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Supplementary Materials for

Female hunters of the early Americas

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1 Excavation and mapping

Excavations at Wilamaya Patjxa were designed to discover intact Archaic Period cultural features. Fifty-centimeter wide trenches were hand excavated in areas of high artifact density as established by point-provenienced lithic tools recovered from the surface. Trenches were oriented to the UTM Zone 19S grid (WGS84) and were divided into 1 m long excavation units (Figs. 1 and S1). The plow zone, which is approximately 30 cm deep, was excavated as a single stratigraphic unit down to the contact with undisturbed sediment. All plow zone sediment was passed through 6 mm screen mesh to recover cultural materials. The underlying geologic stratum is an artifact-sterile, light gray 10 YR 7/2 (*62*), compact sandy colluvium. Cultural pit features extend into this geologic stratum and are recognizable as dark grayish brown 10 YR 3/2 ashy stains.

When cultural features were encountered in exploratory trenches, 1.0×0.5 m excavation units were extended to expose the full horizontal extent of the feature. Features were then excavated in natural horizontal and vertical units, dividing natural levels into arbitrary 10-cm levels as needed. Excavation was accomplished using standard spatially controlled hand-excavation techniques with trowels, brushes, bamboo skewers, and dental picks. Up to 40 liters sediment was collected from each features for flotation analysis. Any additional feature sediment was screened through 1 mm mesh to recover artifacts.

Burial assemblages were exposed and photographed from many angles with a Canon PowerShot G1 X Mark II digital camera. The photographs were used to generate a high-resolution, georeferenced 3D models and orthoimages using OpenDroneMap (V0.3.1) Structure from Motion software. Skeletal materials and artifact topology were digitized from 3D model-derived orthoimages using QGIS 2.18 GIS software.

Mapping data were collected and referenced to the WGS84 ellipsoid (*63*) using single-frequency global navigation satellite systems (GNSS), ephemeride-based post-processing, and drone and terrestrial photogrammetry with structure-from-motion (SfM) image processing. A primary geographic datum point, WMP1, was established on a small knoll approximately 150 m southwest of the site. The datum is a small ($\sim$2cm) cross chiseled into boulder (see fig. S1). A static GNSS survey was performed over the point for approximately four hours using a single-frequency Emlid Reach RS unit. The resultant satellite observation data were stored in receiver independent exchange format (RINEX) and uploaded to Natural Resource Canada's Precise Point Positioning (PPP) system for ephemeride-based post-processing (*64–66*). The online service returned a geode-

Fig. S1 Wilamaya Patjxa excavation areas and primary mapping datum. (A) Aerial planimetric view of the site and excavation areas. (B) Primary site datum, WMP1, is located on a knoll approximately 150 m southwest of the site. The site is visible in the background at the location of the truck. A GNSS unit is shown during the course of the static survey used to derive the datum's geodetic position. (C) WMP1 mapping datum is a small etched cross on a boulder. The yellow circles indicate precise location. Photo Credit: Randall Haas, University of California, Davis.

tic position of S16° 14' 35.0309"±0.22 m, W69° 43' 47.5801"±0.22 m, 3923.84m±0.55 m (95%, WGS84 ellipsoid). This position is the assumed position of the primary datum for all site mapping. All excavation unit boundaries were recorded using paired Emlid Reach RS units in real-time kinematic mode with the base station established over datum WMP1 assuming the static-survey derived coordinates. Geographic data are recorded in polar coordinates and converted to UTM zone 19S (WGS84) for mapping purposes. Three-dimensional accuracy estimates are on the order of ±3 cm (95%) relative to the WMP1 primary datum.

2 Human osteology

Human osteological observations were limited to standard non-destructive methods (*59*) and included an element inventory and condition assessment, estimation of age and sex, and documentation of bone morphology including observations of pathology, activity markers, metric variables, and developmental variants. Detailed observations that support demographic estimates for WMP6 and WMP1 are reported here.

2.1 WMP6

WMP6 consists of the fragmented remains of an older adolescent/young adult individual. Age at death is estimated at approximately 17–19 years old based on dental development (*32*). Apart from the third molars, which were still developing at the time of death, the remaining fourteen permanent teeth present are fully formed, in occlusion, and exhibit some wear. Long bones are small and gracile indicative of a probable female individual. Preservation is poor with most of the skeleton missing and all bones fragmented with considerable cracking and exfoliation. Elements present include portions of the cranial vault (parietals and occipital), 18 teeth (fragments of three upper incisors, portions of three premolars, and 12 mostly complete molars), the diaphyses of the left and right femori, and a tibia or fibula fragment. One femur exhibits slight anterior bowing– a condition observed in several other individuals from this site. There is no evidence of pathology, but poor preservation may preclude such observations.

2.2 WMP1

Individual 1 consists of the fragmented remains of an adult male. Age at death is estimated at approximately 25–30 years old based on dental wear (*67*). Sex is estimated as male based on robust cranial and mandibular features (*59*). Preservation is poor. The remains consist of the left half of the cranial vault and most of the face with intact maxillae and mandible, cervical vertebrae 1 and 2, both clavicles (partially complete and

gracile), part of the left scapula (glenoid fossa complete with smooth edges–no DJD), the distal diaphysis of the right humerus with a marked deltoid tuberosity (small septal aperture present and smooth articular surfaces of capitulum and trochlea), the proximal third of left humeral diaphysis, small fragments of both ulnae and the left radius, both femur diaphyses with significant bowing and an elevated linea aspera, most of both tibiae and a small fragment of the left fibula. There are also 300+ fragments that may contain portions of the post-cranial axial skeleton and extremities, but the pieces are too small to identify securely.

Pathology consists of antemortem tooth loss of the right mandibular M1 and a large carious lesion that has removed the crown and infected the roots of the left mandibular M1. In addition, tooth wear is heavy on the maxillary incisors and first molars indicating heavy use as a child between 6 and 12 years of age. This same heavy wear on the opposing mandibular molars may have contributed to exposure of the pulp cavity, infection, and loss/destruction.

3 Burial artifacts

Non-destructive qualitative and quantitative methods for examining flaked stone were adapted from Andrefsky (*60*), Inizan et al. (*68*), and Beck and Jones (*69*). Methods included an inventory of all lithic artifacts, size sorting and quantification of various stages of debitage (i.e., core reduction and retouch), evaluation of condition of artifacts, biface reduction stages, flake scar orientation, flake scar morphology, platform preparation, cross-section and profile shape, and lithic reduction methods and techniques. Projectile point typological assignments are based on Klink and Aldenderfer's typology for the south-central Andes (*28*). Analysis of cobble tools, ocher, and manuports follows Adams (*70*). We report on lithic artifacts associated with WMP6 and WMP1 individuals and associated burial fill.

3.1 WMP6

Lithic artifacts associated with WMP6 were recovered from three contexts–in situ artifacts clustered and stacked in the pelvic area of the individual, isolated in situ artifacts located on the burial pit floor, and artifacts found in the burial fill. Artifacts include scrapers, ocher, possible polishing stones, flakes, flake tools, and projectile points. Flaked stone tools were produced on chert, chalcedony, and fine-grained volcanic materials. Metric and non-metric attributes of these artifacts are reported in table S1. Artifacts associated with the toolkit are illustrated in Figs. 2 and S2. The four projectile points found within the burial toolkit (artifacts 1–4) exhibit ears and contracting, semi-squared stems, which are diagnostic of type 1B Early Archaic Period forms, 11–9

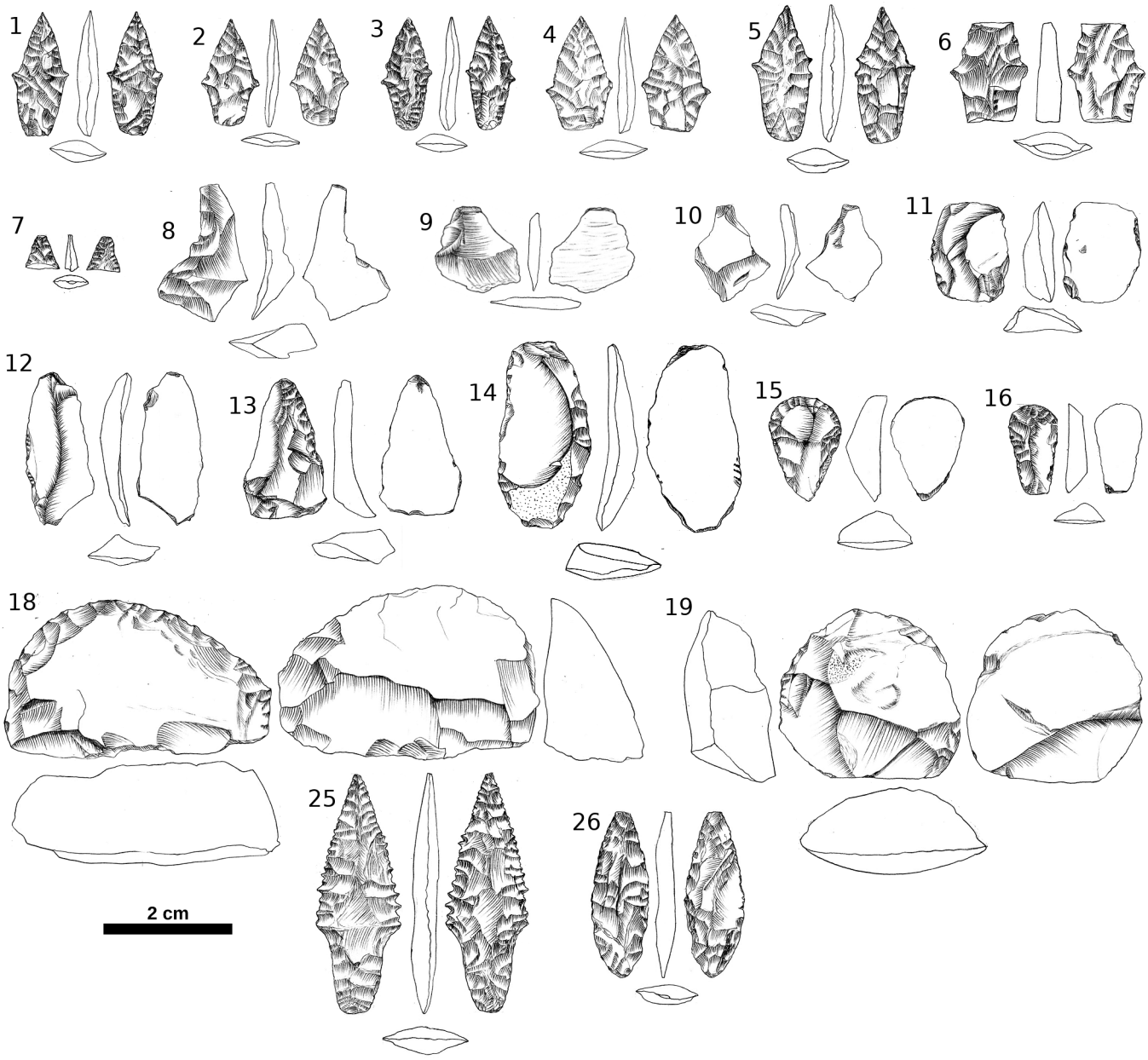

Fig. S2 Drawings of WMP6 and WMP 1 tools including both faces and edges. Artifacts 1–24 are associated with WMP6. Artifacts 25 and 26 are associated with WMP1. Drawings by Javier Chalcha Saraza.

Table S1 Metric attributes of in situ artifacts associated with individuals 6 and 1 at Wilamaya Patjxa.

ID	Fig. ID	type	material	context	length (mm)	width (mm)	thick. (mm)	mass (g)
944	1	point	chert	WMP6	38.3	17.0	6.1	3.64
945	2	point	chert	WMP6	32.4	17.5	3.5	1.52
946	3	point	chert	WMP6	34.7	14.7	4.8	2.34
948	4	point	chert	WMP6	35.3	20.4	5.7	3.39
947	5	point	chert	WMP6	42.1	18.3	7.0	4.88
949	6	point mid-section	chert	WMP6	29.7	22.9	7.9	4.26
950	7	point tip	chert	WMP6	10.4	10.6	3.8	0.31
941b	8	flake	chert	WMP6	42.0	27.1	7.3	5.15
941c	9	flake	chert	WMP6	26.0	26.1	3.6	2.10
941d	10	flake	chert	WMP6	43.0	25.4	7.3	7.40
941a	11	modified flake	chert	WMP6	31.9	23.6	7.0	4.91
939	12	modified flake	chert	WMP6	46.7	21.7	6.4	5.30
940	13	modified flake	chert	WMP6	42.2	24.7	7.3	7.40
938	14	modified flake	chert	WMP6	57.8	28.9	9.0	14.2
937	15	scraper	chalcedony	WMP6	32.0	22.9	10.4	7.81
936	16	scraper	chert	WMP6	27.5	15.3	6.5	2.44
952	17	scraper	volcanic	WMP6	111.5	80.1	36.6	342
943	18	scraper	volcanic	WMP6	82.0	53.6	27.6	184.14
942	19	scraper	volcanic	WMP6	53.9	58.3	25.1	128.09
953	20	hammer	volcanic	WMP6	59.6	39.0	26.2	85.41
954	21	cobble	volcanic?	WMP6	61.8	30.1	12.9	37.70
951	22	ocher	hematite	WMP6	72.2	62.3	22.2	118.30
951	23	ocher	hematite	WMP6	28.9	22.1	9.5	7.80
951	24	ocher	hematite	WMP6	19.9	19.9	10.8	3.58
913	25	point	chert	WMP1	73.7	25.7	7.8	12.45
912	26	point	volcanic	WMP1	51.1	18.4	6.1	5.04

cal. ka (*28*). All projectile points within the assemblage bear flake scar patterning indicative of a pressure-over-percussion reduction sequence. Pressure negatives are largely chevron patterned or parallel collateral. While no portions of the original blanks are visible on these points, it is possible that they were made on flakes as three out of the four points exhibit a slight curve in profile. Cross sections range from biconvex to nearly flat.

Five scrapers of varying size, shape, and material were also recovered from the burial cache. Three large volcanic scrapers/choppers were recovered–one made on a cobble (artifact 17) and two made on large flakes (artifacts 18 and 19). Artifact 18 appears to be a flake that was removed along a flat cleavage plane and therefore lacks classic ventral attributes. The cobble scraper (artifact 17) may have doubled as a hammer or pestle-like processing implement due to the presence of some battering on the cortical pole opposite the flaked edge. The mesio-distal convex area of one side of the tool exhibits ocher staining and numerous striations aligned parallel with the orientation of the tool's length (fig. S3). The flake scraper (artifact 19) exhibits extensive wear along one margin suggesting prolonged and intensive use. Future micro-wear analysis may be able to ascertain possible functions of these implements.

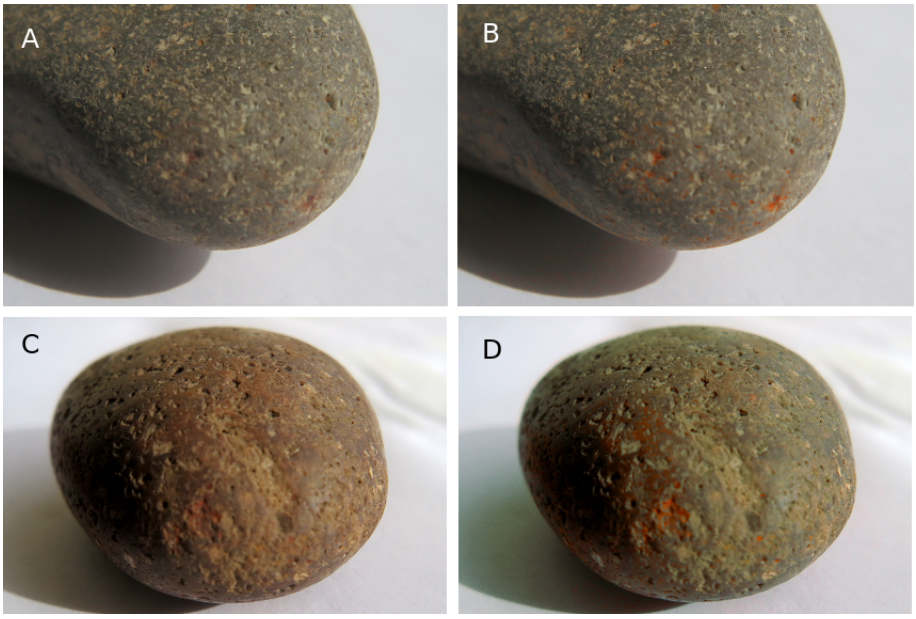

Fig. S3 Red ocher staining on groundstone artifacts. (a) Acute end of large cobble, artifact 17. (b) Same view as a with red color saturation enhancement to highlight ocher staining. (c) End of small cobble, artifact 20. (d) Same view as c with red color saturation enhancement to highlight ocher staining. Photo Credit: Randall Haas, University of California, Davis.

Two thumbnail end-scrapers of nearly identical morphology were recovered from the cache (artifacts 15 and 16). Both of these artifacts were made on elongated flakes with thick triangular cross sections following a single prominent arris. Both were largely unifacially worked and exhibit fine parallel pressure flaking and

retouch along their distal convex working edge. Both also exhibit less refined unifacial marginal retouch to produce a convergent mesio-proximal portion likely for hafting. Interestingly, the chalcedony scraper (artifact 15) was made with the convex working edge on the proximal portion of the flake blank, while the chert scraper (artifact 16) was made with its working edge on the distal portion. In both cases the thickest end of the flake blank was selected for the working edge and the resulting tool morphology is nearly identical suggesting specialized use.

Three utilized flakes (artifacts 11–12 and 14) and three possibly utilized flakes (artifacts 8–10) were also recovered from the cache. The edge-modified flakes were secondary core reduction flake blanks with varying degrees of retouch or use-wear. Artifact 12 appears to have been made on an elongated laminar flake, possibly overshot, with thick triangular cross section. Artifact 14 exhibits steep retouch along one margin and low short removals on the concave opposite margin. While this tool could be classified typologically as a concavo-convex side scraper, the retouch patterns indicate that it may have more likely functioned as a backed knife. It is interesting to note that the longer laminar edge-modified flakes bear very similar morphology to the blanks needed to produce the small thumbnail end scrapers within the assemblage. It is possible that these flake tools and scrapers represent different use-life stages. It is also possible that this pattern may reflect a specific core reduction strategy targeting such laminar flakes or simply the use of thicker elongated flakes that were deemed inappropriate for the production of projectile points. Artifacts 8–10 exhibit minute traces of what could be edge modification due to use. Micro-wear analysis is necessary to determine whether the ostensible modification resulted from cutting activities.

In addition to flaked stone artifacts, two volcanic water worn cobbles (artifacts 20 and 21) and three pieces of red ocher (artifacts 22–24) were also found within the cache. Artifact 20 exhibits ocher staining on one of the acute ends (see fig. S3). The ocher nodules (degraded hematite) range from 20–72 mm in maximum length and exhibit some parallel striations that may indicate processing activity. Ocher has been used ethnographically for various purposes including personal adornment, sunscreen, preserving food, decorative paint, insect repellent, and animal hide preservative (*29, 71, 72*). Given the association of the ocher, burnishing stones, and scrapers in a cohesive toolkit, it seems likely that the WMP6 individual used the ocher and cobbles in hide processing. Similar interpretations have been made for the burial toolkit of Individual 2 at Telarmachay (*50, 73*). Future micro-wear or residue analysis could be used to further evaluate this hypothesis (*71*).

The co-occurrence of numerous projectile points with animal processing tools suggests the toolkit was designed to accommodate the full range of big-game hunting tasks from prey acquisition to butchering to hide

processing. Although it is possible that the projectile points served as knives, the backed knife, retouched flakes, and unmodified flakes more likely served that purpose. It might furthermore be tempting to evaluate this conclusion with lithic usewear analysis on the projectile points. However, the efficacy of discriminating projectile versus knife wear has yet to be validated, and projectile action may not leave detectable edge modifications. Such analysis would therefore be vulnerable to false negatives–failing to identify projectile wear among artifacts actually used as projectiles.

Four additional artifacts were located on the burial pit floor but appear to have been unassociated with the toolkit. These include a utilized jasper flake (artifact 13), a complete jasper 1B point (artifact 5), a 1A or 1B point midsection made on white chert (artifact 6), and a black chert projectile point tip (artifact 7). The utilized flake is similar in form to artifact 12, also made on a laminar overshot flake. The jasper projectile point is similar to artifact 3 in exhibiting double spurs on one margin. The projectile point mid-section bears unfinished scalloped edges and heavily abraded blade margins. This artifact appears to have been broken in production or use and only partially re-sharpened or shaped. The projectile point tip is made of Quelcatani chert–a material that primarily occurs at higher elevations (*74*) but can be found in gravel deposits in the vicinity of Wilamaya Patjxa (*34*).

A small assemblage of 29 pieces of chert debitage was recovered from the burial fill. Of these, 18 exhibited platforms, four were flake fragments, two were heat induced potlids, and four were categorized as miscellaneous shatter. All flaked stone debris found within the burial fill appears to be in the middle to late stages of core reduction and biface manufacture.

3.2 WMP1

Two flaked stone artifacts were recovered in direct association with WMP1 (Figs. 3 and S2, artifacts 25 and 26). These include a fine grained volcanic contracting stem lanceolate 3E style point and a white chert eared contracting stem 3B style point. Both are Middle Archaic Period forms dating to 9.0–7.0 cal. ka (*28*). The volcanic point exhibits a mix of percussion and pressure flaking with a relatively random flake negative signature and step fracturing likely due to the more heterogeneous nature of the raw material. The cross sections and profiles of this artifact are curved to slightly twisted yet relatively thin. The chert projectile point is finely pressure flaked over earlier percussion thinning as evidenced in portions where pressure negatives have not obliterated percussion negatives. This finely serrated point is missing the distal-most tip (ca. 2 mm) and a small fragment of the proximal-most portion indicating that the point had been used before it was buried.

The point exhibits a straight profile and biconvex section with some abrasion of the hafting element further supporting that it had been used prior to interment.

4 Radiocarbon dating

Radiocarbon and associated stable isotope measurements were carried out at the Keck Carbon Cycle AMS laboratory at University of California, Irvine. Bone sample preparation followed Shammas et al. (*75*). Bones were cleaned mechanically with a Dremel rotary tool, and aliquots of crushed bone ($\sim$200mg) were decalcified in 1N HCl at room temperature overnight, gelatinized at 60°C and pH 2, and ultrafiltered to select a high molecular weight fraction (>30kDa), which was freeze-dried. Aliquots for ^{14}C were combusted in vacuo in quartz at 900°C with CuO, graphitized, and measured by AMS.

Radiocarbon results are given as conventional radiocarbon ages following the conventions of Stuiver and Polach (*76*). Sample preparation backgrounds have been subtracted based on measurements of ^{14}C-free collagen, and all results have been corrected for isotopic fractionation using δ^{13}C values measured on prepared graphite using the AMS spectrometer. The δ^{13}C and δ^{15}N values shown here were measured to a precision of $<$0.1‰ and $<$0.2‰, respectively, on aliquots of ultrafiltered collagen, using a Fisons NA1500NC elemental analyzer/Finnigan Delta Plus isotope ratio mass spectrometer. Calibration was performed using Bchron (*77*) as implemented in R statistical computing environment (*78*) using the 2013 Southern Hemisphere calibration curve (*61*).

Sample extracted from a WMP6 cranial vault fragment and femur fragment yielded age estimates of 8035$\pm$20 and 7965$\pm$25 ^{14}C B.P., respectively (table S2). Following the method described by Long and Rippeteau (*79*), these two dates average to 8008$\pm$16 ^{14}C B.P., which calibrates to 8.98–8.73 cal. ka (95%).

Table S2 Radiocarbon results for WMP Individual 6. Collagen [a]>30kDa yield (%).

UCIAMS#	sample	collagen	^{14}C age (B.P.)	δ^{15}N (‰)	δ^{13}C (‰)	%N	%C	atomic C:N
212748	cranial vault	6.5	8035$\pm$20	8.2	-18.8	15.7	43.4	3.2
212749	left femur	1.9	7965$\pm$25	8.0	-19.0	15.0	42.5	3.3

5 Proteomics

Proteomic analysis of the dental enamel from the Wilamaya Patjxa individuals was conducted at UC Davis to estimate the sex of WMP6 and WMP1. Here we detail the laboratory and data-analysis methods.

5.1 Laboratory procedure

A small amount of enamel, $\sim$20 mg, was removed from teeth by cutting with a clean double sided, diamond-coated steel disc (Brasseler Inc., Savannah, GA, HP medium), or by grinding with an unused carbide steel burr (Brasseler Inc, Savannah, GA, US# 7 SH round). Blades were cleaned with ultrasonication and triple rinsed with 95% ethanol between samples. Powdered or cut enamel samples ($\sim$20 mg) were demineralized by adding 200 μL of 1.2M hydrochloric acid to 2mL sample vial with seven 2.8 mM ceramic beads (Omni-International Inc.). Samples were milled for three minutes at 7000 rpm in a MagnaLyzer (Roche Inc.), then centrifuged for five minutes at 16000g. To reduce soluble proteins, 6 μL of 0.5M dithioerythritol (DTE) was added to each sample vial and incubated at 56°C for 60 minutes. After incubation, 2M ammonium bicarbonate was added to each sample vial until the pH of the supernatant was 7.5-8.0. Alkylation was performed by adding 12L of 0.5M iodoacetamide to the sample vials and incubated in the dark at 25°C for 60 minutes. The carbamidomethylation reaction was quenched by adding 12 μL of 0.5M DTE to the sample vials and incubated at room temperature for five minutes. After incubation, 0.01% Protease Max (Promega Inc.) was added to the sample vials along with 0.5 μg mass spectrometry grade trypsin (Thermo Pierce Inc.). Each sample was incubated at room temperature for 20 hours at 300 rpm. After incubation, sample vials were centrifuged for five minutes and 200 μL of the supernatant transferred to 0.22 μm centrifugal filters and centrifuged for 30 minutes. The filtrate was then transferred to clean Eppendorf Protein LoBind tubes for ZipTip (Millipore-Sigma Inc.) sample clean up to prepare for mass spectrometric analysis. Organic contaminants in aqueous stocks and solutions were removed by prior passage over solid phase extraction (SepPak, C18, Waters Inc.). Blank samples were prepared alongside each batch of samples.

Digested peptides were desalted and concentrated using ZipTip C18 pipette tips (Millipore Inc.) with the eluted material lyophilized and stored at 4°C in Lo-Bind (Eppendorf) tubes until analyzed via liquid chromatography-tandem mass spectrometry. Prior to analysis, samples were re-suspended in 2% (v/v) acetonitrile and 0.1% (v/v) TFA. Peptide concentration was measured using the Pierce Quantitative Fluorometric Peptide Assay (Thermo Pierce, Inc.) and 1 μg of peptide, or 40% of the total sample if the sample was too diluted, was applied to mass spectrometry. Liquid chromatography-tandem mass spectrometry of peptides was accomplished with a Thermo Scientific Q-Extractive Plus Orbitrap mass spectrometer equipped with a Proxeon Easy-nLC II HPLC (Thermo Scientific). Samples were loaded a 100 micron x 25 mm Magic C18 100Å 5U reverse phase trap where they were desalted online before being separated using a 75 micron x 150 mm

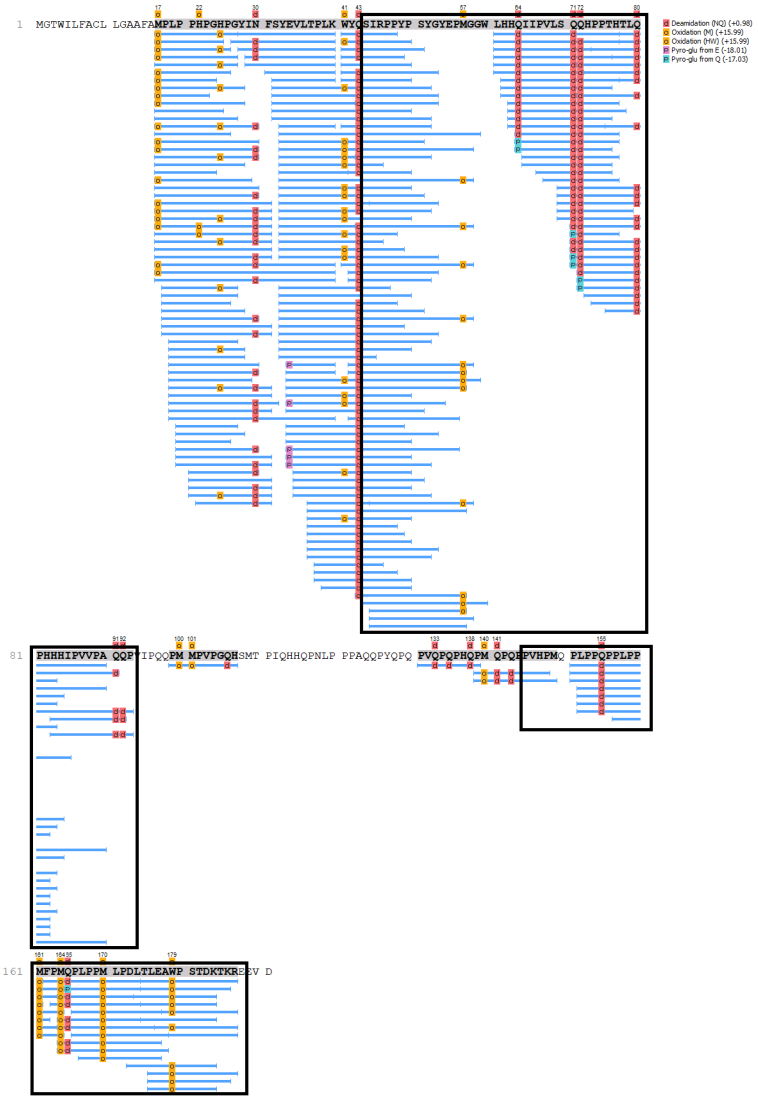

Fig. S4 Multiple peptides for AMELX_HUMAN isoform 1 (Uniprot accession number Q99217-1) detected in enamel from WMP6 female. AMELX peptides are detected in both female and male enamel, while AMELY peptides are detected only in male enamel. Peptides with amino acid substitutions unique to the AMELX form of amelogenin are indicated here by back rectangles. Chemical modifications such as methionine oxidation (yellow squares), deamidation (red squares), and pyro-Glu modification (teal squares) are included. No unique AMELY_HUMAN signal was observed for WMP6.

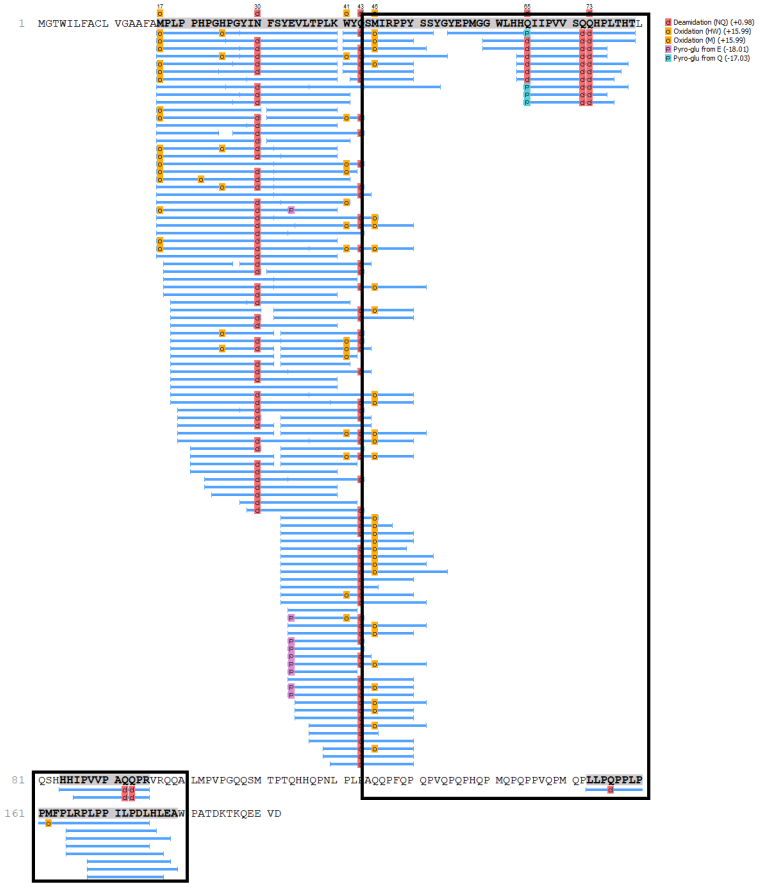

Fig. S5 Multiple peptides for AMELY_HUMAN isoform 1 (Uniprot Q99218-1) detected in enamel from WMP1 male. AMELY peptides are only detected in male enamel, while AMELX peptides are detected both female and male enamel. Peptides with amino acid substitutions unique to the AMELY forms of amelogenin are indicated here by back rectangles. Chemical modifications such as methionine oxidation (yellow squares), deamidation (red squares), and pyro-Glu modification (teal squares) are included.

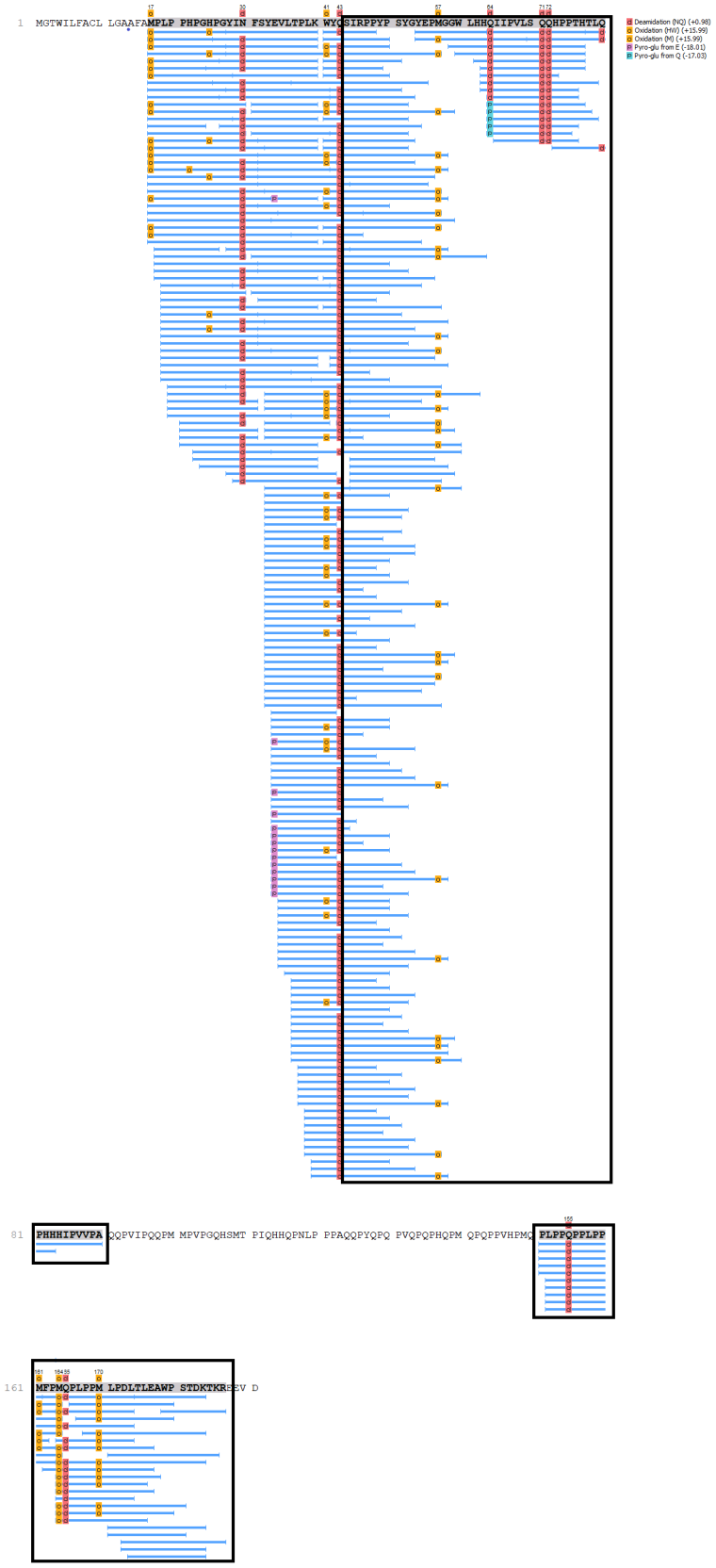

Fig. S6 Multiple peptides for AMELX_HUMAN isoform 1 detected in enamel from WMP1 male. AMELX peptides are detected in both female and male enamel, while AMELY peptides are detected only in male enamel. Peptides with amino acid substitutions unique to either the AMELY or AMELX forms of amelogenin are indicated by back rectangles. Chemical modifications such as methionine oxidation (yellow squares), deamidation (red squares), and pyro-Glu modification (teal squares) are included.

Magic C18 200Å 3U reverse phase column. Peptides were eluted using a 65 minute gradient with a flow rate of 300nl/min. An MS survey scan was obtained for the m/z range 300-1600, MS/MS spectra were acquired using an inclusion list of 28 ions that were subjected to HCD (High Energy Collisional Dissociation). When inclusion list ions were not found, MS/MS was done on other ions in the MS survey scan. An isolation mass window of 1.6 m/z was used for precursor ion selection, and normalized collision energy of 27% used for fragmentation. A five second duration was used for the dynamic exclusion. Washes were applied between each sample. After ten samples a blank run of BSA standards was applied to test for sample-to-sample contamination.

5.2 Data analysis

Mass spectrometry datasets (.RAW format) were processed with PEAKS (10.0) peptide matching software (Bioinformatics Solutions Inc., Waterloo, ON). The FASTA formatted UNIPROT Homo sapiens reference protein database (http://www.uniprot.org/proteomes/UP000005640) was modified to include additional FASTA protein entries of peptide sequences from all splice variants associated with AMELX_HUMAN (Q99217-1, -2, -3) and AMELY_HUMAN (Q99218-1, -2) proteins gene products (*80, 81*). The reference database was further modified to incorporate a decoy database and was validated in PEAKS10 Software (*82*). Peptide matching spectral assignment was conducted using default conditions with the following exceptions: error tolerance was set to ten ppm for precursor mass and 0.04Da for fragment ions; cleavage with trypsin was set to non-specific, and up to two missed cleavages. The algorithm assumed all cysteines were carbamidomethylated, and the peptide was partially modified by deamidation (NQ), oxidation (MHW) and dioxidation (M), and pyroglutamate conversion from glutamate and glutamine. All peptide assignments were filtered by a 1% false discovery rate (*82*). Each peptide was quantified by using the peak ion intensity of the primary precursor mass over charge ratio (m/z). Peptides composed entirely of paralogous amino acid sequences were further filtered from results. Maximum ion intensity signals from all peptides specific to either the AMELY_HUMAN or AMELX_HUMAN gene product were then combined into a cumulative single metric (combined intensities, CI), normalized for total enamel sampled (mg), and corrected for the proportion of the sample applied to the instrument (CI per mg enamel). Detection of peptides specific to the AMELY_HUMAN gene product was considered unambiguous evidence of male sex. In the absence of AMELY_HUMAN peptides, female probability, $Pr(F)$, was calculated as a function of the combined intensity of AMELX peptides, based on logistic regression of known standards where increased AMELX signal increased the probability of female sex (*36*). Specifically, AMELX_HUMAN signals (CI/mg) were log transformed and then solved for $Pr(F)$ using the

equation

$$Pr(F) = 1.0 + \frac{0.059 - 1.0}{1 + \left(\frac{x}{7.54}\right)^{13.99}}$$

where x is the logarithm (base 10) of the AMELX_HUMAN (*36*). Samples with a $Pr(F) < 0.5$ are considered indeterminate for proteomic sex estimation.

6 Stable isotopes

Bone samples were washed with deionized water (dH2O) and the surface brushed cleaned of any adhering soil or other material. Because the outer surface is exposed to water and sediment in the burial environment, it is more subject to contamination and alteration (*83, 84*). Our study focuses on interior sections of well-preserved cortical bone minimizing the potential effects of diagenetic changes to isotopic values (*85*). All exposed surfaces of bone, as well as any cancellous bone, were removed using a Fordham microdrill and discarded, leaving cleaned interior cortical bone. The sample was then sonicated in deionized water in five-minute washes, at least three times, until the water remained clear after a wash.

Approximately 200 micrograms of bone was then powdered in an agate mortar. Organics were removed by adding a 1.5% sodium hypochlorite (NaClO) at a ratio of .04 ml solution/mg sample (*86*). After 24 hours the sample was centrifuged and the NaClO solution replaced. After a second 24 hours the solution was discarded and the sample was washed three times with dH2O. The sample was then placed in a diagenetic wash composed of a 1M acetic acid solution (at the same ratio of .04 ml solution/mg sample) which was replaced after 8–12 hours. The sample was then rinsed three times with dH2O and any remaining water pipetted off. The sample was left in the container with no cap until completely dry.

Approximately 3 mg of powdered bioapatite was weighed into a 12-ml Labco Exetainer vial, loaded into an autosampler rack held at 70°C, and flushed with helium at 100ml/min for 10 min. Several drops of phosphoric acid (103%) were manually injected through a septum into each vial using a syringe to liberate CO_2 from carbonate, with the vial returned to the autosampler rack to equilibrate for 24 h at 30°C. The vial headspace was then analyzed for CO_2 using a ThermoFisherScientific GasBench II device with a 100 μl sample loop connected to a ThermoFisherScientific Delta V Plus gas-isotope ratio mass spectrometer. A pure CO_2 reference gas was used to calculate provisional delta (δ) values of the sample peak. Final δ values were obtained after adjusting provisional values for changes in linearity and instrumental drift that correct δ^{13}C and δ^{18}O values

relative to laboratory reference materials. NBS 18 (-5.01‰, -23.01‰, for δ^{13}C and δ^{18}O respectively), NBS 19 (1.95‰, -2.20‰), and LSVEC (-46.60‰, -26.70‰) were used to calibrate data on the Vienna Pee Dee Belemnite (VPDB) scale. Long-term external precision for δ^{13}C and δ^{18}O has been measured at $\pm$0.1 and $\pm$0.2 (1σ), respectively.

Table S3 presents the results including oxygen and carbon stable isotope values taken on bone bioapatite from WMP6 and WMP1. WMP6 produced a $\delta^{18}O_{VPDB}$ value of -10.6$\pm$0.2‰, which translates to a meteoric water value of -16.8$\pm$0.2‰ after conversion to the VSMOW scale (*87*) and correcting for fractionation due to bone incorporation (*88*). The $\delta^{13}C_{VPDB}$ value of -12.8‰ translates to a dietary value of -22.8‰ correcting for fractionation due to bone incorporation (*89, 90*). WMP1 produced $\delta^{18}O_{VPDB}$ values of -9.1$\pm$0.1 and -9.2$\pm$0.1‰ , which translate to an average meteoric water value of -14.5‰ after conversion to the VSMOW scale (*87*) and correcting for fractionation due to bone incorporation (*88*). $\delta^{13}C_{VPDB}$ values of -12.0$\pm$0.1 and -12.2$\pm$0.1‰ translate to an average dietary value of -22.1$\pm$0.1‰ correcting for fractionation due to bone incorporation (*89, 90*).

Table S3 Bioapatite stable oxygen and carbon isotope results.

sample	mass (mg)	$\delta^{13}C_{VPDB}$‰	$\delta^{18}O_{VPDB}$‰	% CO_3	VSMOW	MW
WMP1	0.991	-11.99	-9.13	1.7	21.50	-14.46
WMP1	1.003	-12.21	-9.22	1.8	21.41	-14.60
WMP6	0.964	-12.84	-10.55	2.1	20.03	-16.78

Additional dietary insight can be gained from the radiocarbon data (see table S3). The $\delta^{15}N_{VPDB}$ values of 8.2$\pm$0.2 and 8.0$\pm$0.2‰ translate to an average dietary value of 2.1$\pm$0.1‰ after correcting for trophic enrichment (*91*). The $\delta^{13}C_{VPDB}$ values of -18.8$\pm$0.1‰ and -19.0$\pm$0.1‰ translate to an average dietary value of -23.9$\pm$0.1‰ after correcting for carbon fractionation due to bone incorporation (*92*). These δ^{13}C values are consistent with those obtained on the δ^{13}C values obtained on bioapatite. Fig. S7 plots the WMP6 $\delta^{13}C_{diet}$ and $\delta^{15}N_{diet}$ values against subsistence resource from the Andean Altiplano (*39, 93–97*). The results show a diet of mixed C_3 plants and camelid meat.

7 Faunal analysis

Taxonomic assignments were based on qualitative macroscopic identification of osteological landmarks with reference to comparative collections following Pacheco et al. (*98*) for camelid remains and Gilbert (*99*) for taruca, or Andean deer, remains. The majority of fragments were assigned to categories of large terres-

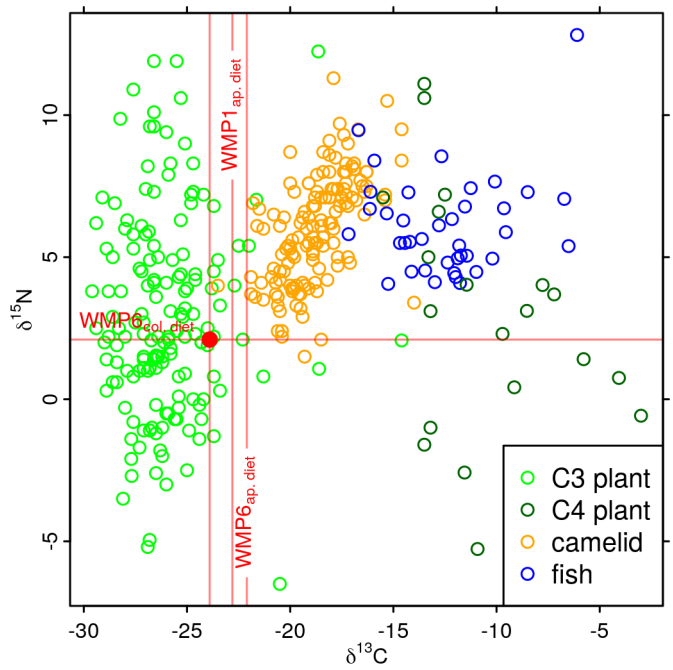

Fig. S7 WMP6 and WMP1 dietary stable carbon and nitrogen isotope values in relation to values for high-elevation Andean subsistence resources (*39, 93–97*). Note that while collagen values include both carbon and nitrogen determinations, apatite values only include carbon determinations.

trial mammal (LTM), small terrestrial mammal (STM), or indeterminate terrestrial mammal (TM). Endemic Holocene LTMs in the Titicaca Basin include vicuña (*Vicugna vicugna*) and taruca (*Hippocamelus antisensis*). Endemic Holocene STMs include puma (*Felis concolor*), Andean fox (*Lycalopex culpaeus*), cuy (*Cavia porcellus*), viscacha (*Lagidium peruanum*), and skunk (*Conepatus chinga*). All bones and bone fragments were counted and weighed to a 100th of a gram. In total, 341 bone fragments comprising 61 g were recovered and examined. One diagnostic deer, three indeterminate large-terrestrial mammal, and six indeterminate mammal bone fragments were located in the fill of Individual 6 burial pit. Overall, camelid and deer bone are abundant (fig. S8). Notably absent or rare are small mammal, bird, and fish bone (table S4).

Fig. S8 Examples of taxonomically diagnostic faunal bones. (A) Taruca third phalanx. (B) Camelid third phalanx. Photo Credit: Sarah Noe, University of California, Santa Barbara.

Table S4 WMP faunal data summary. Raw data presented in table S5. TM=terrestrial mammal.

context	camelid	deer	large TM	small TM	TM	bird	total
Individual 1 fill (unit 46)	0	0	0	0	0	0	0
Individual 6 fill (unit 85)	0	1	3	0	6	0	10
all other feature fill	14	2	47	0	92	0	155
plow zone	3	2	56	0	114	1	176
total	17	5	106	0	212	1	341

Table S5 WMP faunal data.

unit	level	feature	count	taxon	element	side	portion	mass (g)
14	1	plow zone	8	mammal	long-bone fragment	indeterminate	shaft	1.58
18	1	plow zone	1	camelid	radioulna	left	dist. shaft	1.23
18	1	plow zone	19	mammal	long-bone fragment	indeterminate	shaft	5.02
18	1	plow zone	15	mammal	unidentified	indeterminate		0.21
22	1	plow zone	39	mammal	unidentified	indeterminate		1.58
24	1	plow zone	1	camelid	phalanx 1	indeterminate	shaft	1.27
25	1	plow zone	8	mammal	unidentified	indeterminate		0.56
26			12	mammal	crania	indeterminate	fragment	0.11
26	1	plow zone	16	mammal	unidentified	indeterminate		0.14
32	1	plow zone	2	mammal	long-bone fragment	indeterminate	shaft	0.13
41	1	plow zone	1	mammal	tooth	indeterminate	fragment	0.11
41	1	plow zone	4	mammal	unidentified	indeterminate		0.17
43	1	4	8	mammal	long-bone fragment	indeterminate	shaft	4.23
43	1	4	2	mammal	unidentified	indeterminate		0.14
44	1	5	3	mammal	unidentified	indeterminate		0.24
44	1	5	1	mammal	long-bone fragment	indeterminate	shaft	0.18
44	1	5	1	mammal	rib	indeterminate	shaft	0.16
44	2	5	7	mammal	long-bone fragment	indeterminate	shaft	3.47
44	2	5	1	mammal	rib	indeterminate	shaft	0.19
44	2	5	13	mammal	unidentified	indeterminate		0.33
45	1	plow zone	17	mammal	unidentified	indeterminate		0.62
49	1	6	5	mammal	unidentified	indeterminate		0.19
52	1	plow zone	2	mammal	unidentified	indeterminate		0.11
52	1	plow zone	1	mammal	crania	indeterminate	fragment	0.20
56	1	plow zone	3	mammal	long-bone fragment	indeterminate	shaft	1.68
56	1	plow zone	1	mammal	unidentified	indeterminate		0.14
57	1	plow zone	1	mammal	crania	indeterminate		0.17
61	1	plow zone	3	mammal	teeth	indeterminate	fragment	0.55
62	1	plow zone	1	camelid	maxilla	indeterminate	body	4.89
66	1	plow zone	1	bird	long-bone fragment	indeterminate	shaft	0.08
66	1	plow zone	1	mammal	long-bone fragment	indeterminate	shaft	0.15
66	1	plow zone	4	mammal	unidentified	indeterminate		0.07
67	1	plow zone	3	mammal	long-bone fragment	indeterminate	shaft	0.38
68	1	7	6	mammal	long-bone fragment	indeterminate	shaft	0.48
68	1	7	2	mammal	rib	indeterminate	shaft	0.18
68	1	7	2	mammal	unidentified	indeterminate		0.08
72	1	1	1	camelid	metacarpal	right	proximal	2.48
72	1	1	5	mammal	long-bone fragment	indeterminate	shaft	0.38
72	1	1	30	mammal	unidentified	indeterminate		1.20

Table S5 (cont.) WMP faunal data.

unit	level	feat.	count	taxon	element	side	portion	mass (g)
72	2	1	1	mammal	long-bone fragment	indeterminate	shaft	0.90
72	2	1	3	mammal	unidentified	indeterminate		0.10
72	3	1	9	camelid	molar	indeterminate	maxilla	2.45
72	3	1	1	camelid	phalanx 3	indeterminate	posterior	0.18
72	3	1	1	deer	phalanx 3	right	shaft	2.20
72	3	1	1	deer	phalanx 3	right	shaft	2.20
72	3	1	1	deer/camelid	crania	indeterminate	parietal	0.15
72	3	1	1	deer/camelid	crania	indeterminate	parietal	0.34
72	3	1	4	mammal	long-bone fragment	indeterminate	shaft	0.18
72	3	1	9	mammal	tooth	indeterminate	fragment	1.10
72	3	1	15	mammal	unidentified	indeterminate		0.12
75	1	9	1	camelid	metatarsal	right	proximal	3.78
75	1	9	1	camelid	phalanx 2/3	indeterminate	proximal	0.23
75	1	8	19	mammal	unidentified	indeterminate		0.35
75	2	8	1	camelid	tibia	right	shaft	7.84
75	2	plow zone	1	deer	astragalus	indeterminate	proximal	1.05
75	2	plow zone	1	deer	phalanx 2/3	indeterminate	shaft	2.32
75	2	plow zone	1	deer/camelid	tooth	indeterminate	fragment	0.02
75	2	plow zone	1	mammal	rib	indeterminate	shaft	0.27
75	2	plow zone	8	mammal	unidentified	indeterminate		0.07
85	3	9	1	deer	lumbar	indeterminate	trans. process	0.20
85	3	9	3	deer/camelid	tooth	indeterminate	fragment	0.05
85	3	9	6	mammal	unidentified	indeterminate		0.08

8 Burial meta-analysis

In order to contextualize the WMP6 burial, we examine early hunter-gatherer burial practices throughout the Americas. Here we present the analytical procedure and raw data.

8.1 Data collection

Early hunter-gatherer burial data from the Americas are compiled from published sources. Regional reviews of early human burial practices are first consulted and included those by Chatters (*100*), Dixon (*101*), Lepper (*102*), Owsley (*103*), Santoro (*104*), Strauss (*105*), and Walthall (*46*). Data are then compiled from the primary sources therein. Context, sex, age, and date estimates are recorded for each burial. Context refers to the quality of association between a burial and big-game hunting tools and can take one of three values–secure, tentative, or not applicable. Determining a secure context first requires the presence of big-game hunting tools including projectile points or atlatl parts such as hooks or banner stones. Atlatl parts are considered secure instances of big-game hunting tools. For projectile points to be considered secure instances of big-game hunting tools,

they must be ruled out as implements of human impalement (e.g., homicide weapons or hunting accidents). Projectile points that are embedded in human bone or otherwise determined to have been inside a body cavity near the time of death are not considered big-game hunting tools for this analysis. If a projectile point occurs in a position that is clearly outside the body but in clear stratigraphic association, especially with other grave goods and no evidence of disturbance, then the context is considered secure. All other isolated projectile points associated with burials are considered tentative hunting-tool associations. An absence of big-game hunting tools is almost always considered tentative absence given the fact that perishable tools could have degraded leading to false negatives. The exception to this is dry cave and water-logged contexts where we could reasonably expect perishable big-game hunting tools to preserve.

A second contextual consideration is burial type, which include primary inhumations, secondary inhumations, cremations, and disturbed burials. Secondary inhumations and disturbed burials are ineligible for a secure context classification. Primary inhumations and cremations are eligible for a secure assessment, though such contexts can exhibit a degree of disturbance that would result in classification as tentative. Context must also be well documented and reported with maps or photographs in published literature to be considered secure.

Sex estimations include female, male, or unknown sex. Female and male estimates are assessed as either secure or tentative. Secure assessments include those based on high-confidence DNA, enamel protein, or osteological assessments (*37*). Secure osteological assessments are considered those in which the analyst has expressed confidence in the identification, and their methods conformed to the standards of Buikstra and Ubelaker (*59*). All other osteological sex estimates are considered tentative. Age estimates are reduced to child or adult for the purpose of this study. The age classification scheme of Buikstra and Ubelaker (*59*) serves as the baseline, and adolescents are classified as adults for this study given that hunter-gatherer children begin hunting big game during adolescence (*106*). We do not make confidence determinations (i.e., secure or tentative) for age estimates given that the distinction between child and adult is relatively error prone. Moreover, age estimation is not intrinsically relevant to the research question. While it is unequivocal that only adults (i.e., adolescents and older) can hunt big game, that fact does not preclude the possibility of cultural association between female or male children with big-game hunting.

Date estimates for burials are based on radiocarbon, stratigraphic provenience, or artifact seriation. Where authors present averaged dates, those are used to date the burial event. Otherwise, we average multiple radiocarbon dates from single burial events using the method of Long and Rippeteau (*79*). All calibration is performed using Bchron (*77*) as implemented in R statistical computing environment (*78*) and using the north-

ern and southern hemisphere calibration curves as appropriate (*61, 107*). All burial date estimates are reduced to lower and upper bounds. For date estimates based on associated radiocarbon dates, these reflect the 95% confidence ranges of calibrated dates. For those based on stratigraphic associations or diagnostic artifacts, the date ranges reflect best estimates for beginning and end dates for the associated unit or diagnostic artifact types. Direct dates on bone collagen or cultural materials associated with the burial are considered more reliable than stratigraphic associations, which notoriously tend to overestimate burial ages (*108*). A date is considered secure if (a) the date is based on direct dates from human bone collagen or directly associated grave goods or (b) the burial is directly overlain and sealed by a securely dated, intact stratigraphic event such as a cultural feature or distinct marker horizon that pre-dates 8 cal. ka.

In aggregate, secure observations for the purpose of this analysis are considered those that produce secure contexts, secure sex estimates, and secure pre-8 cal. ka dates. Tentative observations are considered any burials in which context, sex estimation, and pre-8ka dates are identified as secure or tentative with at least one tentative determination. All other burials–those in which hunting tools are securely or tentatively identified as absent, sex is indeterminate, or age is indeterminate or post dates 8 cal. ka–are excluded from the final analysis. Data are summarized in table S6. Detailed information for each observation are presented below in narrative form by site ordered by latitude from north to south.

Table S6 Early human burials in the Americas with hunting tool associations and demographic estimates. *secure.

site	mni	lat.	long.	type	tools	sex	age	date (cal. ka)
Upward Sun River	1	64.4	-147.0	cremation	absent*	unknown	child	11.5*
Upward Sun River	2	64.4	-147.0	primary	present*	female*	child	11.5*
On Your Knees Cave	1	56.3	-133.6	disturbed	absent	male	adult	10.4*
L'Anse Amour	1	51.5	-56.9	primary	present*	unknown	adult	8.5–7.9
Gore Creek	1	50.7	-119.8	disturbed	absent	male*	adult	9.5–9.0*
Cummins	1	48.8	-89.4	cremation	absent	unknown	unknown	9.5–8.5
Marmes	1	46.6	-118.2	primary	absent	male	adult	9.4–7.8
Marmes	4	46.6	-118.2	primary	absent	unknown	unknown	9.4–7.8
CWU-DO1	1	46.2	-119.2	unknown	absent	male	adult	9.2–8.8
Kennewick	1	46.2	-119.2	primary	absent	male*	adult	9.4–9.3*
Anzick	1	46.0	-110.6	primary	present	male*	child	12.7–12.6*
Anzick	1	46.0	-110.6	disturbed	absent	unknown	child	9.9–9.5*
Browns Valley	1	45.6	-96.8	primary	present	male	adult	10.1–9.5
Renier	1	44.6	-87.8	cremation	present	male	adult	9.0–8.0
Buhl	1	42.7	-114.8	primary	present	female	adult	12.7–12.4*
Annasnappet Pond	1	41.9	-70.8	cremation	present	unknown	unknown	8.7–8.0
Squaw Rockshelter	1	41.4	-81.4	disturbed	absent	female	adult	11.1–6.0
Squaw Rockshelter	2	41.4	-81.4	disturbed	absent	unknown	unknown	11.1–6.0
Gordon Creek	1	40.7	-105.4	primary	present	female	adult	11.9–10.3

Table S6 (cont.) Early human burials in the Americas with hunting tool associations and demographic estimates. *secure.

site	mni	lat.	long.	type	tools	sex	age	date (cal. ka)
Meadowcroft Rockshelter	1	40.3	-80.5	disturbed	absent	unknown	child	16.8–8.5
Fishbone Cave	1	40.1	-119.3	disturbed	absent	unknown	unknown	14.6–12.6
Wizards Beach	1	40.1	-119.7	disturbed	absent	unknown	unknown	10.6–10.2*
Grimes Shelter	1	39.4	-118.6	primary	absent	unknown	child	11.1–10.6
Spirit Cave	2	39.4	-118.6	cremation	absent	unknown	unknown	10.4–9.9*
Spirit Cave	1	39.4	-118.6	disturbed	absent	female	adult	10.6–10.3*
Spirit Cave	1	39.4	-118.6	primary	absent*	male	adult	10.7–10.6*
Koster	3	39.2	-90.5	primary	absent	female	adult	10.2–9.4
Koster	1	39.2	-90.5	primary	absent	male	adult	10.2–9.4
Koster	1	39.2	-90.5	primary	present	male	adult	10.2–9.4
Koster	4	39.2	-90.5	primary	absent	unknown	child	10.2–9.4
Koster	1	39.2	-90.5	unknown	absent	unknown	unknown	9.1–8.4
Hourglass Cave	1	39.0	-106.0	disturbed	absent	male*	adult	9.0–8.6*
Mostin	19	39.0	-122.8	primary	absent	unknown	unknown	11.4–7.8
Mostin	1	39.0	-122.8	primary	absent	female	adult	12.8–11.4
Graham Cave	1	38.9	-92.2	primary	absent	unknown	adult	12.0–8.0
Arnold Cave	1	38.7	-92.6	primary	present	unknown	adult	12.0–8.0
Arnold Cave	1	38.7	-92.6	primary	absent	unknown	child	12.0–8.0
Jerger	3	38.0	-87.1	cremation	present	unknown	unknown	9.8–9.3
Ashworth Shelter	1	37.6	-85.6	primary	present	female	adult	10.7–8.3
Kaskaskia Mine Site	1	37.5	-89.7	primary	absent	female	adult	9.0–8.8
Modoc	2	37.5	-89.7	primary	absent	female	adult	10.2–7.8
Modoc	2	37.5	-89.7	primary	absent	male	adult	10.2–7.8
Modoc	1	37.5	-89.7	primary	absent	unknown	child	10.2–7.8
Olive Branch	1	36.6	-89.2	cremation	absent	female	adult	12.5–11.3
Lawrence	1	36.2	-87.7	primary	present	male	adult	10.7–7.9
Lawrence	1	36.2	-87.7	primary	present*	male*	adult	8.4–7.9
Lawrence	9	36.2	-87.7	primary	absent	unknown	adult	10.7–7.9
Sloan	1	36.1	-90.6	disturbed	present	female	unknown	11.3–12.5
Sloan	1	36.1	-90.6	disturbed	present	male	unknown	11.3–12.5
Red Rock Cave	1	35.9	-94.7	primary	absent	unknown	adult	12.5–11.3
Red Rock Cave	1	35.9	-94.7	primary	absent	unknown	child	12.5–11.3
Allen	2	35.8	-88.0	primary	present*	male	adult	10.7–8.3
Icehouse Bottom	1	35.6	-84.2	cremation	absent	female	adult	10.5–8.3
Icehouse Bottom	1	35.6	-84.2	cremation	present	female	adult	9.8–9.3
Dust Cave	1	34.4	-87.7	primary	absent	female	adult	10.7–8.3
Dust Cave	1	34.4	-87.7	primary	absent	unknown	child	10.7–8.3
Rancho La Brea	1	34.1	-118.4	disturbed	absent	female	adult	10.2–10.2*
Arch Lake	1	34.0	-103.1	primary	absent	female	adult	11.7–11.3*
Arlington Springs	1	34.0	-120.1	disturbed	absent	unknown	adult	13.0–12.7*
Tuquan	1	34.0	-120.4	unknown	absent	male	adult	10.2–9.9
Chancellor	1	32.9	-117.2	primary	absent	male	adult	9.6–9.4
Chancellor	1	32.9	-117.2	primary	absent	female	adult	9.6–9.4
Midland	1	32.0	-102.1	disturbed	absent	female	adult	10.0–8.0
Horn Shelter No. 2	1	31.8	-97.3	primary	absent*	female	child	11.2–10.8*
Horn Shelter No. 2	1	31.8	-97.3	primary	absent*	male	adult	11.2–10.8*
Whitewater Draw	1	31.7	-109.7	primary	absent	female	adult	12.4–9.1
Wilson-Leonard	1	30.5	-97.8	primary	absent	female	adult	10.0–9.5

Table S6 (cont.) Early human burials in the Americas with hunting tool associations and demographic estimates. *secure.

site	mni	lat.	long.	type	tools	sex	age	date (cal. ka)
Windover	1	28.5	-80.9	primary	present*	female	adult	9.3–7.5
Windover	1	28.5	-80.9	primary	absent	female	adult	9.3–7.5
Windover	1	28.5	-80.9	primary	present	male	adult	9.3–7.5
Windover	1	28.5	-80.9	primary	absent	male	adult	9.3–7.5
Warm Mineral Springs	1	27.1	-82.3	disturbed	absent	unknown	child	12.6–11.3
Cutler Site	1	25.6	-80.3	disturbed	absent	female*	adult	11.3–10.7
Cutler Site	1	25.6	-80.3	disturbed	absent	male*	adult	11.3–10.7
Cutler Site	1	25.6	-80.3	disturbed	absent	unknown*	adult	11.3–10.7
Cutler Site	2	25.6	-80.3	disturbed	absent	unknown*	child	11.3–10.7
Hoyo Negro	1	20.2	-87.5	disturbed	absent	female*	adult	12.8–12.8*
Las Palmas	1	20.2	-87.5	primary	absent	female	adult	9.4–8.6*
Muknal Cave	1	20.2	-87.5	secondary	absent	male	adult	13.0–9.6*
Naharon	1	20.2	-87.5	disturbed	absent	female	adult	13.6–13.4
Mexico City sites	1	19.0	-99.5	disturbed	absent	female	adult	12.7–12.6*
Mexico City sites	1	19.0	-99.5	disturbed	absent	unknown	adult	12.4–10.7*
Mexico City sites	1	19.0	-99.5	disturbed	absent	unknown	unknown	10.5
Mexico City sites	2	19.0	-99.5	disturbed	absent	unknown	adult	10.5
Texcal Cave	1	18.9	-98.1	unknown	absent	male	adult	8.4–8.2*
Checua	3	5.6	-73.8	primary	absent	female	adult	9.4–7.6
Checua	3	5.6	-73.8	primary	absent	male	adult	9.4–7.6
Checua	3	5.6	-73.8	primary	absent	unknown	adult	9.4–7.6
Checua	1	5.6	-73.8	primary	absent	unknown	child	9.4–7.6
Nemocón	1	5.1	-73.9	disturbed	absent	unknown	unknown	8.5–7.6
Chia III	7	4.9	-73.7	disturbed	absent	unknown	unknown	8.3–5.7
Tequendama	1	4.4	-74.1	cremation	absent	unknown	unknown	10.2–8.8
Tequendama	1	4.4	-74.1	primary	absent*	male	adult	8.2–7.9*
Tequendama	17	4.4	-74.1	unknown	absent	unknown	unknown	8.2–6.4
Tequendama	1	4.4	-74.1	disturbed	absent	unknown	unknown	8.2–6.4
OGSE-80	1	-2.2	-80.9	primary	absent*	female*	adult	9.5–7.1
OGSE-80	1	-2.2	-80.9	primary	absent*	male*	adult	9.5–7.1
OGSE-80	1	-2.2	-80.9	primary	absent*	female*	child	9.5–7.1
OGSE-80	1	-2.2	-80.9	primary	absent*	male*	child	9.5–7.1
Guavio 1	1	-4.7	-73.5	primary	absent	female	adult	10.7–10.3
Sueva 1	1	-4.8	-73.7	primary	present	unknown	adult	11.3–7.2
CA-09-28	1	-7.0	-79.2	disturbed	absent	unknown	unknown	9.5–7.8
CA-09-52	1	-7.0	-79.2	disturbed	absent	male	unknown	9.5–7.8
Pampa de los Fósiles 13	1	-7.3	-79.3	primary	absent	male	adult	12.6–11.2
Pampa de los Fósiles 13	1	-7.3	-79.3	primary	absent	unknown	child	12.6–11.2
Toca do Paraguaio	1	-8.8	-42.6	primary	absent	female	adult	10.1–9.4
Toca dos Coqueiros	1	-8.8	-42.6	primary	present*	unknown	adult	11.3–11.2
Toca da Cerca do Elias	1	-8.9	-42.6	disturbed	absent	unknown	unknown	12.0–11.8
Toca do Gordo do Garrincho	1	-8.9	-42.6	disturbed	absent	unknown	unknown	14.1–13.9
Lauricocha	1	-10.3	-76.7	primary	absent	female*	adult	8.6–8.5*
Lauricocha	1	-10.3	-76.7	primary	absent	male*	child	8.6–8.4*
Telarmachay	1	-11.2	-75.9	primary	absent*	female	adult	10.2–8.0
Telarmachay	1	-11.2	-75.9	primary	present*	female	adult	10.2–8.0
Telarmachay	1	-11.2	-75.9	primary	absent*	unknown	child	10.2–8.0
Lurin Village 20	1	-12.2	-76.9	unknown	absent	unknown	unknown	8.3–7.8

Table S6 (cont.) Early human burials in the Americas with hunting tool associations and demographic estimates. *secure.

site	mni	lat.	long.	type	tools	sex	age	date (cal. ka)
Quiqché	1	-12.3	-76.5	primary	absent	female	adult	12.0–8.5
Tres Ventanas Cave II	1	-12.3	-76.5	primary	absent	unknown	child	9.3–8.5*
Tres Ventanas Cave II	1	-12.3	-76.5	primary	absent	unknown	adult	9.3–8.5
Quipa Pucusana	1	-12.5	-76.7	primary	absent	female	adult	8.4–7.6
Bay of Paracas Village 514	1	-13.8	-76.3	primary	present	male	adult	9.0–8.2
Bay of Paracas Village 96	1	-13.8	-76.3	primary	absent	male	adult	9.0–8.2
Cuncaicha	1	-15.4	-72.6	primary	absent	male*	adult	9.0–8.7*
Cuncaicha	1	-15.4	-72.6	primary	absent	female*	adult	8.5–8.4*
Cuncaicha	1	-15.4	-72.6	primary	absent*	female*	adult	9.1–8.8*
Wilamaya Patjxa	1	-16.2	-69.7	primary	present*	female*	adult	9.0–8.7*
Wilamaya Patjxa	1	-16.2	-69.7	primary	present	male*	adult	9.0–7.0
Quebrada de los Burros	1	-18.0	-70.8	primary	absent	male	adult	8.0–7.5
Quebrada de los Burros	1	-18.0	-70.8	primary	absent	male	adult	9.5–9.0
El Morro 1	1	-18.5	-70.3	unknown	absent	unknown	unknown	9.0–3.6
Harold Walter Collection	11	-19.0	-44.0	unknown	absent	female	unknown	8.5–8.0
Harold Walter Collection	11	-19.0	-44.0	unknown	absent	male	unknown	8.5–8.0
Lapa D'Água	2	-19.0	-44.0	unknown	absent	female	unknown	9.5–8.8
Lapa da Amoreira	1	-19.0	-44.0	unknown	absent	male	unknown	9.0–7.8
Lapa de Carrancas	2	-19.0	-44.0	unknown	absent	male	unknown	9.0–8.6
Lapa de Escrivânia 3	1	-19.0	-44.0	unknown	absent	female	unknown	8.6–8.4
Lapa de Escrivânia 3	1	-19.0	-44.0	unknown	absent	unknown	unknown	8.6–8.4
Santana do Riacho	1	-19.2	-43.8	primary	present	unknown	unknown	9.4–8.6
Santana do Riacho	1	-19.2	-43.8	primary	absent	female	adult	15.4–14.8
Santana do Riacho	1	-19.2	-43.8	primary	absent	unknown	unknown	9.5–9.0
Santana do Riacho	1	-19.2	-43.8	primary	absent	unknown	unknown	9.4–9.0*
Santana do Riacho	1	-19.2	-43.8	primary	absent	unknown	unknown	9.5–8.7
Acha-2	1	-19.3	-70.3	disturbed	absent	male	adult	10.7–9.5*
Cerca Grande Rockshelters	1	-19.5	-44.0	primary	absent	female	unknown	10.3–10.2
Cerca Grande Rockshelters	1	-19.5	-44.0	primary	absent	unknown	unknown	9.3–9.0*
Cerca Grande Rockshelters	1	-19.5	-44.0	primary	absent	male	unknown	9.3–9.0*
Cerca Grande Rockshelters	19	-19.5	-44.0	primary	absent	unknown	unknown	10.3–8.9
Cerca Grande Rockshelters	2	-19.5	-44.0	disturbed	absent	unknown	unknown	10.3–8.9
Lapa do Caetano	1	-19.5	-44.0	unknown	absent	female	unknown	10.7–8.8
Lapa do Caetano	1	-19.5	-44.0	unknown	absent	male	unknown	10.7–8.8
Lapa do Santo	32	-19.5	-44.0	unknown	absent	unknown	unknown	10.1–7.9
Sumidouro	14	-19.5	-43.9	unknown	absent	female	unknown	10.2–8.0
Sumidouro	17	-19.5	-43.9	unknown	absent	male	unknown	10.2–8.0
Lapa Mortuária Cave	1	-19.6	-44.0	primary	absent	male	adult	14.0–13.6
Lapa Mortuária Rockshelter	2	-19.6	-44.0	unknown	absent	female	unknown	10.1–7.9
Lapa Mortuária Rockshelter	2	-19.6	-44.0	unknown	absent	male	unknown	10.1–7.9
Lapa Vermelha IV	1	-19.7	-43.9	disturbed	absent	female	adult	11.7–11.2*
Cueva Yavi	4	-22.2	-65.4	secondary	absent	unknown	unknown	11.4–8.6
Pintoscayoc 1	1	-22.9	-65.4	primary	absent	female	adult	10.3–10.0
Pintoscayoc 1	1	-22.9	-65.4	primary	absent	male	adult	10.3–10.0
Pintoscayoc 1	1	-22.9	-65.4	disturbed	absent	unknown	unknown	9.0–8.4
La Chimba 13	1	-23.6	-70.7	primary	absent	male	adult	10.6–10.3
Cueva Huachichocana III	1	-24.7	-65.7	secondary	present	male	adult	11.2–10.6
Peñas de las Trampas 1.1	5	-26.0	-68.0	secondary	absent*	unknown	child	9.5–8.5*

Table S6 (cont.) Early human burials in the Americas with hunting tool associations and demographic estimates. *secure.

site	mni	lat.	long.	type	tools	sex	age	date (cal. ka)
Peñas de las Trampas 1.1	1	-26.0	-68.0	secondary	absent*	unknown	adult	9.5–8.5*
La Fundición 1	1	-30.1	-70.9	primary	absent	unknown	unknown	10.1–9.5
La Fundición 1	1	-30.1	-70.9	disturbed	absent	unknown	unknown	10.1–9.5
La Fundición 1	3	-30.1	-70.9	secondary	absent	unknown	adult	10.1–9.5
La Fundición 1	1	-30.1	-70.9	secondary	absent	unknown	child	10.1–9.5
Caverna Piuquenes	1	-32.9	-70.3	primary	absent	female	adult	9.0
Caverna Piuquenes	1	-32.9	-70.3	primary	absent	female	adult	10.2–9.5
Punta Curaumilla	1	-33.1	-71.7	disturbed	absent	unknown	unknown	10.2–9.5
Huentelauquén	2	-33.4	-70.6	primary	absent	unknown	adult	9.1–8.6
Huentelauquén	1	-33.4	-70.6	primary	absent	female	adult	9.1–8.6
Huentelauquén	4	-33.4	-70.6	primary	absent	unknown	child	9.1–8.6
Cuchipuy	50	-34.5	-71.1	unknown	absent	unknown	unknown	9.2–6.6
Arroyo Seco 2	1	-38.4	-60.2	primary	absent	male*	adult	9.0–8.2
Arroyo Seco 2	1	-38.4	-60.2	primary	present	male*	adult	9.0–8.4*
Arroyo Seco 2	1	-38.4	-60.2	primary	absent	female*	adult	8.4–8.2*
Arroyo Seco 2	1	-38.4	-60.2	primary	present	male	adult	8.5–8.2*
Arroyo Seco 2	1	-38.4	-60.2	primary	absent	female*	adult	8.6–8.2*
Arroyo Seco 2	1	-38.4	-60.2	primary	absent	unknown	child	8.6–8.2*
Arroyo Seco 2	1	-38.4	-60.2	primary	present	male*	adult	8.8–8.4*
Arroyo Seco 2	1	-38.4	-60.2	primary	present	female*	adult	8.8–8.4*
Arroyo Seco 2	1	-38.4	-60.2	primary	absent	female*	adult	9.0–8.2
Arroyo Seco 2	1	-38.4	-60.2	primary	absent	male*	adult	8.5–8.2*
Arroyo Seco 2	1	-38.4	-60.2	primary	absent	female*	adult	8.5–8.2*
Arroyo Seco 2	1	-38.4	-60.2	primary	absent	male*	child	8.5–8.2*
Arroyo Seco 2	1	-38.4	-60.2	primary	absent	female*	child	8.5–8.2*
Baño Nuevo 1	1	-45.3	-71.5	unknown	absent	male	adult	10.2–9.7*
Baño Nuevo 1	1	-45.3	-71.5	unknown	absent	female	adult	9.9–9.0
Palli Aike	1	-52.1	-69.7	unknown	absent	male	adult	10.7–8.4
Palli Aike	1	-52.1	-69.7	cremation	absent	unknown	unknown	10.7–8.4

8.2 Data analysis

To determine the extent to which females were buried with big-game hunting tools, we first examine secure cases in which context, sex, and date estimates are each determined to be secure. Only four individuals from three sites meet these strict criteria (table S7)–Cuncaicha burial 7, Wilamaya Patjxa Individual 6, and the two lower burials from Upward Sun River. Of those, three female burials are securely associated with big game hunting tools, no males are securely associated, one female is securely unassociated, and no males are securely unassociated. The securely associated female burials include the WMP6 burial and two Upward Sun River burials. The Upward Sun River females are both infants and thus were not hunters per se, although they appear to have been gendered in a way that recognized females as being associated with big game hunting. Thus the WMP6 burial is the only burial securely identified as a big-game hunter burial in the entire sample of late

Pleistocene and early Holocene burials in the Americas. Under the most conservative criteria, we identify one female hunter burial and no male hunter burials.

Table S7 Burials with hunting tools–secure context, sex, and date estimations.

	no	yes	sum
female	1	3	4
male	0	0	0
sum	1	3	4

We next relax the strict context, sex, and dating criteria to include both secure and tentative associations under the assumption that any behavioral signals ought to rise above the noise of spurious singular observations. When we do this, the sample increases to 182 individuals, including 93 females and 89 males (table S8), which is at statistical parity ($\chi^2 = 0.09$, $df = 1$, $p = 0.77$). Of the 27 individuals with secure or tentative association with big game hunting tools, 11 are female and 16 are male, which is at statistical parity ($\chi^2 = 0.93$, $df = 1$, $p = 0.34$). Given the most liberal criteria for identifying early hunter burials, we cannot exclude the possibility that females and males are just as likely to be associated with big-game hunting tools, which is consistent with the hypothesis of non-gendered big-game hunting among early populations.

Table S8 Burials with hunting tools–secure and tentative context, sex, and date estimations.

	no	yes	sum
female	82	11	93
male	73	16	88
sum	155	27	182

To be sure that individual sites are not biasing the outcome, we examine the data at a site level, considering only unique sex-site-association instances. For example, a site with two male burials associated with tools would count as a single instance in this approach. The outcome is 25 associations (table S9). Ten sites have at least one female burial in association with hunting tools and 15 sites have at least one male in association (table S9), which is again at statistical parity ($\chi^2 = 1$, $df = 1$, $p = 0.32$). Sites with female burials in secure or tentative association with hunting tools include Arroyo Seco 2, Ashworth Shelter, Buhl, Gordon Creek, Icehouse Bottom, Sloan, Telarmachay, Upward Sun River, Wilamaya Patjxa, and Windover. Sites with male burials in secure or tentative association with hunting tools include Allen, Anzick, Arroyo Seco 2, Bay of Paracas Village 514, Browns Valley, Cueva Huachichocana III, Koster, Lawrence, Renier, Sloan, Wilamaya Patjxa, and Windover. This result does not change significantly from that obtained in the individual-burial analysis. We therefore have no reason to believe that there is any appreciable site bias influencing the analysis.

Table S9 Site-based sex-tool associations–secure and tentative context, sex, and date estimations.

	no	yes	sum
female	52	10	62
male	42	15	57
sum	94	25	119

We further evaluate the extent to which some particular time period is driving the observed results by comparing date estimates for female and male burials. The 11 female burials tend to produce older date estimates than the 14 male burials, but the difference is not statistically significant ($KSD = 0.33$, $p = 0.52$). There thus does not appear to be any appreciable temporal effect driving the observed patterns.

We also consider all other combinations of secure and tentative estimations for sex, date, and context to evaluate the extent to which the results are influenced by any one variable. Relaxing just the sex estimation confidence to include secure and tentative sex estimates while excluding tentative date and context estimates, we get three female burials in association with hunting tools and no males (table S10).

Table S10 Burials with hunting tools–secure context, sex, and dates with tentative sex estimations.

	no	yes	sum
female	2	3	5
male	3	0	3
unknown	7	0	7
sum	12	3	15

Relaxing date estimation to include secure and tentative date estimations while excluding tentative sex and context estimations, we get three female burials in association with hunting tools and one male (table S11).

Table S11 Burials with hunting tools–secure context, sex, and dates with tentative date estimations.

	no	yes	sum
female	3	3	6
male	2	1	3
unknown	0	0	0
sum	5	4	9

Relaxing context estimation to include secure and tentative estimations while excluding tentative sex and date estimations, we get four female burials in association with hunting tools and three males (table S12).

Relaxing sex and context estimation to include secure and tentative estimations while excluding tentative date estimations, we get five female burials in association with hunting tools and four males (table S13).

Relaxing sex and date estimation to include secure and tentative estimations while excluding tentative context estimations, we get five female burials in association with hunting tools and three males (table S14).

Table S12 Burials with hunting tools–secure context, sex, and dates with tentative context estimations.

	no	yes	sum
female	8	4	12
male	7	3	10
unknown	0	0	0
sum	15	7	22

Table S13 Burials with hunting tools–secure context, sex, and dates with tentative sex and context estimations.

	no	yes	sum
female	16	5	21
male	15	4	19
unknown	17	0	17
sum	48	9	57

Table S14 Burials with hunting tools–secure context, sex, and dates with tentative sex and date estimations.

	no	yes	sum
female	5	5	10
male	5	3	8
unknown	8	2	10
sum	18	10	28

Relaxing date and context estimation to include secure and tentative estimations while excluding tentative sex estimations, we get four female burials in association with hunting tools and five males (table S15).

Table S15 Burials with hunting tools–secure context, sex, and dates with tentative context and date estimations.

	no	yes	sum
female	12	4	16
male	11	5	16
unknown	3	0	3
sum	26	9	35

In sum, all combinations of secure and tentative sex, date, and context estimations produce results that include at least one female in association with big game hunting tools, and all are statistically indistinguishable from female:male parity. We therefore fail to find support for hypotheses that envision big game hunting as male gendered among early hunter-gatherer populations in the Americas. We do, however, find support for hypotheses that envision big game hunting as nongendered or minimally gendered.

8.3 Raw data

Because the burial data compiled in this analysis derive from many different investigations spanning decades and two continents, there is considerable variation in methods, data quality, and reporting. In the interest of documenting our classificatory decisions, we describe our baseline observations here on a site-by-site basis. Sites are presented in order of latitude from north to south. The synthesis is presented in table S6.

Upward Sun River is an open-air site located in Alaska at approximately 64.4° north latitude, 147.0° west longitude. The summary information reported here is drawn from Potter and colleagues (*44, 109*). The site includes three Late Pleistocene human burials all in the same locale with one individual separated vertically from the two others in a lower burial. The upper burial consists of fragmentary cremated human bones with associated radiocarbon dates bracketing the age at approximately 11.5 cal. ka. Osteometric sexing was not possible. Limited dental evidence suggest an age-at-death of approximately 2–4 years. No grave goods were found in association, but two small fragments of ocher were found in close spatial association.

The lower burial includes two infant inhumations approximately 40 cm below the upper burial. The skeletal remains were largely complete and covered in ocher, suggesting the presence of shrouds. One individual was a primary interment. The other was either a primary or secondary interment. One individual is estimated to have died a 0–6 weeks of age. The other appears to have been a late term fetus. Weak morphological evidence suggests females, which was confirmed by DNA (*110*). Four antler rods, two large dart points, and a third biface were found in association with the burial. A robust suite of radiocarbon dates on associated materials also place the burial at approximately 11.5 cal. ka. While not hunters per se, the observed artifact associations are consistent with a cultural model in which hunting was considered a female activity.

On Your Knees Cave (49–PET–408) is located in southeastern Alaska at 56.33° north latitude, 133.59° west longitude. The summary presented here is based on Dixon (*101*). Skeletal remains include a mandible identified as male. Two direct AMS dates place the individual at 9800 ^{14}C B.P. However, local marine effects in the region suggest a 600 year offset, leading Dixon to suggest a corrected date of approximately 9200 ^{14}C B.P., or 10.4 cal. ka, which is more consistent with dates on charcoal from the same stratigraphic context. No directly associated tools are reported, and it seems that the scattered nature of the skeletal materials would prevent any confident association, but obsidian bifaces, microblades, and other tools are stratigraphically associated.

L'Anse Amour is an open-air single mound burial located in Labrador approximately 51.5° north latitude, 56.9° west longitude. The summary presented here is based on Tuck (*111*). The burial dates to 8.5–7.9 cal. ka based on two associated charcoal dates of 7530±140 and 7255±85 ^{14}C B.P. The individual is identified as a sub-adult of indeterminate sex. The burial is rich in tools including a bone whistle, an antler toggling harpoon, a bone projectile point, four quartz projectile points, and bone or antler pendant.

Gore Creek is an open-air site in British Columbia located at 50.7° north latitude, 119.8° west longitude. The following summary is based on Cybulski et al. (*112*). Disturbed skeletal remains from a male individual 27–35 years-old were discovered eroding out of a gully. A radiocarbon date on bone collagen produced a date of 8340±115 ^{14}C B.P., or 9.5–9.0 cal. ka. The date is consistent with detailed geologic work. No artifacts were found in association.

Cummins is an open-air site in Ontario located at 48.8° north latitude, 89.4° west longitude. The following summary is based on Walthall's review (*46*). Cremated remains directly dated to 8480 were discovered without grave goods. It is unclear if this is a calibrated date. If so, it would calibrate to approximately 9.5 cal. ka. No age or sex estimates are provided for the burial.

Marmes is located in Idaho at approximately 46.6° north latitude, 118.2° west longitude. This summary is based on Hicks (*113*). The site consists of rockshelter and floodplain components both with human burials. The MNI is 38, of which 14 are considered intact burials. Of the rockshelter burials, a minimum of eleven individuals occur below the Mazama ash layer, which dates to 6.7 ^{14}C ka. The oldest burial includes 6+ cremated individuals. Demographic estimates and artifacts are absent for those individuals. Five of the pre-Mazama individuals occur in stratigraphic level III, which is estimated to have formed between 8.0–7.0 ^{14}C ka, or 9.0–7.8 cal. ka (*114*). This discussion focuses on those individuals.

Burial 1 is a possible male estimated to have been 30–40-years-old at death and interred with nine olivella beads and ocher. Burials 2, 11, 15, and 64-6 were not associated with any artifacts, and demographic estimates were not possible. Another burial, possibly burial 22, is listed as possibly associated with level III, but demographic data and artifacts are absent. The floodplain aggraded between 10.5–9.5 ^{14}C ka (*114*) suggesting that any burials in the sediment fall in that range. The Marmes I floodplain burial included fragmentary cranial remains identified as a possible female in their teens possibly buried with two antler rods. Marmes II floodplain

burial also included cranial fragments with teeth of a child. The Marmes III floodplain burial included cranial fragments and teeth of a teenage male. No artifacts are reported. The Marmes IV floodplain burial included cranial fragments identified only as an adult.

It is worth noting that several individuals from later levels are associated with projectile technology including one individual identified as female.

Kennewick is an open-air site located at 46.2° north latitude, 119.2° west longitude in Washington state. The summary presented here is based on Owsley (*115*). Direct radiocarbon dates place it at 8358±21 ^{14}C B.P., or 9.4–9.3 cal. ka (*116*). Osteological analysis identifies it as a male individual approximately 35–39 years old at the time of death. No artifacts were found in direct association though a stone projectile was found lodged in the individual's ilium (*117*).

CWU-DO1 refers to a cranium from an unknown site in Eastern Washington. The location used in this analysis is that of Kennewick. The individual is reported as "Stick Man" in Lepper (*102*). The summary presented here is based on Chatters et al. (*117*). A 40–60-year-old male individual of unknown burial context is reported in association with bone-collagen radiocarbon dates on of 8020±50, 8140±50, and 8110±50 ^{14}C B.P. These average to 8090±29 ^{14}C B.P., or 9.1–9.0 cal. ka. No artifact associations are reported.

Anzick is a rockshelter site located in Montana at approximately 45.983° north latitude, 110.647° west longitude. The summary reported here is from Wilke et al. (*118*), Morrow and Fiedel (*119*), and Rasmussen et al. (*120*). Anzick is a burial site that includes the skeletal fragments of two sub-adult individuals and a large artifact assemblage. One of the individuals–Anzick 1–was reportedly found in a burial pit and was overlain by 115 stone and bone artifacts including large bifaces, fluted points, cutting and scraping tools, and bone rods all covered in red ocher. The burial feature was unearthed with heavy equipment by non-professionals, and the associations are based largely on the recollection of one of the discoverers over 30 years after the discovery. Direct dates on the human bone and bone artifacts place the burial at 10,705±35 ^{14}C B.P., or 12.7–12.6 cal. ka. Osteological analysis place the age-at-death at 1–2 years old. DNA identifies the individual as male.

The second individual was found on the surface with no apparent artifact associations. The juvenile was 6–8 years old at death. The average of five direct dates on one individual is 8610±90 ^{14}C B.P., or 9.9–9.5 cal. ka.

Browns Valley is an open-air single burial site in Minnesota located at 45.6° north latitude, 96.8° west longitude. Information presented here is based on Jenks (*121, 122*). The individual consists of fragmentary cranial and long bones found at the base of a gravel pit escarpment directly below a burial pit visible in profile as an ocher lined feature. Jenks (*122*) states that, "The skeleton is unquestionably that of an adult male whose age is estimated as between twenty-five and forty years." The basis for these determinations is unclear, though the skeletal analysis seems to be fairly thorough in terms of rote measurements. Five flaked stone bifaces and two sandstone "abraders" were also found out of context at the base of the escarpment. The bulk of these materials were recovered by a local individual. Jenks followed up on the findings less than a year later and conducted professional excavations in and around the feature, which resulted in the discovery of additional bone fragments out of context and a seventh biface in situ in the burial pit. The bifaces included four projectile points and two knives, all large and extremely well made. The knives are identified by their asymmetry, absence of fluting, and absence of basal margin grinding. The dart points exhibit basal fluting or flute-like flaking, securing the burials Paleoindian association. Powell and Steele (*123*) present a radiocarbon date of 8700±110 ^{14}C B.P., or 10.1–9.5 cal. ka, but do not offer any context–not the material dated, method of dating, lab number, nor discussion of the dating procedure.

Renier is an open-air site in Wisconsin located at 44.6° north latitude, 87.8° west longitude. The following summary is based on Mason and Irwin (*124*). Excavations at the site revealed cremated human remains in association with Eden, Scottsbluff, and a possible Turin side-notched projectile point. Detailed osteological analysis suggests either a young adult female or adolescent male. Note that Walthall reports the individual as an adolescent male in his review (*46*). The projectile point forms tentatively place the burial between 9.0–8.0 cal. ka (*125*).

Buhl is an open-air site located 42.7° north latitude, 114.8° west longitude in Idaho. The summary presented here is based on Green et al. (*45*). The site includes a human burial radiocarbon dated to 10,675±95 ^{14}C B.P., 12.7–12.1 cal. ka accounting for a partial marine diet (*126*). The burial is a 17–21 year old female interred with a complete dart point place under the cranium, an eyed bone needle, and a bone awl or pin. The tip of the point was intentionally chiseled suggesting to Owsley that the tool was used as a hafted knife as opposed to a projectile point (*103*).

Crowfield is an open-air site in Ontario located at 42.7884° north latitude, 81.5795° west longitude. Lepper (*102*) lists Crowfield as a cremation site. However, the excavators did not find any human bone, but rather inferred Paleoindian cremation from assemblage structure (*127*).

Annasnappet Pond is an open-air multi-component site located in Massachusetts at approximately 41.9° north latitude, 70.8° west longitude. The summary data presented here are from Doucette (*21*). A deep burial pit with cremated human bone, two polished atlatl weights, and two complete projectile points were located at the site. A radiocarbon date of 7570±150 ^{14}C B.P., or 8.7–8.0 cal. ka, is associated with the pit. The sex of the individual has not been determined, and it has been suggested the cremated individual is part of an offering to a buried individual whose remains had completely degraded.

Squaw Rockshelter is a rockshelter site in Ohio located at 41.4° north latitude, 81.4° west longitude. The following summary is based on Brose (*128*) and Prior (*129*). Fragmentary skeletal remains of at least three individuals were recovered from a stratigraphic level–level II–is associated with a radiocarbon date of 9480±160 ^{14}C B.P., or 11.1–10.3 cal. ka, and Early Archaic projectile point forms. Most skeletal materials were likely associated with one individual tentatively identified as a 25-year-old female. Miscellaneous teeth indicate the presence of at least two other individuals. One other date from overlaying level I produced an age of 5500±85 ^{14}C B.P., or 6.5–6.0 cal. ka.

Gordon Creek is an open-air burial site in Colorado at approximately 40.7° north latitude, 105.4° west longitude. The summary presented here is based on Breternitz et al. (*23*) and Muniz (*22*). The buried individual is identified as a 25–30 year old female interred 9700±250 ^{14}C B.P., or 11.9–10.3 cal. ka. Although context was imperfect due to erosion, the individual appears to have been associated with a projectile point preform, a large biface, a scraper, flake tools, a hammerstone, and a polishing stone. The projectile point preform is suggestive of big-game hunting, though its use as a knife is possible (*22, 23, 103*).

Meadowcroft Rockshelter is a rockshelter site in Pennsylvania located at 40.3° north latitude, 80.5° west longitude (*130*). This summary is based on Sciulli's analysis of the human remains (*131*). Excavations located 32 isolated human bone or tooth fragments and one possible interment. Two fragments are associated with an early stratigraphic unit–stratum IIa. One of the artifacts is a middle hand phalanx from an immature individual. Sciulli notes that the "specimen is directly associated with [a] radiocarbon date" of 13,270±340 ^{14}C B.P.

However, it is unclear from the report if this is a direct date on the bone or some other spatially associated material. The other artifact is a possible occipital bone that was recovered from a fire pit with a date of 13,240±1010 ^{14}C B.P. The quality of these dates have been the subject of considerable debate with concerns related to sample contamination and depositional mixing (*132–136*). Radiocarbon dates from the bone-bearing cultural stratum are wide ranging with the most recent being 8010±110 ^{14}C B.P. Averaging the two associated bone dates and considering the range of the calibrated 95% confidence intervals gives a range of 16.8–8.5 cal. ka, which we take to be a conservative confidence interval for the age of the human bone.

Wizards Beach is an open-air burial site in located on the margins of Pyramid Lake, Nevada at 40.1195° north latitude, 119.7060° west longitude. Three disarticulated individuals were discovered eroding from a lake margin. Burial B produced radiocarbon dates of 9250±60 and 9200±60 ^{14}C B.P. for a mean age of 9225±60 ^{14}C B.P., or 10.6–10.2 cal. ka (*137*). Burial A dated to 6000 B.P. Dansie does not report on individual C age nor the sex of any of the individuals.

Fishbone Cave is a rockshelter site in Nevada located at 40.1° north latitude, 119.3° west longitude. The following summary is based on Orr (*138*). Fragmentary skeletal materials including a "carbonized left foot, clavicle and fibula" were found in a stratigraphic level associated with radiocarbon dates of 11,555±500 and 10,999±300 ^{14}C B.P., or 14.6–12.6 cal. ka. The burial was associated with perishable goods including a pelican skin, netting, basketry, cordage, and matting. Lepper (*102*) lists the individual as a 25–44-year-old female. However, the primary source does not make any age or sex determinations on the fragmentary assemblage.

Hourglass Cave is a cave site in Colorado located at 39° north latitude, 106° west longitude. This is a general location based on Mosch and Watson (*139*). A disturbed adult burial was identified as male based on osteometric and DNA analysis. Age-at-death is estimated at 30–45. No artifacts are associated. Three radiocarbon dates on bone collagen produced the following results: 8170±100, 7714±77, and 7944±84 ^{14}C B.P. giving an average of 7905±49 ^{14}C B.P., or 9.0–8.6 cal. ka. This appears to be the same site as the White River Forest Site described by Dixon (*101*) and thus duplicated in Lepper (*102*).

Spirit Cave is located at 39.4° north latitude, 118.6° west longitude in Nevada (*140*). The summary presented here is based on Wheeler (*141*), Tuohy and Dansie (*142*), and Kirner et al. (*143*). Five burials were located in the site including two cremations, one intact primary inhumation, and bones from two disarticu-

lated individuals. Burial 1–one of the disarticulated individuals–was located above burial 2, the articulated individual known as the Spirit Cave mummy. The original excavators reburied the burial 1 bones and retained the mat. Other collected bones from a 35-year-old female show a statistically identical date to the burial mat, leading Dansie to conclude that those bones likely belong to burial 1. In addition to the burial mat, burial 1 was associated with a wood knife handle. Dates on human bone and associated mat are 9300±70 and 9270±60 ^{14}C B.P., respectively, giving an average of 9283±46 ^{14}C B.P., or 10.6–10.3 cal. ka.

Burial 2 is a 35–55-year-old male associated with textiles and moccasins. The weighted mean of seven dates all on high quality materials in close agreement is 9415±25 ^{14}C B.P., or 10.7–10.6 cal. ka. Another disarticulated individual dated to 4.6 ^{14}C ka. The two cremations occurred in two separate woven bags that were in direct contact with one another. One of the bags produced a date of 9040±60 ^{14}C B.P., or 10.4–9.9 cal. ka.

Grimes Shelter (26Ch1C) is a burial rockshelter site located at 39.4024° north latitude, 118.6391° west longitude in Nevada. The summary reported here is based on Dansie (*137*). The remains of a 10-year-old child dating to 9470±60 ^{14}C B.P., or 11.1–10.6 cal. ka, was found with matting and bone fragments of an older individual. No other artifacts are reported.

Koster is located in 39.20917° north latitude, 90.54917° west longitude in a deeply stratified open-air site located in Illinois with an Early Archaic component dating to approximately 9.0–8.4 ^{14}C ka, or 10.2–9.4 cal. ka, and a Middle Archaic 1 component dating to 8.2–7.6 ^{14}C ka, or 9.1–8.4 cal. ka (*144*). Early Archaic I did not produce human burials. Early Archaic II produced nine burials. Burials are noted for Middle Archaic 1, but no further details are reported by Brown and Vierra (*144*). A limited burial analysis by Jane Buikstra is presented in Cook (*145*), but it does not appear to pertain to the earliest levels. Walthall's (*46*) summary describes five adult and four infant primary inhumations. The adults include two males and three females. One of the adult males was interred with a perforated bone-and-antler artifact that was interpreted as a possible atlatl weight.

Mostin is an open-air site located in California at 39.0° north latitude, 122.8° west longitude (*146*). Discussion of Mostin data are based on Dixon (*101*) who reviewed available gray literature. Salvage excavations revealed 20 burials with bone collagen dates falling in the 10.0–7.0 ^{14}C ka, or 11.4–7.8 cal. ka range. One

individual from a stratigraphic unit dating to 11 ^{14}C ka, or 12.8 cal. ka, is reportedly an adult female associated with groundstone artifacts. Unfortunately the burial details have not been published, and the radiocarbon dates have been critiqued on the grounds of potential contamination.

Graham Cave is a rockshelter site in Missouri located at 38.9° north latitude, 92.2° west longitude. The following summary is based on Walthall's review (*46*). A primary adult inhumation associated with a perforated canine was identified in early Holocene materials. Sex is not indicated in Walthall's summary.

Arnold Cave is a rockshelter site in Missouri located at 38.7° north latitude, 92.6° west longitude. The following summary is based on Walthall's review (*46*). Two inhumations were discovered in association with Early Holocene deposits. One individual is identified as an adult associated with three hafted chert bifaces. A second individual is an infant. Walthall does not report sex estimates.

Jerger is an open-air site in Indiana located at 38.0° north latitude, 87.1° west longitude. The following summary is based on Tomak (*147*) and Walthall's review (*46*). Associations with bifurcate points suggest contemporaneity with Icehouse Bottom, ca. 9.8–9.3 cal. ka. All features were heavily disturbed by plowing. Three features contained calcined human bone, bifurcate projectile points, and bifaces among other artifact types. No age or sex estimates are reported.

Ashworth Shelter is a rockshelter site in Kentucky located at 37.6° north latitude, 85.6° west longitude. The following summary is based on Walthall's review (*46*). A primary inhumation identified as an adult female had a Kirk style projectile point embedded in a vertebra and a second point located near the left patella. The Kirk point associations place the burial at 10.7–8.3 cal. ka (*148, 149*).

Olive Branch is an open-air site in Illinois located at 36.6° north latitude, 89.2° west longitude. The following summary is based on Walthall's review (*46*). A secondary cremation burial was identified as an adult female. No grave goods were found in association. The cremation is reportedly associated with Dalton-age deposits, which tentatively places the burial at 12.5–11.3 cal. ka (*47, 150*).

Kaskaskia Mine Site is a rockshelter site in Illinois located at 37.5° north latitude, 89.7° west longitude. The following summary is based on an unpublished poster by Hargrave (*151*). A human burial was found eroding

out of a possible pit. The individual is identified as an adolescent female with a bone collagen date of 8050±35 ^{14}C B.P., or 9.0–8.8 cal. ka. No artifacts are mentioned.

Modoc is a rockshelter site in Illinois located at 37.5° north latitude, 89.7° west longitude. The following summary is based on Walthall's review (*46*). Four primary inhumations are associated with levels dating to 9–7 ^{14}C ka, or 10.2–7.8 cal. ka (*152*). Burials include two adult females, two adult males, and an infant, all without grave goods.

Lawrence is an open-air site in Kentucky located at 36.2° north latitude, 87.7° west longitude. The following summary is based on Mocas' (*153*) report on Burial 72 and Walthall's review of the total burial assemblage (*46*). Seventeen burials features were excavated at the site. Eleven were attributed to the Kirk Stemmed point tradition, ca. 10.7–8.3 cal. ka (*148, 149*). All were primary inhumations. Sex could not be estimated in most cases, and "most...appear to have been adults" according to Walthall. Two burials were associated with grave goods. Burial 73 is identified as an adult in association with two bifaces and a sandstone abrader. Burial 72 is a double burial with two adult male individuals both 22–28 years old at the time of death. Sex estimation appears to have been based on robust pelvic diagnostics. Individual A was interred with a series of artifacts including (a) a serrated Kirk-like projectile point under the left ulna, (b) a cache of lithic tools including a lanceolate point, a concave-base point, two Kirk-like points, a scraper, two utilized flakes, and two drills, and (c) an animal tooth necklace. Individual B was associated with ocher and an animal-tooth necklace. A radiocarbon date of 7325±125 ^{14}C B.P., or 8.4–7.9 cal. ka, was obtained on a piece of charcoal from the burial. The date is in general agreement with other dates at the site and associated projectile point forms.

Sloan is an open-air site located at approximately 36.1° north latitude, 90.6° west longitude in Arkansas and produced human burial assemblages dating to 12.5–11.3 cal. ka (*47, 154*). Unfortunately, the human remains are too fragmentary for sex identification or even identification of individual burials. Morse et al. (*155*) performed K-Means cluster analysis on the spatial distributions of artifacts to define clusters that they attribute to individual burials. They identify 29 such clusters, which they interpret to tentatively reflect individual burials. Twenty-seven of the clusters included projectile points suggesting to Smallwood that the clusters either represent nearly all male burials or that both males and females were interred with points (*47*). Because tool types that are often associated with females in later times occur among the Sloan clusters, she concludes

that it is more likely that the burials include females leading her to speculate that, "The unpatterned distribution of other artifact types across the site suggests that tasks or behavioral roles were generally not clearly divided." We therefore tentatively conclude that there was a minimum of one female and one male in association with hunting tools.

Red Rock is a rockshelter site in in Arkansas located at 35.9° north latitude, 94.7° west longitude. The following summary is based on Walthall's review (*46*). Two primary inhumations, both adults without grave goods, were located in deposits associated with Dalton materials, which would place the burials at 12.5–11.3 cal. ka (*47, 150*).

Allen is an open-air site in in Tennessee located at 35.8° north latitude, 88.0° west longitude. The following summary is based on Walthall's review (*46*). Two primary inhumations were excavated and attributed to the Kirk tradition, ca. 10.7–8.3 cal. ka (*148, 149*). Burial 1 was identified as an adult male with a Kirk serrated projectile point and bifacial knife above the cranium. Burial 2 was identified as an adolescent, possibly male, associated with a deposit of grade goods in the pelvic area that included three Kirk serrated projectile points, a knife, a possible preform, a scraper, and a hammerstone.

Icehouse Bottom is an open-air site with Archaic–Mississippian period components located at 35.59° north latitude, 84.20° west longitude in Tennessee. The following summary is based on Chapman (*48*). Two cremation burials were excavated. Burial 1, identified as an adult female without grave goods, occurred in a lower stratigraphic level dated between 9.3–8.8 ^{14}C ka, or 10.5–8.8 cal. ka. Burial 2 was also a cremated adult female. It was associated with a bifurcate-base projectile point form known to date to 8.8–8.3 ^{14}C ka, or 9.8–9.3 cal. ka. Note that Chatters (*100*) misattributes this to a 1973 publication by Chapman.

Dust Cave is a rockshelter site in Alabama located at 34.4° north latitude, 87.7° west longitude. The following summary is based on Walthall's review (*46*). Two burials associated with a Kirk Stemmed component, ca.10.7–8.3 cal. ka (*148, 149*), were excavated at the site. One individual is identified as an adult female, the other as a child. Both were without grave goods.

Rancho La Brea is an open-air site in California located at 34.064° north latitude, 118.356° west longitude. The following summary is based on Merriam (*156*). The site includes cranial and post-cranial elements of an

individual in relatively good condition though widely scattered and mixed in the original pit feature. Merriam identifies the individual as a young adult female. Merriam did not report artifacts nor did Kroeber in a subsequent report (*157*). Direct ^{14}C dates on bone collagen are 9000±80 and 9080±15 ^{14}C B.P. yield an average date of 9077±15 ^{14}C B.P., or 10.2 cal. ka (*158*).

Arch Lake is an open-air site located in New Mexico at 34.0° north latitude, 103.1° west longitude. A 17-21-year-old female was buried in extended position at the site with a retouched flaked stone tool and a bone tool of unknown function (*103*). Nine radiocarbon date determinations were processed in two different labs and using different processing protocols. The two extreme ages are 10,020±50 and 8500±100 ^{14}C B.P., giving a 95% calibrated date range of 11.8–9.3 cal. ka. However, Owsley et al. reason on technical grounds that the oldest date is the most reliable, which would place the skeleton's calibrated date range at 11.7–11.3 cal. ka. For the purpose of the current analysis, we use the more conservative range to underscore that the burial falls securely in the pre-8 ka time frame of interest.

Tuquan is a site located in California at 34.04° north latitude, 120.37° west longitude. The following summary is based on Chatters (*100*) who cites an unpublished 2013 M.A. thesis from UC Santa Barbara. The site includes a burial with the skull and partial longbones of a 36–46-year-old male dated to 8965±30 ^{14}C B.P., or 10.2–9.9 cal. ka.

Arlington Springs is located on the Channel Islands of California 33.9554° north latitude, 120.1139° west longitude. This summary is based largely on Orr (*159, 160*). A single disturbed human burial was discovered deeply buried under 11 m of sediment. No artifacts are associated. Radiocarbon dates on the human bone are variable, but Johnson et al. (*161*) reason that a collagen date of 10,960±80 ^{14}C B.P., or 13.0–12.7 cal. ka, is the most reliable. Chatters (*100*) indicates that the individual is an adult male, but Johnson et al. (*161*) present data suggesting female.

Chancellor is an open-air site located in California at 32.9° north latitude, 117.2° west longitude. Site information is currently limited, and the site is identified in Lepper's review (*102*). It appears to be the site containing the "La Jolla skeletons" (*162*). Lepper lists a double burial including a 33–44-year-old male with an associated ^{14}C date of 8690±40 and a 40–54-year-old male with an associated radiocarbon date of 8350±90 ^{14}C B.P. The mean date is 8520±69 ^{14}C B.P., or 9.6–9.4 cal. ka. No grave goods are reported.

Midland is an open-air site in Texas located at 32.0124° north latitude, 102.1051° west longitude (*163*). The following summary is based on Stewart (*164*) and Holliday and Meltzer (*163*). Scattered skeletal materials from a human individual was discovered in general association with Paleoindian lithic artifacts. The individual was determined to be a 30-year-old female. Though there has been considerable work on the age of the site, Holliday and Meltzer's detailed geoarchaeological analysis suggests only that the remains are likely less than 10.0 cal. ka. Radiocarbon dates may suggest a youngest date of around 8 cal. ka.

Horn Shelter No. 2 is a rockshelter double burial site in Texas at approximately 31.8° north latitude, 97.3° west longitude. The summary presented her is based largely on Redder and Fox (*165*) and Young et al. (*166*). A young female 9–11 years old was buried with an eyed bone needle. In the same burial, a 30–45-year-old male was interred with deer antler billets, sandstone abraders, red ocher nodules, turtle carapaces, animal claws/talons, shell beads, a bone spatula, and a biface. This assemblage has been interpreted as a flintknapping kit (*103*) or a ritual paraphernalia kit ostensibly for shamanic practices (*167*). Radiocarbon dates on human bone of 9710±40 and 9690±50 ^{14}C B.P. place the burial between 11.2–10.8 cal. ka (*103*).

Whitewater Draw is located in Arizona at 31.6675° north latitude, 109.7235° west longitude. The following summary is based on Waters (*168*). A single primary inhumation was discovered deeply buried in alluvium. The individual is identified as a 25–35-year-old female. No artifacts were found in association. Although not directly dated, Waters' detailed geoarchaeological analysis places the burial between 10.4–8.2 ^{14}C ka, or 12.4–9.1 cal. ka.

Wilson-Leonard is located at 30.5402° north latitude, 97.7722° west longitude in Texas (*169*). The summary presented here is based on Guy (*170*), Steele (*171*), and Bousman (*172*). Burials include three individuals–two primary inhumations and an isolated cranium. Burial 1 is a disturbed, incomplete post-cranium of an adolescent or young adult of indeterminate sex, tentatively Late Archaic in age. Feature 90 includes a fragmentary cranium tentatively identified as adolescent or young adult female. Burial 2 is a complete skeleton of a young female estimated to be 25-years old at the time of death with an estimated date of 10.5–10.0 cal. ka based on stratigraphic position. This burial is associated with a groundstone tool (mano/chopper), fossilized shark tooth, and limestone cobble. Fossilized shark teeth occur naturally in the area, making the association is ambiguous.

Seminole Sink is a sinkhole site located in Texas at 29.6866° north latitude, 101.3160° west longitude (*173*). A minimum of 22 individuals have been recovered as scattered remains (*174*). Lepper (*102*) lists the site as having human remains dating between 10.0–5.0 ^{14}C ka (*175*). However, eight radiocarbon dates–six of which are on human bone, are all younger than 6.0 ^{14}C ka. Early corner notched points may suggest earlier burials (*175*), but direct evidence is lacking.

Windover is a mortuary pond site located at 28.5° north latitude, 80.86° west longitude in Florida (*49*). Excavations of a pond revealed at least 168 individuals with 110 considered in situ and 58 completely articulated (*176*). Six radiocarbon dates on bone and six on wooden artifacts all associated with burials ranged between 8120±70 and 6980±120 ^{14}C B.P., or 9.3–7.5 cal. ka (*177*). Dickel (*176*) provides summary data for artifact-sex associations, classifying the artifacts in several ways, and Penders (*178*) describes the tools with some analysis of sex associations.

Several sex-based patterns are apparent. All atlatl cups with spurs are male associated. Atlatl handles, which tend to co-occur with atlatl cups, also tend to occur with males though one is associated with a female. Pointed radius awls are overwhelmingly male. Bird bone tubes, drilled vertebra beads, drilled seed beads, and spiral ground shell beads are overwhelmingly female. One biface is associated with a subadult female. While it looks like a projectile point, Penders states that it "is probably a cutting tool or scraper because the edges near the tip have been worked, and its sharpened down 50% of the artifact length on both edges." This reasoning is unclear given that projectile points are well-known to undergo resharpening. A large stemmed point was associated with a 47-year-old female. Penders concludes it was "probably also used as a knife or scraper," but the rationale is not specified. A large biface "similar in form to a Kirk point" was associated with a 45-year-old male burial. Hollow-base antler projectile points are reportedly male and female associated, but quantity and context is unclear except for the note that one was embedded in the ilium of a male. Hooked/barbed deer bone points are found among two females and no males.

From these patterns, we conclude that projectile technology was associated with both males and females but that different forms may have been sex biased. The reporting format make it impossible parse the burials, dates, and artifact associations at an individual level.

Little Salt Spring is a sinkhole site located in Florida at 27.07484° north latitude, 82.23308° west longitude (*179*). Lepper lists it as containing an adult male dating to 10.0 ^{14}C ka. However, primary sources indicate that

human remains post-date 8 cal. ka (*179, 180*).

Warm Mineral Springs is a sinkhole site located in Florida at 27.05844° north latitude, 82.25990° west longitude. The summary presented here is based on Clausen et al. (*181*). Human bone including an ilium fragment and vertebra were recovered from deeply buried deposits dating to 10,260±190 ^{14}C B.P., or 12.6–11.3 cal. ka. The individual is estimated to have been six years old at the time of death. No sex estimation was made. No artifacts were associated.

Cutler Site is an open-air sinkhole site in Florida at 25.6° north latitude, 80.3° west longitude. The summary presented here is based on Carr (*182*). Fragmentary and disarticulated human bone was recovered representing at least five individuals including three adults and two sub-adults. One adult is identified as female and another as male. All others are indeterminate. No grave goods were found in association. Direct dating of the human bone was unsuccessful. Three projectile point forms are potentially consistent with an early Holocene occupation. Two charcoal radiocarbon dates from possible hearth contexts stratigraphically associated with human remains ranged between 11.3–10.7 cal. ka. The uncalibrated dates are not reported, though a date of 9760±120 ^{14}C B.P. is reported elsewhere (*183*). One date on a charred hazelnut produced a modern date. Unfortunately the reporting on the remains is minimal.

Naharon is a submersed cave site located on the Yucatan Peninsula, Mexico at 20.2° north latitude, 87.5° west longitude. The following is based on summary observations by González et al. (*184*). The site is part of the same cave system as the Las Palmas site. A single mostly complete but disturbed skeleton of 20–30-year-old female was discovered at the site. No artifacts were reported. A radiocarbon date on human bone produced an age of 11,670±60 ^{14}C B.P., or 13.6–13.4 cal. ka. A lack of collagen has prevented multiple dating attempts and raises some concern about the reliability of the date.

Las Palmas is a submersed cave site located on the Yucatan Peninsula, Mexico at 20.2° north latitude, 87.5° west longitude. The following is based on summary observations by González et al. (*184*). The site is part of the same cave system as the Naharon site. A single, mostly complete primary inhumation of an adult female, 44–50 years old, was discovered at the site. No artifacts were found in association. A radiocarbon date on human bone produced an age of 8050±130 ^{14}C B.P., or 9.4–8.6 cal. ka. Two associated charcoal dates are in close agreement.

Muknal Cave is a submersed cave site located on the Yucatan Peninsula, Mexico at 20.2° north latitude, 87.5° west longitude. The following is based on summary observations by Stinnesbeck et al. (*185*). A single incomplete secondary burial of an adult male, 40-45 years old, was discovered at the site. No tools were found in association. Radiocarbon dating was not successful, but other evidence including estimates for cave submersion dates suggest a terminus ante quem date of 9.6 cal. ka.

Hoyo Negro is a submersed cave site located on the Yucatan Peninsula, Mexico at 20.2° north latitude, 87.5° west longitude. The following is based on summary observations by Chatters et al. (*100*). A single nearly complete primary inhumation of an adolescent female, 15–16 years old, was discovered at the site. No tools were found in association. Two radiocarbon dates on bone collagen average to 10,976±20 ^{14}C B.P., or 12.8 cal. ka.

Mexico City Sites include a series of sites in the Mexico city area. Gonzalez et al. (*186*) synthesize and extend work on early human remains from the Peñon and Tlapacoya 1 sites in Mexico City at 19.0° north latitude, 99.5° west longitude. The Peñon burials include four individuals discovered in travertine. Three individuals consist of relatively intact crania and the fourth consists of post-cranial fragments. Only one–known as Peñon Woman–was directly dated to 10,755±75 ^{14}C B.P., or 12.7–12.6. The individual was identified as an adult female and was found in association with a polished bird bone. The Tlapacoya crania include two specimens–Tlapacoya I with a direct date of 10,200±65 ^{14}C B.P., 12.1–11.6 cal. ka and Tlapacoya II stratigraphically associated with a date of 9920±250 ^{14}C B.P., or 12.4–10.7 cal. ka. Provenience of these individuals is problematic and there are no reports of associated artifacts. Gonzalez does not provide age or sex estimates, and it is possible that primary sources could have that information. A figure showing the Tlapacoya I cranium shows that it was an adult. Finally, two other crania from the city referred to as Metro Man and Chimalhuacán Man are indirectly dated to 10.5 cal. ka, but no additional information is provided. Images of the crania clearly show the two individuals to be adults.

Texcal Cave is located in Puebla, Mexico at 18.9° north latitude, 98.1° west longitude. A human skeleton dated to 7480±55 ^{14}C B.P., or 8.4–8.2 cal. ka, is identified as a 31–35-year-old male (*187*). Gonzalez' short description does not mention artifacts. Romano (*188*) also describes the Texcal Cave remains but limited to the cranium.

Checua is an open-air site located in Central Columbia at 5.592° north latitude, 73.809° west longitude. The summary presented here is based on Groot and Mahecha (*189*) and Neves et al. (*190*). Chronometric analysis places the site occupation between 8.5–3.0 ^{14}C ka. Ten human burials are reported from stratum 5, which produced a charcoal date of 7800±60 ^{14}C B.P., or 8.6–8.4 cal. ka. Underlying stratum 4 produced a conventional ^{14}C date of 8200±110 ^{14}C B.P., or 9.4–8.8 cal. ka. Stratigraphic correspondence with the nearby site of Nemocón suggests an upper date of 6825±40 ^{14}C B.P., or 7.7–7.6 cal. ka. Taken together, stratum 5 burials likely date to sometime between 9.4–7.6 ka. Overlaying stratum 8 contained four human burials. There are no radiocarbon dates from stratum 8, but comparison with neighboring sites suggests an approximate age of 3.0 ^{14}C ka.

The burials are in relatively good condition. Details of the burials along with photos are provided by Groot and Mahecha, but osteological methods are not specified, and there is little mention of artifact associations, ostensibly because there are few. All burials are primary inhumations. Burials 4, 8, and 13 are of unspecified age and sex, though all appear to be adults based on photos and maps. Burial 5 is a child located above–and possibly associated with–burial 6, which is identified as a 30–35-year-old male. Burial 7 is a 40–45-year-old female. Burial 9 is a 40–45-year-old female buried with ocher. Burials 10 and 11 are a part of a double burial associated with retouched lithic flakes. Burial 10 is a 40–45-year-old male, and Burial 11 is a 25–35-year-old female. Burial 12 is a 45–50-year-old male buried with lithic, bone, and sandstone artifacts.

Nemocón is a rockshelter site located in central Columbia at 5.1° north latitude, 73.9° west longitude. The site is dated between 7530±100 ^{14}C B.P. and 6825±40 ^{14}C B.P., or 8.5–7.6 cal. ka (*191*). While no complete burials were found, all units except one produced isolated human remains.

Chia III is a rockshelter locality at the site of Chia in Central Columbia, located at 4.890° north latitude, 73.720° west longitude. The summary presented here is based on Neves et al. (*190*) and Ardila (*192*). Seven burials consisting of unknown number of individuals were recovered. One of these produced a direct date of 5040±100 ^{14}C B.P., or 6.0–5.6 cal. ka, and the other is reported to come from the same stratigraphic context with an estimated date range of 7.5–5.0 ^{14}C ka, or 8.3–5.7 cal. ka. Despite what appears in the photographs to be fairly good preservation, age, sex, and associated artifacts are not reported.

Tequendama is a rockshelter site near Bogota, Colombia at 4.366° north latitude, 74.107° west longitude. Correal (*193, 194*) analyzed the human remains from the site. Twenty-one primary inhumations are associated the Tequendama I locus. Based on detailed analysis of burial stratigraphy and radiocarbon dates, Correal and van der Hammen (*193*) conclude that Individual 14 is the oldest with an estimated age of 9–8 ^{14}C B.P., or 10.2–8.8 cal. ka. Burial 7 produced a collagen date of 5805±50 ^{14}C B.P., or 6.7–6.4 cal. ka. Burial 12 produced a direct date of 7235±60 ^{14}C B.P., or 8.2–7.9 cal. ka. Burial 12 is reported to be an adult male associated with lithics, bone and shell. Burial 13, which produced a direct date of 6020±45, or 6.9–6.7 cal. ka, is also reported as an adult male associated with antler, lithics, bone, and ocher. Burial 14 is associated with lithics, but sex is indeterminate due to poor preservation. No further details are provided on the associated artifacts.

Tequendama II is a locus that consists of two occupation zones. Zone I reportedly dates to 11.0–10.0 cal. ka. This level contains fragments of burnt human phalanges. Zone II reportedly dates to 9.5–7.5 cal. ka and also contains fragmentary burnt human bone including a highly degraded cranium.

Las Vegas (OGSE-80) is an open-air village site located on the coast of central Ecuador at 2.217° south latitude, 80.867° west longitude. Summary information presented here are from Stothert (*195*) and Ubelaker (*196*). Stratigraphic analysis with a robust suite of radiocarbon dates define three general occupations. Human burials were recovered from the Late Las Vegas phase, which is estimated to date to 8250±120 to 6600±150 ^{14}C B.P., or 9.5–7.1 cal. ka. Analysis of the human burials determined that 192 individuals were represented. Ubelaker's analysis does not include artifact associations, but Stothert did examine burial-artifact associations. Most burials are secondary burials making artifact associations problematic. Stothert's analysis notes that primary burials tended to be associated with "neatly rectangular secondary bone bundles, two containing defleshed bones and one containing cremated bones; shell spoons; perforated conch shells; a polished stone axe head; a compact pile of soft limestone balls or marbles; traces of red pigment; cobbles and cobble percussors; flat pebbles, round in outline; small white pebbles; groups of mollusk shells, sometimes forming a pillow or nest for the deceased; and lithic flakes." She further observed that females (14 of 19) and subadults (7 of 9) were more likely to be interred with durable goods than males (5 of 9). Unfortunately, specific sex-artifact associations are not presented, and we're currently unaware of published data to that effect. Nonetheless, it is possible to conclude that none of the individuals–female, male, adult, child–were interred with archaeologically detectable big-game hunting goods.

Guavio 1 is a rockshelter site in Central Columbia at 4.7° south latitude, 73.5° west longitude. The summary presented here is from Neves et al. (*190*). Eight primary inhumations, including three adults and five subadults all in poor condition, were recovered. A single charcoal sample associated with burial 8 produced an age of 9360±45 ^{14}C B.P., or 10.7–10.3 ka. Burial 8 was identified as an adult female. The authors note that "stone artifacts, unretouced flakes, hematite plaques, animal bones, and gastropod shells were deposited in burial pits," but only those of adults. No further information on the artifacts or other burials is presented, and Neves et al. (including Correal–the original excavator) note that the site had not been reported as of 2007 despite excavation in 1975. Nonetheless, it can be concluded that a female burial occurs in the absence of archaeologically detectable big-game hunting tools.

Sueva 1 is a rockshelter located in central Colombia at 4.8° south latitude, 73.7° west longitude. The summary presented here is based on Correal et al. (*191, 194*). One adult primary burial is reported from stratum 3, which produced a single ^{14}C date of 10,090±90 B.P., or 11.3–11.2 cal. ka.

No dates were produced for overlaying stratum 4, but the lower levels of stratum 5 produced a conventional date of 6350±40 ^{14}C B.P., or 7.3–7.2 cal. ka, providing a ceiling for the burial date with a conservative calibrated date range of 11.3–7.2 ka. The individual is identified as an adult female buried with 14 triangular flakes, other flakes, a side scraper, sandstone cobble, a deer bone, and fragments of specular hematite (*191*).

CA-09-28 is an open-air site in the lower Zaña Valley of northern Peru at 7.0° south latitude, 79.2° west longitude. The summary presented here is based on Rosen and Dillehay (*197*). The site was occupied during the Las Pircas Phase, 8.5–7.0 ^{14}C ka, or 9.5–7.8 cal. ka. The location reported here is an approximation based on the modern town of Nanchoc (*198*). A single articulated adult male burial was recovered among 857 scattered bone fragments. No artifact associations are reported for the burial.

CA-09-52 is an open-air site in the lower Zaña Valley of northern Peru at 7.0° south latitude, 79.2° west longitude. The summary presented here is based on Rosen and Dillehay (*197*). The site was occupied in the Las Pircas Phase, 8.5–7.0 ^{14}C ka, or 9.5–7.8 cal. ka. The location reported here is an approximation based on the modern town of Nanchoc (*198*). A single fragmented adult male burial was recovered among 262 scattered bone fragments. No artifact associations are reported for the burial.

Pampa de los Fósiles 13 is a Paijan culture site located near the north coast of Peru at 7.3° south latitude, 79.3° west longitude. The following summary is based on Chauchat and Lacombre (*199, 200*). Two well-preserved primary inhumations, one adult male and the other a subadult of indeterminate sex, were discovered. A radiocarbon date on charcoal from under one of the burials produced a date of 10,200±180 ^{14}C B.P., or 12.6–11.2 cal. ka. Although artifacts were found in the burial fill, none appear to have been directly associated with the burial.

Toca do Paraguaio is rockshelter site in the Serra da Capivara region of Brazil at 8.78466° south latitude, 42.48985° west longitude. The summary reported here is from Strauss (*105*). Two skeletons have been excavated from the site with one likely being post 7 ka. The other burial is a female, 35–40 years old, buried in a circular pit associated with a level dated to 8670±120 ^{14}C B.P., or 10.1–9.4 cal. ka. Strauss cautions that the date should be considered tentative.

Toca da Janela da Barra do Antonião is rockshelter site in the Serra da Capivara region of Brazil at 8.80225° south latitude, 42.41651° west longitude. The summary reported here is from Strauss (*105*) unless otherwise specified. A human skeleton nicknamed "Zaza" was discovered at the site found. Estimated sex is female and age-at-death is 20–30 years (*201*). Unassociated charcoal from a nearby hearth dated to 9670±140 ^{14}C B.P., or 11.3–10.6 cal. ka. No associated artifacts are mentioned.

Toca dos Coqueiros is rockshelter site in the Serra da Capivara region of Brazil at 8.83851° south latitude, 42.56270° west longitude. The summary reported here is from Strauss (*105*) unless otherwise cited. A complete, articulated skeleton was excavated from the site. Collagen was not sufficiently preserved for a direct date. A date on charcoal from a hearth that was in contact with the burial produced a value of 9870±50 ^{14}C B.P., or 11.3–11.2 cal. ka. Though suggestive, the associated date does not offer a definitive estimate of the burial date (*105*). Osteometric age estimation indicates an age-at-death of 35–45 years old, and osteometric sex estimation was most consistent with a female individual. However, the analysts noted several osteometric ambiguities and the associated projectile points as potentially consistent with a male individual. "From the archaeological perspective, the finding of projectile points in association with the burial suggested that the skeleton is male" (*25*).

To resolve this uncertainty, the analysts submitted a bone sample for DNA assessment, which indicated a

female individual. Nelson (*24*), however, suggested on osteometric grounds that Lessa and Guidon's determination was likely in error. He concluded that "...beyond the light build and generally gracile nature of the Coqueiros skeleton, the pelvic and much of the cranial morphology point to a male individual. The presence of inferred funerary offerings in the form of chipped stone points and other tools and flakes appear to support this as well. I am skeptical of their genetic determination of sex for this individual" (*24*). Unfortunately, Lessa and Guidon did not provide metadata on the genetic analysis precluding assessment of the quality of the DNA determination. Hubbe et al. (*202*) ran osteometric analysis "based on visual inspection of cranial and postcranial markers, complemented by a discriminant analysis of its morphology in relation to the Paleoindian sample. The results favor a male classification and are consistent with the mortuary offerings found in the burial, yet do not agree with a molecular determination." The authors argue that re-analysis of the DNA is needed. All three analyses note ambiguities in the osteological indicators. We therefore conclude that the sex identification is currently inconclusive.

Toca da Cerca do Elias includes a series of rockshelter sites in the Serra da Capivara region of Brazil at 8.84470° south latitude, 42.56180° west longitude. The summary reported here is from Strauss (*105*). Human remains include isolated teeth and skull fragments in deposits 30 cm below the surface and 70 cm from that hearth dated to 10,270±35 ^{14}C B.P., or 12.0–11.8 cal. ka.

Toca do Gordo do Garrincho is a cave site in the Serra da Capivara region of Brazil at 8.92480° south latitude, 42.60829° west longitude. The summary reported here is from Strauss (*105*). Human remains include fragments of a human skull recovered from modern backdirt. Collagen was insufficient, but pretreatment acid washes produced a date of 12,170±40 ^{14}C B.P., or 14.1–13.9 cal. ka. Strauss interprets the date as inconclusive. Subsequent excavations located a partial calvaria in contexts dated by TL and OSL to over 14 ka. The dates and stratigraphy have not been sufficiently reported for evaluation according to Strauss. In addition, a complete set of human dentition was found without associated bone and without an associated date.

Lauricocha is a rockshelter site located in Peru at 10.3° south latitude, 76.7° west longitude. Cardich (*203*) reported on Lauricocha Cave 2. The lowest levels are clearly preceramic and contain human burials in what appeared to have been good stratigraphic context. Direct dates were not produced on the human remains, but stratigraphic relationships and dates on associated charcoal tentatively suggested a minimum date of 5.3 cal ka

and possibly as early as 11.7 cal ka. Fehren-Schmitz et al. (*108*) directly dated the skeletal materials and found that Individual 1 dated to 7871±30 ^{14}C B.P. (8.6–8.5 cal. ka), Individual 2 to 5158±27 ^{14}C B.P. (5.9–5.8 cal. ka), individual 6 to 3337±22 ^{14}C B.P. (3.5–36 cal. ka), and Individual 9 to 7756±31 ^{14}C B.P. (8.6–8.4 cal. ka). Analysis of the dates and stratigraphic associations place individuals 1, 5, 9, 10, and 11 in an older phase and individuals 2, 3, 4, 6, and 7 in a younger phase. Individual 8 is intermediate. The results show that some relatively young burials are intrusive into older stratigraphic layers, so only directly dated skeletons provide reliable observations for the current study. We therefore focus on individuals 1 and 9, the only two secure pre-8ka burials.

Individual 1 is an adult female (*108*) buried with two retouched flakes and burnt animal bone (*203*). Individual 9 is a 2–4-year-old male (*108*) with "some flakes" and a piece of red ocher (*203*). Note that Cardich identifies individual 9 as 1–2 years old and Fehren Schmitz Table 1 reports the same age, but the main text of Fehren-Schmitz reports 2–4, which we assume is the determination of their analysis. Other individuals are buried with tools including scrapers and a knife. Individual 11, a two-year-old male is buried with a a complete foliate projectile point. Unfortunately the dates of that individual are indeterminate. All burials are incomplete.

Telarmachay is a rockshelter site located in the central highlands of Peru at 11.2° south latitude, 75.9° west longitude. The summary presented here is based on Lavallèe et al. (*50*). Stratigraphic level VI is dated to 9.0–7.2 ^{14}C ka, or 10.2–8.0 cal. ka, and contained three burials. Burial 1 contained a well-preserved adult female missing the cranium and without associated artifacts except flakes in the burial fill. Individuals 2 and 3 were part of a double burial with a female 17–25 years old above and separate from an infant of unknown sex. Near the femur of Individual 2 was a mass of ocher, 6 scrapers, 2 small bifaces, one bifacial projectile point, 2 retouched flakes, one small ground pebble, and six bone instruments including awls and smoothers. Below the assemblage are a series of small camelid and bird bones with cut marks. The bone smoothers show ocher on the working surfaces. Microwear analysis on the scrapers suggest dry hide working. The authors interpret the contents, attributes, tight spatial clustering, and placement of the artifacts to reflect a hide working toolkit that was in a bag on the individuals waist at the time of death. This assemblage is remarkably similar to that of the WMP6 individual in terms of placement and contents. The infant is associated with ocher, limestone beads, and bone pendants.

Unfortunately the burials do not have direct dates. Because burial pits necessarily originate in higher stratigraphic layers than the ones they occur in, they are always younger than laterally adjacent sediments.

Santoro et al. (*104*) observe that the burials are sealed by an overlaying hearth associated with a stratum dating to 6780–5320 ^{14}C B.P. (7.6–6.0 cal. ka), which constrains the upper end of possible dates on the burial. The projectile point appears to be a generic form with wide temporal range and so does not contribute to further refinement of the age. The burials almost certainly predate 6.0 cal. ka and likely date to sometime between 10.2–8.2 cal. ka as Lavallèe's chronology suggests.

Lurin Village 20 is an open-air site in Peru, located at 12.2° south latitude, 76.9° west longitude. The summary presented here is based on Engel (*204*). One skeleton from a stratigraphic level dating to 7270±125 ^{14}C B.P., or 8.3–7.8 cal. ka, is reported. The brief communication by Engel does not give additional information about the context or nature of the burial. The location provided in is for the general Lurin region.

Quiqché is a rockshelter site located in Chilca Canyon near the central coast of Peru at 12.3° south latitude, 76.5° west longitude. The summary presented here is based on Engel (*204, 205*). A single, mostly intact adult primary inhumation was found in a pit excavated into the bottom sterile level of cave sediment. The burial is bracketed by stratigraphic level 9, which produced a date of 9940±200 ^{14}C B.P., and level 4, which produced a date of 8030±150 ^{14}C B.P. (collectively, 12.0–8.5ka). Beynon and Siegel (*206*) identify the individual as a female 23–40 years of age at death. No further published information related to burial contents is currently available to our knowledge.

Tres Ventanas Cave II is a rockshelter site located in Chilca Canyon near the central coast of Peru at 12.3° south latitude, 76.5° west longitude. The summary presented here is based on Engel (*204, 205*). Two well-preserved burials were recovered. Both burials are associated with stratigraphic level 4. The wrappings of a juvenile individual produced a date of 8030±130 ^{14}C B.P., or 9.3–8.5 cal. ka (*205*). The second individual is a young adult, likely an adolescent, associated with animal hide, cordage, and unwoven plant fibers. No further published information related to burial contents is currently available to our knowledge.

Quipa Pucusana is a stratified open-air site located on the central coast of Peru at 12.5° south latitude, 76.7° west longitude. The location given here is for the modern town of Pucusana. The summary presented here is based on Engel (*204*), Beynon and Siegel (*206*), and Santoro et al. (*104*). This site appears to be the same as Chilca Village 20 reported in Engel's brief communication. Two individuals were discovered during testing by Engel. Beynon and Siegel describe one of them, which produced an associated date of 6970±300 ^{14}C B.P.,

or 8.4–7.6 cal. ka. The individual was associated with woven garments, a twined reed mat, a stone mortar, a small bag decorated with seeds and shell beads, and a yarn wrapped stick. The individual is estimated to be an adult female at least 20 years old. Map location estimated from Santoro et al.

Bay of Paracas Village 96 (Santo Domingo 14A VI-96) is an open-air site in Peru located at 13.8° south latitude, 76.3° west longitude. This location is for the general Paracas region. The following summary is based on Engel (*204*) and Beynon and Siegel (*206*). A skeleton is reported from a stratigraphic level dating to 8830±190 ^{14}C B.P., or 10.3–9.5 cal. ka. The brief communication by Engel does not give additional information about the context or nature of the burial. Moreover, the site is described as having deflated and obscure dunal stratigraphy, which would tend to conflate materials of different ages. The reported date must therefore remain tentative. Tomb 1 individual l is identified as likely male, 29–45 years old, based on a robust suite of skeletal features. They were wrapped in fibrous twine matting and associated with a single bone pendant.

Bay of Paracas Village 514 is an open-air site in Peru located at 13.8° south latitude, 76.3° west longitude. This location is for the general Paracas region. The following summary is based on Engel (*204*) and Beynon and Siegel (*206*). A skeleton is reported from a stratigraphic level dating to 7740±185 ^{14}C B.P., or 9.0–8.2 cal. ka. The brief communication by Engel does not give additional information about the context or nature of the burial. Moreover, the site is described as having deflated and obscure dunal stratigraphy, which would tend to conflate materials of different ages. The reported dates must therefore remain tentative. The individual is identified as likely male, 24–40, based on limited skeletal features. The state of preservation is reported to be poor. The individual was wrapped in a feather garment and twined reed mat and associated with a bone needle and projectile point. Note that while Engel attributes this burial to Village 514, Beynon and Siegel attribute it to Village 96.

Cuncaicha is a stratified rockshelter site located in the central highlands of Peru at 15.4° south latitude, 72.6° west longitude (*207*). The summary presented here is based on Francken et al. (*208*). Excavations resulted in the discovery of two adult females and three adult males. Burials 3 and 4, both males, post-date 4.3 cal. ka Burials 5, 6, and 7 pre-date 8.3 cal. ka. Burial 5 was only partially excavated. The individual is a 35–55 year old male directly dated to 9.0–8.7 cal. ka. No associated artifacts are reported. Burial 6 is a partial skeleton of

a 30–50-year-old female directly dated to 8.5–8.4 cal. ka. The individual was associated with a flake, scraper, and pointed bone tool with the latter two showing traces of ocher. Burial 7 is a relatively complete female with an estimated age of 18–25 and directly dated to 9.1–8.8 cal. ka. No tools are reported for burial 7.

Quebrada de los Burros is a cave site located along the coast near Tacna Peru at 18.0° south latitude, 70.8° west longitude. The human remains are reported by Delabarde et al. (*209*) and Lavallèe et al. (*210*). Two highly degraded human skeletons are reported from a level dated to 9830±140 ^{14}C B.P., or 11.7–10.7 cal. ka. One individual is a young adult male. No artifacts were located in situ. It is associated with a stratigraphic level dating to 8.0–7.5 ^{14}C, or 9.0–7.8 cal. ka. Direct dating was not possible for lack of collagen. A second individual is identified as a male, approximately 25 years old. No funerary objects were observed. The burial is dated stratigraphically to approximately 9.5 cal. ka.

El Morro 1 is a Chinchorro site located along the coast of northern Chile at 18.5° south latitude, 70.3° west longitude (*211*). The summary presented here is based on Allison et al. (*211*) who analyzed 96 mummies from the site. Nine radiocarbon dates range from 7810±180 to 3670±100 ^{14}C B.P., or 9.0–3.6 cal. ka, with most dates toward the later end (4200, 3830, 3790, 7810, 5160, 4350, 4040, 4570, and 3670 ^{14}C B.P.). No additional information could be located specifically on the early burial(s).

Lapa de Escrivânia 3 is located in the Lagoa Santa region of Brazil at 19.0° south latitude, 44.0° west longitude. The coordinates reflect the general location of Lagoa Santa. Neves and Hubbe (*212*) included two individuals from the site in their craniometric analysis, which was based largely on unpublished museum collections. One individual is reported as female, the other indeterminate. A direct date on human bone from one unspecified individual is 7740±80 ^{14}C B.P., or 8.6–8.4 cal. ka. The remains were recovered by the prominent Danish-Brazilian archaeologist, Peter Lund (1801–1880). No further site information nor primary citations are provided for this site.

Harold Walter Collection (Lagoa Santa) is a collection of 22 individuals, 11 female and 11 male, from unspecified stratigraphic contexts dated to 8.5–8.0 ka ^{14}C B.P., or 9.5–8.8 cal. ka, in the Lagoa Santa region of Brazil at 19.0° south latitude, 44.0° west longitude. The coordinates reflect the general location of Lagoa Santa. Information included in the craniometric study of Neves and Hubbe (*212*), which was based largely

on unpublished museum collections. No age estimates, contextual information, or osteological methods are provided.

Lapa D'Água is located in the Lagoa Santa of Brazil region at 19.0° south latitude, 44.0° west longitude. The coordinates reflect the general location of Lagoa Santa. Neves and Hubbe (*212*) included one female individual from the site in their craniometric analysis, which was based largely on unpublished museum collections. The individual comes from an unspecified stratigraphic context dated to 8.5–8.0 ^{14}C ka, or 9.5–8.8 cal. ka. No further contextual information is reported for this site.

Lapa da Amoreira is located in the Lagoa Santa region of Brazil at 19.0° south latitude, 44.0° west longitude. The coordinates reflect the general location of Lagoa Santa. Neves and Hubbe (*212*) included a male individual from Lapa do Amoreira in their craniometric analysis, which was based largely on unpublished museum collections. Two human bone dates of 7070±40 and 8040±40 ^{14}C B.P., or 9.0–7.8 cal. ka, are reported for the site. It is unclear if either date is from the male individual in their study. No further contextual information nor primary citations are provided for this site.

Lapa de Carrancas is located in the Lagoa Santa region of Brazil at 19.0° south latitude, 44.0° west longitude. The coordinates reflect the general location of Lagoa Santa. Neves and Hubbe (*212*) included two male individuals from Lapa de Carrancas in their craniometric analysis, which was based largely on unpublished museum collections. A radiocarbon date of 7970±40 ^{14}C B.P., or 9.0–8.6 cal. ka, on human is reported. No further contextual information nor primary citation are provided for this site.

Santana do Riacho is a rockshelter site located in southern Brazil at 19.2° south latitude, 43.8° west longitude. The summary presented here is based on Neves et al. (*213*). Twenty-eight human burials have been recovered. Neves et al. report a detailed summary of burial treatment. Burial 4 is dated via AMS charcoal reading to 8150±150 ^{14}C B.P., or 9.4–8.6 cal. ka. Burial 5a is dated via AMS collagen to 12,760±70 ^{14}C B.P., or 15.4–14.8 cal. ka. However, the date is flagged as "...older than expected." Burial 13 is dated via AMS charcoal reading to 9460±110 ^{14}C B.P., or 9.5–9.0 cal. ka. Burial 20 is dated via AMS collagen reading to 8280±40 ^{14}C B.P., or 9.4–9.0 cal. ka. Burial 23 is dated via AMS charcoal reading to 8230±150 ^{14}C B.P., or 9.5–8.7 cal. ka. Sex and age are only reported for Burial 4 who is identified as a 20–24-year-old female. All appear to have been primary inhumations based on the map provided by Neves et al. Some burials were unas-

sociated with grave goods, others were associated with beads, hammerstones, borers, scrapers, quartz flakes, and bone instruments. Only one individual is reported with potential big-game hunting tools. Burial 4 was associated with three bone point fragments.

Acha-2 is a coastal open-air Chinchorro site located near the Azapa Valley at 19.3° south latitude, 70.3° west longitude. Site location used here is general. Information presented here are from Aufderheide et al. (*214*) who refer to an unpublished 1982 report by Muñoz and Chacama. A single disturbed burial was recovered and directly dated to 8970±255 ^{14}C B.P., or 10.7–9.5 cal. ka. The burial is broadly associated with houses and subsistence tools including fish hooks and projectile points. The cranium was associated with a totora textile and camelid hide. There are no additional indications of artifact associations. Age is estimated at 25–30 years old. Sex is estimated to be male.

Sumidouro is a cave site located in the Lagoa Santa region of Brazil at 43.9397° south latitude, 19.5453° west longitude. Neves and Hubbe (*212*) included 31 individuals including 14 females and 17 males from Sumidouro in their craniometric analysis. A series of six radiocarbon dates from site charcoal, shell, and calcite are as follows: 7650±50, 8960±50, 7680±40, 7590±80, 8150±450, and 7674±456 ^{14}C B.P., suggesting a date range of 10.2–8.0 cal. ka.

Lapa Vermelha IV is a rockshelter located in the Lagoa Santa region of Brazil at 43.9931° south latitude, 19.6198° west longitude. The following summary is based on Fontugne (*215*) and Feathers (*216*). A single disturbed burial of a 20–25-year-old female known as Luzia has been the subject of several investigations, many centered on dating the remains. Radiocarbon dates on associated charcoal place the burial between 11.7–11.2 cal. ka at the younger end of the result obtained by optically stimulated luminescence. Neves and Hubbe (*212*) conducted detailed craniometric analysis on the individual, but do not provide specific data relevant to the current study.

Cerca Grande Rockshelters include a series of rockshelters located in the Lago Santa region of Brazil at 44.0032° south latitude, 19.5281° west longitude (*217*). The summary presented here is based on Hurt (*218*) and Neves et al. (*219*). Twenty-one burials have been discovered among the caves, with chronometric analyses suggesting a date range of 10.7–8.8 cal. ka. Most burials were primary inhumations, and no funerary goods are

reported. Although Neves et al. report radiocarbon dates and sex estimations, the presentation format makes them difficult to parse. No age-at-death estimates are presented.

Burial 1 from rockshelter 7 is dated via charcoal to 9130±30 ^{14}C B.P., or 10.3–10.2 cal. ka, and is identified as female. Burial 2 from shelter 6 is collagen dated to 8230±50 ^{14}C B.P., or 9.3–9.0 cal. ka. Burial 3 from shelter 6 is dated via collagen to 8240±40 ^{14}C B.P., or 9.3–9.0 cal. ka, and is identified as male. Four other individuals are identified as female all from shelter 6 and four others as male from shelters 2, 5, and 6. Hurt reports that four burials from rockshelter 2 are tightly flexed and one is disturbed. Four burials from rockshelter 5 are tightly flexed and 1 disturbed. Rockshelter 6 had many disturbed bone fragments but 11 flexed primary inhumations were identified.

Lapa do Caetano is a rockshelter site located in the Lagoa Santa region of Brazil at 44.0122° south latitude, 19.5271° west longitude (*217*). Neves and Hubbe (*212*) included two individuals–one female and one male–in their craniometric analysis. Chronometric analysis places the burials between 10.7–8.8 cal. ka. No additional information or references are reported.

Lapa do Santo is a cave site located in the Lagoa Santa region of Brazil at 44.0379° south latitude, 19.4818° west longitude (*217*). Thirty-two burials were recovered from the site. Neves and colleagues conducted craniometric analysis on seven individuals (*217, 220*). Chronometric analysis places the burials between 10.3–7.8 cal. ka. Few formal instruments have been recovered from the site.

Lapa Mortuária (rockshelter) is located in the Lagoa Santa region of Brazil at 19.6424° south latitude, 43.9720° west longitude (*217*). Neves and Hubbe (*212*) included two female and two male individual from the site in their craniometric analysis, which was based largely on unpublished museum collections. Four radiocarbon dates of 8810±50, 8350±40, 8290±40, and 7190±50 ^{14}C B.P., each on human bone, are reported translating to a calendar date range of 10.1–7.9 cal. ka. No further contextual information nor primary citations are provided for this site.

Lapa Mortuária (cave) is located in the Lagoa Santa region of Brazil at 19.6424° south latitude, 43.9720° west longitude (*217*). The summary presented here is based on Walter et al. (*221*) and Neves and Hubbe (*212*). Walter et al. conducted a detailed craniometric analysis of a male individual known as Confins Man. Photographs of the cranium and basic description of the burial context is reported. They note that no artifacts

were associated with the relatively intact, extended burial. Neves and Hubbe supported the male sex estimation. They report a radiocarbon date of 11,990±50 ^{14}C B.P., or 14.0–13.6 cal. ka, on human is reported but was "under confirmation" at the time of publication. No further contextual information nor primary citation are provided for this site.

Cueva Yavi is a cave site located in northwest Argentina at approximately 22.217° south latitude, 65.367° west longitude. The location is for the general study region. Kulemeyer et al. (*222*) report two secondary burials including at least four individuals in association with levels that produced ^{14}C dates of 8320±260 and 8420±70 ^{14}C B.P., or 9.7–8.6 cal. ka. A date of 9790±100 ^{14}C B.P., or 11.4–10.8 cal. ka, from a lower level temporally constrains the overlying stratigraphic units in which the burials were located. Thus the burial-bearing strata likely date to sometime between 11.4–8.6 cal. ka. There is no indication of sex, age or artifact associations in the limited description of the burials, save for one individual who was associated with a clay nodule.

Pintoscayoc 1 is a rockshelter site located in northwest Argentina at approximately 22.9317° south latitude, 65.428° west longitude. The summary presented here is based on Hernández (*223*). Two adult primary inhumations were recovered in level 6–one adult female and one adult male. No artifacts are reported in association. A direct date on one individual of 9080±50 ^{14}C B.P., or 10.3–10.0 cal. ka, is consistent with other dates in same stratum and surrounding strata. Level 5, dating to approximately 7850±110 ^{14}C B.P., or 9.0–8.4 cal. ka, produced a disarticulated and burnt cranium.

La Chimba 13 is an open-air site located along the coast of northern Chile at 23.526° south latitude, 70.393° west longitude. The following summary is based on Costa-Junqueira's description (*224*). A single adult male primary inhumation in a poor state of preservation from the site with three associated radiocarbon dates of 9170±80, 9400±160, and 9680±160 ^{14}C B.P., giving a combined average of 9293±65 ^{14}C B.P., or 10.6–10.3 cal. ka. Fifteen shells and a stone were carefully stacked near the cranium. Small red ocher fragments were also found around the cranium. Possible artifact associations include a sandstone abrader and cylinder. Few projectile points were found at the site in general.

Cueva Huachichocana III is located in Northwest Argentina at 24.7° south latitude, 65.7° west longitude. Fernández (*225*) reports 4 burials from cave 3, one of which–Individual 2–is a secondary burial associated with

an adjacent hearth radiocarbon dated to 9620±120 ^{14}C B.P., or 11.2–10.6 cal. ka. Lanceolate and triangular projectile points and debitage are reported in association. The individual consists of cranial and many post-cranial elements, which permit estimation of a male individual 18–20 years old. All other burials appear to postdate approximately 3.7 cal. ka. It is worth noting that an elaborate burial dating to 3.6 cal. ka is estimated to be an adult male and is associated with a complete atlatl among many other objects of wood, stone, bone, and shell.

Peñas de las Trampas 1.1 is a rockshelter site located in Argentina at 26.0° south latitude, 68.0° west longitude. Coordinates are for the nearby town of Antofagasta de la Sierra. Summary data presented here are based on Martínez et al. (*226, 227*). The site includes two funerary structures that date to 8.0 ^{14}C ka, or 8.9 cal. ka. Both structures contain secondary burials, each with at least three individuals for a total of six individuals. Two are sub-adults under two years of age, three are sub-adults under 10 years of age, and one is an adult. Sex is indeterminate for all individuals. Direct dates, one from each of the six individuals, are as follows: 8230±30 ^{14}C B.P. (9.3–9.0 cal. ka), 8140±30 ^{14}C B.P. (9.1–9.0 cal. ka), 8150±30 ^{14}C B.P. (9.1–9.0 cal. ka), 8170±30 ^{14}C B.P. (9.1–9.0 cal. ka), 8210±30 ^{14}C B.P. (9.2–9.0 cal. ka), 8000±30 ^{14}C B.P. (9.0–8.7 cal. ka), 8440±30 ^{14}C B.P. (9.5–9.3 cal. ka), and 7790±30 ^{14}C B.P. (8.6–8.5 cal. ka). All are secondary burials, and no hunting equipment is reported, though the burials are associated with beads, textiles, and feathers.

La Fundición 1 is an open-air site located near the central coast of Chile at approximately 29.70° south latitude, 70.92° west longitude. The following summary is based on Castillo and Rodriquez's report (*228*) and Costa-Junqueira's description (*224*). Artifact assemblages at the site suggest a subsistence economy based largely on big-game hunting. Costa-Junqueira suggests that the burials (along with those of Huentelauguén and La Chimba-13) date between 9.7–8.1 ^{14}C ka. However, this is based on few radiocarbon dates–only one of which is from La Funcdición. A radiocarbon date of 8730±90 ^{14}C B.P., or 10.1–9.5 cal. ka, is associated with a stratigraphic level that corresponds to Burial 1. Three burials are reported from the site including at least six individuals. The condition of the skeletons appear to have been relatively good. Burial 1 is a primary burial without grave goods. Age and sex are not reported. Burial 2 is a disturbed burial associated with river cobbles and a quartzite tool preform. Age and sex are not reported. Burial 3 is a mixed assemblage with at least three adult individuals and one child. The adults appear to be male but evidence is not cited. Two retouched obsidian flakes were observed in the mixed burial assemblage.

Caverna Piuquenes is a cave site located in the central highlands of Chile at 32.849° south latitude, 70.584° west longitude. The site location reported here is the location of the nearby modern village of Saladillo, Chile. The following summary is based on Rojas et al. (*229*). One human burial was encountered in zone B and one in zone D. Zone B dates to approximately 9 cal. ka. The individual from zone D is directly dated to 10.4-10.2 cal. ka. The second date is reported as a 95% range calibrated using IntCal98. Both are reportedly females 20–30 years old at the time of death. Only a stone is reported in association with the thorax of the second burial.

Punta Curaumilla is a open-air site located at 33.10° south latitude, 71.73° west longitude on the coast of Chile. The following summary is based on Ramírez et al.'s (*230*) published chapter on the site. It has a preceramic deposit with a single date of 8790±110 ^{14}C B.P., 10.2–9.5 cal. ka. Test pits produced only fragments of human bone and no apparent burial pits. No additional osteological observations are reported.

Huentelauquén is an open-air site located near the central coast of Chile at approximately 31.580° south latitude, 71.524° west longitude. The following summary is based on Costa-Junqueira's description (*224*). Artifact assemblages at the site suggest a mixed terrestrial/marine subsistence base. Three adults and four infants are reported from a multiple burial with an associated radiocarbon date of 8080±70 ^{14}C B.P., or 9.1–8.6 cal. ka. The condition of the skeletons appears to have been relatively good. Individual 3 is an adult female associated with two large groundstone artifacts. Individual 2 is associated with a shell bead and two mollusk shells. Age and sex are not reported. Individual 1 is associated with an engraved plaque, a bead necklace, and two mollusk shells. No additional information on age, sex, or associated artifacts is reported. The infant skeletons were all disturbed as were two of the adults. However, the drawing shows them to be relatively intact.

Cuchipuy is an open-air site located in central Chile at 34.48° south latitude, 71.12° west longitude. The following summary is based on Kaltwasser et al.'s examination of skeletal materials (*231*). Three stratigraphic levels are recognized. The upper level is a ceramic bearing level. All lower levels are characterized as aceramic. Level 2 included a cemetery with approximately 50 individuals. Level three contains isolated human bone. Level 4 included two individuals. Table 1 of their report presents sex estimates for eight individuals, but it is unclear which individuals belong to which levels, which may be due to the poor quality of the article available online. The chronological placement of these strata is not well described despite indication that 15 radiocarbon

dates have been produced. Two ^{14}C dates are reported for the lowest levelsone date of 8070±100 ^{14}C B.P., or 9.2–8.6 cal. ka, on carbon and the other of 6105±145 ^{14}C B.P., or 7.3–6.6 cal. ka, on bone (unspecified whether human or animal).

Arroyo Seco 2 is a multi-component hunter-gatherer site located in the eastern pampas of Argentina, 60 km from the Atlantic coast at 38.4° south latitude, 60.2° west longitude. All data presented here are from Politis (*51*). Based on ^{14}C dates and stratigraphic positioning, Politis defines three major chronological groups: group 3, 5.6–5.0 cal. ka (4.9–4.4 ^{14}C ka); group 2, 8.0–7.0 cal. ka (7.2–6.2 ^{14}C ka); and group 1, 9.0–8.2 cal. ka (8.1–7.4 ^{14}C ka). Thirteen burials associated with group 1 are the focus of this summary (table S16). The condition of the burials is generally good, but some show evidence of disturbance. Those with hunting goods are AS24, AS31, AS36, and AS39. In all cases the hunting goods are projectile points. AS24 and AS36 are male. AS31 is a possible male. AS39 is female. A single quartzite point was found near the left femur of AS20. Five projectile points are associated with AS31. Three of those were embedded in the skeleton. AS36 is associated with four quartzite projectile points spread out in the left rib cage near the dorsal and lumbar vertebral regions. It is unclear if the points represent violence or offerings. AS39 is associated with AS36 in the same burial and was buried with a quartzite projectile point between the left femur and tibia diaphyses and another in the left rib cage. In sum, four individuals are associated with projectile points including three adult males and one adult female. Some of the point associations with AS31 are clearly the result of violence. Although the other association pathways appear to be systemic, it is unclear if they are the product of violence or burial offering.

Table S16 Group 1 burials from Arroyo Seco 2 (*51*).

id	sex	age	^{14}C B.P.	date (cal. ka 95%)	grave goods
E13, AS20	male	45–49	–	NA	stones
E17, AS24	male	55+	7800±115	9.0–8.4	projectile point, ocher
E19, AS26	female	25–29	7580±50	8.4–8.2	beads
E24, AS31	male?	55+	7615±90	8.5–8.2	projectile points, rocks
E25, AS32	female	50–54	7685±95	8.6–8.2	ocher
E25, AS34	unknown	1–2	see AS32	8.6–8.2	ocher
E27, AS36	male	20–24	7805±85	8.8–8.4	projectile points
E27, AS39	female	15–19	see AS36	8.8–8.4	projectile points, ocher
E32, AS41	female	50+	–	NA	none
E33, AS42	male	adult	7619±62	8.5–8.2	none
E33, AS43	female	adult	see AS42	8.5–8.2	none
E33, AS44	male	subadult	see AS42	8.5–8.2	none
E33, AS45	female	subadult	see AS42	8.5–8.2	none

Baño Nuevo 1 is a cave site located on the steppe of central Patagonia at 45.28° south latitude, 71.53° west longitude. This summary is based on Mena and Reyes' (*232, 233*) report on five individuals, two of which produce early chronometric associations. Individual 2 is identified as 20–25-year-old male. Two direct dates of 8850±50 and 8880±50 ^{14}C B.P., giving a combined date of 8865±50 ^{14}C B.P., or 10.2–9.7 cal. ka, along with an indirect date of 8890±90 ^{14}C B.P., or 10.2–9.6 cal. ka, are associated with the individual. The skeleton was mostly complete lacking only the pelvis. Individual 3 is identified as a 40–45-year-old female associated with an indirect date of 8530±160 ^{14}C B.P., or 9.9–9.0 cal. ka. The cranium was missing. No grave goods are reported for either individual.

Palli Aike is a rockshelter site located in the Tierra del Fuego region of Chile at approximately 52.1° south latitude, 69.7° west longitude. This summary is based on reports by Munizaga (*234*) and Neves et al. (*235*). A single partially intact adult male skeleton and three cremation burials were indirectly dated to 8639±450 ^{14}C B.P., or 10.7–8.5 cal. ka. Attempts at direct dating have failed to produce collagen, but a date on free carbon molecules produced during pretreatment produced a date of 7830±60 ^{14}C B.P., or 8.7–8.4 cal. ka, which thus reflects a minimum age. Associated grave goods are not reported.

9 Artist reconstruction of WMP6

Various lines of anthropological evidence inform a graphic visualization of the Wilamaya Patjxa individual 6 hunter. Matthew Verdolivo (Senior Artist, UC Davis IET Academic Technology Services) composed the digital rendering shown in fig. S9 in consultation with Haas, Madeline Frey (UC Davis undergraduate student and artist), and Steve Dana (Graphics Lead, UC Davis IET Academic Technology Services). To the extent possible, we have attempted to depict an individual that conforms to empirical data gained directly from the WMP6 burial. Where necessary, gaps were filled using related archaeological or ethnographic observations.

The toolkit, faunal remains, and isotope bone chemistry suggest that the individual was a hunter, likely of vicuña and taruca. We have therefore chosen to depict a vicuña hunting scene. The landscape is based on photographs taken at the site of Wilamaya Patjxa and in the greater Ilave Basin. Osteological and biomolecular data (i.e., enamel protein) indicate the individual was a young adult female. DNA evidence from contemporary Aymara populations and the neighboring sites of Soro Mik'aya Patjxa (*35*) and Jiskairumoko (*236*) suggests deep-time genetic continuity between the early archaeological populations of the region and modern Aymara communities (*237*). We have therefore modeled the individual's appearance from photographs of Aymara

Fig. S9 Artistic rendering of Wilamaya Patjxa vicuña hunting scene. Design attributes are informed by the WMP6 burial as well as other archaeological and ethnographic observations as described in the text.

women from the region.

The atlatl dart points are based on the forms and colors found in the WMP6 burial toolkit. The clothing depicts ocher-tanned animal hide clothing following from the co-occurrence of hide scrapers and red ocher nodules in the WMP6 toolkit. Ethnography and experimental research further show that red ocher was a common hide-tanning ingredient (*29, 238, 239*). The pouch shown on the hunter's hip reflects the toolkit found near the hip of the WMP6 burial. The depiction of tailored leather clothing is consistent with the diverse hide-processing tools and the clothing required in a cold, hypoxic environment as Aldenderfer has argued for the neighboring high-elevation site of Asana (*240*).

The darts, hairstyle, clothing, and cooperative camelid hunting scene are informed by rockart scenes in the Atacama region (*241*). Braided hair is also observed among early burials of the Atacama (*242*). The cooperative vicuña hunting scene is further inspired by a long tradition of cooperative vicuña capture, or *chaccus*, that continue on the Altiplano today (*243*). The atlatl depicts a camelid radioulna bone form that has been reported from cave sites in northern Chile (*241*). We suspect that similar forms would have been used on the Andean Altiplano where wood is spare.

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