ^{14}C BP [7600 cal BP]) human occupations in the region (Cressman 1942). Consequently, he dug the caves in three basic stratigraphic units: roughly 1 m of sediment above the Mount Mazama tephra, as much as 30 cm of tephra, and 1 m of sediment below the tephra. Photographs, field notes, and excavation-damaged artifacts suggest that deposits were predominantly removed with pick and shovel. Only those artifacts and faunal remains found in situ were recorded with precise vertical and horizontal provenience.

In Cave 3, Cressman discovered a U-shaped living floor, cleared of stones and outlined with boulders, well below the Mazama tephra layer. The remains of late Pleistocene camel, bison, horse, and waterfowl had apparently been
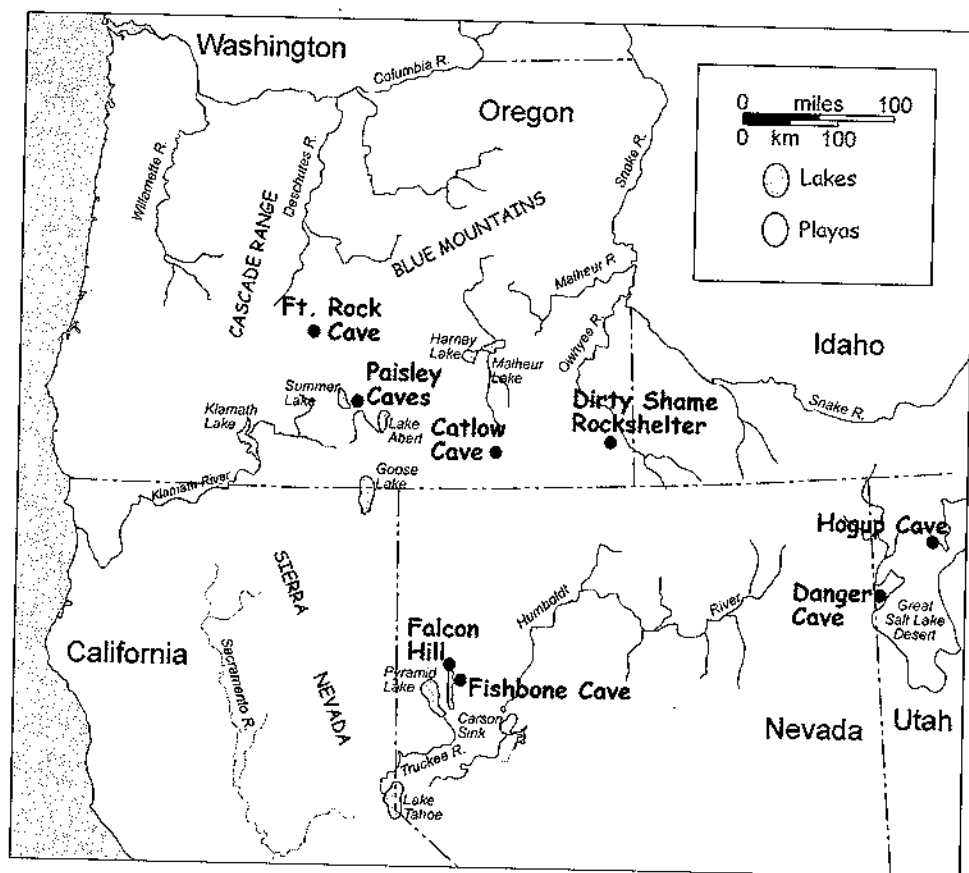
FIGURE 4.1.
Location of the Paisley
Five Mile Point Caves
in the northern Great
Basin, south-central
Oregon.

tossed out of this area, piling up around it, particularly near the rear wall. A small assemblage of obsidian artifacts was recovered from the living floor and the surrounding area. The bone discard pattern combined with the charring of some of the specimens suggested to Cressman that the megafauna bones represented food remains left by the occupants of the cave (Cressman 1942:93).

While Cressman believed this evidence demonstrated the association of cultural materials with extinct Pleistocene fauna at the Paisley Caves (Cressman 1986:121, 1966:41, 1942; Cressman and Williams 1940), Heizer and Baumhoff (1970:5), among others (cf. Krieger 1944), questioned his interpretations on the grounds that he had failed to provide adequate quantification and precise provenience data for the artifacts and megafaunal remains. Still, they acknowledged that they were "inclined to accept Paisley Five-Mile Point Cave No. 3 as the strongest candidate for contemporaneity of man and extinct animals in the Great Basin."

A strong candidate it might be, but Jesse Jennings's (1986:115) abrupt conclusion on the matter—"no situation has been found where extinct mammals, stone tools or weapons, or evidence of fire, are credibly reported in good association [in the Great Basin]"—remains the standard after another two decades of research on the topic. With this statement, unabashedly included
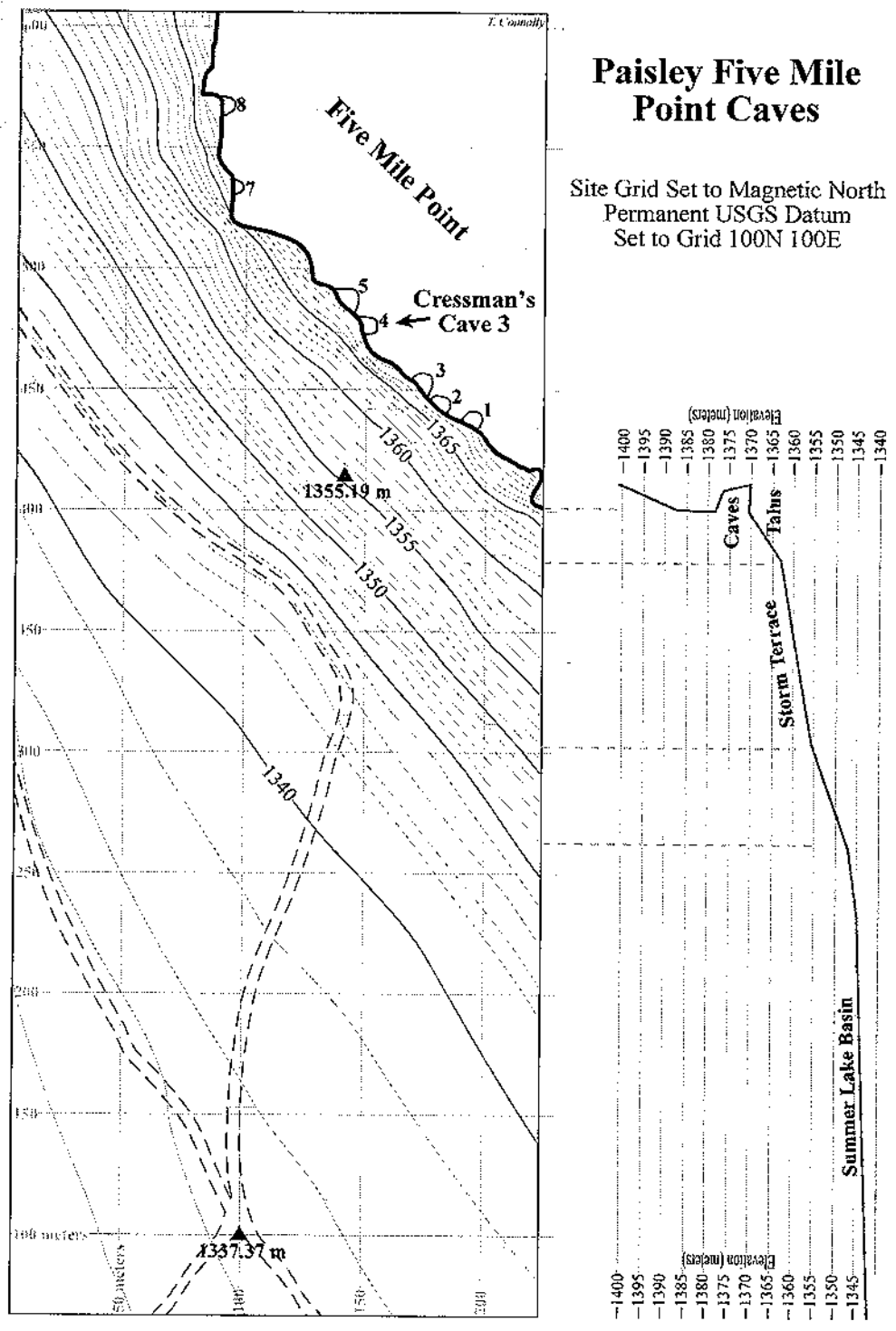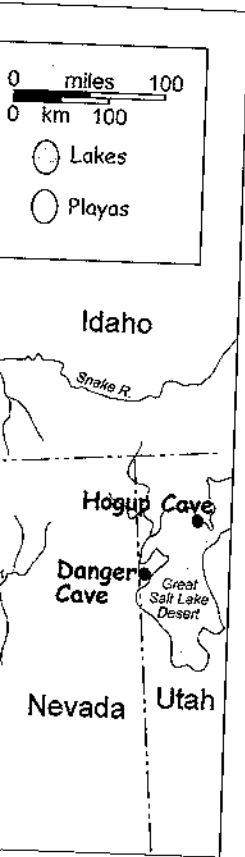
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FIGURE 4.2. Map of the Paisley Five Mile Point Caves site (35LK3400).

in the same volume that Cressman (1986:121) repeated his assertion that he had proven human/megafauna contemporaneity in the northern Great Basin, Jennings implied that the association of artifacts and megafauna remains in the Paisley Caves was spurious. Considering these very different interpretations of the Paisley Caves data, and the lack of irrefutable evidence supporting late Pleistocene human/megafauna interactions in the Great Basin, a reinvestigation of the Paisley Caves seemed critical to establishing the timing of the first human occupations in the region.

The University of Oregon archaeological field school conducted excavations at the Paisley Caves during the summers of 2002 and 2003 with the goal of testing Cressman's theory of Pleistocene human/megafauna contemporaneity at that site. This chapter reports on the current status of investigations into the distribution and dating of the cultural and paleontological remains found there. Specifically, it will address the following questions: (1) Do cultural and megafaunal remains occur in horizontal, vertical, and stratigraphic association in the Paisley Caves? And (2) are the cultural and megafaunal remains the same age?

CRESSMAN'S DESCRIPTIONS OF STRATA AND CULTURAL/MEGAFAUNAL ASSOCIATIONS

Cressman (1942:93) described the stratigraphic sequence he found in Paisley Cave 3. Of Strata 6 and 7 (numbered from top down), the only strata that contained Pleistocene faunal remains, and the "floor" they were apparently associated with, he writes:

> Stratum 6 was dry, soft, and contained rather numerous rodent remains. It ran from less than .1 m. in thickness at the rear to .25 m. in the front, where it abutted against the large rock [Figure 4.3]. Stratum 7 was predominantly sand and gravel from the old beach, along the level of which the shelter was formed. It had a depth of approximately .25 m. resting on large water smoothed rocks forming the floor of the cave. Strata 6 and 7 contained the remains of an extinct fauna, worked obsidian, and ash lenses with both fine ash and thumb-sized bits of charcoal.... The cave floor sloped up sharply from the center on both sides. The large rock shown in the profile was apparently a part of the bedrock.... It was very smooth from water action. Running back on either side to the wall a number of rocks, all water smoothed, extended up into the dry stratum overlying the sand. Some of these seemed to have been in place as cave floor, while others apparently were placed in the spaces between some of the larger ones. At any rate, it was in this roughly U-shaped space that the faunal remains and evidence of human occupation were found. The mixture of bones and ash in this small space tells a story of these hunters bringing a part of their kill to this shelter, where it was cooked and the refuse thrown back over the rock or against the wall to pile up midden-like.
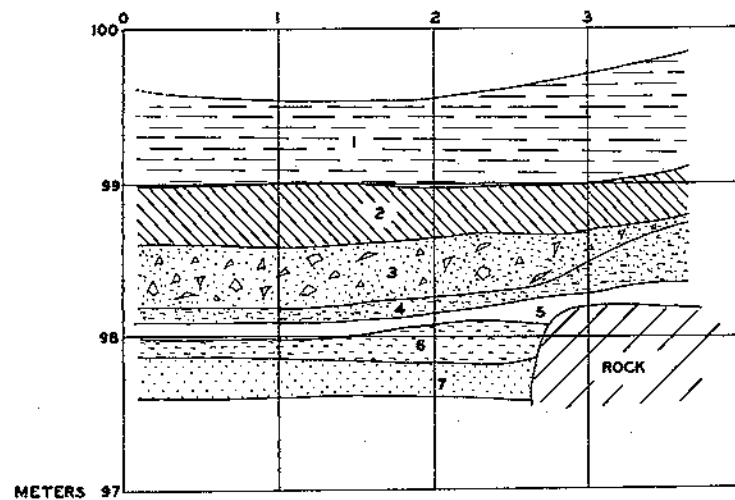
FIGURE 4.3.
Profile of strata in
Paisley Cave 3, from
rear of cave to front.

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UNIVERSITY OF OREGON ARCHAEOLOGICAL FIELD SCHOOL INVESTIGATIONS

University of Oregon field school excavations were conducted in Caves 1, 2, 4 (Cressman's Cave 3), and 5, generally revealing dry, well-stratified sediments wherever undisturbed deposits were encountered. Sediments were removed by 5 cm levels in cultural deposits and 10 cm levels in culturally sterile deposits. Levels were dug within strata to a mean depth of 250 cm. All materials were screened through ⅛" wire mesh. Students were closely supervised at all times, with special attention paid to recovering paleontological and cultural materials in situ, noting stratigraphic and spatial associations, and recording evidence for possible stratigraphic mixing.
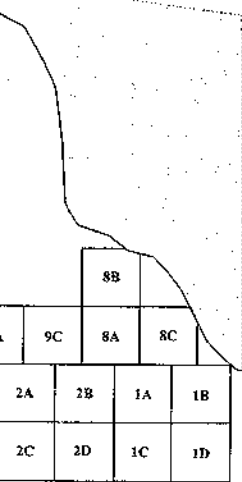
Though extinct faunal remains have been recovered from three of the four investigated caves, Cave 1 being the exception, it is only in Cave 5 that sufficient samples of artifacts and extinct faunal remains have been recovered in close proximity to warrant the distributional analysis offered here. Data collected from the other caves offer good supportive contextual information—datable cultural features and artifacts stratigraphically sealed between thin strata—as well as isolated elements of extinct fauna. Consequently, here the attention is focused on the distribution of megafaunal remains in Cave 5 assemblages. However, dating for the site is based on data collected from all of the caves investigated by the field school.

EXCAVATIONS AND STRATIGRAPHY

The strata in Cave 5 are predominantly composed of organic debris (rodent feces, vegetation, and bone), exfoliating volcanic breccia and basalt from the cliff formation, volcanic tephra deposited during the climactic eruption of Mount Mazama, and aeolian silt and sand transported from exposed lake bottom as Pleistocene Winter Lake retreated, and the Holocene floor of the Summer Lake

Paisley Cave #5   Plan View   35LK3400

FIGURE 4.4.
University of Oregon
field school excavations
in Paisley Cave 5.

0   5 meters

basin was exposed. Organic remains, reflecting the occupations of people and the nesting behaviors of wood rats and various avian species, occur predominantly in the more sheltered northern and eastern sections of the cave. Preservation of cordage, netting, thin twisted threads, processed sinew, hide, bone, coprolites, and plant material was exceptional in these sections of the cave. However, the main chamber in Cave 5, in particular those deposits nearest the cave walls, had been extensively vandalized prior to University of Oregon excavations. Consequently, investigations were focused near the mouth of the cave in two excavation blocks (Figure 4.4).

The first, located at the south end, was situated on the interior slope of the berm formed by the redeposition of interior deposits near the drip line during the vandalism of the cave. Here, rocky gravel deposits predominate in younger (post–Mount Mazama) strata. The older (pre-Mazama) strata are generally more fine-grained, composed of thin layers of silt and sand showing evidence of pedogenic development, separated by thin layers of sandy gravels composed of roof spalls (Davis 2006). Deposits nearest the drip line remain wet throughout the summers, and the composting effects of moisture prevail. Bone and perishable artifacts are uncommon in these strata, and seriously degraded when they are present.

The second block excavation, located at the north end of the cave in a small alcove, was situated between a trench dug by vandals along the rear (east) wall and a large boulder lying on the surface to the west across the mouth of the alcove. Compact rodent feces covering the surface of this sheltered area gave clear evidence of the undisturbed nature of the deposits preserved in the

35LK3400

		8B	
9C	8A	8C	
2A	2B	1A	1B
2C	2D	1C	1D

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"pocket" behind this boulder, although surface deposits along the east side of the block sloped steeply to the east and southeast toward the vandal trench along the wall of the cave. Subsequent excavations revealed a series of very thin (2–3 cm) layers of alternating fine-silty/coarse-sandy deposits of dusty, acrid rat feces, vegetation, bone, feathers, coprolites, and artifacts. These deposits were divided into 10 basic lithostratigraphic units (numbered from the bottom up) by Loren G. Davis (2006; Figure 4.5A):

LU1a: Moderately sorted mix of fine sediments (mainly fine sand to silt) with occasional subangular to angular pebble and cobble clasts of igneous rock, very consolidated (firm to hard), common macrobotanical remains and *Neotoma* sp. fecal pellets, matrix supported, abrupt irregular boundary as deposit overlies basal boulder deposit, unit dips to the southeast.

LU1b: Poorly sorted mix of angular to subangular fine pebble to coarse cobble igneous clasts and fine interstitial sediments (mainly fine sand to silt), weakly consolidated (loose to friable), *Neotoma* sp. fecal pellets, some macrobotanical organics, clast supported, abrupt irregular boundary as deposit overlies basal boulder deposit, unit dips to the southeast.

LU2: Moderately sorted mix of fine sediments (mainly fine sand to silt) with occasional subangular to angular pebble and cobble clasts of igneous rock, consolidated (firm), common macrobotanical remains and *Neotoma* sp. fecal pellets, matrix supported, abrupt wavy boundary, unit dips to the southeast.

LU3: Thin (ca. 2–4 cm thick) layer of whitish volcanic tephra, suspected as representing Mazama set O eruption, abrupt wavy boundary, unit dips to the southeast.

LU4: Moderately sorted mix of fine sediments (mainly fine sand to silt) with occasional subangular to angular pebble and cobble clasts of igneous rock that increases notably to the south, consolidated (firm), common macro-botanical remains and *Neotoma* sp. fecal pellets, matrix supported, abrupt wavy boundary, unit dips to the southeast and interfingers with LU5.

LU5: Poorly sorted mix of angular to subangular fine pebble to fine boulder igneous clasts and fine interstitial sediments (mainly fine sand to silt), weakly consolidated (loose to friable), rare macrobotanical organics, clast supported, abrupt wavy boundary, unit dips to the southeast and inter-fingers with LU4 and LU6 to the north.

LU6: Moderately sorted mix of fine sediments (mainly fine sand to silt) with occasional subangular to angular pebble and cobble clasts of igneous rock
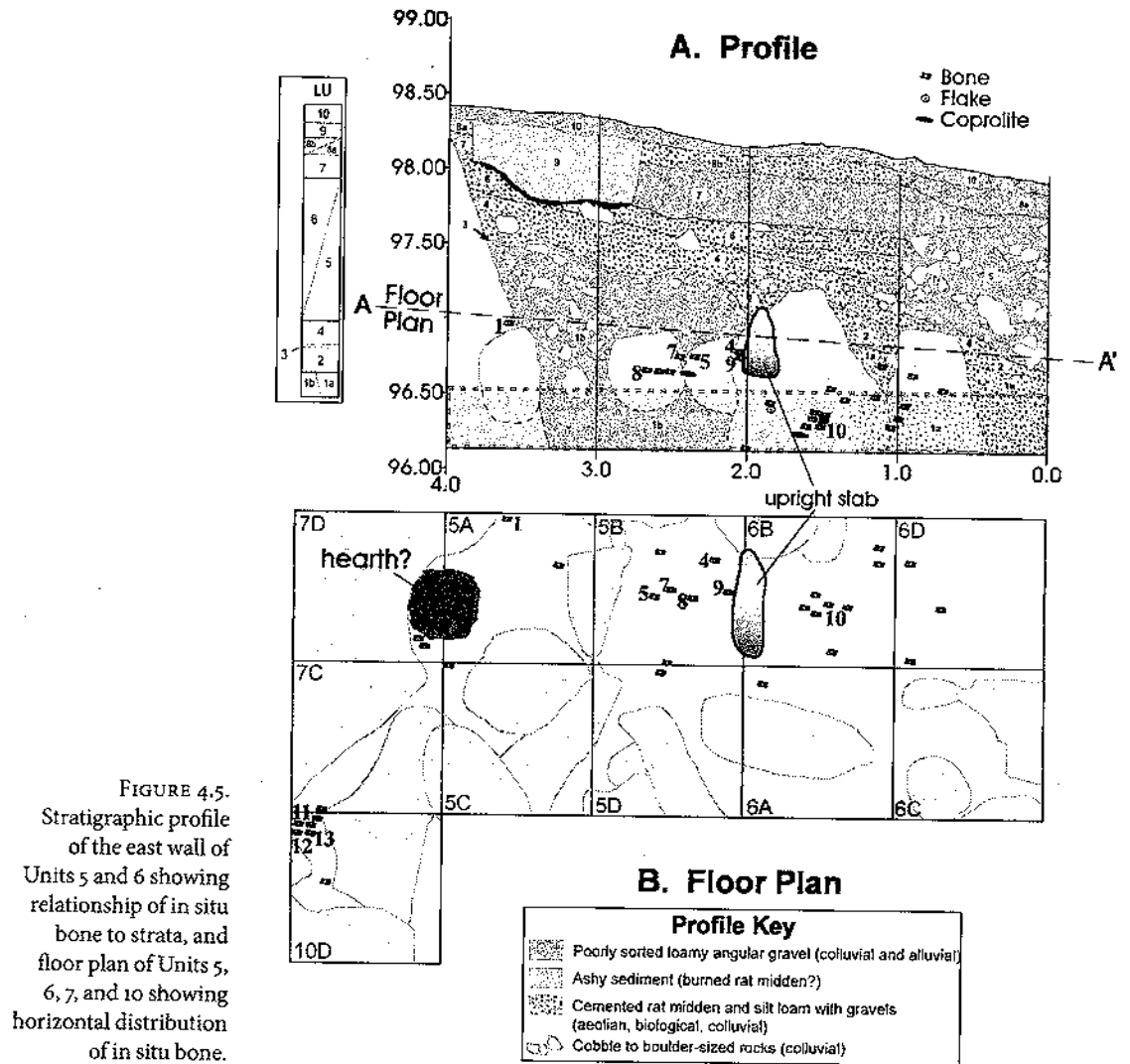
FIGURE 4.5.
Stratigraphic profile
of the east wall of
Units 5 and 6 showing
relationship of in situ
bone to strata, and
floor plan of Units 5,
6, 7, and 10 showing
horizontal distribution
of in situ bone.

that increases notably to the south, consolidated (firm), common macro-
botanical remains and *Neotoma* sp. fecal pellets, matrix supported, abrupt
wavy boundary, unit dips to the southeast and interfingers with LU5.

LU7: Poorly sorted mix of angular to subangular fine pebbles and coarse cob-
ble-sized igneous clasts and fine interstitial sediments (mainly medium sand
to silt), moderately consolidated (friable), clast supported, occasional mac-
robotanical organics and *Neotoma* sp. fecal pellets appear in discrete layers
or dispersed in matrix, abrupt wavy boundary, unit dips to the southeast.

LU8a: Moderately sorted mix of fine sediments (mainly fine sand to silt)
with occasional subangular to angular pebble and cobble clasts of igneous
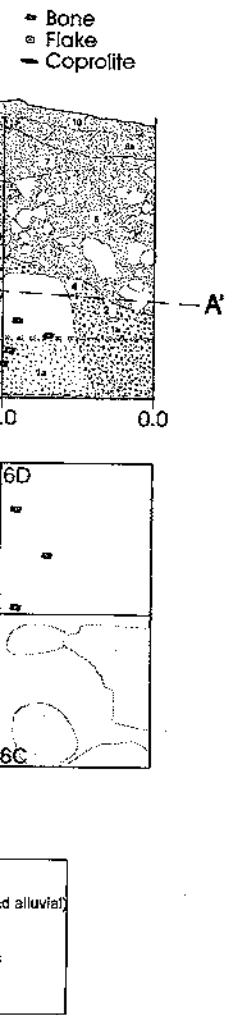
rock, consolidated (firm), common macrobotanical remains and *Neotoma* sp. fecal pellets, matrix supported, abrupt wavy boundary, unit dips to the southeast and interfingers with 8b to the south.

LU8b: Poorly sorted mix of angular to subangular fine pebbles and coarse cobble-sized igneous clasts and fine interstitial sediments (mainly medium sand to silt), moderately consolidated (friable), clast supported, occasional macrobotanical organics and *Neotoma* sp. fecal pellets appear in discrete layers or dispersed in matrix, abrupt wavy boundary, unit dips to the southeast.

LU9: Zone of burned organics and ash accumulation with layer of charcoal at base. Prior to burning, deposit may have appeared as a lateral extension of LU7 and LU8a, as seen to the south. Unit has abrupt wavy boundaries on sides and base.

LU10: Poorly sorted mix of angular to subangular fine to medium pebbles with occasional cobble-sized igneous clasts and fine sediments (mainly medium sand to silt), poorly consolidated (loose to friable), matrix and clast supported, occasional macrobotanical organics and *Neotoma* sp. fecal pellets, abrupt wavy boundary, unit dips to the southeast.

All identifiable megafauna remains in Cave 5 were recovered from Strata LU1a and LU1b in Units 5, 6, 7, and 10 (Figure 4.5A). These two strata are predominantly differentiated by the quantity of subangular to angular pebble and cobble clasts of igneous rock, degree of poorly to moderately sorted mixes of fine sand and silt, and loose to consolidated (firm to extremely hard) compaction. All units dip to the southeast, thickening as the distance from the north wall of the cave increases, and most contain some measure of wood rat midden materials (rodent fecal pellets, coprolites, bones, feathers, seeds, and twigs). Capping these units, the Mazama tephra lens (Stratum LU3) is thin (1–2 cm) but easily discernible in the northeast corner of the excavations.

The majority of identifiable megafauna remains were recovered from excavation Units 5 and 6 (Figure 4.5B). As noted above, the strata thicken and slope downward away from the walls in these units in the same manner as those described by Cressman for Cave 3. Consequently, Units 7 and 10, located along the north wall of the cave, contain strata that are substantially thinner than those of Units 5 and 6. Their strata are also more compacted with crystallized rat urine, suggesting that moisture (condensation or melting snow along the walls resulting in dripping amberat) may have had some compacting effect on the deposits. A 15 cm thick deposit of extremely hard wood rat feces below the Mazama tephra spread across Unit 7 and the north end of Unit 5. This deposit was so hard that it had to be chipped apart with a pick. While there were no rodent holes passing through this lens, there was evidence that rodents had dug through softer sediments skirting around its edges to reach the lowest deposits

(Strata LU1a, LU1b, and LU2) of the cave. This allowed oxygen to reach these deposits and set the stage for smoldering fires to destroy significant portions of them. Rodent holes filled with white ash—as well as broader, more diffuse, and amorphous charred features—were particularly evident in Unit 5. One of these smoldering fires destroyed a large area of organic sediment near the modern surface in the northeast corner of Unit 5A (LU9 in Figure 4.5A) and then followed a rodent hole down through the flammable deposits to near the floor of the cave. Perishable artifacts were destroyed by such fires, and bones were charred by them. It is therefore very important to evaluate the distribution of both cultural and faunal remains when attributing the charring of bone from these deposits to cultural activity.

Also, while camelid (probably *Camelops* sp. [James Martin, personal communication]) and horse bones were recovered from Units 7 and 10 (Figure 4.5B), the situation of most specimens in narrow crevices between boulders on the cave floor at the base of the cave walls suggest—along with evidence of rodent gnawing—that they could have been accumulated there due to wood rat scavenging in the cave. In Units 5 and 6, camel and horse bones were recovered from late Pleistocene deposits (Strata LU1a and LU1b) that were generally thicker, looser, and often separated by up to 60 cm of culturally sterile early Holocene deposits from the overlying middle Holocene cultural deposits.

DISTRIBUTION AND DATING OF MEGAFAUNA BONES AND CULTURAL MATERIALS

Faunal remains recovered in situ from late Pleistocene deposits—generally large game (camel, horse, bison, and artiodactyls) but also birds (swans, geese, herons, seagulls, and sage hens), fish, and small mammals—tended to be located in the east half of the excavations toward the rear of the cave. Smaller clusters of large bone were encountered near a possible hearth (Feature 5/3 described below) and in a boulder crevice in the floor along the protected north wall of the cave (Figure 4.5B). The more exposed west side of the excavations contained little bone but more sand, rock, and gravel that had accumulated at the cave mouth as the cliff face weathered.

A relatively thin upright rock slab that appears to have been culturally emplaced (possibly as part of an encircling wall such as Cressman reported for the living floor in Cave 3) separated the majority of in situ bone in Units 5 and 6 into northern and southern clusters (Figure 4.5B). The main bone cluster north of this slab was discovered in the floor of the cave between elevations of 96.65 and 96.80 m (as measured from the permanent block datum set at 99.00 m in the large boulder on the west edge of the excavation block) in a pocket of LU1b deposits covered by an elongated boulder. These faunal remains included a large camel vertebra, a camel astragalus, a horse phalanx, a camel mandible, a sheep mandible, and a horse hoof. None of the identifiable bone in this group comes from prime meat-bearing portions of the carcass. Preliminary analysis

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reliminary analysis

Indicates there is evidence of moderate large carnivore and rodent gnawing. What percentage of the assemblage was first contributed by humans and later scavenged by carnivores either accompanying them (domesticated dogs) or occupying the caves after they left (wolves, coyotes, bears, and large cats) is currently unknown. In fact, while there are spiral green fractures and conchoidal impact depressions on some of the large mammal bones, suggesting possible human modification (O'Connor 2000:43), the possibility that the megafaunal assemblage accumulated naturally, rather than culturally, cannot be discounted at this stage.

Tiny threads of tightly twisted grass, sinew, and possibly hemp or hair were recovered from the deposits in and around the megafauna remains in the pocket of LU1b sediment. However, a tiny piece (5 × 6 mm) of tightly woven light brown fabric was recovered from the adjacent Unit 5D at an elevation of ca. 96.70 m, raising the specter of rodent disturbance as a significant consideration in determining the possible association of megafauna remains with cultural materials nearby.

As mentioned above, rodent tunnels were occasionally followed through the course of excavations across stratigraphic boundaries from near surface deposits to the lowest strata of the cave. The possibility that modern threads, fabrics, paper, and cotton items could have been incorporated into these deposits as nest building materials cannot be discounted. In some cases, cultural materials were believed by the excavators to have been recovered from filled-in rodent nests. In fact, one of the human coprolites submitted for ^{14}C dating, a specimen recovered 10 cm above camel and horse bones in a boulder crevice in Unit 10, proved to be stratigraphically out of place with an age of only 4130 ± 40 (Beta-213427) ^{14}C BP (4770 cal BP), and a cotton thread recovered from Level 28 of Unit 2, at the south end of the cave, produced a statistically modern AMS date of 139.1 ± 0.2 pMC (Beta-221344).

The organic deposits of LU1a and LU1b were generally compact where exposed, but looser under boulders. The latter was possibly due to the preference of rodents for building nests under boulders, protecting them to some degree from moisture that may have occasionally penetrated interior cave deposits as drifting snow. Finally, moisture may have caused sediment compaction through composting; accumulation of salts, calcium carbonates, and silica; and crystallization of rodent urine, which permeates the deposits. However, it must be remembered that the preservation of perishable cultural materials (threads and coprolites, in particular) and soft tissue on bones of great antiquity establishes limits on the amount of moisture that could have penetrated these deposits without also destroying the perishables.

In Figure 4.6, the vertical distributions of all bone, cultural materials (36 artifacts and 10 lithic debitage), and identifiable megafaunal elements recovered from Unit 5B (1 × 1 m) are compared as the percentage of class totals in 5 cm levels. The megafauna class includes seven diagnostic camel and horse elements, predominantly joint and foot bones (Table 4.1: nos. 2–8). Thick-walled,
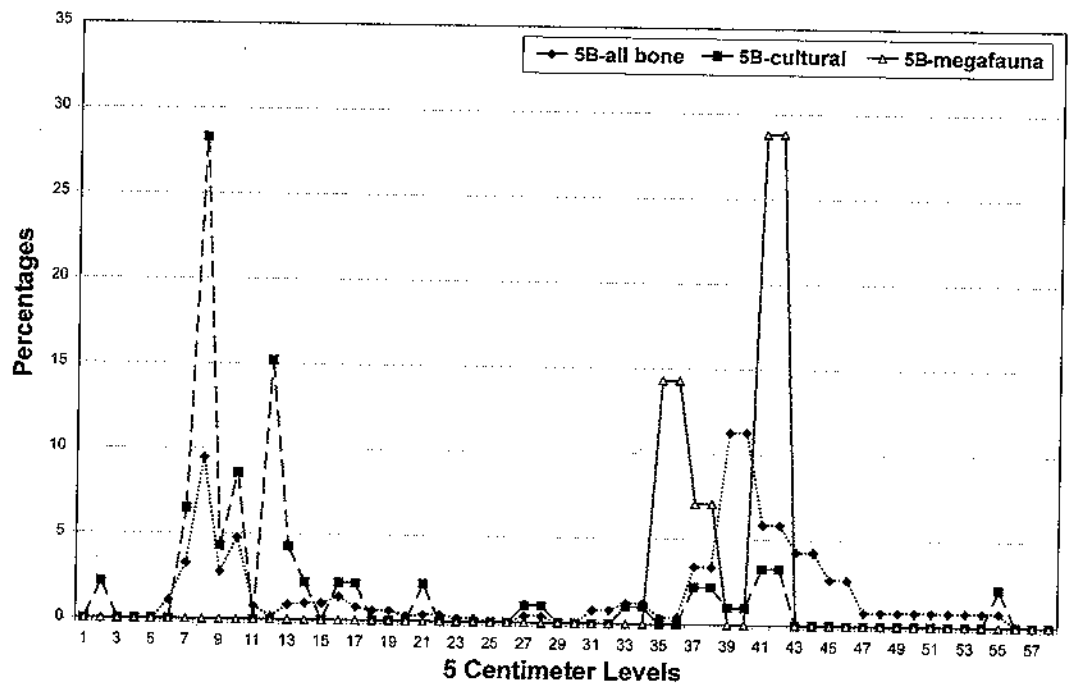
FIGURE 4.6.
Distribution of cultural
and faunal remains in
Unit 5B.

nondiagnostic long bone fragments far outnumber diagnostic elements. However, because they lack genera identifications, these bone fragments are included in the "all bone" category.

Bone and cultural materials exhibit strong bimodal distributions, with the peaks separated by 60 cm of culturally sterile deposits. The upper peak represents roughly 1 m of late and middle Holocene sediment; the lower peak, roughly 80 cm of late Pleistocene and early Holocene sediment. All megafauna remains were recovered from the lower deposits (Strata LU1a and LU1b), and cultural materials were recovered stratigraphically below them. Most of these artifacts are tiny threads particularly susceptible to movement through the deposits by rodent activity. On the other hand, obsidian and cryptocrystalline silicate artifacts (flakes and bifaces) were also found stratigraphically below the identifiable megafauna remains, and the results of obsidian hydration (OH) studies from this unit and the units to the south suggest that that is where they originated (see discussion below). This interpretation may be further supported by the synchronous fluctuations in megafauna elements and cultural remains within the lowest deposits of this unit (see Levels 34–38 and 41–43 in Figure 4.6). The point here is that while there is the possibility of stratigraphic mixing in the lower cave deposits, there is also the distinct possibility that two separate late Pleistocene occupations occurred here.

Radiocarbon Dating

Radiocarbon dating of cultural features, coprolites, perishable artifacts, bone, and rat feces has provided 27 ^{14}C dates spanning >14,000 calibrated years at

TABLE 4.1. Distribution of Megafaunal Elements in Paisley Cave 5

UNIT	STRATUM	GENUS	ELEMENT	ELEVATION (BD)[a]	COMMENTS
1) 5A	1b	horse	phalange	97.03	burned, both sides
2) 5B	1b	camelid	pisiform	96.95	burned, one side
3) 5B	1b	horse	phalange	96.95	partially charred, 11,130 ± 40 (Beta-185942) [14]C (13,140 cal BP)
4) 5B	1b	horse	hoof	96.81	
5) 5B	1b	camelid	vertebra	96.76	
6) 5B	1b	horse	phalange	96.75	
7) 5B	1b	camelid	mandible	96.66	
8) 5B	1b	camelid	astragalus	96.65	12,300 ± 40 (Beta-172663) [14]C (14,290 cal BP)
9) 6B	1a	horse	hoof	96.81	
10) 6B	1a	horse	calcaneous	96.39	
11) 7C	1a	camelid	phalange	97.83	rodent gnawing, flesh still attached
12) 10D	1a	horse	phalange	97.83	
13) 10	1a	camelid	metatarsal	97.66	

Note: Locations of megafauna elements found in situ are identified in Figure 4.5 by the corresponding numbers in the first column.
[a] BD = block datum elevation, arbitrarily set at 99.00 m.

the Paisley Caves (Table 4.2). Cressman dated wood rat droppings from just below Mazama ash in Cave 3 during the 1950s (Preston et al. 1955). Connolly et al. (1998) and Connolly and Barker (2004) dated two pieces of basketry and a sandal fragment, respectively, from the Cressman collections. Connolly and Trieu (2006) dated the cotton thread recovered out of stratigraphic sequence from Unit 2. The remaining 23 dates are field school and DNA study related samples, 22 of which are stratigraphically consistent.

Radiocarbon dating of a horse phalange, a camelid astragalus, and three culturally processed (stripped and tightly twisted) threads of grass recovered from LU1b deposits in and around the pocket of megafauna bone north of the upright slab serves to illustrate the continued need for extreme caution when interpreting stratigraphic associations. Bone collagen from the horse phalange produced an AMS date of 11,130 ± 40 (Beta-185942) ^{14}C BP (13,140 cal BP). The camelid astragalus produced an AMS date on bone collagen of 12,300 ± 40 (Beta-172663) ^{14}C BP (ca. 14,290 cal BP), while the three grass thread specimens produced an AMS date of 10,550 ± 40 (Beta-171938) ^{14}C BP (12,750 cal BP). This situation demonstrates two important points: (1) there are late Pleistocene–aged threads suitable for use in sewing and weaving activities in these deposits, and (2) those dated so far are not the same age as the megafauna remains with which they were found (Table 4.2). The megafauna date from the Allerød between ca. 11,130 and 12,300 ^{14}C BP (ca. 13,140 and 14,290 cal BP). The perishable artifacts have so far dated from the Younger Dryas between 10,160 and 10,690 ^{14}C BP (ca. 11,860 to 12,750 cal BP).

TABLE 4.2. Radiocarbon Dates from the Paisley Five Mile Point Caves (35LK3400)

SAMPLE NUMBER	CONVENTIONAL ^{14}C AGE	CAL BP AT 2 SIGMA	MATERIAL	REFERENCES
Beta-221344	139.1 ± 0.2	Modern	Cotton thread	Previously unpublished
AA-19151	145 ± 50	300–0	*Scirpus* basket	Connolly et al. 1998
Beta-195907	1060 ± 40	1060–920	Cloth	Jenkins 2005
OxA-16377	1308 ± 28	1293–1178	Human coprolite	Previously unpublished
Beta-147424	2270 ± 50	2340–2310	*Scirpus* sandal	Connolly & Barker 2004
Beta-213427	4130 ± 40	4830–4520	Human coprolite	Previously unpublished
AA-19153	6560 ± 70	7560–7420	*Scirpus* basket	Connolly et al. 1998
OxA-16496	6608 ± 35[a]	7566–7436	Human coprolite	Previously unpublished
Beta-213428	6640 ± 40[a]	7580–7440	Human coprolite	Previously unpublished
Beta-191540	7600 ± 70	8510–8220	Sagebrush	Jenkins 2005
Y-109	7610 ± 120	8630–8180	Rodent feces	Preston et al. 1955
Beta-191539	7640 ± 50	8540–8360	Sagebrush	Jenkins 2005
Beta-213429	7860 ± 40	8720–8560	Human coprolite	Previously unpublished
Beta-213423	10,050 ± 50[b]	11,950–11,280	Human coprolite	Previously unpublished
OxA-16376	10,965 ± 50[b]	13,030–12,839	Human coprolite	Previously unpublished
Beta-182920	10,160 ± 60	12,320–11,440	P.E.T.[f]	Jenkins 2005
Beta-195908	10,290 ± 40	12,360–11,870	Sagebrush rope	Jenkins 2005
Beta-171938	10,550 ± 40	12,880–12,330	Grass threads	Jenkins et al. 2004
Beta-213425	10,690 ± 60	12,960–12,380	Human coprolite	Previously unpublished
Beta-185942	11,130 ± 40	13,190–12,990	Horse, phalange	Jenkins et al. 2004
OxA-16495	12,140 ± 70[c]	14,156–13,821	Human coprolite	Previously unpublished
Beta-216474	12,260 ± 60[c]	15,340–13,880	Human coprolite	Previously unpublished
Beta-213426	12,290 ± 60[d]	15360–14,100	Human coprolite	Previously unpublished
OxA-16497	12,345 ± 55[d]	14,695–14,052	Human coprolite	Previously unpublished
Beta-172663	12,300 ± 40	15,340–12,170	Camelid astrag.	Jenkins et al. 2004
OxA-16498	12,275 ± 55[e]	14,505–13,971	Human coprolite	Previously unpublished
Beta-213424	12,400 ± 60[e]	15,430–14,130	Human coprolite	Previously unpublished

[a-e] Matched pairs of ^{14}C dates on same samples.
[f] P.E.T. = processed edible tissue.

Radiocarbon-dated samples taken from the interiors of five human coprolites (as indicated by DNA and protein residue) add further insight and support for dual late Pleistocene and early Holocene occupations of the caves (Table 4.2). Mitochondrial DNA testing of the coprolites was conducted by three independent ancient DNA laboratories in Denmark, Sweden, and Germany. Genetic profiles were established for a total of 58 field school supervisors, students, and site visitors for comparative purposes. It is standard protocol for all laboratory personnel involved in DNA studies to have genetic profiles entered in the laboratory data bases to verify they have not contaminated the samples they process. No modern matches were found to the haplogroup Types A and B (Native American) mDNA identified in the dung samples. In other words,

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Further verification that the coprolites are indeed human was sought through protein residue analysis. Human and bison protein residues (Parr 2006) were recovered from specimen 1294-5/6-B-50, which has been dated at 12,140 ± 70 (OxA-16495) ^{14}C BP and 12,260 ± 60 (Beta-216474)^{14}C BP (14,290 cal BP). In fact, three of the coprolites date to a mean of about 12,260 ^{14}C BP (14,280 cal BP), making them the same age as the camel astragalus (Allerød), and two date to about the same time as the Younger Dryas hearth, thread, and braided sagebrush rope (ca. 10,050–10,690 ^{14}C BP [ca. 11,560–12,830 cal BP]). These five coprolites are in proper stratigraphic and chronologic order, with the younger coming from above the stone slab covering the pocket of megafauna bones in Unit 5 and similar elevations in Unit 6, and the older samples being recovered from the lower deposits of Units 5, 6, and 7. The DNA and blood protein analyses prove the coprolites are human, and dating by two independent radiocarbon dating laboratories (Beta Analytic, Inc., and Oxford AMS Radiocarbon Dating Laboratory) prove they are as old as the megafauna. Thus the question of whether or not humans occupied the northern Great Basin before the megafaunal extinctions occurred has finally been resolved in the affirmative.

A small charred feature that may have been a hearth was located adjacent to the cave wall (Unit 7D/Unit 5A), approximately 2 m north of the upright slab (Figure 4.5B), at a unit excavation elevation of 96.85 to 97.20. Feature 5/3 was roughly 60 cm in diameter and 35 cm deep. This feature was bisected in 2002, revealing a deep bowl shape with charred rocks lining the base of the depression. Charred rat feces surrounded the sides and base of the feature (Stratum 1b). The lack of charring in the overlying rat feces suggests that the feature may have been ignited while the top of the depression was exposed to the atmosphere, as one would expect of a hearth but not of a smoldering rodent burrow. Still, the proximity of the LU9 charred feature near Feature 5/3 (the possible hearth) dictates extreme caution in the acceptance of this feature as cultural. It is for this reason that the feature has not yet been directly radiocarbon dated.

Large mammal bones, seldom encountered in noncultural deposits, were recovered in increased quantities in and around Feature 5/3. A charred horse phalange and two unidentifiable large game bone splinters were recovered along the west side of the feature (Figure 4.5B). A large burned bird bone was recovered from the feature, as were fragments of large mammal ribs and various other nondiagnostic bone fragments. Cultural remains recovered from around the feature include a tiny obsidian flake recovered at an elevation of 97.10 m and cordage made of vegetable fibers and possibly hair.

Bones recovered south of the upright slab tended to be found at somewhat greater depths (Figure 4.5A). This is probably due in large part to the nature of the southeast-dipping strata in the cave. However, these deposits also reach proportionately greater depth, so cultural components that are somewhat

"compressed" in shallower deposits north of the upright slab could be more widely separated in deeper deposits south of the slab. Indeed, the results of OH analysis on flakes (n = 2) and bifaces (n = 2) recovered from Strata LU1a and LU1b in this area suggest that this could well be the case. However, to adequately evaluate the OH data, we must first understand the parameters of the OH process as it has occurred within the Paisley Caves.

Obsidian Hydration Dating

Obsidian hydration (OH) dating has been extensively applied with good results in the northern Great Basin (Jenkins 2000, 2004; Jenkins et al. 2004; Pettigrew and Hodges 1995; Skinner et al. 2004). OH is the process of molecular water adsorption by exposed obsidian surfaces (Friedman 1968, 1977; Friedman and Long 1976; Friedman and Smith 1960; Friedman and Trembour 1983). The predominance of obsidian and its use in the production of stone tools in the northern Great Basin (it generally composes 90 percent of cultural assemblages) make this dating technique widely applicable throughout the region.

Establishing reliable OH rates requires prior obsidian source characterization of the specimens. Individual volcanic sources have unique chemical compositions that affect hydration rate (Friedman and Long 1976; Friedman and Smith 1960; Friedman and Trembour 1983). Theoretically, each source hydrates at its own rate. However, regional clusters of obsidian sources, such as those in and around the greater Summer Lake–Chewaucan Basin, often hydrate at rates more similar to each other than to sources at greater distances (Hughes 1986).

OH offers a method of directly addressing the age of obsidian specimens. However, the acceptance of hydration ages must be tempered with the knowledge that the hydration rind thickness of any particular specimen is more than just a measure of its age. Hydration rinds form in response to many factors. Soil temperature and moisture content are two of the most important and highly variable of these. Hydration rinds form more quickly as ambient temperatures increase, and more slowly as they decrease (e.g., Ridings 1991, 1996). Thus, post-depositional histories of individual artifacts, as well as the depositional settings in which they reside, affect the cumulative rate of hydration for each specimen. Artifacts that remain on or near the surface hydrate more quickly than rapidly buried artifacts. It is not surprising, then, that most groups of OH measurements contain some specimens with incongruent measurements. It is generally the mean of a group of specimens in good association and context that is important, not the measurement of each individual specimen.

The current sample of 136 OH measurements at the Paisley Caves offers good evidence that this dating method works reasonably well. Tucker Hill obsidian, locally available in Pleistocene lake gravels near the site, accounts for 75 percent of the late Pleistocene lithic debitage and artifacts at the site. Obsidian source use patterns changed during the middle Holocene as sediment covered Pleistocene gravel deposits incorporating Tucker Hill obsidian nodules near the site. While Tucker Hill obsidian continued as a major stone tool source, apparently

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being brought to the site from the south in the form of completed stone tools, other nearby sources such as Coglan Buttes and Silver Lake/Sycan Marsh contributed proportionately more to site assemblages during the middle and late Holocene.

The Paisley Caves vary considerably in size, with interior dimensions ranging from a few meters to almost 10 m. During the summer, the sun reaches the mouth of most caves by about 1 P.M., rapidly increasing surface temperatures throughout the afternoon. However, deep in some caves are locations that get very little if any direct sunlight and thus remain relatively cool throughout the year. Interior cave deposits are generally exceedingly dry and dusty with silt blown in from the surface of Summer Lake, while exterior cave deposits experience repeated wetting and drying events and are predominantly composed of gravel, rock, and sand. The combination of these radically variant thermal and hydrological settings in close proximity within the site has resulted in widely variant OH rates (Jenkins and Skinner 2004). Obsidian is hydrating at much faster and variable rates at cave exteriors than it is in the dry, cool cave interior deposits. Further analysis involving the collection of soil temperatures both within and without the caves over a period of several years is currently being conducted to determine adequate OH rates for specimens recovered from different settings at the site.

Traditionally, OH dating has depended in large measure on the comparison of associated radiocarbon ages with OH measurements (see Stevenson et al. 2000 for a differing opinion). Development of a hydration rate for obsidian recovered from cool, dry interior settings at the Paisley Caves involved the comparison of hydration rims on 13 specimens (including one stemmed or foliate point base) associated with a stratigraphically sealed-off hearth at the back of Cave 2 (Figure 4.2). Charred, processed edible tissues (possible food) from this hearth produced an AMS date of 10,160 ± 60 (Beta-182920) ^{14}C BP (ca. 11,860 cal BP). An associated segment of braided sagebrush rope produced a confirming AMS age of 10,290 ± 40 (Beta-195908) ^{14}C BP (ca. 12,000 cal BP). The 13 associated OH measurements ranged from 4.8 to 5.3μ, producing a rounded off mean of 5.1μ. Using a hydration rate of 2.2μ² per thousand years, this mean indicates an age of roughly 11,800 cal BP for this deposit, fitting comfortably with OH measurements and ages of cave interior assemblages across the entire site (Figure 4.7).

In Cave 5, four obsidian specimens (two flakes, one biface, and a drill) recovered from Strata LU1a and LU1b in Units 5 (n = 1) and 6 (n = 3) had hydration rinds that ranged in thickness from 5.1μ to 6.1μ, producing a mean of 5.5μ and a mean hydration age of 13,750 cal BP. While individual OH measurements can be notoriously misleading as dating tools (for the reasons noted above), it is interesting to note that in this tiny collection the thinner (presumably younger) measurements occur stratigraphically well above the thicker (presumably older) specimens. A flake and a biface fragment recovered from elevations of 97.15 m (Unit 5A) and 97.25 m (Unit 6A), respectively, produced hydration measurements suggesting that they were deposited during the
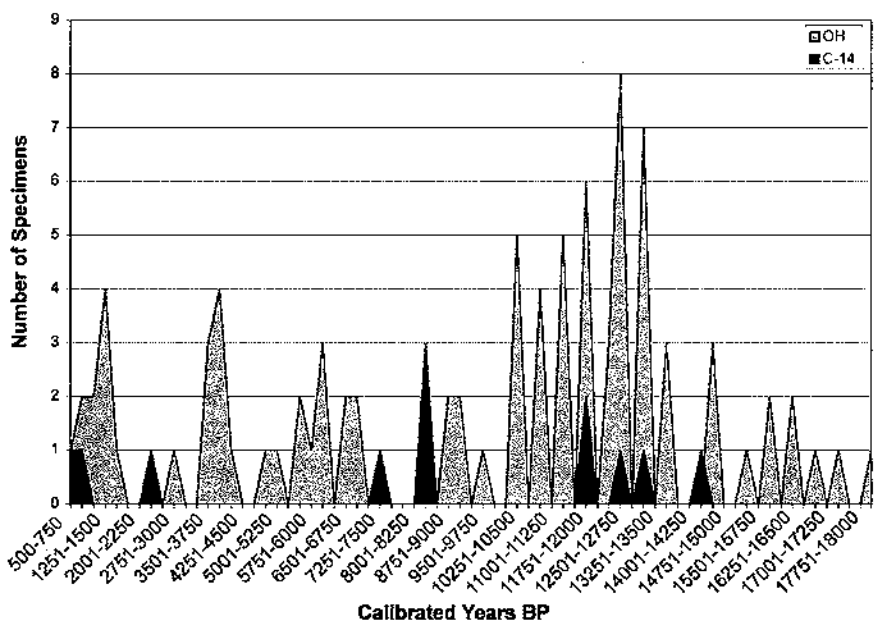
FIGURE 4.7.
Comparison of
radiocarbon and
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Younger Dryas period (ca. 10,200–10,900 ^{14}C BP), while a flake and a drill frag-
ment recovered at greater depths of 96.35 m (Unit 6B) and 96.05 m (Unit 6D),
respectively, produced OH measurements suggesting that they were deposited
substantially earlier (Table 4.3).

Here, OH dating (employing a site-specific hydration rate based on direct
associations between a firmly ^{14}C dated cultural feature and 13 OH measure-
ments in a sealed-off stratum in Cave 2) indicates hydration ages in Cave 5
that are older than the AMS dated perishable artifacts (10,550 ^{14}C BP [12,750
cal BP]) and consistent with the AMS dated megafauna bones and human
coprolites (11,130 to 12,300 ^{14}C BP [13,140 to 14,340 cal BP]; Tables 4.2 and
4.3). Comparison of all of the acceptable OH ages obtained for cool, dry cave
interior deposits with the radiocarbon dates from the same settings suggests
that the most intense site occupation occurred between ca. 13,500 and 11,000
cal BP. However, an occupation during which a bison was consumed also
occurred at about 12,260 ^{14}C BP (14,280 cal BP), and even older occupations
may be indicated by OH dating results (Figure 4.7).

SUMMARY

Luther Cressman conducted three phases of excavations at the Paisley Five
Mile Point Caves between 1938 and 1940 (Cressman 1940, 1942; Cressman and
Williams 1940). Finding megafauna remains (camelid, horse, and bison) in
apparent association with a few obsidian artifacts, he believed he had proven
that humans had hunted megafauna in the northern Great Basin near the end
of the late Pleistocene (Cressman 1966:41, 1986:122). However, the validity of
his claims were challenged on various grounds (Heizer and Baumhoff 1970:5;
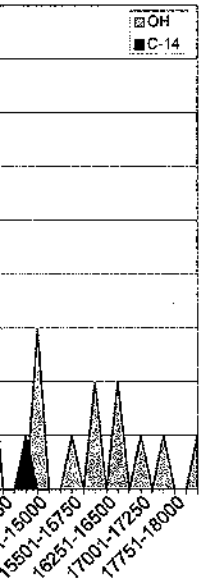
TABLE 4.3. Comparison of Obsidian Hydration and ^{14}C Dating in Units 5 and 6

Unit/ Strat.	Elev.	Item	Source	OH	OH Age	Unit/ Strat.	Elev.	^{14}C Age
5A/1b	97.15	flake	Tucker Hill	5.1μ	11,820 cal BP			
6A/1a	97.25	biface	Coglan Butte	5.3μ	12,770 cal BP	5B/1b	97–96.75	12,750 cal BP[a]
						5D/1b	96.90	12,830 cal BP[b]
						5B/1b	96.75	13,140 cal BP[c]
						5B/1b	96.65	14,290 cal BP[d]
						5D/1b	96.60	14,340 cal BP[b]
6B/1a	96.35	flake	Tucker Hill	5.7μ	14,770 cal BP	6B/1a	96.40	11,560 cal BP[b]
6D/1a	96.05	drill	Tucker Hill	6.1μ	16,910 cal BP	6B/1a	95.95	14,260 cal BP[b]

[a] Processed threads.
[b] Apparently human coprolite.
[c] Horse phalange.
[d] Camel astragalus.

Krieger 1944; Jennings 1986:115), and the issue of human/megafauna contemporaneity at the Paisley Caves has remained in question for two more decades. The University of Oregon's northern Great Basin archaeological field school returned to the site to resume investigations and resolve the issue.

This chapter addressed two questions related to the apparent association of cultural and megafaunal remains in the Paisley Caves. The first concerns whether cultural and megafaunal remains occur in horizontal, vertical, and stratigraphic association in the Paisley Caves, and the answer to this question is yes. Figures 4.5 and 4.6 clearly demonstrate that there is no separation—horizontal, vertical, or stratigraphic—of cultural materials from paleontological materials in Units 5 and 6. Coprolites, cordage, threads, sinew, bifaces, and lithic debitage are found above, among, and below camelid and horse remains in Units 5, 6, 7, and 10 in Cave 5. However, site formation processes such as floor clearing by humans, bone and coprolite scavenging by rodents and carnivores, and movement of artifacts through the site deposits by rodents appear to have affected their distributions to some degree.

While bone taphonomy is not the main thrust of this chapter—and is so important to the analysis of the site that it must remain essentially a separate topic of investigations—it provides an important consideration of site formation processes that cannot be entirely ignored here. The fact is, megafaunal remains identifiable to genus in Cave 5 consist predominantly of phalanges, metatarsals, various other foot bones, vertebrae, and mandibles (James Martin, personal communication). These elements are dense bones that do not contain marrow and did not support thick muscle (meat) at the time of death. Nondiagnostic thick-walled bone fragments of marrow and meat-bearing long bones commonly outnumber the identifiable remains reported more fully here, indicating that these elements were usually broken or masticated prior to burial. Virtually all large carnivores—including humans and

domesticated dogs—break long bones to extract marrow. The differing mecha nisms by which this process occurs (hammer and anvil breakage by humans, and chewing by carnivores) result in distinctive patterns of damage to the bone (O'Connor 2000; Miller 1979). Bone masticated by large canines chewing with their molars exhibits distinctive U-shaped grooving on the chewed ends from which the bone is systematically reduced, while rodents, chewing with chisel like front teeth, leave much smaller, more symmetrical parallel grooves trans verse to edges and ridges of bone. Preliminary analysis indicates that some of the large mammal remains at the Paisley Caves have been chewed by carni vores. Some of these bones also exhibit moderate to extreme degrees of check ing and weathering, whereas others were buried while they still had blood and cartilage attached to them (all stages of weathering as defined by Behrensmeyer [1978]).

What percentage of the assemblage(s) in Strata LU1a and LU1b was first contributed by humans before being scavenged by carnivores (dogs, wolves, coyotes, bears, and large cats that occupied the caves when humans were not present) is currently unknown. In fact, while there are green fractures and con choidal impact depressions on a few long bone fragments (suggestive of human breakage patterns), the possibility that the megafaunal assemblage accumu lated naturally, rather than culturally, cannot be discounted at this stage. Thus, while the evidence currently suggests the association of megafauna and cul tural remains in the site, the faunal evidence by itself is insufficient to unequiv ocally demonstrate the contemporaneity of the two. The most direct way to establish human/megafauna contemporaneity has been ^{14}C dating of human coprolites and megafauna elements to an overlapping period of time.

This brings us to the second question addressed here regarding whether the cultural and paleontological remains are the same age. The answer to this is also yes.

Hearths, rope, cloth, threads, sandals, and basketry provide 10 cultural radiocarbon dates ranging from 139.1 to 10,550 ^{14}C BP (< 200 to 12,750 cal BP), and human coprolites add an additional 14 dates ranging from 1308 to 12,400 ^{14}C BP (ca. 1275 to 14,360 cal BP). Partially charred horse (n = 1) and uncharred camelid (n = 1) bones have been dated to 11,130 and 12,300 ^{14}C BP (ca. 13,140 and 14,290 cal BP), respectively. Thus, among late Pleistocene dates currently available, mean radiocarbon date intercepts for cultural and megafaunal ele ments overlap between 11,130 ^{14}C BP (ca. 13,140 cal BP) and 12,300 ^{14}C BP (14,300 cal BP).

The results of DNA tests and ^{14}C dating (verified through replication of results by multiple independent laboratories) have now conclusively resolved the question of human/megafaunal contemporaneity in the Great Basin. These studies clearly indicate that human occupations in the Paisley Caves were con temporaneous with megafauna (camel, horse, and bison).

The suite of ^{14}C dates from the Paisley Caves offered the opportunity to com pare OH measurements of 136 specimens (artifacts and debitage) from the cave

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deposits with calibrated radiocarbon dates spanning more than 14,000 years. Comparing the results of these two dating methods offers better insight to the total length and intermittency of human occupations at the site than ¹⁴C dating does alone.

The proposed OH rate for dry/cool deposits within cave interiors was established on the basis of close association between 13 obsidian specimens recovered around a 12,000-year-old hearth sealed off by extremely dry, highly organic deposits at the back of Cave 2. Processed edible tissues and a segment of sagebrush rope associated with this hearth produced AMS dates of 10,160 ¹⁴C BP (ca. 11,860 cal BP) and 10,290 ¹⁴C BP (ca. 12,000 cal BP), respectively. The associated hydration measurements ranged from 4.8 to 5.3µ and produced a mean of 5.1µ. Application of a hydration rate of 2.2µ^2 per thousand years to this mean suggests an age of 11,800 years for these deposits, providing close correspondence between radiocarbon and OH dating in the dry/cool deposits of cave interiors for the site.

Application of this rate to OH measurements acquired from a biface, a drill, and two flakes recovered stratigraphically with (one biface and one flake) and below (a large drill/perforator and a flake) megafauna specimens in LU1a and LU1b deposits in Cave 5 produce suggested ages ranging from ca. 11,800 to 16,900 cal BP. While the sample is tiny, the distribution of these specimens in upper (97.25–97.15 m) and lower (96.35–96.05 m) elevation components (Table 4.2) corroborate the existence of two separate late Pleistocene occupations, the older dating between possibly 17,000 and 14,000 cal BP and the younger between ca. 13,000 and 11,500 cal BP, as suggested by the radiocarbon dates. The latter, upper component fits very well with the Younger Dryas climatic event, and the lower, older component correlates well, for the most part, with a documented resurgence of the pluvial ZX and Winter lakes between ca. 14,500 and 13,600 cal BP (Friedel 2001).

Plotting all acceptable OH dates from the entire site against the radiocarbon dates (Figure 4.7) indicates a large number of hydration dates clustering between 12,000 and 13,140 cal BP (ca. 10,200–11,130 ¹⁴C BP), while a smaller number cluster with the 14,280 cal BP (ca. 12,260 ¹⁴C BP) dates obtained from a camelid bone and three human coprolites. As noted above, a number of OH readings suggest that older dates of occupations may be represented at the site. However, these OH dates are currently unsupported by radiocarbon dating and cannot be accepted at face value until they are.

CONCLUSIONS

Cultural remains are stratigraphically and chronologically associated with megafaunal remains in the lowest deposits of the Paisley Caves, as indicated by Cressman (1942). However, the method of accumulation in these strata (site formation processes) must be carefully considered beyond stratigraphic associations. Bone distribution and taphonomy suggest that people may well have

been the cause of some bone accumulations, but others may have been partially or entirely the product of bone scavenging by carnivores and rodents. Establishing the contemporaneity of cultural and paleontological specimens at the site required more direct proof of their relative ages than stratigraphic associations could provide alone. Radiocarbon dating of cultural and megafaunal remains by two independent AMS radiocarbon laboratories has provided that proof, establishing that humans defecated in the Paisley Caves some 14,280 years ago, at the same time that camelid bones were deposited there. These dates are in turn supported by OH dates that closely predict the distribution of radiocarbon ages throughout the site. As discussed above, OH dating has its own limitations to reliability related to individual artifact depositional histories and unique depositional settings within sites. However, here the OH method, which has the advantage of being impervious to carbon-based contamination, provides verification for the radiocarbon dates. Both dating methods clearly indicate the site was occupied at the time the megafaunal remains were deposited in the Paisley Caves.

It remains puzzling that none of the Western Stemmed or Clovis (Dietz) sites in the region, apparently dating between 13,200 and 10,200 ^{14}C BP (ca. 16,000 and 12,000 cal BP) (Bedwell 1973; Willig 1988, 1989; Willig et al. 1988; Wingard 2001:584), have produced reliable evidence of human association with extinct fauna other than bison (*Bison antiquus?*). Jennings (1986:115) noted some 20 years ago that nowhere in the Great Basin was there irrefutable evidence of the exploitation of Pleistocene megafauna by human populations, despite repeated claims to the contrary (Bryan 1979:244; Cressman 1966:41, 1986:122; Harrington and Simpson 1961; Orr 1956; Shutler 1967; Simpson 1956). Technically, that remains the case today, though considering the potential for DNA and protein residue analyses to disclose individual elements of Paleoindian diets, it seems highly unlikely that it will remain the case for much longer.

There is no practical reason for late Pleistocene hunters to have avoided megafauna—in particular, camelids and horses, which were quite common in the Great Basin—had they been available in the region. Two of the most reasonable past explanations for this situation have been that either these animals were already extinct prior to the arrival of human hunters ca. 11,000 ^{14}C BP (ca. 13,000 cal BP), or their demise occurred shortly after humans arrived. Strong evidence for human/megafauna contemporaneity in the Great Basin spanning a period of about 1,300 years (14,280 to 13,000 cal BP) has now been firmly established. Finding the evidence for the hunting and processing of megafauna is the next challenge to Great Basin Paleoindian studies, a challenge that DNA and protein residue analyses are particularly well suited to meeting.

On a broader scale, the volume of evidence for pre-Clovis occupations like those at the Paisley Caves is gradually increasing. Bettinger and Young (2004:246) have posed a very good question: "If the New World was largely

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e Paisley Caves some
vere deposited there.
predict the distribu-
ed above, OH dating
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ed or Clovis (Dietz)
d 10,200 ^{14}C BP (ca.
9; Willig et al. 1988;
human association
Jennings (1986:115)
n was there irrefut-
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r 1956; Shutler 1967;
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World was largely

occupied by 14.6 cal kya, why are [pre-Clovis] sites so rare?" As the investiga-
tions at Monte Verde (Collins and Dillehay 1986; Dillehay 1997, 2002; Dillehay
and Rossen 2002), Meadowcroft (Adovasio et al. 1978), and other early sites
(cf. Adovasio and Pedler 2004 for an updated review) have demonstrated,
the largest portions of cultural assemblages in the earliest sites are perish-
able artifacts that generally do not preserve well in open sites. Quite simply
put, the majority of tools in the cultural repertoire of the first colonists in the
Great Basin have not survived in the earliest open site locations, and assem-
blages from the earliest components of the cave sites are both exceedingly
small and generally indistinguishable from subsequent toolkits (cf. Bedwell
1973:144 for an example). A combination of morphologically and functionally
generic stone tool assemblages may make the earliest colonists in the Great
Basin archaeologically invisible. This is particularly true for those who expect
to find distinctive Clovis progenitor assemblages of some kind in depos-
its purported to be older than 11,500 ^{14}C BP (ca. 13,500 cal BP), but instead
recover tools easily subsumed within early Holocene assemblages. This argu-
ment has been made in various forms in the past, perhaps most prominently
by Bryan (1980), but it now seems more reasonably supported with the wide-
spread acceptance of a pre-Clovis age for Monte Verde.

High residential mobility, such as that expected of late Pleistocene occu-
pations in the northern Great Basin, results in low archaeological visibility
because the quantity of refuse left at briefly occupied sites is generally quite
sparse. Tools designed to facilitate high mobility tend to exhibit multifunc-
tional characteristics suited to maintenance of light, portable, and broadly use-
ful toolkits. The result is that small bands of highly mobile hunter-gatherers
generally leave thin artifact scatters composed of debitage, a few broken or lost
tools with multifunctional capability (scrapers and bifaces), and a few bone
scraps that often quickly disappear from open sites. Chronologically diagnos-
tic artifacts tend to be few and often are not found in short-term single occupa-
tion sites at all.

The contemporaneity of cultural items found with megafaunal remains in
the northern Great Basin (Paisley Caves [Cressman 1942:93], Christmas Valley
[Minor and Spencer 1977], Catlow Cave [Cressman 1940:10], Lower Klamath
Lake [Cressman 1942:99–100], and Tule Lake [Beaton 1991]) has generally been
questioned on the grounds of inconclusive context, tiny assemblage size, and
inadequate reporting (Heizer and Baumhoff 1970, for instance). At the Pais-
ley Caves, well-documented Pleistocene lithic assemblages contain few items,
most of which are not morphologically distinctive (debitage, bifaces, and test
cores). The earliest assemblage could easily have been subsumed within lat-
ter Younger Dryas assemblages were it not for the pre-Clovis radiocarbon
dates on human feces and the unusually thick hydration rinds on the obsid-
ian artifacts. Had the human coprolites at the Paisley Caves not been analyzed
for DNA and subjected to rigorous dating methodology, the pre-Clovis age of
the cultural items recovered with the megafaunal remains could not have been

conclusively proven. In other words, the pre-Clovis component of this site could very well have been missed or dismissed.

The Paisley Caves example suggests that pre-Clovis assemblages may exist at other sites, but their presence may be masked by mixture with younger assemblages (Madsen 2004:18–19; Dillehay 1997). It is only in very rare instances that cultural deposits of Pleistocene age have remained stratigraphically separated from overlying Holocene deposits in such a way that the two may be reliably proven to be distinct. Even then, as at the Paisley Caves, it will often be necessary to sort them out of Younger Dryas and early Holocene assemblages. Finding pre-Clovis sites in the New World is likely to require the application of new technology and methodology suitable to unmasking these assemblages. In fact, the evidence of pre-Clovis site occupations may be waiting for us to sort out of boxes already on museum shelves.

ACKNOWLEDGMENTS

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