NEW DISCOVERIES IN THE AMERICAN PALEOLITHIC

THE PRE-16,000 BP ARCHAEOLOGICAL RECORD

ANZA-BORREGO DESERT STATE PARK®
BORREGO SPRINGS, CALIFORNIA, USA
10-12 JANUARY 2019
Conference Weekend Events

AGENDA

Thursday, January 10, 5:00-8:00 pm
Meet & Greet / Poster Presentations
Steele/Burnand Anza-Borrego Desert Research Center
401 Tilting T Drive Borrego Springs, CA 92004

Friday, January 11, 8:00 am-5:00 pm
Speaker Presentations
Borrego Springs Performing Arts Center
590 Palm Canyon Drive Borrego Springs, CA 92004

Saturday, January 12, 8:00 am-5:00 pm
Speaker Presentations
Borrego Springs Performing Arts Center
590 Palm Canyon Drive Borrego Springs, CA 92004

Host Committee:
Steven R. Holen, Kathleen Holen, Robin Connors,
Lyndon K. Murray, G.T. Jefferson, and Briana Puzzo
Center for American Paleolithic Research
Anza-Borrego Desert State Park®
Anza-Borrego Foundation
Begole Archaeological Research Center
Meet & Greet and Poster Session
Thursday Evening, January 10th 5pm-8pm
Steele/Burnand Desert Research Center, Borrego Springs

5:30 Welcome
Elaine Tulving, UCI Steele/Burnand Desert Research Center
Steven Holen, Center for American Paleolithic Research
Briana Puzzo, Anza-Borrego Foundation
Robin Connors, Anza-Borrego Desert State Park®

THE CALICO SITE: AGE, CONTEXT AND THE ARTIFACT/GEOFACT ISSUE
BUDINGER, Fred E. Jr., Budinger & Associates, San Bernardino, California, USA, OBERLANDER, Theodore M., University of California, Berkeley, California, USA, BISCHOFF, James L., U.S. Geological Survey, Menlo Park, California, USA and OWEN, Lewis A., Geology Department, University of Cincinnati, Cincinnati, Ohio, USA

ROBERT BEGOLE 1919 TO 2010: A LEGACY OF STONES
CONNORS, Robin, and ELSKEN, Hayley, Begole Archaeological Research Center, Anza-Borrego Desert State Park®, California, USA

W. MORLIN CHILDERS: THE SEARCH FOR EARLY MAN IN THE YUHA DESERT
GILBERT, Linda, Colorado Desert District Stout Research Center, Borrego Springs, California and SEVILLA, Edgar Bernal, Imperial Valley Desert Museum, Ocotillo, California, USA

EXPEDIENT BONE TOOLS: EVIDENCE OF HUMAN PRESENCE AT PROBOSCIDEAN DEATH SITES?

Special Thanks for Food and Beverage Sponsors:
- San Diego Archaeological Center
- Center for American Paleolithic Research
Paper Presentations
Borrego Springs Performing Arts Center
Friday January 11

Friday Morning

8:15-8:30  **Opening Remarks:**
  Steven Holen, Center for American Paleolithic Research
  Briana Puzzo, Anza-Borrego Foundation
  Robin Connors, Anza Borrego Desert State Park®
  Carmen Lucas, Kwaaymii Laguna Band of Mission Indians

8:30-9:05  **THE CERUTTI MASTODON SITE: HISTORY OF INVESTIGATIONS AND PRESENT STATUS OF RESEARCH AND THE DEBATE**
  DEMÉRÉ, Thomas A. and CERUTTI, Richard A., Department of Paleontology, San Diego Natural History Museum, San Diego, California, USA

9:05-9:40  **PROVING A FUNCTION: RESIDUES ON BONE-BREAKING STONES AT THE CERUTTI MASTODON SITE**
  FULLAGAR, Richard, HAYES, Elspeth, and BORDES, Luc, Centre for Archaeological Science, School of Earth and Environmental Sciences, University of Wollongong, Wollongong, New South Wales, Australia

9:40-9:55  **THE GEOMORPHIC SETTING OF THE CERUTTI MASTODON SITE WITHIN THE LOWER SWEETWATER VALLEY, SAN DIEGO COUNTY, CALIFORNIA, USA**
  BEETON, Jared, Environmental Studies, Fort Lewis College, Durango, Colorado, USA, and DEMÉRÉ, Thomas A., Department of Paleontology, San Diego Natural History Museum, San Diego, California, USA

9:55-10:15 Break

10:15-10:50  **CERUTTI SITE BROKEN MASTODON LIMB BONE EVIDENCE WITHIN A WORLDWIDE PROBOSCIDEAN BONE TECHNOLOGICAL CONTEXT**
  HOLEN, Steven R., and HOLEN, Kathleen, Center for American Paleolithic Research, Hot Springs, South Dakota, USA

10:50-11:25  **GEOARCHAEOLOGICAL CONTEXT OF MAMMOTH SITES WITH HUMAN ASSOCIATION IN THE REPUBLICAN RIVER BASIN IN SOUTHERN NEBRASKA AND NORTHERN KANSAS, GREAT PLAINS, USA**
  MAY, David W., Department of Geography, University of Northern Iowa, Cedar Falls, Iowa, USA

11:25-1PM Lunch
Friday Afternoon

1:00-1:35  DATING BONE BEYOND THE RADIOCARBON BARRIER USING URANIUM-SERIES DISEQUILIBRIUM
PACES, James B., Geosciences and Environmental Change Science Center, U.S. Geological Survey, Denver, Colorado, USA

1:35-2:10  DETERMINING AGES OF HUMAN OCCUPATION VIA $^{230}$Th/U DATING OF LANDFORMS, ARTIFACTS, AND RATITE EGGSHELLS
SHARP, Warren D., Berkeley Geochronology Center, Berkeley, California, USA

2:10-2:45  DETERMINING THE ORIGINS AND AGES OF PALEO-LANDSCAPES IN THE ANZA-BORREGO DESERT
BLISNIUK, Kimberly, San Jose State University, California, USA, SHARP, Warren D., Berkeley Geochronology Center, California, USA, BROWN, Nathan, and MOON, Seulgi, University of California, Los Angeles, California, USA

2:45-3:05  Break

3:05-3:40  PRELIMINARY VARNISH MICROLAMINATION DATES ON POSSIBLE PALEOLITHIC ARTIFACTS FROM THE ROBERT BEGOLE COLLECTION, ANZA-BORREGO DESERT STATE PARK®
CONNORS, Robin, Begole Archaeological Research Center, Anza-Borrego Desert State Park®, California, USA

3:40-4:15  NO CHIPPED STONE TOOLS: AN EVIDENTARY STANDARD FOR HUMAN ACTIVITY AT LARGE ANIMAL DEATH SITES
HOLEN, Kathleen, Center for American Paleolithic Research, Hot Springs, South Dakota, USA

Thanks to:
♦ Center for American Paleolithic Research
♦ Anza Borrego Desert State Park’s Paleontology Society
♦ Colorado Desert Archaeological Society
for sponsoring international presenters
Saturday January 12

Saturday Morning

8:30-9:05  CHANGES IN THE CONCEPTUALIZATION OF THE INITIAL SETTLEMENT OF THE AMERICAS
GRUHN, Ruth, University of Alberta, Alberta, Canada

9:05-9:40  ARROYO DEL VIZCAINO: STRENGTHS AND WEAKNESSES FOR A VERY OLD SITE IN SOUTHERN SOUTH AMERICA
FARIÑA, Richard A, Departamento de Paleontología, Facultad de Ciencias, Iguá 4225, 11400 Montevideo, Uruguay

9:40-10:15  PAMPAS PRE-LAST GLACIAL MAXIMUM CULTURAL EVIDENCE AND CLIMATE DEMOGRAPHIC OIS 3/2 EXPANSION STAGES, BUENOS AIRES, ARGENTINA
TOLEDO, Marcelo Javier, Universidad de Buenos Aires, Buenos Aires, Argentina

10:15-10:30 Break

10:30-11:05  PLEISTOCENE INDUSTRIES OF NORTHEAST BRAZIL
BOËDA, Eric, UMR 7041 équipe ArScAn - AnTeT, Université de Paris Nanterre, Paris, France & Fundação Museu do Homem Americano (FUMDHAM), São Raimundo Nonato, Brazil

11:05-11:40  TEN YEARS OF CHRONOLOGICAL RESEARCH IN THE SERRA DA CAPIVARA ARCHAEOLOGICAL SITES: WHAT LUMINESCENCE DATING BRINGS TO THE KNOWLEDGE OF PLEISTOCENE-HOLOCENE ARCHAEOLOGICAL SEQUENCES
LAHAYE, Christelle, GUÉRIN, Guillaume, IRAMAT-CRP2A, UMR 5060 CNRS & Université Bordeaux Montaigne, Pessac, France, GLUCHY, Maria, Universidade do Rio Grande do Sul, Rio Grande do Sul, Brazil, HATTÉ, Christine, FONTUGNE, Michel, LSCE UMR 8212 CNRS-CEA-UVSQ, Université Paris-Saclay, Gif-sur-Yvette, France, CLEMENTE-CONTE, Ignacio, CSIC-(IMF), Departamento de Arqueología y Antropología grupo AGREST, Barcelona, Spain, SANTOS, Janiana C., Universidade Federal do Vale do São Francisco, São Raimundo Nonato, Brazil, VILLAGRAN, Ximena, Museu de Arqueologia e Etnologia, Universidade de Sao Paulo, Sao Paulo, Brazil, DA COSTA, Amélie., UMR 7041 équipe ArScAn - AnTeT, France, BORGES, Carolina, Universidade Federal do Piauí, Teresina, Brazil, GUIDON, Niede, Fundação Museu do Homem Americano (FUMDHAM), São Raimundo Nonato, Brazil and BOËDA, Eric, UMR 7041 équipe ArScAn - AnTeT, Université de Paris Nanterre, Paris, France & Fundação Museu do Homem Americano (FUMDHAM), São Raimundo Nonato, Brazil

11:40-1:00 PM Lunch
Saturday Afternoon

1:00-1:35  GETTIN’ TO TEXAS: THE EARLY HUMAN OCCUPATIONS AT THE GAULT SITE  
           COLLINS, Michael B., WILLIAMS, Thomas J., and VELCHOFF, Nancy, Gault School of  
           Archaeological Research, Texas State University, Texas, USA

1:35-2:10  EXCAVATION OF THE SAND MAMMOTH: A PRELIMINARY REPORT  
           KEELEY, Sandra, and KEELEY, Robert, Stout Research Center, California State Parks,  
           California, USA, HOLEN, Kathleen, Center for American Paleolithic Research, Hot  
           Springs, South Dakota, USA, JEFFERSON, George T., and MURRAY, Lyndon, Stout  
           Research Center, California State Parks, California, USA

2:10-2:45  ROBERT BEGOLE’S EARLY MAN SITES IN THE ANZA-BORREGO DESERT STATE PARK®:  
           NEW RESEARCH ON LITHICS IN DESERT PAVEMENTS IN HYPERARID ENVIRONMENTS  
           RUNNELS, Curtis, MURRAY, Priscilla, and HOLCOMB, Justin, Boston University, Massa-  
           chusetts, USA, WEGMAN, Karl, North Carolina State University, North Carolina, USA,  
           EPPES, Martha C., University of North Carolina-Charlotte, North Carolina, USA,  
           SHARP, Warren D. Berkeley Geochronology Center, Berkeley, California, USA

2:45-3:00  Break

3:00-3:35  EARLY HOMININ DISPERSAL INTO NORTH AMERICA DURING LATE MIS6/5E CLIMATIC  
           AND ECOLOGICAL EXPLANATIONS OF HOMININ AND FAUNAL MOVEMENTS  
           HOLEN, Steven R., Center for American Paleolithic Research, Hot Springs, South Da-  
           kota, USA, FULLAGAR, Richard, Centre for Archaeological Science, University of Wol-  
           longong, Wollongong, New South Wales, Australia, and HOLEN, Kathleen, Center for  
           American Paleolithic Research, Hot Springs, South Dakota, USA

Keynote Address

3:35-4:30  WHEN DID PEOPLE FIRST ARRIVE IN AUSTRALIA?  
           FULLAGAR, Richard, Centre for Archaeological Science, School of Earth and  
           Environmental Sciences, University of Wollongong, Wollongong, New South Wales, Australia
THE GEOMORPHIC SETTING OF THE CERUTTI MASTODON SITE WITHIN THE LOWER SWEETWATER VALLEY, SAN DIEGO COUNTY, CALIFORNIA, USA

BEETON, Jared, Environmental Studies, Fort Lewis College, Durango, Colorado, USA, and DEMÉRÉ, Thomas A., Department of Paleontology, San Diego Natural History Museum, San Diego, California, USA

This study examines spatial patterns of landscape evolution in the lower Sweetwater River Valley. Specifically, Quaternary aggradational fluvial terraces were mapped in January of 2018 to better understand the broad geomorphic setting of the Cerutti Mastodon (CM) Site. Based on preliminary sediment descriptions, elevation measurements, stratigraphic relationships, and topographic expressions at eleven localities, the CM Site is in the 130,000 ka fluvial fill of a high terrace (T-3) of the mainstem of the Sweetwater River. The T-3 is locally evident on the north side of the Sweetwater River drainage, on the inside of a large meander bend. The lower, younger T-2 and T-1 terraces are more extensive and evident on both sides of the drainage. A small, unnamed Holocene tributary that flows into the Sweetwater River from the northeast has eroded down into the older T-3 fluvial fill to the south of the CM Site, and into the underlying Neogene San Diego Formation and Otay Formation strata exposed west of the site. Geographic Information Systems is used to display the spatial extent of each terrace.

DETERMINING THE ORIGINS AND AGES OF PALEO-LANDSCAPES IN THE ANZA-BORREGO DESERT

BLISNIUK, Kimberly, San Jose State University, California, USA, SHARP, Warren D., Berkeley Geochronology Center, California, USA, BROWN, Nathan, and MOON, Seulgi, University of California, Los Angeles, California, USA

Identifying and understanding paleo-landscapes is critical to documenting the timing of human range expansion into the Americas. Therefore, interpreting the origins of landscape surfaces and accurately quantifying their ages is central to this effort. We review geologic and geochronologic methods that have been successfully used to provide insights into paleo-landscapes in the Anza-Borrego Desert. Geologic mapping, relative dating techniques based on geomorphology, surface properties and soil development, and radionuclide-based dating techniques, specifically 10Be cosmogenic surface exposure dating, post-IR. IRSL dating of feldspars, and U-series dating of pedogenic carbonate coatings on subsurface clasts, have been applied to mid-Holocene to late Pleistocene alluvial fans at four sites in the Anza-Borrego Desert of California. Our results show that careful sampling of Quaternary alluvial fans yield concordant 10Be, post-IR IRSL and U-series dates in most cases, thereby
In South America, the Pleistocene is known mainly for its final stage, usually named as a transition period, dated around 12 to 11 kyr BP. This phase is essentially characterized by one category of object: the bifacial pieces. Those pieces are like the little white stones of “little Thumb”, they help us determine the migration routes of the first settlements.

Brazil, and more especially the Nordeste, is usually ignored when debating the migration routes, though it is the cradle of the “Itaprica” transition industry. It is true that this industry, of the same age as the bifacial industry, is mainly characterized by uniface pieces usually named “lesmas” and not by their rare associated projectile points. Equally unknown is that it shelters a human fossil dated 13 kyr BP associated with this industry. Could this culture, apparently coming from nowhere, be stemming from prior populations living at the same place? The park of Capivara (Piaui), where we research for over ten years, offers some elements of an answer.

Nine archeological sites, in different geological situations have delivered more than 40 archeological layers dated between 42 and 14 kyr BP. Various noteworthy observations can be done on these sets of artefacts. On a wide scale of observation, these industries show the technical specificities of the Pleistocene, i.e. a mix of affordance and of façonnage in the production of the tools, a toolbox comprising more than 20 different tools whose composition can differ between two layers of a same site, or from one site to another. At a more detailed level, we clearly distinguish technical trends, like a phenomenon of miniaturization of the tools around 31 to 29 kyr BP. Or, assemblies dominated by one specific type, or a diversity of tools, reflecting maybe specialized activities, or home life. At an even more detailed level, certain assemblies show new types of tools, mainly using a new type of mineral raw material. Those tools can be associated to smoothers with their flat, concave or convex surfaces, permitting to smoothing, abrasion, and polishing activities. Finally, sometimes we encounter singular artifacts evoking a function of sign, or others (singular and unique use, toy etc.). When comparing these late Pleistocene industries with those of the transition period, we observe real changes, although part of the toolbox remains the same. The changes are primarily technical and not so much geographical, as it is common to find that these cultures succeed one another in the same site.

If technically we observe novelties, we note that they relate to production techniques. The shaping, that used to be done through direct internal percussion, starts being tangential. This change is due to a surprising thing. In fact, the "lesmas and bifacial points" tools do exist from the last phases of the late Pleistocene industries, but with production modes mixing affordance and shaping, not suitable for their manufacture. The change of technique to produce a same tool is a classic technical phenomenon during transition phases. As a consequence, the Itaparica culture is an emanation of the last Pleistocene industries, inherited itself from older industries.
THE CALICO SITE: AGE, CONTEXT, AND THE ARTIFACT/GEOFACT ISSUE

BUDINGER, Fred E. Jr., Budinger & Associates, San Bernardino, California, USA, OBERLANDER, Theodore M., University of California, Berkeley, California, USA, BISCHOFF, James L., U.S. Geological Survey, Menlo Park, California, USA, and OWEN, Lewis A., Geology Department, University of Cincinnati, Cincinnati, Ohio, USA

The Calico Site (central Mojave Desert, California) provides the greatest time depth of evidence of hominin activity in the USA. This poster considers the Calico Site’s oldest component; siliceous rock tools, flakes, and angular debitage of the “Calico Lithic Industry.” Younger surface artifacts or those from a nested inset of alluvial deposits are not considered.

The two foci of investigation and controversy are: (1) the authenticity of the specimens as bona fide artifacts (the “artifact/geofact” issue), and (2) the age and contexts of the host alluvial fan deposits. These are separate issues.

Uranium series dating and surface beryllium-10 (10Be) cosmogenic dating indicate that the host deposits are older than 200,000 years. The alluvial stratigraphy will be presented.

Skeptics have questioned the artifactual character of the Calico lithic materials. Natural processes suggested as alternatives to hominin flint knapping include rock-on-rock percussion in streams and mudflows (i.e., alluvial processes acting as a giant “gravel crusher”), lightning strikes, animal trampling, earthquake liquefaction, and pressure retouch of buried cobbles. These hypotheses are examined and found wanting. Intentional percussion flaking (guided by cognitive evaluation of ever-changing geometries, planned percussion removals that facilitate subsequent modification, and knowledge and experience of the specific lithology involved) is suggested as a more viable hypothesis.

GETTIN’ TO TEXAS: THE EARLY HUMAN OCCUPATIONS AT THE GAULT SITE

COLLINS, Michael B., WILLIAMS, Thomas J., and VELCHOFF, Nancy, Gault School of Archaeological Research and Texas State University, San Marcos, Texas, USA

Concurrent with the increasing evidence of an early human occupation of the Americas is the diversity and complexity of the Upper Paleolithic record at the Gault Site, central Texas, USA. Within this new framework, several hypotheses have been presented to explain the new evidence. This paper will examine the evidence from the Gault Site and place it in the context of these hypotheses, the current archaeological, geological, and genetic evidence and the proposed entry models. As our research paradigm shifts, asking more nuanced questions will move our conversations towards a greater understanding of this early period.
Varnish Microlamination (VML), is a method used for dating geomorphic features by measuring the microstratigraphy levels and layering of Mn- and Fe- deposits. Shaving off ultrathin sections of the varnish layer allows the microstratigraphic layers to be seen through a light microscope. From the outermost dark subaerial surface of desert varnish to a basal layer, electron microprobe chemical mapping reveals elemental concentrations that are visible as dark layers with Mn and Ba in abundance, and a scarcity of Si and Al. Yellow layers indicate the opposite, an abundance of Si and Al and a scarcity of Mn and Ba. The changes in the layers of coloration can be linked to correlated climatic conditions, using radiometric dating and the SPECMAP record. We have submitted three desert varnished tool specimens to Tanzhuo Liu’s laboratory, testing the flaked surface of varnished stone tools collected in the Anza Borrego Desert by Robert Begole in the 1970’s. We are hoping through VML testing that we can present early dates for these tools. Here, we present the preliminary findings.

ROBERT BEGOLE 1919 TO 2010: A LEGACY OF STONES

Here, we examine the life and work of Robert Begole. Robert (Bob) Begole began his first career as an engineer and contractor. He began his explorations as an archaeologist in 1955, leaving us a legacy of maps and early reports. His deep appreciation for the science of archaeology took him around the world and focused his work within the deserts of southern California.

Returning to college to take courses in archaeology and anthropology, Begole began his new career as an archaeologist. For 35 years, Begole worked in Anza Borrego Desert State Park®, a part of the Sonoran Desert, recording at least 2,000 sites. Begole published multiple articles in the quarterly journal published by the Pacific Coast Archaeological Society on rock art, areas of ritual significance and reports for the surveys he conducted in the Park.

Begole sought evidence for the presence of early man in the Americas. To this end, he traveled across the deserts looking for evidence of the presence of ancient people, to signify a much earlier migration into the Americas.
Curated at the Begole Archaeological Research Center, many of these tools were previously described simply as “rocks”. More recent examinations show clear flake scars, heavy patination and calcium carbonate traces on the surface. This allows the use of newer technologies to gather evidence for the age of these tools. Highly regarded experts in the fields of geomorphology, dating methods and lithic analysis are providing a more authentic inquiry into the age, use and manufacture of these tools, as well as a comparison of form with old world artifacts. With this new knowledge, we hope to work towards confirming decades of Begole’s dedicated search for evidence of an earlier peopling of the Americas.

THE CERUTTI MASTODON SITE: HISTORY OF INVESTIGATIONS AND PRESENT STATUS OF RESEARCH AND THE DEBATE

DEMÉRÉ, Thomas A. and CERUTTI, Richard A., Department of Paleontology, San Diego Natural History Museum, San Diego, California, USA

The Cerutti Mastodon (CM) site was discovered in November 1992 during routine paleontological monitoring of highway construction activities along State Route 54 in coastal San Diego County, California, USA. Excavated over a five-month period by paleontologists from the San Diego Natural History Museum and others, the CM site yielded the partial remains of a single American mastodon (*Mammut americanum*) in association with five large cobbles and a puzzling taphonomic pattern of bone impact features, stone impact and usewear features, unusual bone, tusk, stone distribution patterns, differential bone breakage, and bone, molar, and stone refits. Beginning in 2008, an interdisciplinary team of scientists was assembled to complete the laboratory analysis of the CM site. Published as a Letter in April 2017 in the journal *Nature*, our research proposed that an unknown hominin species was in North America 130,000 years ago breaking mastodon bones using the cobble hammer and anvil method. Although the publication stirred a negative response from many North American archaeologists, others, including scientists from other continents have been more accepting of an archaeological interpretation. We discuss the status of this debate, the ongoing research with the CM bones and stones, and a possible future reopening of the site.

ARROYO DEL VIZCAINO: STRENGTHS AND WEAKNESSES FOR A VERY OLD SITE IN SOUTHERN SOUTH AMERICA

FARIÑA, Richard A., Departamento de Paleontología, Facultad de Ciencias, Iguá 4225, 11400 Montevideo, Uruguay

Found during a severe drought in the summer of 1997 in the bottom of a stream, the Arroyo del Vizcaíno site (AdV), near the town of Sauce, Uruguay, has yielded over 1600 fossil remains (mostly belonging to the giant sloth *Lestodon armatus* but also from other Pleistocene mega-mammals). About 60 of them show marks with features compatible with human agency. Other lines of evidence
are congruent, such as other modifications of the bones, the mortality profile and the anatomical regions represented, among others. Since the dates obtained from radiocarbon and luminiscent analyses cluster about ca. 30 kyr BP, the possibility of human presence at such an old age and so far south as 34° S latitude challenges currently most accepted models of human dispersal in the Americas, AdV joins other proposed pre-LGM sites (Monteverde in Chile, Toca do Boqueirão da Pedra Furada in Brazil, etc.), including the very unexpectedly old site of Cerruti Mastodon in the USA. Here the AdV site is presented, the difficulties for its excavation posed by its geographical circumstances are explained, its strengths and weaknesses as an archaeological site are discussed and its importance as a local and national cultural phenomenon is stated.

WHEN DID PEOPLE FIRST ARRIVE IN AUSTRALIA?

FULLAGAR, Richard, Centre for Archaeological Science, School of Earth and Environmental Sciences, University of Wollongong, Wollongong, New South Wales, Australia

Widely accepted genetic, archaeological and human fossil records suggest that modern humans first colonized Australia from southeast Asia about 50 kyr ago, and America from Siberia about 15 kyr ago. Two archaeological sites have recently challenged this view, suggesting that humans may have got to Australia 65 kyr (Madjedbebe) ago and to America (Cerutti Mastodon) about 130 kyr ago. Clarkson et al. conclude that “settlement of Madjedbebe around 65 ka (conservatively 59.3 ka, calculated as 65.0 ka minus the age uncertainty of 5.7 kyr at 95.4% probability) sets a new minimum age for the human colonization of Australia and the dispersal of modern humans out of Africa and across south Asia.” A brief overview of the Madjedbebe excavations presents the archaeological evidence at this site, what is contested and the prospects for resolving the conflicting views. At Madjedbebe, the stone artefacts and tools are not contested; rather it is their context, proposed archaeological chronology and the stratigraphic integrity that are questioned. The early levels at Madjedbebe include distinctive flaked stone technology, grinding stones, ground pigment with reflective additives and edge-ground stone hatchet heads.

PROVING A FUNCTION: RESIDUES ON BONE-BREAKING STONES AT THE CERUTTI MASTODON SITE

FULLAGAR, Richard, HAYES, Elspeth, and BORDES, Luc, Centre for Archaeological Science, School of Earth and Environmental Sciences, University of Wollongong, Wollongong, New South Wales, Australia

Previous study at the Cerutti Mastodon (CM) site proposed that usewear, impact marks and breakage patterns on five cobbles indicate a likely role as anvils or hammers to break mastodon bones. Here we report (1) experimental wear and residue traces from bone breaking, and (2) analyses of residues on the CM stones. Initial analysis by Birgitta Stephenson, using a modified
Picrosirius Red staining protocol, showed collagen and bone (with an absence of carbonised tissue, phytoliths and starch grains) on extractions from three stones: CM114, CM254 and CM383. The collagen residues were considered equivocal with respect to human agency because of their ubiquity and because they could have been transferred naturally, following deposition, as a result of incidental contact with the bones (and/or other carcass remains). Subsequent study by Bordes, using Raman spectroscopy, identified bone residues (apatite) from extractions that derive from impact locations on CM281 and an absence of bone from an extraction on the lower side of the same stone, where there are no impacts marks. The Raman spectra on CM281 bone extractions match spectra for a sample of mastodon bone from the CM site and also spectra on aged bone from other sites. However, it should be noted that Raman spectra do not permit identification of bone taxa. The Raman spectra are distinct from spectra on geological apatite, which was also identified. Collagen was not detected on the CM281 extractions, using an Orange G staining protocol. However, the presence of bone fragments at impact locations and their absence at another location suggest forceful contact between CM281 and mastodon bone. These results support the argument that CM cobbles not only fractured as a result of hard hammer contact (with stone on stone impact marks) but that they also struck bones (some of which also bear impact marks).

**W. Morlin Childers: The Search for Early Man in the Yuha Desert**

GILBERT, Linda, Colorado Desert District Stout Research Center, Borrego Springs, California, and SEVILLA, Edgar Bernal, Imperial Valley Desert Museum, Ocotillo, California, USA

Among the eroded, dissected, tilted and upthrust remains of ancient lakes and streams lie scattered stone artifacts made by earlier people. Morlin Childers of El Centro, California explored the Yuha Desert in his spare time, discovering primitive stone artifacts on high mesas, eroded alluvial fans and along ancient beaches. At the Calico Conference in 1970, Childers was able to share his Yuha specimens with Louis Leakey. Leakey agreed that the artifacts represented an extremely early culture. Within a few months, Childers located a cairn from which the skeleton of the “Yuha Man” was excavated. On the basis of radiocarbon and thorium-230 dating of the caliche associated with the skeleton and the results of amino acid racemization studies, an age of about 20,000 years BP was assigned. The date was challenged and ultimately revised in 1984 to less than 4,000 years BP. Childers continued his research as curator of paleo-archaeology at the Imperial Valley College Museum where his work focused on investigating the Yuha’s geology and geomorphology for artifact-bearing strata that would reveal the presence of early man. His collection of stone artifacts is housed at the Imperial Valley Desert Museum in Ocotillo, California, USA.

**Changes in the Conceptualization of the Initial Settlement of the Americas**

GRUHN, Ruth, University of Alberta, Alberta, Canada
For many decades, after discovery of fluted projectile points in association with Pleistocene mega-fauna, archaeologists conceived of an early postglacial entry of Clovis big-game hunters via the Bering land bridge and the interior ice-free corridor, with a very rapid movement and settlement of both American continents by ca. 13,000 years ago. After the mid-1970s, enough field evidence has accumulated to destroy this so-called Clovis-first model; but archaeologists have moved the timing of the initial entry only a few thousand years earlier than the Clovis horizon, to only ca. 16,000 cal. BP.

General acceptance of the field evidence for a pre-LGM entry will require continued accumulation of verified archaeological sites dated before the beginning of the LGM; and a reasonable conceptualization of the process of the initial settlement in terms of human population dynamics.

**NO CHIPPED STONE TOOLS: AN EVIDENTARY STANDARD FOR HUMAN ACTIVITY AT LARGE ANIMAL DEATH SITES**

HOLEN, Kathleen, Center for American Paleolithic Research, Hot Springs, South Dakota, USA

Chipped stone tools in close association with well dated animal remains has been held out as the standard of evidence required to demonstrate human activity at archaeological sites, primarily by archaeologists who advance the Late Entry Model of peopling the Americas. The contention that certain bone modifications and other features are evidence of human activity despite the absence of manufactured tools is contested especially when such evidence is offered in support of an Early Entry Model of American population dispersal. This presentation will explore modifications of large prey animal bones and associated evidence of human behavior and show that characteristic bone modifications with supporting contextual evidence, present at both late and early archaeological sites, is sufficient to demonstrate human presence in the absence of manufactured stone tools.

**EXPEDIENT BONE TOOLS: EVIDENCE OF HUMAN PRESENCE AT PROBOSCIDEAN DEATH SITES?**

HOLEN, Kathleen, Center for American Paleolithic Research, Hot Springs, South Dakota, USA

Humans manipulate and utilize objects in ways that demonstrate the capacity to recognize function in form. This universal principle can be applied to the archaeological analyses of bones found at prey animal death assemblages. Bone fragments modified as the result of percussion technology have been shown experimentally to be used as tools. This poster will suggest methods for identifying expedient bone tools at archaeological sites. Examples from multiple archaeological sites show that these types of tools are evidence of human presence.
EARLY HOMININ DISPERSAL INTO NORTH AMERICA DURING LATE MIS6/5E CLIMATE AND ECOLOGICAL EXPLANATIONS OF HOMININ AND FAUNAL MOVEMENTS

HOLEN, Steven R., Center for American Paleolithic Research, Hot Springs, South Dakota, USA, FULLAGAR, Richard, Centre for Archaeological Science, School of Earth and Environmental Sciences, University of Wollongong, Australia, and HOLEN, Kathleen, Center for American Paleolithic Research, Hot Springs, South Dakota, USA

The Cerruti Mastodon Site, a ~130,000-year-old archaeological site in southern California, USA, documents an early movement of hominins into North America. This discovery offers the opportunity to develop climatic and ecological hypotheses concerning how hominins could have arrived in North America this early. Rapid climate warming and attendant floral and faunal changes during late MIS 6 and early MIS 5e resulted in mega-fauna moving far north of their previous ranges. This included the spread of mastodons, camels and sloths from the USA to north above the Arctic Circle in the Yukon and Alaska. It seems only logical that humans would have rapidly increased their range far to the north in Asia in a similar response to climate change. Rapid sea level rises inundated Beringia early in MIS 5e cutting off this land route, indicating that if hominins arrived in North America via the Beringian Land Bridge, they entered before ~130 ka. At the same time, bison spread across the Bering Land Bridge from Siberia, first appearing in the Yukon at ~ 130 ka. Hominin groups adapted to hunting bison may have expanded their range along with this prey animal.

A coastal route of entry for early hominins by watercraft is also a possibility. Early hominins developed watercraft capable of crossing short distances of open ocean by at least ~130 ka as evidenced by the presence of early humans on Crete in the Mediterranean Sea and on the island of Sulawesi in Indonesia. Both islands are separated from continental land by many kilometers of open water and have been islands throughout the later Pleistocene. During rapid climate warming at the onset of late MIS 6/MIS 5e, early hominins using watercraft could have navigated the coastal north Pacific Ocean from Asia to North America via Beringia, provided Beringia was not inundated. There could have been both a land crossing and a coastal watercraft transit because these are not competing hypotheses.

CERUTTI SITE BROKEN MASTODON LIMB BONE EVIDENCE WITHIN A WORLDWIDE PROBOSCIDEAN BONE TECHNOLOGICAL CONTEXT

HOLEN, Steven R., and HOLEN, Kathleen, Center for American Paleolithic Research, Hot Springs, South Dakota, USA

The timing of the first human entry into North America has been controversial for decades. Evidence of human presence in the form of percussion technology on proboscidean limb bones, in the absence of knapped stone tools, has been a major part of this debate. However, the worldwide utilization of proboscidean bone technology has not been fully considered in this debate. Here we discuss early human use of proboscidean bone technology in Africa, Europe and Asia placing the North American record within a worldwide technological context. The history of the debate concerning North American proboscidean sites that have evidence of bone quarrying is discussed.
A partial mammoth skeleton was excavated from the Bow Willow beds in Anza-Borrego Desert State Park®, southeastern California in 2012-2013. The geologic context of the fossil site was originally inferred to be >300 ka with no expectation of an archaeological component. Discovery during excavation of dynamic green-bone fracturing on some skeletal elements implied human interaction. The added discovery of bison remains in nearby stratigraphically equivalent sediments established an upper age <210 ka.

Laboratory preparation and evaluation of the remains and their taphonomy has continued since 2013. Additional archaeological evidence of impact on bone includes cone flakes, bulbs of percussion, as well as bone refits. A cobble from under the in situ skull shows wear consistent with human activity.

Dating the site sediments with IRSL (luminescence) and bone apatite C-14 provided ages of 18 ka and 25 ka respectively. Initial U-series ages range from 80 to 100 ka. Efforts to obtain a definitive absolute date of the deposit continue.

Because of possible interaction of humans with extinct fauna at this site, future studies in this stratigraphic unit will be jointly monitored using State Park Operations Protocols for both paleontology and archaeology. Given the possibility of encountering previously unrecognized evidence of human activity in association with fossil vertebrate remains in early Wisconsinan and Sangamon age deposits in North America, we recommend that other government agencies institute similar resource management protocols.

TEN YEARS OF CHRONOLOGICAL RESEARCH IN THE SERRA DA CAPIVARA ARCHAEOLOGICAL SITES: WHAT LUMINESCENCE DATING BRINGS TO THE KNOWLEDGE OF PLEISTOCENE-HOLOCENE ARCHAEOLOGICAL SEQUENCES

LAHAYE, Christelle and GUÉRIN, Guillaume, IRAMAT-CRP2A, UMR 5060 CNRS & Université Bordeaux Montaigne, Pessac, France, GLUCHY, Maria, Universidade do Rio Grande do Sul, Rio Grande do Sul, Brazil, HATTÉ, Christine and FONTUGNE, Michel, LSCE UMR 8212 CNRS-CEA-UVSQ, Université Paris-Saclay, Gif-sur-Yvette, France, CLEMENTE-CONTE, Ignacio, CSIC-(IMF), Departamento de Arqueología y Antropología grupo AGREST, Barcelona, Spain, SANTOS, Janiana C., Universidade Federal do Vale do São Francisco, São Raimundo Nonato, Brazil, VILLAGRAN, Ximena, Museu de Arqueologia e Etnologia, Universidade de Sao Paulo, Sao Paulo, Brazil, DA COSTA, Amélie., UMR 7041 équipe ArScAn - AnTeT, France, BORGES, Carolina, Universidade Federal do Piauí, Teresina, Brazil, GUIDON, Niede, Fundação Museu do Homem Americano (FUMDHAM), São Raimundo Nonato, Brazil and
Within the last ten years, our French-Brazilian research team has investigated several sites in and around the Serra da Capivara Regional Park, in the Nordeste region of Brazil. Among all sites, eight have been subject to luminescence dating program. Part of them are located in sandstone hills area, and part are sandstone or limestone rockshelters. Some of the results have already been presented: Vale da Pedra Furada, Toca da Tira Peia and Toca da Janela da Barra do Antoniăo-North. We present here the complete sequences of Toca da Tira Peia, Toca da Pena, “point 412”, Toca da Janela da Barra do Antoniăo-North, Toca do Sitio do Meio, Livierac, Vale da Pedra Furada and Boqueirao da Pedra Furada. These results represent 62 luminescence ages (OSL on quartz and IRSL on K-feldspars), obtained from 55 sedimentary samples. Based on OSL and $^{14}$C ages, as well as stratigraphic considerations and cultural similarities among archaeological assemblages, we now propose to establish a chrono-cultural framework for these late-Pleistocene and Holocene occupations at a micro-regional scale.

MAMMOTH MOLAR TOOLS FROM 18,000 YEARS AGO IN TEXAS

LEWIS, C.R., Independent Researcher, Corpus Christi, Texas, USA

The Petronila Creek site in South Texas (41NU246) is an open-air human occupation site dated at 18,000 radiocarbon years before present. The principal site component is a bone bed of primarily small bones, which are the remains of animals that people ate while occupying the site, although Pleistocene mega mammals are also well represented. The occupation was beside a river, and fish, turtles, and alligators were also eaten. Raw material for stone tools is scarce on this coastal plain, and lithic material at the site is limited and undiagnostic. There are some tools made from mammoth bone but the characteristic tool at this site is a kind of pounder/abrader made from fist-sized chunks of mammoth molar. These molar tools are abundant enough, and similar enough, to suggest that they represent an established tool-making tradition. Investigators at other Pleistocene sites should be on the alert for more examples of these tools.

GEOARCHAEOLOGICAL CONTEXT OF MAMMOTH SITES WITH HUMAN ASSOCIATION IN THE REPUBLICAN RIVER BASIN IN SOUTHERN NEBRASKA AND NORTHERN KANSAS, GREAT PLAINS, USA

MAY, David W., Department of Geography, University of Northern Iowa, Cedar Falls, Iowa, USA

Mammoth remains with human association have been recovered from reservoir shorelines and in loess where it overlies Wisconsinan terraces in the Republican and Platte River Valleys in Nebraska and Kansas. The stratigraphic contexts illustrate the difficulty of finding and excavating such sites, and, as such, the challenges of discovery of these pre-Clovis sites. Five such sites have been discovered and excavated in terminal Gilman Canyon Formation (MIS 3) deposits and the basal Late Wisconsinan Peoria Loess (MIS 2) at Lovewell Reservoir in extreme northern Kansas. Sites have also
been found within Peoria Loess at Harry Strunk Lake (La Sena and Hamburger Sites), and along the Platte River below a loess-mantled terrace (Jensen Site). The stratigraphic contexts of these sites range from the surface of Gilman Canyon Formation (both alluvial and eolian facies) up through Peoria Loess. These sites have yielded ages between 20 and 14 radiocarbon kyr BP. As Peoria Loess is thick and the lowest deposits are only exposed by construction activities or persistent shoreline erosion around reservoirs in the Great Plains, the chances for discovery of these sites is very limited.

**DATING BONE BEYOND THE RADIOCARBON BARRIER USING URANIUM-SERIES DISEQUILIBRIUM**

PACES, James B., Geosciences and Environmental Change Science Center, U.S. Geological Survey, Denver, Colorado, USA

Radiocarbon ($^{14}$C) dating, a cornerstone method for late Pleistocene sites, is limited to materials younger than ~45,000 years that retain original organic constituents. Mineralized bone older than that, or lacking collagen, may be datable using uranium-series disequilibrium methods ($^{230}$Th/U), but not without careful evaluation of U-Th systematics. Living bone tissue contains U concentrations <0.05 ppm; however, mineralized bone can have 100s of ppm U introduced after burial. Understanding the history of diagenetic U-uptake is a key challenge for accurately estimating ages. U is readily soluble in oxidizing groundwater. Buried bones exposed to migrating solutions lose collagen and adsorb uranyl ions. U-uptake depends on water saturation and migration histories, diffusive characteristics of the bone, and environmental uranium concentrations. Candidate bones can be evaluated by analyzing profiles of U concentration and $^{230}$Th/U ages across cortical sections. Simple uptake yields $\Upsilon$-shaped profiles that can provide robust, defensible ages. Profiles reflecting complex adsorption and leaching histories are not good candidates. Models of diffusion-adsorption-decay provide a theoretical and numerical means of addressing continuous U-uptake. Age validity requires that multiple specimens from a single horizon have narrow ranges of $^{230}$Th/U age and initial $^{234}$U/$^{238}$U. Robust $^{230}$Th/U dating will play an increasingly critical role as more ancient archaeological sites are investigated.

**ROBERT BEGOLE’S EARLY MAN SITES IN THE ANZA-BORREGO DESERT STATE PARK: NEW RESEARCH ON LITHICS IN DESERT PAVEMENTS IN HYPERARID ENVIRONMENTS**

RUNNELS, Curtis, MURRAY, Priscilla, and HOLCOMB, Justin, Boston University, USA, WEGMAN, Karl, North Carolina State University, USA, EPPES, Martha C., University of North Carolina-Charlotte, USA, SHARP, Warren D., Berkeley Geochronology Center, Berkeley, California, USA

Robert Begole identified 17 undated surface sites in the Anza-Borrego Desert State Park® where lithic artifacts are associated with desert pavements. The lithics include large bifacial artifacts and Levallois-like prepared core technologies, and the artifacts are weathered or coated with desert varnish. Begole estimated their age to be ca. 20-30 kyr. The lithics occur on or in desert pavements,
which have long been assumed to be erosional lags formed by the removal of fine sediments through deflationary processes (i.e. wind or water), which concentrated heavier stones on the denuded surface. Lag deposits are poor geologic contexts for estimating the age(s) of associated artifacts, but geomorphologists now understand that desert pavements are actively maintained at the surface through depositional and pedogenic modification via windblown dust. They are created at the surface of geomorphic landforms and remain at the surface, providing a potentially datable long-term record of human interaction with geologic, hydrologic, and climatic processes within desert landscapes. If limiting dates can be obtained through OSL, uranium-series, and perhaps cosmogenic dating for underlying Quaternary deposits such as fluvial terraces—and the inflationary desert soils overlying them—it may be possible to place Begole’s sites in a chronostratigraphic context.

DETERMINING AGES OF HUMAN OCCUPATION VIA $^{230}$Th/U DATING OF LANDFORMS, ARTIFACTS, AND RATITE EGGSHELLS

SHARP, Warren D., Berkeley Geochronology Center, Berkeley, California, USA

Soils in the Anza-Borrego Desert have likely accumulated pedogenic carbonate throughout all or most of the Late Pleistocene and Holocene. In gravelly alluvium, such carbonate forms coatings on the undersides of clasts during the initial stages of accumulation. $^{230}$Th/U dating can provide precise ages for milligram quantities of such clast-coatings, thereby providing a firm younger age limit for deposition of host alluvium or fabrication of a coated artifact. Indeed, $^{230}$Th/U dating of Holocene alluvium and comparisons with $^{10}$Be cosmogenic radionuclide ages in the Anza-Borrego Desert and elsewhere indicate that datable carbonate may form rapidly; i.e., in $\sim$1-3 ka. Thus, $^{230}$Th/U ages of clast-coatings may closely approach the ages of interest. Clast-coatings formed during calcic soil development in gravelly alluvium are commonly dense, laminated, and visibly free of detritus making them highly suitable for $^{230}$Th/U dating and coatings as thin as 0.1 mm can be dated. The main assumption of $^{230}$Th/U dating, that carbonate has remained closed to U and Th since formation, may be tested on a case-by-case basis to assess the reliability of ages. Optimal $^{230}$Th/U samples come from the zone of maximum carbonate accumulation in a given soil, which typically occurs at depths of $\sim$0.2 to 2.0 m. Thus, $^{230}$Th/U dating is readily applicable to buried artifacts; its application to artifacts residing at or near the surface may prove more challenging.

PAMPAS PRE-LAST GLACIAL MAXIMUM CULTURAL EVIDENCE AND CLIMATE DEMOGRAPHIC OIS 3/2 EXPANSION STAGES, BUENOS AIRES, ARGENTINA

TOLEDO, Marcelo Javier, Universidad de Buenos Aires, Buenos Aires, Argentina

Occupation of the Americas was shaped by expansion-diffusion stages modulated by global climatic cycles inducing changes in the distribution and productivity and of biomes. For the Chaco-Pampean area, we hypothesize that the peopling was shaped by the following succession of events:
1. An exploration-colonization event had occurred between 50 and 30 kyr BP (Expansion I). The climate improvement of the OIS 3 interstadial triggered this process of demographic expansion.

2. The post-LGM climate improvement induced the re-colonization (Expansion II), uninterrupted exploration, occupation, and displacement of new groups, under strongly improving environmental conditions. Benign Holocene climate conditions lead to occupation of all ecological niches, with a flowering of diverse adaptations and complex networking.

These main climatic-demographic stages modulated the diffusion of different biological-cultural components. The pre-LGM expansion would be characterized by generalized technological elements with roots in the terminal Eurasian Middle Paleolithic; and the post-LGM expansion by an increasing participation of later components carrying Upper Paleolithic technologies. Analysis of museum collections, prospection trenches, and taphonomic analysis confirm the presence of artifacts in upper Pleistocene deposits; leading to consideration of a Pampean peopling from, at least, 35-45 kyr BP. Cultural evidences consist of abundant modified megafaunal bones and scarce lithics embedded in late Pleistocene channel and alluvial plain settings. These deposits are sealed by a “black mat,” indicating an abrupt climatic change with an increase of humidity, triggering extinctions, starting sometime between 12.5 and 13 kyr BP. Based on facies, sequence-stratigraphic analysis and isotopic dating, we conclude that the outcropping fluvial layers containing cultural material spans from OIS 3 to OIS 2, with sequence boundaries reflecting regional glacioeustatic downcutting events.

**STAYIN’ IN TEXAS: TECHNOLOGICAL AND SUBSISTENCE ACTIVITIES EVIDENCED IN THE GAULT ASSEMBLAGE**

VELCHOFF, Nancy, WILLIAMS, Thomas J., and COLLINS, Michael B., Gault School of Archaeological Research and Texas State University, San Marcos, Texas, USA

Excavations in Area 15 of the Gault Site, Central Texas, USA, have recovered a substantial assemblage of stone tools from the lowest deposits (Strata 1 and 2). These early cultural materials, referred to as the Gault Assemblage, are comprised of over 150,000 artifacts of mostly flakes and debitage. So far, we recognize over 200+ tools including a previously unknown, early projectile point technology unrelated to Clovis. Optically-Stimulated Luminescence (OSL) dates have been obtained from the entire stratigraphic sequence in excavation area 15 of the Gault Site and demonstrate a near-complete regional prehistoric sequence in excellent agreement with known dated components from other sites. These data confirm the presence of an Upper Palaeolithic occupation of Central Texas by around 16,000 years ago.
The Center for American Paleolithic Research (CAPR) is a nonprofit 501(c)(3) archaeological research center dedicated to discovering evidence of the earliest humans in the Americas by systematically investigating geological deposits to find archaeological sites that are more than 15,000 years old. Our field research is not limited to searching for stone tools. Instead, we look for the full range of behavioral and technological indicators of human presence. CAPR maintains an active experimental archaeology program focusing on bone modification. CAPR archaeologists reevaluate museum collections applying new analytic techniques to look for evidence of human presence that may have been previously overlooked. CAPR provides financial, logistical, and informational support to professional and student archaeologists who share our research goals. We work closely with avocational archaeologists and the general public to pursue these research goals. We think citizen scientists are important to the discovery, excavation, and publication of new information. CAPR's outreach and educational program disseminates the results of our research through publications and presentations to avocational and professional audiences, community groups, college classes, and school groups. Presentations can be scheduled by contacting CAPR at 720-217-6758 or by email at capr@goldenwest.net. CAPR is completely funded by donations from private citizens and foundations.

The CDAS mission is to assist Park staff with the documentation, preservation, and protection of the district’s Prehistoric and historic cultural resources. Volunteers are trained by State Park staff to work with professional Archaeologists as Archaeological Site Stewards or Archaeological Technicians. To learn more go to www.anzaborregoarchaeo.org.

The Anza-Borrego Desert State Park® Paleontology Society, a State Park Volunteer group under the auspices of the Colorado Desert District (CDD), Anza-Borrego Desert State Park® (ABDSP), is an organization where volunteer researchers develop the knowledge and skills needed to build, support, and maintain an internationally significant paleontology program. Volunteers are trained through an in-house, hands-on Certification program covering all aspects of paleontology, ensuring that members can participate actively and responsibly in discovering, recording, collecting, protecting, preserving, and interpreting the fossil resources from the ancient past in this unique environment. Members adopt and adapt new technologies, such as photogrammetry and UAS aerial photography, to enhance the data collected for sites and specimens. Formed in 1993 and under the direction of the Park’s District Paleontologist, the Society is an extension of volunteer work dating back to 1974. Its membership of 50+ amateur paleontologists contribute over 10,000+ hours per year to (1) survey the fossiliferous beds within the 650,000 acre Park, (2) prepare the
covered specimens, and (3) curate them. Membership has been very diverse, including elementary-school students and nonagenarians, retired generalists, the self-taught jack-of-all-trades and the academic or professional non-paleontology specialist. Learn more at www.anzaborregopaleo.org.

California State Park’s mission is to provide for the health, inspiration and education of the people of California by helping to preserve the state's extraordinary biological diversity, protecting its most valued natural and cultural resources, and creating opportunities for high-quality outdoor recreation.

Anza-Borrego Foundation (ABF) is the official nonprofit partner of Anza-Borrego Desert State Park. We have been working since 1967 to provide financial support for park programs, acquire land for conservation in and around the Park, educate the public about the Park’s resources and support research relevant to our region. Our small, dedicated staff — together with the board and Park programs and projects, ABF sells an extensive selection of guidebooks, clothing and other products in Anza-Borrego Desert State Park’s Visitor Center and State Park Store. If you love the Park, join Anza-Borrego Foundation or make a donation today!

Thank you to all of our volunteers! This event could not have happened without their support!

LLouise Jee  Dennis Connors  Eugenie Newton
Joanne Odenthal  Dan Jellis  Astrid Webb
Linda Gilbert  Velda Welch  Sandy Thomsen
Toni DeLorenzo  Karen DeLorenzo  Ann Nourse
Virginia Perrine  Mary Lou White  Lance Deibler
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